PROFESSIONAL MEDICAL PRODUCTS

MULTIPARAMETER SIMULATOR

User manual

ATTENTION: *The operators must carefully read and completely understand the present manual before using the product.*

Gima 54602

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User Notice

The manual is written for the current product. In case of modifications and software upgrades, the information contained in this document is subject to change without notice.

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Note: The user manual is applicable for two-channel IBP (IBP1 and IBP2) and four-channel IBP (IBP1, IBP2, IBP3 and IBP4). Please refer to relative contents according to your product.

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Chapter 1 Introduction

The Multiparameter Simulator is a kind of small, lightweight portable device. It can accurately simulate the 12-lead ECG, respiration, temperature and IBP channels-1, 2, 3 and 4. ECG includes about 30 kinds of arrhythmia (including atrial arrhythmia, ventricular arrhythmia, conduction block, etc.), normal sinus rhythm (which can be adjusted for a wide range of heart rate and amplitude adjustments), performance testing wave (sine wave, triangle wave, square wave, etc.), pacemaker (asynchronous, non capture, non function, etc.), and ST segment. The simulator generates a variety of respiratory rates, 4 kinds of impedance and apnea(0R/MIN) of 12, 22 and 32 seconds. The simulator can simulate four kinds of temperature and four-channel IBP (static-pressure levels and dynamic IBP waveforms).

In addition to built-in functions, The simulator can also use the external ECG data.

Slide the touch-screen to switch between ECG waveform and respiratory waveform. So you can observe and compare the waveforms conveniently.

The simulator has the function list. So you do not need to remember the functions. And also you can select a function by double-clicking one item of the list.

In addition, when powering on the system, the simulator will sound alarm. And also it can calibrate the screen.

The display can show in English,Portuguese,etc, so you can operate it conveniently.

Chapter 2 Safety Considerations

- **Warning!:** Please read the manual carefully before using the simulator, and operate according to this manual strictly.
- As for abnormality, human injury and equipment damages caused by wrong operation, which violates the rules in manual, our company assumes no responsibility for this kind of danger and will not maintain free for this kind of malfunction.
- **Warning!** Internal Voltage. Always turn off the simulator and unplug the adapter before replacing the batteries or cleaning the outer surface.
- Check the products. After power-on and connection, if the new simulator has been damaged or the new simulator system fails to start or to operate successfully, please contact our company immediately.
- **Warning!** Liquids. Avoid spilling liquids on the instrument. fluid seepage into internal components creates corrosion and a potential shock hazard. Do not operate the instrument if internal components are exposed to fluid.
- Do not open the simulator, there are not any parts inside which you can replace by yourself.
- Do not operate it with the defibrillation instrument.
- The simulator should be adjusted annually.
- Authorized service personnel should service the simulator. Only qualified technical personnel should perform troubleshooting and service procedures.
- **Caution: Environmental Conditions.** Do not expose the instrument to temperature extremes. Ambient operating temperature should remain between 15℃ and 35℃. Storage temperature should remain between 0℃ and 50℃. System performance may be adversely affected if the temperature fluctuates above or below these ranges, or if ambient humidity exceeds the maximum of 80%.
- **Caution: Do NOT Immerse.** Clean only with a damp, lint-free cloth using a mild detergent and wipe down gently.

- **Caution: Inspection.** Before each use, inspect the lead ends for wear, cracks, or breaks.
- When the device is subjected to the interference from lightning surge, it is advised to disconnect the power socket of the adapter or the DC socket of the device.
- When connecting with an adapter, it is advised to connect DC socket of the device, then the mains socket.
- When connecting the Simulator with other equipment, it is advised that the equipment should meet the requirements in IEC 60601-1 or relevant standards.
- Effect from shock and conduction electromagnetic waves:
  High-frequency noise from other equipment can enter the device through the AC socket. Please identify the source of noise, if possible, stop using relevant equipment. If the equipment can not be stopped, it is recommended to take measures (such as use the noise-suppression equipment) to reduce the impact.
- Effect from static electricity: The operation to the device may be affected by the static electricity in a dry environment (indoor), especially in winter. It is recommended to humidify the indoor air before using it.
- Effect from thunder and lightning:
  If there is thunder and lightning nearby, it may cause a voltage surge on the device. If you are worried about danger, unplug the power plug and use the internal power supply.

Chapter 3 Abbreviation and Symbols

Abbreviation and Symbols	Meaning
℃	Degree Celsius
°F	Fahrenheit
DC	Direct current
uV	Microvolt
mV	Millivolt
V	Volt
BPM	Beats per minute
ms	Millisecond
mmHg	Millimeter mercury
Ω	Ohm
R/MIN	Breaths per minute
Hz	Hertz
m	Milli-(10^{3-})
RL	Right leg (lead)
LL	Left leg (lead)
RA	Right arm (lead)
LA	Left arm (lead)
cm	Centimeter

Meaning of symbols：

SN	Serial number
	Class II equipment
	Manufacturer
	Date of manufacture
REF	Product code
LOT	Batch code
	Refer to instruction manual/booklet.
	WEEE disposal
CE	CE Certification
EU REP	European Representative
	Caution: read instructions (warnings) carefully
	Imported by

Chapter 4 Specifications

4.1 Conventional

Keyboard: 10 numeric keys and 7 function keys

Display: 3.5-inch color TFT touch-screen

ECG output connector: Output to 10 ECG Sockets, color-coded to AHA and IEC Standards

Power: Built-in 3.7V rechargeable lithium-polymer battery and/or equivalent 9V/1000mA DC power supply

Environment: Indoor use

Operating temperature: 15 to 35℃

Storage temperature: 0 to 50℃

Maximum operation humidity: 1℃ below 80%, and 40℃, the linear reduction to 50%

Maximum storage humidity: 95%

Altitude: Maximum 2000 m

Volume

Length: 18.86 cm

Width: 12.5 cm

Thickness: 4.1 cm

4.2 Accessories

Item	Quantity
Standard components:	
User Manual (print version)	1
9V adapter	1
Optional Accessories:	
Temperature Cable	1
IBP Cable	1
Case Convertion Software and Operating Introduction	1
For more information, please contact your local dealer.	

4.3 ECG

12-lead ECG, with 9 independent outputs referenced to right leg (RL).

The default ECG Rate: 80 BPM

ECG Rate: 0, 15, 20, 25, 30, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300,320 340 and 350 BPM

maximum permissible error: ± (1% of reading + 1 bpm)

The default amplitude: 1 mV

Amplitude: 0.5mV, 1.0mV, 1.5mV and 2.0 mV

The accuracy of Amplitude: ±2% (Lead II)

ECG artifacts

ECG artifacts: 50Hz and 60 Hz, Muscle,Baseline drift and Breathing

ST Segment

The elevation of the ST segment: -0.8 mV to +0.8 mV, the step is 0.1 mV.

Pacemaker

Asynchronous

Non Capture

Non Function

Demand Occ Sinus

Demand Freq Sinus

A/V Sequential

Pacemaker-spike Amplitude (0mV,2mV, 4mV, 6mV, 8mV and 10 mV)

Pacemaker-spike Width (0.1ms, 0.5ms, 1.0ms, 1.5ms and 2.0 ms)

4.4 Arrhythmia

ATRIAL FIB:COARSE	ATRIAL FIB:FINE
ATRIAL FLUTTER	SINUS ARRHYTHMIA
MISSED BEAT	ATRIAL TACHYCARDIA
NODAL RHYTHM	SUPRAVENT TACHY
PVCs 6/MIN	ATRIAL PAC
PVCs 12/MIN	NODAL PNC

PVCs 24/MIN	PVC1 LV FOCUS
PAIRED PVCs	PVC1 E LV FOCUS
MULTIFOCAL PVC	R ON T LV FOCUS
FREQ MULTIFOCAL	PVC2 RV FOCUS
RUN 5 PVCs	PVC2 E RV FOCUS
RUN 11 PVCs	R ON T RV FOCUS
BIGEMINY	VENT FIB:COARSE
TRIGEMINY	VENT FIB:FINE
VENT TACHYCARDIA	ASYSTOLE
1ST DEGREE HEART BLOCK	R BNDL BRANCH BLOCK
2ND DEGREE HEART BLOCK	L BNDL BRANCH BLOCK
3RD DEGREE HEART BLOCK	

4.5 Performance Testing Wave

Square: 0.125Hz,2.0 Hz and 2.5Hz

Pulse: 30 BPM and 60 BPM, the width of pulse wave is 60ms

Sine: 0.1Hz, 0.5Hz, 0.67Hz, 1Hz, 2Hz, 5Hz, 8Hz, 10Hz, 25Hz, 40Hz, 50Hz, 60Hz and 100 Hz

Triangle: 2.0Hz and 2.5 Hz

4.6 ANSI/AAMI EC13:2002

ECG Rate: 0, 15, 20, 25, 30, 40, 60, 80, 100, 120, 140, 160, 180,200,220, 240, 250, 260, 280, 300, 320, 340 and 350 BPM

QRS-Wave Height: 0mV, 0.10mV, 0.15mV, 0.5mV, 1mV, 2mV, 3mV, 4mV, 5mV

QRS-Wave Width: 10ms 18ms, 19ms, 20ms, 21ms, 22ms, 23ms, 24ms, 25ms, 26ms, 27ms, 28ms, 29ms, 30ms, 40ms, 50ms, 60ms, 70ms, 80ms, 90ms, 100ms, 110ms, 120 ms, 130ms, 140ms, 150ms, 160ms, 180ms, 200ms and 250ms

T-Wave Height: 0mV, 0.2mV, 0.4mV, 0.6mV, 0.8mV, 1.0mV, 1.2mV, 1.4mV, 1.6mV, 1.8mV, 2.0mV

Standard adult ECG

ECG RATE: 80 BPM

QRS-Wave Width: 100 ms

QRS-Wave Height: 1.0 mV

T-Wave Width: 180 ms

T-Wave Height: 0.4 mV

Q_T: 350 ms

Standard pediatric ECG

ECG RATE: 100 BPM

QRS-Wave Width:	60 ms
QRS-Wave Height:	1.0 mV
T-Wave Width:	130 ms
T-Wave Height:	0.4 mV
Q_T:	260 ms

4.7 External ECG Data (optional)

If using an external ECG case, you need to use the software provided by our company to convert the external ECG case to the case which the simulator can use.

Note: Before converting the data of the case, you need to know the storage format, sampling frequency, sampling precision, data type, baseline location, calibration and lead sign.

4.8 IBP

IBP Zeroing

IBP 1:	0 mmHg
IBP 2:	0 mmHg
IBP 3:	0 mmHg
IBP 4:	0 mmHg

Static-Pressure Levels

IBP 1:	-100, 0, 80, 160, 240, 320 and 400 mmHg
IBP 2:	-100, 0, 50, 100, 150, 200 and 250 mmHg
IBP 3:	-100, 0, 20, 40, 60, 80 and 100 mmHg
IBP 4:	P4 tracks the static pressure levels of P3

Dynamic IBP waveforms

Artery 120/80:	Channel 1, 2 and 3
Arteria radialis 120/80:	Channel 1, 2 and 3
Left Ventricle 120/00:	Channel 1, 2 and 3
Right Ventricle 25/00:	Channel 1, 2 and 3
Pulmonary Artery 25/10:	Channel 2 and 3
Left Atrium 14/4:	Channel 2 and 3
CVP 15/10:	Channel 2 and 3
Pulmonary Wedge 10/2	Channel 2 and 3
Channel 4:	
Auto Swan-Ganz (every 15 seconds):	RA(CVP), RV, PA, PAW (Pulmonary Wedge)
Man Swan-Ganz:	press ENTER key to change every time
The Accuracy Of IBP:	± (1% of reading + 1 mmHg)

4.9 Respiration

Impedance:	0.2Ω, 0.5Ω, 1.0Ω and 3.0 Ω
The Accuracy of Impedance:	±3%
Baseline impedance:	500Ω,1000Ω,1500Ω and 2000Ω
Lead selection:	LL
Respiration Rate:	0(Apnea), 15, 20, 30, 40, 60, 80, 100, 120 and 150 R/MIN
The Accuracy of Respiration Rate:	±1R/MIN

Apnea: 12 s, 22 s, 32 s

4.10 Temperature

0℃ (32°F),24 ℃ (75°F),37℃(98.6°F),40℃ (104 °F)

Accuracy: ±0.2℃

Chapter 5 Project Name Description

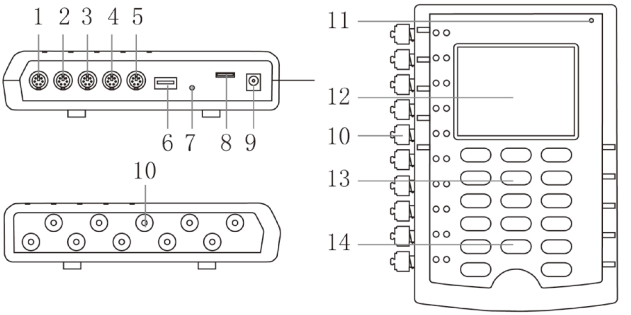


Fig.1 Appearance

Project	Name	Description	
1	IBP1 port	Used to connect IBP1 cable plug. (Refer to "IBP Line Orders")	
2	IBP2 port	Used to connect IBP2 cable plug. (Refer to "IBP Line Orders")	
3	IBP3 port	Used to connect IBP3 cable plug. (Refer to "IBP Line Orders")	
4	IBP4 port	Used to connect IBP4 cable plug. (Refer to "IBP Line Orders")	
5	TEMP port	The port is temperature port at present. **Note:** if you use this port, plugged the body temperature cables before turned on the simulator.	
6	USB port	Reserved port	
7	Reset port	Switch the simulator.	
8	TF port	Plug SD card. **Note:** If use the SD card, you need to put the SD card into the simulator before turning it on.	
9	Equivalent power jack	According to the instructions of our company's power supply.	
10	10-lead jacks	Output to 10 Universal ECG Jacks, color-coded to AHA and IEC Standards.	
		Label	Meaning
		RA or R	Right arm
		LA or L	Left arm
		RL or N	Right leg(reference or grounded)
		LL or F	Left leg
		V1, V2, V3, V4, V5 and V6	V Leads (U.S. and Canada), also referred to as pericardial, precordial or unipolar chest leads.
		C1, C2, C3, C4, C5	Chest leads (International)

		and C6
11	The indicator light of charging	Charge indicator light is red : AC power supply / charging. Green : full electricity. Red and flashing: battery low.
12	Display	The display shows the selected code, the meanings of the code, the waveforms, the list of the functions, System Setting and so on.
13	Keys	There are two kinds of keys: the numeric keys and function keys.
	0	View the current settings.
	1	Normal sinus rhythm, 80BPM, 1mV.
	2	Set the ECG Rate: 15, 20, 25, 30, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340 and 350 BPM.
	3	Set amplitude: 0.5, 1.0, 1.5 and 2.0 mV.
	4	Set the respiratory Rate: 0 (Apnea), 15, 20, 30, 40, 60, 80,100, 120 and 150 R/MIN.
	5	Set the baseline impedance : 500, 1000, 1500 and 2000Ω.
	6	Set the respiratory impedance : 0.2, 0.5, 1.0 and 3.0 Ω.
	7	Channel 1, 2,3 and 4 will be reset to 0.
	8	Set all the channels as IBP waveform.
	9	Set all the channels as static-pressure level.
14	Control keys	
	Up and down keys	When select a key which can adjust a setting, you can click the up and down keys to adjust it.
	Left and right keys	Switch the pages and browse the codes.
	Enter	Determine the choice.
	CLEAR	Cancel the current selection, select the code again.
	On/Off	Long press the key to turn on or turn off the simulator.

Chapter 6 IBP Line Orders

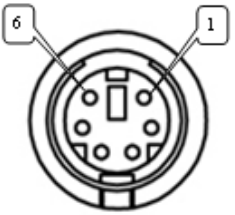


Fig.2 IBP line orders

Pin	Pin Meaning
2	IBP+
3	VCC
5	IBP-
6	GND

Temperature Line Orders

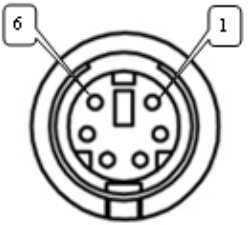


Fig.3 Temperature line orders

Pin	Pin Meaning
2	TEMP1
6	TEMP2

Chapter 7 Power to The Multiparameter Simulator

The simulator has a built-in 3.7 V lithium battery. When the battery is too low, it will show a red indicator light on the top right and flash alarm. Then please use 9V adapter provided by our company to charge the simulator. At the same time, the simulator can be operated normally.

Note:

- Do not replace the built-in battery by yourself.
- If you do not use the simulator for a long time, please disconnect the equivalent power connection. And charge once every two months.

Chapter 8 Page Introduction

1. Key

This page shows the detailed information of the current selected function, numeric keys, the left and right keys, the up and down keys, the clear key and enter key. You can enter the code to select the function. Shown in Fig.4:



Fig.4

2. Wave

This page shows the current selected waveform which can display with the collection device synchronously, so you can compare with the sampling waveform conveniently. Shown in Fig.5:

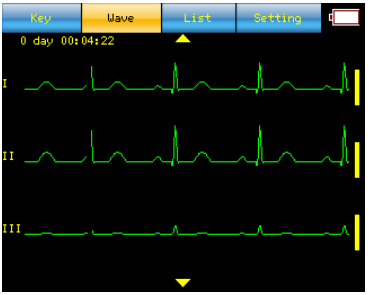


Fig.5

3. List

This page displays some information, including the codes and its meaning. Shown in Fig.6:



Fig.6

4. Setting

Language: English,Portuguese,etc.

Data Source: Built-in and SD Card.

Display Timeout: Off, 10 Sec, 30 Sec, 1 Min and 2 Min.

The Others: Lightness, Touch Calibrate, Version and Help. Shown in Fig.7:

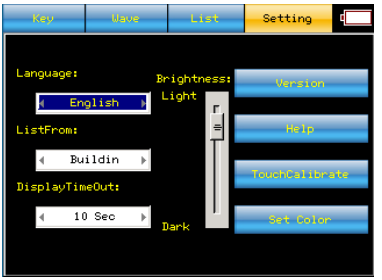


Fig.7

Chapter 9 Operation

Please connect the simulator to the tested device. There are some operation examples as follows:

1. Turn on the power, it will show the page as Fig.4.

When you right-click every time, the preset code increases 1. And when you left-click every time, the preset code decreases 1. For example: After right-clicking, the display will show the first preset code. When the preset code is selected, before pressing **ENTER**, you can click the left and right keys to browse the preset codes.

2. Keyed the code.

Method 1: For example, to simulate **0**℃ **(32°F)** (code **189**), click the number keys **1** + **8** + **9**, then press **ENTER**. Before pressing **ENTER**, you can click the left and right keys to browse the preset codes. Press **CLEAR** (Clear), you can input the code again.

Method 2: For example, to simulate ATRIAL FIB: COARSE (code **12**), in the "List" page, double-click the item (code **12**), then the simulator is simulating ATRIAL FIB:COARSE.

3. Click the up and down keys, you can adjust some settings.

For example, if you want to adjust heart rate, press **2**, then press **ENTER**, the display will show the current heart rate. Click the up key to increase heart rate, and click the down key to decrease heart rate.

4. Switch the pages.

Click the touch-screen buttons, such as "**Key**", "**Wave**", "**List**" and "**Setting**", or click the left and right keys on the keyboard to switch the pages.

5. View the waveform.

Select the "**Wave**" page. ECG is 12 leads, but the display of the simulator only shows three leads waveforms. If you want to view the others, please click the up and down arrows on the touch-screen or slide the touch-screen up and down. Respiration waveform will display in the end of all ECG waveforms.

6. Use external data.

For example: before booting, please place the SD card which has cases into the simulator. After booting, select the "**Setting**" page, then select "SD Card" from "**ListFrom**". Select the "**List**" page, the list will show the information of the cases. And then you can double-click one item of the list to select a case.

Note 1: When you switch the pages by clicking the key on the keyboard, and if the current page is the "**Wave**", please select **CLEAR** firstly, and then you can click the left and right keys to switch the pages.

Note 2: In the "**Setting**" page, when you operate the simulator by clicking the key on the keyboard, firstly click the up and down keys to switch the items. Secondly if you want to select an item, click **ENTER** on the item. Thirdly if you want to set the item, click the up and down keys. Finally click **ENTER** on the item to exit.

Note 3: At any time, press 0, and then click **ENTER** continuously, you can view the current settings of the parameters which include ECG, respiration, IBP and temperature. For example, select 0, the display shows "**0 = VIEW SETTINGS**", then press **ENTER**, the setting of ECG is shown as "ECG Rate = --- BPM, AMP= --- mV, QRS wave = ---". Fig.8 shows the current setting of ECG.



Fig.8

Current settings:

Display	Explanation
ECG	
AMP	ECG amplitude (unit: mV)
QRS	Adult
ECG RATE	Heart Rate (unit: BPM)
Respiratory	
RESP RATE	Respiratory Rate (unit: R/MIN)
RESP DELTA	Impedance Variables (unit: Ω)
BASELINE	Respiratory Baseline (unit: Ω)
IBP	
P1	IBP Channel 1 (unit: mmHg)
P2	IBP Channel 2 (unit: mmHg)
P3	IBP Channel 3 (unit: mmHg)
P4	IBP Channel 4 (unit: mmHg)
SENS	Sensor Sensitivity (unit: uV / V / mmHg)
Temperature	
TEMP	Temperature (unit: ℃ (°F))

Chapter 10 Function

10.1 ECG / Arrhythmia

This section introduces simulation steps according to the functions. If you are not familiar with the basic operation of the simulator, please read the "Operation" section. The simulator can simulate many different types of arrhythmia, from nodal PNC to the asystole. In addition, it can also simulate a variety of performance testing waves, and be installed the 12-lead configuration, allowing each lead cable which refers to the right leg (RL) to output respectively.

10.1.1 Normal Sinus Rhythm

Select ''**1 = NORMAL SINUS RHYTHM**", the simulator will simulate normal sinus rhythm. The heart rate is 80BPM and the amplitude is 1mV.

10.1.2 ECG Rate

The simulator can simulate 22 kinds of heart rate. First select "**2 = ECG Rate**", press **ENTER**, and then click the up and down keys to adjust the heart rate. It is adjustable to 15, 20, 25, 30, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340 and 350 BPM.

Note: When you select "**1 = NORMAL SINUS RHYTHM**", the heart rate will become 80 BPM.

10.1.3 Amplitude

The simulator can simulate over a range of amplitudes (lead II) .The accuracy is ± 2%. The amplitude setting applies to all the ECG waveforms except performance testing waves which have their own amplitude settings. You can select "**3 = ECG AMPLITUDE**", press **ENTER**, then use the up and down keys to adjust the amplitude. The amplitude is adjustable to 0.5, 1.0, 1.5 and 2.0 mV. The Setting is available before changing the amplitude or powering off the simulator.

Note: When you select "**1 = NORMAL SINUS RHYTHM**", the amplitude will become 1mV.

10.1.4 Arrhythmia: Artery

Code	Meaning
12	ATRIAL FIB:COARSE
13	ATRIAL FIB:FINE
14	ATRIAL FLUTTER
15	SINUS ARRHYTHMIA
16	MISSED BEAT
17	ATRIAL TACHYCARDIA
18	NODAL RHYTHM
19	SUPRAVENT TACHY

10.1.5 Arrhythmia: Atrial

Code	Meaning
21	PVCs 6/MIN
22	PVCs 12/MIN
23	PVCs 24/MIN
24	FREQ MULTIFOCAL
25	BIGEMINY
26	TRIGEMINY
27	PAIRED PVCs
28	RUN 5 PVCs

29	RUN 11 PVCs
30	VENT TACHYCARDIA
31	VENT FIB:COARSE
32	VENT FIB:FINE
33	ASYSTOLE

10.1.6 Arrhythmia: Premature Beat

Code	Meaning
35	ATRIAL PAC
36	NODAL PNC
37	PVC1 LV FOCUS
38	PVC1 E LV FOCUS
39	R ON T LV FOCUS
40	PVC2 RV FOCUS
41	PVC2 E RV FOCUS
42	R ON T RV FOCUS
43	MULTIFOCAL PVC

10.1.7 Arrhythmia: Conduction Defects

Code	Meaning
46	1ST DEGREE HEART BLOCK
47	2ND DEGREE HEART BLOCK
48	3RD DEGREE HEART BLOCK
49	R BNDL BRANCH BLOCK
50	L BNDL BRANCH BLOCK

10.1.8 ECG Artifact

The simulator simulates a number of different ECG artifacts that can affect the accuracy of ECG. Select the following code to simulate ECG artifacts, which can be added to many ECG waves, including line-frequency artifacts of 60 Hz (U.S. lines) and 50 Hz (European lines), as well as artifacts for muscle, baseline, and respiration. When you select another ECG or arrhythmia, the ECG-artifacts are eliminated.

Code	Meaning
105	50HZ ARTIFACT
106	60HZ ARTIFACT
107	MUSCLE ARTIFACT
108	BASELINE ARTIFACT
109	RESPIRATION ARTIFACT

10.1.9 Pacemaker

The simulator can simulate six pacing signals. You can select the following code, press **ENTER**, and then these pacing signals are generated.

Code	Meaning
110	ASYNCHRONOUS
111	DEMAND FREQ SINUS
112	DEMAND OCC SINUS

113	A/V SEQUENTIAL
114	NON CAPTURE
115	NON FUNCTION

10.1.10 Pacemaker-Spike Amplitude, Lead II

After selecting any pacing signals, you can adjust the pacemaker-spike amplitude of the lead II. It is adjustable to 2, 4, 6, 8 and 10 mV. Select "**116 = PACE AMP LEAD II (Lead II)**", press **ENTER**, and then click the up and down keys to adjust it.

10.1.11 Pacemaker-Spike Width

After selecting any pacing signals, you can adjust the pacemaker-spike width. It is adjustable to 0.1, 0.5, 1.0, 1.5 and 2ms. Select "**117 = PACE AMP WIDTH**", press **ENTER**, and then click the up and down keys to adjust it.

10.1.12 ECG Performance Testing

Square:

Code	Meaning
120	2HZ SQUARE WAVE
121	0.125HZ SQUARE WAVE
127	2.5HZ SQUARE WAVE

Triangle Wave:

Code	Meaning
122	2HZ TRIANGLE WAVE
123	2.5HZ TRIANGLE WAVE

Pulse:

Code	Meaning
124	PULSE = 30 BPM
125	PULSE = 60 BPM

Sine Wave:

The frequency of sine wave is adjustable to 0.1, 0.5, 0.67, 1, 2, 5, 8, 10, 25, 40, 50, 60 and 100 Hz. Select "**126 = SINE WAVE**", press **ENTER**, and then click the up and down keys to adjust it.

10.1.13 ST SEGMENT

The elevation of the ST segment is adjustable to -0.8 to +0.8 mV. The step is 0.1 mV. Select "**145 = ST segment**", press **ENTER**, and then click the up and down keys to adjust it.

10.1.14 External ECG Data (optional)

The simulator has a variety of built-in functions. In addition, you can use an external ECG case. Before using the case, there is some work to be done as follows:

First, you need to fill some parameters of the case in the software provided by our company, including sampling frequency, data precision, storage format, baseline location and some other information. Then the case is converted into the type which the simulator can use.

After converting a case, you can store it to a SD card .Then put the SD card into the simulator. In the "Setting" page, select "SD Card" and then switch to the "List" page, the page will display the number and name of the case.

Then, double-click the number or name of the case, you will see the display start drawing waveforms, it completed to select a case successfully. The list is shown in Fig.9:

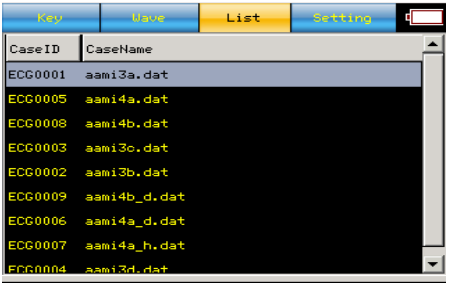


Fig.9

10.1.15 ANSI/AAMI EC13:2002

Standard Adult ECG

Select "**51 = Adult ECG**", press **ENTER**, and then the simulator will generate standard adult ECG.

Standard Pediatric ECG

Select "**59 = Pediatric ECG**", press **ENTER**, and then the simulator will generate standard pediatric ECG.

YY ECG Rate

ECG Rate is adjustable to 15, 20, 25, 30, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 250, 260, 280, 300, 320, 340 and 350 BPM. Select "**52 = YY ECG Rate**", press **ENTER**, and then you can click the up and down keys to adjust it.

QRS-wave Width

QRS-wave Width is adjustable to 40, 50, 60, 70, 80, 90, 100, 110 and 120ms. Select "**53 = QRS-wave Width**", press **ENTER**, and then you can click the up and down keys to adjust it.

QRS-wave Height

QRS-wave Height is adjustable to 0.5, 1.0, 2.0, 3.0, 4.0, 5.0 mV. Select "**54 = QRS-wave Height**", press **ENTER**, then you can click the up and down keys to adjust it.

T-wave Height

T-wave Height is adjustable to 0.4, 0.6, 0.8, 1.0, 1.2 mV. Select "**55 = T-wave Height**", press **ENTER**, then you can click the up and down keys to adjust it.

10.2 Respiratory

10.2.1 Respiration Rate

Respiration rate is generated from 0 to 150 R/MIN. Select "**4 = RESPIRATION RATE**", press **ENTER**, and then click the up and down keys to adjust it. The respiratory waveform is shown in Fig.10:

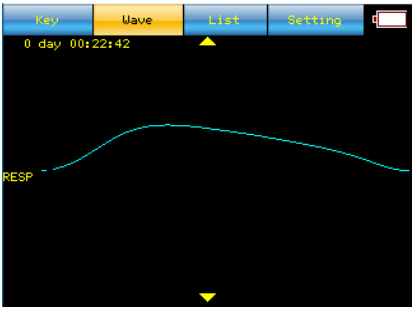


Fig.10

10.2.2 Respiration Impedance

Respiration impedance is adjustable to 0.2, 0.5, 1.0 and 3.0 Ω. Select "**6 = DELTA OHMS**", press **ENTER**,

and then you can click the up and down keys to adjust it.

10.2.3 Baseline Impedance

Baseline impedance is adjustable to 500, 1000, 1500 and 2000 Ω. Select "**5 =BASELINE IMPEDANCE**", press **ENTER**, and then you can click the up and down keys to adjust it.

10.2.4 Apnea

The simulator generates apnea (0 R/MIN) of 12, 22, and 32 seconds. You can enter the following code to set the type of apnea directly, and then press **ENTER**.

Code	Meaning
152	12 SEC APNEA
153	22 SEC APNEA
154	32 SEC APNEA

10.3 IBP

The simulator simulates static-pressure levels and dynamic IBP waveforms. It provides calibrated static pressures and dynamic IBP waveforms to simulate signals such as artery, left- and right-ventricle and pulmonary-artery pressures. At the same time, it controls the channel 1, 2, 3 and 4. Dynamic IBP waveforms are synchronous with the heart rates of all the normal sinus rhythm.

Note: When you select "**33 = ASYSTOLE**", all the channels are reset to 0.

10.3.1 IBP Zero

Select "**7 = IBP ZERO**", each channel will be reset to 0.

10.3.2 Static-Pressure Levels

If you want to adjust the static-pressure level, select "**9 = IBP STATIC LEVELS** "directly, press **ENTER**, and then click the up and down keys to adjust it. The static-pressure level is shown in Fig.11 and Fig.12:

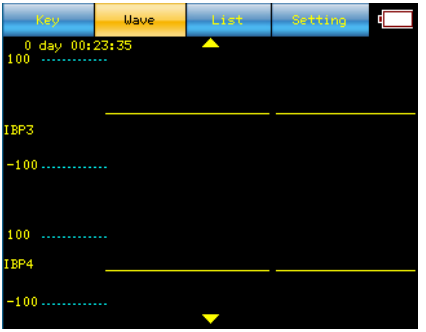


Fig.11

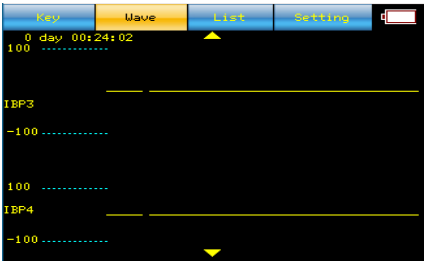


Fig.12

IBP1	IBP2	IBP3	IBP4
P1 = 0/mmHg	P2 = 0/mmHg	P3 = 0/mmHg	P4 = 0/mmHg
P1 = 80/mmHg	P2 = 50/mmHg	P3 = 20/mmHg	P4 = 20/mmHg
P1 = 160/mmHg	P2 = 100/mmHg	P3 = 40/mmHg	P4 = 40/mmHg
P1 = 240/mmHg	P2 = 150/mmHg	P3 = 60/mmHg	P4 = 60/mmHg
P1 = 320/mmHg	P2 = 200/mmHg	P3 = 80/mmHg	P4 = 80/mmHg
P1 = 400/mmHg	P2 = 250/mmHg	P3 = 100/mmHg	P4 = 100/mmHg

10.3.3 Dynamic IBP Waveforms

Select "**8 = IBP DYNAMIC WAVEFORMS**", then the channel 1 generates arterial 120/80mmHg (the highest pressure is 120mmHg, and the lowest pressure is 80mmHg), the channel 2 generates pulmonary arterial 25/10mmHg, the channel 3 generates pulmonary artery 25/00mmHg, and the channel 4 generates RA(CVP). You can enter 60-63 to change channel 1, enter 70-77 to change channel 2, enter 80-87 to change channel 3, and enter 88-89 to change channel 4. For example, select "**60 = P1 ART 120/80**", press **ENTER**, the channel 1 generates arterial 120/80mmHg, and then select "**71 = P2 RAD 120/80**", the channel 2 generates radial artery 120/80 mmHg.The waveforms of channel 1, 2, 3 and 4 shown in Fig.13 and Fig.14:

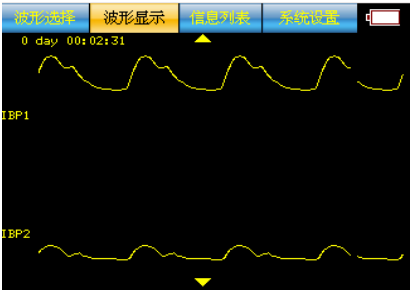


Fig.13

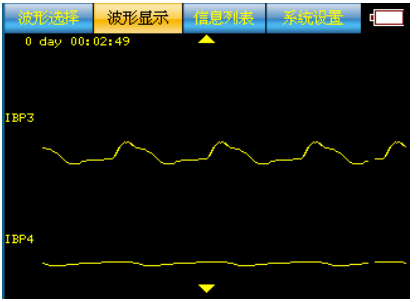


Fig.14

Channel P1

Code	Meaning
60	P1 ARTERIAL 120/80 mmHg
61	P1 RADIAL ARTERY 120/80 mmHg
62	P1 LEFT VENTRICLE 120/00 mmHg
63	P1 RIGHT VENTRICLE 25/00 mmHg

Channel P2

Code	Meaning
70	P2 ARTERIAL 120/80 mmHg
71	P2 RADIAL ARTERY 120/80 mmHg
72	P2 LEFT VENTRICLE 120/00 mmHg
73	P2 RIGHT VENTRICLE 25/00 mmHg
74	P2 PULMONARY ARTERY 25/10 mmHg
75	P2 PULMONARY WEDGE 10/2 mmHg
76	P2 LEFT ATRIUM 14/4 mmHg
77	P2 RIGHT ATRIUM CVP 15/10 mmHg

Channel P3

Code	Meaning
80	P3 ARTERIAL 120/80 mmHg
81	P3 RADIAL ARTERY 120/80 mmHg
82	P3 LEFT VENTRICLE 120/00 mmHg
83	P3RIGHT ATRIUM CVP 15/10 mmHg
84	P3 PULMONARY ARTERY 25/10 mmHg
85	P3 PULMONARY WEDGE 10/2 mmHg
86	P3 LEFT ATRIUM 14/4 mmHg
87	P3 RIGHT VENTRICLE 25/00 mmHg

Channel P4

Code	Meaning
88	P4 SWAN-GANZ AUTO
89	P4 SWAN-GANZ MAN

10.4 Temperature

The simulator provides four kinds of temperature simulations: 0℃, 24℃, 37℃ and 40℃. You can enter the following code to set the temperature directly. Also you can select "**193 = TEMP SELECT**", press **ENTER**, and then click the up and down keys to adjust it. Before operating it, you need to use the temperature cable provided by our company.

Code	Meaning
189	0℃ (32°F)
190	24℃ (75°F)
191	37℃ (98.6°F)
192	40℃ (104°F)
193	Temperature selection



Smaltimento: *Il prodotto non deve essere smaltito assieme agli altri rifiuti domestici. Gli utenti devono provvedere allo smaltimento delle apparecchiature da rottamare portandole al luogo di raccolta indicato per il riciclaggio delle apparecchiature elettriche ed elettroniche*

CONDIZIONI DI GARANZIA GIMA

Si applica la garanzia B2B standard Gima di 12 mesi