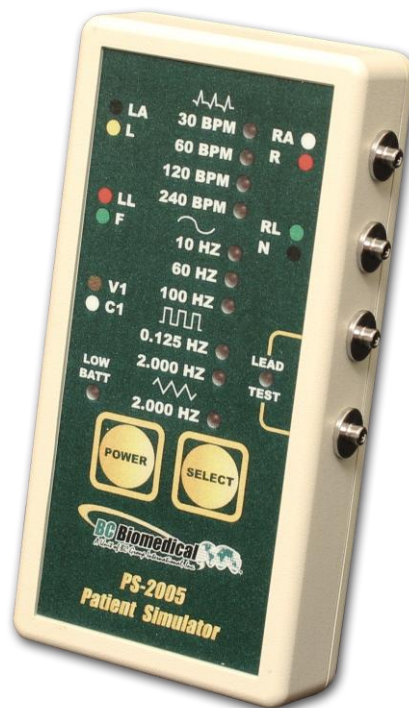




# ECG PATIENT SIMULATOR FIVE LEAD



**PS-2005**

**USER MANUAL**



**BC BIOMEDICAL  
PS-2005  
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### **WARNING - USE**

The PS-2005 is intended for testing only and should never be used in diagnostics, treatment or any other capacity where it would come in contact with a patient.

### **WARNING - CONNECTIONS**

All connections to patients must be removed before connecting the DUT to the PS-2005. A serious hazard may occur if the patient is connected when testing with the PS-2005. Do not connect any leads from the patient directly to the PS-2005 or DUT.

### **CAUTION - SERVICE**

The PS-2005 is intended to be serviced only by authorized service personnel. Troubleshooting and service procedures should only be performed by qualified technical personnel.

### **CAUTION - ENVIRONMENT**

Exposure to environmental conditions outside the specifications can adversely affect the performance of the PS-2005. Allow the PS-2005 to acclimate to specified conditions for at least 30 minutes before attempting to operate it.

### **CAUTION - CLEANING**

Do not immerse. The PS-2005 should be cleaned by wiping gently with a damp, lint-free cloth. A mild detergent can be used if desired.

## CAUTION - INSPECTION

The PS-2005 should be inspected before each use for obvious signs of abuse or wear. The PS-2005 should not be used and should be serviced if any parts are in question.

## NOTICE – SYMBOLS

### Symbol    Description



**Caution**  
(Consult Manual for Further Information)



**Center Negative**



Per European Council Directive 2002/95/EC,  
do not dispose of this product as unsorted  
municipal waste.

## NOTICE – ABBREVIATIONS

<b>AHA</b>	<b>American Heart Association</b>
<b>ANSI</b>	<b>American National Standards Institute</b>
<b>BPM</b>	<b>Beats Per Minute</b>
<b>C</b>	<b>Celsius</b>
<b>°</b>	<b>degree(s)</b>
<b>ECG</b>	<b>Electrocardiogram</b>
<b>F</b>	<b>Fahrenheit</b>
<b>Hz</b>	<b>hertz</b>
<b>IEC</b>	<b>International Electrotechnical Commission</b>
<b>Lbs</b>	<b>pounds</b>
<b>LED</b>	<b>Light Emitting Diode</b>
<b>mm</b>	<b>millimeter(s)</b>
<b>mV</b>	<b>millivolt(s)</b>
<b>NEDA</b>	<b>National Electronic Distributors Association</b>
<b>Ω</b>	<b>ohm(s)</b>
<b>USA</b>	<b>United States of America</b>
<b>VDC</b>	<b>Volts Direct Current</b>

## **NOTICE – DISCLAIMER**

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## **NOTICE – CONTACT INFORMATION**

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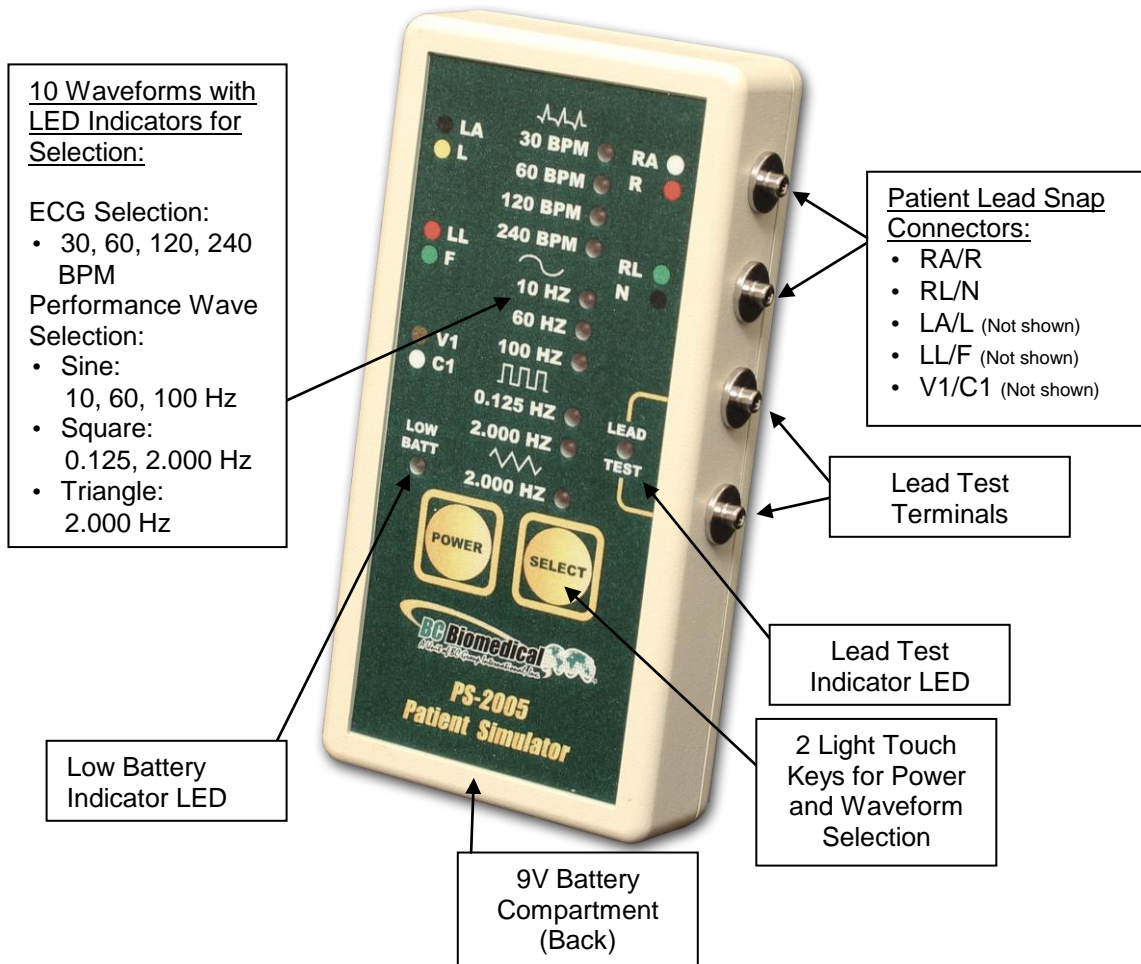
**BC BIOMEDICAL  
PS-2005  
PATIENT SIMULATOR**

The Model PS-2005 is a Microprocessor based Patient Simulator. It provides ECG Simulation with four waveforms with constant QRS duration and six machine performance testing waveforms. The following are highlights of some of the main features:

- 5 PATIENT LEAD SNAP CONNECTORS
- ECG: 30, 60, 120 AND 240 BPM
- SINE: 10, 60 AND 100 Hz
- SQUARE: 0.125 AND 2.000 Hz
- TRIANGLE: 2.000 Hz
- AMPLITUDE ACCURACY:  $\pm 2\%$
- FREQUENCY ACCURACY:  $\pm 0.5\%$  OF SETTING
- 9 VOLT BATTERY POWER
- LOW BATTERY INDICATOR
- % BATTERY LIFE INDICATOR
- LEAD TEST FUNCTION
- HIGH IMPACT PLASTIC CASE
- LIGHT TOUCH KEYS – NO KNOBS OR SWITCHES

# LAYOUT

This section looks at the layout of a PS-2005 and gives descriptions of the elements that are present.



The unit is controlled by 2 light touch keys. They allow the user to select waveforms and control the power for the unit.

There are 10 LEDs to provide the user with information about waveforms that are generated, 1 LED for Lead Test confirmation and 1 LED for Low Battery Indication.




## Patient Lead Snap Connectors

AHA and IEC color-coded labels are located on the face of the unit to aid in connecting the corresponding AHA and IEC Patient Leads.

<b>AHA Label</b>	<b>IEC Label</b>	<b>Description</b>
RA	R	Right Arm
LA	L	Left Arm
RL	N	Right Leg (reference or ground)
LL	F	Left Leg
V1	C1	V Leads (V1) (U.S. and Canada) also referred to as pericardial, precordial or unipolar chest leads  Chest Leads (C1) (International)


## Waveform Selection

There is one key and 10 LEDs to use for Waveform Selection. The LEDs indicate which waveform is generated. The  key sequentially selects each waveform. The microprocessor sends the stored waveform information of the selected waveform to a Digital to Analog converter that generates an accurate analog representation. This waveform is then sent through a resistor network, developing the appropriate signals on the output terminals.

## **Lead Test Terminals**

There are two test terminals on the side of the unit that allow for a quick test of the continuity of the lead cables. Connecting one end of the cable to one terminal and the other end to the other terminal will test the cable. If the cable is OK (less than 1000 ohms), the LEAD TEST LED in the lower right of the face will light.

## **Power Key**

The  key turns the unit off and on.

## **Auto Power Off**



The unit will automatically turn off after 10 minutes of no key activity to conserve the battery.

To override this feature and keep the unit on continuously, press and hold the SELECT key while turning the unit on. This will keep the unit on until it is manually turned off. The “Low Batt” LED will illuminate for 3 sec to indicate that the Auto Power Off feature has been turned off.

## **Power Supply**

The unit utilizes a 9 Volt Alkaline Battery in the rear battery compartment. When the unit detects a LOW BATTERY, the LED in the lower left of the face will blink, indicating the need to change the battery.

## **Percent of Battery Life Indicator**

The unit provides a visual indication of the battery life left on the 9 Volt Alkaline Battery. An Analog to Digital converter monitors the battery voltage. Continuously holding down the  key will change the 10 waveform LEDs into a Percent of Battery Life display, with each LED representing 10% intervals. The Indicator will strobe up to the present battery level and flash. This sequence will continue while the  key is depressed.

## MANUAL REVISIONS

<u>Revision #</u>	<u>Revisions Made</u>
Rev 01	Origination
Rev 02	Format and Pictures Updated
Rev 03	Misc. Edits, Format Updated, and Pictures Updated
Rev 04	Misc. Edits
Rev 05	Misc. Edits

## LIMITED WARRANTY

**WARRANTY:** BC GROUP INTERNATIONAL, INC. WARRANTS ITS NEW PRODUCTS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP UNDER THE SERVICE FOR WHICH THEY ARE INTENDED. THIS WARRANTY IS EFFECTIVE FOR TWELVE MONTHS FROM THE DATE OF SHIPMENT.

**EXCLUSIONS:** THIS WARRANTY IS **IN LIEU OF** ANY OTHER WARRANTY EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF **MERCHANTABILITY** OR FITNESS FOR A PARTICULAR PURPOSE.

**BC GROUP INTERNATIONAL, INC.** IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

NO PERSON OTHER THAN AN OFFICER IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR ASSUME ANY LIABILITY.

**REMEDIES:** THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY SHALL BE: (1) THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS OR PRODUCTS, WITHOUT CHARGE. (2) AT THE OPTION OF **BC GROUP INTERNATIONAL, INC.**, THE REFUND OF THE PURCHASE PRICE.

## SPECIFICATIONS

PATIENT SIMULATION			
RATE	NORMAL SINUS RHYTHM	30, 60, 120, 240 BPM	
	PERFORMANCE WAVEFORMS	SINE	10, 60, 100 Hz
		SQUARE	0.125, 2.0 Hz
		TRIANGLE	2.0 Hz
	ACCURACY	± 0.5 %	
AMPLITUDE	LEAD 1	1.75 mV	
	LEAD 2	2.75 mV	
	LEAD 3	1.00 mV	
	ACCURACY	± 2 % Lead II	
IMPEDANCE	LEAD TO LEAD	1000 Ω	
	LEAD TEST	< 1000 Ω	

PHYSICAL & ENVIRONMENTAL		
CONSTRUCTION	ENCLOSURE	ABS Plastic
	FACEPLATE	Lexan, Back printed
SIZE	5.15 x 2.89 x 1.06 Inches (130.8 x 73.4 x 26.9 mm)	
WEIGHT	≤ 0.5 Lbs (0.23 kg)	
OPERATING RANGE	15 to 40 °C (59 to 104 °F)	
STORAGE RANGE	-20 to 65 °C (-4 to 149 °F)	

ELECTRICAL	
BATTERY	9 V Alkaline Battery (ANSI/NEDA 1604A or equivalent)

**NOTES**





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