



ECG PATIENT SIMULATOR TEN LEAD



PS-2010

USER MANUAL

**BC BIOMEDICAL
PS-2010
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WARNING

All connections to patients must be removed before connecting the Device Under Test (DUT) to the Simulator. A serious hazard may occur if the patient is connected when testing with the Simulator.

Do not connect any leads from the patient directly to the Simulator or DUT.

CONTACT INFORMATION

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<p style="text-align: center;">BC GROUP PS-2010 PATIENT SIMULATOR</p>
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The Model PS-2010 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:

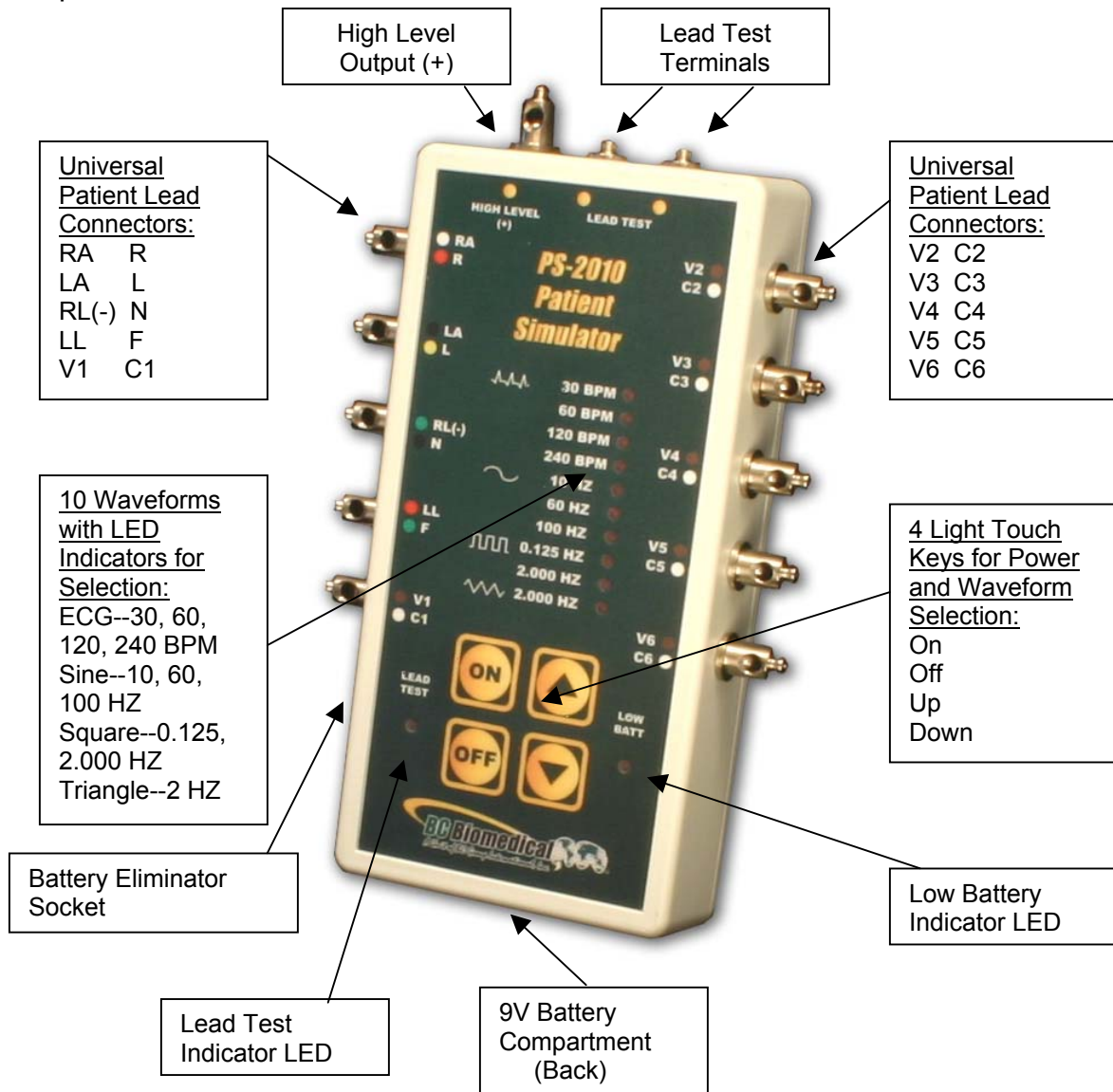
- 10 UNIVERSAL PATIENT LEAD CONNECTORS
- ECG: 30, 60, 120 AND 240 BPM
- SINE: 10, 60 AND 100 HZ
- SQUARE: 0.125 AND 2.0 HZ
- TRIANGLE: 2 HZ
- HIGH LEVEL OUTPUT (1 V p-p)
- AMPLITUDE ACCURACY: +/- 2%
- FREQUENCY ACCURACY: +/- 0.5% OF SETTING
- 9 VOLT BATTERY POWER
- LOW BATTERY INDICATOR
- % BATTERY LIFE INDICATOR
- OPTIONAL BATTERY ELIMINATOR
- LEAD TEST FUNCTION
- HIGH IMPACT PLASTIC CASE
- LIGHT TOUCH KEYS – NO KNOBS OR SWITCHES

OPTIONAL ACCESSORIES

BC20 - 30103	BC BIOMEDICAL SMALL SOFT SIDED CARRYING CASE
BC20 - 21100	BATTERY ELIMINATOR (US Version)
BE20 - 21101	BATTERY ELIMINATOR (Euro Version)

OVERVIEW

This section looks at the layout of a PS-2010 and gives descriptions of the elements that are present.



The unit is controlled by 4 light touch keys. They allow the user to select waveforms and control the power for the unit. There is an audio click when a key is depressed.

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.

Universal Patient Lead Connectors



The 10 Universal Patient Lead Connectors allow for 12 lead ECG simulation with independent outputs. AHA and IEC color-coded labels are located on the face of the unit to aid in connecting the corresponding U.S. and International Patient Leads.

AHA Label	IEC Label	Description
RA	R	Right Arm
LA	L	Left Arm
RL	N	Right Leg (reference or ground)
LL	F	Left Leg
V1 V2 V3 V4 V5 V6	C1 C2 C3 C4 C5 C6	V Leads (V1-V6) (U.S. and Canada) also referred to as pericardial, precordial or unipolar chest leads Chest Leads (C1-C6) (International)

High Level Output (+)

An additional Universal Patient Lead Connector is located on the top of the unit for connecting the high level ECG output signal (1 Volt p-p). The connection is between High Level (+) and RL (-).

Waveform Selection

There are two keys and 10 LEDs in the Waveform Selection Control Section. The LEDs indicate which waveform is generated. The   keys sequentially select each waveform. Internally, the microprocessor has stored in memory the digitalized waveforms. It sends the selected waveform to a D/A 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 top 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 left of the face will light.

Power Keys



The   keys control the power for the unit.

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, depress the  key twice after the unit is 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.

Percent of Battery Life Indicator

The unit provides an indication of the Percent of battery life left on the 9 Volt Alkaline Battery. An A/D 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%. The stack will strobe up to the present level and flash. This sequence will continue while the  key is depressed.

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 right of the face will light, indicating the need to change the battery.

Power Input – A 2.1 mm jack is provided for the optional 9 VDC Battery Eliminator power supply that may be used for continuous run applications. It bypasses the internal battery when plugged in.

Note: The unit is shipped with a red plug in the Power Input that prevents it from turning on and using up the battery during transport. This plug must be removed before use.



MANUAL REVISIONS

<u>Revision #</u>	<u>Program #</u>	<u>Revisions Made</u>
Rev 01	DT7345	Origination
Rev02	DT7345CA	Format and Pictures Updated

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.

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SPECIFICATIONS

SCALES & RANGES	
Normal Sinus Rhythm	
Rate	30,60,120,240 BPM
Performance	
Sine Wave	10,60,100 Hz
Square Wave	0.125, 2.000 Hz
Triangle Wave	2.000 Hz

OUTPUT	
LEAD 1	1.75 mV
LEAD 2	2.75 mV
LEAD 3	1.00 mV
LEAD TO LEAD IMPEDENCE	1000 Ohms
LEAD TEST IMPEDENCE	< 1000 Ohms

ACCURACY	
AMPLITUDE	+/- 2 % Lead II
FREQUENCY	0.5 %

PHYSICAL	
ENCLOSURE	6.7 x 3.35 x 1.33 Inches (170.18 x 85.09 x 33.78 mm) ABS Plastic
WEIGHT	< 1Lbs (< 0.45 Kg)
FACE PLATE	Lexan, Back printed
OPERATING RANGE	15 to 40 degrees C
STORAGE RANGE	-20 to 65 degrees C

ELECTRICAL	
POWER	Battery, 9 VDC (NEDA 1604) Alkaline
BATTERY ELIMINATOR (Optional)	BE2000PU (120 VAC) – US BE2000PE (220 VAC) – Euro 9V, 50 mA DC 

NOTES