



NON-INVASIVE BLOOD PRESSURE SIMULATORS



NIBP-1030



NIBP-1020



NIBP-1010

USER MANUAL

**BC BIOMEDICAL
NIBP-1000 SERIES
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WARNING - USERS

The NIBP-1000 Series Simulators are for use by skilled technical personnel only.

WARNING - USE

The NIBP-1000 Series Simulators are intended for testing only and they should never be used in diagnostics, treatment or any other capacity where they would come in contact with a patient.

WARNING - MODIFICATIONS

The NIBP-1000 Series Simulators are intended for use within the published specifications. Any application beyond these specifications or any unauthorized user modifications may result in hazards or improper operation.

WARNING - CONNECTIONS

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

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

WARNING - ADAPTER

Turn Power Off and unplug any AC Power Adapter before cleaning the surface of the Simulators.

WARNING - LIQUIDS

Do not submerge or spill liquids on Simulators. Do not operate the Simulators if internal components may have been exposed to fluid, as the internal leakage may have caused corrosion and be a potential hazard.

CAUTION - SERVICE

The NIBP-1000 Series Simulators are intended to be serviced only by authorized service personnel. Troubleshooting and service procedures should only be performed by qualified technical personnel.

CAUTION - ENVIRONMENT

The NIBP-1000 Series Simulators are intended to function between 15 and 40 °C. Exposure to temperatures outside this range can adversely affect the performance of the Simulators.

CAUTION - CLEANING

Do not immerse. The Simulators should be cleaned by wiping gently with a damp, lint-free cloth.

CAUTION - INSPECTION

The NIBP-1000 Series Simulators should be inspected before each use for wear and the Simulator should be serviced if any parts are in question.



NOTICE – CE



The NIBP-1000 Simulators bear the  mark
Based on the following testing standards:

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE
**EMC – Directive 89/336/EEC and 2004/108/EC as amended by
92/31/EEC, 93/68/EEC and Directive 91/263/EEC [TTE/SES]**

EN 61326-1:1997 + A1:1998 + A2:2001 + A3:2003
**“Electrical equipment for measurement, control and
laboratory use – EMC requirements”**

This equipment has been type tested by an independent, accredited testing laboratory
and compliance was demonstrated to the above standard to the extent applicable.

EMISSIONS
Radiated and Line Conducted Emissions

EN 61000-3-2	Harmonic Current Emissions
EN 61000-3-3	Voltage Fluctuation and Flicker

IMMUNITY– CLASS C

EN 61000-4-2	Electrostatic Discharge
EN 61000-4-3	Radiated Electric Field Immunity
EN 61000-4-4	Electrical Fast Transients / Bursts
EN 61000-4-5	Surge Voltage
EN 61000-4-6	Conducted Disturbance
EN 61000-4-11	Voltage Dips and Short Interrupts

LOW VOLTAGE DIRECTIVE
EC – Directive 73/23/EC

EN 61010-1:2001
**“Safety requirements for electrical equipment for measurement, control, and
laboratory use – General requirements”**

This equipment has been type tested and compliance was demonstrated
to the above standard to the extent applicable.

NOTICE – SYMBOLS

Symbol

Description



Caution

(Consult Manual for Further Information)



Center Negative



Direct Current



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

NOTICE – ABBREVIATIONS

AC	Alternating Current
BP	Blood Pressure
Bpm	Beats per minute
brpm	breaths per minute
C	Celsius
°	degree
DUT	Device Under Test
Dias	Diastolic
ECG	Electrocardiogram
Euro	European
HR	Heart Rate
Hz	hertz
k	kilo- (10 ³)
Kg	Kilogram
μ	micro- (10 ⁻⁶)
μA	microampere
m	milli- (10 ⁻³)
mA	milliampere
mm	millimeter
mmHg	millimeter mercury
mV	millivolt
min	minutes
Neo	Neonatal
NSR	Normal Sinus Rhythm
Ω	ohm
lbs	pounds
R	Respiration
Sec	seconds
Syst	Systolic
US	United States
VDC	Direct Current Voltage

NOTICE – DISCLAIMER

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NOTICE – CONTACT INFORMATION

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<p style="text-align: center;">BC GROUP NIBP-1000 SERIES NON-INVASIVE BLOOD PRESSURE SIMULATORS</p>
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The Model NIBP-1000 Series is a family of Microprocessor based, High Precision Non-Invasive Blood Pressure (NIBP) Simulators. The units are small, easy to use and have multiple features to fit many different applications. The NIBP-1020, offers ECG waveforms that are full QRS and respiration waveforms that look real. The NIBP-1030 offers Invasive Blood Pressure, Temperature, Arrhythmias and a Leak Rate test mode.

The graphics display not only provides multiple screens that give the pressure digitally in mmHg, but also offers views of the plot of the overall pressure or a close-up of the BP waveform.

The following are highlights of some of the main features:

NIBP-1010 (BASIC FEATURES, NIBP ONLY):

- LARGE GRAPHICS DISPLAY WITH CURSOR SELECTION OF OPTIONS AND SETUP OF PARAMETERS
- FULL RANGE MANOMETER
- ADULT, NEONATAL HYPERTENSIVE AND HYPOTENSIVE MODES
- 0-500 mmHg PRESSURE RANGE
- +/- 1% OF READING PRESSURE ACCURACY
- DIGITAL PRESSURE ENVELOPE OFFSET
- OPTIONAL PEAK PRESSURE DETECT WITH SIMPLE RESET
- SpO₂ READY – COMPATIBLE WITH MSP-2100 MODULE
- DIGITAL CALIBRATION – NO POTS TO TURN
- SELECTABLE DISPLAY OPTIONS AND DIGIT SIZES
- SOFTWARE ADJUSTABLE CONTRAST
- FLASH PROGRAMMABLE
- BATTERY LIFE DISPLAY (0 TO 100%)
- OPTIONAL RECHARGEABLE NiMH BATTERIES
- BATTERY ELIMINATOR
- RS232 INTERFACE

NIBP-1020 (NIBP, ECG PACE & RESP)

HAS ALL THE BASIC MODEL FEATURES PLUS:

- ECG OUTPUT WITH FULL NSR WAVEFORM
- SINUSOIDAL RESPIRATION SIMULATION
- ECG TEST WAVEFORMS
- PACE WAVEFORM
- OPTIONAL PEAK PRESSURE DETECT WITH ECG ALARM TEST
- ECG SYNCRONIZED WITH BLOOD PRESSURE

NIBP-1030 (NIBP, IBP, TEMPERATURE, ECG PACE & RESP)

HAS ALL THE 1020 MODEL FEATURES PLUS:

- BACKLIT LCD DISPLAY
- SYNCHRONIZED INVASIVE BLOOD PRESSURE OUTPUT
- SELECTABLE IBP SENSITIVITY 5/40 $\mu\text{V/V/mmHg}$
- STATIC IBP SIMULATION -10mmHg TO 400 mmHg
- LEAK RATE TEST
- ECG ARRHYTHMIA WAVEFORMS
- ECG ARRHYTHMIA SEQUENCE
- YSI 400 AND 700 SERIES TEMPERATURE SIMULATION

AVAILABLE MODELS:

NIBP1010	BASIC UNIT
NIBP1010-P	+ PEAK
NIBP1010-BP	+ BATTERY & PEAK
NIBP1010-KIT	NIBP1010-BP, 5 ADAPTERS & SOFT CARRYING CASE
NIBP1020	BASIC UNIT WITH ECG
NIBP1020-PA	+ PEAK & ALARM
NIBP1020-BPA	+ BATTERY, PEAK & ALARM
NIBP1020-KIT	NIBP1020-BPA, 5 ADAPTERS & SOFT CARRYING CASE
NIBP1030	BASIC UNIT WITH ECG, IBP, TEMP, PEAK & ALARM + MANY MORE
NIBP1030-B	+ BATTERY
NIBP1030-KIT	NIBP1030-B, 5 ADAPTERS & SOFT CARRYING CASE

ACCESSORIES:

- BC20-40614 AC POWER ADAPTER (EURO)
- BC20-40613 AC POWER ADAPTER (US)

OPTIONAL ACCESSORIES:

- BC20-30111 SOFT CARRYING CASE
- BC20-40714 DINAMAP/CRITIKON ADAPTER
- BC20-40715 QUICK DISCONNECT ADAPTER
- BC20-40716 LUER ADAPTER
- BC20-40717 MARQUETTE ADAPTER
- BC20-40608 BULB ADAPTER
- BC20-40602 NIBP FITTING KIT (HP CUFF ADAPTER, INFLATION BULB, CPC CONNECTOR, QUICK COUPLER WITH 1/8" MNPT AND SILICONE TUBING AND TEE)
- BC20-40605 NIBP ADAPTER KIT (11 CONNECTORS)

INVASIVE BLOOD PRESSURE CABLES

FOR A COMPLETE LIST CONSULT THE BC GROUP WEBSITE AT

WWW.BCGROUPINTL.COM

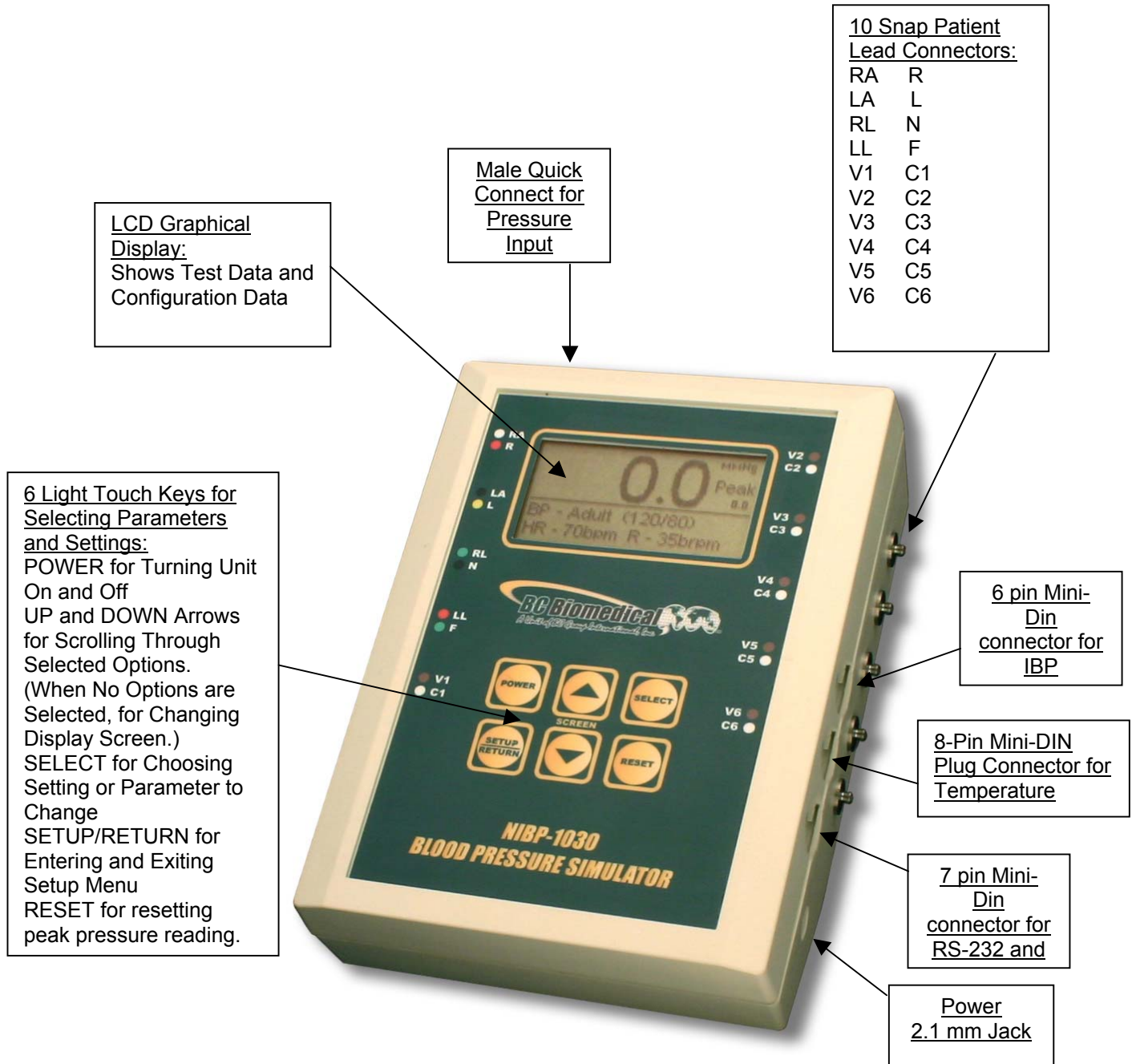
TEMPERATURE CABLES

BC20 - 41333 UT-1 YSI-400

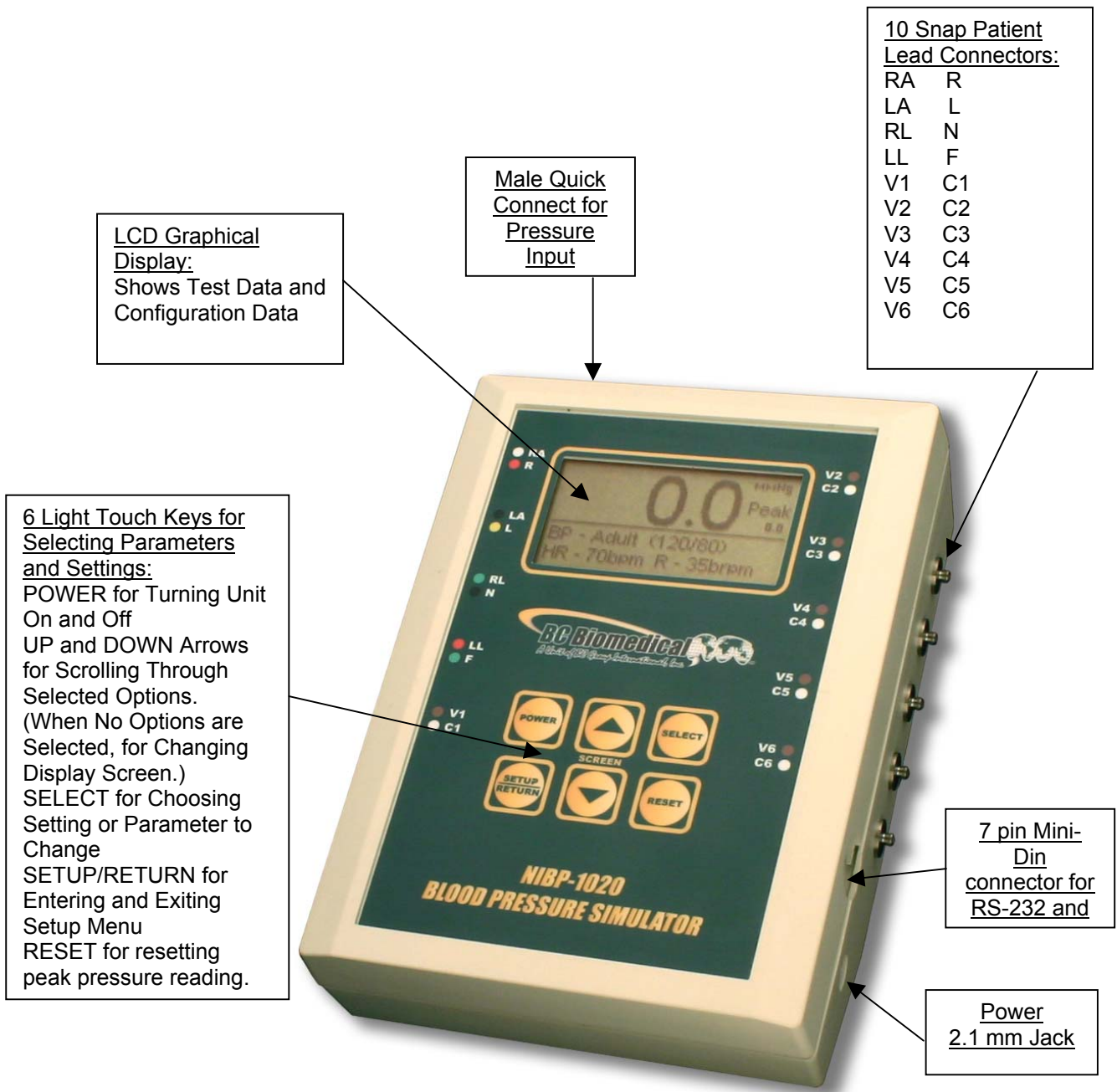
BC20 - 41334 UT-2 YSI-700

OVERVIEW

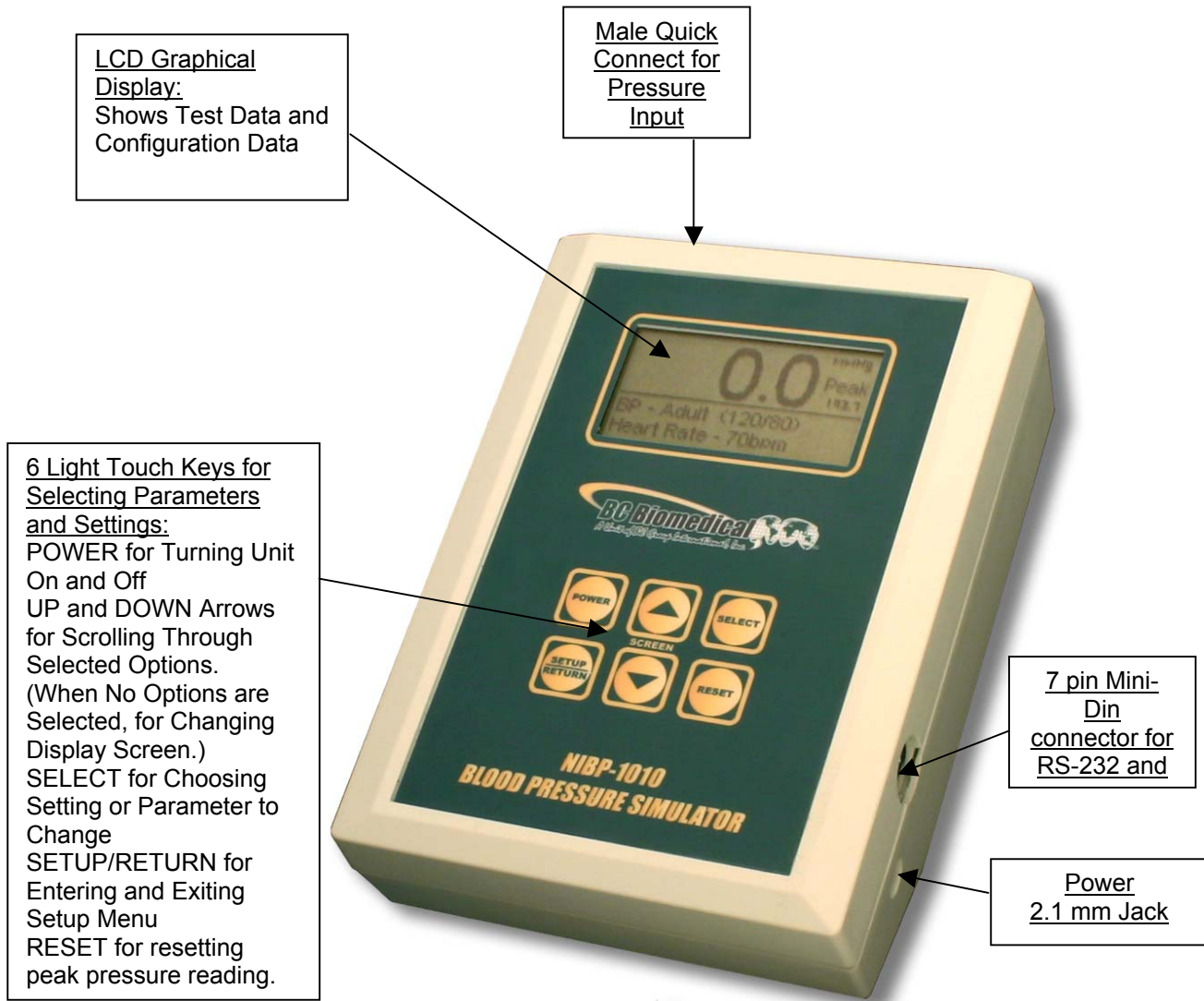
This section looks at the layout of the NIBP-1030 and gives descriptions of the elements that are present.



This section looks at the layout of the NIBP-1020 and gives descriptions of the elements that are present.



This section looks at the layout of the NIBP-1010 and gives descriptions of the elements that are present.



KEYS

Six tactile-touch keys are provided for system operation:



– This key turns the unit off and on. The unit will return to the screen that was active when it was turned off.



– In the DISPLAY MODE, these keys toggle the display through the available main screens.



In the SELECT MODE, if a parameter has been highlighted, these keys will scroll through the available settings.



– On the Main screen, this key sequences through the available NIBP or ECG simulations. On the Setup screen, there are a number of parameters that may be selected and changed. This key sequences the cursor (Highlight) through those parameters.



– This key is used to RESET the peak pressure reading or to begin a Leak Test.



– This key toggles the unit into and out of the Setup Mode. Depressing this key will enter the Setup screen where the configuration can be viewed and adjusted. Depressing the key again will exit the Setup Mode and return to the previously viewed main screen.

SCREENS

MAIN SCREENS – There are five main screens: Pressure Only, Pressure with Output Waveform, Pressure with Pressure Graph, ECG (optional) and Battery Indicator (optional).

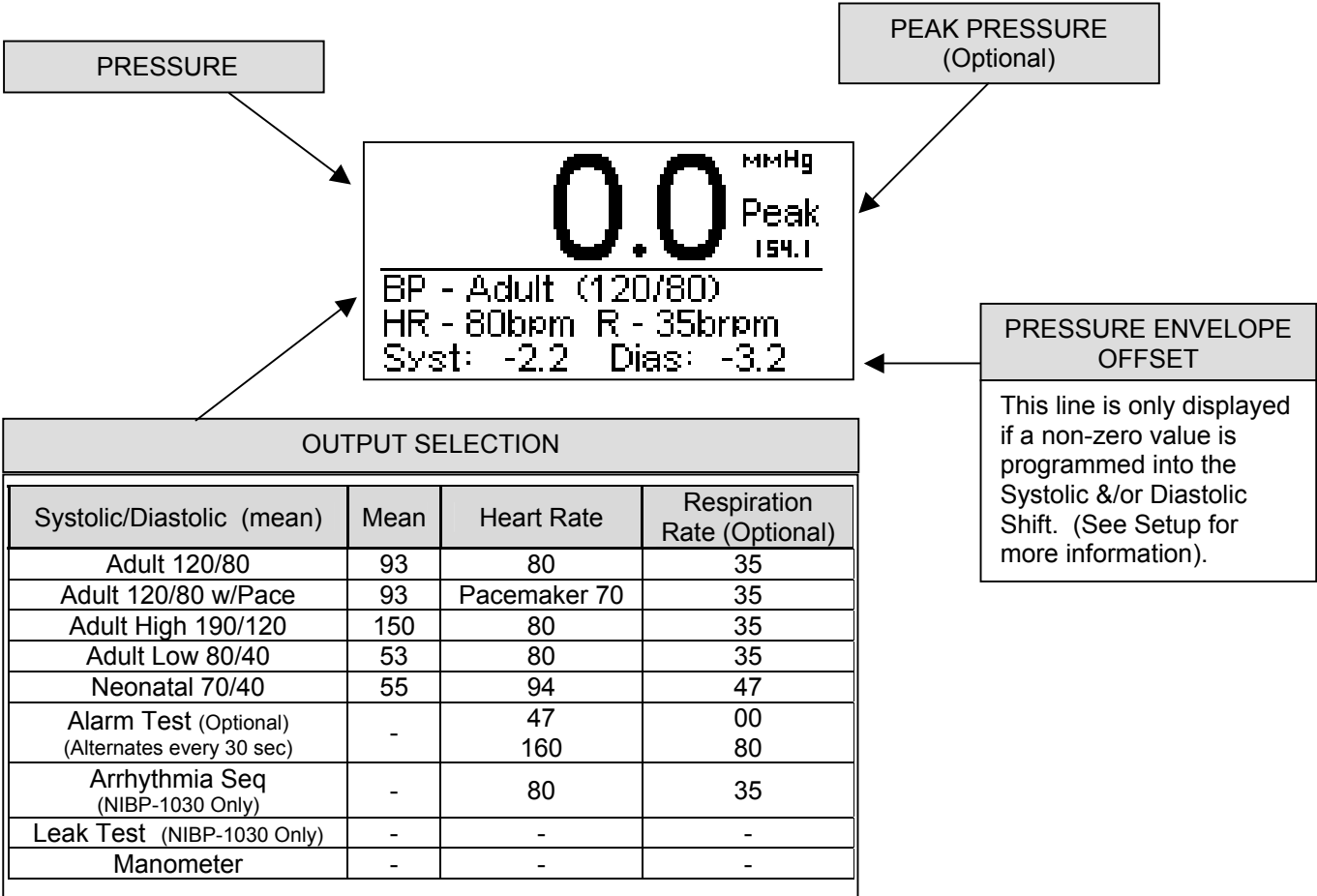


The available screens can be toggled using .

PRESSURE ONLY SCREEN – This screen has a large pressure display, as shown below.

Also displayed on this screen is the peak pressure and selected output waveform

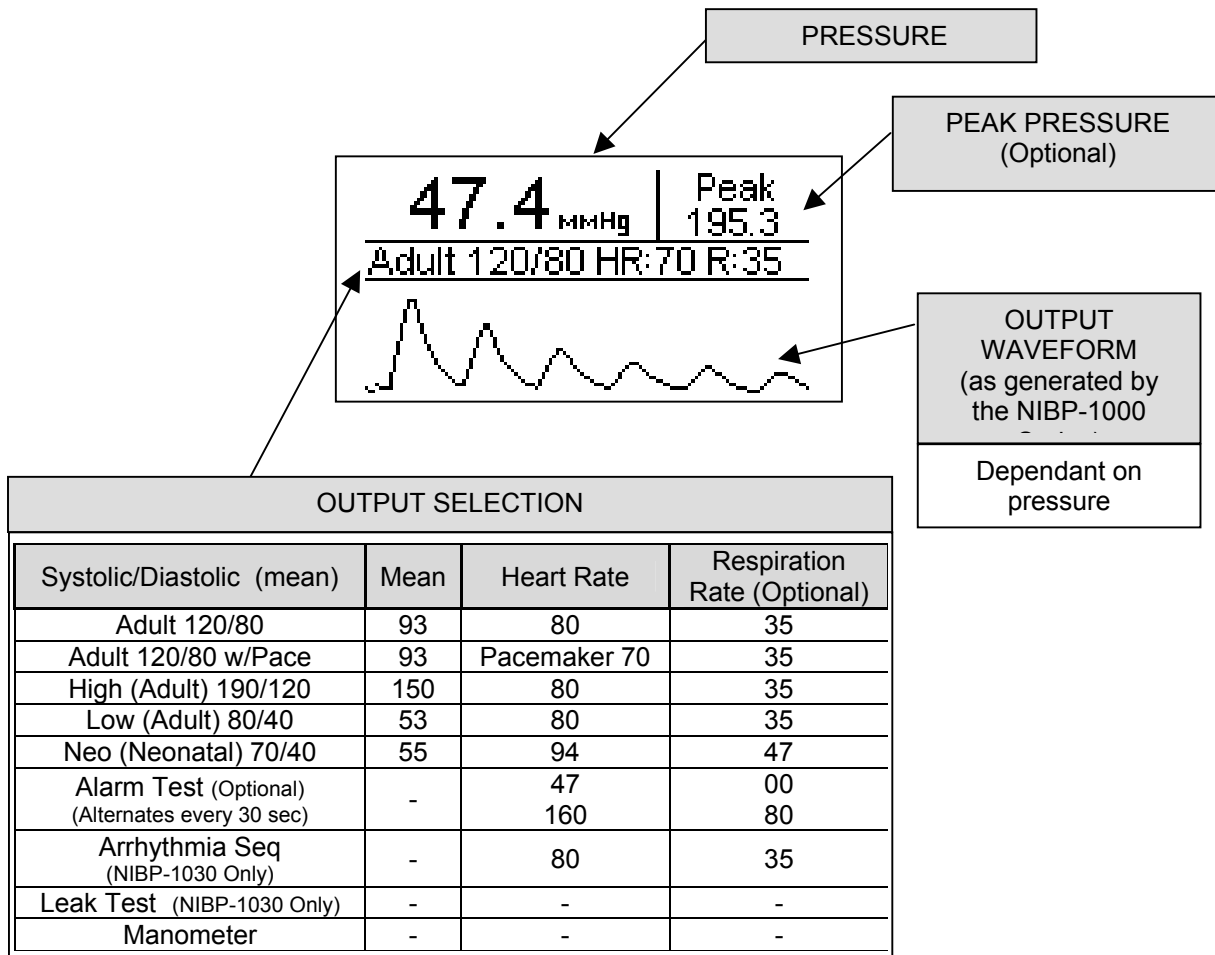
The display will resemble the following:



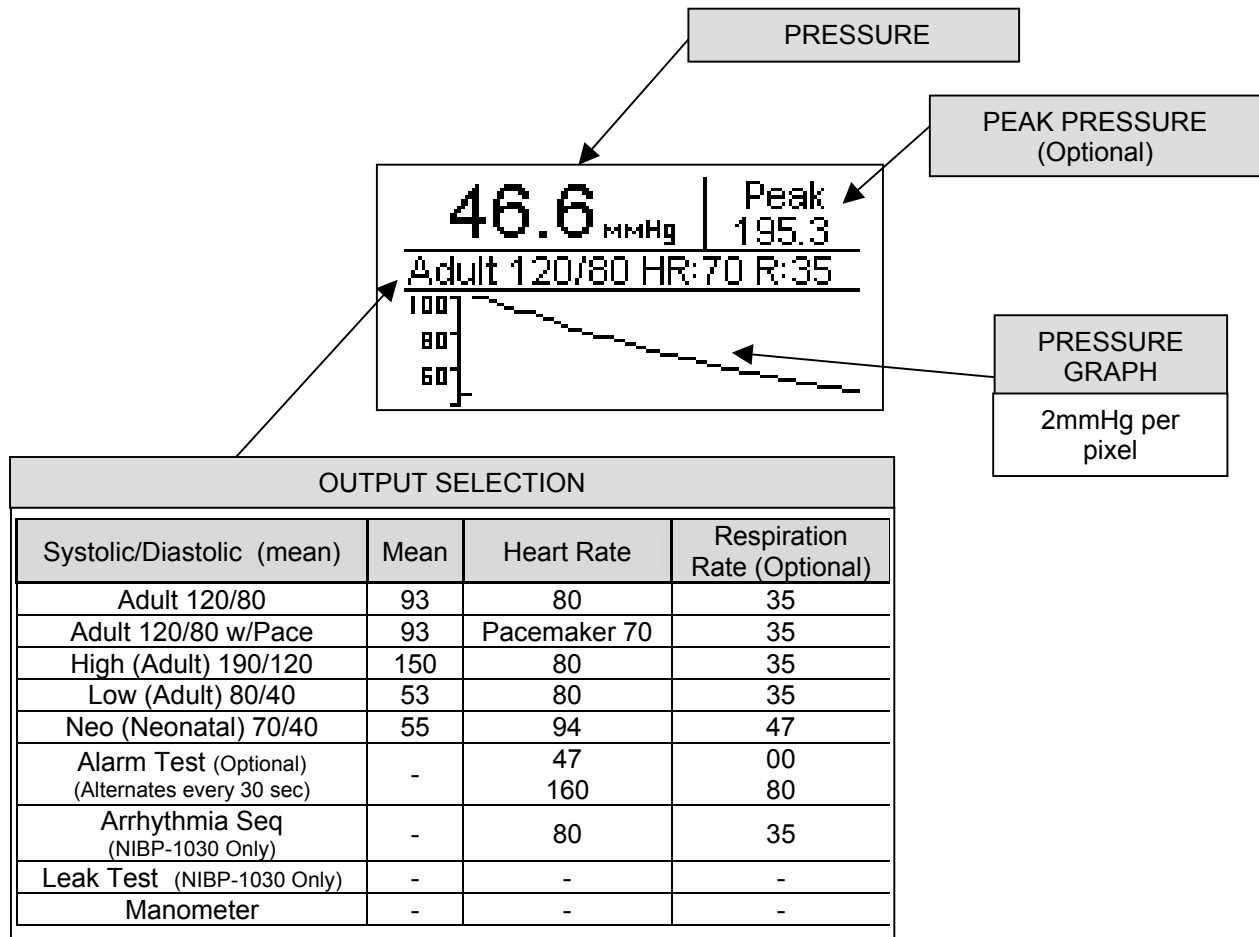
OUTPUT WAVEFORM SCREEN – This screen shows the output waveform, as well as, the pressure, peak pressure and output selection.

NOTE
This waveform is not intended to be physiologically correct.

The display will resemble the following:



PRESSURE GRAPH SCREEN – This screen provides a graph of the pressure, as well as, the pressure, peak pressure and output selection



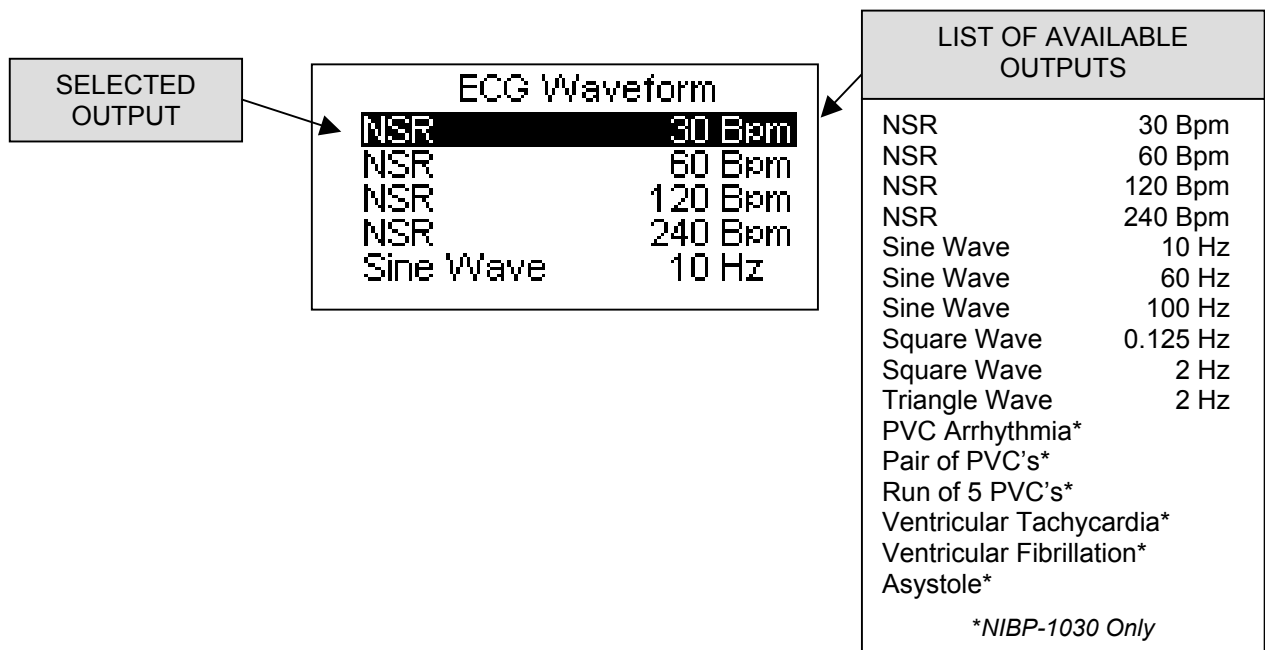
ECG OUTPUT SCREEN – This screen shows the selected ECG output mode.

(NIBP-1020 & NIBP-1030 units only)

NOTE: While in this mode, the NIBP simulation does not run.

NOTE: NSR ECG output is active during NIBP testing at the rate stipulated for the selected test.

The display will resemble the following:

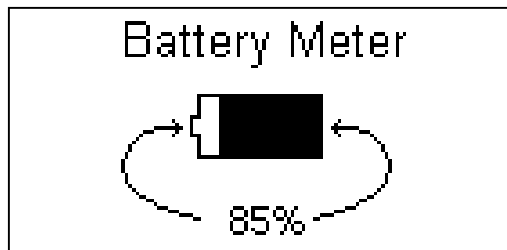


BATTERY INDICATOR SCREEN – This screen shows the status of the battery voltage level with Built-In Battery Option only.

NOTE: It is only an estimate of the battery life remaining.

When the level reaches 10%, the BP simulation mode will be disabled; however, the Manometer and ECG (optional) will continue to function. Once the battery level reaches 0%, the unit will automatically turn itself off to avoid damaging the batteries.

The display will resemble the following:








Batteries charge from provided AC power adapter. The charge time is about 4 hours from full discharge. While the batteries are charging, the display will flash “charging.”

CAUTION

**USE ONLY THE AC POWER ADAPTER PROVIDED
WITH THE NIBP-1010, NIBP-1020 AND NIBP-1030.**

SETUP

The Setup Mode allows the user to adjust the configuration of the simulator. The Setup screen can be entered using the  key. The parameters can be changed by using  key to highlight the line and   to toggle the available options. The Setup screen can be exited using the  key.

System Setup	
1) Systolic Shift	-2.2
2) Diastolic Shift	-3.2
3) SpO ₂ Output	On
4) Auto Off Timer (Min)	30
5) Contrast Adjust	11

NIBP 1010 and NIBP 1020

System Setup	
1) Systolic Shift	0.0
2) Diastolic Shift	0.0
3) Static BP	-10 mmHg
4) IBP Sen	5 μ V/V/mmHg
5) Temp	0.0 C 32.0 F

NIBP 1030

The following is a breakdown of the parameters available in the configuration of the unit and their available options:

System Setup Configuration		
Parameter	Description	Range
Systolic Shift	Adjusts the Systolic Output of the NIBP Simulation. This is not a direct mmHg adjustment.	±50.0
Diastolic Shift	Adjusts the Diastolic Output of the NIBP Simulation. This is not a direct mmHg adjustment.	±50.0
Static BP (NIBP-1030 Only)	Adjusts the Static Blood Pressure Output.	-10 to 400 mmHg
IBP Sens (NIBP-1030 Only)	Selects the Invasive Blood Pressure Output sensitivity.	5 µV/V/mmHg 40 µV/V/mmHg
Temp	Selects the simulated Temperature output.	0, 24, 30, 35, 37, 40, 42 C
SpO ₂ Output	This parameter determines whether the SpO ₂ output pulse is active. The output drives an MSP-2100 FingerSim Module.	Off/On
Auto Off Timer (Min)	Determines the period of inactivity before the unit is turned OFF. A timer is started when the unit is turned ON and is reset each time a key is pressed. When the timer reaches the value set in this parameter, the power is automatically turned OFF. (NOTE: Setting this parameter to 0 disables the Auto Off timer. When running from line power, the unit does not automatically shut off. Auto Off timer is inactive during a test.)	0-30 Minutes
Contrast Adjust	Sets the contrast of the display screen.	0-20
Backlight (Sec) (NIBP-1030 Only)	Off – Always off 1-30 sec – The elapsed time after which the backlight will automatically turn off. ON – Always ON. The Default setting is 30 seconds.	Off, 1-30 sec, ON
Battery Life	Available only with Battery Option installed. Displays current life of the battery. At 10%, a warning screen will appear. At 0%, the unit will power down automatically.	0-100% (Read Only)
Software	Displays current software program.	(Read Only)

SYSTOLIC AND DIASTOLIC SHIFT – The NIBP-1000 Series is equipped with the option to shift test results to compensate for different methods of measuring Oscillometric NIBP by various manufacturers and models of devices under test.

CAUTION

These adjustments must be used with caution as they will allow the user to adjust the output results to invalid values.

These adjustments should only be used to aid in the simplification of testing and with documented controls.

There are no absolute standards for Oscillometric NIBP readings; therefore, for a number of reasons (including patents, technology, etc.), each manufacturer has established a different method for evaluating the oscillometric pulses. Due to these varying methods, precisely the same waveforms will give different results on different manufacturer's units.

The normal technique used is to run the monitor against a fixed source like the NIBP-1000, with the understanding that each manufacturer has a predictable error from this norm. While this is generally the most direct method, users have asked for a method to correct for this difference, making the monitors read the same as the test unit. The Systolic and Diastolic Shift settings allow for just such correction.

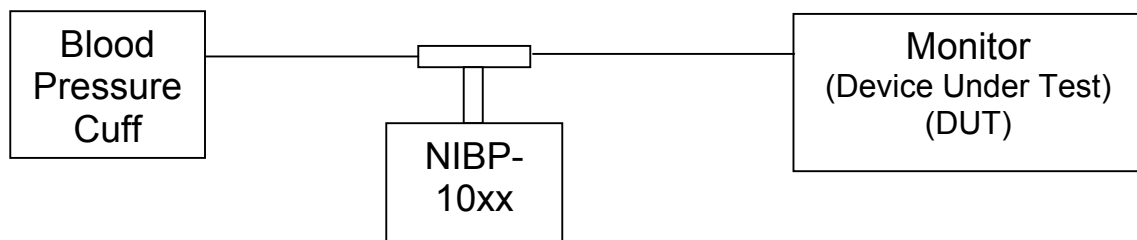
These adjustments are indicated in a line added to the main display to inform the user of any shift that has been programmed into the system. This is done so there is no misunderstanding of the meaning of the results.

OPERATIONS

CONNECTING PRESSURE

The NIBP-1010, NIBP-1020 and NIBP-1030 Blood Pressure Simulators are connected between the blood pressure cuff and the monitor (Device Under Test, DUT).

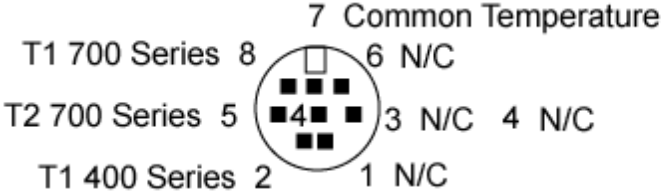
The blood pressure cuff should be disconnected from the DUT and a 'T' adapter inserted between the cuff and the DUT. The NIBP simulator is then connected to the open side.



Roll the cuff tightly on itself or around a mandrel.

TEMPERATURE CONNECTOR (NIBP-1030 ONLY)

For the models with Temperature output, connect a standard Temperature test cable (mini-din to monitor connector) between the NIBP-1030 and the DUT (Device Under Test). The pin-out is shown below.



AUX CONNECTOR

The Aux connector is used for both serial communications and SpO₂. The serial connection is made using the BC20-41337 cable. The MSP-2100 module plugs directly into the Aux port and provides the SpO₂ function.



THEORY OF OPERATIONS

NIBP (Non-Invasive Blood Pressure) Function

A digital stepping motor and piston assembly is used to generate the output waveforms. A differential pressure sensor is used to measure the pressure of the cuff. The pressure sensor is read by a 16-bit differential Analog to Digital converter.

The cuff pressure is monitored and the motor/piston assembly reacts to provide the correct response based on the selected mode.

IBP (Invasive Blood Pressure) Function

A 12-bit Digital to Analog converter is used to generate the IBP waveforms. The output circuit is fully isolated and capable of switching between the two standard sensitivities (5 $\mu\text{V}/\text{V}/\text{mmHg}$ and 40 $\mu\text{V}/\text{V}/\text{mmHg}$).

Temperature

There is an 8-pin mini-DIN plug connector on the right side of the unit for connection of a Temperature cable. Temperatures are simulated for both YSI 400 and YSI 700 probe types. There are seven different temperatures selectable for each.

ECG Function


The ECG output is performed by a 12-bit Digital to Analog converter. All waveforms for the standard ECG and Arrhythmias are generated via data stored in the program.

Respiration Function

A 12-bit Digital to Analog converter is used to generate the respiration waveform. The respiration output is present on the LA ECG lead only. Refer to Monitor manual to determine which lead the Monitor uses for respiration. It may be necessary to reverse the LA and LL leads for respiration to be detected.

RUNNING A TEST

Depending on the model, there are up to 9 Basic Test Modes and 3 Sub-Test Modes. This section will walk through each of the tests and their basic operation.


The Main Tests are accessible with a single key. The  key will scroll through the following tests in a continuous loop:

- Adult 120/80
- Adult 120/80 w/Pace
- Adult High 190/120
- Adult Low 80/40
- Neonatal 70/40
- Alarm Test
- Arrhythmia Seq
- Leak Test
- Manometer

BASIC TEST MODES

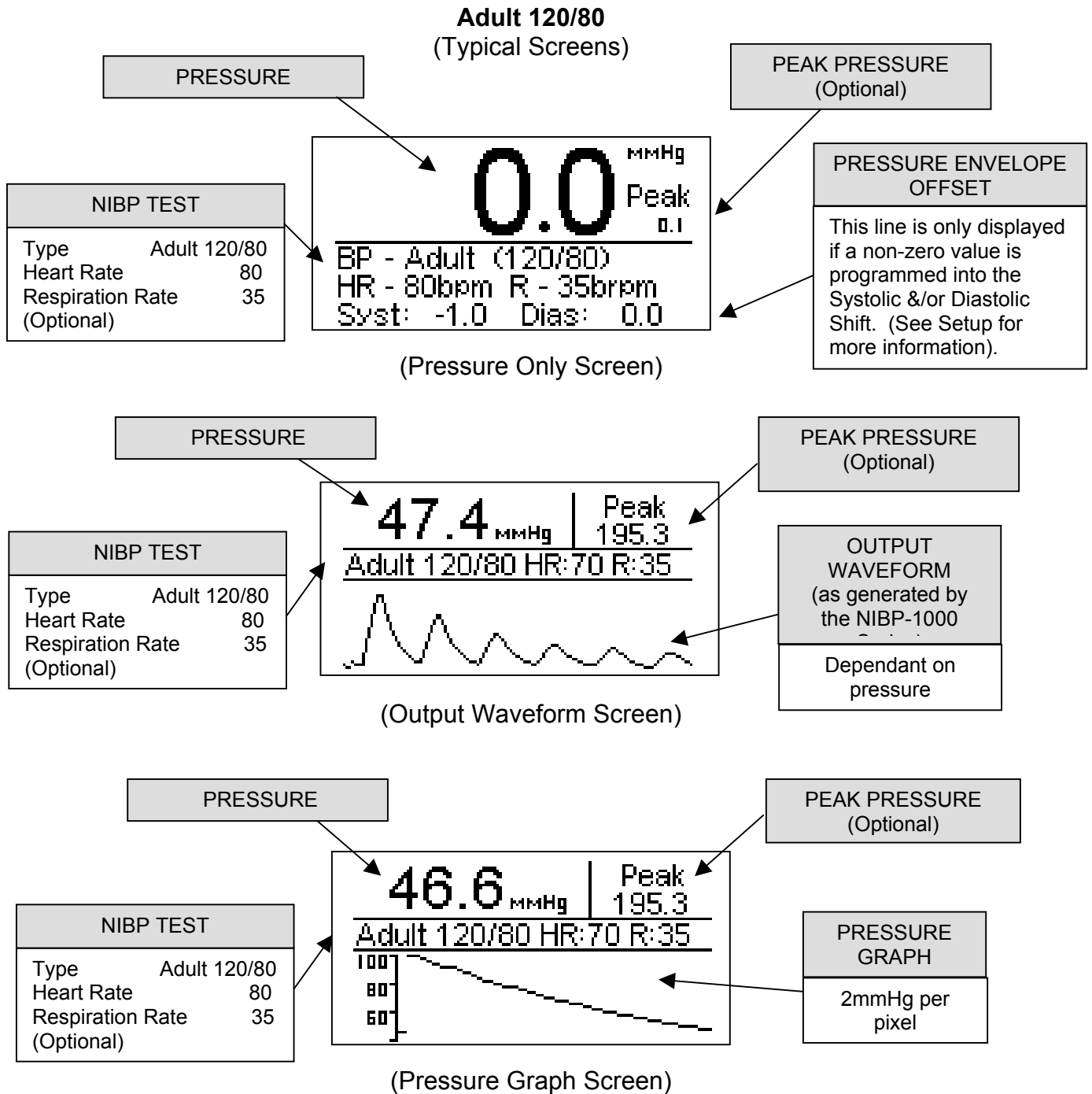
NIBP:

The first 5 test modes deal with various NIBP setups. To run an NIBP simulation, the cuff and monitor are connected to the pressure input. Then the measurement is initiated by the monitor and the NIBP-1000 unit will output the proper waveform based on the cuff pressure provided by the monitor and the selected simulation.

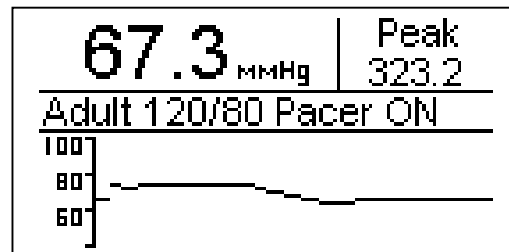
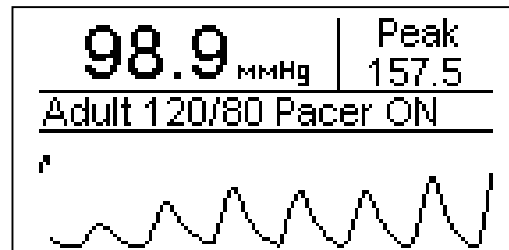
The NIBP output mode can be changed by pressing the  key. Once the desired operating mode is selected, the output will automatically begin when the correct pressure is detected.

There are 5 selectable NIBP Basic Test Modes; Adult, Adult w/pace, Adult High, Adult Low and Neonatal. The displays will resemble the following examples:

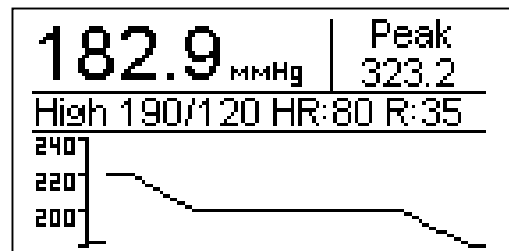
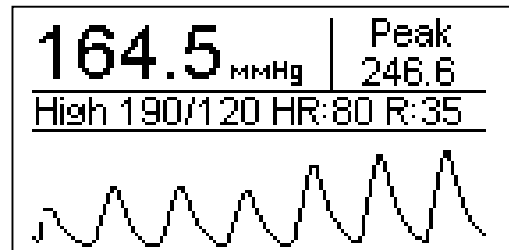
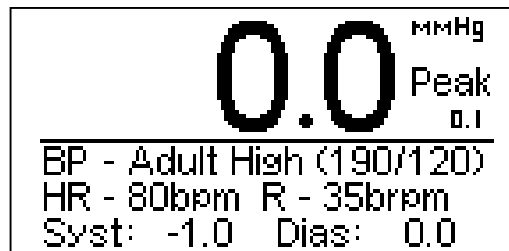
NOTE: The screens for the first test will have the individual components labeled. The component labels for subsequent tests are the same.



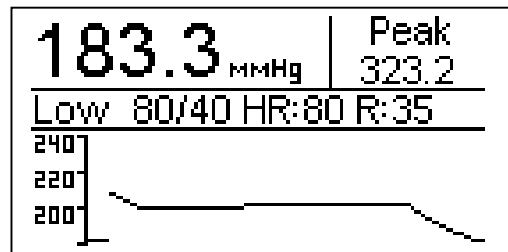
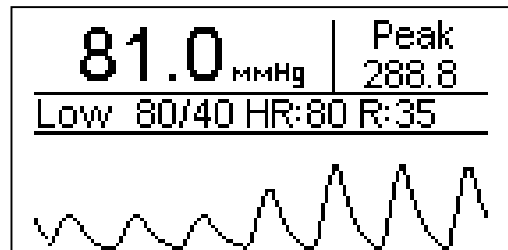
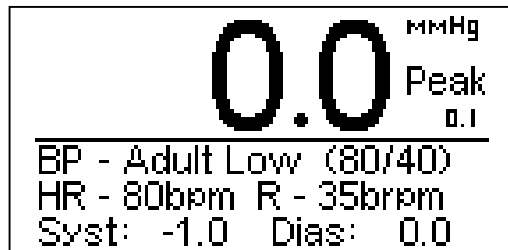
Adult 120/80 with Pace
(Typical Screens)



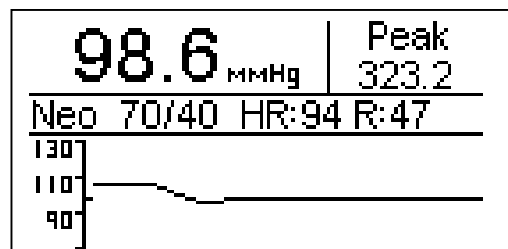
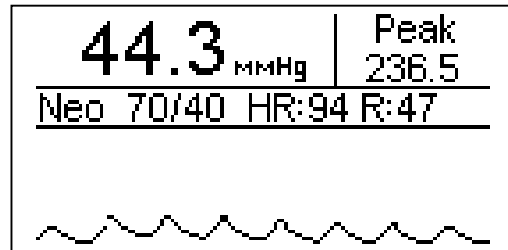
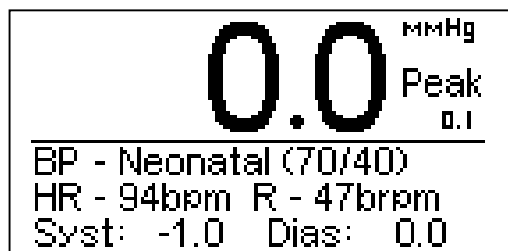
Adult High 120/80
(Typical Screens)




Adult Low 80/40
(Typical Screens)



Neonatal 70/40
(Typical Screens)

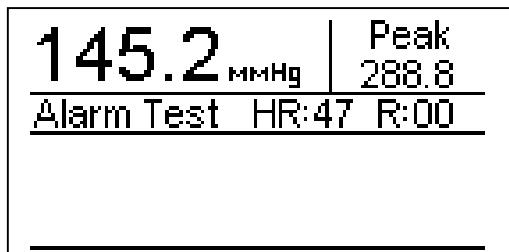
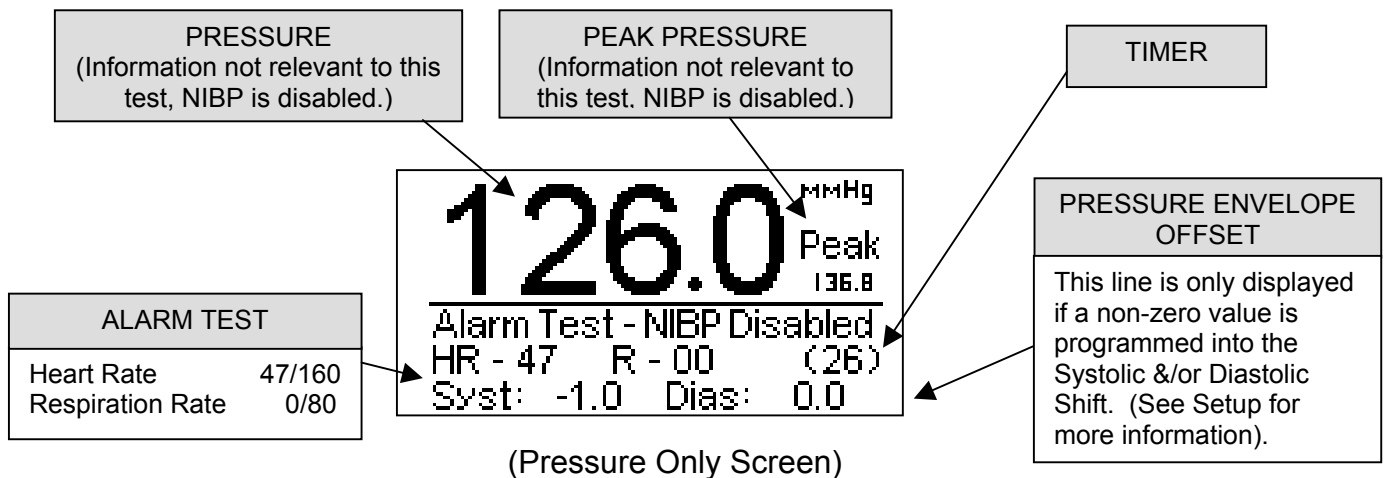


ALARM TEST:

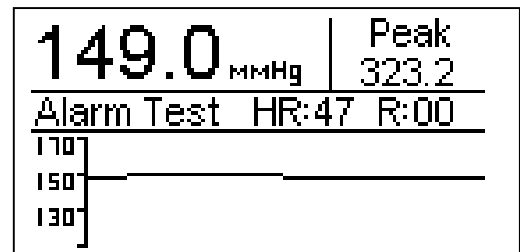
Use the  key to cycle through the Test Modes until Alarm Test appears. The purpose of this function is to help test the alarms of the monitor under test. The ECG output will alternate from a 47 BPM NSR with apnea respiration (0 brpm) to 160 BPM NSR with 80 brpm respiration. The time interval between alternations is 30 seconds. A count down timer is displayed to indicate the time still remaining for the current output.

NOTE: While in this mode, the NIBP simulation output is disabled.

The displays will resemble the following examples: (Typical Screens)




(Output Waveform Screen)



(Pressure Graph Screen)

ARRHYTHMIA SEQUENCE: (NIBP-1030 Only)

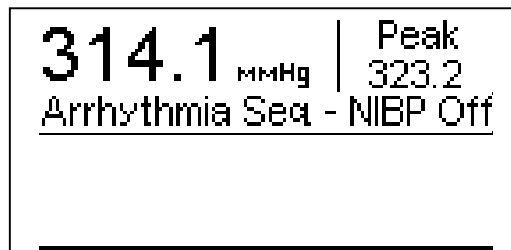
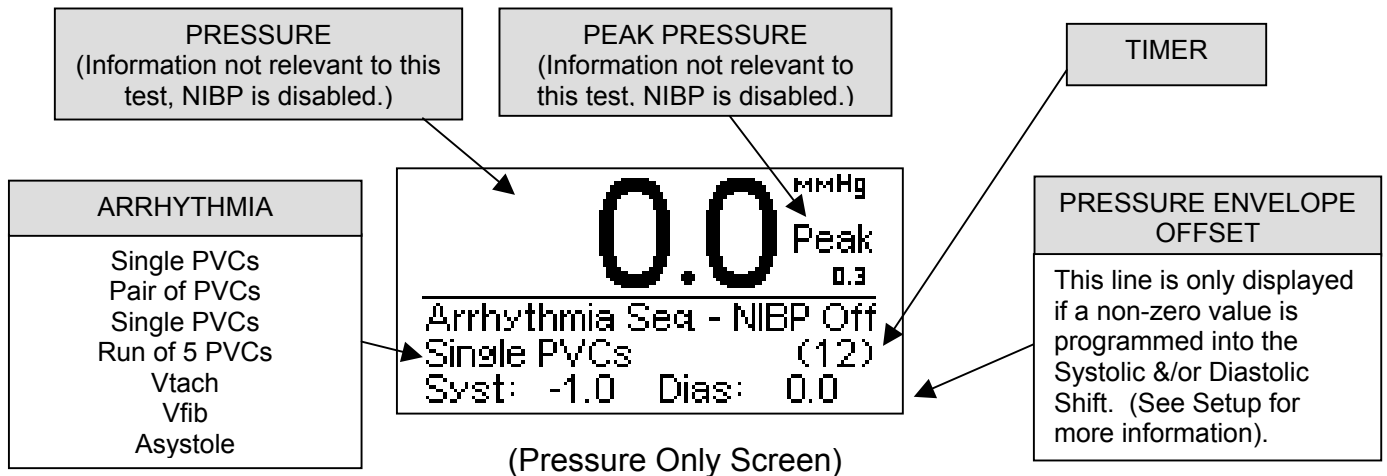
Use the  key to cycle through the Test Modes until Arrhythmia Sequence appears.

The purpose of this function is to provide a timed sequence of some of the more common Arrhythmias. The test will continually cycle through the 6 arrhythmias in the sequence listed below. A count down timer is displayed to indicate the time still remaining in each step.

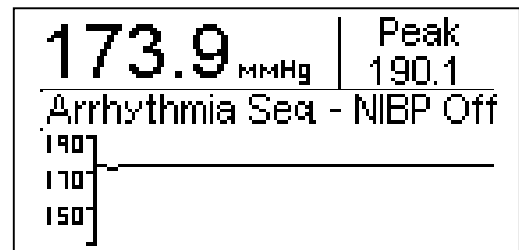
NOTE: While in this mode, the NIBP simulation output is disabled.

Step	Display	Total Time	ECG Output
1	Single PVCs	18 sec	11 NSR, 1 PVC, 11 NSR, 1 PVC
2	Pair of PVCs	9 sec	10 NSR, Pair of PVCs
3	Single PVCs	18 sec	11 NSR, 1 PVC, 11 NSR, 1 PVC
4	Run of 5 PVCs	12 sec	11 NSR, Run of 5 PVCs
5	Vtach	30 sec	15 NSR, VTach
6	Vfib	30 sec	15 NSR, VFib
7	Asystole	30 sec	15 NSR, Asystole

The displays will resemble the following examples: (Typical Screens)





(Output Waveform Screen)



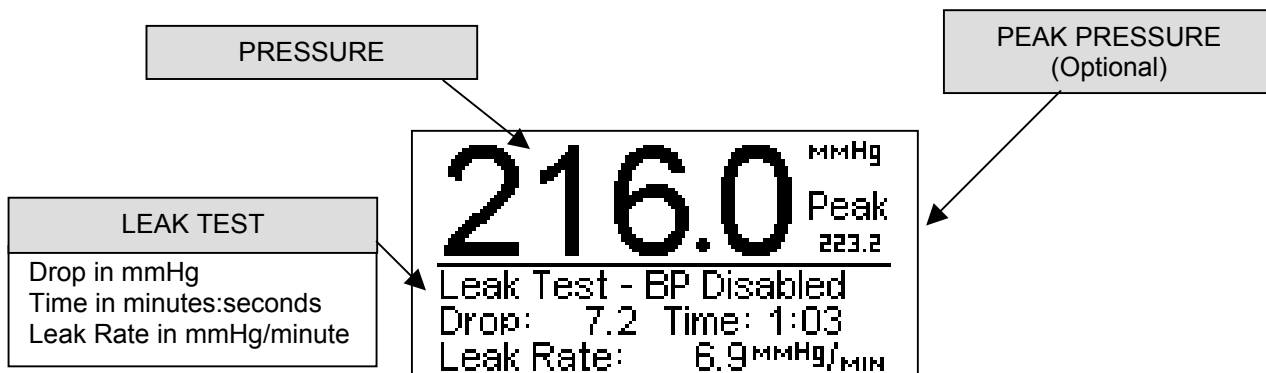
(Pressure Graph Screen)

LEAK TEST: (NIBP-1030 Only)

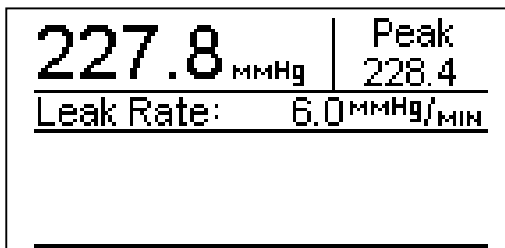
Use the  key to cycle through the Test Modes until Leak Test appears. The purpose of this function is to provide a standard pressure leak test. The pressure input is connected to the system that is to be monitored. Pressure is then applied to the system. The Leak Test is initiated by pressing the  key. The unit traces and displays the pressure drop and the time since the test was initiated. It also, calculates and displays the leak rate in mmHg per minute.

NOTE: While in this mode, the BP simulation outputs are disabled.

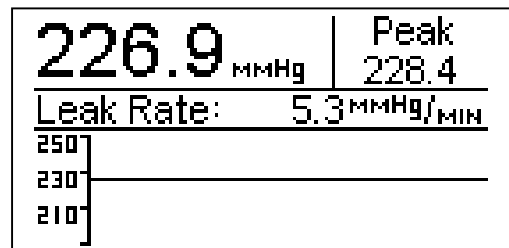
The displays will resemble the following examples: (Typical Screens)



(Pressure Only Screen)




(Output Waveform Screen)



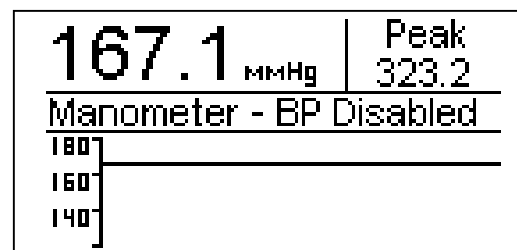
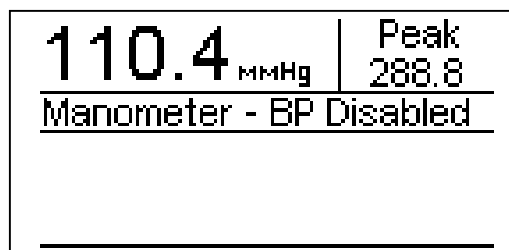
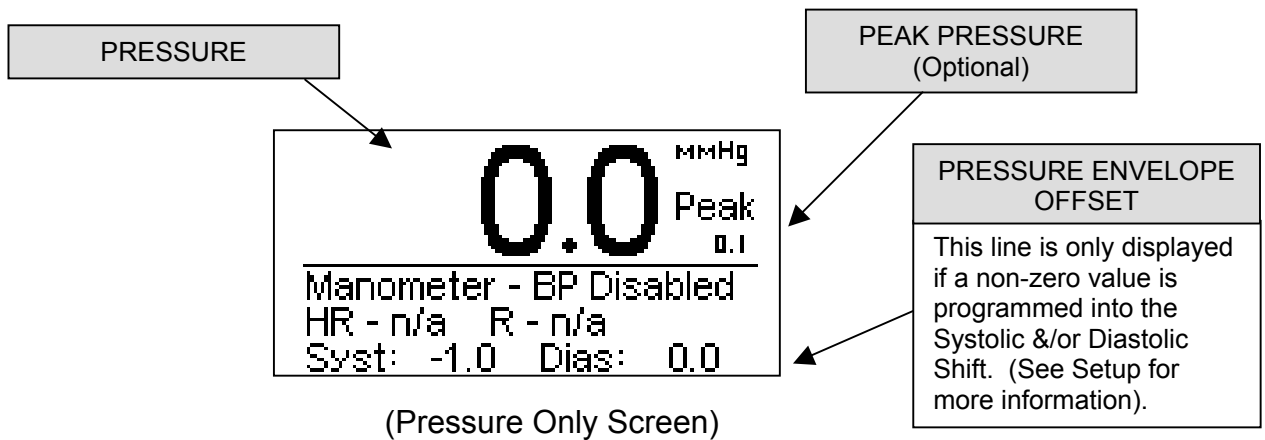
(Pressure Graph Screen)

MANOMETER:

Use the  key to cycle through the Test Modes until Manometer appears. The purpose of this function is to allow the unit to be used strictly as a Manometer with a full scale range of +/- 500 mmHg.


NOTE: The Graphic Screens are also available in this mode for maximum flexibility

The displays will resemble the following examples: (Typical Screens)

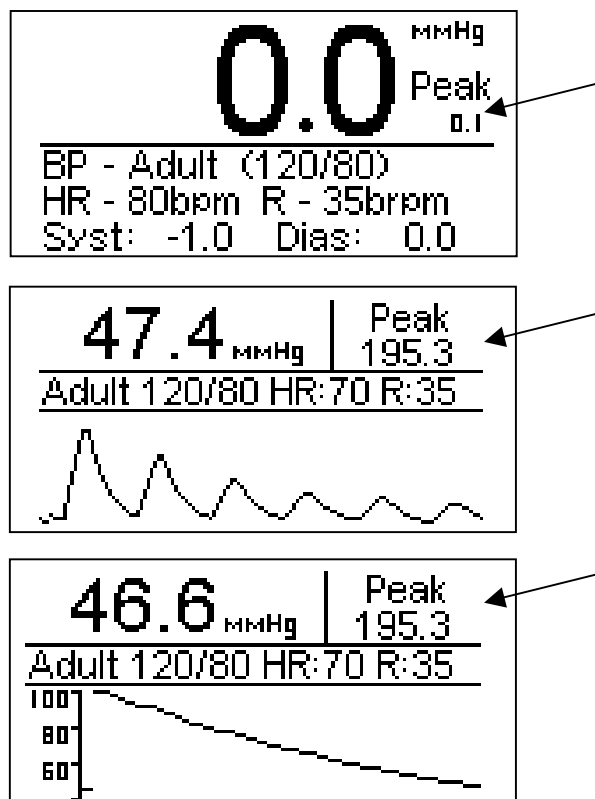


SUB TEST MODES



PEAK: (Optional)

The optional Peak test feature is available whenever the display is in a pressure mode. It will continuously monitor the pressure input and display and hold the maximum value. This value may be reset at any time by pressing the  key.

The displays will resemble the following examples: (Typical Screens)

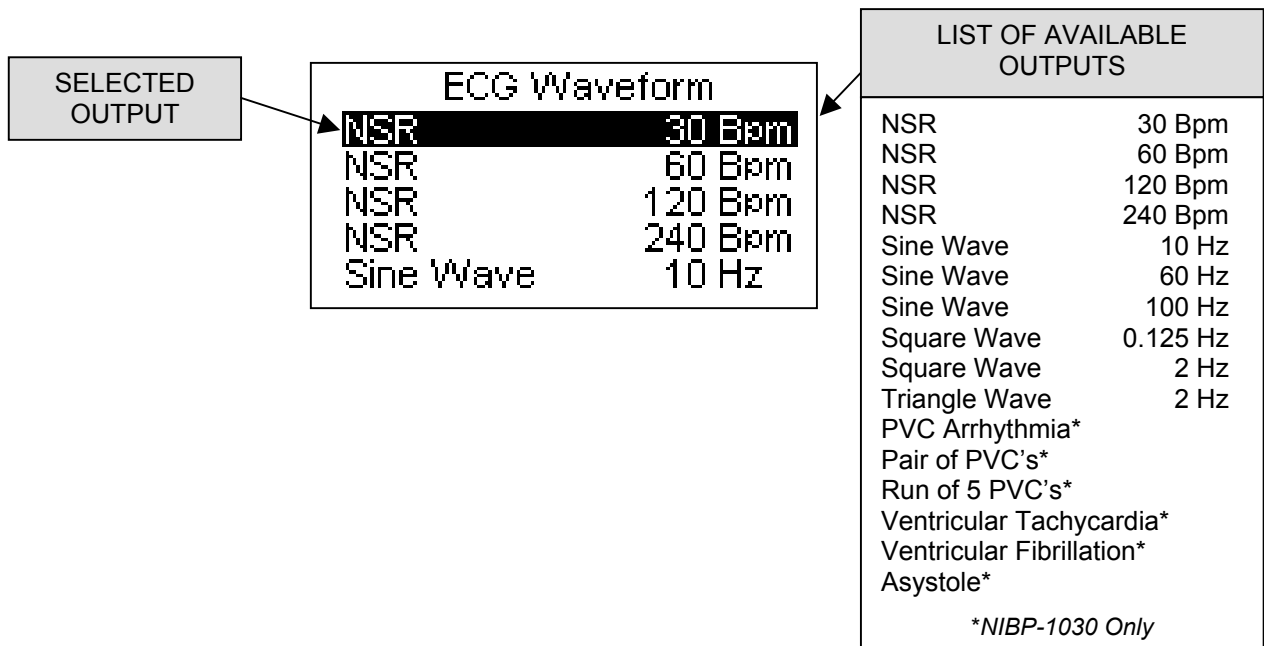


ECG PERFORMANCE TEST: (NIBP-1020 & NIBP-1030)

The ECG output is selected by pressing  until the ECG Waveforms menu is displayed. The  key is used to choose the desired ECG output. There are 16 fixed waveforms available.

NOTE: While in this mode, the NIBP simulation is disabled, but the IBP simulation is active (NIBP-1030 only).

The display will resemble the following example:



DYNAMIC IBP: (NIBP-1030 Only)

The IBP output matches the NIBP setting in the NIBP mode or the ECG setting in the ECG Waveform mode.

NOTE: The IBP sensitivity (5 $\mu\text{V}/\text{V}/\text{mmHg}$ or 40 $\mu\text{V}/\text{V}/\text{mmHg}$) must be correctly selected in the SETUP Mode before using IBP. (See Setup section for more information.)

STATIC IBP: (NIBP-1030 Only)

A static Blood Pressure output may be selected in the SETUP mode. This fixed value will remain on the IBP output until changed.

NOTE: The IBP sensitivity (5 $\mu\text{V}/\text{V}/\text{mmHg}$ or 40 $\mu\text{V}/\text{V}/\text{mmHg}$) must be correctly selected in the SETUP Mode before using IBP. (See Setup section for more information.)

System Setup	
1) Systolic Shift	0.0
2) Diastolic Shift	0.0
3) Static BP	0 mmHg
4) IBP Sen	5 $\mu\text{V}/\text{V}/\text{mmHg}$
5) Temp	42.0 C 107.6 F

TEMPERATURE SIMULATION: (NIBP-1030 Only)

The temperature setting can be selected in the SETUP mode. This fixed value will remain on the Temperature output until changed. The output will simulate both YSI 400 and YSI 700 Temperature probes.

NOTE: Both outputs are available at the output connector simultaneously.

System Setup		
1) Systolic Shift		0.0
2) Diastolic Shift		0.0
3) Static BP		-10 mmHg
4) IBP Sen	5 uV/V/mmHg	
5) Temp	0.0 C	32.0 F

MANUAL REVISIONS

<u>Revision #</u>	<u>Program #</u>	<u>Revisions Made</u>
Rev 01	DT7355CA	Origination
Rev 02	DT7355CA	Specification Information Updated
Rev 03	DT7355CA	Miscellaneous Edits
Rev 04	DT7355CF	Add Systolic/Diastolic adjustments
Rev 05	DT7355CG	Output Selection edited
Rev 06	DT7355CI	Miscellaneous Edits
Rev 07	DT7355CI	Warnings, Cautions, Notices Updated
Rev 08	DT7359CA	NIBP-1030, IBP, ECG Arrhythmia Waveforms Added
Rev 09	DT7359CA	Temperature Added
Rev 10	DT7359CA	Temp Connector Updated, Static 120 Added

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

NIBP-1010

Blood Pressure	
RANGE	0-500 mmHg @ 20°C
ACCURACY	+/- (1% of Reading + .5 mmHg)
RATE	80, 94 bpm
ACCURACY	+/- 1%

Physical	
DISPLAYS	LCD Graphical 128 X 64 Pixels
ENCLOSURE	7 x 5 x 4 Inches (177.8 x 127.0 x 101.6 mm) ABS Plastic
WEIGHT	< 3 Lbs (< 1.36 Kg)
FACE PLATE	Lexan, Back printed
OPERATING RANGE	15 to 40 C
STORAGE RANGE	-20 to 65 C

Electrical	
BATTERY ELIMINATOR	12VDC, 500mA 
BATTERY (OPTIONAL)	6 AA NiMH Rechargeable (Not user serviceable)
BATTERY RUNTIME	500 Test Cycles between charges
BATTERY STORAGE LIFE	1 Year from full charge

NIBP-1020

Blood Pressure	
RANGE	0-500 mmHg @ 20°C
ACCURACY	+/- (1% of Reading + .5 mmHg)
RATE	80, 94 bpm (synchronized to ECG)
ACCURACY	+/- 1%

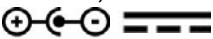
ECG NSR	
RATE	30,60,120,240 BPM
ACCURACY	+/- 1%
AMPLITUDE	2.75 mV
ACCURACY	+/- 2% @ Lead II

ECG Performance	
SINE WAVE	10,60,100 Hz
SQUARE WAVE	0.125, 2.000 Hz
TRIANGLE WAVE	2.000 Hz
RATE ACCURACY	+/- 1%
AMPLITUDE	2.75 mV
AMPLITUDE ACCURACY	+/- 2% @ Lead II

Pacemaker Waveforms	
AMPLITUDE	3 mV
ACCURACY	+/- 10%
WIDTH	6 ms
ACCURACY	+/- 5%

Respiration	
RATE ACCURACY	+/- 1%
IMPEDANCE DELTA	3.0 ohms
ACCURACY	+/- 10%
BASELINE	1000 ohms
ACCURACY	+/- 5%

Physical	
DISPLAYS	LCD Graphical 128 X 64 Pixels White LED Backlight
ENCLOSURE	7 x 5 x 4 Inches (177.8 x 127.0 x 101.6 mm) ABS Plastic
WEIGHT	< 3 Lbs (< 1.36 Kg)
FACE PLATE	Lexan, Back printed
OPERATING RANGE	15 to 40 C
STORAGE RANGE	-20 to 65 C

Electrical	
AC POWER ADAPTER	12VDC, 500mA 
BATTERY (OPTIONAL)	6 AA NiMH Rechargeable (Not user serviceable)
BATTERY RUNTIME	500 Test Cycles between charges
BATTERY STORAGE LIFE	1 Year from full charge

NIBP-1030

Blood Pressure	
RANGE	+/- 500 mmHg @ 20°C
ACCURACY	+/- (1% of Reading + .5 mmHg)
RATE	80, 94 bpm (synched to ECG)
ACCURACY	+/- 1%

Invasive Blood Pressure	
STATIC PRESSURE	-10,-5,0,20,40,50,60,80,100,120,150,160,200,240,250,300,320,400 mmHg
ACCURACY	+/- (1% Full Range + 1 mmHg) or +/- (2% Setting + 2 mmHg) whichever is better
IMPEDANCE	300 ohms
ACCURACY	+/- 10%
EXCITATION RANGE	2 to 16 V RMS
EXCITATION FREQUENCY	DC to 5 KHz
SENSITIVITY	5 or 40 μ V/V/mmHg

ECG NSR	
RATE	30,60,120,240 BPM
ACCURACY	+/- 1%
AMPLITUDE	2.75 mV
ACCURACY	+/- 2% @ Lead II

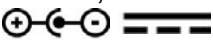
ECG Performance	
SINE WAVE	10,60,100 Hz
SQUARE WAVE	0.125, 2.000 Hz
TRIANGLE WAVE	2.000 Hz
RATE ACCURACY	+/- 1%
AMPLITUDE	2.75 mV
AMPLITUDE ACCURACY	+/- 2% @ Lead II

Pacemaker Waveforms	
AMPLITUDE	3 mV
ACCURACY	+/- 10%
WIDTH	6 ms
ACCURACY	+/- 5%

Respiration	
RATE ACCURACY	+/- 1%
IMPEDANCE DELTA	3.0 ohms
ACCURACY	+/- 10%
BASELINE	1000 ohms
ACCURACY	+/- 5%

Temperature	
Temperature	0,24,30,37,40 C (32.0, 75.2,86.0,98.6,104.0 F)
Accuracy	+/- 0.1 C
Type	YSI Series 400 and 700

Physical	
DISPLAYS	LCD Graphical 128 X 64 Pixels
ENCLOSURE	7 x 5 x 4 Inches (177.8 x 127.0 x 101.6 mm) ABS Plastic
WEIGHT	< 3 Lbs (< 1.36 Kg)
FACE PLATE	Lexan, Back printed
OPERATING RANGE	15 to 40 C
STORAGE RANGE	-20 to 65 C

Electrical	
AC POWER ADAPTER	12VDC, 500mA 
BATTERY (OPTIONAL)	6 AA NiMH Rechargeable (Not user serviceable)
BATTERY RUNTIME	500 Test Cycles between charges
BATTERY STORAGE LIFE	1 Year from full charge

NOTES