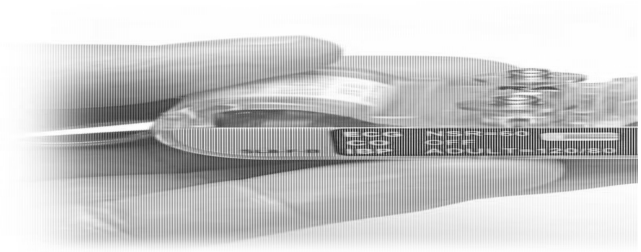

PRONK TECHNOLOGIES SimSlim Multi Parameter Patient Simulator Instruction Manual

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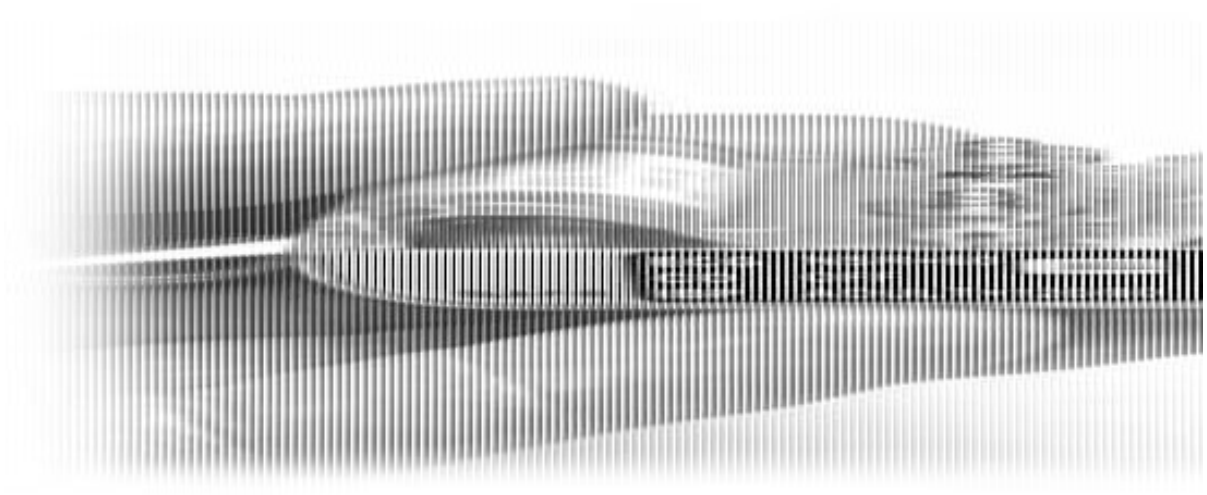

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CE

CAUTION:
Risk of explosion if lithium battery is replaced by an incorrect type. Dispose of used batteries according to country and state specific laws and regulations.

Compliant products conforming to the relevant standards and directives required for CE have a CE Mark label, as shown above, affixed to the unit. Do not dispose of this product as unsorted waste. To dispose, contact Pronk Technologies at support@pronktech.com. A Return Material Authorization will be issued to return the unit for disposal.

Contact Us

- Sales: 800-609-9802
- Technical Support: 800-541-9802
- FAX: 818-768-5606
- Support Email: support@pronktech.com
- Website: www.pronktech.com
- Ship-to Address: Pronk Technologies
  8933 Lankershim Blvd.
  Sun Valley, CA 91352
  U.S.A.

Introduction

The SimSlim® Multi-Parameter Patient Simulator is compact, rugged, and easy to use with the following features:

- ECG, Respiration and Pacer Simulation via 10 snaps/banana plugs on a patented interface
- 4 Invasive Blood Pressure Channels via four 6-pin mini-din connectors
- Cardiac Output Simulation
- YSI 700 and 400 Temp Simulation via two 3.5mm stereo jacks
- Up to 10-year battery life (no charging or changing required)
- Simple, single-button operation
- 4mm and 1/8″ banana plug grooves for easy hookup to a 12-lead cart
- 50+ different selectable simulations

Getting Started

Please refer to each parameter section in this manual for more detailed operational information.

1. You never have to turn the SimSlim Simulator on.
The SimSlim Simulator runs all day, every day for up to 10 years (depending upon how often the LEDs are lit and the duration of the mode selected) on its internal battery.

2. Mode Selection
The label on the front face has 5 blue boxes, each with an LED. Each box represents a different mode.
• To show the current mode, click the MODE button.
• To change the mode, double click the MODE button.
• After two hours with no button presses, the SimSlim Simulator will return to the ECG NSR/ADULT mode.

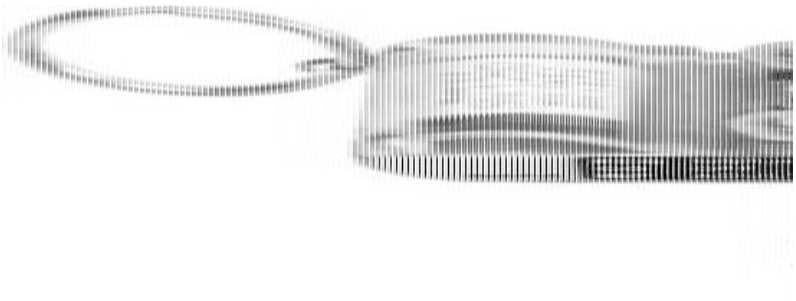
3. Waveform Selection within a Mode
Some of the SimSlim Simulator modes contain multiple waveforms:
• An example of this is ARR MODE 1 which has NSR with PVCs, VTACH, VFIB and Asystole waveforms.
• These waveforms are listed on the bottom label.
• To change between waveforms within a mode, click the mode button once.

4. Zeroing Invasive Blood Pressures
Click the mode button once to zero all blood pressures for 15 seconds, then zero the monitor within those 15 seconds. After 15 seconds, the blood pressures will return to their prior values.
• You may shorten the 15 second wait time to resume IBP simulation mode by pressing the MODE button once at any time after zeroing the monitor.

5. Cardiac Output Readings
• Double click the mode button to select the desired C.O. mode.
• Enter into the patient monitor the appropriate computational constant determined by referencing the injectate temperature listed on the CC table on the bottom label of the SimSlim.
• Hold the mode button for 2 seconds to start a simulated C.O. injection.
• Mode 5 C.O. simulation of 5 l/min @ 2° C Ti requires CC = 0.542.
2° Celsius injectate simulator is available for testing Philips Healthcare patient monitor with thermodilution Cardiac Output, part number 501-0502.

Detailed ECG Operation

Connecting the ECG Leads
ECG lead wires with snaps can be connected directly to the SimSlim Simulator snaps. The snaps are clearly labeled with the name and color code of the lead. If your lead wires have banana plugs rather than snaps, the banana plugs are slid into the grooves under the snap such that the metal part of the plug is against the underside of the snap. Two different sizes of grooves (4mm and 1/8″) are provided for the banana plugs.



• ECG Size
ECG size is 1mV, Lead II, in ECG NSR MODE. Resp size is 4.0 Ohms in ECG NSR, ECG NEO and HR STEPS MODES.

• ECG NSR MODE
Simulates a patient with a NSR waveform at 60 BPM. Resp is at 30 BPM.

• ECG NEO MODE
Simulates a patient with a NSR waveform at 140 BPM. Resp is at 70 BPM.

• HR STEPS MODE
This mode offers a selection of heart rates and resp rates. The rates available are shown on the bottom label of the unit and are 30, 60, 90, 120, 160, 200, and 240 BPM. When entering this mode, the HR will be 30 BPM. Click the MODE button to advance to the next HR. In this mode, the resp rate is always ½ of heart rate.

• ARR MODE 1
This mode is a cardiac failure sequence, which starts out as NSR with scattered PVCs, and then progresses to VTACH, VFIB, and Asystole. Click the MODE button to advance from one waveform to the next. The waveform will not advance until you click the MODE button. This mode is designed to give biomedical engineers a simple way to test all life-critical arrhythmia alarms. The waveform sequence is shown on the back of the unit. In this mode, Resp rate is always zero.

• ARR MODE 2
In this mode, a selection of different arrhythmia waveforms is available. These waveforms are listed on the back of the unit and are: Bigeminy, Pacer, Trigeminy, ST elevation, 2nd Degree block, and 1mV square wave. When entering the mode, the waveform will be Bigeminy. Click the MODE button to advance to the next waveform. The waveform will not advance until you click the MODE button. In this MODE, Resp rate is always zero.

Detailed Invasive Blood Pressure Operation

• Connecting the Cables
You will need a monitor-specific cable to connect the SimSlim Simulator IBP simulation ports to your monitor. A

variety of these cables are available from Pronk Technologies and other sources. Pronk's cables are supplied as a 6′ (1.8 m) extension cable which connects to a 6″ (15cm) adapter cable. Most simulator cables with 6-pin mini-din connectors should work, as the 6-pin mini-din simulator IBP pin-out is fairly standard. Wiring is as follows:
+ Excit = pin 1, – Excit = pin 4, + Sig = pin 3, -Sig = pin 6. Contact Pronk Technologies Inc. at **800-541-9802** for more information.
The IBP simulation ports are labeled on the bottom of the unit.

• Zeroing Simulated Blood Pressures
In all modes except IBP STEPS, clicking the mode button will force all four IBP channels to OmmHg for 15 seconds. If you desire to return to normal operation prior to the 15 second timeout, a second MODE button click will 'unzero' all channels.

• Sensitivity
The SimSlim Simulator simulates 5uV/V/mmHg transducers.

• ECG NSR MODE
Simulates a NSR adult patient at 60 BPM with:
o ART pressure on P1 of 120/80
o PA pressure on P2 of 30/10
o LV Pressure on P3 of 125/15
o CVP Pressure on P4 of (6) Mean

• ECG NEO MODE
Simulates a NSR neonatal patient at 140 BPM with:
o ART pressure on P1 of 60/30
o PA pressure on P2 of 20/10

o LV Pressure on P3 of 60/5
o CVP Pressure on P4 of (2) Mean

• 100 mmHg MODE
Simulates static 100mmHg on all four channels.

• 200 mmHg MODE
Simulates static 200mmHg on all four channels.

• IBP STEPS MODE
In this mode, a selection of static blood pressures is available on all four channels.
o The pressures available are shown on the bottom of the unit and are 0, 25, 50, 100, 150, 200, and 250mmHg.
o When entering the mode, the pressure will be OmmHg, so zero the monitor while in this step. Click the MODE button to advance to the next pressure step.

Detailed Cardiac Output Operation

• Connecting the Cables
The SimSlim Simulator is designed to operate without a custom C.O. cable. Instead, use the monitor's standard C.O. cable. The connections are as follows:
1. Connect the monitor's C.O. cable to the monitor.
2. Connect the catheter connector on the C.O. cable to the C.O. port on the SimSlim Simulator.
3. Make sure the normal injectate temp sensor is connected to the C.O. cable. The injectate temp sensor should be left at room temperature. It does not need to be placed in a bath of any kind, but for best results, place it where the temperature will be at a relatively stable room temperature (e.g., not directly under a hot lamp or in your hand).

• Reading the Injectate Temperature
With the cables connected correctly, you should be able to read the room temperature as measured by the injectate probe from the monitor.

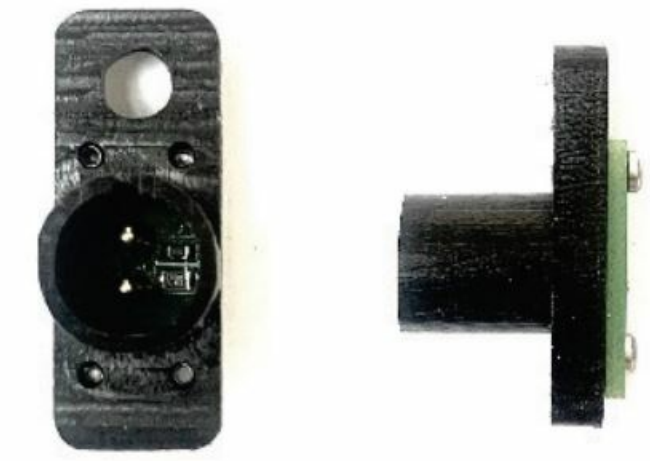
• Looking up the Computation Constant (C.C.) Value

- Once you know the current injectate temp, you can look up the C.C. value from the table on the back of the SimSlim Simulator.
- Once you have the correct C.C. value, enter it into the monitor.
- The granularity of the C.C. table on the SimSlim Simulator can introduce up to a 5% error in the readings. This should be fine for most applications, but if you want better precision you can interpolate between values.
- For example, if your injectate temp were 25.5 °C, you would look up the value for 25° C (0.500) and the value for 26° C (.545), and split the difference (0.522).
  o If you want to use an injectate temp value that is not on the table, you can calculate the correct C.C. value according to C.C. = 6/(37-Ti).

• Selecting the Simulation Mode

- Referring to the label on the side of the SimSlim, navigate the modes by double clicking the MODE button to select the proper mode to simulate the intended 3, 5 or 7 l/m simulation.
- In Mode 5, SimSlim has a 5 l/m Cardiac Output simulation available that utilizes a 2° Celsius injectate value with a computational constant of 0.542. For using this mode when testing Philips Healthcare monitors with thermodilution cardiac output, an injectate simulator is available by ordering part number 501-0502 as shown below in Figure 1.

Figure 1



• Starting a Simulated Injection
To start a simulated injection, hold the MODE button down for 2 seconds. When the injection starts, the LED will flash. If you are performing C.O. simulations for an extended period of time, keep in mind that the injectate temperature may drift and the C.C. value may have to be updated from time to time for best accuracy.

• Using an Injectate Temp Simulator
It is possible to use an injectate temp simulator rather than the actual injectate temp probe. Unfortunately, different

monitor vendors use a wide variety of thermistors and connectors for injectate temperature. Pronk Technologies has an Injectate Simulator available for testing Philips and GE healthcare monitors. One additional solution would be to fabricate an injectate temp simulator locally from an injectate probe and some resistors. Some vendors use YSI 400 or YSI 700 thermistors for injectate temp. In these cases, the internal YSI temp simulator in the SimSlim Simulator can be used.

Detailed YSI Temp Operation

• Connecting the Cables
The SimSlim Simulator has two 3.5 mm temp ports. The upper port is
YSI 400 and the lower port is YSI 700. Included with the SimSlim Simulator are a 3.5mm male-to-male stereo extension cable and a 3.5mm to ¼" stereo plug converter. This should be all you need to simulate temperature on monitors which use ¼" or 3.5mm stereo jack connectors for temperature monitoring. Some monitors use different connectors, and these will require additional adaptors.

• Selecting the Simulated Temperature
Move the slide switch to select the desired temperature simulation values.

Troubleshooting Tips

SYMPTOM	SOLUTION
Not calling VTACH or VFIB	Some arrhythmia systems will not call VTACH on a straight jump out of clean NSR. At the start of ARR MODE 1, the NSR section has some PVCs and runs mixed in. In some cases, it may be necessary to let the arrhythmia system see some of these PVCs prior to transitioning into VTACH.
I am trying to advance quickly through the waveforms, but sometimes, I accidentally change the mode.	For rapid single clicking, watch the LED. If you click a second time while the LED is still on, this will be seen as a double click, which will change the mode. If you click a second time just after the LED has gone out, it will be seen as a second single click, which will advance the waveform.
Misshapen or undersized ECG waveform	With Hardware E6 and prior, some monitors will occasionally have interaction between the IBP and ECG. Unplug IBP to work around the problem. On E7 hardware, touching the metal shell of an IBP connector and an ECG snap at the same time can cause waveform interaction.
Not picking RESP waveform	Most monitors look for respiration drive across RA/LA leads. Some do not. If RESP waveform is not picking, try swapping the RL and LL leads. Please keep in mind that RESP is zero in ARR MODE 1 and ARR MODE 2.
No heart rate on EASI-configured telemetry	When viewing AVR or V2 lead, change the V lead to V6 snap.
Unable to resolve problem	Contact Support at: support@pronktech.com or (800) 541-9802.

Service Item	Description	Price
Annual SimSlim Calibration*	Full checkout, adjustment, and calibration certificate	Please email support@pronktech.com or call (800) 541-9802
SimSlim Rejuvenation	Full checkout, replacement of visually worn parts, batteries, and calibration certificate	Please email support@pronktech.com or call (800) 541-9802

*Pronk Technologies recommends an annual calibration interval. If Out of Tolerance Events for ECG amplitude and/or Cardiac Output simulation after year 5 of usage are of concern for customers on this device, preventative replacement of the main battery should be performed. We recommend battery replacement for any customers concerned about OOT events at/after year 5 based on the date stamp on the primary battery. SimSlim reliability operation in specification of all parameters up to year 10 without battery replacement is approximately 94%.

SimSlim Simulator Limited Warranty

The SimSlim Simulator is warranted against defects in materials and workmanship for a period of forty-eight (48) months from the date of shipment to the original purchaser. Warranty is valid only to the original buyer. Defective equipment should be returned freight prepaid to Pronk Technologies. Equipment returned with defective parts and assemblies shall be either repaired or replaced at the manufacturer's sole discretion. This warranty is not applicable if the unit has been opened, if repair has been attempted, if the unit has been damaged due to operation outside the environmental and power specifications for the product, or due to improper handling or use. If any fault develops, notify Pronk Technologies (see Returns and Repairs, below) giving full details of the difficulty, and include the model and serial number of the device. Upon receipt of shipping instructions, forward the device prepaid and repairs will be made at the factory.

The foregoing warranty is in lieu of all other warranties expressed or implied, including but not limited to any implied warranty or merchantability, fitness or adequacy for any particular purpose or use. Pronk Technologies shall be liable only for repair or replacement of the SimSlim Simulator and optional features. Pronk Technologies shall not be liable for any incidental or consequential damages.

Order Cancellation and Refund Policy
You may return your item within 14 days of delivery for a full refund. We are unable to exchange items (however, if you received a defective or incorrect item, we will be happy to make an exchange). Item(s) returned for refund must be in its original condition, undamaged and with no missing parts, packed in its original packaging, and include both the original receipt and an RMA number.

We will notify you via e-mail or fax of your refund once we have received and processed the returned item. You can expect a refund in the same form of payment originally used for purchase within 7 to 14 business days of our receiving your return.

Returns and Repairs
Please call Pronk Technologies' Service Department at **800-541-9802** to obtain a Return Merchandise Authorization (RMA) number and the shipping address. Returns should be packaged securely in the original packaging materials. The RMA number should be clearly marked on the packaging. If the return is for a new item and is a result of our error, we will make arrangements for payment of return shipping. Otherwise, items should be returned freight prepaid to Pronk Technologies.

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References

- Biomedical Test Equipment Manufacturer | Pronk Technologies
- User Manual