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CereStim™ R96

Instructions for Use



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Overview and Intended Use

This manual contains information on the CereStim R96, a fully programmable 96-channel, neural stimulator. The figure below depicts typical setup configurations for the CereStim:

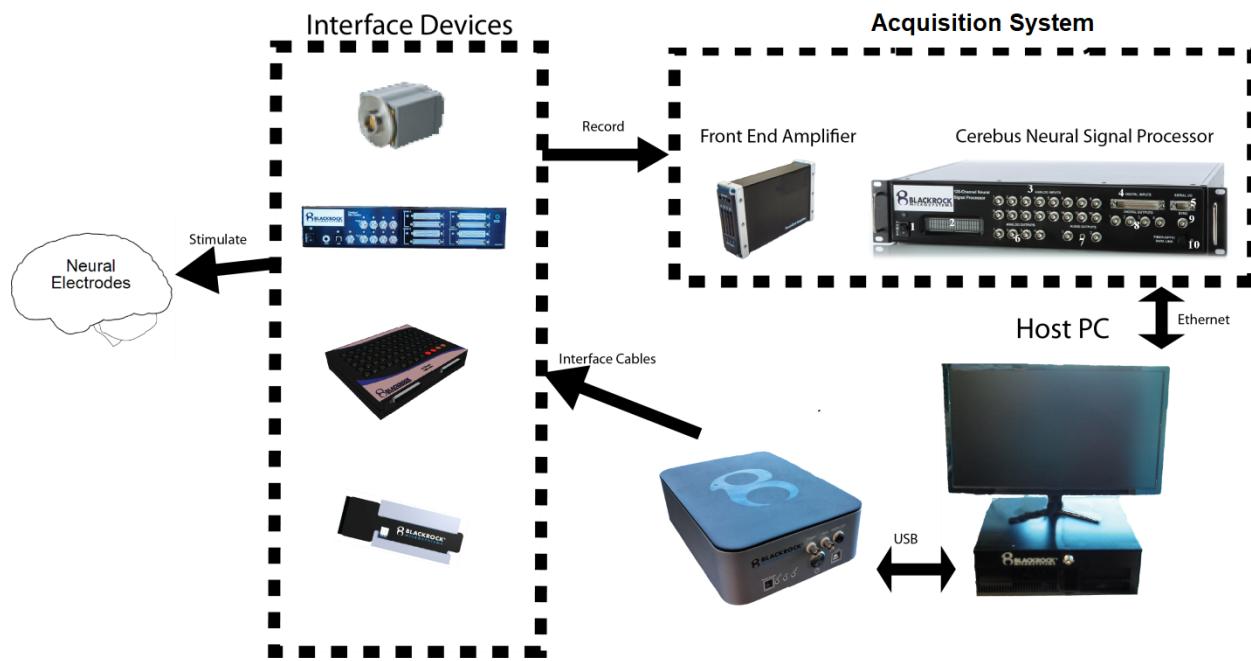


Figure 1—Typical setup and configurations for the CereStim

The CereStim R96 generates biphasic current pulses that are intended to stimulate neurons in proximity to a set of implanted microelectrodes or surface-contacting macroelectrodes.

This manual will cover the system requirements, associated software, and an overview of the system's hardware features.

This device is for research or investigational use only.

For questions on this product or any other Blackrock products, contact our 24/7 support service at support@blackrockmicro.com

Warnings and Precautions

- The CereStim R96 must only be used by highly qualified personnel trained in the use of cortical stimulation. This manual is to be used in support of device use by personnel who have received device training from Blackrock Microsystems.
- The CereStim R96 should not be used in chronic applications. The CereStim R96 is intended for acute (<30 days) operation only.
- Electro cautery should not be performed while the CereStim R96 is in use.
- The CereStim R96 should only be used with a computer that has been tested to IEC 60950 standards.
- Only use the CereStim R96 with electrodes that are within the impedance level specified by the part number of the stimulator.
- When in use, the CereStim R96 must be attended at all times by personnel trained in cortical stimulation.
- Do not change parameters while stimulation is in progress.
- The CereStim R96 stimulation parameters should only be used within the safe operating range of the specific electrode being used.
- Use only the supplied CereStim R96 components (i.e. External Power Supply). Substitution of components not supplied by Blackrock Microsystems may affect system performance and patient safety.
- Disconnect the CereStim R96 Stimulation System before defibrillation. The CereStim R96 is not defibrillator safe and should not be in use concurrently with a defibrillator.
- Do not use the CereStim R96 in the presence of flammable substances, including flammable anesthetic agents.
- Only connect CereStim R96 components to properly tested, grounded and dedicated AC outlets to reduce the risk of electrical shock. Do not use an adapter for ungrounded wall outlets.
- Do not use damaged components (i.e. cables, external power supply). Damaged components may compromise patient and/or operator safety.
- Do not connect the CereStim R96 to an outlet controlled by a wall switch.
- Avoid strong static discharges from sources like televisions or computer monitors as they can damage the electrical parts of the system.
- Keep the CereStim R96 away from liquids. Contact with water, shower spray, or wet surfaces can lead to the patient receiving an electrical shock and compromise patient safety.
- Do not unplug the power supply to the CereStim R96 while the system is in use.
- Do not connect/disconnect any cables to/from the CereStim R96 while the system is in use.
- Do not leave the CereStim R96 connected to the patient electrodes or other devices when the system is not in use.
- Do not change CereStim R96 Output Voltage values while connected to the patient. Doing so may result in an electric shock to the patient and compromise patient safety.
- Ensure that the CereStim R96 is securely positioned on a flat surface during use.
- Use caution when placing power cords, cables and other connectors to minimize the likelihood of tripping or accidentally pulling on cables. Damaged cables may result in failed ground connections.
- Connecting equipment to and from the CereStim R96 may result in a summation of leakage currents that can lead to the patient receiving an electric shock.
- It is highly recommended that automatic Microsoft updates be turned off on the PC connected to the CereStim R96. Updates that occur while the system is in use may interrupt stimulation and may not be compatible with the current version of the software.
- It is highly recommended that active and normal scanning with Anti-Virus Software be disabled on the PC connected to the CereStim R96. Anti-Virus software scans may interrupt stimulation.
- Do not connect to the internet while the system is in use.
- Care should be used in selecting equipment for connection to the Monitor port. Devices connected to this port must be isolated from earth ground in compliance with IEC 60601-1.

- The following options are recommended if there is a need to remediate system leakage current:
 - Redundant protective earth connection shall be made to either the medical device or the other equipment.
 - The other equipment shall be powered from a medical grade (IEC 60601-1 compliant) separating transformer.

The CereStim R96 should not be used if the device has been dropped. Dropping the device may cause damage to internal components that affect system performance and patient safety. A dropped device must be returned to Blackrock Microsystems for inspection and recalibration before it can be used again (See Section on Return Merchandise Authorization of the CereStim R96 User Manual).

Specifications

Number of Output Channels	96
Electrical Protection	Class II
Degree of Protection	Type BF Applied Part
Output Voltage	$\pm 4.7 - \pm 9.5V$
Stimulation Frequency	4 Hz – 5 kHz
Phase Width	44 μ S – 65535 μ S
Interphase Width	53 μ S – 65535 μ S
Maximum Charge Per Phase (Microstimulator models)	30 nC/phase
Maximum Charge Per Phase (Macrostimulator models)	20 μ C/Phase
PC Hardware Interface	USB A-B cable
TTL Trigger	Input Low < 0.8 V ; Input High > 3.0 V
TTL Sync	Output Low < 0.8 V; Output High > 3.0 V
Analog Resolution	12 Bits
Slew Rate	550 V/ μ S
External Power Supply	Inventus Power FWA065012A-11A AC Input 100-240 Vac, 0.5-3 A, 50-60 Hz DC Output: 12V, 6A, 72W MAX
Emergency Off Switch	Normally open emergency off switch Connector: Samtec MCP-8-02-L-02.00-T-BC
CereStim R96 Cable Connectors	Samtec MIT-019-02-F-D
Monitor Connector	Samtec SMM-109-02-F-D
IPX Rating	Ordinary Equipment, Not Fluid Resistant, IP20
Operating Environment	10°C to 40°C, 10 to 85% R.H. (non-condensing)
Storage/Transportation Environment	-15°C to 60°C, 10 to 85% R.H. (non-condensing), 500 to 1060 hPa
Polarity	Configurable – anodic or cathodic first

Model Specifications

Model Name	CereStim R96 Micro Stimulator
Part Number	7008
Recommended electrode impedance	<100 kΩ
Number of Current Modules	3
Output Current	1µA – 215µA, adjustable in 1 µA increments

Model Name	CereStim R96 Micro Stimulator
Part Number	7039
Recommended electrode impedance	<100 kΩ
Number of Current Modules	16
Output Current	1µA – 215µA, adjustable in 1 µA increments

Model Name	CereStim R96 Macro Stimulator
Part Number	7656
Recommended electrode impedance	<1 kΩ
Number of Current Modules	1
Output Current	100 µA – 10 mA, adjustable in 100 µA increments

Model Name	CereStim R96 Macro Stimulator
Part Number	7655
Recommended electrode impedance	<1 kΩ
Number of Current Modules	3
Output Current	100 µA – 10 mA, adjustable in 100 µA increments

Model Name	CereStim R96 Macro Stimulator
Part Number	7875
Recommended electrode impedance	<1 kΩ
Number of Current Modules	16
Output Current	100 µA – 10 mA, adjustable in 100 µA increments

Overview of Hardware

The CereStim R96 comes in two models: a microstimulator operating from 1 μ A - 215 μ A intended for use with electrodes having impedances of < 100k Ω and a macrostimulator operating from 100 μ A to 10 mA intended for use with macro electrode grids or strips with impedances < 1 k Ω . The CereStim's label (located on the underside of the chassis) identifies it as either a macro or a micro stimulator.

The CereStim consists of a base motherboard with a customizable number (up to 16) of hardware current modules—the number of current modules installed defines the number of simultaneous stimuli that can be delivered.

Standard configurations are 1, 3, or 16 current modules—additional current modules may be added to configurations with fewer than 16. The stimulator outputs stimulation to three banks of 32 channels each, allowing stimulation to be directed to 96 different electrodes.

Front Panel



Figure 2—CereStim 96 front panel. Applicable to serial numbers 15412 and above

Power Supply

The external power supply should be a medical grade power supply. The CereStim R96 ships with an ICCNexergy medical grade power supply with an AC input of 100-240 VAC, 50-60 Hz, with a DC output of 12V, 6A, 72W max.

Stimulators with serial numbers 15412 and above have a 5 pin Switchcraft connector as seen in the front panel picture above.



Figure 3—Front panel for the CereStim 96. Applicable to serial numbers 15411 and below. The power supply connector is highlighted in the red box.

Stimulators with a serial number below 15412 will have a barrel pin connector to connect to the power supply as seen in Figure 3:

USB

The USB Connector is a type B connector that allows the CereStim to communicate with the host PC. The CereStim is a Human Interface Device and will appear in the device manager when plugged in and powered on.

The LED to the left of the USB connector is a status LED that illuminates when a USB is plugged into both the stimulator and a computer. The LED will be unlit when no USB cable is plugged in.

Power Switch

The power switch is a pushbutton switch that turns the device on and off. When the switch is depressed, the switch is closed, and the device is in the ‘on’ position.

An LED behind the switch will illuminate the switch blue when the CereStim is plugged in and the pushbutton is depressed.

Status LED

The status LED provides visual feedback to the user that the device is currently stimulating. The LED is illuminated only during stimulus delivery. Depending on the stimulation parameters, the LED may flicker very briefly.

Emergency Off LED

The emergency off LED is a status LED that illuminates when the device is in emergency off mode. While the device is in emergency off mode, power is cut off and the device will not stimulate.

Trigger

The trigger BNC connector is a TTL input where <.8V is considered TTL low and >3.0 V is considered TTL high. When the CereStim is placed in trigger mode, inputs to this connector serve as triggers to begin stimulation.

Sync

The Sync BNC connector is a TTL output where <.8V is considered TTL low and >3.0V is considered TTL high. This connector outputs TTL high while stimulation is being

delivered and TTL low when there is no stimulation. This can be used to sync external devices, such as a fast settle input or provide a common signal to a data acquisition system.

Emergency Off port

The emergency off port allows for the connection of a Normally Open Emergency Off switch. When there is no switch plugged in, or if there is a switch plugged in but not pressed, the connection is open and the CereStim will receive power. When a switch is plugged in and pressed, power is shut off from the device and the emergency off LED will illuminate.

CereStims with serial number 15412 and above will have a Samtec MCR connector as the interface to the emergency stop switch as seen in Figure 2.

CereStims with serial numbers below 15412 will have a ¼ inch phono jack as their interface to an emergency stop switch as seen in the following picture:



Figure 4—CereStim 96 front panel. Applicable to serial numbers 15411 and below. The emergency off switch connector is highlighted in red.

Rear Panel

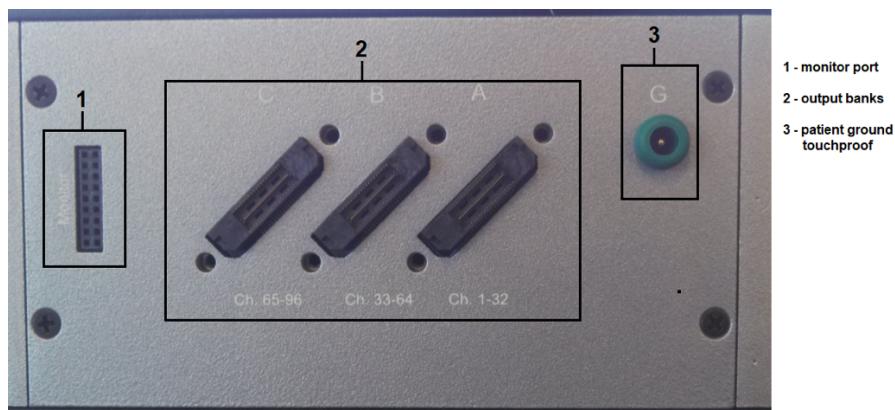


Figure 5—CereStim 96 rear panel.

Monitor Port

The monitor port is a diagnostic port that shows the voltage waveform of the stimulus being delivered. This waveform is generated by the stimulation parameters selected and a resistor (100 kΩ for microstimulator, 500 Ω for macrostimulator). The resistor is on the individual current module. There are 18 pins on the monitor port: 1 for each current module slot and 2 for patient ground.

Possible monitor ports pinouts are shown in the figures below:

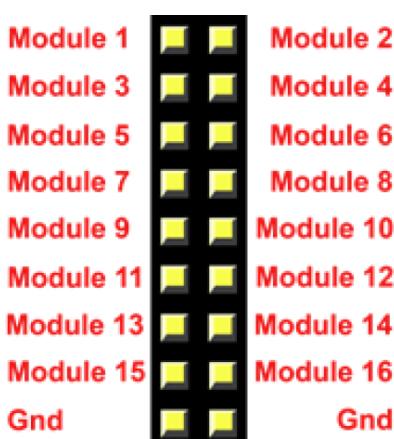


Figure 6—Monitor port pinout.
Applicable to serial numbers 15412 and up

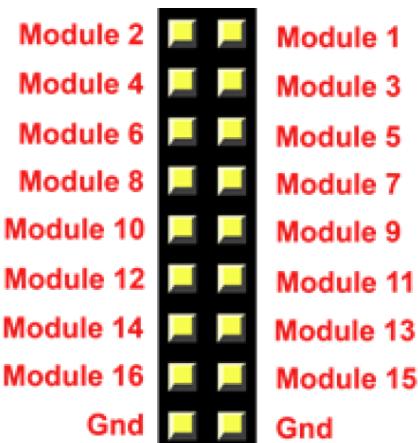


Figure 7—Monitor port pinout.
Applicable to serial numbers 15411 and below

Output Banks

There are 3 output banks of 32 channels each. Bank A contains channels 1-32, Bank B contains 33-64, and Bank C contains channels 65-96. The output banks are Samtec MIT connectors.

By default, channel 1 refers to output pin 1, channel 2 refers to output 2, etc. The CereStim API allows for relabeling the channel numbers for each output pin. In addition, if using a Utah array, the provided .cmp file can be imported into Stim Manager so that the visual display of the electrode array corresponds to the array's geometry.

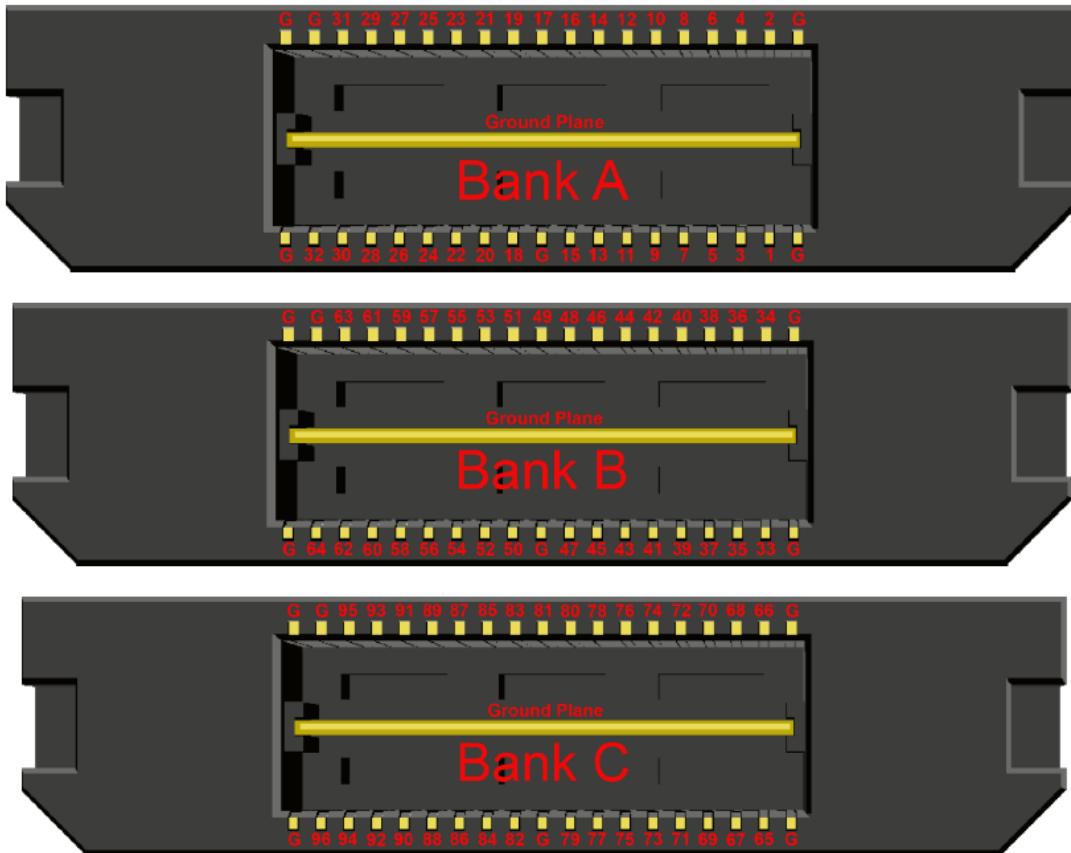


Figure 8—CereStim 96 output bank pinout

For more information on common CereStim interface cables and their pinouts, please see the appendix on CereStim accessories.

Patient Ground

This touchproof connector is tied internally to the patient ground circuitry. Patient ground serves as the current return path for the stimulating electrode and needs to be connected to the subject's ground, either through this connector or the electrode bank connector. The monitor port and the three output banks also contain connections to the same patient ground plane. However, this touchproof can be used if an additional low-impedance connection to patient ground is needed.

CereStim 96 API

The CereStim 96 API allows the user to write custom code in C++ to programmatically control and configure the CereStim. A Matlab wrapper (StimMex) for the C++ API is also available for users that would prefer to interface with the CereStim through Matlab. The API has both x86 and x64 versions. Please refer to Blackrock Microsystem's CereStim API/StimMex user's manual and documentation for more detailed descriptions of functions and basic examples. StimMex and the C++ API along with associated documentation can be downloaded from the following address: <http://blackrockmicro.com/wp-content/uploads/2016/02/CereStim-API.zip>.

Example scripts for the C++ API and Matlab wrapper can be found here: <http://blackrockmicro.com/wp-content/uploads/2016/08/CereStim-API-Examples.zip>

Stim Manager

The Stim Manager software is a GUI built on the CereStim 96 API and Qt. It provides a simple and intuitive graphical interface to control and configure the CereStim. Stim Manager can perform single channel stimulation (manual mode) as well as execute pre-configured stimulation sequences incorporating multiple waveforms and multiple channels (program mode). When started up, Stim Manager will automatically interface with a CereStim that is powered and plugged into the host PC with the USB A-B cable.

Manual Mode

Stim Manager's manual mode provides an interface for the user to select a single electrode channel to stimulate with specified parameters on command. General workflow using this mode is to select an electrode channel, configure the waveform parameters in the waveform panel, then click the 'stimulate' button to activate stimulation. This mode does not perform automated scripted stimulation.

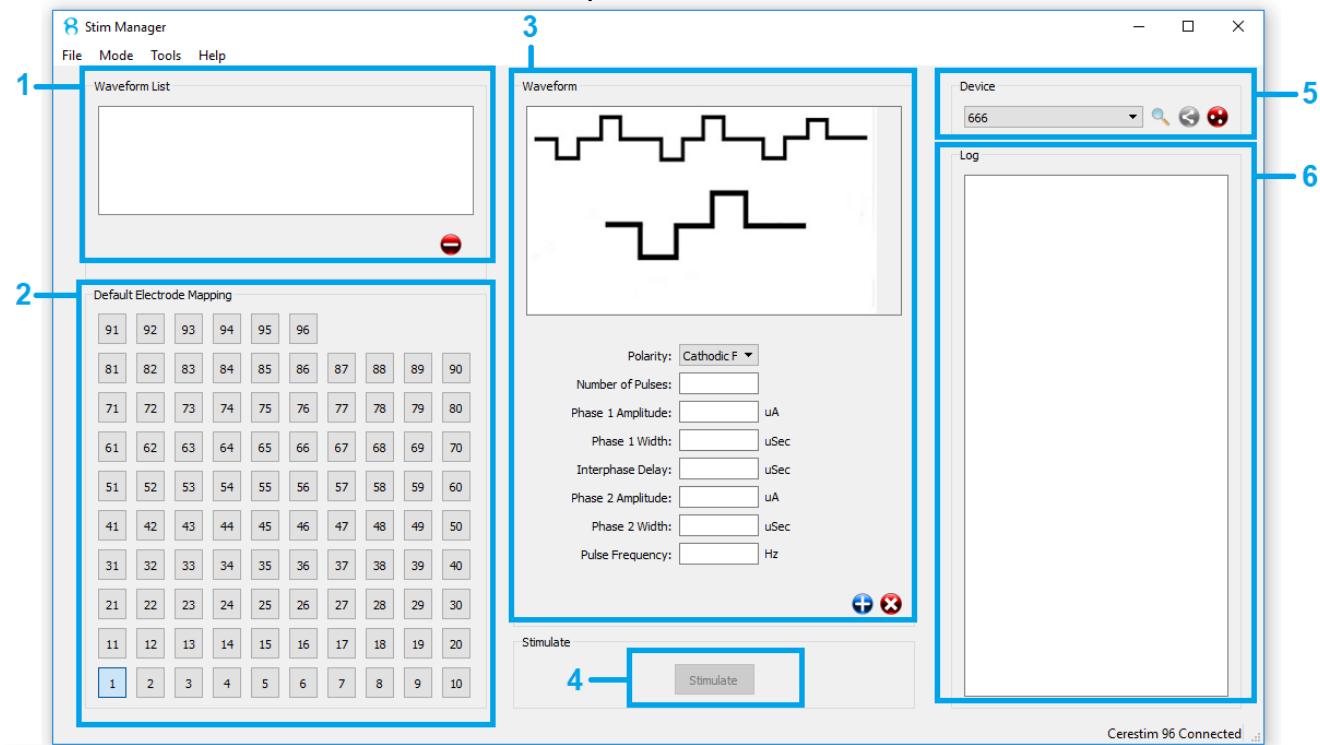


Figure 9—Stim Manager manual mode display

1 Waveform List

This panel shows all waveforms saved in the waveform directory (this can be configured in the Tools menu > Settings. Stim Manager loads the saved parameters of the waveform selected in Waveform List into the central Waveform panel. The red ‘minus’ button removes the selected waveform from the list and deletes it from the waveform directory.

2 Electrode Array

This panel provides a graphical representation of the 96 output channels available for stimulation. In manual mode, stimulation will be delivered to the selected electrode. The default electrode mapping is in ascending numerical order. The display can be custom configured to match the array’s geometry through importing a .CMP file. All Utah Arrays ship with .CMP files specifying the electrode and channel arrangement.

3 Waveform

The Waveform contains a visual representation of the biphasic stimulus based on the parameters provided and a series of fields in which to enter the user’s desired stimulus parameters. Mousing over the parameter fields will show valid values for the parameter in the lower left corner as well as highlight on the graphical representation which part of the stimulation is affected by the moused-over parameter. By default, a stimulation waveform must be charge-balanced between the two phases for Stim Manager to consider it valid.

4 Stimulate

Clicking this button sends a single stimulus pulse to the electrode selected in the electrode array with the given parameters entered in the waveform fields.

5 Device

The Device panel is common to both manual and program mode. This panel contains a dropdown menu listing the serial numbers of all connected and powered CereStims. The magnifying glass icon will initiate a new search. The connect button is in the center and will connect to the selected device. The disconnect button is located to the far left and disconnects the selected device. The current connection status is displayed in the bottom right—when it reads ‘Cerestim 96 Connected’, the connect button will be greyed out. When it reads ‘Cerestim 96 Disconnected’, the disconnect button will be greyed out.

6 Log

The Log panel is common to both manual and program mode. This panel displays all activities that the stimulator performs. Stimulating in manual mode will log the time-stamp of stimulation, the number of the electrode stimulated, and the stimulation parameters.

Program Mode

Program mode provides an interface for users to assemble more complex stimulation protocols. Operators may create, save, edit, and load different stimulation scripts referred to as ‘programs.’ Programs consist of two customizable components—the sequence of commands to be executed, and the associated stimulation waveforms. Programs may be played on an infinite loop or for a finite number of iterations.

Program mode also provides the user the option of starting stimulation upon receipt of a trigger signal on the TTL Trigger input connector. When a program is selected, the waveforms and program sequence are loaded and validated to ensure that no errors will occur. If a program is invalid, an error message will pop up and the issue will be highlighted in red.

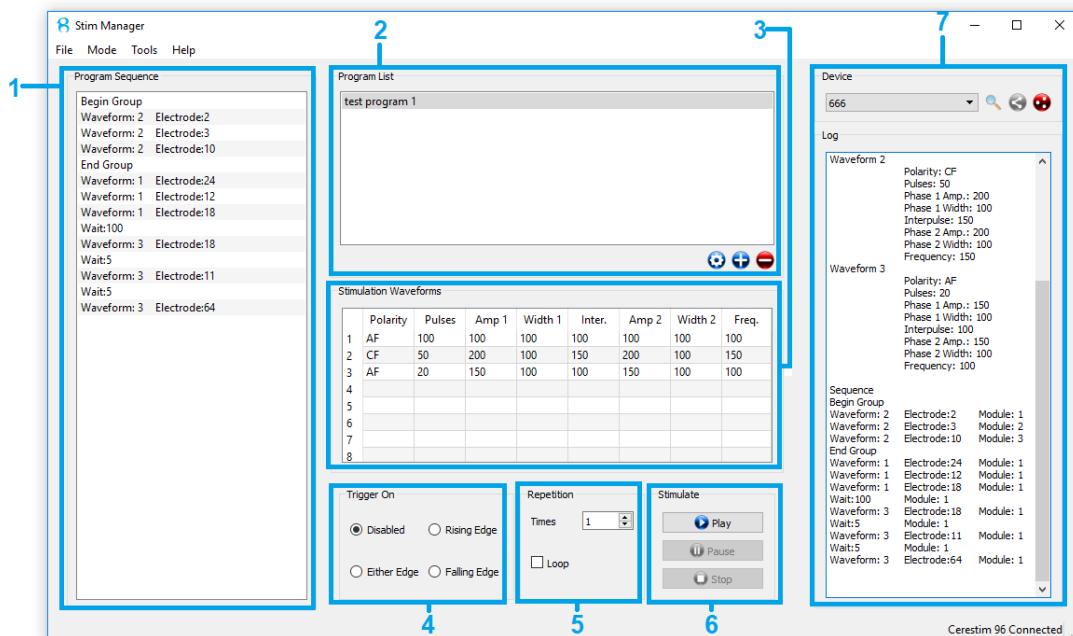


Figure 10—Stim Manager program mode

1 Program Sequence

This panel lists the commands in the program. For more details on configuring these commands and putting together a stimulation program, please see the Program Creator section.

2 Program List

This panel lists all programs that have been saved in the specified program directory (this can be customized under Tools > Settings. Selecting a program from this list will populate the Program Sequence and Stimulation Waveform panels with the saved information from the selected program.

The blue cog button on the left opens the Program Creator window to edit the selected program. The blue plus button in the middle opens the Program Creator window to create a new program.

The red minus button on the right deletes the selected program from the program list and from the program directory.

3 Stimulation Waveforms

This panel displays the waveforms and parameters configured in the currently selected program.

4 Trigger On

If 'Disabled' is selected, the stimulator will begin the program as soon as the 'Play' button is clicked. Otherwise, the stimulator will be configured to begin the program once it receives the selected trigger (digital rising edge, falling edge, or any edge change). Note: Selecting a trigger type locks the CereStim down in trigger mode until the device is power-cycle or 'Disabled' is selected.

5 Repetition

This field allows the operator to select how many times the program will execute. Valid values are from 1-65,535. If the loop box is selected, then the stimulation script will run until stopped or paused.

6 Stimulate

This panel allows the user to start, stop, or pause a stimulation program during execution. If a trigger type has been selected, the 'play' button will say 'Waiting for Trigger.' The Stimulate panel commands will be greyed out until a valid program is selected.

7 Device/Log (Populated)

The device and log panels are common to program mode and manual mode. This picture shows these panels when they are populated.

Program Creation

The Program Creator window is opened by clicking on either the blue cog button (to edit an existing program) or the blue plus button (to create a new program) underneath the Program List panel. Programs can be loaded and saved with the Open, Save, and Save & Close buttons in the lower left of the window.

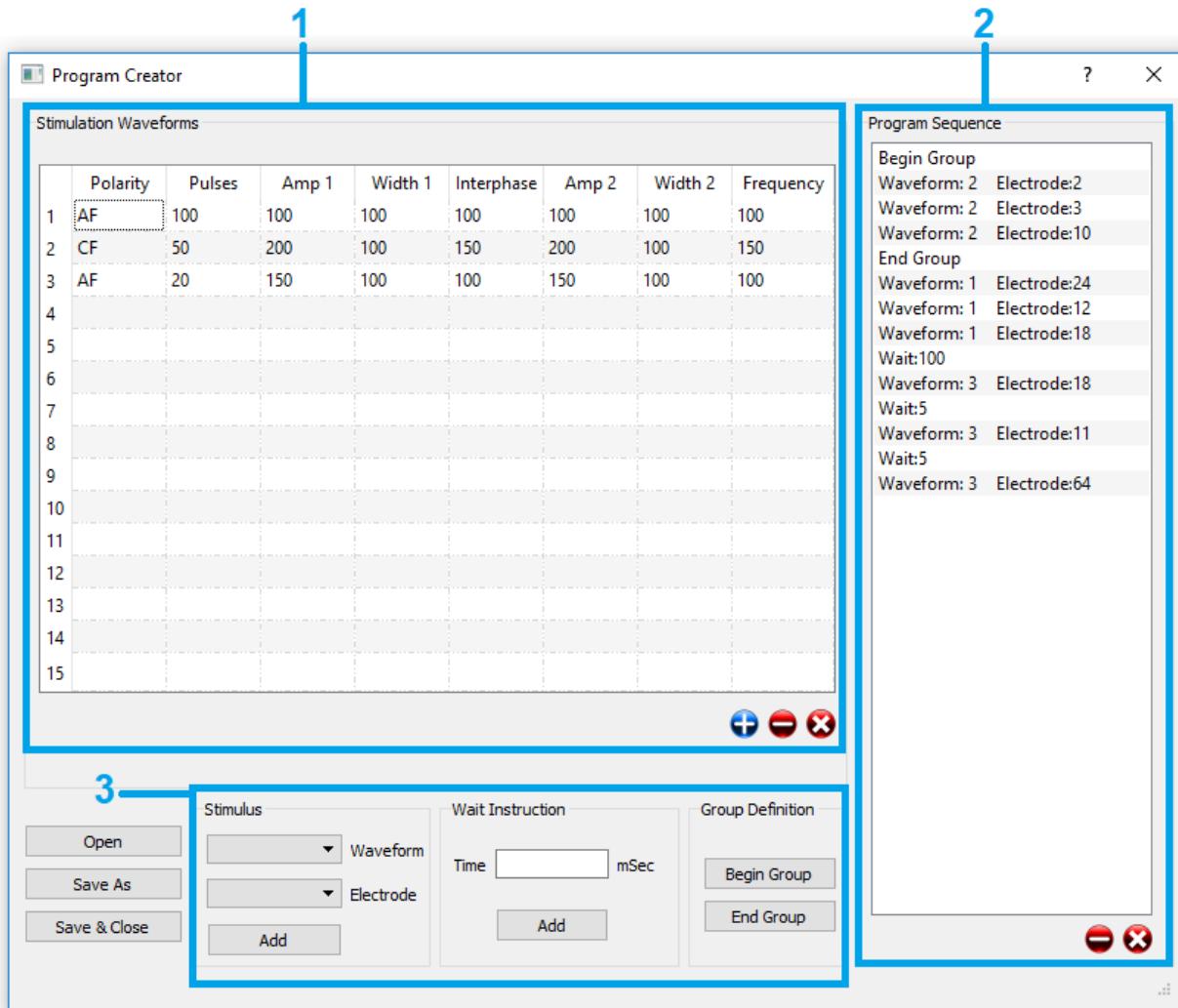


Figure 11—Program Creator

1 Stimulation Waveforms

The user can enter their desired stimulus parameters in the Stimulation Waveforms panel. The blue plus button opens the specified waveforms directory to load a previously-saved waveform. The red minus button removes the currently-selected waveform from the program. The red X button removes all waveforms from the program.

2 Program Sequence

This panel displays the current sequence of commands in the program. This panel is interactive: clicking a command will highlight it and commands can be dragged-and-dropped for quick reorganization. Clicking the red minus button will remove the currently highlighted command. Clicking the red x button will remove all commands from the program.

3 Commands

Commands can be added to the program sequence through the Stimulus, Wait Instruction, and Group Definition panels. The command will be added above the currently highlighted command in the program sequence. If no command is currently highlighted in the program sequence, the command will be added above the current first command.

- **Stimulus**
The user can add a stimulation command to the sequence by selecting a waveform and electrode from the dropdown menu and pressing ‘Add.’
- **Wait Instruction**
The user can tell the stimulator to wait for a specified number of milliseconds before executing the next command in the program sequence. Only positive whole-number values are valid.
- **Group Definition**
The user can define the beginning and end of a simultaneous stimulation group with the Begin Group and End Group commands. All stimulation commands between a Begin Group and End Group pair will be executed simultaneously. If a group is defined to simultaneously stimulate on more electrodes than there are current modules or if the same electrode is listed twice, an error will be generated on execution.

Menus

File Menu

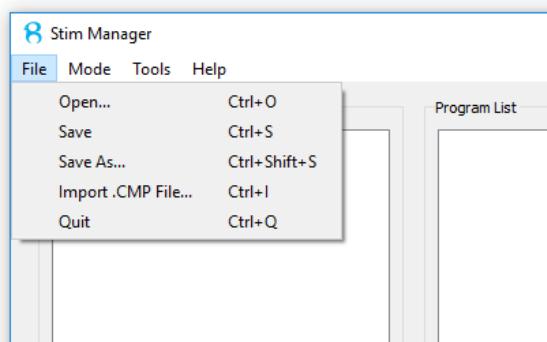


Figure 12—File menu

Open

(**keyboard shortcut CTRL + O**)

The open option allows the operator to load a previously saved configuration file (.cfg). The configuration file stores which mode the user was in, the number of active current modules, and the default directories that Stim Manager loads mapfiles, waveforms, and programs from and saves logfiles in.

Save

(**keyboard shortcut CTRL + S**)

The save option saves the current mode as well as all settings under the previously saved configuration name. If no previous configuration file has been saved then it will behave like Save As and prompt the user for a configuration name.

Save As

(keyboard shortcut **CTRL + SHIFT + S**)

Save As saves the current mode and all settings under a configuration name entered by the user.

Import .CMP File

(keyboard shortcut **CTRL + I**)

Import .CMP file allows the user to import an electrode array mapfile, which will correctly map the channel numbers on the stimulator to their corresponding numbered electrodes on the array. The Electrode Array panel in manual mode will be updated to reflect the electrode array's geometry.

Quit

(keyboard shortcut **CTRL + Q**)

Exits Stim Manager

Mode Menu

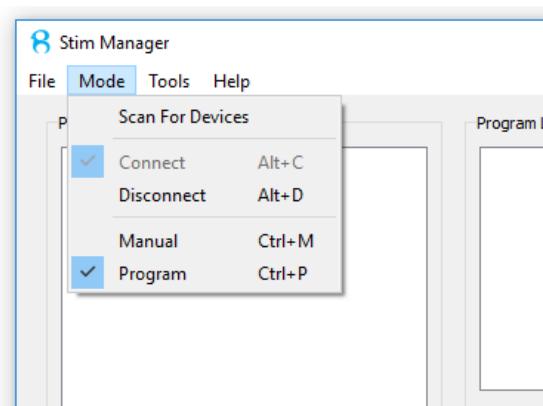


Figure 13—Mode menu

Scan For Devices

Scan For Devices polls the USB ports for plugged-in, powered CereStims and refreshes the list in the Devices dropdown menu.

Connect

(keyboard shortcut **ALT + C**)

The Connect command instructs Stim Manager to attempt to connect to the currently selected device in the Devices dropdown menu. If a CereStim is currently connected to Stim Manager, this option will be greyed out and unavailable. Connect will automatically run when starting Stim Manager. Stim Manager will make 10 attempts to connect to a device before entering a disconnected state.

Disconnect

(**keyboard shortcut ALT + D**)

Disconnect ends the connection between the CereStim and Stim Manager, freeing it up to be connected to other instances of Stim Manager or the CereStim 96 API. If no CereStim is connected, the Disconnect option will be greyed out and unavailable.

Manual

(**keyboard shortcut CTRL + M**)

Places Stim Manager in manual mode interface.

Program

(**keyboard shortcut CTRL + D**)

Places Stim Manager in program mode interface.

Tools Menu

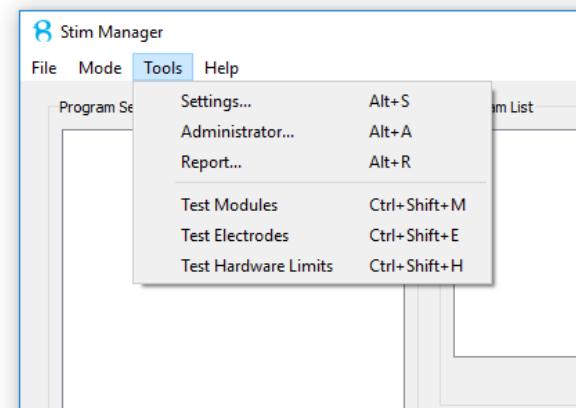


Figure 14—Tools menu

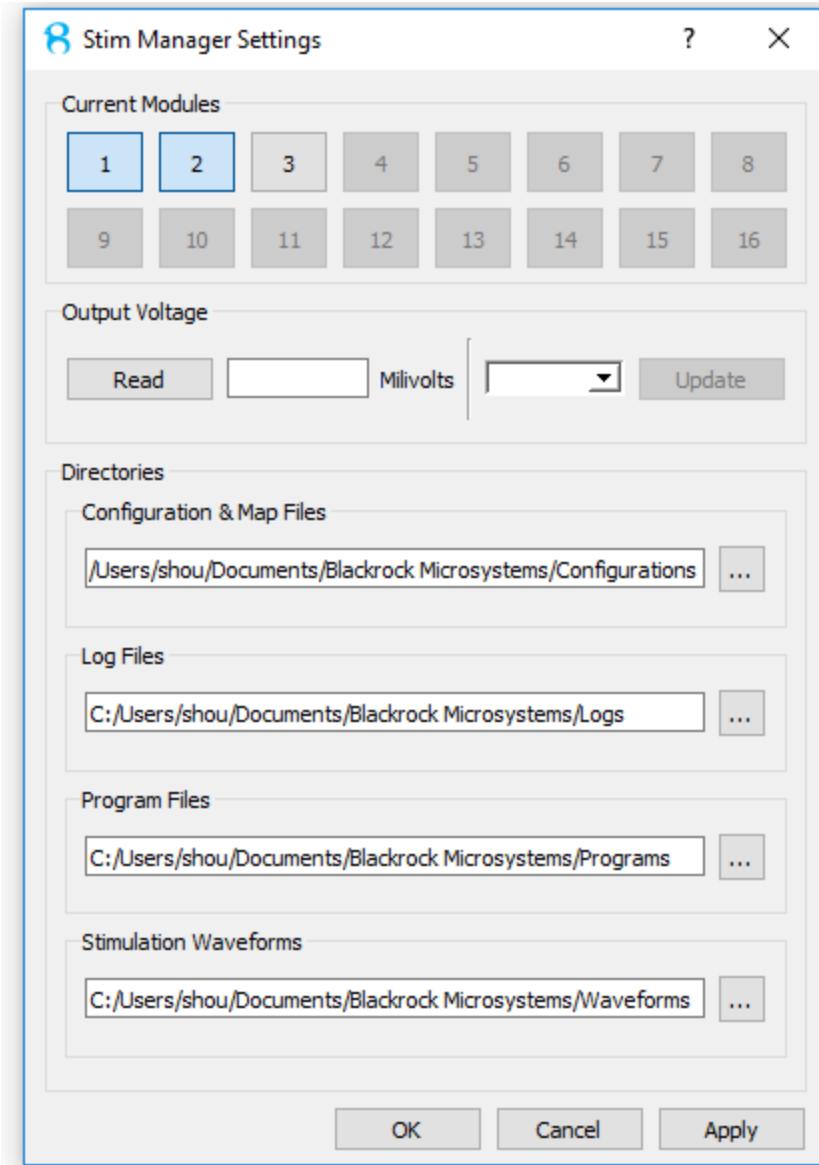


Figure 15—Settings menu

Settings

(Keyboard shortcut ALT+S)

- **Current Modules**
This panel displays the number of current modules installed in the stimulator as well as their position and status. Empty current module slots will be greyed out and unavailable. Enabled current modules will be highlighted blue, while disabled current modules will be light grey. In the screenshot above, current modules 4-16 are empty, 1-2 are installed and enabled, and 3 is installed but disabled.
- **Output Voltage**
Output voltage can be read and set in this panel. Macro stimulator models only allow 9.5 V out, while micro stimulator models allow several different voltage levels to be used.

- **Directories**

This panel allows the user to customize the default directories of logs, config/map files, programs, and stimulation waveforms.

These settings can be saved as a .cfg file under the File > Save/Save As.

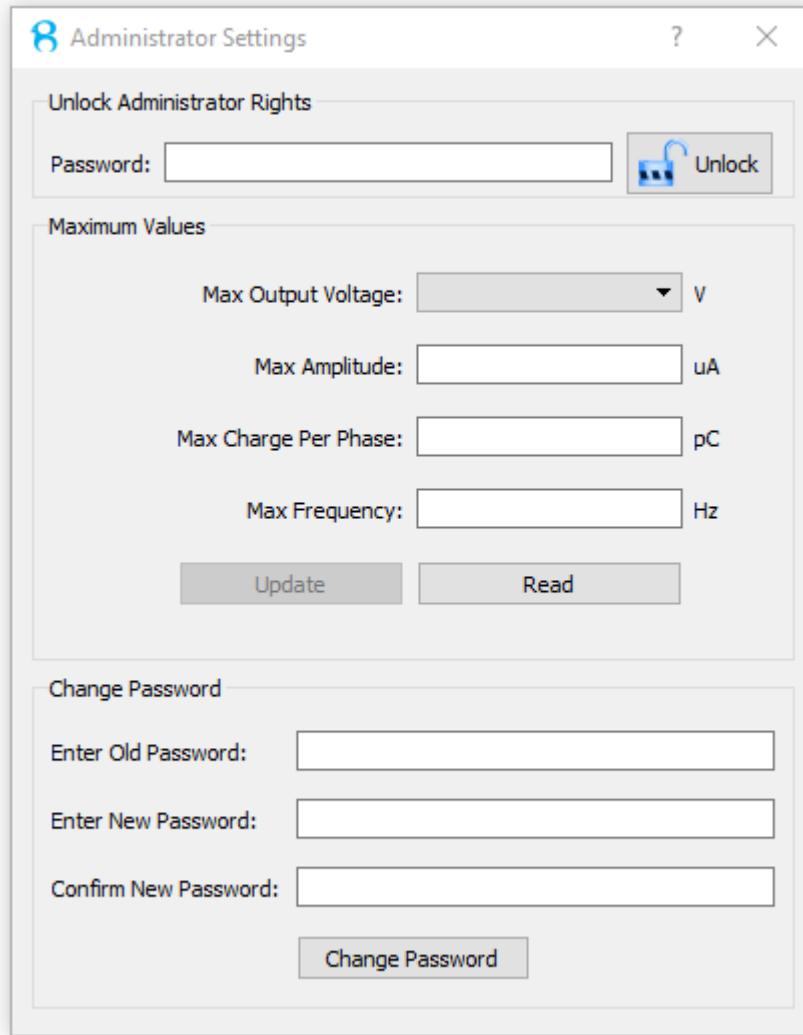


Figure 16—Admin settings menu

Administrator

Keyboard shortcut ALT+A

The administrator interface is password protected to prevent unwanted changes. This interface allows the primary operator to set additional safety levels to the stimulator to restrict safety levels to lower custom levels than the software originally allows. The default password is 'CereStim96'.

- **Unlock Administrator Rights**

Entering the password in this field allows the user to make changes to maximum values. The figure above shows an unlocked interface.

- **Maximum Values**

The CereStim's maximum outputs can be configured manually by entering the administrator password and unlocking the interface. When the interface is locked, this field is greyed out.

- **Change Password**

This panel allows the user to change the password. The default password is 'CereStim96.'

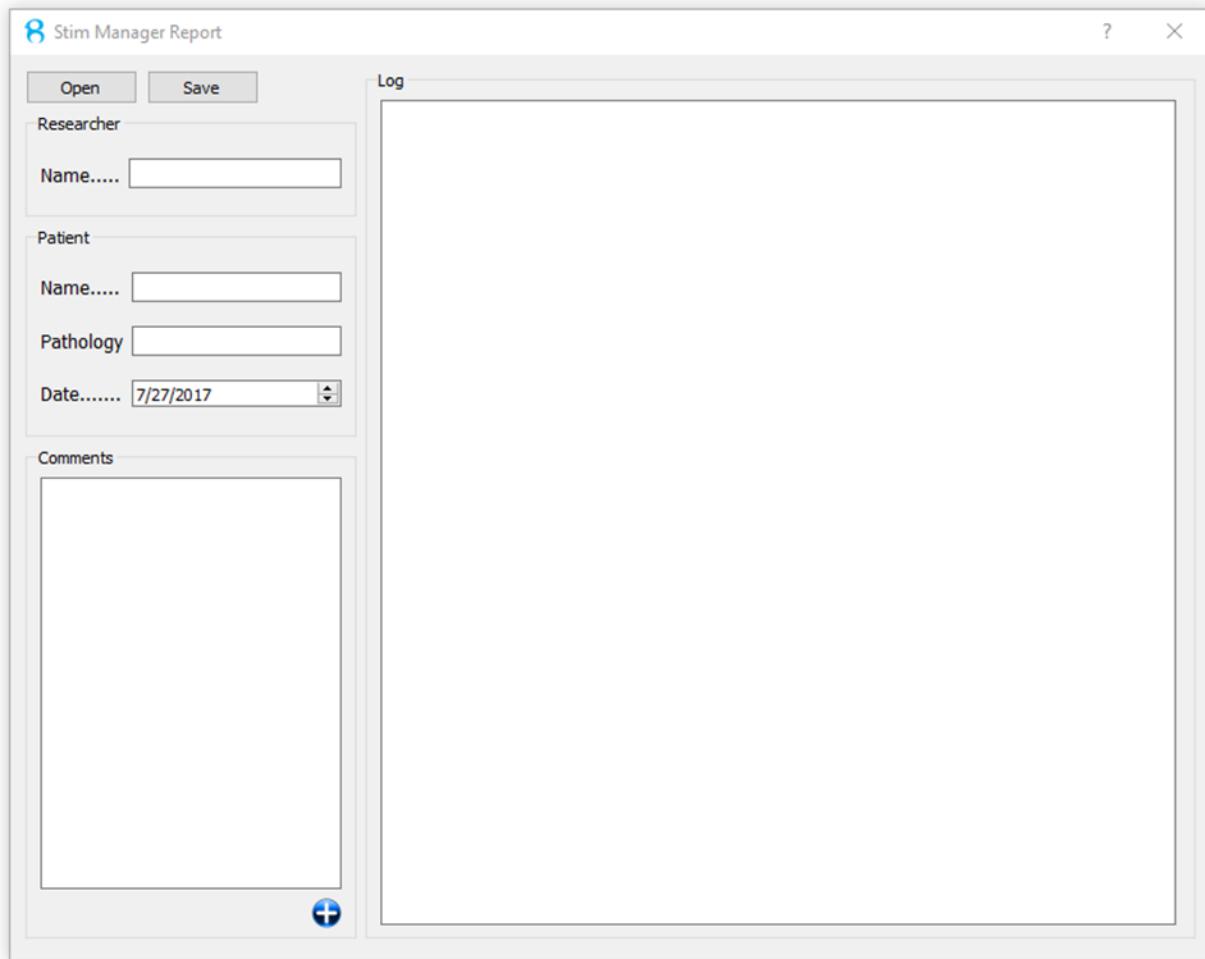


Figure 17—Report menu

Report

Keyboard shortcut ALT+R

The Report window is used to log all stimulation activity within a single session or across multiple sessions with a single subject. Custom comments, as well as other miscellaneous patient-related fields can be entered. Log files can be saved and then loaded later to continue work.

- **File Options**

The 'Open' and 'Save' buttons allow the operator to load previous log files to continue work or save the currently loaded log file. Log files will be saved in the directory specified in the Settings tab.

- **Researcher and Patient**

Information entered into the 'Researcher' and 'Patient' fields are saved in the log file.

- **Comments**
Comments can be entered in the ‘Comments’ field then added to the log with the blue ‘plus’ button in the lower right corner of the panel. Comments that are not added to the log will not be saved.
- **Log**
Log displays all activity that the stimulator performs, as well as custom comments entered. Log display is also present in manual and program mode view. Log can be used as visual confirmation on the PC that the stimulator has performed an action.

Test Electrodes

Keyboard shortcut CTRL+SHIFT+E

Test Electrodes uses known stimulation parameters (described below) to send a stimulus through the first current module in the stimulator to each electrode channel and measures the voltage five times during the stimulus. The five voltage measurements are taken right before the first phase of the pulse, during the first phase, during the interphase period, during the second phase, and after the second phase. Test electrodes will also calculate the resistance of the electrode based on the calculation $V/I = R$.

Note that this is not calibrated and should be used for reference only.

The stimulation parameters used are listed below:

Pulse Count:	1
Stimulation Width:	300 μ s
Stimulation Amplitude:	45 μ A for Micro; 900 μ A for Macro
Interphase Width:	200 μ s
Interpulse Width:	200 μ s (+ 53 μ s time between electrodes)

Test Modules

Keyboard Shortcut ‘CTRL+SHIFT+M’

Test Modules will test each enabled module in the stimulator to determine its output voltage levels. It uses a known waveform and sends a stimulus across an internal resistive load to determine what the output voltage is.

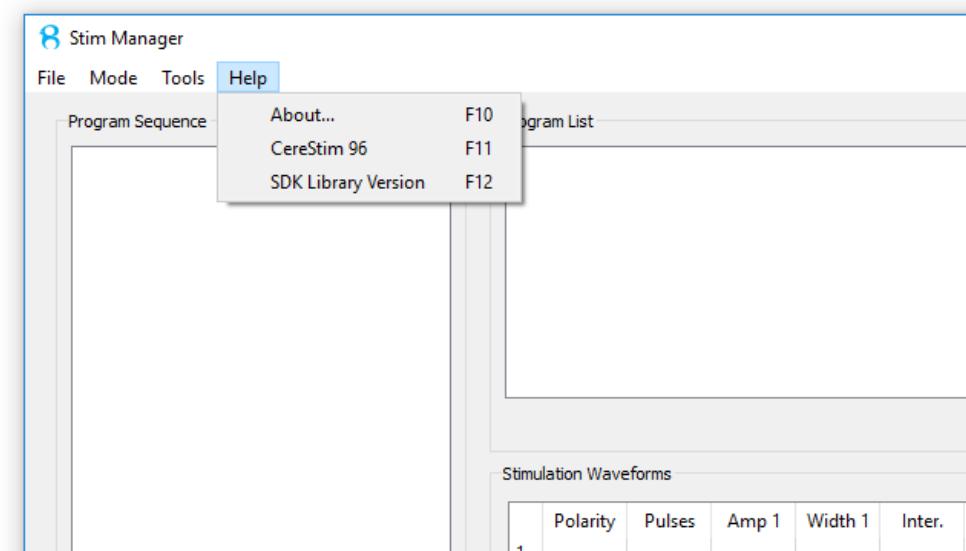


Figure 18—Help menu

Help Menu

About

(**keyboard shortcut F10**)

'About' provides the version of Stim Manager being used along with the Blackrock Microsystems website URL (not a link).

CereStim 96

(**keyboard shortcut F11**)

When a stimulator is plugged in and connected to Stim Manager, the 'CereStim 96' option provides information (serial number, firmware versions of motherboard and current modules, and communication protocol version) on the stimulator in the log window.

SDK Library Version

(**keyboard shortcut F12**)

The SDK Library version option gives the CereStim 96 API version number that Stim Manager is using.

Status Bar

The Status bar is located across the bottom of the main Stim Manager dialog. On the lower right-hand corner there is a status message and on the left is where messages appear depending on where the cursor is at, or what text field is entered.



Figure 19—Status bar

CereStim Status

The status is located in the lower right-hand corner and indicates to the status of the stimulator. Status messages include: disconnected, connected, waiting on trigger, and stimulating.

Status Messages

The status messages that appear in the lower left-hand corner provides the user with miscellaneous messages such as valid ranges of text fields or display information about the object or widget that the cursor is hovering on.

Cleaning and Maintenance

The CereStim may be used multiple times. To clean the CereStim, the exterior of may be wiped down with a standard sanitizing wipe. Dust or debris can be removed from exterior ports and connectors with compressed air. Maintenance on interior components of the CereStim should only be carried out by or on the instructions of an authorized Blackrock Microsystems representative.

Return Merchandise Authorization

In the event that your device needs to be returned to Blackrock for repair or maintenance, do not send any equipment back without a Return Merchandise Authorization Number (RMA). An RMA number will be issued to you by a Blackrock representative. If you need to obtain an RMA number, you may contact a product support representative at +1 (801) 582 5533 or by emailing support@blackrockmicro.com.

Once an RMA number has been issued, it is important to safely pack the returned item for shipping back to Blackrock. It is preferred that you save the original boxes and packing materials that your system arrived in for return shipment. Please address the package as follows:

Blackrock Microsystems, LLC
ATTN: RMA#
630 S. Komas Dr., Suite 200
Salt Lake City, UT 84108 USA
Tel: +1 (801) 582 5533

Warranty

Blackrock Microsystems ("Blackrock") warrants its products are free from defects in materials and manufacturing for a period of one year from the date of shipment. At its option, Blackrock will repair or replace any product that does not comply with this warranty. This warranty is voided by: (1) any modification or attempted modification to the product done by anyone other than an authorized Blackrock employee; (2) any abuse, negligent handling or misapplication of the product; or (3) any sale or other transfer of the product by the original purchaser.

Except for the warranty set forth in the preceding paragraph, Blackrock provides no warranties of any kind, either express or implied, by fact or law, and hereby disclaims all other warranties, including without limitation the implied warranties of merchantability, fitness for a particular purpose, and non-infringement of third-party patent or other intellectual property rights.

Blackrock shall not be liable for special, indirect, incidental, punitive, exemplary or consequential damages (including without limitation, damages resulting from loss of use, loss of profits, interruption or loss of business or other economic loss) arising out of non-compliance with any warranty. Blackrock's entire liability shall be limited to providing the remedy set forth in the previous paragraph.

Support

Blackrock prides itself in its customer support. For additional information on this product or any of our products, you can contact our Support team through the contact information below:

Manuals, Software Downloads, and Application Notes
www.blackrockmicro.com

Complaints

When filing a complaint, please provide the product description, product number, lot number, software number, complainant's name and address, and the nature of the complaint.

Issues or Questions

www.blackrockmicro.com/
support@blackrockmicro.com
+1.801.839.1062

Appendix

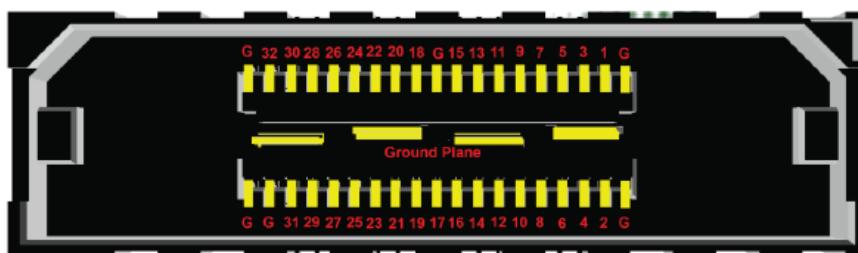
Common Interface Cables

The CereStim 96 can be used in a variety of configurations that all have different equipment/cabling requirements. Pinouts of some of the most common interface cables are provided below.

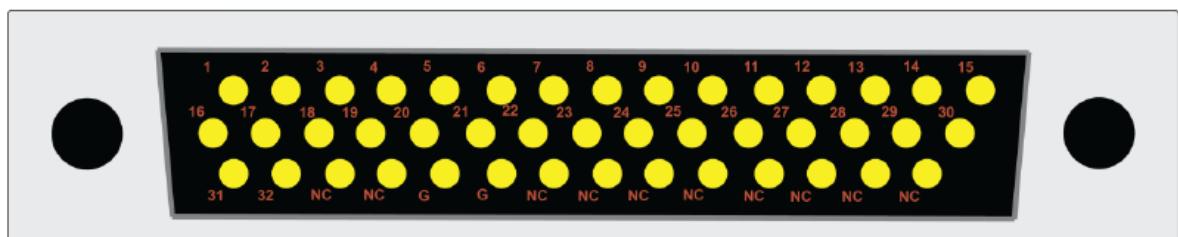
CereStim to DB44 Cable (PN 7965)

The CereStim to DB44 Cable is a custom cable that mates with the MIT connector on the back of the stimulator through a Samtec MIS connector to a male DB44 44-pin HD-Sub connector. This cable can connect the CereStim to the Blackrock Splitter Box.

MIS Connector



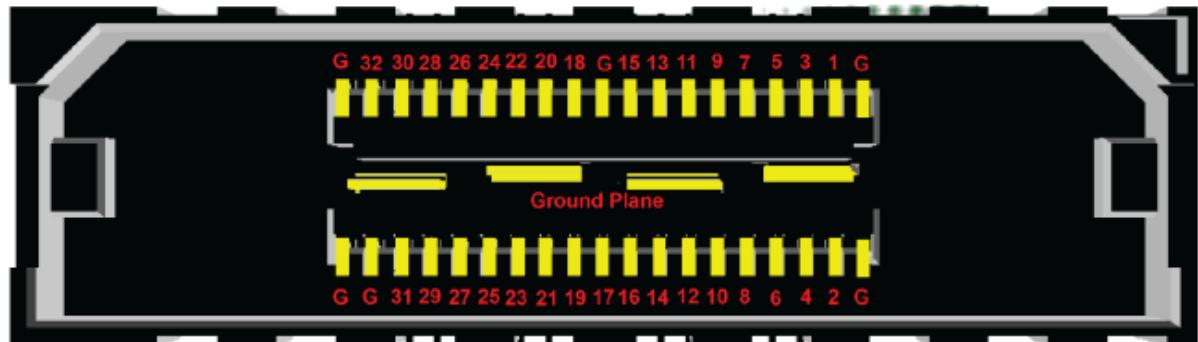
DB44 Connector



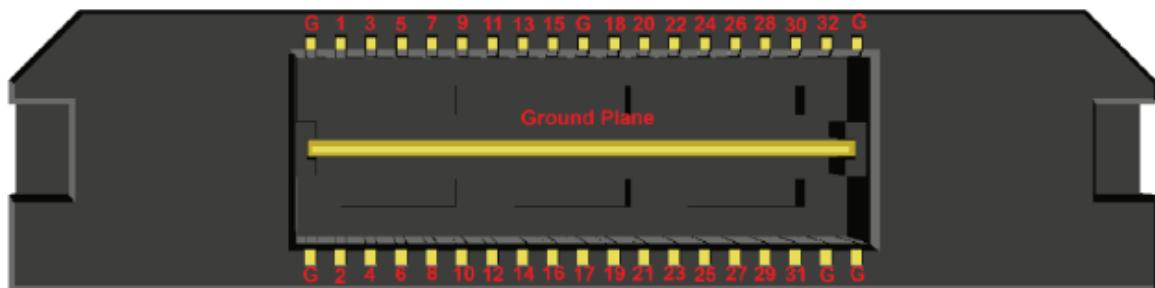
CereStim to MIT Connector (PN 8734)

The CereStim to Splitter Box Cable is a custom cable that mates with the MIT connector on the back of the stimulator through a Samtec MIS connector to a Samtec MIT connector on the other end. This cable can be used to connect the CereStim to a Blackrock Cabrio headstage or a Blackrock Stim/Record analog headstage.

MIS Connector



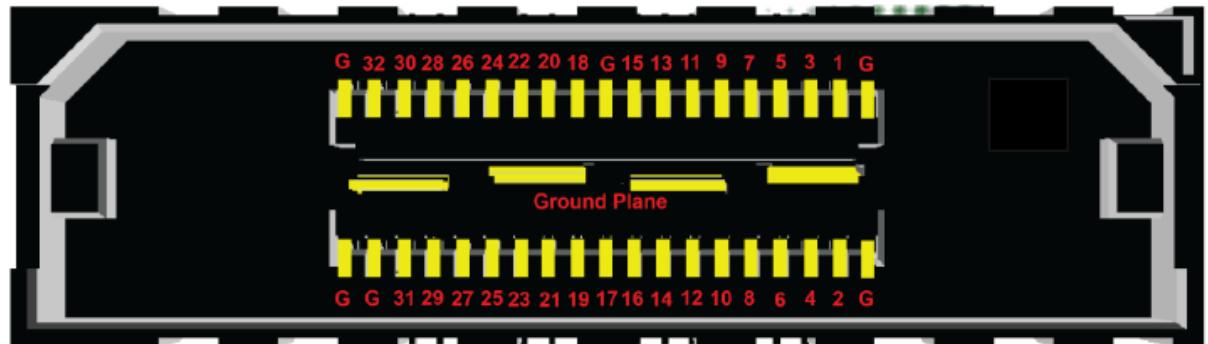
MIT Connector



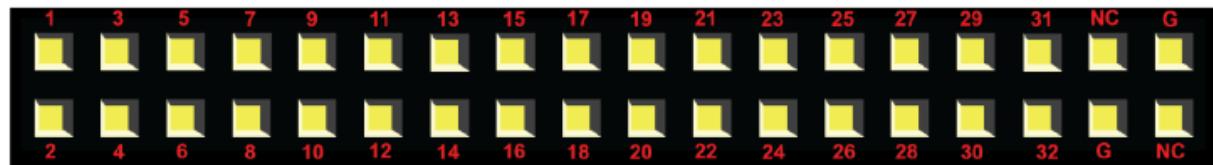
CereStim to CerePort Plug Cable (PN 8161)

The CereStim to CerePort Plug Cable is a cable that mates with the MIT connector on the back of the stimulator to a 36-pin Samtec SFMC Header. This cable can be used to interface with a Blackrock CerePort Plug or an ICS-96 connector.

MIS Connector



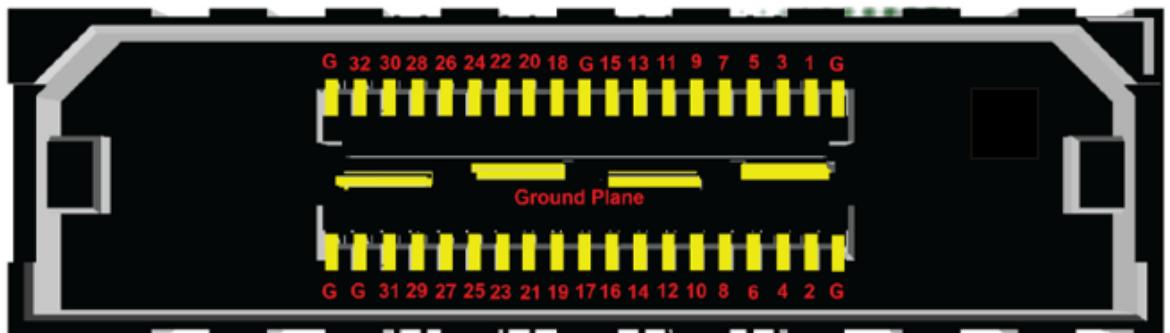
36-pin Samtec SFMC Connector



CereStim to Omnetics Cable (PN 9534)

The CereStim to Omnetics 36-pin is a cable that mates with the MIT connector on the back of the stimulator through a Samtec MIS connector to a 36-pin Omnetics connector. This cable can be used to interface with a Blackrock CerePort Plug or an ICS-96 connector.

36-pin Samtec SFMC Connector



Omnetics Connector

