

VRAM
Variable Resource
Automixer
Operation Manual

VRAM

TABLE OF CONTENTS

Front & Rear Panel Features	pgs. 2 & 3
Setup	pgs. 4-9
Logic Inputs	pgs. 10 & 11
Logic Outputs	pgs. 12 & 13
RS-232 Control	pgs. 14 & 15
Specifications & Block Diagram	pg. 16
Warranty	

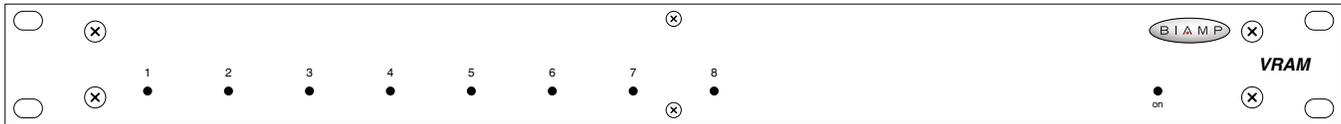
INTRODUCTION

The **VRAM** Variable Resource Automixer is a 10-in / 2-out programmable automatic mixer, which is completely user tamper proof, providing no external controls. All mixer parameters are under microprocessor control, and are easily programmed via Windows® software. The VRAM is extremely versatile, with an extensive set of features, and is designed to adapt to a variety of applications. A second model, **VRAMeq**, includes 3-band channel equalization, with variable mid-frequency. The VRAM is covered by a five-year warranty.

VRAM features include:

- ◆ 8 balanced mic/line inputs on plug-in barrier strip connectors
- ◆ 2 balanced auxiliary line inputs on plug-in barrier connectors
- ◆ balanced main & aux outputs on plug-in barrier connectors
- ◆ phantom power, trim, HPF, level, & gating on channels 1-8
- ◆ model **VRAMeq** includes 3-band, variable-mid, channel EQ
- ◆ aux line inputs include mix-minus & teleconferencing mode
- ◆ independent mixing to main & aux outputs (pre/post gate)
- ◆ direct outputs from channels (programmable pre/post gate)
- ◆ eight logic outputs (programmable timing & pre/post gate)
- ◆ eight logic inputs (programmable for remote switch control)
- ◆ sixteen non-volatile memory presets store all mixer settings
- ◆ NOM attenuation, last mic, default mic, & hold time selectable
- ◆ selectable channel-off gating attenuation (-10dB to -80dB)
- ◆ expansion in & out for linking of units for more mixer inputs
- ◆ controls & indicators provided by software graphic interface
- ◆ software peak & level meters - front panel active indicators
- ◆ Windows® 95/98/NT/2000/XP software & cable included
- ◆ remote control via RS-232 & programmable logic inputs
- ◆ incorporates **AES** recommended grounding practices
- ◆ **CE** marked and **UL / C-UL** listed power source
- ◆ covered by Biamp Systems' five-year warranty

FRONT & REAR PANEL FEATURES



FRONT PANEL FEATURES

Channel Gate Indicators: These red LEDs normally indicate when Channels 1~8 are active to Main Out ('on' or 'auto' gating). **NOTE:** When a channel is assigned as 'off' to Main Out, but is assigned as 'auto' to Aux Out, this indicator will light when the channel is active (gated on) to Aux Out (see Setup on pg. 5).

On Indicator: When AC power is applied to the VRAM, this red LED will light indicating power to the mixer is On. When power is removed, all 'current mix' settings (levels, assignments, etc.) will be stored in non-volatile memory and recalled when power is restored. **NOTE:** During setup the VRAM may instead be set to recall a special preset whenever power is turned on (see Setup on pg. 9).

REAR PANEL FEATURES

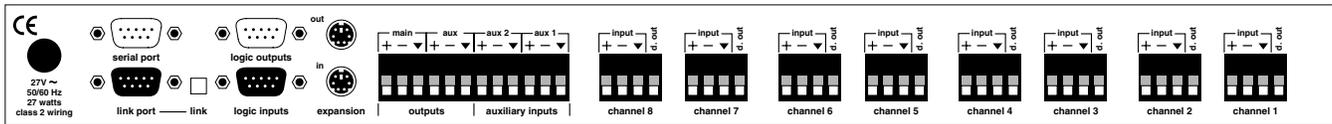
AC Power Cord: The power transformer provides 27 Volts AC to the VRAM, and is detachable via a 5-pin DIN connector. The VRAM has two internal 'self-resetting' fuses (there are no user serviceable parts inside the unit). If the internal fuses blow, they will attempt to re-set after a short period. However, this may be an indication that the VRAM requires service.

Serial Port: This 9-pin Sub-D (male) connector provides an RS-232 Serial Port for remote control via computer or third-party controllers (see RS-232 Control on pg. 14). The Serial Port has the following pin assignments (left-to-right & top-to-bottom): **Pin 1**) not used; **Pin 2**) Receive Data (RxD) input; **Pin 3**) Transmit Data (TxD) output; **Pin 4**) Data Terminal Ready (DTR) output; **Pin 5**) Ground; **Pin 6**) not used; **Pin 7**) Request To Send (RTS) output; **Pin 8**) not used; **Pin 9**) not used. BiampWin software and a null-modem cable are provided for programming (see Setup on pg. 4). **NOTE:** The Serial Port can also transmit commands received via the Logic Inputs (see Setup on pg. 8).

Link Port: This 9-pin Sub-D (female) connector provides a Link Port for RS-232 control of multiple BIAMP products (see RS-232 Control on pg. 14). The Link Port of one device simply connects to the Serial Port of the next device (and so forth). Link cables are available as an option (Biamp #909-0057-00). **NOTE:** All but the final device in a system should have the Link Switch pressed in (see below). The Link Port has the following pin assignments (right-to-left & top-to-bottom): **Pin 1**) not used; **Pin 2**) Transmit Data (TxD) output; **Pin 3**) Receive Data (RxD) input; **Pin 4**) not used; **Pin 5**) Ground; **Pin 6**) not used; **Pin 7**) not used; **Pin 8**) not used; **Pin 9**) not used. **NOTE:** The Link Port will also transmit commands received via the Logic Inputs (see Setup on pg. 8).

Link Switch: The Link Switch is used when connecting multiple devices in a 'Link Port to Serial Port' configuration (see Link Port above). From the factory, the Link Switch is released (out). When connecting multiple devices, the Link Switch must be depressed (in) on all devices except the final device in the system (the device with no Link Port connection).

FRONT & REAR PANEL FEATURES



Logic Outputs: This 9-pin Sub-D connector provides Logic Outputs from Channels 1~8 (see Logic Outputs on pg. 12). If a channel is assigned as 'auto' to either Main Out or Aux Out, the corresponding Logic Output will turn on whenever the channel is gated on. Logic Outputs may be used to control external switching circuits, such as relays or other BIAMP products. These outputs are typically used to turn off speakers or select cameras when certain microphones are active. **NOTE:** *Individual Logic Outputs may be turned on/off via software or remote control. However, this temporarily defeats their ability to follow the active channel, until again assigned to 'follow gate' (see Setup on pg. 5).*

Logic Inputs: This 9-pin Sub-D (female) connector provides eight logic inputs for controlling the VRAM via contact-closures (see Logic Inputs on pg. 10). Logic Inputs are programmed using the BiampWin software and serial cable provided with the VRAM (see Setup on pg. 8). **NOTE:** *From the factory, Logic Inputs 1~8 have no pre-programmed function.*

Expansion In & Out: These 6-pin mini-DIN connectors are for linking multiple mixers, to increase the number of input channels. A 6-pin mini-DIN cable is provided with each mixer. To link mixers, simply connect the cable from the Expansion Out jack of one mixer to the Expansion In jack of the next mixer (and so forth). The final mixer in the system (with no Expansion Out jack connection) becomes the 'master'. The 'master' collects audio signals & control data from the other mixers, which become 'slaves'. Main Out & Aux Out signals, plus NOM attenuation, for the combined system are provided by the 'master'. The outputs from 'slave' mixers provide only signals from their own inputs, plus those of any 'slave' mixers connected to them via Expansion In.

Main Out: This plug-in barrier strip provides the balanced Main Out from the VRAM. For balanced output, wire high to (+), low to (-), and ground to (▼). For unbalanced output, wire high to (+) and ground to (▼), leaving (-) unconnected. Signal level will be reduced by 6dB when outputs are unbalanced.

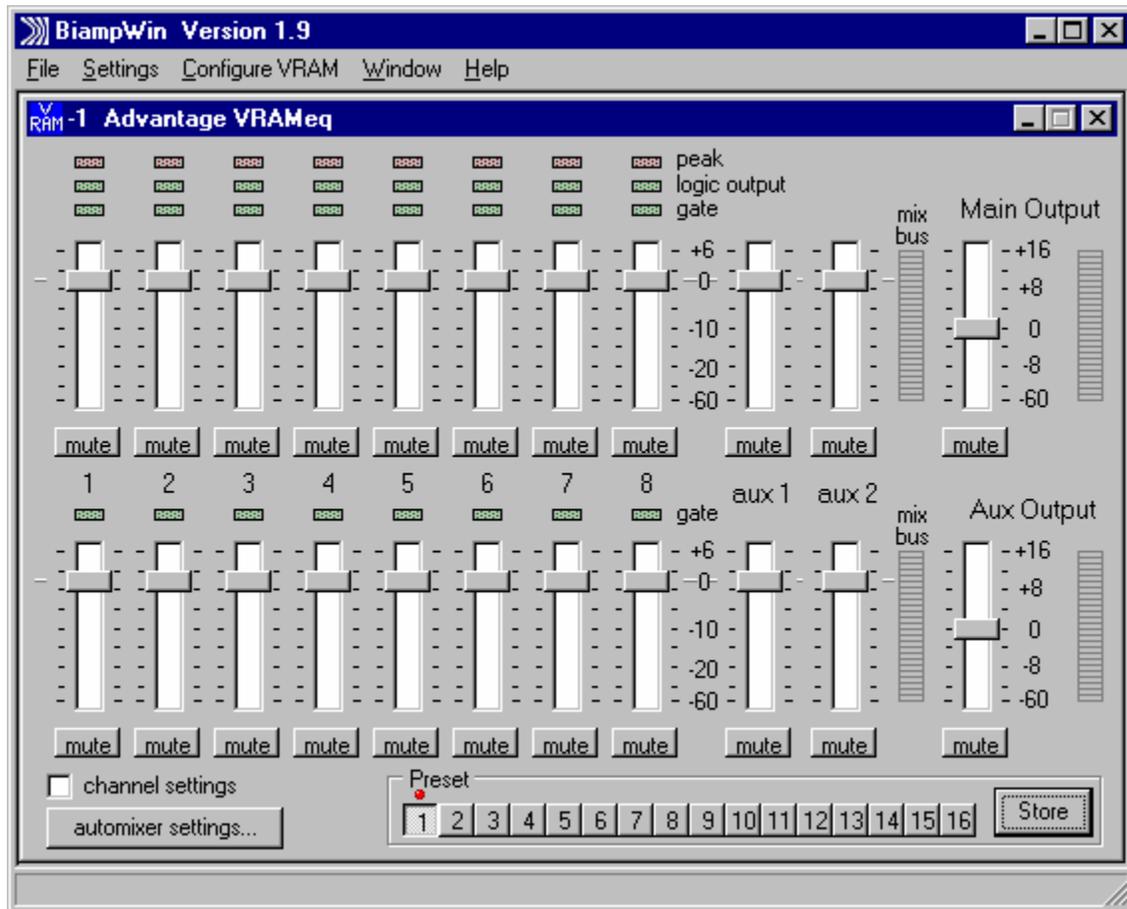
Aux Out: This plug-in barrier strip provides the balanced Aux Out from the VRAM. For balanced output, wire high to (+), low to (-), and ground to (▼). For unbalanced output, wire high to (+) and ground to (▼), leaving (-) unconnected. Signal level will be reduced by 6dB when outputs are unbalanced.

Aux 1 & Aux 2 Inputs: These plug-in barrier strips provide the balanced auxiliary line inputs to the VRAM. For balanced input, wire high to (+), low to (-), and ground to (▼). For unbalanced input, wire high to (+) and ground to both (-) & (▼).

Channel Input & Direct Output: These plug-in barrier strips provide the balanced mic/line input to the respective channels. For balanced input, wire high to (+), low to (-), and ground to (▼). For unbalanced input, wire high to (+) and ground to both (-) & (▼). Unbalanced Direct Outputs are also available from the channels using (d out) & (▼). **NOTE:** *Inputs & Direct Outputs can be assigned for 'auto' (gated) or on/off operation (see Setup on pg. 5).*

SETUP

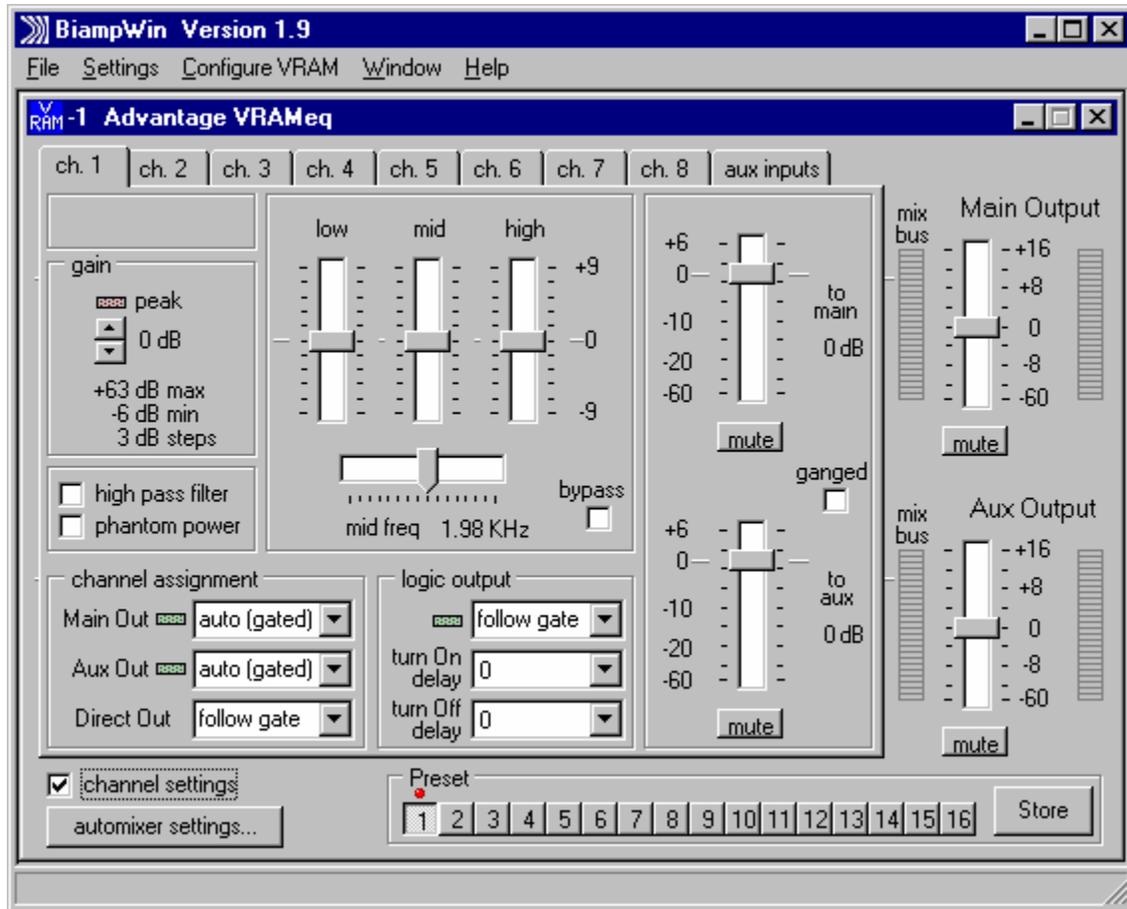
VRAM & VRAMeq parameters are all adjustable using the 'BiampWin' software and null-modem cable provided with the unit. BiampWin software provides programs for various BIAMP products, including the VRAM(eq). The VRAM program includes seven control screens, which are described on the following pages. Once the software is started (and Comm Port Configuration is set), the control screens are accessed via the drop-down menus at the top of the opening screen. The Mix screen appears whenever a VRAM file is opened. Channel Settings, Automixer Settings, Button Definitions, Logic Input Definitions, Logic Output Polarity, & Configuration Options screens are then available from the Configure VRAM menu. The File menu provides functions such as save, open, download, etc. The Settings menu recalls the Comm Port Configuration screen. The Window menu arranges the active product screens. The Help menu explains the available adjustments. To install BiampWin software: Select 'Run' from 'Start' menu, and browse to 'BiampWin' on appropriate drive. System Requirements: Windows® 95/98/NT/2000/XP with 8MB of available hard disk space (serial port required for 'on-line' operation).



MIX SCREEN

The Mix Screen is used to adjust VRAM input/output levels, as well as to store/recall sixteen memory presets. All VRAM inputs may be adjusted to each output independently. Each output is also independently adjusted. Adjustments are made with the computer mouse (or keyboard). Input & output levels are adjusted by dragging the corresponding 'faders' up or down. Mute buttons turn off the respective input/output signals, without changing the channel assignments (see next page). Mix Bus meters display 'pre-fader' signal levels for the respective outputs. Main Output & Aux Output meters display 'post-fader' signal levels for the respective outputs. **NOTE:** For best performance, adjust faders so the meters show occasional peaks in the yellow area, but never to the top (red). Peak indicators should flash only on occasional peaks in signal level, as determined by input gain adjustments (see pg. 5). Logic Outputs indicators will light whenever the respective Logic Outputs are on (see pg. 5). Gate indicators will light whenever channels are active to the corresponding outputs (see pg. 5). Channel Settings selects a screen for adjusting individual input parameters (see pg. 5). Automixer Settings selects a screen for adjusting automatic mixing functions, which affect the entire mixer (see pg. 6). Preset buttons recall the corresponding presets from non-volatile memory. Presets must first be created & stored by the user (no factory presets). The Store button opens a menu for storing current settings in any of the Presets 1-16. Each preset includes settings from the Mix screen, as well as from the Channel Settings & Automixer Settings screens (see pgs. 5 & 6). The title bar across the top of the Main screen will indicate the Device #, the custom Device Name, and the model of product being controlled. BiampWin software can operate 'off-line' (with no product connected) by opening a 'new' file for the desired product. The Device # for 'off-line' files is assigned sequentially as a negative number.

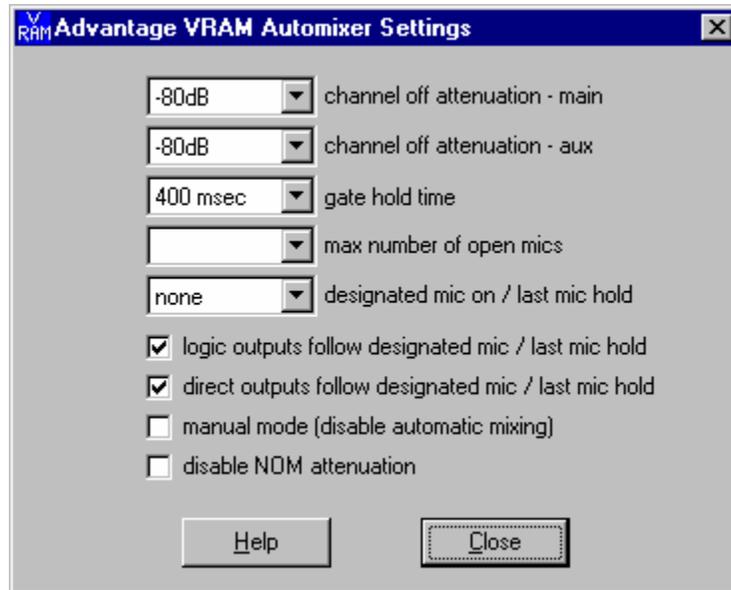
SETUP



CHANNEL SETTINGS SCREEN

The Channel Settings screen appears as an overlay of the Mix screen, and is used to adjust individual input parameters. It is accessed via the Configure VRAM menu, or from the Mix screen. Individual tabs are provided for Channels 1-8 and the Aux Inputs. Right-clicking the blank area at the upper-left of a tab allows that input to be given a custom name. Gain adjusts the input to compensate for different signal levels. Set Gain so the Peak indicator flashes only on occasional peaks in signal level. High Pass Filter reduces low frequencies signals 6dB/octave @ 110Hz. Phantom Power turns on +36V power for condenser mics. Low, Mid, & High (*model VRAMEq only*) provide 3-band input equalization, with variable mid frequency & bypass. Faders & Mute provide the same functions as on the Mix screen, except that Main & Aux faders may be Ganged for combined control. Channel Assignment allows the input to be assigned as 'on', 'off', or 'auto' to Main Out & Aux Out independently. **NOTE:** 'Auto' means automatic gating (signal activated). 'On' means not gated (always active). 'Off' means unassigned (never active). Direct Out provides 'on', 'off', or 'follow gate' assignment. **NOTE:** 'Follow gate' means to turn on & off simultaneously with any channel gating (to Main Out or Aux Out). Logic Output provides the same 'on', 'off', or 'follow gate' assignment. Turn On Delay selects the timing between when a channel becomes active (gate on) and when the corresponding Logic Output turns on. Turn Off Delay selects the timing between when a channel becomes inactive (gate off) and when the corresponding Logic Output turns off. **NOTE:** Logic Output delay times are typically used for proper timing in applications where camera switching circuits are being controlled. The Aux Inputs tab provides two Gain settings (+6dB & -6dB), and faders for Main Out & Aux Out. Each of the Aux Inputs may be given a custom name. Aux 1 includes a Teleconference Mode, which defeats the Aux Out fader (mix-minus), and enables a Threshold fader (Adaptive Threshold Sensing). In this mode Aux 1 provides the teleconference input, and Aux Out provides the teleconference output. **NOTE:** Automixer Settings, Presets, & output faders (on the Mix screen) are still available while using the Channel Settings screen.

SETUP



AUTOMIXER SETTINGS SCREEN

The Automixer Settings screen is used to adjust automatic mixing functions, which affect the entire mixer. It is accessed via the Configure VRAM menu, or from the Mix screen. Channel Off Attenuation selects the amount of attenuation applied to 'auto' channels when they are inactive (gated off). **NOTE:** *Channel Off Attenuation is set separately for Main Out & Aux Out.* Gate Hold Time selects the length of time that 'auto' channels will remain active (gated on) once signal is no longer present. Max Number of Open Mics limits the quantity of 'auto' channels which can be active (gated on) to Main Out at the same time. Designated Mic On / Last Mic Hold selects the most recently active 'auto' channel to remain active (gated on), or a specified channel to become active (gated on), whenever signals are no longer present. Logic Outputs Follow Designated Mic / Last Mic Hold causes logic outputs to turn on when corresponding channels are activated (gated on) due to their assignment as Designated Mic On or Last Mic On. Direct Outputs Follow Designated Mic / Last Mic Hold causes direct outputs to turn on when corresponding channels are activated (gated on) due to their assignment as Designated Mic On or Last Mic On. **NOTE:** *If Logic Outputs or Direct Outputs are not assigned to follow Designated Mic / Last Mic Hold, they will still follow normal gating activity of the channels, but will not hold without signal (as Last Mic Hold) and will not turn on without signal (as Designated Mic On).* Manual Mode defeats the channel gating functions, turning all channels on to Main Out & Aux Out (except for channels specifically assigned as 'off'). Disable NOM Attenuation defeats the typical attenuation (3dB for each doubling of active 'auto' channels) which occurs at Main Out. Help provides additional instruction. Close will close the Automixer Settings screen.

SETUP

The screenshot shows the 'Advantage VRAM Button Definitions' window. It is organized into several functional areas:

- Store Preset:** A dropdown menu for selecting a preset to store.
- Recall Preset:** A dropdown menu for selecting a preset to recall.
- Logic Outputs:** Eight dropdown menus, numbered 1 through 8, for assigning actions to logic outputs.
- Echo Character:** A dropdown menu currently set to 'B'.
- Main Volume & Aux Volume:** Two columns of dropdown menus. The 'Main Volume' column includes channels ch.1 through ch.8, aux1, aux2, and output. The 'Aux Volume' column includes dropdown menus for each of these categories.
- Remote Control Buttons:** A grid of 40 buttons, numbered 1 through 40. Button '1' is highlighted with a grey background.

At the bottom of the window, there are four buttons: 'Clear', 'Help', 'Try It', and 'Close'.

BUTTON DEFINITIONS SCREEN

The Button Definitions screen is used to assign specific 'actions' to remote control buttons. Although the VRAM does not accept commands from push-button remote controls directly, it can receive individual ASCII characters (via RS-232) from other BIAMP products and/or third-party control systems. From the factory, Remote Control Buttons have equivalent ASCII characters permanently assigned to them (see RS-232 Control on pg. 14). Therefore, a Remote Control Button can be assigned specific 'actions', which the VRAM will then perform whenever the equivalent ASCII character for that button is received. From the factory, Remote Control Buttons have no pre-programmed functions. However, using the Button Definitions screen, each Remote Control Button may be assigned various 'actions'. Remote Control Buttons select which button is to be defined. Equivalent ASCII Character displays the permanent ASCII character for the selected button. Store Preset allows store actions for Presets 1~16 to be assigned to the selected button. Recall Preset allows recall actions for Presets 1~16 to be assigned to the selected button. Logic Outputs allows 'on', 'off', & 'toggle' actions for Logic Outputs 1~8 to be assigned to the selected button. **NOTE:** *Turning a Logic Output on/off will temporarily defeat its ability to follow channel gating activity, until again assigned to 'follow gate' (see pg. 5).* Echo Character displays the 'echo' character for the selected button. **NOTE:** *Echo Characters are permanent for Remote Control Buttons, and can only be changed for Logic Input control (see next page).* Main Volume & Aux Volume allow specific volume & muting actions for Channels 1~8, Aux 1 & 2, Main Out, & Aux Out to be assigned to the selected button. Clear allows all actions assigned to the selected button (or all buttons) to be cleared. Try It causes the actions currently assigned to the selected button to be performed by the VRAM. Help provides additional instruction. Close will close the Button Definitions screen.

SETUP

The screenshot shows a software window titled "Advantage VRAM Logic Input Definitions". The window is divided into several functional areas:

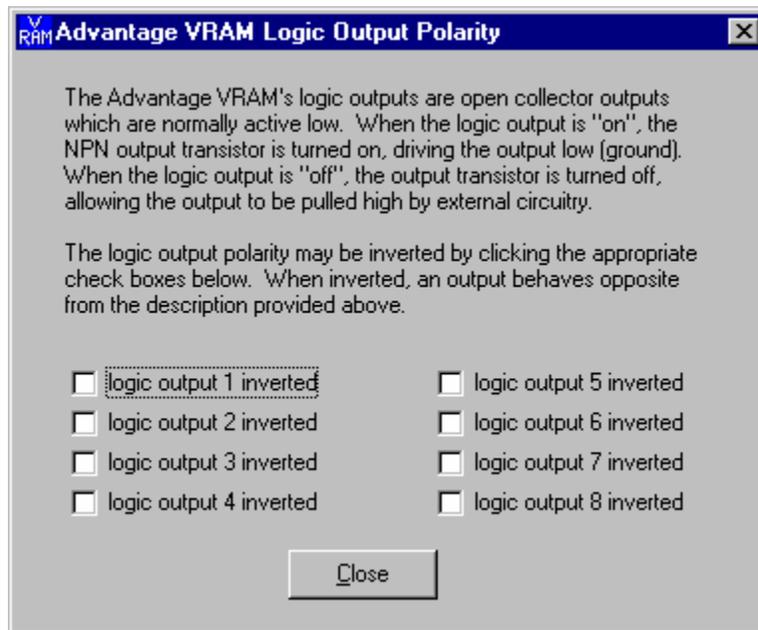
- Store Preset**: A dropdown menu.
- Recall Preset**: A dropdown menu.
- Logic Outputs**: A grid of dropdown menus for outputs 1 through 8, arranged in two columns (1-4 on the left, 5-8 on the right).
- Echo Character**: A dropdown menu currently set to "none".
- Main Volume**: A column of dropdown menus for channels ch.1 through ch.8, plus aux1 and aux2.
- Aux Volume**: A column of dropdown menus for channels ch.1 through ch.8, plus aux1 and aux2.
- Logic Inputs**: A grid of buttons for assigning actions to Logic Inputs 1-8. Each input has two buttons: "Open" and "Close".

At the bottom of the window are four buttons: "Clear", "Help", "Try It", and "Close".

LOGIC INPUT DEFINITIONS SCREEN

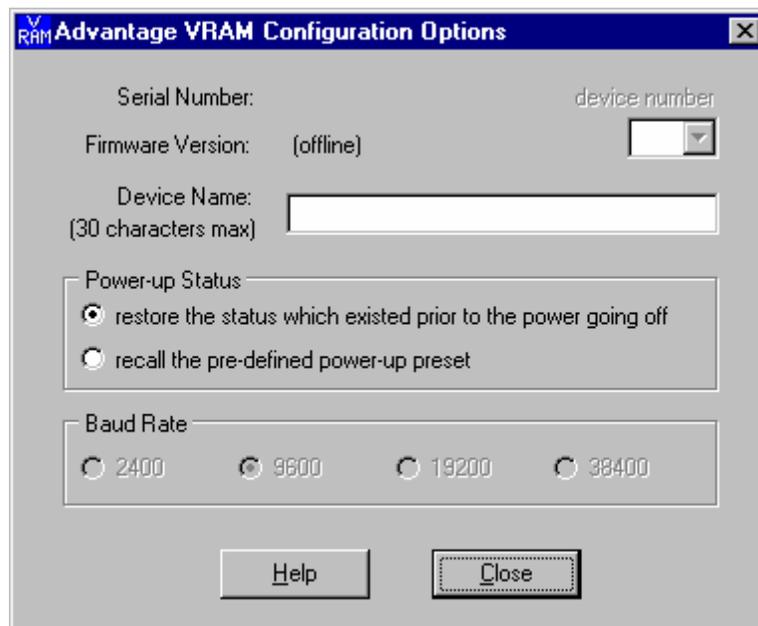
The Logic Input Definitions screen is used to assign specific 'actions' to the Logic Inputs (and remote control buttons). Logic Inputs allow remote control of the VRAM via external circuits, such as switches, contact-closures, active driver circuits, and/or 'open-collector' logic outputs (see Logic Inputs on pg. 10). From the factory, Logic Inputs 1~8 have no pre-programmed functions. However, using the Logic Input Definitions screen, each Logic Input may be assigned various 'actions'. Logic Inputs select which Logic Input is to be defined. **NOTE:** Since Logic Inputs are controlled by switches, contact-closures, etc., each Logic Input may be assigned certain actions to perform when the switch is 'opened', and different actions to perform when that same switch is 'closed'. Store Preset allows store actions for Presets 1~16 to be assigned to the selected Logic Input. Recall Preset allows recall actions for Presets 1~16 to be assigned to the selected Logic Input. Logic Outputs allows 'on', 'off', & 'toggle' actions for Logic Outputs 1~8 to be assigned to the selected Logic Input. **NOTE:** Turning a Logic Output on/off will temporarily defeat its ability to follow channel gating activity, until again assigned to 'follow gate' (see pg. 5). Echo Character allows the 'echo' character for the selected Logic Input to be changed. **NOTE:** This is the RS-232 ASCII character which will be transmitted via the Serial Port whenever that Logic Input is switched. From the factory, no echo characters are assigned to Logic Inputs 1~8. Changing the Echo Character is used primarily for customizing remote control commands amongst various RS-232 controlled products within a system (see RS-232 Control on pg. 14). Main Volume & Aux Volume allow specific volume & muting actions for Channels 1~8, Aux 1 & 2, Main Out, & Aux Out to be assigned to the selected Logic Input. **NOTE:** Although Logic Inputs volume actions include a 'repeating' (volume ramp) function, they will not continuously repeat the echo character via RS-232. Clear allows all actions assigned to the selected Logic Input (or all Logic Inputs) to be cleared. Try It causes the actions currently assigned to the selected Logic Input to be performed by the VRAM. Help provides additional instruction. Close will close the Button Definitions screen.

SETUP



LOGIC OUTPUT POLARITY SCREEN

Normally, when a Logic Output turns 'on' it provides a DC path to ground, which is then used to control 'active-low' type circuits. The Logic Outputs Polarity screen simply allows this operation of the individual Logic Outputs to be reversed, for driving 'active-high' type circuits.



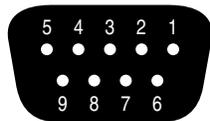
CONFIGURATION OPTIONS SCREEN

The Configuration Options screen is used to select options which customize the operation of the VRAM. At the top of the Configuration Options screen, the Serial Number and Firmware Version of the VRAM will be displayed. BiampWin software can operate 'off-line' (with no product connected) by opening a 'new' file for the desired product. The Serial Number and Firmware Version are not displayed for 'new' ('off-line') files. Device Number allows a device number (0-63) to be assigned to the currently active VRAM. This allows multiple VRAM (or other BIAMP programmable products) to be individually controlled when linked together. Unique device numbers must be assigned to each device before the devices are linked together. Device Name allows a custom name to be given to the particular VRAM, by entering up to 30 characters of text. The Device Name will be stored in the VRAM memory, and will be displayed on the title bar of the Main screen whenever that VRAM is accessed with the software. Power-up Status provides a choice of settings to be recalled from non-volatile memory each time the VRAM is powered up. When 'pre-defined power-up preset' is selected, the associated store & recall preset options are then made available on the Mix screen, via the Store button menu. Baud Rate determines the speed of data transfer for the software, as well as for any products currently connected which support this function. Help provides additional instruction. Close will close the Configuration Options screen.

LOGIC INPUTS

Eight Logic Inputs are available on a rear panel 9-pin Sub-D (female) connector. Logic Inputs allow remote control of the VRAM via external circuits, such as switches, contact-closures, active driver circuits, and/or 'open-collector' logic outputs. From the factory, Logic Inputs 1~8 have no pre-programmed function. However, each Logic Input may be assigned different 'actions' using the BiampWin software and null-modem cable provided with the VRAM (see Setup on pg. 8). Since Logic Inputs are controlled by switches, contact-closures, etc., each Logic Input may be assigned two functions (one for switch 'closed' and one for switch 'open').

Logic Inputs have the following pin assignments (right-to-left & top-to-bottom): **Pins 1~8** Logic Inputs 1~8; **Pin 9** Ground.



pin #1 = Logic Input 1
pin #2 = Logic Input 2
pin #3 = Logic Input 3
pin #4 = Logic Input 4
pin #5 = Logic Input 5

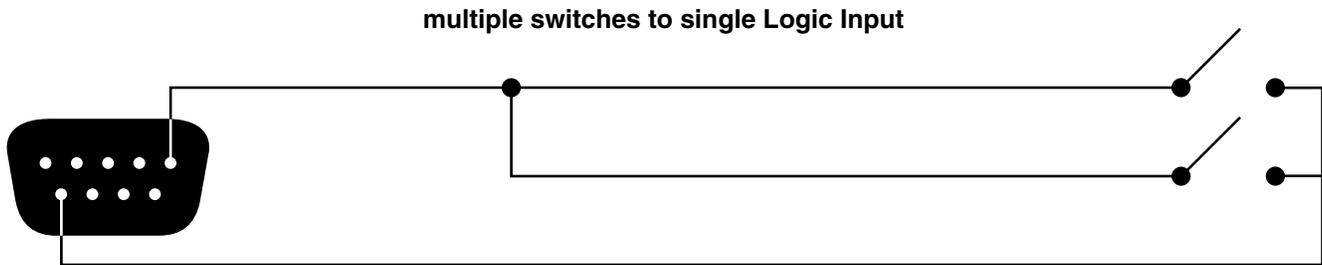
pin #6 = Logic Input 6
pin #7 = Logic Input 7
pin #8 = Logic Input 8
pin #9 = ground

logic inputs

When nothing is connected to a Logic Input, an internal pull-up resistor keeps it at a 'high' idle state (+5.0 VDC). The Logic Input is activated when its input goes 'low' (less than +0.8 VDC), and is de-activated when its input goes 'high' (greater than +2.4 VDC). A Logic Input is controlled in one of three ways: 1) Use an NPN style 'open-collector' logic output from an external device (such as another BIAMP product) to short the Logic Input to ground. 2) Use a switch, relay, or other contact-closure (such as from a third-party controller) to short the Logic Input to ground. 3) Use an active TTL output driver circuit (such as from a third-party controller) to actively drive the Logic Input to a 'high' or 'low' state.

LOGIC INPUTS

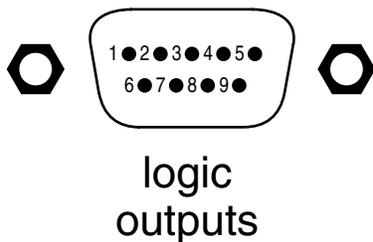
Multiple contact-closures or 'open-collector' logic outputs may be wired in parallel to a single Logic Input (see diagram below). Logic Outputs and contact-closures should be rated for at least 5 Volts / 1mA operation. Low-current / dry-contact closures are recommended for reliability. Active output driver circuits should not exceed a signal range of 0~5 Volts DC, and should have a minimum pulse width of 100 milli-seconds. Logic Input impedances are approximately 10k ohms.



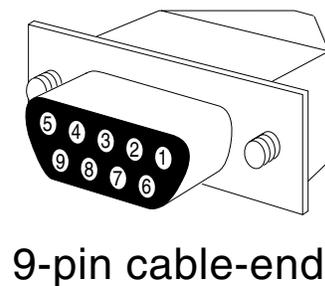
LOGIC OUTPUTS

The VRAM provides eight logic outputs on a rear panel 9-pin Subminiature D (male) connector. Logic Outputs can be used to control external switching circuits (such as relays) for speakers, cameras, indicators, etc. The VRAM Logic Outputs are most often used, in conjunction with external relays, to turn off specific speakers when nearby microphones are active (reducing feedback problems). For example, if a speaker is located directly above microphone #1, the Logic Output for Channel 1 of the VRAM can be used to turn off that speaker relay when microphone #1 is active (see diagram on next page). The Logic Outputs can also be combined (wired in parallel) to control a single circuit. For example, a speaker relay could be turned off when either microphone #1 or microphone #2 is active. In addition to speaker relays, the VRAM Logic Outputs may be used to control external indicator lights (see diagram on next page). Another common application for Logic Outputs is to control video cameras. Different cameras could be activated depending upon which microphone (or group of microphones) is currently active. Cameras can be selected (using a video switcher such as a VSX41) and/or camera presets may be triggered (using a 'pan/tilt/zoom' camera system). The VRAM Logic Outputs may also be used in conjunction with the VRAM Logic Inputs to perform such functions as 'automatic priority', which allows a microphone (or group of microphones) to be muted whenever specific 'priority' microphones are active (see diagram on next page). The Logic Output for the 'priority' microphone is wired to a Logic Input which is defined to mute the other microphones (see Setup on pg. 8). A similar approach is useful for 'page-over-music' applications. However, in this case the Logic Outputs from multiple 'paging' microphones are wired to a Logic Input which is defined to mute the music channel. Multi-level priority schemes are also possible, but require the use of multiple Logic Inputs and a diode matrix. These 'priority' applications require that Logic Inputs do not follow Designated Mic On / Last Mic Hold (see Setup on pg. 6). Of course, manual muting of microphones via external switches is also possible (see Logic Inputs on pg. 10).

The VRAM Logic Outputs are 'open collector' outputs. Each Logic Output is an NPN transistor with the collector being the output and the emitter being ground (see diagram on next page). When a Logic Output is turned on, the transistor provides a path for DC current to flow. The Logic Outputs do not provide any voltage or current. They act only as switches (with a common ground return). To activate external relays, an external power supply must be used (see diagram on next page). The Logic Output transistors are rated up to a maximum of 24 VDC and 50 mA per output (24 volt relay coils maximum). However, +12 Volts DC is sufficient power for most applications. When using the Logic Outputs to control relays, protection diodes must be used to suppress high voltage transients that are generated when the relays turn off (see diagram on next page). Any of the 1N4004 family of diodes (1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007, or equivalent) will provide proper protection. When a Logic Output goes on, the associated relay may be wired to perform on, off, or 'A/B' switching functions. To use logic 'on' to turn on (or activate) a device, wire across the 'normally open' relay contacts, in series with the device (or control voltage source). To use logic 'on' to select between 'A' or 'B' signals (inputs or outputs), wire one signal to the 'normally closed' relay terminal and the other signal to the 'normally open' relay terminal, with the common relay terminal providing the feed (input or output).

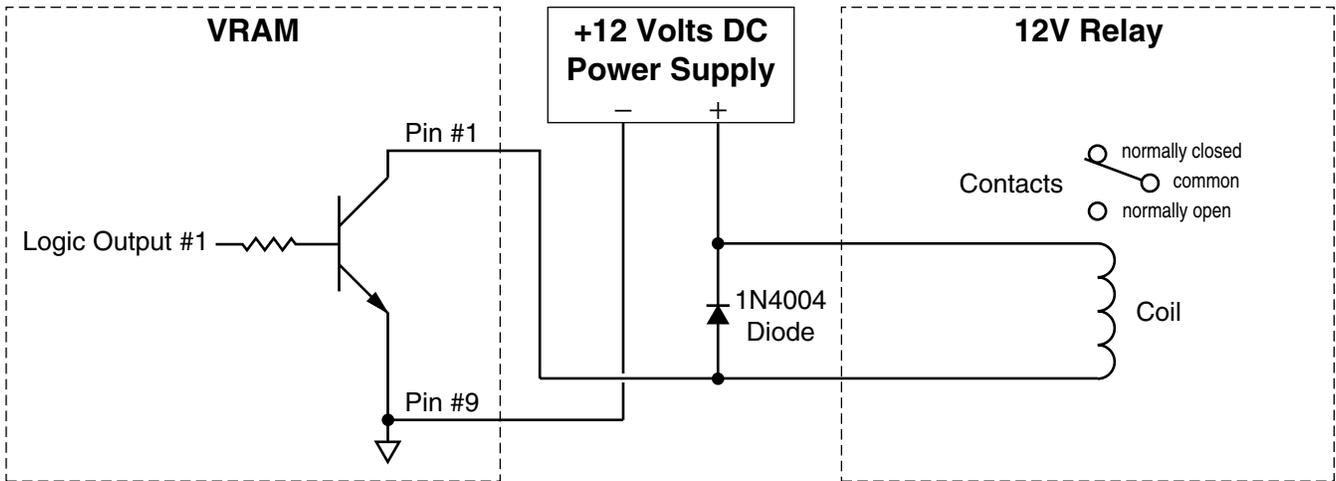


logic out	pin number
channel 1	pin #1
channel 2	pin #2
channel 3	pin #3
channel 4	pin #4
channel 5	pin #5
channel 6	pin #6
channel 7	pin #7
channel 8	pin #8
ground	pin #9

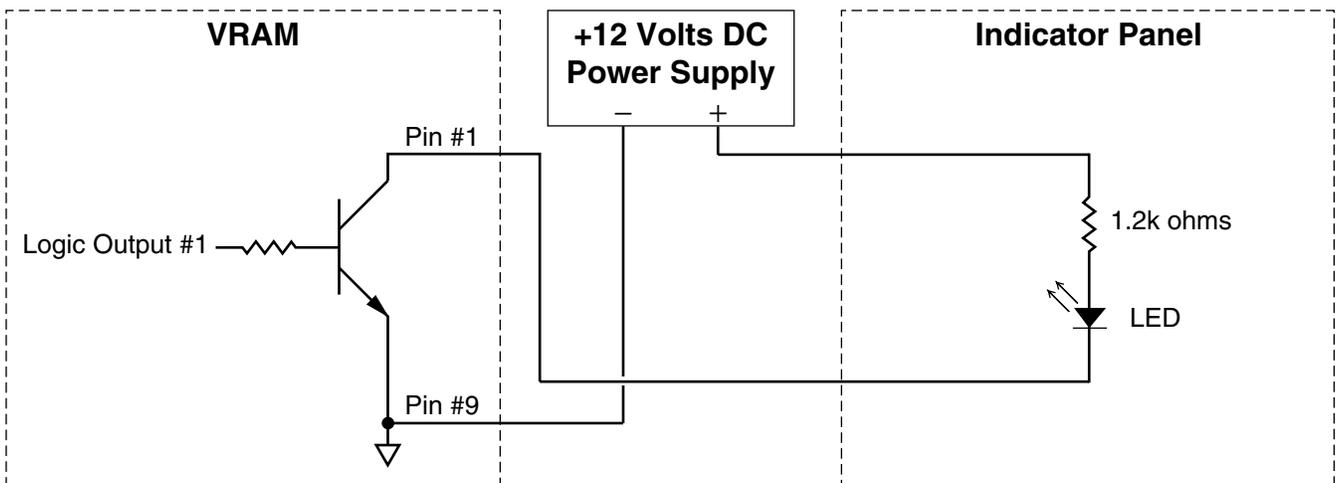


LOGIC OUTPUTS

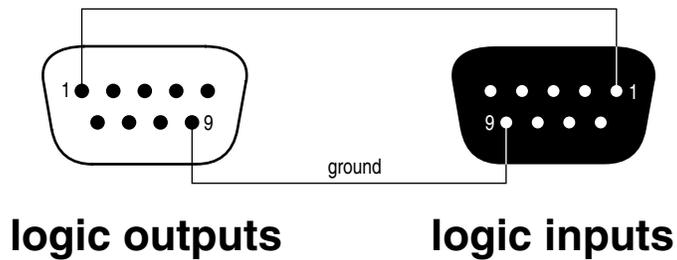
Logic/Relay circuit



Logic Outputs controlling indicators



Channel 1 'automatic priority' over Channels 2-8



RS-232 CONTROL

The VRAM has an RS-232 Serial Port, which allows it to be controlled by a computer (see Front & Rear Panel Features on pg. 2). In addition to the BiampWin software, the VRAM offers two other methods of computer control.

Control Button Emulation: This method allows the computer to imitate the operation of an infrared transmitter or wall-mount control panel. Although the VRAM does not accept infrared or wall-mount remote controls itself, it can still receive ASCII characters (via RS-232) which emulate the buttons on these types of remote controls. From the factory, remote control buttons have equivalent ASCII characters permanently assigned to them (see table below). Therefore, actions can be assigned to remote control buttons in the same way they are assigned to Logic Inputs. Then, using this method, the computer can output ASCII characters which are equivalent to the commands generated by those standard remote control buttons. Control Button Emulation allows the computer to utilize up to forty button definitions (unlike standard remote controls, which have only twenty-eight buttons). When using up to four devices in a system, Control Button Emulation also allows the computer to designate which device or devices should react to each control button command.

Advanced Computer Control: This method provides advanced commands, which allow the computer to retrieve or edit various VRAM settings. The computer may also emulate control buttons. Using this method, the computer may designate up to sixty-four devices, and may also provide 'real-time' display of various settings.

This manual only describes the Control Button Emulation method of computer control. For complete details about using the VRAM with a computer, including Advanced Computer Control, contact Biamp Systems for the manual "[Computer Control of the VRAM](#)".

Each control button on an infrared transmitter or wall-mount control panel corresponds to one character in the standard ASCII character set. The character equivalents are summarized in the following table. This table includes all forty possible buttons, their button numbers, their ASCII code equivalents, and their factory default button definitions (no operation assigned).

button 01	B	no operation assigned	button 15	P	no operation assigned	button 29	^	no operation assigned
button 02	C	no operation assigned	button 16	Q	no operation assigned	button 30	_	no operation assigned
button 03	D	no operation assigned	button 17	R	no operation assigned	button 31	'	no operation assigned
button 04	E	no operation assigned	button 18	S	no operation assigned	button 32	b	no operation assigned
button 05	F	no operation assigned	button 19	T	no operation assigned	button 33	c	no operation assigned
button 06	G	no operation assigned	button 20	U	no operation assigned	button 34	d	no operation assigned
button 07	H	no operation assigned	button 21	V	no operation assigned	button 35	e	no operation assigned
button 08	I	no operation assigned	button 22	W	no operation assigned	button 36	f	no operation assigned
button 09	J	no operation assigned	button 23	X	no operation assigned	button 37	g	no operation assigned
button 10	K	no operation assigned	button 24	Y	no operation assigned	button 38	h	no operation assigned
button 11	L	no operation assigned	button 25	Z	no operation assigned	button 39	i	no operation assigned
button 12	M	no operation assigned	button 26	[no operation assigned	button 40	j	no operation assigned
button 13	N	no operation assigned	button 27	\	no operation assigned			
button 14	O	no operation assigned	button 28]	no operation assigned			

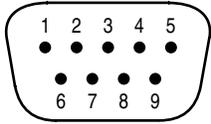
The computer can initiate any functions or actions that a standard control can, by simply transmitting the equivalent control button ASCII character. When interfacing the VRAM to a computer, the computer must be aware that the VRAM will 'echo' all characters it receives (both from computer and Logic Inputs) via the Serial Port Transmit Data (TXD) output signal. However, from the factory, the VRAM Logic inputs are programmed with no 'echo character' assigned to them.

When using Control Button Emulation, up to four BIAMP products may be connected together and addressed individually. When multiple units are used, each unit is assigned a unique "Device #" (see Setup on pg. 9). Normally, all units would react to control button commands. However, a computer can send commands to specific units, by preceding each command with a "device select prefix" character (see table below). Only those units whose Device #s are specified will respond to the command which follows. If a command is not preceded by a device select prefix character, then all units in the system will react to that command.

Select Device 1	l	Select Devices 2 & 3	q	Select Devices 1 & 2 & 4	v
Select Device 2	m	Select Devices 1 & 2 & 3	r	Select Devices 3 & 4	w
Select Devices 1 & 2	n	Select Device 4	s	Select Devices 1 & 3 & 4	x
Select Device 3	o	Select Devices 1 & 4	t	Select Devices 2 & 3 & 4	y
Select Devices 1 & 3	p	Select Devices 2 & 4	u	Select Devices 1 & 2 & 3 & 4	z

RS-232 CONTROL

Serial Port: The 9-pin Sub-D (male) connector on the VRAM rear panel provides the RS-232 compatible serial interface signals used for computer control. The VRAM Serial Port transmits serial data on pin 3 (TxD), receives serial data on pin 2 (RxD), and provides a ground on Pin 5. The Data Terminal Ready (DTR) & Request To Send (RTS) output signals are connected to the +12 Volt power supply (through a resistor) and are always asserted when the VRAM power is on. **NOTE:** *The Serial Port may also transmit commands which are received via the Logic Inputs, depending upon the echo character assignments (see Setup on pg. 8).*



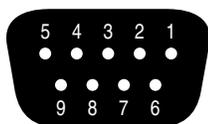
- | | |
|--|--|
| pin #1 = not used | pin #6 = not used |
| pin #2 = Receive Data (RxD) input | pin #7 = Request To Send (RTS) output |
| pin #3 = Transmit Data (TxD) output | pin #8 = not used |
| pin #4 = Data Terminal Ready (DTR) output | pin #9 = not used |
| pin #5 = ground | |

serial port

The VRAM only requires receive data (pin 2), transmit data (pin 3), and signal ground (pin 5) to be connected for successful data communications (see cable diagram below). However, the PC may require that signals be present on the data set ready, clear to send, or carrier detect inputs, as well as the receive data, transmit data, and signal ground pins. Success or failure depends entirely on the actual computer hardware and software being used. When trying to solve an interfacing problem, the most important thing to remember is that an output of one device should connect to one or more inputs of the other device, and that two outputs should never be connected together. Also, keep in mind that the RS-232 specification calls for the cable length to be no greater than 50 feet (although it is not unusual to be able to operate over distances of 150 to 250 feet), and the connectors must be of the appropriate gender (male or female) to mate properly. For best results, a shielded cable should be used, with the shield connected to chassis ground. Since the VRAM serial interface ground is also tied (indirectly) to the analog signal ground, undesirable ground loops may occur when the VRAM is connected to a PC (if the system grounding is not carefully designed). For best performance, the PC ground and the chassis ground of the VRAM should be at the same potential, and the PC should get AC power from the same source as the VRAM (and any other audio equipment which is connected to the VRAM). Since most lap-top computers are isolated from earth ground, this should rarely pose a problem.

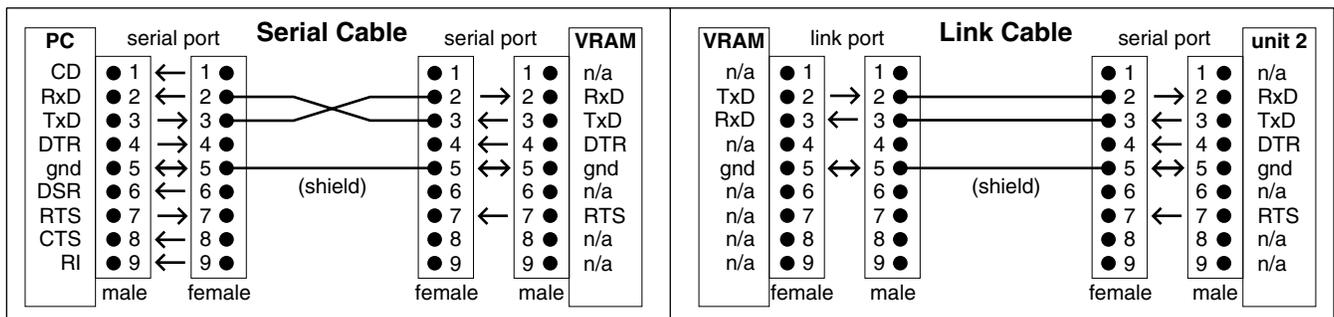
Serial Port Data Communications Parameters: The VRAM communicates through the Serial Port at the factory selected rate of 38400 bits per second, with 8 data bits, 1 stop bit, and no parity. The VRAM utilizes a subset of the standard 7-bit ASCII character set. The eighth data bit of each character (the most significant bit) should always be 0. The computer should not echo the characters it receives. The computer should not be set for either hardware (DTR) or software (XON/XOFF) flow control. The baud rate may be changed to either 2400, 9600, or 19200 bits per second by means of the software (see Setup on pg. 9). **NOTE:** *Baud rate may need to be changed when the VRAM is being used in RS-232 systems with other products having a lower maximum baud rate.*

Link Port Connections: The 9-pin Sub-D (female) connector on the VRAM rear panel provides the RS-232 compatible serial interface signals used for linking multiple BIAMP products within a system. The Link Port of one device simply connects to the Serial Port of the next device, and so forth (see diagram below). Link cables are available as an option (Biamp #909-0057-00). **NOTE:** *All but the final device in a system should have its 'Link' switch pressed in (see Front & Rear Panel Features on pg. 2). The Link Port may also transmit commands which are received via the Logic Inputs, depending upon the echo character assignments (see Setup on pg. 8).*



- | | |
|--|--------------------------|
| pin #1 = not used | pin #6 = not used |
| pin #2 = Transmit Data (TxD) output | pin #7 = not used |
| pin #3 = Receive Data (RxD) input | pin #8 = not used |
| pin #4 = not used | pin #9 = not used |
| pin #5 = ground | |

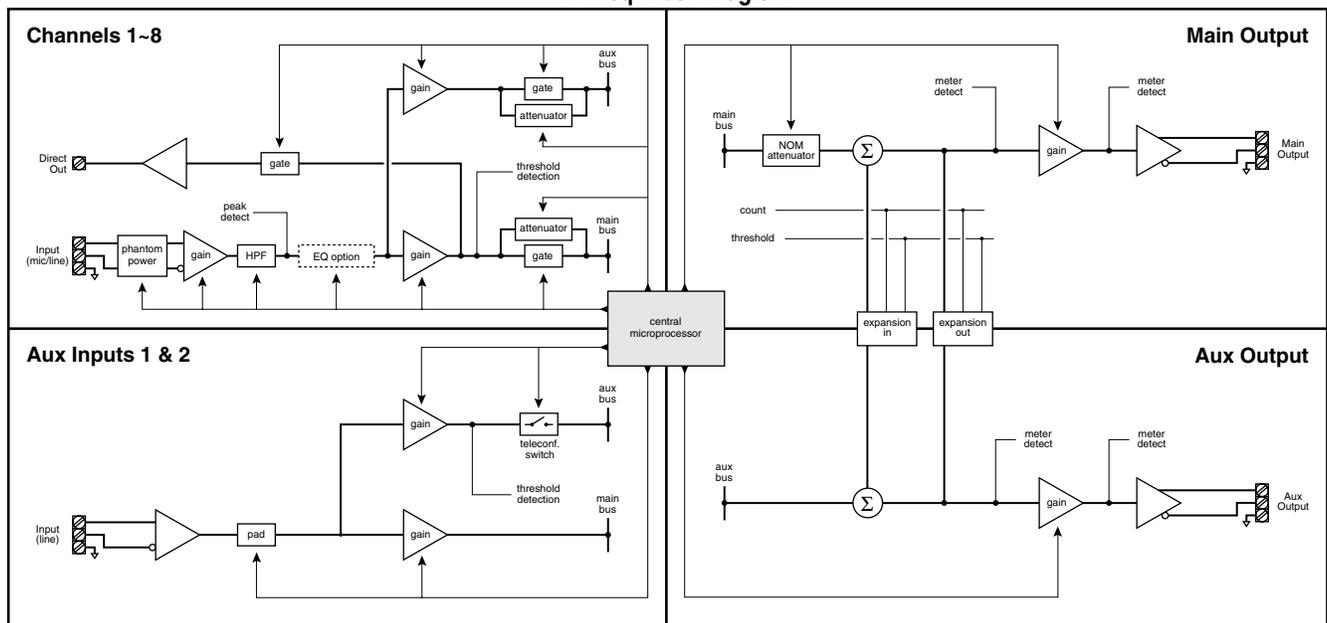
link port



SPECIFICATIONS & BLOCK DIAGRAM

Frequency Response (20Hz~20kHz @ +4dBu):	+0/-0.3dB	Phantom Power:	+36VDC (7mA/channel)
THD + Noise (20Hz~20kHz @ +4dBu):	< 0.03%	Input Gain Range:	
Equivalent Input Noise (20Hz~20kHz, 60dB gain, 150 ohm):	-126dBu	mic/line inputs (variable trim)	-6dB to +63dB
Output Noise (20Hz~20kHz, main & 1 channel @ nominal):	< -83dBu	aux line inputs (selectable pad)	-6dB or +6dB
Maximum Gain:		Channel Equalization (model VRAMEq):	
mic/line inputs to main & aux outputs	85dB	low-frequency (shelving)	±9dB @ 100Hz
aux line inputs to main & aux outputs	28dB	mid-frequency (variable peaking)	±9dB @ 220Hz~3.6kHz
Crosstalk (channel-to-channel @ 1kHz):	< -95dB	high-frequency (shelving)	±9dB @ 3.3kHz
Output Impedance:		High-Pass Filter:	6dB/octave @ 110Hz
main & aux outputs (balanced)	200 ohms	Automixing:	
channel direct outputs (unbalanced)	560 ohms	gate attack time (signal dependent)	4mSec min.
Input Impedance		release time (variable)	200mSec to 2Sec
mic/line inputs (balanced)	6.6k ohms	channel-off attenuation (variable)	-10dB to -80dB
aux line inputs (balanced)	20k ohms	NOM attenuation (doubling of active inputs)	-3dB
Maximum Output:		Feedback/Noise Improvement (8 channels)	9dB
main & aux outputs (balanced)	+24dBu	Power Consumption (115/230VAC 50/60Hz):	< 27 watts
Maximum Input:		Dimensions (HxWxD):	1.75"x19"x11" (44x483x279mm)
mic/line & aux line inputs	+24dBu	Weight:	< 10 lbs. (4.55kg)

VRAMEq Block Diagram

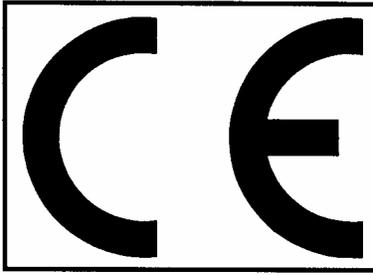


WARRANTY

BIAMP SYSTEMS IS PLEASED TO EXTEND THE FOLLOWING 5-YEAR LIMITED WARRANTY TO THE ORIGINAL PURCHASER OF THE PROFESSIONAL SOUND EQUIPMENT DESCRIBED IN THIS MANUAL

1. BIAMP Systems warrants to the original purchaser of new products that the product will be free from defects in material and workmanship for a period of 5 YEARS from the date of purchase from an authorized BIAMP Systems dealer, subject to the terms and conditions set forth below.
2. If you notify BIAMP during the warranty period that a BIAMP Systems product fails to comply with the warranty, BIAMP Systems will repair or replace, at BIAMP Systems' option, the nonconforming product. As a condition to receiving the benefits of this warranty, you must provide BIAMP Systems with documentation that establishes that you were the original purchaser of the products. Such evidence may consist of your sales receipt from an authorized BIAMP Systems dealer. Transportation and insurance charges to and from the BIAMP Systems factory for warranty service shall be your responsibility.
3. This warranty will be VOID if the serial number has been removed or defaced; or if the product has been altered, subjected to damage, abuse or rental usage, repaired by any person not authorized by BIAMP Systems to make repairs; or installed in any manner that does not comply with BIAMP Systems' recommendations.
4. Electro-mechanical fans, electrolytic capacitors, and normal wear and tear of items such as paint, knobs, handles, and covers are not covered under this warranty.
5. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. BIAMP SYSTEMS DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
6. The remedies set forth herein shall be the purchaser's sole and exclusive remedies with respect to any defective product.
7. No agent, employee, distributor or dealer of Biamp Systems is authorized to modify this warranty or to make additional warranties on behalf of Biamp Systems. statements, representations or warranties made by any dealer do not constitute warranties by Biamp Systems. Biamp Systems shall not be responsible or liable for any statement, representation or warranty made by any dealer or other person.
8. No action for breach of this warranty may be commenced more than one year after the expiration of this warranty.
9. BIAMP SYSTEMS SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS OR LOSS OF USE ARISING OUT OF THE PURCHASE, SALE, OR USE OF THE PRODUCTS, EVEN IF BIAMP SYSTEMS WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Biamp Systems
10074 S.W. Arctic Drive
Beaverton, Oregon 97005
(503) 641-7287



Declaration of Conformity

BIAMP SYSTEMS
10074 SW Arctic Drive
Beaverton, OR USA 97005

as the manufacturer, hereby declares that the following described product, in our delivered version, complies with the provisions of the DIRECTIVES as noted herein. In case of alteration of the product, not agreed upon or directed by us, this declaration is no longer valid.

Product: Model: ADVANTAGE® VRAM
Description: Variable Resource Automixer

Applicable EC Directives: EMC Directive (89/336/EEC) LVD Directive (73/23/EEC)

Applicable Harmonized Standards: EN55103-1 emissions EN55103-2 immunity
EN60065 safety

Special Considerations for Product Environment or Compliance:

Shielded cabling must be used for system connections. The apparatus is deemed incapable of producing harmonic emissions or flicker levels sufficient enough to interfere with other apparatus as noted in EN61000-3-2 and EN61000-3-3.

This apparatus operates from a removeable external power source at voltages below the levels encompassed by the LVD. The external power source complies with the applicable requirements of EN60065. The apparatus itself is outside of the scope of the LVD and presents no hazardous voltages, as defined in the LVD. For compliance, the apparatus shall be powered only from the separate CE marked BIAMP SYSTEMS power source.

RF interference conducted through interconnect cabling may cause varying degrees of random signal degradation. The effect of increased noise or distortion due to this interference is typically masked by the desired signal. In no instance is operation inhibited.

The Technical Report/File is maintained at: Biamp Systems
10074 S.W. Arctic Drive
Beaverton, OR USA 97005
phone: (503) 641-7287 fax: (503) 626-0281
e-mail: biamp@biamp.com

Authorized Representative: Ralph Lockhart, President

Authorized Representative Signature:

Issued: 1998

SAFETY INFORMATION

The words **WARNING** and **CAUTION** throughout the manual, and on the device, call attention to important safety information. These words have the following meanings.

WARNING: The related information alerts you to conditions that could result in serious injury or damage to property if the instructions are not followed properly.

CAUTION: The related information instructs you on how to prevent damage to the equipment or how to avoid conditions that could result in minor injury if proper steps are not followed.

Product labelling and the operation manual may use the internationally recognized symbols defined below to note safety messages.



The lightning flash with arrowhead symbol, enclosed within a triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the apparatus's enclosure or at connection terminals that may be of sufficient magnitude to constitute a risk of electrical shock.



The exclamation point, enclosed within a triangle, is intended to alert the user to important installation, operation, and maintenance (servicing) instructions in the literature accompanying the apparatus.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

CAUTION: Installation of this apparatus should be made by a qualified installation person and should conform to all applicable local codes.



Modification and optional equipment information referenced in this manual is for use by qualified installation and service personnel only.



"INFORMACIÓN DE SEGURIDAD"

Las palabras **PELIGRO** (**WARNING**) y **PRECAUCIÓN** (**CAUTION**) a lo largo del manual y en el dispositivo (sistema), llaman la atención acerca de una importante información de seguridad. Estas palabras tienen los siguientes significados:

PELIGRO : la información relata las condiciones en que podría ser dañada seriamente la propiedad si no se siguen adecuadamente las instrucciones.

PRECAUCIÓN : la información que se relata le instruye en cómo prevenir daños al equipo o como evitar condiciones que podrían resultar en perjuicio menor si los pasos adecuados no son seguidos correctamente.

El etiquetado del producto y el manual de operación pueden hacer uso de los símbolos reconocidos internacionalmente y cuyos mensajes están definidos a continuación para modificar mensajes de seguridad:



El símbolo del rayo encerrado en un triángulo pretende alertar al usuario de la presencia de un peligroso voltaje no aislado, dentro de la caja del aparato o a un terminal de conexión y que podría ser de suficiente magnitud como para constituir un grave riesgo de descarga eléctrica.



El punto de exclamación dentro de un triángulo pretende alertar al usuario de la importancia de las instrucciones de instalación, operación y mantenimiento (servicio) que acompañan al aparato.

PELIGRO : para reducir el riesgo de fuego o una descarga eléctrica, no exponer este aparato a la lluvia o la humedad.

PRECAUCIÓN : la instalación de este aparato debería hacerse por una persona calificada en la instalación, y debería conformar todos los códigos locales aplicables.



La modificación y la información opcional del equipo referenciada en este manual es para ser utilizada únicamente por personal cualificado en instalación y servicio.



INFORMATION CONCERNANT VOTRE SECURITE

Les mots **WARNING** et **CAUTION** dans le manuel d'utilisation et sur les appareils attirent votre attention sur les plus importantes informations concernant votre sécurité. Ces mots ont la signification suivante:

WARNING: Ce mot vous indique les circonstances dans lesquelles vous pourriez être blessé ou endommager votre équipement si les instructions ne sont pas suivies correctement.

CAUTION: Ce mot vous indique comment éviter d'endommager votre matériel et comment éviter de vous blesser si vous ne suivez pas les instructions.

Vous trouverez peut-être les symboles suivants sur votre appareil ou dans le manuel d'utilisation.



L'éclair se terminant en flèche dans un triangle permet de prévenir l'utilisateur d'un voltage dangereux non isolé dans l'appareil ou d'une connexion d'une amplitude suffisante pour constituer un risque de choc électrique.



Le point d'exclamation dans un triangle permet de prévenir l'utilisateur des points importants concernant l'installation, le fonctionnement et l'entretien de l'appareil figurant dans le manuel d'utilisation.

WARNING: POUR REDUIRE LES RISQUES DE FEU OU DE CHOC ELECTRIQUE, NE PAS METTRE L'APPAREIL SOUS LA PLUIE OU DANS L'HUMIDITE.

CAUTION: L'installation de cet appareil doit être faite par un installateur qualifié et doit être en conformité avec toutes les lois locales en application.



Les informations concernant une modification ou un équipement en option dans le manuel doivent être effectués par du personnel qualifié.



INFORMAZIONI PER LA SICUREZZA

Le parole **AVVERTENZA** (**WARNING**) e **PRUDENZA** (**CAUTION**) poste sul manuale d'uso e sul apparato richiamano la vostra attenzione su delle importanti informazioni per la vostra sicurezza. Queste parole hanno il seguente significato.

AVVERTENZA: La suddetta indicazione vi avvisa sul rischio di incorrere in danni a cose o a persone, se le procedure d'uso e installazione non saranno seguite propriamente.

PRUDENZA: La suddetta indicazione vi instruisce su come prevenire e ridurre al minimo, il rischio di danni agli apparati e alle persone se le istruzioni saranno seguite propriamente.

Le apparecchiature e i manuali di istruzioni riporteranno la simbologia standard raffigurata qui sotto, accompagnate dalle relative informazioni per la sicurezza.



La simbologia con il fulmine all'interno di un triangolo, intende avvisare l'utente della presenza di alto voltaggio all'interno del apparecchio in questione, e che il suddetto apparecchio si alimenta attraverso una tensione di rete ad alto voltaggio e che dunque si potrebbe incorrere sul rischio di una possibile scossa elettrica.



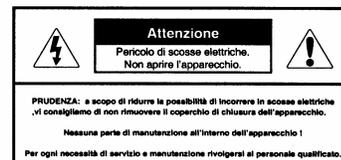
La simbologia con il punto esclamativo all'interno di un triangolo, intende avvisare l'utente di una serie di istruzioni contenute nel manuale d'uso riguardanti: operato, manutenzione e assistenza. Il suddetto manuale sarà a corredo dell'apparecchio.

AVVERTENZA: PER RIDURRE IL RISCHIO DI POSSIBILI INCENDI O SCOSSE ELETTRICHE, SCONSIGLIAMO DI ESPORRE L'APPARECCHIO ALLA PIOGGIA O ALL'UMIDITA'.

PRUDENZA: L'installazione di questo apparato dovrà essere effettuata solo da personale qualificato e il tipo di installazione dovrà essere in regola con le norme vigenti locali.



Modifiche e ulteriori informazioni specificate in questo manuale sono solamente riservate al personale qualificato all'installazione.



Sicherheitshinweise

Die Begriffe **WARNUNG** (engl. WARNING) und **ACHTUNG** (engl. CAUTION) in der Bedienungsanleitung und auf den Geräten machen auf wichtige Sicherheitsinformationen aufmerksam. Diese Begriffe haben die folgende Bedeutung:

WARNUNG: Der folgende Text warnt Sie vor ernsthaften Verletzungen oder Beschädigungen, (WARNING) die aus einer fehlerhaften Bedienung bzw. Handhabung des Gerätes resultieren können.

ACHTUNG: Der folgende Text informiert Sie über Bedienungshinweise zum Schutz Ihres Gerätes oder weist auf mögliche Schäden hin, wenn die Bedienungshinweise nicht beachtet werden.

Die Beschriftung der Geräte und die Bedienungsanleitungen weisen unter Umständen international bekannte Symbole auf, die die folgende Bedeutung haben:



Das Blitzsymbol im Dreieck warnt vor anliegender, nicht isolierter „gefährlicher Spannung“ im Inneren oder an den Anschlüssen des Gerätes. Die Berührung der unter Spannung stehenden Teile kann zu einem elektrischen Schock führen.



Das Rufzeichen im Dreieck macht auf wichtige Installations-, Bedienungs- und Servicehinweise in der zugehörigen Bedienungsanleitung aufmerksam.

WARNUNG: Zur Minderung des Risikos von Feuer und elektrischem Schock schützen Sie das Gerät vor Regen und Feuchtigkeit.

ACHTUNG: Die Installation des Gerätes sollte nur durch qualifiziertes Personal durchgeführt werden und muß den jeweiligen Bestimmungen entsprechen.



Die Modifikationen und die Informationen zu den optionalen Erweiterungen in der Bedienungsanleitung sind nur für qualifiziertes Personal bestimmt.

	ACHTUNG Risiko von elektrischem Schock Gerät nicht öffnen	
Achtung: Zur Minderung des Risikos von elektrischem Schock das Gerät nicht öffnen		
Keine Bedienungselemente im Inneren des Gerätes		
Service nur durch qualifiziertes Personal durchführen lassen		

Sikkerhedsinformation

Ordene **ADVARSEL** (WARNING) og **FORSIGTIG** (CAUTION), brugt i henholdsvis brugervejledning og på selve produktet, indikerer, at vigtig information omkring sikkerhed følger. Ordene betyder følgende:

ADVARSEL: Den efterfølgende information advarer Dem om forhold, der kan føre til alvorlige ulykker og ejendomsskader, hvis ikke vejledningen følges.

FORSIGTIG: Den efterfølgende information vejleder Dem i, hvordan De undgår skade på produktet, samt undgår forhold der kan føre til mindre ulykker og ejendomsskader, hvis ikke vejledningen følges.

Produktetiketter og brugervejledning kan indeholde de internationalt anerkendte symboler der er vist nedenfor:



Trekanten med et lyn i midten har til hensigt at advare brugeren om, at produktet indeholder "farlig spænding", og at det derfor er forbundet med fare for elektrisk stød at åbne produktet.



Trekanten med udråbstegn har til hensigt at advare brugeren om, at vigtig information omkring installation, brug, service og vedligeholdelse af produktet er indeholdt i den medfølgende brugervejledning.

ADVARSEL: Med henblik på at reducere risikoen for brand eller elektrisk stød, må produktet ikke udsættes for regn eller fugt.

FORSIGTIG: Installation af dette produkt skal foretages af en autoriseret installatør og skal være i overensstemmelse med alle anvendelige lokale retningslinier.



Modifikationer samt alternativt udstyr beskrevet i denne brugervejledning er kun henvendt til kvalificerede installatører og servicepersonale.

	FORSIGTIG Fare for elektrisk stød - må ikke åbnes.	
FORSIGTIG: Med henblik på at reducere risikoen for elektrisk stød, må svæbet ikke fjernes.		
Indeholder ingen komponenter relevante for brugeren.		
Anvend autoriseret servicepersonale ved alle servicetilfælde.		

VEILIGHEIDSINFORMATIE

De woorden **WAARSCHUWING** (WARNING) en **VOORZICHTIG** (CAUTION) welke in de handleiding en op het apparaat voorkomen, waarschuwen U voor belangrijke veiligheidsinformatie. Zij hebben de volgende betekenis:

WAARSCHUWING: De betreffende informatie waarschuwt U voor omstandigheden die kunnen leiden tot defecten of beschadigingen aan apparaten als de instructies niet volledig worden opgevolgd.

VOORZICHTIG: De betreffende informatie instrueert U hoe U defecten aan apparatuur kunt voorkomen of hoe U omstandigheden kunt vermijden die kunnen resulteren in schade als de juiste stappen niet worden opgevolgd.

Produkt informatie en handleiding hanteren onderstaande internationaal erkende symbolen om veiligheidsinstructies aan te geven.



De bliksemschicht in een driehoek wordt gebruikt om de gebruiker te attenderen op ongeïsoleerde "gevaarlijke spanning" in het apparaat of bij de aansluitklemmen, die het risico van een elektrische schok kunnen geven.



Het uitroepteken in een driehoek wordt gebruikt om de gebruiker te attenderen op belangrijke installatie, gebruiks- en onderhoudsinstructies in de beschrijving die bij het apparaat hoort.

WAARSCHUWING: OM HET RISICO VAN BRAND OF EEN ELECTRISCHE SCHOK TE VERMIDEN DIENT U HET APPARAAT NIET AAN VOCHT BLOOT TE STELLEN.

VOORZICHTIG: Installatie van dit apparaat dient te geschieden door gekwalificeerd personeel en dient te geschieden conform de plaatselijke voorschriften.



Modificaties en aanvullende informatie waar in de handleiding naar wordt verwezen, dient alleen voor gebruik door gekwalificeerd personeel.

	VOORZICHTIG. Risiko van elektrische schok. Niet openen.	
Waarschuwing: Om het risico van een elektrische schok te verminderen het apparaat niet openen.		
Er zijn geen, door gebruiker, vervangbare onderdelen in dit apparaat.		
Service overlaten aan gekwalificeerd service personeel.		

TURVALLISUUSTIEDOTE

Sanat **VAROITUS** (WARNING) ja **HUOMIO** (CAUTION), jotka esiintyvät manuaalissa ja itse laitteessa, ilmoittavat tärkeästä turvallisuusinformaatiosta. Näillä sanoilla on seuraava merkitys:

VAROITUS: Yhteydessä oleva informaatio varoittaa olosuhteista, jotka saattavat johtaa vakaviin vammoihin tai laitteen vaurioitumiseen, mikäli ohjeita ei täysin noudateta.

HUOMIO: Yhteydessä oleva informaatio neuvoo, miten laitteen vaurioituminen voidaan ehkäistä tai miten voidaan välttää olosuhteet, jotka voivat johtaa lieviin vammoihin, mikäli ohjeita ei noudateta.

Tuotteessa tai käyttöohjeessa voidaan käyttää seuraavia alla määriteltyjä kansainvälisiä symboleja, jotka viittaavat turvallisuusinformaatioon.



Kolmion sisällä olevan nuolipäinen salama varoittaa käyttäjää laitteen sisällä tai liitännöissä olevasta eristämättömästä vaarallisesta jännitteestä, joka saattaa olla tarpeeksi suuri aiheuttaakseen sähköiskun vaaran.



Kolmion sisällä oleva huutomerkki tarkoituksena on ilmoittaa käyttäjälle tärkeistä asennusta, käyttöä tai huoltoa koskevista ohjeista laitteen mukana seuraavassa kirjallisuudessa.

VAROITUS: ÄLÄ ALTISTA LAITETTA SATEELLE TAI KOSTEUELLE TULIPALON JA SÄHKÖISKUN VAARAN VUOKSI.

HUOMIO: Laitteen asentaminen tulisi jättää ammattitaitoisen henkilön suoritettavaksi ja asennuksessa tulee noudattaa kaikkia paikallisia säännöksiä.



Tässä manuaalissa oleva informaatio, joka koskee muutostöitä ja lisälaitteita, on tarkoitettu vain ammattilaisien asennus- ja huoltohenkilöiden käyttöön.

	HUOMIO Sähköiskun vaara, älä avaa.	
HUOMIO: ÄLÄ AVAA KANTTA SÄHKÖISKUN VAARAN VUOKSI		
EI SISÄLLÄ KÄYTTÄJÄN HUOLLETTAVIA OSIA		
JÄTÄ HUOLTO AMMATTITAITOISELLE HENKILÖKUNNALLE		

SIKKERHETS INFORMASJON

Når ordene **ADVARSEL** (WARNING) og **VIKTIG** (CAUTION) blir brukt i manualen og på produktet, gjelder det informasjon som har med brukersikkerhet å gjøre. Ordene har følgende mening:

ADVARSEL: Tilhørende informasjon viser til forhold som kan resultere i alvorlige skader eller ødeleggelser hvis anvisningene ikke følges nøye.

VIKTIG: Tilhørende informasjon forteller deg hvordan du skal unngå feil på utstyret, eller unngå situasjoner som kan resultere i mindre skader.

Produkt merkingen og bruksanvisningen bruker internasjonale symboler for å merke punkter som er viktige for brukersikkerhet.



Lynet i en triangel advarer brukeren om uisolert "farlig spenning" inne i apparatet, eller tilkoblings terminaler som kan gi støt.



Etter utropsteget i en triangel følger informasjon som er viktig når det gjelder installasjon, bruk og vedlikehold (service) av apparatet.

ADVARSEL: FOR Å REDUSERE FAREN FOR BRANN ELLER STØT MÅ APPARATET IKKE UTSETTES FOR VANN ELLER FUKTIGHET.

VIKTIG: Installasjon av apparatet skal foretas av autorisert installatør etter gjeldende forskrifter.



Modifikasjoner og tilleggs informasjon som følger er kun for kvalifiserte installatører eller service personell.

	VIKTIG FARE FOR STØT, MÅ IKKE DEMONTERES.	
VIKTIG: For å unngå faren for støt, må ingen deksler fjernes Ingen interne deler skal justeres eller repareres av bruker. Overlat service til autorisert personell.		

SÄKERHETS INFORMATION

Orden **VARNING** (WARNING) och **OBSERVERA** (CAUTION) vilka används i denna manual och på apparaten, är menade att uppmärksamma viktig säkerhets information. Dessa ord har följande betydelse.

VARNING: Information som uppmärksammar på omständigheter som kan resultera i allvarig personskada eller skada på egendom om instruktionerna ej följs.

OBSERVERA: Information som uppmärksammar på instruktioner om hur skada på utrustning eller hur situationer där lättare personskador kan uppstå undviks.

Följande internationellt använda ord och symboler används i handboken och på märkningar på produkten för att uppmärksamma användare på viktiga säkerhetsinstruktioner.



En blix med pil, innesluten i en triangel, menad att uppmärksamma användare på närvaron av isolerade "farliga spänningar" i apparaten eller på anslutningskontakter vilka har tillräcklig styrka för att medföra risk för elektrisk stöt.



Ett utropstecken, innesluten i en triangel, menad att uppmärksamma användare på viktiga installations, handhavande eller underhålls-instruktioner i medföljande dokumentation.

VARNING: FÖR ATT MINSKA RISKEN FÖR BRAND ELLER ELEKTRISK STÖT, UTSÄTT EJ APPARATEN FÖR FUKT ELLER VÄTSKA.

OBSERVERA: Installation av denna apparat skall utföras av kvalificerad installatör samt enligt alla gällande lokala bestämmelser.



Eventuella modifieringsinstruktioner och annan information av teknisk art i denna manual är endast avsedd att användas av kvalificerad installations och service personal.

	OBSERVERA RISK FÖR ELEKTRISK STÖT FÄR EJ ÖPPNAS	
OBSERVERA: FÖR ATT MINSKA RISKEN FÖR ELEKTRISK STÖT, AVLÅGSNA EJ LOCKET. INGA AV ANVÄNDARE UTBYTBARA ELLER REPARERBARA KOMPONENTER INUTI DENNA APPARAT. ALL SERVICE PÅ DENNA APPARAT SKALL UTFÖRAS AV KVALIFICERAD PERSONAL		

ΠΛΗΡΟΦΟΡΙΕΣ ΑΣΦΑΛΕΙΑΣ

Οι λέξεις **ΚΙΝΔΥΝΟΣ** (WARNING) και **ΠΡΟΣΟΧΗ** (CAUTION) που αναφέρονται μέσα στο εγχειρίδιο και στη συσκευή, επικεντρώνουν την προσοχή σε σημαντικές πληροφορίες ασφαλείας. Οι λέξεις αυτές έχουν την παρακάτω σημασία.

ΚΙΝΔΥΝΟΣ: Η αναγραφόμενη πληροφορία επιστά την προσοχή σας σε καταστάσεις που θα μπορούσαν να έχουν σαν αποτέλεσμα σοβαρό τραυματισμό ή καταστροφή της ιδιοκτησίας αν οι οδηγίες δεν ακολουθηθούν κατάλληλα.

ΠΡΟΣΟΧΗ: Η αναγραφόμενη πληροφορία σας καθοδηγεί πώς να προλάβετε καταστροφή του εξοπλισμού ή πώς να αποφύγετε καταστάσεις που θα μπορούσαν να έχουν ως αποτέλεσμα μικροτραυματισμούς αν δεν ακολουθηθούν τα σωστά βήματα.

Στις επιγραφές των προϊόντων και στο εγχειρίδιο λειτουργίας, χρησιμοποιούνται τα συμβολικά αναγνωρισμένα σύμβολα, των οποίων ο ορισμός δίνεται παρακάτω έτσι ώστε να υπογραμμιστούν τα μηνύματα ασφαλείας.



Η φωτεινή αναλαμπή με σύμβολο το βέλος, μέσα στο τρίγωνο, έχει σκοπό να επιστήσει την προσοχή του χρήστη, στην ύπαρξη μη μονομέρους « επικίνδυνος ισχύος ρεύματος » στο εσωτερικό της συσκευής ή στις άκρες σύνδεσης οι οποίες μπορεί να έχουν αρκετό μέγεθος ώστε να περιέχουν κίνδυνο ηλεκτροπληξίας.



Το επεξηγηματικό σημείο, μέσα στο τρίγωνο, έχει σκοπό να επιστήσει την προσοχή του χρήστη στις σημαντικές οδηγίες εγκατάστασης, λειτουργίας και συντήρησης (service) που περιέχονται στα φυλλάδια που συνοδεύουν την συσκευή.

ΚΙΝΔΥΝΟΣ: Για να αποφύγετε τον κίνδυνο φωτιάς ή ηλεκτροπληξίας, μην εκθέτετε αυτή τη συσκευή σε βροχή ή σε υγρασία.

ΠΡΟΣΟΧΗ: Η εγκατάσταση αυτής της συσκευής θα πρέπει να γίνει από εξειδικευμένο άτομο και θα πρέπει να προσαρμόζεται σε όλους τους εφαρμοσμένους τοπικούς κώδικες.



Οι τροποποιήσεις και οι προληπτικές πληροφορίες για τον εξοπλισμό, που αναφέρονται σε αυτό το εγχειρίδιο, προορίζονται για χρήση μόνο από εξειδικευμένα στην εγκατάσταση και στο service, άτομα.

	ΠΡΟΣΟΧΗ ΚΙΝΔΥΝΟΣ ΗΛΕΚΤΡΟΠΛΗΞΙΑΣ. ΜΗΝ ΑΝΟΙΓΕΤΕ.	
ΠΡΟΣΟΧΗ: ΓΙΑ ΝΑ ΜΕΙΩΣΕΤΕ ΤΟΝ ΚΙΝΔΥΝΟ ΗΛΕΚΤΡΟΠΛΗΞΙΑΣ, ΜΗΝ ΜΕΤΑΚΙΝΗΣΕΤΕ ΤΟ ΚΑΛΥΜΜΑ. ΔΕΝ ΠΑΡΕΧΟΝΤΑΙ ΑΝΤΑΛΛΑΚΤΙΚΑ SERVICE ΣΤΟΝ ΧΡΗΣΤΗ ΓΙΑ SERVICE ΑΝΑΦΕΡΕΤΕ ΣΤΟ ΕΞΟΥΣΙΟΘΕΤΗΜΕΝΟ ΠΡΟΣΩΠΙΚΟ SERVICE.		

INFORMAÇÃO SOBRE SEGURANÇA

As palavras **ADVERTÊNCIA** (WARNING) e **PRECAUÇÃO** (CAUTION) neste manual, e no dispositivo, alertam para importantes informações sobre segurança. Estas palavras significam o seguinte:

ADVERTÊNCIA: Informação relacionada que alerta sobre condições que poderão resultar em lesões sérias ou prejuízo, se as instruções não forem seguidas adequadamente.

PRECAUÇÃO: Informação relacionada que instrui como prevenir danos no equipamento ou como evitar condições que poderão resultar em lesões leves, se os passos não forem seguidos adequadamente.



As etiquetas do produto e do manual de operações podem usar os símbolos internacionalmente reconhecidos definidos abaixo para advertir mensagens de segurança.



símbolo do relâmpago com uma seta, dentro de um triângulo, tem o fim de alertar o usuário a presença de "voltagem perigosa" sem isolamento dentro da caixa isolamento do aparelho ou nos terminais de ligação que podem ter a magnitude suficiente que constitui um risco de choque elétrico.



ponto de exclamação, dentro de um triângulo, tem o fim de alertar o usuário sobre instruções importantes de instalação, operação e manutenção (serviços) na literatura que acompanha o aparelho.

ADVERTÊNCIA: PARA REDUZIR O RISCO DE INCÊNDIO OU CHOQUE ELÉCTRICO, NÃO EXPONHA ESTE APARELHO A CHUVA OU HUMIDADE.

PRECAUÇÃO: A instalação deste aparelho deve ser feita por um profissional qualificado e deve obedecer a todos os códigos locais aplicáveis.



Modificação e informação sobre equipamento adicional citados neste manual são para o uso exclusivo do pessoal qualificado de instalação e manutenção.

	PRECAUÇÃO RISCO DE CHOQUE ELÉCTRICO NÃO ABRA.	
PRECAUÇÃO: PARA REDUZIR O RISCO DE CHOQUE ELÉCTRICO, NÃO REMOVA A TAMPA. PARTES INTERNAS NÃO MANTIDAS PELO USUÁRIO. ENCAMINHE A MANUTENÇÃO PARA PESSOAL DE SERVIÇOS QUALIFICADO.		