

**ADVANTAGE[®] VOICECRAFTER
and VOICECRAFTER Plus
Acoustic Echo Cancellers**

Operation Manual

advantage [®]

VOICECRAFTER and VOICECRAFTER Plus

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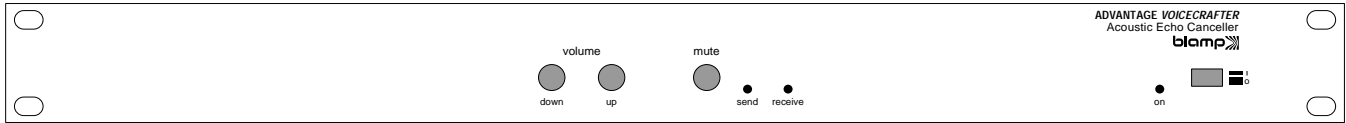
INTRODUCTION

ADVANTAGE® **VOICECRAFTER** and **VOICECRAFTER Plus** are tamper proof Acoustic Echo Cancellers, which provide full-duplex speech between 2 or more locations in video or teleconferencing applications. **VOICECRAFTER** is a DSP based device and is easily programmed via Windows® 95/98/NT software. **VOICECRAFTERS'** long tail length and fast convergence time allow flawless adaptation to acoustic changes in a room, without the necessity of continual training. A second model, **VOICECRAFTER Plus**, includes a 2-wire (POTS) card for teleconferencing applications. The **VOICECRAFTER** and the **VOICECRAFTER Plus** are both covered by a 5-year warranty.

VOICECRAFTER features include:

- ◆ 2 balanced channel inputs on plug-in barrier connectors
- ◆ channel input 2 can be configured to accept line level inputs
- ◆ balanced codec input and output on plug-in barrier connectors
- ◆ phantom power and trim control on channels 1 & 2 (rear panel)
- ◆ optional input/output transformers on codec inputs/outputs
- ◆ model **VOICECRAFTER Plus** includes 2-wire interface
- ◆ mono-summing aux interface provided on RCA connectors
- ◆ 0dB and -20dB nominal codec levels switch selectable
- ◆ 5 ASIC chips provide long tail length and fast convergence time
- ◆ 270 mSec tail length and 250 mSec convergence time
- ◆ five non-volatile memory presets store all settings
- ◆ information stored in preset 1 is automatically recalled on power-up
- ◆ RS-232 serial port & Windows® 95/98/NT programming software
- ◆ bi-colored LED's provide level and peak indication
- ◆ 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

Volume Control: Volume up and volume down controls adjust the 'User Volume' inside the *VOICECRAFTER*. 'User Volume' adjusts the Main Output level, and the range of 'User Volume' is established by the *VOICECRAFTER* during a Configuration Train Cycle.

Mute Switch: This momentary switch toggles the System Mute mode. When the mute switch is pressed a first time, system mute is engaged (Send and Receive LED both Blink amber), when the mute switch is depressed again, the system mute is turned off (Send and Receive LED's stop blinking). **NOTE:** System mute mutes the channel inputs and the main output, system mute also disables adaptation of the echo canceller until the system mute is turned off.

Send & Receive LED's: These bi-colored LED's indicate signal levels inside the *VOICECRAFTER*. When the LED is green; indicates that there are normal levels inside the unit. When the LED is red; indicates a clipping or peak condition in the unit. Send LED indicates levels being transmitted out of the *VOICECRAFTER* (2-wire interface, Codec Output, Aux output). Receive LED indicates levels being received by the *VOICECRAFTER* (2-wire interface, Codec Input, Aux Input). **NOTE:** The send and receive LED will both blink amber when the *VOICECRAFTER* is in a System Mute Mode. The send and receive LED will both blink green during a Configuration Train Cycle.

Power Switch & On Indicator: When the Power Switch is depressed, the adjacent red LED will light indicating power to the unit is On. Release the Power Switch to turn power off. **NOTE:** If information is stored into preset 1, upon power-up, the *VOICECRAFTER* will recall preset 1. If information is not stored in preset 1, then the *VOICECRAFTER* will initiate a Configuration Train Cycle upon power up.

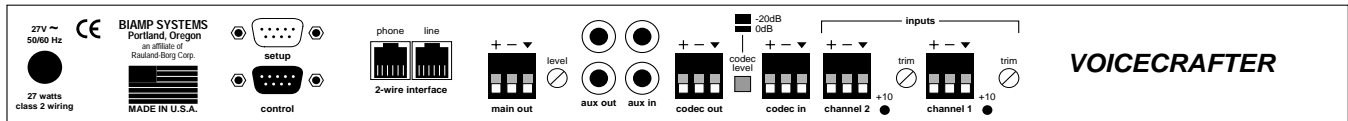
REAR PANEL FEATURES

AC Power Cord: The power transformer provides 27 Volts AC to the *VOICECRAFTER*, and is detachable via a 5-pin DIN connector. The *VOICECRAFTER* 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 *VOICECRAFTER* requires service.

Setup Port: This 9-pin Sub-D (male) connector provides an RS-232 Serial Port for control via computer (default of 9600 baud). The Setup 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) Communication to Send (CTS); Pin 9) not used. PC Control Software and a serial cable are provided for programming via Windows® 95 (see Setup on pg. 4). **NOTE:** The CTS and RTS lines are internally shorted inside the *VOICECRAFTER* (these pins do not need to be controlled by the PC).

Control Port: This 9-pin Sub-D (female) connector provides a Control Port for RS-232 control (default of 9600 baud) of the *VOICECRAFTER* via the *VOICECRAFTER* TTC or third-party controllers. The Control Port has the following pin assignments (right-to-left & top-to-bottom): Pin 1) +5 Volts; 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.

FRONT & REAR PANEL FEATURES



2-wire Interface: (*VOICECRAFTER Plus* only.) Connect the telephone wall outlet to the RJ11 port labeled 'line', and connect an analog telephone to the RJ11 port labeled 'phone'. The 2-wire interface can be used at the same time as the codec ports for adding a telephone call to a videoconference, or it can be used alone for teleconferencing applications.

Main Out: This plug-in barrier strip provides the balanced Main Out from the *VOICECRAFTER*. 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.

Main Level: This screwdriver adjustable control allows the main output of the *VOICECRAFTER* to be adjusted during calibration. Once the main level is set and the *VOICECRAFTER* is trained, the main level control should be left alone.

Aux In & Aux Out: These RCA connectors provide a mono-summing Auxiliary interface for connection to a recording device, VCR, or a second codec (See page 7 for instructions). The Aux out connectors are wired so that a stereo signal is split and the same signal will appear on each RCA connector. The Aux In connectors are wired so that stereo signals are summed together into a mono signal at this input.

Codec Out: This plug-in barrier strip provides the balanced Codec Out from the *VOICECRAFTER*. 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.

Codec In: This plug-in barrier strip provides the balanced Codec Output from the *VOICECRAFTER*. For balanced input, wire high to (+), low to (-), and ground to (∇). For unbalanced input, wire high to (+) and ground to both (-) & (∇).

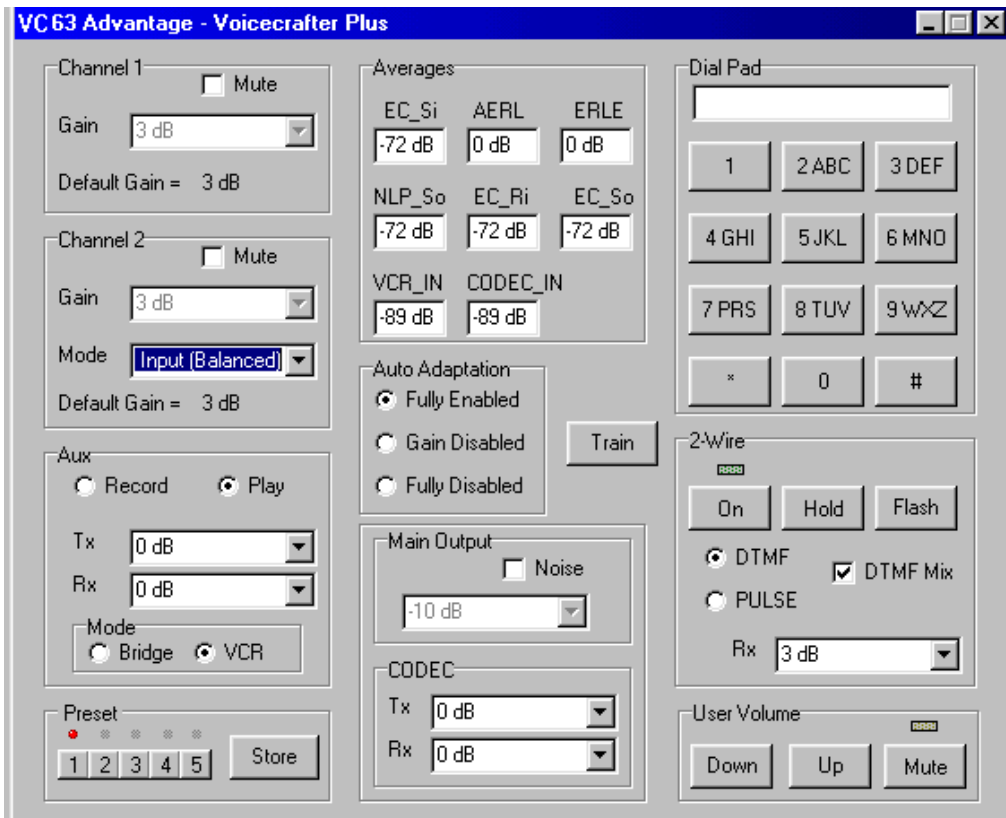
0 dB / -20dB: This push button switch changes the nominal level of the codec input and output to either -20dB or 0dB, (switch out is -20dB, switch in is 0dB) allowing proper interface with many different codecs. The *VOICECRAFTER* has an internal +/-12dB of adjustment via software (see page 4). **NOTE:** Check the documentation of your specific codec before installation.

Channel Inputs 1 & 2: These plug-in barrier strips provide the balanced mic input to the *VOICECRAFTER*. Input 2 can be set for balanced or unbalanced line level signals via software selection (see Page 4). For balanced input, wire high to (+), low to (-), and ground to (∇). For unbalanced input, wire high to (+) and ground to both (-) & (∇). Internally, 12 Volt phantom power is available and is **always on**, unless line level input is selected via software on input 2.

Channel Trim & +10 Indicator: The Trim controls adjust gain at the respective inputs to compensate for different signal levels. For best performance, set Trim so only occasional peaks in signal level activate the +10 Indicator.

SOFTWARE CONTROL

VOICECRAFTER and *VOICECRAFTER Plus* parameters are all adjustable using the BiampWin Windows® 95/98/NT 'PC Control Software' and serial cable provided with the unit. The PC Control Software provides programs for various ADVANTAGE® products, including the *VOICECRAFTER (Plus)*. 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 File menu provides functions such as open, close, save, 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 PC Control Software: Select 'Run' from Windows® 95/98/NT 'Start' menu, and enter A:\SETUP. System Requirements: Windows® 95 with 8M of RAM & 2M of available hard disk space (serial port required for 'on-line' operation). The title bar across the top of the Main screen will indicate model of the *VOICECRAFTER* being controlled. The PC Control Software can operate 'off-line' (with no product connected) by opening a 'new' file for the desired product.



MIX SCREEN

The Mix Screen is used to adjust *VOICECRAFTER* input/output levels, store/recall of five memory presets (preset 1 being the power-up preset) and to initiate training. Adjustments are made with the computer mouse (or keyboard). Input & output levels are changed by selecting the desired level via the pull down menu.

Channel 1 & 2 These sections are for setting up the channel inputs on the *VOICECRAFTER*. Setting the desired level also changes the default gain (which is used for a train). **NOTE:** there is an analog screwdriver trim pot on the rear panel for making input adjustments.

Aux selects the mode of the Aux port, and sets the desired levels for the Aux port interface. (See page 13)

Preset buttons recall the corresponding presets from non-volatile memory.

Store button opens a menu for storing current settings in any of the Presets 1~5, or deleting the preset stored into preset #1. Each preset saves settings established by a Configuration Train Cycle. If settings are stored into Preset 1, then Preset 1 will be recalled upon power-up.

Averages displays the DSP averages calculated by the *VOICECRAFTER*, these values are continually updated every second.

AutoAdaptation selects the operation of the AutoAdaptation function, Fully Enabled, Gain Disabled, and Fully Disabled. **NOTE:** Gain adjustments on Channel 1/ 2 and Main Output cannot be made unless AutoAdaptation is set to Fully Disabled. Gain Disabled: stops the *VOICECRAFTER* AGC from making gain changes to the Mic inputs, Codec Input, and Main Output.

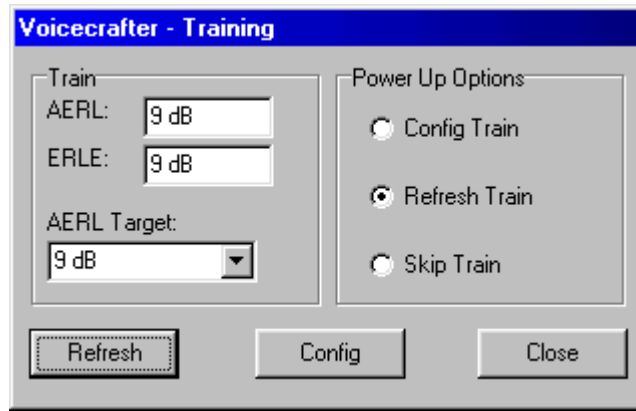
Main Output selects the level of the main output, Noise turns on/off the internal white noise generator

Codec adjusts the level of the Codec Input and Codec Output.

Dial Pad is for dialing out of a *VOICECRAFTER Plus* via the 2-wire port.

2-Wire turns on and off the 2-wire port, puts a call on hold, or performs the flash function, as well as selecting either pulse or DTMF dialing modes. Click on DTMF mix to hear DTMF tones through the speakers (checked is enabled). After selecting the 2-wire On/Off button, either click each desired number to be dialed out, or press the corresponding numbers on the keyboard to dial the number. After the call is complete, click on the 2-wire On/Off button again.

SOFTWARE CONTROL



Train Screen

The train screen is accessed by clicking on the Train button located in the AutoAdaption section of the Mix-screen.

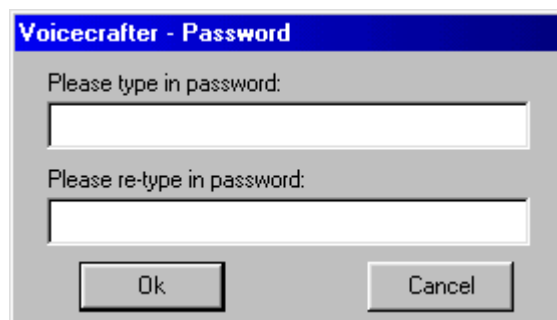
The Train screen is used to set the AERL Target, initiate a Config Train, a Refresh train, or select the Power Up options of a VOICECRAFTER or VOICECRAFTER Plus.

AERL Target Select the desired AERL target (0-20dB) via the pull-down menu before initiating a Config train. (See Calibration, pages 9~11, for more information)

Refresh begins a refresh train; two quick bursts of white noise are generated for the VOICECRAFTER to build an acoustic model of the room.

Config begins a configuration train; white noise is generated and the VOICECRAFTER takes measurements and adjusts levels for the room. A 'Training Complete' prompt pops up after a Config train, click 'OK' and then the training results are displayed in the Train section of the Train Screen.

Power Up Options selects the mode of training performed upon a power-up. Select between a Config Train, Refresh Train, or a Skip Train. **NOTE: In order for Power Up Options to take effect, settings must be stored into Preset 1.**



Password Screen

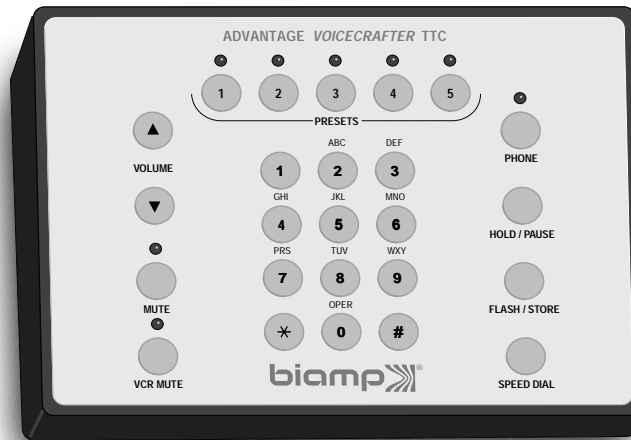
This screen allows a password to be set, preventing un-authorized tampering with the Echo Cancellers settings. Type in the desired password, then re-type the password to verify. The password can be any combination of alpha or numeric characters up to 32 characters

Advanced Settings

The advanced settings screen is used to diagnose the VOICECRAFTER and VOICECRAFTER Plus units. A qualified technician should only access the Advanced Settings screen, as parameters changed in this screen can adversely effect the performance of the echo canceller. Access the Advanced screen by clicking on the VOICECRAFTER pull-down menu (located at the top of BiampWin, then select the Advanced Setings option.

TTC CONTROL

The *VOICECRAFTER TTC* (Table Top Controller) allows convenient control of the day-to-day operations of the *VOICECRAFTER* and *VOICECRAFTER Plus*. The TTC features a 15' attached cable for connecting the TTC to the Control Port on the *VOICECRAFTER*. To add a longer cable (up to 50'), remove the 4 screws on the bottom of the TTC. Remove the existing cable from the TTC. Feed the 'pigtail' end of the connector through the hole; attach the strain relief and the ferrite bead from the old cable to the new cable on the inside of the TTC. Attach the wire connected to pin 1 (DB9M) to the terminal labeled '+V' on the TTC. Attach the wire connected to Pin 3 (DB9M) to the terminal labeled 'Tx' on the TTC. Attach the wire connected to pin 5 (DB9M) to the terminal labeled 'Gnd' on the TTC. Replace the bottom cover and the 4 screws. Attach the DB9M to the Control Port of the *VOICECRAFTER (Plus)*.



VOICECRAFTER TTC

Connect the TTC to the Control Port of the *VOICECRAFTER (Plus)*. The *VOICECRAFTER* provides the necessary power for the TTC.

Preset Recall – Recalls up to 5 stored presets (Presets must be stored using PC Control Software, and can NOT be stored via the *VOICECRAFTER TTC*).

Volume – Adjusts the user volume up and down. The *VOICECRAFTER* sets the limits on user volume increase and decrease amounts to ensure that the *VOICECRAFTER* can adapt to changes.

Mute – Engages the System Mute Mode (Channel inputs and Main Output is muted). LED flashes amber when *VOICECRAFTER* is muted, and remains off during normal operation.

VCR Mute – Mutes and un-mutes the Aux port in VCR mode for switching between Record and playback functions. This button will have no effect if the *VOICECRAFTER* is in Bridged Mode.

Dialing Pad – When the 2-wire interface is connected, these numbers (similar to any telephone) allows dialing directly from the *VOICECRAFTER Plus*.

Phone – Connects and dis-connects the 2-wire interface. When the red LED is on, the 2-wire connection is made, when the red LED is off, the 2-wire interface is 'hung-up'.

Hold/Pause – Puts the 2-wire interface on hold. This button can be used to put a 2-wire conversation on hold, yet still maintains a 4-wire connection (useful in Video- and Audio-conferencing situations). Pause function is used in speed dialing.

Flash/Store –

Flash Engages the Flash function (if available –Check with your phone system provider) to answer call waiting or engage 3-way calling.

Store Used for setup of Speed Dial. In a dis-connected state this button is used to store Speed Dial numbers.

Speed Dial – When pressed, followed by a 0-9 on the Dialing pad, will connect the 2-wire interface and dial the stored number.

Storing Speed Dial Numbers

1. When a conference call is not connected, hold the Speed Dial button until the Mute and VCR Mute LED begin to blink.
2. Press the memory location desired (0-9), followed by the desired number to be dialed (up to 16 characters), then press Flash/Store button.
3. The LED above the Phone button will blink signaling that another speed dial number is ready to be stored, repeat step 2, or press Speed Dial to cancel.

NOTE: The pause button is used to insert a delay between numbers dialed. This is useful when dialing out of a local PBX. Example: Press and hold Speed Dial button, enter memory location then 9 to get an outside line, then the Hold/Pause button, followed by the number to be dialed. This inserts the necessary delay for the PBX to obtain an outside line.

CONFIGURATION

After all the microphones and speakers are connected to the *VOICECRAFTER*, the unit needs to be calibrated and trained before a videoconference or teleconference can be held. Training is how the *VOICECRAFTER* is configured for proper operation, setting microphone and speaker gains for optimum performance, by means of the Control Software. The *VOICECRAFTER* uses white noise to establish gain settings as well as to make an acoustic model of the room for echo cancelling purposes. There are 2 modes of training for the *VOICECRAFTER*.

Configuration Train: Training mode where *VOICECRAFTER* sets microphone gain and speaker gain settings. The *VOICECRAFTER* also updates the H-register* in this training mode.

Refresh Train: Training mode where the H-register* is updated. *VOICECRAFTER* reverts to settings from the most recent Configuration Train cycle.

(* H-register: A memory location where an acoustic model of the room is created and stored for use in the echo canceling process.)

After a Configuration Train cycle is initiated by means of the BiampWin software, the *VOICECRAFTER* will provide resulting information from the Train cycle. The *VOICECRAFTER* will send out an AERL* value and an ERLE* value.

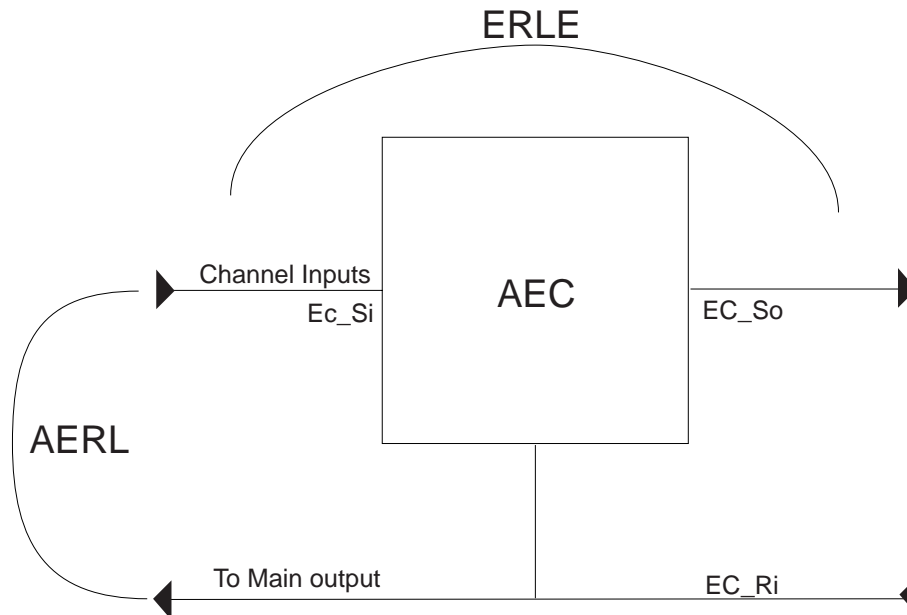
***AERL** (Acoustic Echo Return Loss) is the difference in level between signal coming out of the speakers and signal which is picked up by the microphones. *VOICECRAFTER* calculates an AERL by subtracting what is received by the echo canceller (EC_Si*) from what is sent out to the speakers (EC_Ri*). The formula is $(EC_Ri - EC_Si = AERL)$. An AERL target is factory set for +10dB, with a range of 0dB ~ +20dB, which is adjustable via software. This number is used as the basis for a Configuration Train cycle. This number represents the amount of attenuation that the *VOICECRAFTER* expects to see due to the normal room acoustics. AERL should be within +/-2dB of set target. If the *VOICECRAFTER* fails to achieve an AERL greater than 0dB, the *VOICECRAFTER* will display a train alarm.

(*EC_Si - the amount of signal fed to the echo canceller from Channel 1 and Channel 2.)

(*EC_Ri - the amount of signal fed to the echo canceller from Codec In, 2-wire in, and Aux In.)

***ERLE** (Echo Return Loss Enhancement) is an indication of the amount of *VOICECRAFTER* processing required for the room. The ERLE is a snapshot measurement taken at the end of a Configuration Train cycle. The *VOICECRAFTER* calculates ERLE by taking what is received by the echo canceller (EC_Si) and subtracting what is sent out of the echo canceller (EC_So)*. The formula is $(EC_Si - EC_So = ERLE)$. For most rooms the ERLE should be 8dB or greater. In some less reverberant rooms a lower ERLE may be acceptable. A low ERLE in a highly reflective room means that the echo canceller may not be able to adapt quickly to changes in the conference environment. In a more absorptive room the echo canceller may not need to work as hard and therefore the ERLE can be a lower value without any effect on the echo cancellers performance.

(*EC_So - the amount of signal fed out of the echo canceller to Codec Out, 2-wire out, and Aux Out.)



CONFIGURATION

If the *VOICECRAFTER* can't achieve an AERL within +/-2dB of target, the target may need to be raised or lowered depending on the room. Example: A large room, which produces excessive loudspeaker gain and echo after training, may require the AERL target be increased. However, a small room, which produces insufficient loudspeaker gain, may require the AERL target to be decreased. After adjusting the AERL target, the *VOICECRAFTER* must again be put through a Configuration Train cycle. The room should be quiet during any training cycle. An EC_Si of less than -35dB is desired for an accurate training cycle, otherwise there is too much ambient noise in the room due to air handling, ect. Placement of microphones in relation to speakers is essential for proper training values. If a microphone is too close to a speaker, the *VOICECRAFTER* may set channel or speaker gains to low, which will affect the AERL. Channel default settings also play an important part in determining AERL and ERLE values. When connecting a microphone mixer directly into a *VOICECRAFTER*, be sure that Channel 2 is set for line level input. The Channel 2 default gain will depend on the output level of the microphone mixer; the end result being that the EC-Si is approximately -20dB with normal speech or white noise.

AERL and ERLE values can more easily be achieved by properly adjusting Channel gain settings, and by paying attention to appropriate microphone and speaker placement. **NOTE:** It is recommended that microphone and speakers be placed apart from each other to prevent direct coupling between speaker output and mic input (4-5 feet is a good distance). **For best performance:** If ceiling speakers are being used, try and use table mics. If ceiling mics are being used, try using a speaker mounted on a wall.

Mix-Minus

When a mixer is connected to both a *VOICECRAFTER* and a local sound reinforcement system, it is essential that *VOICECRAFTER* output signal never be fed back to the *VOICECRAFTER* input. Therefore, the mixer must provide an output to the local sound reinforcement system, which includes all signals (near end and far end). In addition, the mixer must also provide an output to the *VOICECRAFTER*, which includes only local signals (near end). This is known as a 'mix-minus' output.

SETUP PROCEDURES

Connecting up to 2 microphones directly to the VOICECRAFTER.

1. Connect the Main Output of the VOICECRAFTER to the input of the amplifier. Adjust amplifier for no output level. Connect microphones to the VOICECRAFTER using 2-conductor shielded cable.
2. Apply power to the System. The VOICECRAFTER will attempt to train, wait for train cycle to complete before continuing (send and receive LED's will blink 2 or more times then stop). Connect the provided serial cable to the VOICECRAFTER and the computer. Open BiampWin on your PC. Click on **File**, then **Connect** to retrieve the VOICECRAFTER's settings. Click on **Fully Disabled** in the **AutoAdaptation** section.
3. Enable the internal white noise generator, click on the **Noise** box in the **Main Output** section (enabled is checked, disabled is unchecked, white noise sounds like hiss). The Receive LED on the VOICECRAFTER will be green when white noise is being generated. Set the **Main Output** Level (via the Pull-down menu) for 0dB. Adjust the amplifier level so that 72dB ('A' weighted setting) of sound pressure is measured approximately 3 Inches (7.5 cm) in front of the microphone. (There is a screwdriver adjusted level pot on the rear panel of the VOICECRAFTER that will provide more gain if needed, but having the level pot set to the lowest position will still allow audio to pass.)

Hint: If a sound pressure level meter is not available, do not enable the white noise, instead have someone speak into the mic at normal speech levels. The use of a Sound Pressure Level Meter is STRONGLY recommended.

4. Adjust the trim control on the rear panel of the VOICECRAFTER, so that the Channel 1 peak LED is lit with the white noise on (or speech if SPL meter isn't available), then back the trim control off until the trim LED goes off. Repeat this step for the second microphone and make adjustments to Channel 2.
5. Mute Channel 2 by clicking on the **Mute** box located in the Channel 2 section of the software (checked is muted, unchecked is unmuted). Look in the **Averages** section of the Control Software and view the **EC_Si** section. This value is automatically updated every 2 seconds. Adjust the **Channel 1 Gain** (VOICECRAFTER software) so that the average **EC_Si** is approximately -20dB. Unmute Channel 2, then mute Channel 1 and adjust **Channel 2 Gain** for an **EC_Si** of -20dB. Unmute Channel 1 and turn the white noise off.
6. Select -10dB on the **Main Output's** pull-down menu. Turn on the white noise again, measure the **AERL** in the **Averages** section of the Control Software. This number should be a positive number between +2dB and +20dB. Turn off the white noise. Click on the **Train** button bringing up a train menu. Using the pull-down menu set the **Target AERL** to the same value as measured. Click on the **Config** button at the bottom of the train screen to begin a Configuration Train Cycle. The VOICECRAFTER will use white noise to perform the Configuration Train Cycle.

Hint: If a SPL meter is not available, adjust the speaker level for a comfortable listening level in the room (still using white noise).

Hint: If the measured **AERL** is not between +2dB and +20dB, adjust the level of the amplifier either up or down. Increasing amplifier level will lower AERL and decreasing amplifier level will increase AERL.

7. Training results will be displayed in the training menu by clicking the '**OK**' button on the 'Training Done' screen. Once acceptable training responses have been achieved (AERL within +/-2dB of set target, and ERLE >7 *see hints below*) set **AutoAdaptation** to **Fully Enabled**, store the resulting configuration by clicking on the **Store** button followed by the desired memory location on the 'pop-up' menu. The VOICECRAFTER will power up into the mode stored into the Preset 1 location. Presets 2~5 can be used to store room configurations for different rooms (roll about applications), or different room configurations where mics and speakers are moved around.

Hint: If training results are not achieved adjust AERL target +/-2dB depending on direction of white noise adjustment during Configuration train. Example: During a train, if white increases, increase AERL target by 2dB. If white noise decreases during train, decrease AERL target by 2dB. Retrain the VOICECRAFTER after any AERL target changes

Hint: For most rooms the ERLE should be 8dB or greater. In some less reverberant rooms a lower ERLE may be acceptable. A low ERLE in a highly reflective room means that the echo canceller may not be able to adapt quickly to changes in the room. In a more absorptive room the echo canceller may not need to work as hard, and therefore the ERLE can be a lower value without any adverse effect on the echo cancellers performance.

SETUP PROCEDURES

Using an external microphone mixer without local sound reinforcement.

1. Connect the Main Output of the *VOICECRAFTER* to the input of the amplifier. Adjust amplifier for no output level. The output of the external mixer should be connected to Channel 2 of the *VOICECRAFTER* using 2-conductor shielded cable. Microphones are then connected to the inputs of the external mixer.
2. Apply power to the System. The *VOICECRAFTER* will attempt to train, wait for train cycle to complete before continuing (send and receive LED's will blink 2 or more times then stop). Connect the provided serial cable to the *VOICECRAFTER* and the computer. Open BiampWin on your PC. Click on **File**, then **Connect** to retrieve the *VOICECRAFTER*'s settings. Click on **Fully Disabled** in the **AutoAdaptation** section.
3. Channel 2 of the *VOICECRAFTER* must be configured for a line level input. Click on **Mode** under Channel 2; use the pull-down menu to select **Line Input** (Balanced or Unbalanced depending on mixer used).
4. Adjust the Input level and trim controls of the mic mixer so that proper gain structure and levels are established in the mixer (the peak LED is occasionally lit during speech, if output metering is available activity will be detected).
5. Enable the internal white noise generator, click on the **Noise** box in the **Main Output** section (enabled is checked, disabled is unchecked, white noise sounds like hiss). The Receive LED on the *VOICECRAFTER* will be green when white noise is being generated. Set the **Main Output** Level (via the Pull-down menu) for 0dB. Adjust the amplifier level so that 72dB ('A' weighted setting) of sound pressure is measured approximately 3 Inches (7.5 cm) in front of the microphone. (There is a screwdriver adjusted level pot on the rear panel of the *VOICECRAFTER* that will provide more gain if needed, but having the level pot set to the lowest position will still allow audio to pass.)

Hint: If a sound pressure level meter is not available do not enable the white noise, instead have someone speak into the mic at normal speech levels. The use of a Sound Pressure Level Meter is STRONGLY recommended.

6. Adjust the trim control on the rear panel of the *VOICECRAFTER*, and/or the external mixer output, so that the Channel 2 peak LED is lit with the white noise on (or speech if SPL meter isn't available), then back the trim control off until the trim LED goes off.
7. Look in the **Averages** section of the Control Software and view the **EC_Si** section. This value is automatically updated every 2 seconds. Adjust the **Channel 2 Gain** (*VOICECRAFTER* software) so that the average **EC_Si** is approximately -20dB. Turn the white noise off.
8. Select -10dB on the **Main Output's** pull-down menu. Turn on the white noise again, measure the **AERL** in the **Averages** section of the Control Software. This number should be a positive number between +2dB and +20dB. Turn off the white noise. Click on the **Train** button bringing up a train menu. Using the pull-down menu set the **Target AERL** to the same value as measured. Click on the **Config** button at the bottom of the train screen to begin a Configuration Train Cycle. The *VOICECRAFTER* will use white noise to perform the Configuration Train Cycle.

Hint: If a SPL meter is not available, adjust the speaker level for a comfortable listening level in the room (still using white noise).

Hint: If the measured **AERL** is not between +2dB and +20dB, adjust the level of the amplifier either up or down. Increasing amplifier level will lower AERL, and decreasing amplifier level will increase AERL.

9. Training results will be displayed in the training menu by clicking the '**OK**' button on the 'Training Done' screen. Once acceptable training responses have been achieved (AERL within +/-2dB of set target, and ERLE >7 *see hints below*) set **AutoAdaptation** to **Fully Enabled**, store the resulting configuration by clicking on the **Store** button followed by the desired memory location on the 'pop-up' menu. The *VOICECRAFTER* will power up into the mode stored into the Preset 1 location. Presets 2~5 can be used to store room configurations for different rooms (roll about applications), or different room configurations where mics and speakers are moved around.

Hint: If training results are not achieved adjust AERL target +/-2dB depending on direction of white noise adjustment during Configuration train. Example: During a train, if white increases, increase AERL target by 2dB. If white noise decreases during train, decrease AERL target by 2dB. Retrain the *VOICECRAFTER* after any AERL target changes

Hint: For most rooms the ERLE should be 8dB or greater. In some less reverberant rooms a lower ERLE may be acceptable. A low ERLE in a highly reflective room means that the echo canceller may not be able to adapt quickly to changes in the room. In a more absorptive room the echo canceller may not need to work as hard, and therefore the ERLE can be a lower value without any adverse effect on the echo cancellers performance.

SETUP PROCEDURES

Using an external microphone mixer with local sound reinforcement.

1. Connect the mix-minus output of the mixer (containing only local speech) to the Channel 2 input of the *VOICECRAFTER*. Connect the Main Output of the *VOICECRAFTER* to an input of the mixer (this signal should only be routed to the amplifier and NOT fed back in to the Channel 2 input of the *VOICECRAFTER*.) Connect the output of the mixer containing all audio signals to the amplifier. Connect the Main Output of the *VOICECRAFTER* to the input of the amplifier. Adjust amplifier for no output level. The output of the external mixer should be connected to Channel 2 of the *VOICECRAFTER*. 2-conductor shielded cable should be used for all connections. Microphones are then connected to the inputs of the external mixer.
2. Apply power to the System. The *VOICECRAFTER* will attempt to train, wait for train cycle to complete before continuing (send and receive LED's will blink 2 or more times then stop). Connect the provided serial cable to the *VOICECRAFTER* and the computer. Open BiampWin on your PC. Click on **File**, then **Connect** to retrieve the *VOICECRAFTER*'s settings. Click on **Fully Disabled** in the **AutoAdaptation** section.
3. Channel 2 of the *VOICECRAFTER* must be configured for a line level input. Click on **Mode** under Channel 2; use the pull-down menu to select **Line Input** (Balanced or Unbalanced depending on mixer used).
4. Adjust the Input level and trim controls of the mic mixer so that proper gain structure and levels are established in the mixer (the peak LED is occasionally lit during speech, if output metering is available activity will be detected).
5. Enable the internal white noise generator, click on the **Noise** box in the **Main Output** section (enabled is checked, disabled is unchecked, white noise sounds like hiss). The Receive LED on the *VOICECRAFTER* will be green when white noise is being generated. Set the **Main Output** Level (via the Pull-down menu) for 0dB. Adjust the amplifier and/or mixer levels so that 72dB ('A' weighted) of sound pressure is measured approximately 3 Inches (7.5 cm) in front of the microphone. (There is a screwdriver adjusted level pot on the rear panel of the *VOICECRAFTER* that will provide more gain if needed, but having the level pot set to the lowest position will still allow audio to pass.)

Hint: If a sound pressure level meter is not available have someone speak into the mic at normal speech levels. The use of a Sound Pressure Level Meter is STRONGLY recommended.

6. Adjust the trim control on the rear panel of the *VOICECRAFTER*, and/or the external mixer output, so that the Channel 2 peak LED is lit with the white noise on (or speech if SPL meter isn't available), then back the trim control off until the trim LED goes off.
7. Look in the **Averages** section of the Control Software and view the **EC_Si** section. This value is automatically updated every 2 seconds. Adjust the Channel 2 gain (*VOICECRAFTER* software) so that the average **EC_Si** is approximately -20dB. Turn the white noise off.
8. Select -10dB on the **Main Output's** pull-down menu. Turn on the white noise again, measure the **AERL** in the **Averages** section of the Control Software. This number should be a positive number between +2dB and +20dB. Turn off the white noise. Click on the **Train** button bringing up a train menu. Using the pull-down menu set the **Target AERL** to the same value as measured. Click on the **Config** button at the bottom of the train screen to begin a Configuration Train Cycle. The *VOICECRAFTER* will use white noise to perform the Configuration Train Cycle.

Hint: If a SPL meter is not available, adjust the speaker level for a comfortable listening level in the room (still using white noise).

Hint: If the measured **AERL** is not between +2dB and +20dB, adjust the level of the amplifier either up or down. Increasing amplifier level will lower AERL, and decreasing amplifier level will increase AERL.

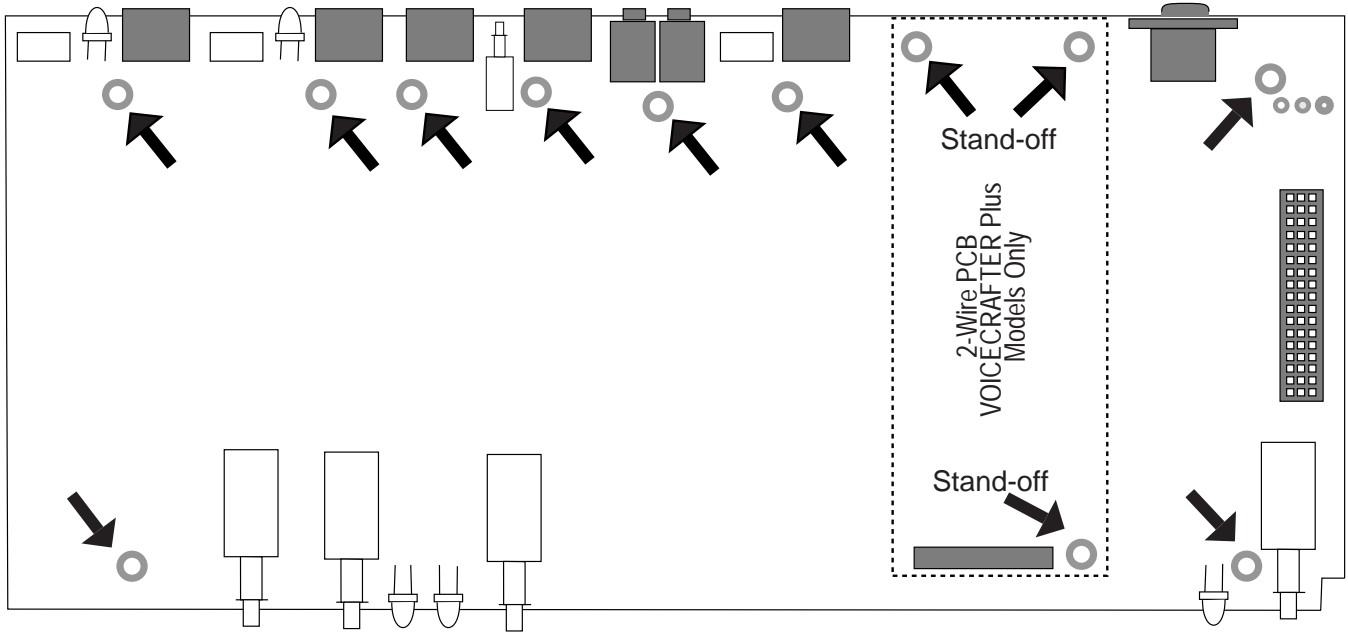
9. Training results will be displayed in the training menu by clicking the '**OK**' button on the 'Training Done' screen. Once acceptable training responses have been achieved (AERL within +/-2dB of set target, and ERLE >7 *see hints below*) set **AutoAdaptation** to **Fully Enabled**, store the resulting configuration by clicking on the **Store** button followed by the desired memory location on the 'pop-up' menu. The *VOICECRAFTER* will power up into the mode stored into the Preset 1 location. Presets 2~5 can be used to store room configurations for different rooms (roll about applications), or different room configurations where mics and speakers are moved around.

Hint: If training results are not achieved adjust AERL target +/-2dB depending on direction of white noise adjustment during Configuration train. Example: During a train if white increases, increase AERL target by 2dB. If white noise decreases during train, decrease AERL target by 2dB. Retrain the *VOICECRAFTER* after any AERL target changes

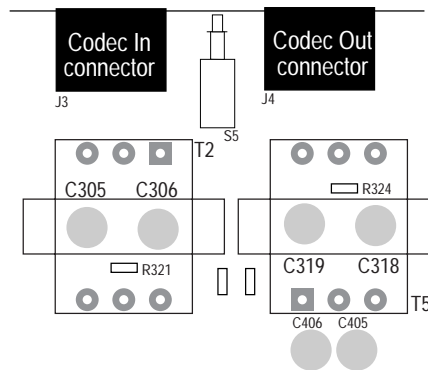
Hint: For most rooms the ERLE should be 8dB or greater. In some less reverberant rooms a lower ERLE may be acceptable. A low ERLE in a highly reflective room means that the echo canceller may not be able to adapt quickly to changes in the room. In a more absorptive room the echo canceller may not need to work as hard, and therefore the ERLE can be a lower value without any adverse effect on the echo cancellers performance.

OPTIONS

The Codec input and output have an isolation transformer option available. Installation of these transformers requires soldering and disassembly of the unit. The IT-B transformers are used for this option (BIAMP PN# 909.0019.00). To install these transformers, turn power off to the *VOICECRAFTER*, dis-connect the power supply via the DIN connector, remove the 4 screws on the side of the *VOICECRAFTER* (2 on each side), and the one screw on the rear and front section of the top panel. Remove the top-panel, and also remove the 4 screws (near the rack mounting holes) that attach the front panel to the chassis.



Remove the 9 screws that hold the PCB to the chassis (marked by arrows in the diagram above). If installing transformers into a *VOICECRAFTER Plus*, remove the 2-wire PCB then the 3 stand-offs located under the PCB. Carefully slide the strain relief off of the power supply DIN connector on the rear panel. At this point the PCB should be lifted from the chassis. If desired, the DIN connector can be de-soldered, making the installation of the transformers easier, but this installation can be completed with the DIN connector attached to the PCB.



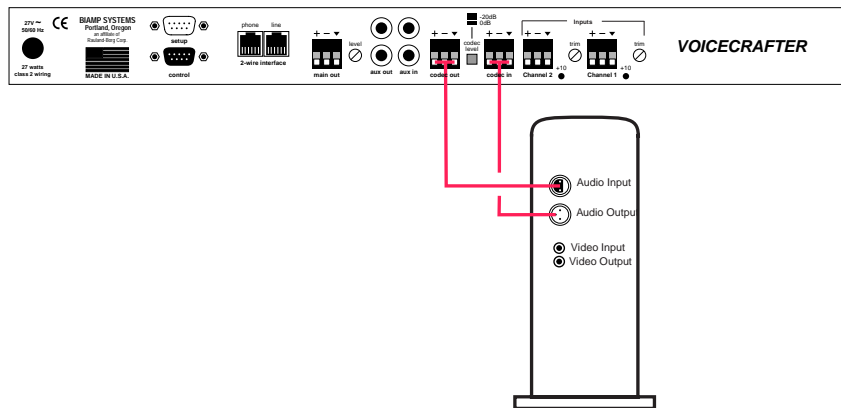
Locate the transformer positions T2 and T5 located just beneath the Codec Input and Output connectors. De-solder C305, C306, C319 and C318 from the PCB. Leave resistors R324 and R321 in place (the transformers will fit over them). Insert the transformers into the PCB, ensuring that the pin with the red dot on the transformer is inserted into the square pad of the PCB. Solder the pins of the transformer into place. Put the PCB back in the chassis, put the screw back into the chassis, and attach the front panel and the lid. Power the *VOICECRAFTER* back up. Installation of the isolation transformers is complete.

CONNECTING EXTERNAL DEVICES

Codecs:

Many codecs have different audio interface levels. In order to accommodate these versatile devices, the *VOICECRAFTER* is able to accept these different audio levels. The *VOICECRAFTER* has a push-button selector switch on the rear panel (between the codec input and codec output). This switch selects either 0 dB or -20 dB codec levels. There is also +/-12dB of adjustment available via the control software. **NOTE:** In order to maintain proper balance of codec levels, if you adjust a parameter in one direction, the other parameter should be adjusted in the opposite direction and at the same level. Example: With the *VOICECRAFTER* set to communicate at 0dB nominal codec level (and the codec is a -10dB device), then adjust the Codec Output to -10 dB via the pull-down menu, and adjust the codec input to +10dB via it's pull-down menu. This subtracts 10dB from the output signal, and adds 10dB to the input signal.

1. Connect the audio output of the codec to the Codec Input of the *VOICECRAFTER*.
2. Connect the audio input of the codec to the Codec Output of the *VOICECRAFTER*.

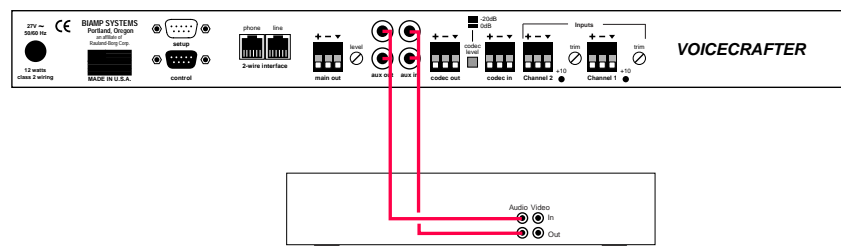


Aux Port:

The *VOICECRAFTER* provides a mono-summing connection for a VCR, but the Aux Port can also be used as a second codec interface if needed. **NOTE:** The Aux Port of the *VOICECRAFTER* has 2 modes of operation: 1) VCR mode: allowing alternating use of the Aux Input and Aux Output. This is useful when using a consumer grade VCR, since during recording these types of VCR's will send the recording signal back out of the VCR's output, thus causing feedback in an Echo Canceller. 2) Bridge Mode: Allowing the Aux Input and Aux output to be active at the same time. This is useful when connecting a 2nd codec to the *VOICECRAFTER*.

VCR:

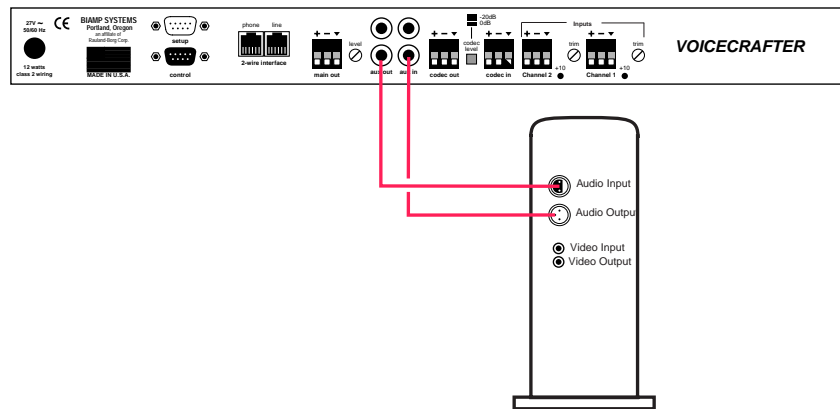
1. Connect the output of the VCR to the Aux Input. If connecting to a Stereo VCR: Connect the left and right inputs to input RCA jacks. If connecting to a mono VCR: Connect the VCR input to either RCA inputs, a 'Y-cable' is not necessary.
2. Connect the input of the VCR to the Aux Output of the *VOICECRAFTER*. If connecting to a Stereo VCR: Connect the left and right inputs to the RCA jacks. If connecting to a mono VCR: Connect the VCR output to either RCA inputs.
3. Set the *VOICECRAFTER* to VCR mode by selecting VCR or Bridge in the Aux section of the Control Software. When the Aux Port is in the Play condition the Aux Output is active, and when the Aux Port is in the Record condition, the Aux Input is active.



CONNECTING EXTERNAL DEVICES

Second Codec:

1. Connect the Audio output of the 2nd codec to the Audio Input of the *VOICECRAFTER*.
5. Connect the audio input of the 2nd codec to the Aux Input of the *VOICECRAFTER*.
6. Set the Aux port to Bridge mode by selecting Bridge in the Aux section of the Control Software.

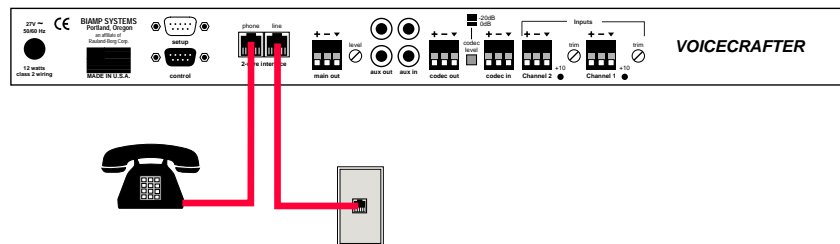


2-Wire Interface:

The *VOICECRAFTER Plus* models can be used in an audio only application, or a telephone conference can be bridged into a conference during a videoconference. NOTE: The *VOICECRAFTER Plus* 2-Wire interface will only connect to an **ANALOG** telephone system.

1. Connect the analog phone line to the RJ11 jack labeled 'line'.
2. Connect an analog telephone to the RJ11 jack labeled 'phone'.

The *VOICECRAFTER Plus* provides DTMF and Tone dialing. Select DTMF or Tone via the Control Software. 2-wire dialing can be accomplished via the Control Software in the Dial Pad section. Connection and dis-connection of the phone line can be done in the 2-wire section of the Control Software, via 3rd party controllers, or by the *VOICECRAFTER TTC*. Gain can be added or subtracted via the Tx pull-down menu on the Control Software.



RS-232 CONTROL

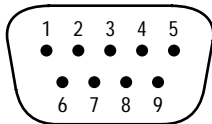
The *VOICECRAFTER* has two RS-232 Serial Ports, which allow it to be controlled by a computer (see Front & Rear Panel Features on pg. 2). In addition to the PC Control Software, the *VOICECRAFTER* offers two other methods of computer control.

t-Commands: This method provides advanced commands, which allow the computer to retrieve or edit various *VOICECRAFTER* settings. For complete details about using the *VOICECRAFTER* with a computer, including t-commands, contact BIAMP Systems for the manual "Computer Control of *ADVANTAGE*® *VOICECRAFTER*", or visit the website at www.biamp.com to download the manual.

ASCII Commands: This method uses a variety of commands for controlling the *VOICECRAFTER* and *VOICECRAFTER Plus*. For complete details about using the *VOICECRAFTER* with a computer, including ASCII Commands, contact BIAMP Systems for the manual "Computer Control of *ADVANTAGE*® *VOICECRAFTER*", or visit the website at www.biamp.com to download the manual.

NOTE: The Setup port (DB9 male) is for use with BiampWin PC Control Software only. The Control Port (DB9 Female) should be used for connection to the *VOICECRAFTER TTC*, or third-party controllers.

Setup Port: The 9-pin Sub-D (male) connector on the *VOICECRAFTER* rear panel provides the RS-232 compatible serial interface signals used for computer control. The *VOICECRAFTER* 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 *VOICECRAFTER* power is on. Pins 7 & 8 are internally shorted together, so it is not necessary to utilize the CTS and RTS lines during communications.

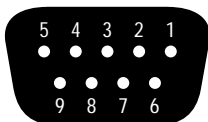


pin #1 = not used	pin #6 = not used
pin #2 = Receive Data (RxD) input	pin #7 = rts
pin #3 = Transmit Data (TxD) output	pin #8 = cts
pin #4 = Data Terminal Ready (DTR) output	pin #9 = not used
pin #5 = ground	

Setup Port

The *VOICECRAFTER* only requires receive data (pin 2), transmit data (pin 3), and signal ground (pin 5) to be connected for successful data communications. 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 *VOICECRAFTER* serial interface ground is also tied (indirectly) to the analog signal ground, undesirable ground loops may occur when the *VOICECRAFTER* 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 *VOICECRAFTER* should be at the same potential, and the PC should get AC power from the same source as the *VOICECRAFTER* (and any other audio equipment which is connected to the *VOICECRAFTER*). Since most laptop computers are isolated from earth ground, this should rarely pose a problem.

Control Port: The 9-pin Sub-D (female) connector on the *VOICECRAFTER* rear panel provides the RS-232 compatible serial interface signals used for third-party controllers, or the *VOICECRAFTER TTC*.

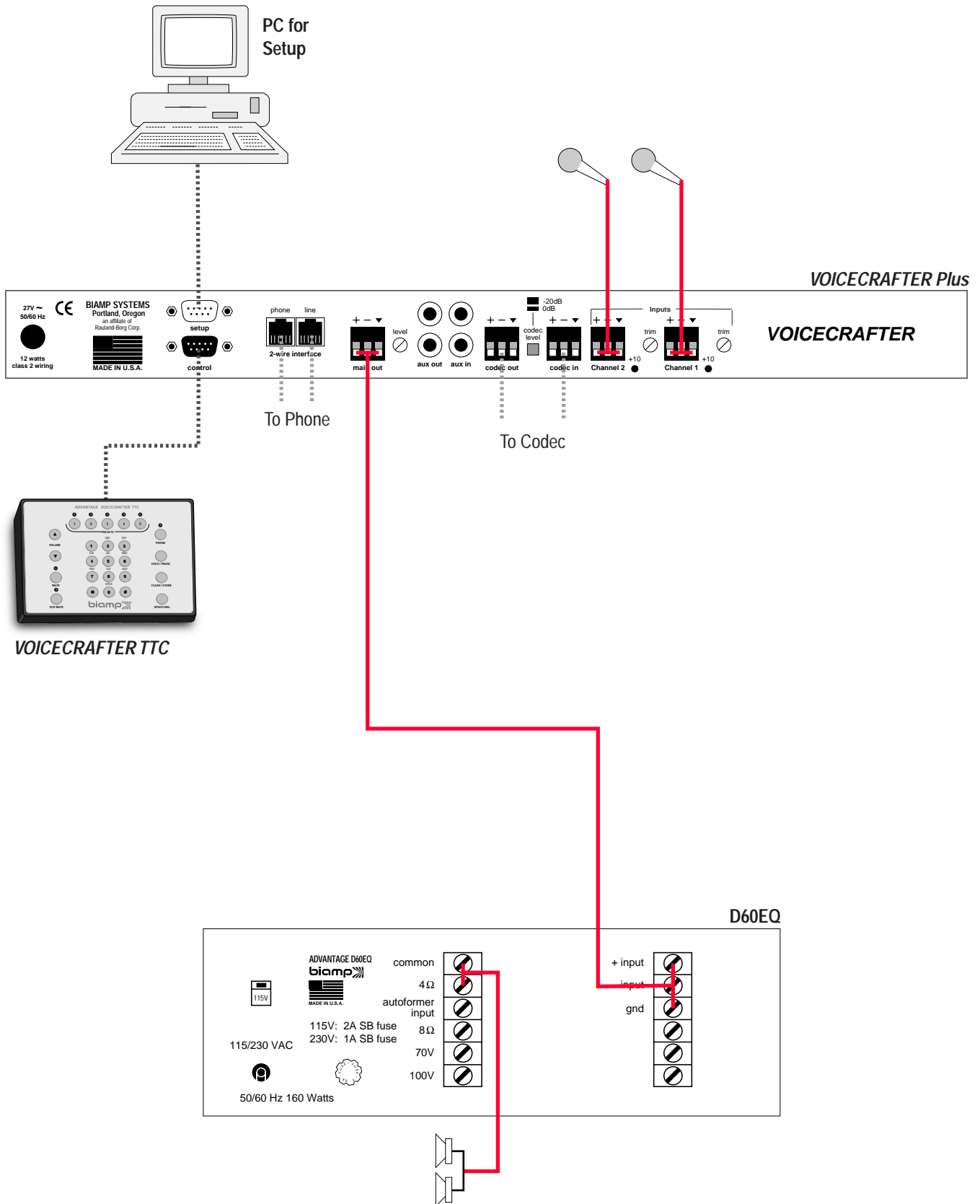


pin #1 = +5 Volts	pin #6 = not used
pin #2 = Transmit Data (TxD) output	pin #7 = not used
pin #3 = Receive Data (RxD) input	pin #8 = not used
pin #4 = not used	pin #9 = not used
pin #5 = ground	

Control Port

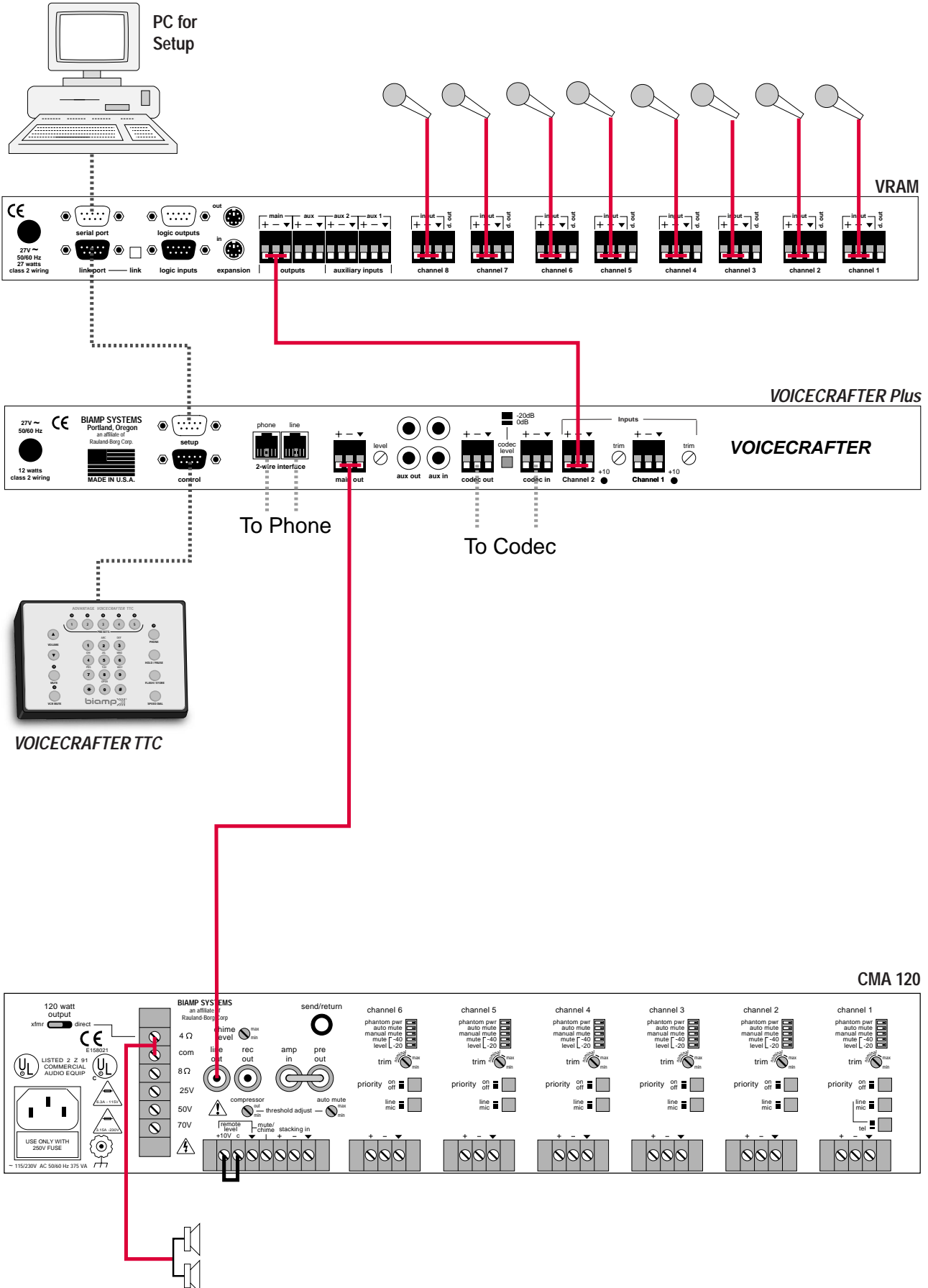
APPLICATIONS

Conferencing with mics connected directly to the VOICECRAFTER



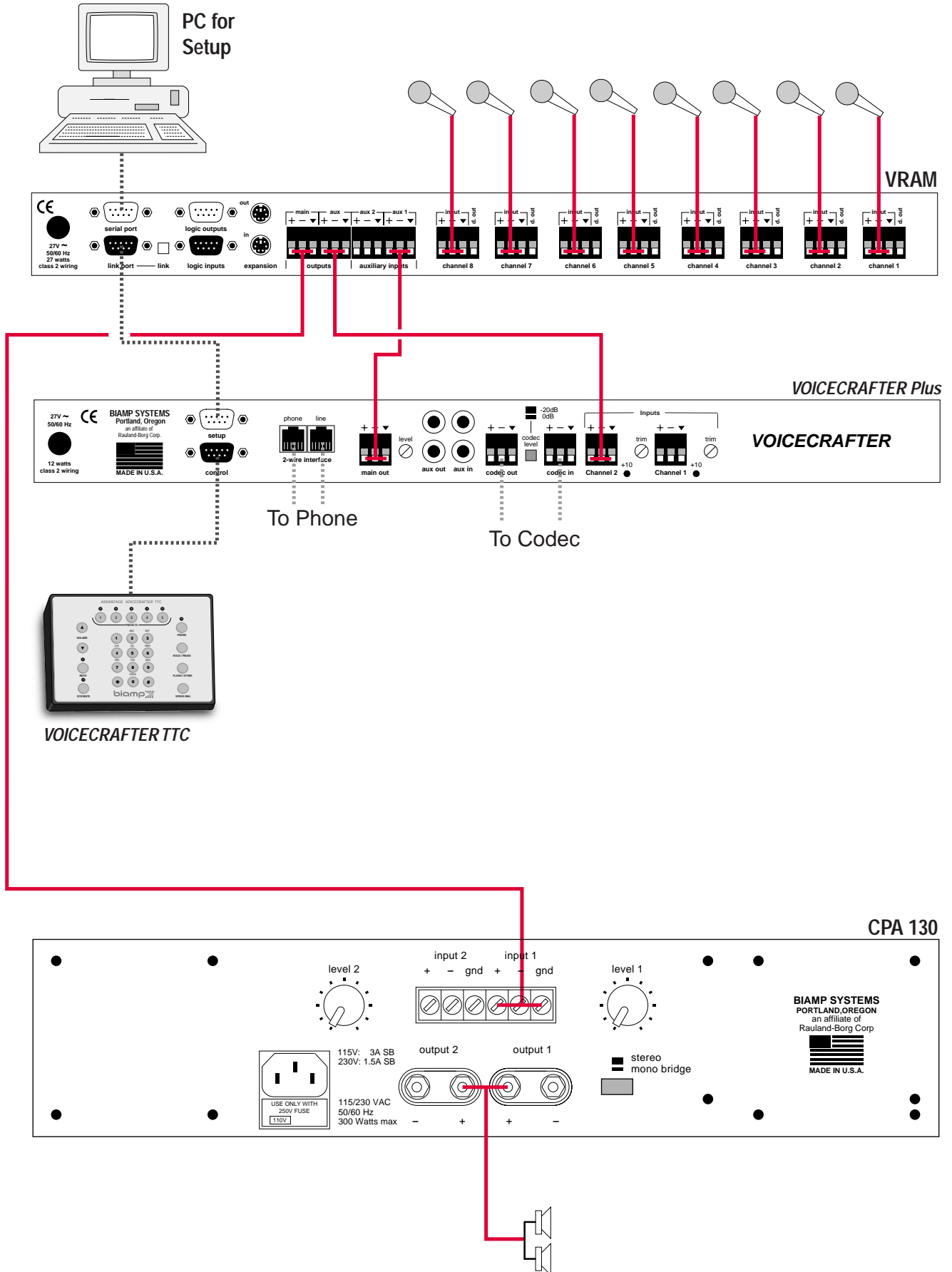
APPLICATIONS

Connecting a mixer without local Sound Reinforcement



APPLICATIONS

Connecting a mixer with local Sound Reinforcement



TROUBLESHOOTING

What if I can't make any gain changes in the BiampWin software?

Make sure AutoAdaptation is set to 'Fully Disabled'

What if I can't communicate with the VOICECRAFTER?

Make sure you are connecting via the appropriate PC Comm port. (Comm 1 is the ONLY port you can use in most laptop computers). Make sure you are trying to communicate with the upper Setup Port on the VC using the provided PC Serial Cable. Make sure you have the baud rate set to 9600. Make sure you are using the supplied PC serial cable. Make sure you have BiampWin version 2.5 or greater.

What if I need more speaker gain?

Reduce the AERL target by 2 dB and retrain the VC. This will lower the amount of acoustic room loss the VC expects and the VC will raise the main output gain by 2dB. Do not make changes to the Amplifier gain.

What if the speaker gain is too high?

Increase the AERL target by 2dB and retrain the VC. This will increase the amount of acoustic room loss the VC expects and the VC will lower the Main Output gain by 2dB. Do not make changes to the Amplifier gain.

What if I can't reach my AERL Target?

Check for clipping in the mixer or a loose connection to the VC inputs. By following the setup procedure in pages 9~11 the VC should set itself to the measured AERL value.

What if I can't reach an ERLE of >7dB?

Retrain the system, make sure the room is quiet with no one speaking or making any noise. Noises that occur during a train can confuse the echo canceller and produce inaccurate measurements.

Make sure there are no clipped signals being fed to the VC.

Make sure the EC_Si is -20dB with 72dB of sound pressure measured in front of the mic.

Make sure the Peak LED is not continually lit during speech. (It should be only occasionally lit.)

In some highly absorbent rooms it may be difficult to acoustically excite a room without creating too much far-end volume. If the AERL is within +/-2dB of the Target AERL and the ERLE is low, try conferencing with another site and check the settings. Move around the room while speaking and check the VC's adaption. Some rooms will require a lot of processing, some will require more. It all depends on each room's acoustic characteristics.

What if I still need help?

Contact our VOICECRAFTER Technical Support Center at 1-800-826-1457, Contact Kerry White at Kwhite@biamp.com, or contact your local distributor.

THIRD-PARTY CONTROL

To perform third-party control of the *VOICECRAFTER* use the bottom 'Control Port'. This port is setup for 9600 baud (which cannot be changed), 8 data bits, no parity, and 1 stop bit. Pin 2 is used to receive data, pin 3 sends data, and Pin 5 is the ground pin. Pin #1 contains 5VDC for powering the TTC receiver. The following is a list of some third-party commands:

s-Commands

The 's' commands (used by the TTC Table Top Controller) allow limited control of functions without making any permanent changes to the *VOICECRAFTER* configuration settings. Each s-Command consists of a start byte (lower case 's') followed by two command bytes (also lower case letters), but not followed by a carriage return. Each of the s-Commands will generate a response from the *VOICECRAFTER*. The response packet consists of two ASCII characters.

s-Commands

Command	ASCII	Response
User Volume Increase	s g z	OB HB if limit
User Volume Decrease	s h z	FB HB if limit
System Mute	s i j	HV
System unmute	s i l	FV
VCR Record Mode	s q j	O[
VCR Play Mode	s q l	F[
System Mute Toggle	s i z	HV if muted FV if unmuted
Connect 2-wire	s j m	OW if connected
Hang-up 2-wire	s l m	FW
Dial 1	s c l	None
Dial 2	s d l	None
Dial 3	s e l	None

Command	ASCII	Response
Dial 4	s c m	None
Dial 5	s d m	None
Dial 6	s e m	None
Dial 7	s c n	None
Dial 8	s d n	None
Dial 9	s e n	None
Dial 0	s d o	None
Dial #	s e o	None
Dial *	s c o	None
Hook Flash	s c p	None
Hold 2-wire (toggle)	s k m	None

****NOTE** – DTMF tones can not be heard through the main output unless the DTMF Mix is enabled. To enable DTMF Mix in BiampWin, click on the DTMF Mix box located in the 2-wire section of the control software.

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.

BIAMP Systems expressly warrants this product to be free from defects in material and workmanship for a period of 5 YEARS from the date of purchase as a new product from an authorized BIAMP Systems dealer under the following conditions.

1. The Purchaser is responsible for completing and mailing to BIAMP Systems, within 10 days of purchase, the attached warranty application.
2. In the event the warranted BIAMP Systems product requires service during the warranty period, BIAMP Systems will repair or replace, at its option, defective materials, provided you have identified yourself as the original purchaser of the product to any authorized BIAMP Systems Service Center. Transportation and insurance charges to and from an authorized Service Center or the BIAMP Systems factory for warranted products or components thereof to obtain repairs shall be the responsibility of the purchaser.
3. This warranty will be VOIDED if the serial number has been removed or defaced; or if the product has been subjected to accidental damage, abuse, rental usage, alterations, or attempted repair by any person not authorized by BIAMP Systems to make repairs; or if the product has been installed contrary to BIAMP Systems' recommendations.
4. Electro-mechanical fans, electrolytic capacitors, and the normal wear and tear of appearance items such as paint, knobs, handles, and covers are not covered under this warranty.

5. BIAMP SYSTEMS SHALL NOT IN ANY EVENT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS, LOSS OF USE, PROPERTY DAMAGE, INJURY TO GOODWILL, OR OTHER ECONOMIC LOSS OF ANY SORT. EXCEPT AS EXPRESSLY PROVIDED HEREIN, BIAMP SYSTEMS DISCLAIMS ALL OTHER LIABILITY TO PURCHASER OR ANY OTHER PERSONS ARISING OUT OF USE OR PERFORMANCE OF THE PRODUCT, INCLUDING LIABILITY FOR NEGLIGENCE OR STRICT LIABILITY IN TORT.

6. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. BIAMP SYSTEMS EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE REMEDIES SET FORTH HEREIN SHALL BE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDIES WITH RESPECT TO ANY DEFECTIVE PRODUCT. THE AGENTS, EMPLOYEES, DISTRIBUTORS, AND DEALERS OF BIAMP SYSTEMS ARE NOT AUTHORIZED TO MODIFY THIS WARRANTY OR TO MAKE ADDITIONAL WARRANTIES BINDING ON BIAMP SYSTEMS. ACCORDINGLY, ADDITIONAL STATEMENTS SUCH AS DEALER ADVERTISEMENTS OR REPRESENTATIONS DO NOT CONSTITUTE WARRANTIES BY BIAMP SYSTEMS.

7. No action for breach of this warranty may be commenced more than one year after the expiration of this warranty.

Thank you for purchasing BIAMP SYSTEMS...
AMERICAN SOUND CRAFTSMANSHIP

Biamp Systems
10074 S.W. Arctic Drive
Beaverton, Oregon 97005
(503) 641-7287
<http://www.biamp.com>



Declaration of Conformity

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

Product Models: ADVANTAGE® VOICECRAFTER and VOICECRAFTER PLUS

Product Description: Acoustic Echo Canceller and Acoustice Echo Canceller with Telephony Capability

Applicable EC Directives: EMC Directive (89/336/EEC), R&TTE Directive (1999/5/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 dialing function of the Voicecrafter Plus may not operate properly on certain European networks due to the product's DTMF tone levels.

The Technical Report/File is maintained at:

Biamp Systems, Inc.
10074 S.W. Arctic Drive
Beaverton, OR USA 97005
phone: (503) 641-7287 fax: (503) 626-0281
e-mail: biamp@biamp.com

Authorized Representative: Steven Hedgepeth

Authorized Representative Signature:
Issued: April, 2000

A handwritten signature in black ink, appearing to read 'St. Hedgepeth', written over a white background.

FCC Part 68 Compliance Statement

This equipment complies with Part 68 of the FCC rules. Located on the equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN.) If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

This equipment cannot be used on the telephone company-provided coin service. Connection to Party Line Service is subject to State Tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact: Biamp Systems, Inc.
10074 S.W. Arctic Dr.
Beaverton, OR 97005

If the trouble is causing harm to the telephone network, the telephone company may request that you remove the equipment from the network until the problem is resolved.

This equipment uses the following USOC jacks: RJ11C

It is recommended that the customer install an AC surge arrester in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

The telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity or individual. (The telephone number provided may not be a 900 number or any other number for which charges exceed local or long-distance transmission charges.)

Industry Canada CS-03 Compliance Statement

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) of this device is 0 (zero).

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

The standard connecting arrangement for this equipment is CA11A.

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.



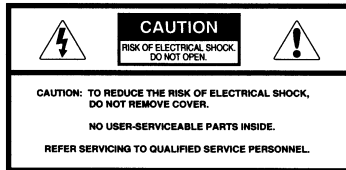
The exclamation point, enclosed within a triangle, is intended to alert the user to important installation, operation, and maintenance (servicing) instructions in the literature accompanying the apparatus.

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.



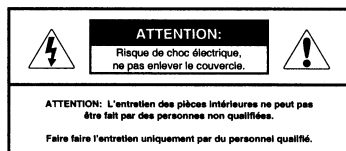
Le point d'exclamation dans un triangle permet de prévenir l'utilisateur des points importants concernant l'installation, le fonctionnement et l'entretien de l'appareil figurant dans le manuel d'utilisation.

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 dell'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.



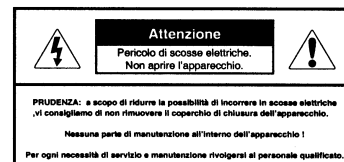
La simbologia con il punto esclamativo all'interno di un triangolo, intende avvisare l'utente di una serie di istruzioni contenute nel manuale d'uso riguardanti: operato, manutenzione e assistenza. Il suddetto manuale sarà a corredo dell'apparecchio.

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, 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 Rußzeichen 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 svabret ikke fjernes.		
Indeholder ingen komponenter relevante for brugeren.		
Anvend autoriseret servicepersonale ved alle servicetilg.		

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 tärkeistä turvallisuusinformatiosta. 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 KOSTEUDELLE TULIPALON JA SÄHKÖISKUN VAARAN VUOKSI.

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



Tässä manuaalissa oleva informaatio, joka koskee muutostöitä ja lisälaitteita, on tarkoitettu vain ammattitaitoisten 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.

Produktmerkingen 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 tilkoblingsterminaler som kan gi støt.



Etter utropetegnet 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 tilleggsinformasjon som følger er kun for kvalifiserte installatører eller servicepersonell.

	VIKTIG FARE FOR STØT, MÅ IKKE DEMONTERES.	
VIKTIG: For å unngå faren for støt, må ingen deler 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 säkerhetsinformation. 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 blixn 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 servicepersonell.

	OBSERVERA RISK FÖR ELEKTRISK STÖT FÄR EJ ÖPPNAS	
OBSERVERA: FÖR ATT MINSKA RISKEN FÖR ELEKTRISK STÖT, AVLÅSNA 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, επιστρέφουν την προσοχή σε σημαντικές πληροφορίες ασφαλείας. Οι λέξεις αυτές έχουν την παρακάτω σημασία.

ΚΙΝΔΥΝΟΣ: Η αναγραφόμενη πληροφορία επιστράφηκε στην προσοχή 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 ΕΞΟΥΣΙΟΘΗΜΕΝΟ ΠΡΟΣΩΠΟ 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.



o 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.



o 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.		