

**VOICECRAFTER™**  
**3000 Series**  
**Echo Canceling Audio System**  
**operation manual**

advantage ®

## TABLE OF CONTENTS

1.	FRONT PANEL FEATURES .....	2
2.	REAR PANEL FEATURES .....	3
3.	CONNECTOR PIN-OUTS .....	4
4.	CONFIGURATION .....	5
5.	USER CONTROL INTERFACE (SOFTWARE) .....	7
6.	INSTALLATION .....	13
7.	CONNECTING EXTERNAL EQUIPMENT .....	15
8.	TROUBLESHOOTING .....	20
9.	DTMF DIALING & BTV MODE .....	24
10.	SPECIFICATIONS .....	26
11.	GENERAL INFORMATION .....	28
12.	WARRANTY	
13.	WARNING (FCC Compliance)	
14.	EQUIPMENT ATTACHMENT LIMITATIONS (Canadian Certification)	

# 1. FRONT PANEL FEATURES

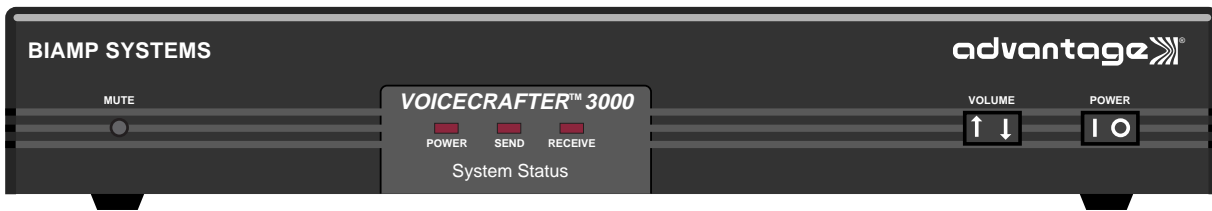


Figure 1-1. Voicecrafter 3000 Series Front Panel

**MUTE BUTTON** - This momentary switch, when pressed and released, puts the Voicecrafter into System Mute mode, which mutes the mic and/or speaker signals. The Voicecrafter can be put into a Configuration Train cycle, which establishes proper level settings, by holding the mute button until both the Send and Receive LED's blink.

**POWER LED** - Indicates that power has been applied to the Voicecrafter.

### SEND LED

When Green: Indicates that normal signal levels (between -30dBm and -6dBm) are present at the internal echo canceling processor.

When Amber: Indicates that excessive signal levels (greater than -6dBm) are present at the internal echo canceling processor.

### RECEIVE LED

When Green: Indicates that normal signal levels (between -30dBm and -6dBm) are present at the internal echo canceling processor.

When Amber: Indicates that excessive signal levels (greater than -6dBm) are present at the internal echo canceling processor.

When both Send and Receive LED's blink Green: Indicates that the Voicecrafter is performing a Train cycle.

When both Send and Receive LED's blink Amber: Indicates that the Voicecrafter is in System Mute mode.

**VOLUME SWITCH** - Momentary two position switch used to raise or lower User Volume from the front panel. User Volume affects output level at Speaker and Line Out. User Volume has a limited range which is established during a Configuration Train cycle.

**POWER SWITCH** - Rocker switch used to turn power on/off to the Voicecrafter. Press **I** to apply power to the Voicecrafter. Press **O** to remove power from the Voicecrafter.

## 2. REAR PANEL FEATURES

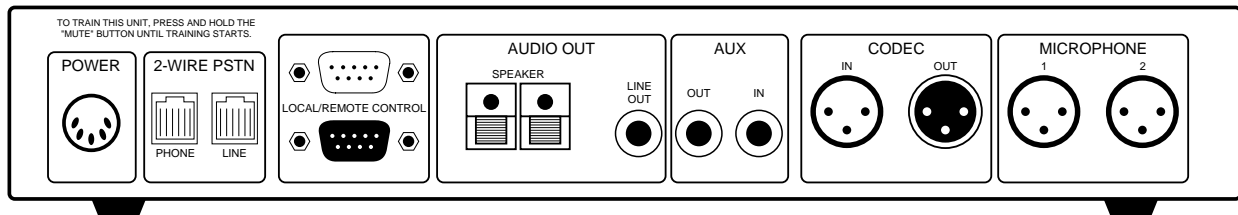


Figure 2-1. Voicerafter 3000 Series Rear Panel

**POWER** - Connects Voicerafter to external DC power supplies.

**2-WIRE PSTN (VC3010 and VC3011 only)** - Connects Voicerafter to analog telephone lines.

### LOCAL/REMOTE CONTROL

Upper DB9 connector (female/DTE): Connects to PC, Hand-Held Terminal, or third-party controller. Uses standard serial cable (Pin 1 to Pin 1, Pin 2 to Pin 2, etc.).

Lower DB9 connector (male/DCE): Connects to external modem, using standard serial cable. Also can connect to PC or third-party controller, using null-modem cable. If the Device that the Voicerafter is connecting to does not control the CTS line, Pins 7 and 8 must be connected together.

### AUDIO OUT

Speaker: Knife jack terminals for connecting speakers to Voicerafter internal power amplifier (Red is + and Black is -).

Line Out: RCA female jack for connecting Voicerafter to an external power amplifier, or to an external mixer which utilizes 'Mix-Minus' (see Connecting External Equipment).

**AUX** - Can be configured for VCR Mode (when using a VCR for record/playback) or for Bridge Mode (when bridging to an additional network site).

Aux Out: Female RCA connector for connection to VCR input (recording), or for sending signal to a network.

Aux In: Female RCA connector for connecting to VCR output (playback), or for receiving signal from a network.

**CODEC** - Balanced XLR connectors to interface Voicerafter with video codecs or other transmission devices.

Codec In: Female XLR jack connects to codec or transmission device output.

Codec Out: Male XLR jack connects to codec or transmission device input.

**MICROPHONE** - Balanced female XLR connectors to interface Voicerafter with near end sound equipment.

MIC 1: Microphone input (+12VDC phantom power supplied).

MIC 2: Microphone input (+12VDC phantom power supplied). MIC 2 can be configured for balanced or unbalanced line input, without phantom power (see User Control Interface). Nominal line level for VC3000 and VC3010 is -35dBm. Nominal line level for VC3001 and VC3011 is 0dBm and cannot be used for a mic input.

### 3. CONNECTOR PIN-OUTS

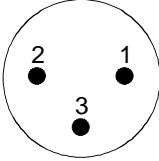
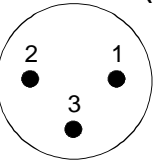
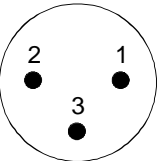
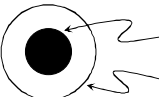
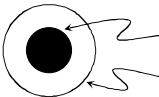
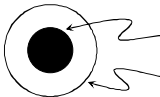
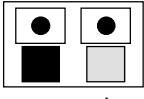
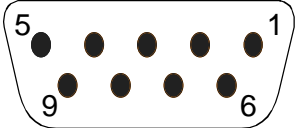
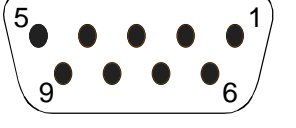
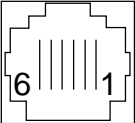
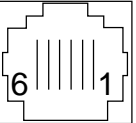
<p><b>MIC 1 &amp; MIC 2 (Mic Level)</b></p>  <p>Pin 1 - Chassis Gnd. or Shield Pin 2 - Signal (-) Pin 3 - Signal (+) 600 Ohm (Balanced)</p>	<p><b>MIC 2 (Line Level)</b></p>  <p>Pin 1 - Chassis Gnd. or Shield Pin 2 - Signal Ground Pin 3 - Signal High Z (Unbalanced)</p>	<p><b>CODEC IN &amp; OUT</b></p>  <p>Pin 1 - Chassis Gnd. or Shield Pin 2 - Signal (-) Pin 3 - Signal (+) 600 Ohm (Balanced) Transformer Isolated</p>	
<p><b>AUXILIARY IN</b></p>  <p>Inner - Signal (+) Outer - Signal (-) 10 k Ohm (Balanced/Unbalanced) Transformer Isolated</p>	<p><b>AUXILIARY OUT</b></p>  <p>Inner - Signal (+) Outer - Signal (-) 600 Ohm (Balanced/Unbalanced) Transformer Isolated</p>	<p><b>AUDIO LINE OUT</b></p>  <p>Inner - Signal (+) Outer - Signal (-) 600 Ohm (Balanced/Unbalanced) Transformer Isolated</p>	
<p><b>LOUDSPEAKER</b></p>  <p>Red - Signal (+) Black - Signal (-)</p>	<p><b>LOCAL DTE CONTROL (TOP PORT)</b></p>  <p>Pin 1 - +5 VDC Pin 2 - Tx (From Voicecrafter) Pin 3 - Rx (To Voicecrafter) Pin 5 - Ground</p>	<p><b>REMOTE DCE CONTROL (BOTTOM PORT)</b></p>  <p>Pin 1 - DCD (Not Implemented) Pin 2 - Rx (To Voicecrafter) Pin 3 - Tx (From Voicecrafter) Pin 4 - DTR (From Voicecrafter) Pin 5 - Ground Pin 7 - RTS (From Voicecrafter) Pin 8 - CTS (To Voicecrafter)</p>	
<p><b>2-WIRE PSTN LINE</b></p>  <p>Pin 1 - PHONE Jack Pin 6 Pin 2 - PHONE Jack Pin 5 Pin 3 - PSTN Tip &amp; PHONE Jack Pin 4 Pin 4 - PSTN Ring &amp; PHONE Jack Pin 3 Pin 5 - PHONE Jack Pin 2 Pin 6 - PHONE Jack Pin 1</p>		<p><b>2-WIRE PSTN PHONE</b></p>  <p>Pin 1 - LINE Jack Pin 6 Pin 2 - LINE Jack Pin 5 Pin 3 - PSTN Ring &amp; LINE Jack Pin 4 Pin 4 - PSTN Tip &amp; LINE Jack Pin 3 Pin 5 - LINE Jack Pin 2 Pin 6 - LINE Jack Pin 1</p>	

Figure 3-1. Connector Pin-Outs

## 4. CONFIGURATION

### 4.1 INTRODUCTION

This chapter describes how to configure the Voicecrafter, and also defines terms which are related to the Voicecrafter.

### 4.2 TRAINING

After all the microphones and speakers are connected to the Voicecrafter, the unit needs to be trained before a video conference 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 User Control Interface software. The Voicecrafter uses white noise to establish gain settings as well as to make an acoustic model of the room for echo canceling purposes.

### 4.3 MODES OF TRAINING

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 (message: "Voicecrafter 3000 Ready"). 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.)

### 4.3 RESULTS OF TRAINING

After a Configuration Train cycle is initiated by means of the User Control Interface (software), the Voicecrafter will provide resulting information from the Train cycle. The Voicecrafter will send out an AERL value and an ERLE value.

#### 4.3.1 AERL

AERL (Acoustic Echo Return Loss) is the difference in level between what comes out of the speakers and what 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 ~ +15dB, which is adjustable via software. This default 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 acoustics of the room. AERL should be within +/-2dB of target. If the Voicecrafter fails to achieve an AERL greater than 0dB, the Voicecrafter will display a train alarm (refer to paragraph 5.3.4 - Alarm).

(\*EC\_Si - the amount of signal fed to the echo canceller from Mic 1 and Mic 2.)

(\*EC\_Ri - the amount of signal fed to the echo canceller from Codec In and Aux In.)

### 4.3.2 ERLE

ERLE (Echo Return Loss Enhancement) is a measurement of the Voicecrafters ability to build an echo canceling model of the room. The ERLE is actually 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  $(EC\_Si - EC\_So = ERLE)$ . The ERLE should be 8dB or greater. If the ERLE is 7dB or less, the Echo canceller will not be able to adapt quickly to changes in the conference environment.

(\*EC\_So - the amount of signal fed out of the echo canceller to Codec Out and Aux Out.)

## 4.4 PROBLEMS WITH TRAINING

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 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. This can be measured by selecting the DSP AVE button on either the ACOUSTIC, NETWORK, or DIAGNOSTIC screens. Use F2← or F3⇒ to display EC\_Si.

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 microphone or speaker gains to low, which will affect the AERL. Microphone 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 Mic 2 is set for line level input. The Mic 2 default gain will depend on the output level of the microphone mixer (see paragraph 6.3).

The loopback features, described in paragraph 5.3.4, are excellent tools for determining if your microphone gain and speaker gain settings are correct. If you talk through a microphone and get a clear signal during a microphone loopback, this is a good indication that the microphone and speaker settings are correct.

AERL and ERLE values can more easily be achieved by properly adjusting microphone gain settings, and by paying attention to appropriate microphone and speaker alignment.

## 4.5 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.

## 5. USER CONTROL INTERFACE (Software)

### 5.1 INTRODUCTION

This chapter describes the SC-300 User Control Interface software for Windows®, which is provided for configuration of the Voicecrafter.

### 5.2 INSTALLATION

Install the SC-300 User Control Interface as described on the software disk label. Connect an open PC comm port to the upper 9-pin female port on the back of the Voicecrafter, using a standard 9-pin male to 9-pin female RS-232 serial cable. All buttons and controls are 'point-and-click', similar to many other Windows® applications.

### 5.3 SCREEN LAYOUT

The Voicecrafter control software is separated into 5 different pages: USER, ACOUSTIC, NETWORK, DIAGNOSTIC, and ADVANCED. Each screen is accessed by clicking on the appropriate tab (labeled USER, ACOUSTIC, etc.) at the bottom of the screen. Use File menu to save current software settings or to exit program. Use Mode menu to select Expert (all screens), Novice (user screen only), or Terminal Display (text entry) access. Use Communications menu to adjust software serial port settings. Use Help menu for additional instruction.

#### 5.3.1 USER SCREEN

The USER screen (see *Figure 5-1*) is designed to be used by the end user. There are a limited number of buttons available for the system operator to use.



Figure 5-1. User Screen

#### Speaker

The Vol Up and Vol Dwn buttons control the User Volume.

#### Microphone Mute

The Microphone Mute buttons mute and un-mute the respective mic inputs.

#### AUX/VCR Port

Mute selects Record mode.\*

UnMute selects Play mode.\*

Vol Up and Vol Dwn adjust Aux port gain.

(\*When Voicecrafter is in VCR mode.)

#### Two-Wire Interface (VC3010 and VC3011 only)

Use to Connect, Hold, or Hang Up the phone line.

**Privacy/System Mute** - Mutes and un-mutes the Voicecrafter (see paragraph 5.3.5).

**Train** - Puts the Voicecrafter into a Configuration Train cycle.



### 5.3.2 ACOUSTIC SCREEN

The ACOUSTIC screen (see *Figure 5-2*) is designed to be used by a system installer for proper set up of the Voicecrafter.



*Figure 5-2. Acoustic Screen*

**F1, F2←, F3⇒, F4, F5,**  
F1~F5 buttons represents locations where Voicecrafter parameters can be stored. F2← and F3⇒ are also used to select other options. (F1~F5 can not be accessed using the function keys on your computer keyboard.)

#### **Mic 1 / Mic 2**

**Default:** Sets the default Mic Gain that the Voicecrafter uses during a Train cycle.

**Gain:** Displays current Mic Gain settings. Mic Gain can be adjusted using F2← and F3⇒ (only when autoadaptation is FULLY DISABLED via the ACOUSTIC screen).

**Mute:** Displays microphone mute status. Mute is toggled using F2← and F3⇒.

**Input Mode:** Selects between Mic level, Unbalanced line input, or Balanced line input. Change Input Mode using F2← and F3⇒ (Mic 2 input only).

#### **Speaker**

**AERL:** Sets the target AERL to be used during a Train cycle

**Gain:** Displays current Speaker Gain. Can be adjusted using F2← and F3⇒ (only when autoadaptation is FULLY DISABLED via ACOUSTIC screen).

**Mute:** Displays current Speaker Mute status. Can be changed using F2← and F3⇒.

**User Vol:** Displays current User Volume. Can be adjusted using F2← and F3⇒. User Volume adjusts Speaker Gain within a limited range, which is established during Configuration Train.

**Train:** Brings up a menu for starting a Train cycle. Select F2 for a Refresh Train. Select F3 for Configuration Train. **Train Mode:** Selects a Train mode for power up. Refresh Train, Configuration Train, or Skip Train.

**AutoAdapt:** Displays current status of autoadaptation. FULLY ENABLED indicates that Voicecrafter autoadaptation is enabled. GAIN ADJUST DISABLED indicates that autoadaptation will not attempt to make any gain adjustments to the system, but will continue to optimize the echo canceller performance. FULLY DISABLED indicates that Voicecrafter autoadaptation is fully disabled (no gain adjust and no changes to the echo cancellation process).

**SW Ver:** Displays current software version. By selecting F2 or F3, the latest training results, time connected to Voicecrafter, serial number in Hex, or Flash Checksum can be displayed.

### Config Memory

**Store:** Brings up the Store menu for storing Voicecrafter parameters. When STORE CONFIG? is displayed, select appropriate memory location for settings to be stored (F1~F5). When F1 has a configuration stored, the unit will recall F1 settings upon power up. Only Configuration Train settings will be saved (manual adjustments to Mic Gain and Speaker Gain will not be saved).

**Recall:** Brings up the Recall menu for recalling stored configuration presets (locations F1~F5).

**Erase:** Brings up the Erase menu for erasing stored configuration presets (locations F1~F5).

### Measurements

**DSP AVE:** Displays calculated average levels from the DSP (EC\_So, NLP\_So, Codec In, EC\_Si, EC\_Ri, VCR IN, AERL, and ERLE). Each time the DSP AVE button is pressed, a current average will be displayed.

**SEND Mon:** Displays current send speech level as calculated by autoadaptation.

**RCV Mon:** Displays current receive speech levels as calculated by autoadaptation.

**Noise:** Displays current status of the internal white noise generator. Noise can be turned on/off using F2⇐ or F3⇒.

### 5.3.3 NETWORK SCREEN

The NETWORK screen (see *Figure 5-3*) is used to adjust the Voicecrafter interface to external devices, such as Codec, VCR, or phone line.



*Figure 5-3. Network Screen*

#### Codec Port

**Input Offset:** The Input Offset Gain can be raised or lowered using F2⇐ and F3⇒. The CODEC/4-wire #1 Input Offset defaults to a factory preset gain of 0dB, and should be compatible with most external equipment or network interface levels. Input Offset Gain can be adjusted in cases where an atypical external interface level is required.

These adjustments to the CODEC Input Gain level are used to compensate for different audio signal levels from a Video CODEC or 4-wire network. The user should follow the audio signal level recommendations of the video codec manufacturer or network provider. In typical networks, this signal level is approximately 0dBm and will be within the operational capability of the Voicecrafter factory preset range. For example: if the audio signal level at the “CODEC IN” interface port is +6dBm, the CODEC Input Gain Offset can be adjusted to -6dB to compensate for the high input signal level. Conversely, the CODEC Output Gain should be adjusted to +6dB to ensure unity gain.

(\*Adj. Range = -12dB to +12dB)

Input Gain: Displays the 4-Wire or Codec Input Gain. Gain can be adjusted by pressing F2← or F3⇒.

Output Gain: Displays the 4-Wire or Codec Output Gain. Gain can be adjusted by pressing F2← or F3⇒.

### Aux Port

Mode: Displays current mode of the Aux port. Aux port can be configured for VCR mode or Bridged mode. Bridged mode allows both Aux In and Aux Out to be used simultaneously. VCR mode allows Aux In and Aux Out only to be used alternately. This avoids the problem of feedback which occurs between the input and output of a VCR.

Input Gain: Displays current Aux Input Gain. Gain can be adjusted by pressing F2← or F3⇒.

Output Gain: Displays current Aux Output Gain. Gain can be adjusted by pressing F2← or F3⇒.

VCR Mute: Displays current mute status of Aux In and Aux Out (while in VCR mode). In Bridged Mode, Voicecrafter will display “Bridged Mode” on the screen.

### 2-Wire Port (VC3010 and VC3011 only)

Hook: Displays current status of 2-wire port (On Line or Off Line). The 2-wire status can be changed by pressing F2← or F3⇒.

Input Gain: Displays current 2-Wire Input Gain. Gain can be adjusted by pressing F2← or F3⇒.

**DB9M Baud** - Allows baud rate of lower serial port (DB9M) to be changed. Change baud rate by pressing F2← or F3⇒.

### 5.3.4 DIAGNOSTIC SCREEN

The DIAGNOSTIC screen (see *Figure 5-4*) is for trouble shooting or fine tuning the Voicecrafter.

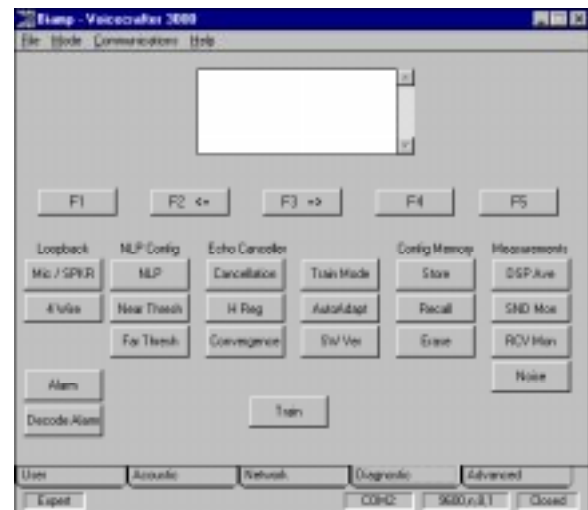


Figure 5-4. Diagnostic Screen

### Loopback

Mic/SPKR: Displays the current state of the microphone loopback. Pressing F2← or F3⇒ will cycle through the various loopback modes available. They are as follows:

**OFF** - No mic loopback occurs.

**MIC #1** - Mic #1 is looped back to Speaker output.

**MIC #2** - Mic #2 is looped back to Speaker output.

**MIC #1 & #2** - Mic #1 & Mic #2 looped back to Speaker output.

**4-Wire**: Displays the current state of the 4-Wire loopback. Pressing F2← or F3⇒ will cycle through the various loopback modes available. They are as follows:

**OFF** - No loopback process.

**CODEC LOOP** - CODEC IN signal is looped back to CODEC OUT.

**AUX/VCR LOOP** - Signal from AUX IN is looped back to AUX OUT (only when Bridged mode is selected).

**CODEC & AUX/VCR LOOP** - Both CODEC LOOP and AUX/VCR LOOP modes are selected.

**Alarm** - Displays current alarm status of the Voicecrafter. A display of Alarm 0x0000 indicates that no alarm condition exists. Latch indicates if an alarm has ever existed. The third line indicates the results of an EC ASIC test that is executed when Alarm is pressed. To clear a Latch, click F3 after Alarm is selected.

**Decode Alarm** - Displays the meaning of an alarm that has occurred.

### **NLP Config**

**NLP**: Displays current status of the NLP (Non-Linear Processor). NLP is enabled or disabled using F2← or F3⇒.

**Near Thresh**: Displays the current NLP near end noise setting. This setting is used to optimize the Non-Linear Processor for the ambient noise conditions of the room. The value of this setting can be changed using F2← or F3⇒. The available options are:

00min  
01weak  
02weak  
03weak  
04weak  
05normal (default)  
06strong  
07strong  
08strong  
09strong  
10Max

**Far Thresh**: This function has been obsolete.

### **Echo Canceller**

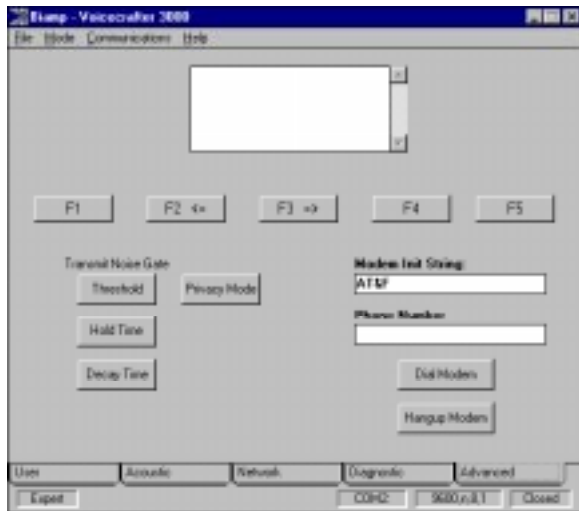
**Cancellation**: Displays current status of the echo canceller. The echo canceller is enabled or disabled using F2← or F3⇒.

**H-Reg**: Displays current status of the H-register. The H-register is enabled or disabled by using F2← or F3⇒.

**Convergence**: Displays current state of Convergence. Convergence is enabled or disabled using F2← or F3⇒.

### 5.3.5 ADVANCED SCREEN

The ADVANCED screen (see *Figure 5-5*) is used to make adjustments to the TNG (Transmit Noise Gate), and to the modem connection through the lower DB9M port.



*Figure 5-5. Advanced Screen*

#### Transmit Noise Gate

**Threshold:** This controls the EC\_Si (Echo Canceler Send Input) that activates the Noise Gate.

**Hold Time:** Displays the amount of time it takes for the noise gate to activate, once the room has become silent.

**Decay Time:** Displays how quickly the noise gate will suppress noise, once the room has become silent.

**Privacy Mode** - Defines what is muted when Mute or System Mute buttons are activated. Select Mic Only, or Mic and Speaker, using F2<=> and F3=>.

**Modem Init String** - If you are using the null-modem (lower) port to connect your Voicecrafter to a modem, you will need to enter the initialization string for your modem in the space provided.

**Phone Number** - Enter the destination phone number, in the space provided, for your modem to dial. (This does not dial out of the 2-wire interface.)

**Dial Modem** - Starts the modem dialing process.

**Hangup Modem** - Ends modem connection.

## 6. INSTALLATION

### 6.1 TOOLS

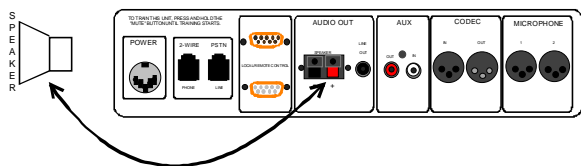
BIAMP Systems recommends using the SC-300 (User Control Interface software) when installing and setting up any Voicerafter product. In some applications a Hand-Held Terminal may be used instead. In order to achieve more accurate adjustment of the Voicerafter, it is also recommended that the following additional test and measurement tools be employed:

- 1) Sound Pressure Level meter, such as Extech model 407750.
- 2) White/pink noise source, with speaker and variable level.

In some installations it is useful to display levels within the Voicerafter. A third-party software program has been developed for this purpose. This program is available by contacting: Ed Lethert @ Ed Lethert Associates. Phone: (612) 545-0030

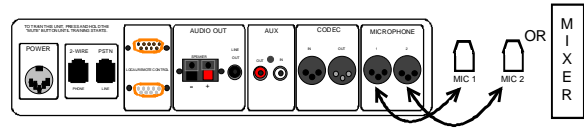
### 6.2 CONNECTIONS

**SPEAKER:** 5 Watts of power is available into a 4 ohm minimum speaker load. Wire the speaker positive to the Red (+) terminal, and wire the speaker negative to the Black (-) terminal.



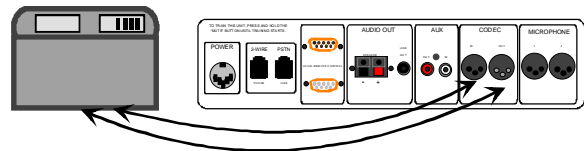
\*\*If connecting the Voicerafter to an external power amplifier (see paragraph 7.3).

**MICROPHONE:** Connect mics to XLR connectors labels MIC 1 and MIC 2 on the Voicerafter.



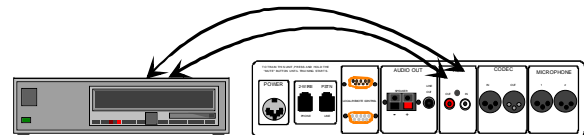
\*\*If connecting Voicerafter to an external microphone mixer (see paragraph 7.2).

**CODEC:** Connect Codec In to the output of a video codec or other transmission device. Connect Codec Out to the input of a video codec or other transmission device.



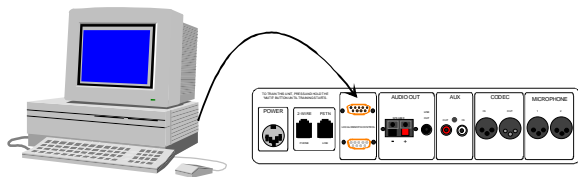
**AUX:** Aux can be configured for either VCR mode or Bridged mode (see User Control Interface).

**VCR MODE:** Connect Aux Out to input of VCR. Connect Aux In to output of VCR. VCR MUTE (NETWORK screen) will need to be switched to Play mode to hear the output of the VCR during a conference. VCR MUTE will need to be switched to Record mode in order to record a conference.

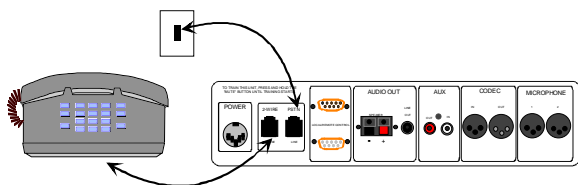


**BRIDGE MODE:** Connect Aux Out to the input of the device to be 'bridged' into the conference. Connect Aux In to the output of the device being 'bridged' into the conference.

**LOCAL / REMOTE CONTROL:** Connect computer to the upper DB9 (female) jack using a standard RS-232 serial cable connected to the appropriate comm port of your computer. Configure the SC-300 User Control Interface software for proper comm port settings, using the pull-down menu labeled COMMUNICATIONS.



**2-WIRE PSTN:** Connect telephone line to RJ11 jack labeled LINE. Connect a telephone handset or ringing device to RJ11 jack labeled PHONE.



\*\*2-Wire PSTN is provided only on models VC3010 or VC3011.

### 6.3 SETUP

1. Place external white/pink noise source approximately 6 inches away from microphone.
2. Enable High pass filter on Mics if available. (Eliminating the low frequency signals produces better training results).

3. Place a sound pressure level meter (SPLM) at the microphone location. Adjust noise source level until SPLM measures 72dB.\*
4. Using the SC-300 User Control Interface software, go to the ACOUSTIC screen and click on DSP AVE. Click on F3⇒ until EC\_Si is displayed.
5. Click on AutoAdapt, then click F3⇒ until FULLY DISABLED is displayed.
6. Adjust Mic Gain (Using F2⇐ and F3⇒) until EC\_Si of approximately -20dB is displayed. EC\_Si is a momentary reading, and is only updated by clicking DSP AVE again.
7. After the correct EC\_Si and mic gains are established, Click on MIC Default and click F2⇐ or F3⇒ until Mic Default is equal to established Mic Gain. If Configuring Mic 2 input for an external microphone mixer, see Connecting External Equipment.

(\*If an external noise source is not available, click on AutoAdapt (ACOUSTIC screen), and use F3⇒ to select FULLY DISABLED. Then, click on Noise and click F3 to enable noise. Select Speaker Gain and use F2⇐ or F3⇒ to adjust for a 72dB reading on the SPLM at the microphone location. Complete the Setup procedure, as described above. Then, set AutoAdapt back to FULLY ENABLED.)

On the ACOUSTIC Screen, click on the button labeled TRAIN and click on F3 when prompted. This will begin a Configuration Train cycle.

**End of setup procedure**



## 7. CONNECTING EXTERNAL EQUIPMENT

### 7.1 INTRODUCTION

This chapter describes the procedure for installing and configuring external equipment for use with the Voicecrafter. The Voicecrafter supports the use of an external microphone mixer and/or an external power amplifier. An external microphone mixer is required when providing more than two microphones. An external power amplifier is required when providing distributed loudspeaker systems. Both an external mixer and an external amplifier are required when sound reinforcement of the local microphones is desired.

### 7.2 EXTERNAL MIXER WITHOUT LOCAL REINFORCEMENT

An external microphone mixer is required when more than two microphones are to be used. Mic 2 of the Voicecrafter is capable of accepting a signal from an external microphone mixer. (If sound reinforcement of local mics is desired, refer to paragraph 7.4.)

#### 7.2.1 INSTALLATION

The Mic 2 input must be configured for a line level input. Click on Input Mode under Mic 2 (ACOUSTIC screen). Use F3⇒ to select Line Input (Balanced or Un-balanced depending on mixer used).

The output of the external mixer should be connected to the Voicecrafter Mic 2 input (+ to pin 3, - to pin 2, and ground to pin 1) using 2-conductor shielded cable. Microphones are then connected to the inputs of the external mixer.

#### 7.2.2 CALIBRATION

The external mixer needs to be calibrated for the nominal level expected at the Mic 2 input of the Voicecrafter (VC3000 & VC3010 = -35dBm; VC3001 & VC3011 = 0dBm). Use the following procedure to calibrate the external mixer:

1. Apply power to the Voicecrafter and the external mixer. If Voicecrafter should attempt to train, wait for train cycle to complete before continuing.
2. Use a white/pink noise source to direct noise at one of the microphones. The Voicecrafter white noise generator may be used for this calibration. To enable the internal white noise generator, click on the Noise button (ACOUSTIC screen) and use F3⇒ to set white noise to ENA (enable).
3. Use a sound pressure level meter to measure the noise level at the microphone.
4. Adjust the level of the noise source so that the sound pressure level at the microphone is 72dB. If the Voicecrafter is being used as the white noise source, the noise level can be adjusted by clicking AutoAdapt (ACOUSTIC screen) and using F3⇒ to select FULLY DISABLED. Then click on the Speaker Gain button and use F2⇐ and F3⇒ to adjust gain levels.
5. Measure the DSP Gain EC\_Si. To do this: click on the DSP AVE button



(ACOUSTIC screen). Use F2⇐ or F3⇒ to display EC\_Si. EC\_Si is a momentary reading, and is only updated by clicking DSP AVE again.

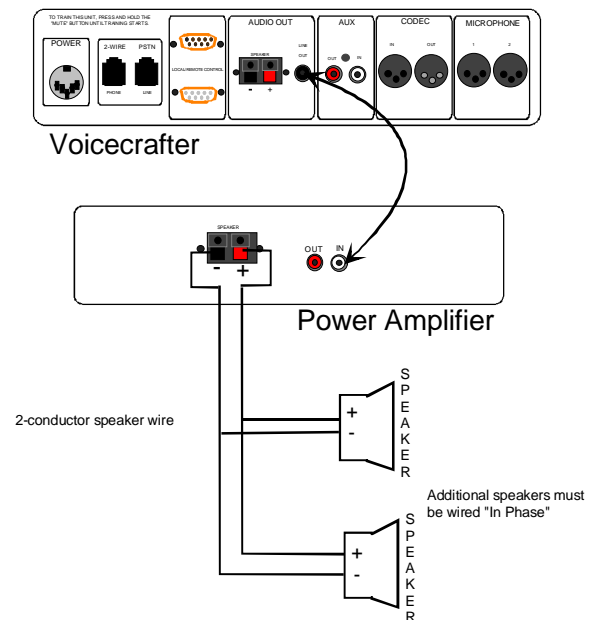
6. Adjust the external mixer output for nominal level (see paragraph 7.2.2). Then adjust Mic 2 Gain (ACOUSTIC screen) so that the average EC\_Si is approximately -20dB. Repeat steps 2~5 for all mics in the installation. Once Mic 2 Gain is established, level adjustments should be made only at the individual inputs of the mixer.
7. After all mics are calibrated, click on Mic 2 Default Gain and use F2⇐ and F3⇒ to make Mic 2 Gain equal Mic 2 Default Gain. Turn the white noise source off. If the Voicerafter is being used as the white noise source, click on Noise and use F3⇒ to set white noise to DIS (disable) Then set Autoadapt back to FULLY ENABLED.
8. If an external amplifier is to be provided, as well as an external mixer, refer to paragraph 7.3.
9. Train the Voicerafter. Click the Train button (ACOUSTIC screen) and click on F3⇒ when prompted, to begin a Configuration Train cycle.
10. Once acceptable training responses have been achieved (see paragraph 4.3), store the resulting configuration by clicking on the Store button (ACOUSTIC Screen) followed by the desired memory location (F1~F5).

### 7.3 EXTERNAL AMPLIFIER WITHOUT LOCAL REINFORCEMENT

The Voicerafter has a line level audio output that is capable of driving external power amplifiers. This line level output is provided on a rear panel RCA jack labeled LINE OUT.

#### 7.3.1 INSTALLATION

Connect LINE OUT to the input of the external amplifier. Connect the external amplifier to the loudspeakers that are to be used. When more than one loudspeaker is to be used, they should be wired *in phase* (loudspeakers wired out of phase will cause acoustic dead zones in the conference room). For distributed loudspeaker systems (25V, 70V, 100V), the external amplifier will require proper interface for the constant voltage system which is to be installed. **\*\*The Voicerafter internal amplifier is not capable of interfacing to distributed speaker systems.**



### 7.3.2 CALIBRATION

The external amplifier needs to be calibrated for the output level expected by the Voicecrafter. Use the following procedure to calibrate the amplifier:

1. Adjust amplifier for low output level. Apply power to the Voicecrafter and the external amplifier. If Voicecrafter should attempt to train, wait for Train cycle to complete before continuing.
2. Click on AutoAdapt (ACOUSTIC screen) and use F3⇒ to select FULLY DISABLED. Then activate the Voicecrafter white noise generator by clicking on the Noise button (ACOUSTIC screen). Use F3⇒ to set white noise to ENA (enable). At this point, white noise (hiss) should be audible from the loudspeakers. If not, check amplifier level, speaker wiring, and power. (The Receive LED on the Voicecrafter will be green when white noise is being generated.)
3. Adjust the Voicecrafter loudspeaker volume to -10dB. To do this, click on Speaker Gain button (ACOUSTIC screen) and use F2⇐ and F3⇒ to adjust gain levels.
4. Using a sound pressure level meter, measure the noise level at the conference room table. The sound level should be measured at a typical listening position for a conference participant.

5. Adjust the gain of the external amplifier so that a sound pressure level of 72dB is produced at the sound pressure level meter.
6. Disable the Voicecrafter white noise generator by clicking on the Noise button (ACOUSTIC screen) and using F3⇒ to set white noise to DIS (disable). Set AutoAdapt to FULLY ENABLED.
7. Train the Voicecrafter. Click on the Train button (ACOUSTIC screen) and click on F3⇒ when prompted to perform a Configuration Train cycle.
8. Once acceptable training responses have been achieved (see paragraph 4.3), store the resulting configuration by clicking on the Store button (ACOUSTIC Screen) followed by the desired memory location (F1~F5).

### 7.4 EXTERNAL MIXER AND AMPLIFIER WITH LOCAL REINFORCEMENT

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.

### 7.4.1 INSTALLATION

Connect a 'mix-minus' output of the mixer (containing only near end signals) to the Mic 2 input of the Voicecrafter. Connect Line Out of the Voicecrafter to an auxiliary or un-used input of the mixer. Connect a 'composite' output of the mixer (containing both near end and far end signals) to the input of the amplifier. Configure Mic 2 for line level input by Clicking on Input Mode under Mic 2 (ACOUSTIC screen). Use F3⇒ to select Line Input (Balanced or Un-balanced depending on the mixer used).

### 7.4.2 CALIBRATION

Both the external mixer and amplifier need to be calibrated for nominal levels expected by the Voicecrafter. The external mixer needs to be calibrated for nominal level expected at Mic 2 input (VC3000 & VC3010 = -35dBm; VC3001 & VC3011 = 0dBm). Use the following procedure to calibrate the external mixer and amplifier:

1. Use a white/pink noise source to direct noise at one of the microphones. The Voicecrafter white noise generator may be used for this calibration. To do so, first Click on AutoAdapt (ACOUSTIC screen) and use F3⇒ to select FULLY DISABLED. Then, enable the internal white noise generator by clicking on the Noise button (ACOUSTIC screen). Use F3⇒ to set white noise to ENA (enable).

2. Use a sound pressure level meter to measure the noise level at one of the microphone locations.
3. Adjust the level of the noise source so that the sound pressure level at the microphone is 72dB. If the Voicecrafter is being used as the white noise source click on the Speaker Gain button and use F2⇐ and F3⇒ to adjust gain levels.
4. Measure the DSP Gain EC\_Si. To do so, click on the DSP AVE button (ACOUSTIC screen). Use F2⇐ or F3⇒ to display EC\_Si. EC\_Si is a momentary reading, and is only updated by clicking DSP AVE again.
5. Adjust the external mixer output for nominal level (see paragraph 7.4.2), and then adjust Mic 2 Gain (ACOUSTIC screen) so that the average EC\_Si is approximately -20dB. Repeat steps 1~4 for all mics in the installation. Once Mic 2 Gain is established, level adjustments should be made only at the individual inputs of the mixer.
6. After all of the mics are calibrated, turn the white noise source off. If the Voicecrafter is being used as the white noise source, click on Noise and use F3⇒ to set white noise to DIS (disable).

7. Activate the Voicecrafter white noise generator by clicking on the Noise button (ACOUSTIC screen). Use F3⇒ to set white noise to ENA (enable). At this point, white noise (hiss) should be audible from the loudspeakers. If not, check amplifier level, speaker wiring, and power. (The Receive LED on the Voicecrafter will be green when white noise is being generated.)
8. Adjust the Voicecrafter loudspeaker volume to -10dB. To do so, first click on AutoAdapt (ACOUSTIC screen) and use F3⇒ to select FULLY DISABLED. Then, click on the Speaker Gain button and use F2⇐ and F3⇒ to adjust gain levels.
9. Using a sound pressure level meter, measure the noise level at the conference room table. The sound level should be measured at a typical listening position for a conference participant.
10. Adjust the level of the external amplifier and/or the mix-minus output of the external mixer which is feeding the amplifier, so that 72dB is measured at the sound pressure level meter.
11. Disable the Voicecrafter white noise generator by clicking on the Noise button (ACOUSTIC screen) and using F3⇒ to set white noise to DIS (disable). Then set AutoAdapt back to FULLY ENABLED.
12. Train the Voicecrafter. Click on the Train button (ACOUSTIC screen) and click on F3⇒ when prompted to begin a Configuration Train cycle
13. Once acceptable training responses have been achieved (see paragraph 4.3), store the resulting configuration by clicking on the Store button (ACOUSTIC Screen) followed by the desired memory location (F1~F5).

## 8. TROUBLESHOOTING

### 8.1 INTRODUCTION

If you encounter problems getting the system to perform as expected, these troubleshooting tips should be helpful.

### 8.2 SYMPTONS AND ACTIONS

#### 8.2.1 IF YOU CAN'T HEAR THE FAR END

1. Check that the speaker cable is attached correctly.
2. Have the far end check microphone inputs for proper connections.
3. Have far end ensure that mics are not muted (either at Vocecrafter or external mixer).
4. Check Voicerafter for System Mute at either near end or far end.
5. Verify that the video codec (if any) is not muted.

#### 8.2.2 IF THE FAR END CAN'T HEAR YOU

1. Check all microphone inputs.
2. Ensure that mics are not muted (either at Voicerafter or external mixer).
3. Have the far end verify that their speakers are properly attached.
4. Verify that the video codec (if any) is not muted.

#### 8.2.3 ALL CASES

1. Check the lights on the front panel of the Voicerafter. The send LEDs should flash when someone is speaking. This light activity can be used as a general indication that the Voicerafter is working.

#### 8.2.4 POOR PERFORMANCE AFTER INSTALLATION

1. Train again, listening for improved performance.
2. Check wiring to/from Voicerafter.
3. Ensure that proper settings for the microphones have been selected.
4. Check mic orientation: be sure they are facing away from loudspeakers.
5. Ensure that mics are located at least 4 feet from the loudspeakers.
6. Consult the codec manual for nominal codec input/output levels (VC3000 and VC3010 = -20dBm; VC3001 and VC3011 = 0dBm).  
\*\*If lower levels are required, decrease Codec Out and Increase Codec In Offset Gain by equal amounts. If higher levels are required, increase Codec Out, and decrease Codec Input Offset Gain by equal amounts (NETWORK screen). There is a 12dB adjustment range on codec transmission levels).
7. Verify that loudspeakers and wiring provide a minimum load of 4 ohms, when using the internal amplifier. Loudspeakers should be wired in phase to avoid acoustic dead zones.

#### 8.2.5 THIN VOICE QUALITY AT THE FAR END

1. Try increasing bass settings on far end mics (watch for signal or echo canceling degradation).
2. Position far end mics closer to participants.

3. Consider the possibility of adding more far end mics, or placing mics closer to conference participants.  
\*\*Lower mic levels, or use of an automatic mixer, will help to limit the transmission of added room noise.
4. Consider installing or adding to the existing room acoustic treatment.

### 8.2.6 POOR PERFORMANCE IN THE MORNING

1. Train, or save a configuration into F1 memory location so that the Voicecrafter will recall a saved configuration upon power-up.

### 8.2.7 PERFORMANCE DEGRADATION AFTER CONTINUOUS USE

1. Have the far end keep talking (without near end speech) so that the Voicecrafter can converge.
2. Train.

### 8.2.8 ABRUPT POOR PERFORMANCE

1. Check microphones to ensure proper positioning.
2. Continue conference momentarily. Voicecrafter will attempt to correct itself during incoming speech (from the far end).
3. Train again.

### 8.2.9 ECHO AT THE FAR END

1. Point any directional mics away from the loudspeakers.
2. Reduce local ambient noise.

3. If the Voicecrafter is set at moderate loudspeaker volume levels:
  - Option 1:** Adjust NLP Near End Noise preset (DIAGNOSTIC screen).
  - Option 2:** Train with mic in bass cut position.
  - Option 3:** Add acoustic treatment.
4. If high local loudspeaker volume:
  - Option 1:** Increase AERL Target by 2~4dB; Train (ACOUSTIC screen).
  - Option 2:** Adjust NLP preset (DIAGNOSTIC screen).
  - Option 3:** Train with mic in bass cut position.
  - Option 4:** Add acoustic treatment.

### 8.2.10 CLIPPING AT THE FAR END DURING DOUBLE TALK

1. Make sure the far end directional mics are facing away from the loudspeaker(s).
2. Reduce far end ambient noise.
3. If high local loudspeaker volume:
  - Option 1:** Increase AERL Target by 2~4dB; Train (ACOUSTIC screen).
  - Option 2:** Adjust NLP preset (DIAGNOSTIC screen).
  - Option 3:** Train with far end mic in bass cut position.
  - Option 4:** Add room acoustic treatment at the far end.
4. If moderate local loudspeaker volume:
  - Option 1:** Adjust NLP preset (DIAGNOSTIC screen).
  - Option 2:** Add acoustic treatment.

### 8.2.11 CLIPPING AT THE NEAR END DURING DOUBLETALK

1. Follow the procedure discussed in paragraph 8.2.10 for the Voicecrafter at the far end.

### 8.2.12 LOCAL DISTORTION

1. Verify that loudspeakers and wiring provide a minimum load of 4 ohms, when using the internal amplifier.
2. Reduce far end noise. If the Receive LED turns amber during distorted far end speech, then the Voicecrafter is being overdriven by the codec. Adjust the Codec Input Gain Offset by clicking the Input Gain Offset button under Codec (NETWORK screen), and using F2← and F3⇒ to change gain settings.

### 8.2.13 THIN VOICE QUALITY AT THE NEAR END

1. Try increasing bass setting on near end mics (watch for training/echo cancellation degradation).
2. Position near end mics closer to participants.
3. Consider the possibility of adding more near end mics, or placing mics closer to conference participants.  
\*\*Lower mic levels, or use of an automatic mixer, will help to limit the transmission of added room noise.
4. Consider installing or adding to the existing room acoustic treatment.

### 8.2.14 HIGH AMBIENT ROOM NOISE TRANSMITTED TO FAR END

1. Reduce local ambient noise.
2. Position microphones closer to conference participants.
3. If necessary, increase the number of near end mics to provide better coverage, then decrease near end Mic Gain (DIAGNOSTIC screen).

## 8.3 REASONS FOR ADJUSTMENT

### 8.3.1 MIC GAIN SETTING

Symptoms:

- High ambient room noise.
- Low ambient room noise, moderate room treatment.

Adjustments:

- Select the Mic Gain adjustment function by clicking Mic 1 Default or Mic 2 Default on the User Control Interface software (ACOUSTIC screen). Use F2← or F3⇒ to change gain settings, then Train.

### 8.3.2 MIC EQ SETTINGS - BASS CUT/FLAT/BOOST

Some microphones have an equalization switch allowing bass boost, flat, or cut settings. When this is the case the proper setting can affect overall performance.

Symptoms and Adjustments:

- If far end sound quality is too thin - try bass flat or boost.
- If far end sound quality is too muddy or bassy - try bass flat or cut.
- If Voicecrafter trains poorly as indicated by echo, distortion, or poor ERLE (less than 7) after training - the bass cut setting may improve training and overall performance.

### 8.3.3 WIRE SEND AND RECEIVE LEVELS

Symptom:

- Distortion on the loudspeaker signal at high volume far end speech.

Adjustment:

- Any codec or CLI with nominal audio levels greater than -20dB (when used with models VC3000 or VC3010) or 0dB (when used with models VC3001 or VC3011) may require adjustment of Voicecrafter Codec levels. To accommodate for a higher transmission level, Codec Input Gain Offset is decreased and Codec Output Gain is increased. To accommodate for a lower transmission level, Codec Input Gain Offset is increased, and Codec Output Gain is decreased.

### 8.3.4 ACOUSTIC ECHO RETURN LOSS TARGET (AERL)

The Voicecrafter will train based on a target AERL setting. The default setting is 10dB.

Symptoms and Adjustments:

- Large room where excessive loudspeaker volume, echo, and/or distortion are present after training - increase AERL target, and Train.
- Small, highly reverberant room where volume is too low - decrease AERL target, and Train.

\*\*The AERL target is adjusted by clicking AERL (ACOUSTIC screen), and using F2← or F3⇒ to change settings.



## 9. DTMF DIALING & BTV MODE

### 9.1 DTMF DIALING

The following tables list the s-Commands and t-Commands that support the Voicecrafter two-wire dialing feature. The Voicecrafter is capable of dialing the full set of DTMF digits (0-9, A-D, \*, and #). The DTMF digits A, B, C and D are not normally included on standard telephone sets. These digits are used by some communication systems for auxiliary signaling. DTMF commands can be initialized through third-party controllers or by entering the ASCII commands in the dialog box at the top of the SC-300 User Control Interface software screen.

**Table 9-1. Dial Mode s-Commands**

Command	HEX Bytes	ASCII Bytes
Dial '1'	0x73 0x63 0x6C	'scl'
Dial '2'	0x73 0x64 0x6C	'sdl'
Dial '3'	0x73 0x65 0x6C	'sel'
Dial 'A'	0x73 0x66 0x6C	'sfl'
Dial '4'	0x73 0x63 0x6D	'scm'
Dial '5'	0x73 0x64 0x6D	'sdm'
Dial '6'	0x73 0x65 0x6D	'sem'
Dial 'B'	0x73 0x66 0x6D	'sfm'
Dial '7'	0x73 0x63 0x6E	'scn'
Dial '8'	0x73 0x64 0x6E	'sdn'
Dial '9'	0x73 0x65 0x6E	'sen'
Dial 'C'	0x73 0x66 0x6E	'sfn'
Dial '*'	0x73 0x63 0x6F	'sco'
Dial '0'	0x73 0x64 0x6F	'sdo'
Dial '#'	0x73 0x65 0x6F	'seo'
Dial 'D'	0x73 0x66 0x6F	'sfo'
Hook Flash	0x73 0x63 0x70	'scp'
Connect Two Wire	0x73 0x6A 0x6D	'sjm'
Hold Two Wire	0x73 0x6B 0x6D	'skm'
Hang Up Two Wire	0x73 0x6C 0x6D	'slm'

**Table 9-2. Dial Mode t-Commands**

Description	Command (XX)	Values (yyyy)	
DTMF Mix	0xEC	0x00	Setting this parameter to zero disables the DTMF Mix feature.
		0x01 - 0xFFFF	Setting this parameter to a non-zero value enables the DTMF Mix Feature. Any DTMF tones generated will be audible in the conference mix.
DTMF Pause	0xED	0x10 - 0x0100	This parameter controls the length of the pause that is inserted between sequential DTMF digits during dialing.
DTMF Duration	0xEE	0x10 - 0x0100	This parameter controls the length of the DTMF tone generated for each digit dialed.
DTMF Attenuation	0xEF	0xFF00 - 0xFFFFD	This parameter controls the signal level of the DTMF tones that are generated and transmitted to the Two Wire Interface. The value 0xFFFFD sets the DTMF level to maximum. The value 0xFF00 sets the DTMF level to the minimum. Each step between the maximum and minimum is a 6dB increment.
Dial Mode	0xF0	0x00	Setting this parameter to zero sets the Voicerafter dialing mode to DTMF dialing.
		0x01 - 0xFFFF	Setting this parameter to any non-zero value sets the Voicerafter dialing mode to Pulse Dialing mode.

The t-Command string consists of a lower case ‘t’, followed by the command (xx), followed by a value (yyyy), and then a checksum of the previous characters in hex.  
Examples: DTMF Mix enable = tEC0001BD; DTMF Mix Disable = tEC0000BC.

**9.2 BTV MODE**

The following table lists the t-Commands that support the Business Television Mode.

**Table 9-3. BTV Mode t-Commands**

Description	Command (xx)	Values (yyyy)	Function
BTV Mode	0xEA	0x00	Setting this parameter to zero disables the BTV Mode feature.
		0x01	Setting this parameter to 0x0001 will put the Voicerafter into the BTV CENTRAL mode. This will cause the Two Wire Transmit port to be muted. It will also prevent the Two Wire Receive audio from being re-transmitted to the Codec Transmit port.
		0x02	Setting this parameter to 0x0002 will put the Voicerafter into the BTV REMOTE mode. This will prevent the Codec Receive Audio from being re-transmitted to the Two Wire Interface.

# 10. SPECIFICATIONS

<b>Product Specifications for VOICECRAFTER 3000, 3010, 3001, 3011</b>	<b>Audio</b>	
	Frequency Response:	50Hz~7200Hz (wideband), 300Hz~3400Hz (narrowband) Supports ITU-T recommendations G.711, G.722 and G.728 audio modes.)
	Harmonic Distortion:	Referenced to 1kHz at 0dBm
	Line Level ports:	1.5% maximum
	Power Amplifier Output:	1% maximum
	Dynamic Range:	+3dBm to -60dBm minimum
	Linear A/D and D/A Conversion:	16-bit
	<b>Echo Control</b>	
	Convergence Time:	250 mSec maximum
	Number of Coefficients:	4096
	Acoustic Tail Length (Memory):	270 mSec
	Center Clipper (NLP):	Adaptive
	Acoustic Echo Return Loss (AERL):	0dB minimum
	Echo Return Loss Enhancement (ERLE):	65dB minimum, with non-linear processor enabled, with -20dBm and 6dB AERL
<b>Input and Output Interfaces for VOICECRAFTER 3000, 3010, 3001, 3011</b>	VOICECRAFTER 3000:	4-wire, 1 XLR connector and 1 RCA connector set
	VOICECRAFTER 3010:	Same configuration as Voicecrafter 3000, plus 2-wire, 1 (RJ11) jack set (for POTS line and touchtone telephone)
	VOICECRAFTER 3001:	Same configuration as Voicecrafter 3000, except CODEC In/CODEC Out interfaces support receive and transmit signal levels of 0dBm nominal
	VOICECRAFTER 3011:	Same configuration as Voicecrafter 3010, except CODEC In/CODEC Out interfaces support receive and transmit signal levels of 0dBm nominal
	Speaker Output:	5 watt, 4 or 8 ohms (SPL 3 feet from speaker equals 90dBA at maximum volume)
	Line Output:	1 auxiliary RCA connector set
	Idle Noise:	20dBmc at unity gain or -70dBmOp
	Microphone Inputs:	
	Mic 1 or Mic 2 (Mic Level):	XLR 600 ohms balanced inputs
	Mic 2 (Line Level):	10k ohms balanced or unbalanced input (software selectable)
	Nominal Mic Level:	-55dBm
	External Mixer Inputs:	High impedance 10k ohms balanced or unbalanced line level input via Mic 2 XLR connector (software selectable)
	Nominal Line Level: Unbal. and Bal.	
	VOICECRAFTER 3000 & 3010:	-35dBm
	VOICECRAFTER 3001 & 3011:	0dBm (+18dBm peak)
	CODEC In & Out	
	VOICECRAFTER 3000 & 3010:	-20dBm
	VOICECRAFTER 3001 & 3011:	0dBm (+18dBm peak)
	Note:	For VOICECRAFTER 3001 & 3011, Mic 2 can only be configured for line level and should be used for direct connection of a mic mixer
	Phantom Power Output:	Mic 1 or Mic 2 at Mic Level: 12 VDC, 2 mA max.
	Auxiliary Input:	10k ohms balanced line level input, RCA connector
	Auxiliary Output:	600 ohms balanced line level output, RCA connector
	User Control Interface:	2 RS-232C DB 9 connectors (1 male DCE, 1 female DTE)
	Physical Dimensions:	11.25" x 10" x 1.75"
	Weight:	4.4 lbs.
	Warranty:	five years

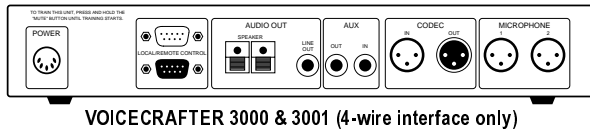


Figure 10-1. Voicecrafter 3000 & 3001 rear panel diagram

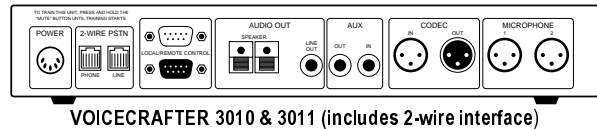


Figure 10-2. Voicecrafter 3010 & 3011 rear panel diagram

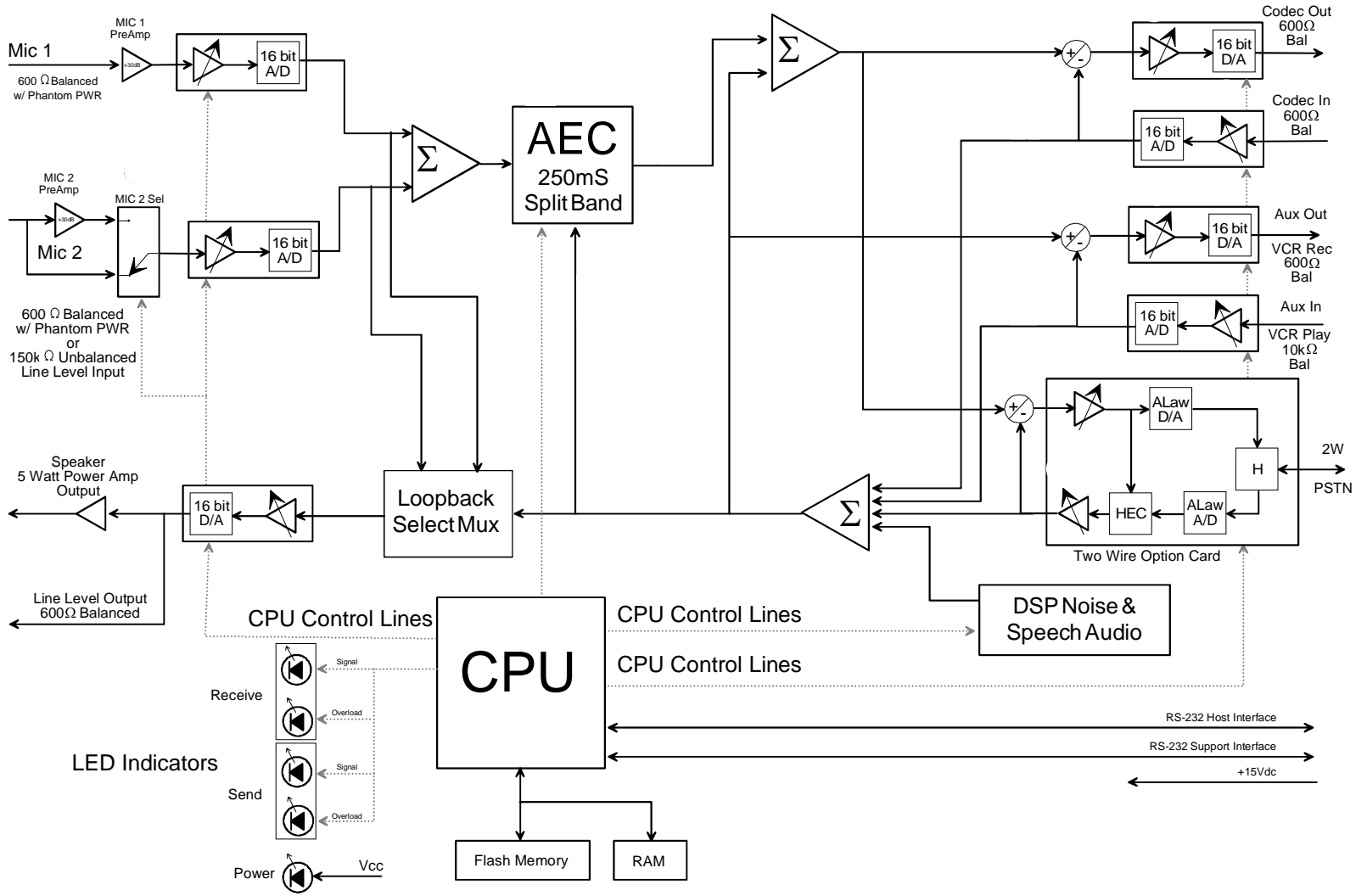


Figure 10-3. Voicecrafter 3000 Block Diagram

## 11. GENERAL INFORMATION

### 11.1 GLOSSARY OF ECHO CANCELING TERMS

Acoustic Coupling - Loudspeaker signal which is picked up by the microphone(s).

Acoustically Dead - A conference room environment with surfaces which reflect very little sound. Such environments contain surfaces such as sound absorbing panels, curtains, carpeting, etc.

Acoustic Echo Return Loss (AERL) - The amount of signal attenuation which occurs naturally between the loudspeaker and the microphone(s).

Ambient Noise - Background noise in the conference room environment due to air conditioning/heating equipment, factory noise, highway noise, etc.

Barrel Effect - A 'hollow' sounding signal, caused by microphones picking up signal which is reverberating within a room.

Bassy - Pronounced signal strength in the lower frequency ranges.

Bridge – Interconnection of conference systems from multiple locations.

Clipping - Signal which is incomplete due to portions being cut in the process of transmission.

Codec - A device which produces a coded output from an analog input and vice versa.

Convergence – Echo canceller adaption to changes in the conference environment.

Dead Zone - The area in a conference room not covered by a microphone, because it is outside the active pickup pattern of the microphone.

Disable - To turn off.

Double Talk - Speech which occurs simultaneously at more than one conference location at the same time.

EC ASIC - A proprietary, integrated circuit that performs echo cancellation.

Echo - Signal coupling which occurs between loudspeakers and microphones located within the same conference room.

Echo Canceller - An adaptive filter that is capable of recognizing echo, on a transmission line, and subtracting it from the near end speech signal.

Echo Return Loss Enhancement (ERLE) - The attenuation applied to the echo signal, by the adaptive filter of the echo canceller.

Enable – To turn on.

EQ Setting - Refers to the switch, available on many conference microphones, which boosts and/or cuts select frequencies.

Far End - A remote or distant site, located at the opposite end of a conference transmission line.

Gain - Volume.

Near End - The local site on a conference transmission line.

Non-Linear Processor (NLP) - Device providing cancellation of residual echo on the outgoing conference signal.

Tail Length - The amount of time it takes for a signal to propagate from the echo canceller receive out port, and return back to the send in port, as an echo.

Transmission Delay - The amount of time for a signal to travel from a far end site to a near end site.

## 11.2 ACRONYMS, ABBREVIATIONS AND SYMBOLS

A	-	Amperes
AERL	-	Acoustic Echo Return Loss
ASIC	-	Application Specific Integrated Circuit
AUX	-	Auxiliary
BW	-	Bandwidth
CLR	-	Clear
CPU	-	Central Processing Unit
DSP	-	Digital Signal Processor
DIS	-	Disable
DOC	-	Department of Commerce
EC	-	Echo Cancellor
EC_Ri		Echo Cancellor Receive Input
EC_Si		Echo Cancellor Send Input
EC_So		Echo Cancellor Send Output
ENA	-	Enable
EQ	-	Equalization
ERLE	-	Echo Return Loss Enhancement
FCC	-	Federal Communications Commission
NLP_So		Non-Linear Proceessor Send Output

HHT - Hand-Held Terminal

RCV - Receive

Hz - Hertz

SND - Send

LED - Light Emitting Diode

V - Volts

kHz - Kilohertz

VDC - Volts Direct Current

mSec - Milliseconds

W - Watts

NLP - Non-Linear Processor

Ω - Ohms

PC - Personal Computer

RAM - Random Access Memory

# WARRANTY

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## 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's 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.

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

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# WARNING

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## FCC COMPLIANCE

**WARNING:** Changes or modifications to these units not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTE:** This equipment has been test and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment generates, uses and radiates radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

**Shield cables must be used with these units to ensure compliance with the Class A FCC limits.**

## DOC COMPLIANCE

"This digital apparatus does not exceed the (Class A) limits for radio noise and emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications."

"Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques (de la Class A) prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada."

# EQUIPMENT ATTACHMENT LIMITATIONS

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**NOTICE:** The Canadian Department of Communications label identifies certified equipment. This certification means that it meets certain telecommunications, network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the users 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. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). 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 made by an authorized Canadian maintenance facility 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.

The user 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.