# TECH NOTE

CALIBRATING A CONVERGE PRO SYSTEM
FOR OPTIMAL PERFORMANCE

OVERVIEW

Good calibration of the various audio channels in any ClearOne CONVERGE Pro system is essential to the proper functioning of all audio processing throughout the system. A poorly calibrated system can result in echo on the far end of a teleconference call, and choppy audio into the conference room, even when other settings are correct. It can also cause other problems, such as audio distortion, poor microphone auto gating, and poor Automatic Level Control (ALC).

## OPTIMIZING GAIN FOR MICROPHONE INPUT CHANNELS

1. Open the channel tab and select the mic input that you want to optimize on the tree view tab (as shown below).
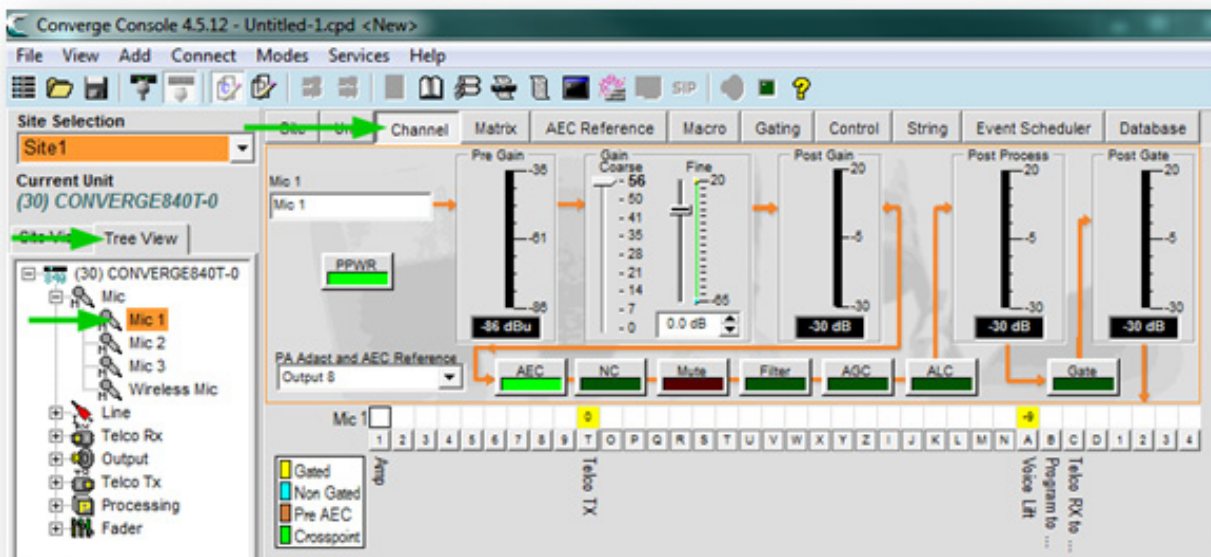
» **NOTE:** If this mic is a wireless mic, be sure to turn off phantom power ("PPWR")
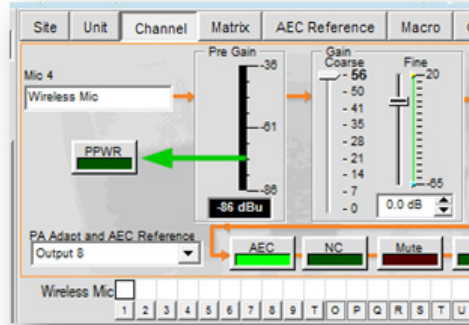
2. Have someone speak at a normal, conversational level, at around 12 inches from the microphone.

3. Adjust the coarse gain slider until the peaks on the post gain meter are close to +6dB (just hitting yellow), and the average level is close to 0dB.
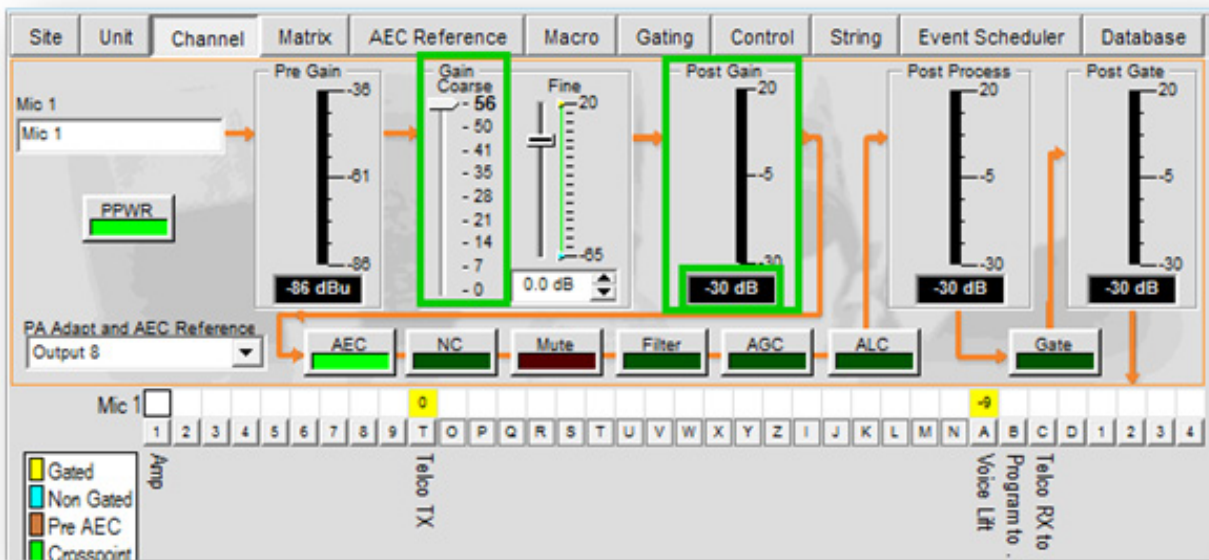
4. Adjust the fine gain slider until the peaks on the post gain meter are as close to +6dB and the average level is as close to 0dB as possible.
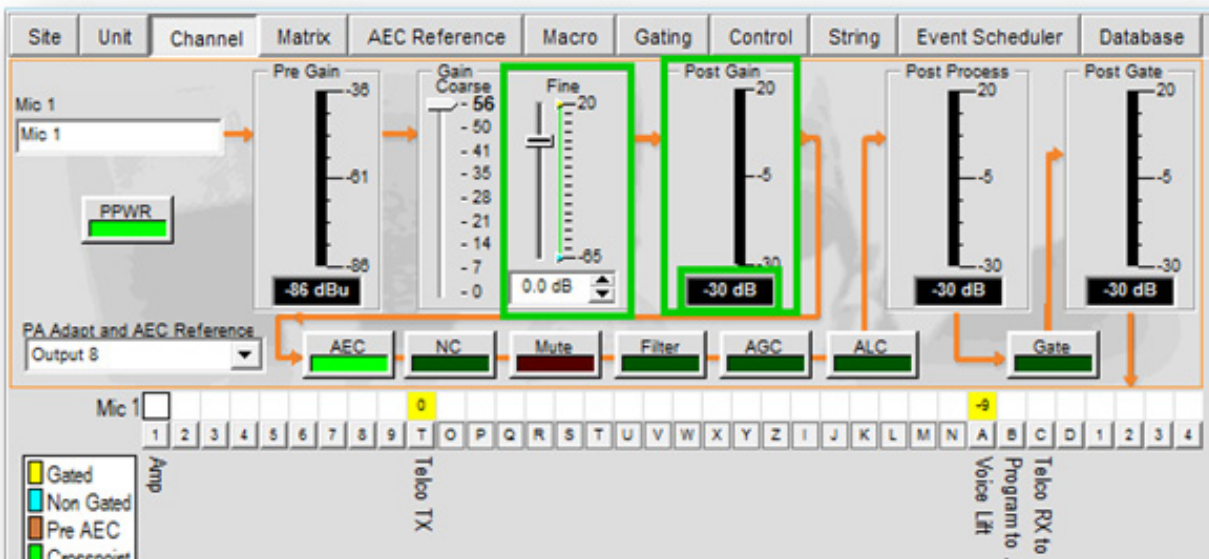
5. Repeat the above steps for each mic input in the venue.

   » **NOTE:** The post gain meter is a peak meter. If it peaks into the red, clipping occurs, resulting in audio distortion. If the meter remains green, the level may be too low. This approach to gain structure, sometimes called unity gain, should be followed on all channels throughout a CONVERGE Pro system. Also note that on mic inputs, it is better to err on the side of audio that is a little low than audio that is too hot.

OPTIMIZING GAIN FOR TELCO RX CHANNELS

Optimize telco RX inputs using the same procedure as mic inputs, with the following additional considerations. (Please refer to the screen shot below)

1. On a properly configured phone line, the receive input meter should show good levels (+6dB). If the levels are too low, put a check in the receive boost check box and increase the receive boost as needed.
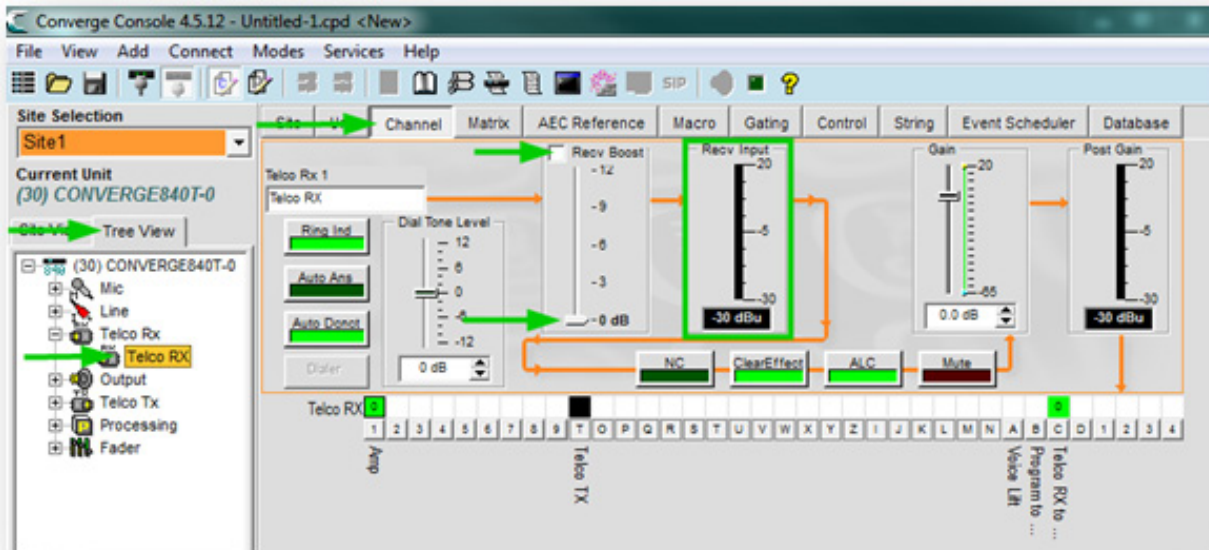
2. Then adjust the gain slider as needed to ensure that the post gain meter shows good levels (+6dB) as well.
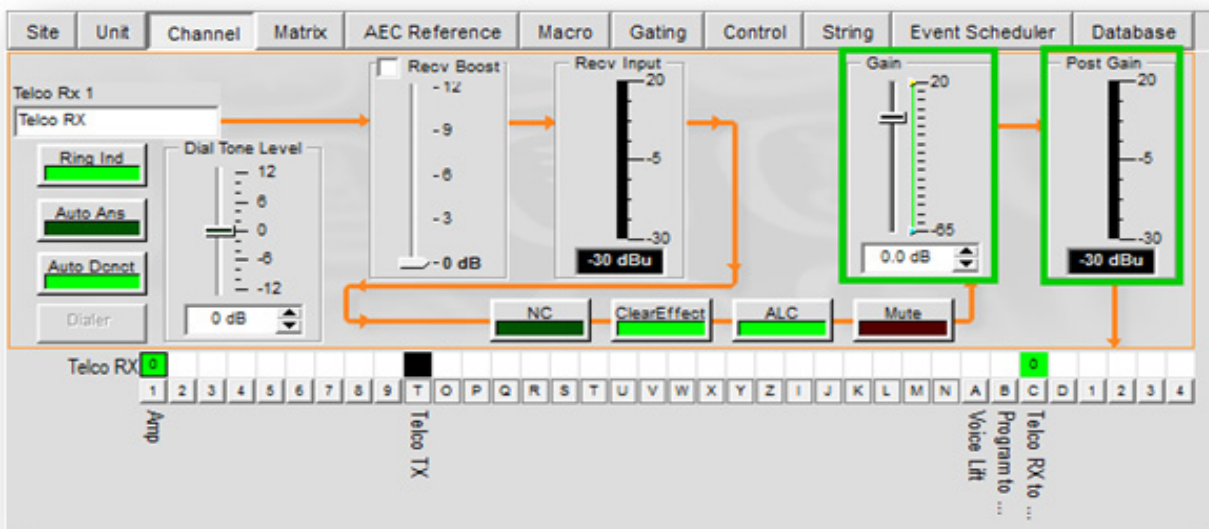
3. The telco RX should maintain this same level throughout the CONVERGE Pro site up to and including the line output(s) to an external amplifier and speaker system. In particular, avoid lowering the telco RX levels at the input, at crosspoints, on busses or at the line outs and then turning up an external amplifier to achieve good room audio levels. This by itself can cause far end echo even when other settings are correct. Instead, keep the telco RX at unity gain and adjust the external amplifier as needed to achieve good room audio levels.
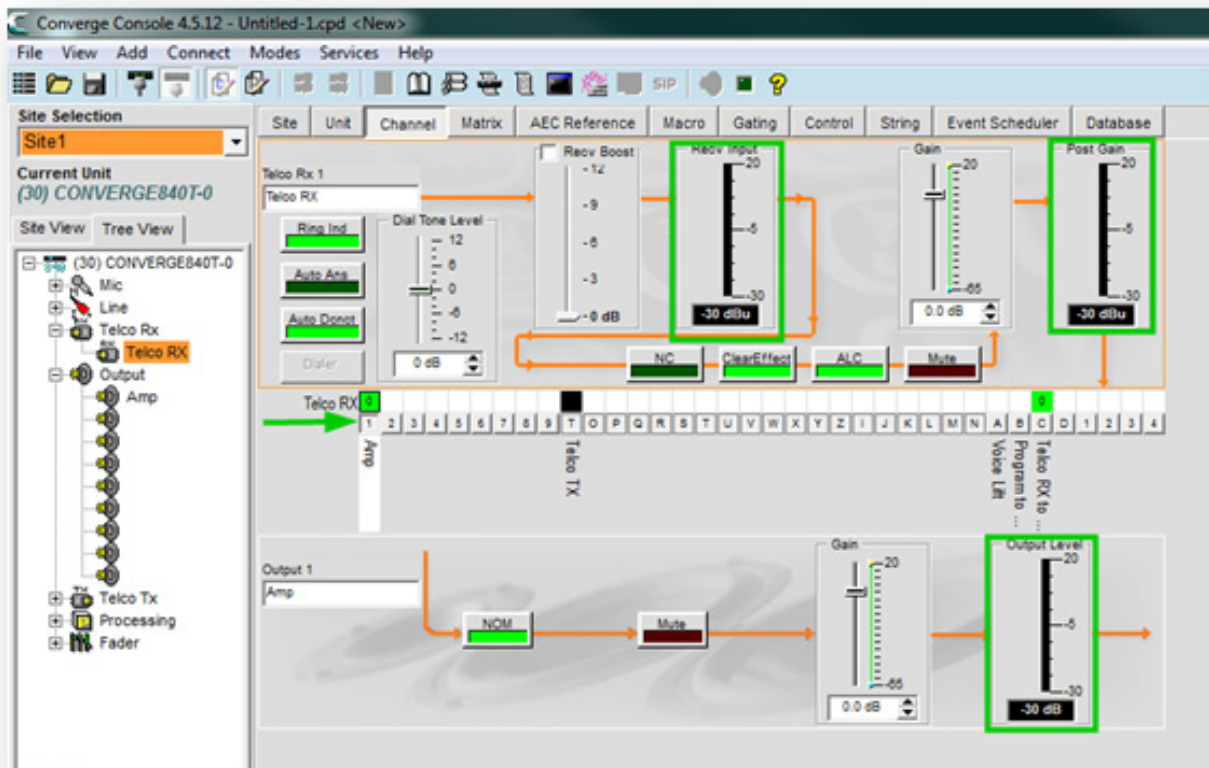
## OPTIMIZING GAIN FOR TELCO TX CHANNELS

The same principles of gain structure apply to the telco TX channel. When someone talks on a microphone in this CONVERGE Pro system, the telco TX post gain meter should show the same levels as recommended for the mic inputs. However, if this results in audio that is too low or too high as heard by a far end caller, adjustments to the telco TX gain should be applied as needed.

»   **NOTE:** For this testing use a standard handset on the far end because levels can be unpredictable from speaker phones, cell phones, and amplified headsets.

OPTIMIZING GAIN FOR LINE INPUT AND OUTPUT CHANNELS

It is important to understand that the CONVERGE Pro needs to receive a strong, line level signal from the source (audio switcher, video codec, DVD player, etc.) that is currently connected.

1. First start by checking the signal at the pre gain meter. This needs to be as close to a 0dB as possible. If this meter is too low (-5dB or more) or too high (peaks greater than +6dB) you will need to adjust the gain at the source (audio switcher, video codec, DVD player, etc).
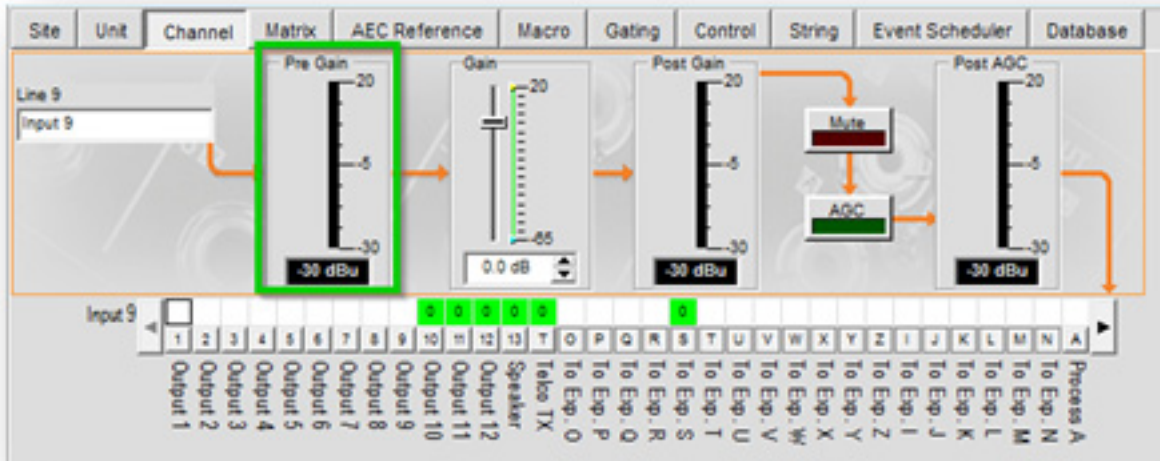

2. If the same principles of unity gain have been applied to all inputs, crosspoints, and process or fader busses, then the line output channels should already show unity gain. However, it is recommended that the levels on output level meter be checked to verify this.

FURTHER CONSIDERATIONS

1. Simplicity - Avoid complex gain structures. For example, avoid boosting the gain of the telco RX audio at one point along its audio path, then dropping it as another point, and boosting it again at a later point. Also avoid unnecessarily complex audio routing, such as routing an audio signal through multiple busses or back and forth across multiple CONVERGE Pro units.

2. Unity Gain - It is always best to set all inputs to unity gain and maintain that same gain level through the CONVERGE Pro system, with a few exceptions:

    a. When mics are routed to local speakers for sound reinforcement this audio will typically need to be reduced at crosspoints or on a bus to prevent local feedback. Care should be taken to keep this routing separate from the routing of mics to the far end of a teleconference.
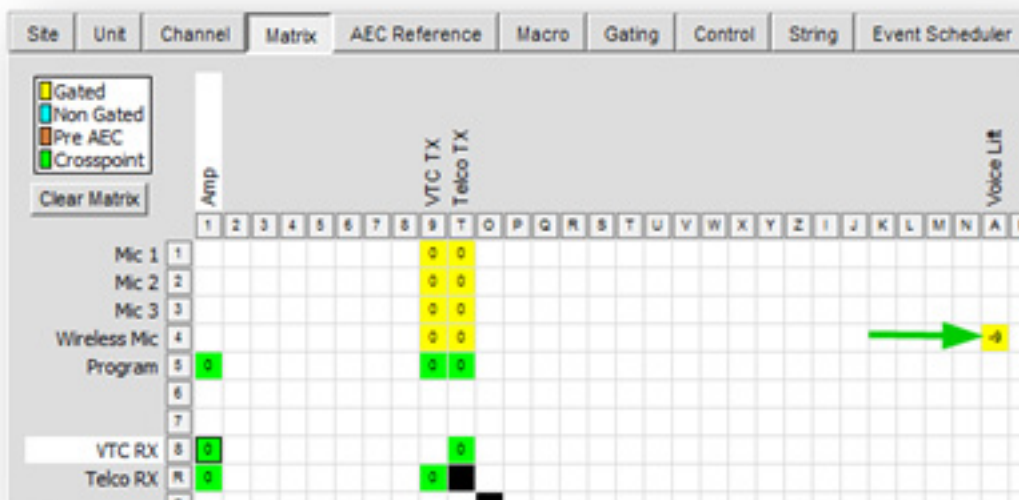
b. When audio is routed from a CONVERGE Pro line output to a video conferencing system input, the line output gain will need to be adjusted according to the requirements of the input on the video conferencing system.
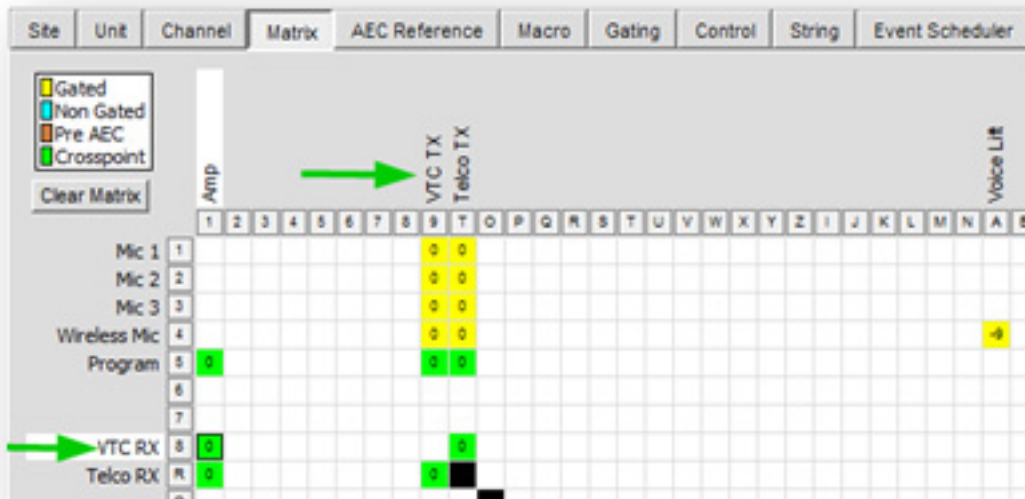
3. Order of Optimization - We typically recommend optimizing gain in the following order:

   a. Microphones
   b. Line Inputs
   c. ATC/VTC RX
   d. Amplifiers
   e. Speech Lift

4. Presets - We recommend waiting to save presets until calibration is complete. Once a preset is saved any calibration changes will need to be made to the preset in preset editor mode.

5. User Gain Control - User control of room audio levels should be done within the CONVERGE Pro system. If the volume is controlled at an external amplifier or other external device, volumes changes are likely to cause far end echo, at least until the system converges.