CALIBRATING AN EXTERNAL AMPLIFIER

It is important to calibrate the external amplifier after all channels in the CP2 system have been optimized, but before voice lift has been configured. Be sure to avoid lowering the Telco or VoIP RX levels at the input, at crosspoints, on busses or at the line outputs and then turning up an external amplifier to achieve good room audio levels. **This alone can cause far end echo even when all other settings are correct.** Keep the Telco and VoIP RX at a nominal level and adjust the external amplifier as needed to achieve good room audio levels.
OPTIMIZING GAIN FOR MIC INPUT CHANNELS

1. Under Channel Properties, select the mic input that you want to optimize, as shown below.

   ![Channel Properties](image)

   » **NOTE:** If this mic is a wireless mic, be sure to turn off phantom power (PPWR). If it is a wired mic, be sure that phantom power is enabled.

2. Have someone speak at a normal, conversational level at a normal, typical distance from the mic.

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.

   ![Gain Adjustments](image)

4. Adjust the (fine) gain slider until the peaks on the post gain meter are as close to +6dB and average level to 0dB as possible.

   ![Gain Adjustments](image)

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 should be followed on all channels throughout a CONVERGE Pro 2 system, except when noted below. Also note that it is better to err on the side of audio that is a little low rather than audio that is too hot on mic inputs.
OPTIMIZING GAIN FOR TELCO RX CHANNELS

Optimize telco RX inputs using the same procedure as mic inputs, with the following added considerations. Please refer to screenshots below.

1. On a properly configured phone line, the receive input meter should show optimal levels (+6dB). If levels are too low, increase receive boost as needed.

2. Adjust the gain slider as needed to ensure that the post gain meter shows optimal levels (+6dB) as well.

3. The telco RX should maintain this same level throughout the CP2 site up to and including the line output(s) to an external amplifier and speaker system. See section above, “CALIBRATING AN EXTERNAL AMPLIFIER.”

OPTIMIZING GAIN FOR VOIP RX CHANNELS

The VoIP RX channel should be calibrated in the same manner as the Telco RX channel, except that on a VoIP RX channel there is only one gain adjustment.
OPTIMIZING GAIN FOR USB COMPUTER AUDIO

When passing audio between a computer and a CP2 system via USB, these same principles of gain structure will apply. The USB RX and TX channels typically should be set around 0dB. The Playback and Record settings on the computer should then be set appropriately to allow for this. Care should be taken to avoid setting the computer’s Playback level too high resulting in excessively high gain levels on the USB RX of the CP2 system.

OPTIMIZING GAIN FOR STAND-ALONE VTC (VIDEO TELECONFERENCING) HARDWARE

When audio is routed from a CONVERGE Pro line output to a video conferencing system input, the line output gain needs to be adjusted according to requirements of the input on the video conferencing system. If the audio level to the VTC is hot enough to overdrive the VTC input, audio distortion can occur. This distortion can cause audio processing problems in the CONVERGE system.

FURTHER CONSIDERATIONS

1. User Gain Control - User control of room audio levels should be from within the CONVERGE Pro system. If the volume is controlled at an external amplifier or other external device, volume changes are likely to cause far end echo at least until the system re-converges.
2. 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.
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. Voice Lift (Speech Lift)
   F. Feedback Eliminator
CONFIGURING AND CALIBRATING VOICE LIFT

When voice lift is present, i.e. when local mics are routed to local speakers for sound reinforcement, calibrating voice lift should be done only after the mic inputs and amplifier and speaker outputs have been calibrated. Calibrating voice lift means finding the optimum gain before feedback.

» NOTE: Make sure that this mic uses a Custom Reference for AEC and that this mic’s audio is excluded from that reference.

Here is the recommended method for configuring voice lift:
1. Route the mic input to a process bus using a purple, Pre-AEC, crosspoint
2. Set the gain on this process bus to -65dB.
3. Route this process bus to an amplifier or speaker output
4. Adjust the gain level of the voice lift using this process bus.

» NOTE: Do not use the mic input gain settings to adjust voice lift volume levels. Instead, make sure that the mic inputs gains have been optimized as explained above.

5. Begin to slowly increase the gain level of this process bus until you start to hear the mic ringing or feeding back into the speakers.
6. Once you find the gain setting where the mic first starts to ring or feed back, reduce the gain by about 6dB to prevent feedback. This typically will be the optimum gain before feedback.

FEEDBACK ELIMINATOR SETUP FOR CONVERGE PRO 2 – A BASIC INTRODUCTION

To increase the maximum gain before feedback, use the Feedback Eliminator. Go to the processing block and run the feedback eliminator setup, as follows:
1. Adjust the gain of the processing block until you start to get a little ringing or feedback, then revert back a couple of dB.
2. Set the Optimum Gain Before Feedback to 3 or 4dB, or possibly a little higher.
3. Check the relevant boxes for Affected Mics and Affected Gating Groups. Affected mics are any mics that are routing to this processing block, and Affected Gating Groups are any groups that contain these mics. It temporarily adjusts certain mic settings to give optimal results.
4. Click the “Run Setup” button. The feedback eliminator will begin to add temporary gain and also add filter nodes to prevent feedback. The process completes when the target gain is reached, at which point the temporary gain is removed. If all the filter nodes are used up before the target gain is reached, then the setup process is stopped and the temporary gain is removed.