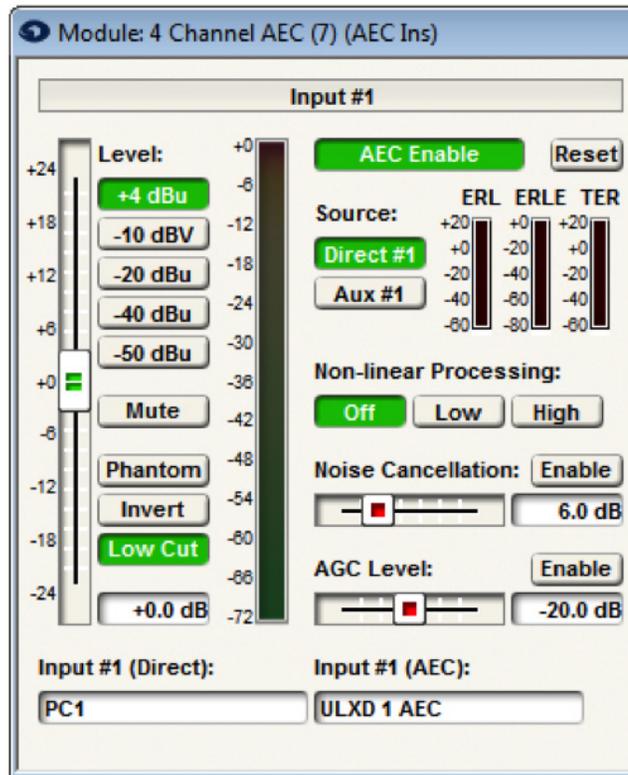


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Tips and Tricks for Successful AEC.



Having a general understanding of the AEC module parameters prior to reading this Tech Tip is essential for success during the programming and commissioning stages of the conferencing system. All parameter definitions are covered in the SymNet Composer Help file. This Tech Tip outlines some tips and tricks to get great results fast from the SymNet 4 Channel AEC Input Card. Keep in mind, room acoustics, mic and speaker placement, and gain structure are the cornerstones of getting the best results in any AEC installation.

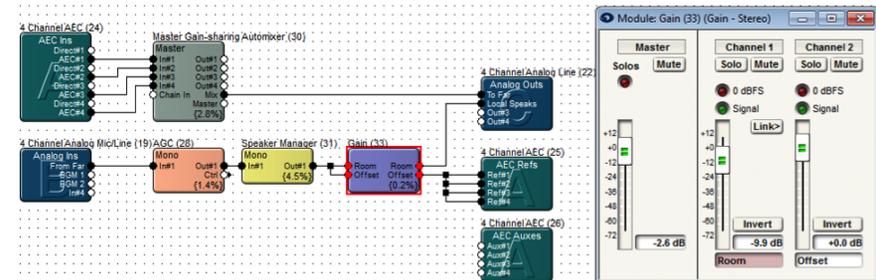
Essential Concepts for Successful AEC

ERL: Echo Return Loss is the difference in signal level between the audio which is present at the reference input and the same audio measured in the room by the microphones. For best results the ERL should be maintained between +/- 10 dB.

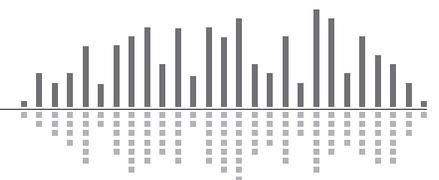
Reference: The reference should be tapped off the signal path as close as possible to the local reinforcement outputs so that any processing latency, filtering, or delay that are applied to the analog outputs are also applied to the reference input.

Reference Offset: In order for the ERL to be maintained at +/- 10 dB, it is sometimes necessary to offset the level of the audio sent to the reference input at 7-10 dB louder than the same audio entering the microphones. When the room gain is turned up, the level of the far end audio at the microphones is turned up as well. Using a two channel gain module's master fader for room gain will turn up the reference and the room gain together, maintaining the necessary offset between the reference and the same audio at the microphone input. See Example 1. If the ERL is reading more than +/-10 dB, turn down the speakers in the room or turn the reference signal slightly up using the reference offset gain module.

Example 1: AEC Basic



Notice in this example the reference is tapped off after all dynamics and filtering has been applied to the far end audio. This means the audio at the AEC reference is as acoustically close as possible to the far end audio as it enters the AEC microphones.

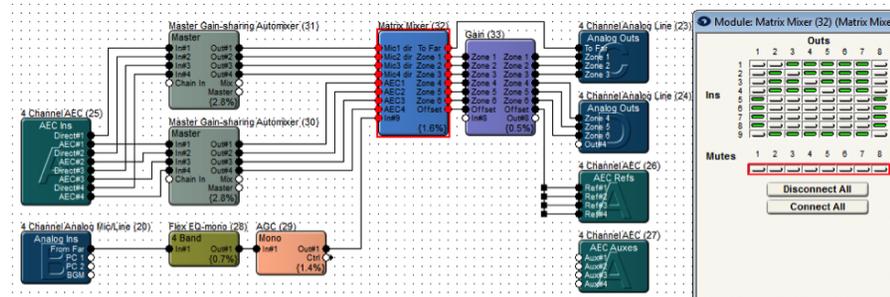


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In a best case scenario the room volume would be set to a static operating level tuned for best AEC results. However, if the customer requires level control, you can include a gain module prior to the reference input and room outputs. Remember, the reference should be 7-10 dB louder than the same audio being picked up by the mics from the speakers. In the example above, gain module (33) gives the end user the ability to adjust the room level with the master fader. The individual input 1 and 2 faders create and maintain the 7-10 dB offset between the reference and the room volume. As the end user turns up the room volume, the reference signal also goes up with it.

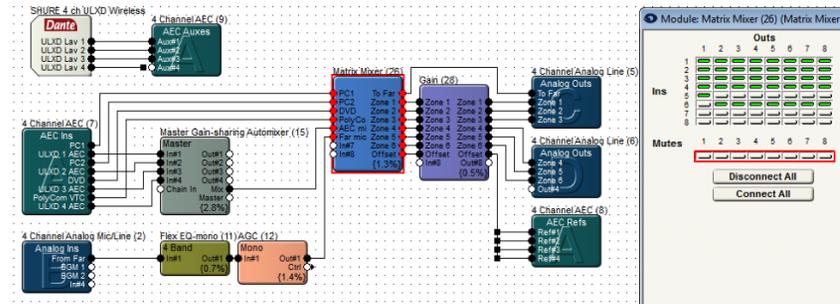
Example 2: AEC with Local Mic Reinforcement + Mix Minus

The AEC algorithm adds 11 ms of latency which would be distracting if used for the local sound reinforcement. For local reinforcement use the direct outputs of the 4 channel AEC input card instead of the AEC outputs. Each set of outputs should be feeding their own Gain-Sharing Automixer before passing through a matrix mixer, which provides the mix minus capabilities and routing to the local sound and far end.



Again, the AEC reference point and local speaker outputs need to be tapped (and right before the outputs).

Example 3: AEC Dante Flow to Aux inputs (using Shure Dante Lavalier mics)



The SymNet 4 Channel AEC Input card can apply the AEC algorithm to either the analog inputs or any source routed to the AEC Auxes. In this example, the AEC is applied to Shure Dante Lavalier mics whose audio enters the SymNet DSP through the Dante bus, while the physical inputs on the AEC card are utilized for additional non-AEC sources via the direct inputs, such as PC audio.

Top reasons for bad AEC result:

- 1) Bad gain structure
- 2) Incorrect mic and speaker placement
- 3) Bad room acoustics
- 4) Local reinforcement is too loud
- 5) ERL showing more than +/- 10 dB
- 6) The reference signal tapped off prior to dynamics, filtering, or delay processing

