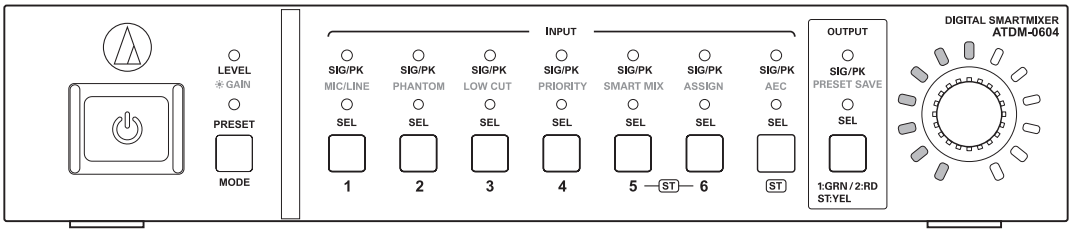
ATDM-0604

AEC (Acoustic Echo Canceler) Operation Manual

DIGITAL SMARTMIXER



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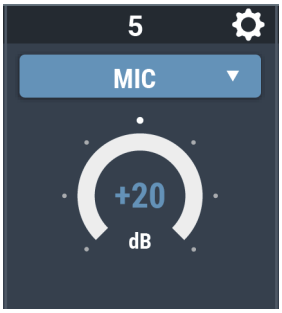
Preparing

1. Using the meter as an indicator, adjust the gain and level of each input (microphone input).
   - Set so that the peak fluctuates up to 0 dB.

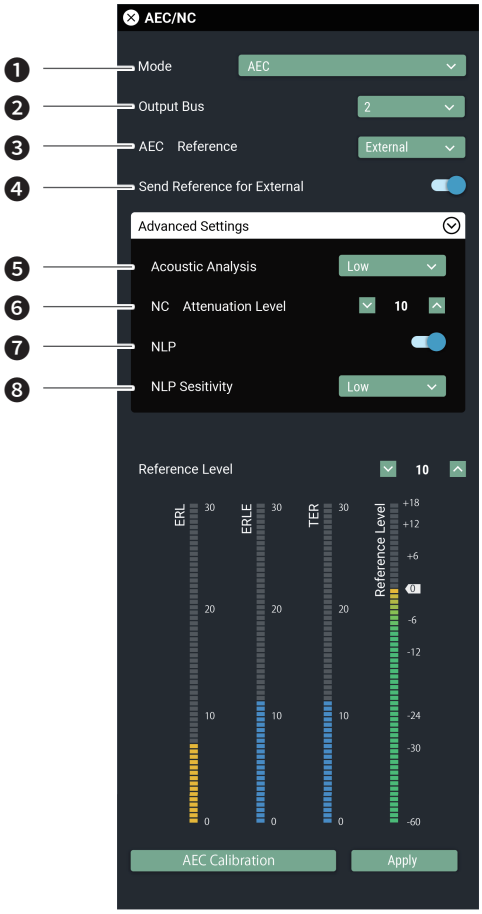
2. Set the gain, phantom power, output assignment, and fader.
   - Check where the audio from the terminal at far-end source is connected (reference source).
     - ch5/6 Line input
     - Stereo input
     - USB input (for USB, switch with ST input.)



   - For audio from USB, adjust the volume settings of the computer audio device and ST input fader.

3. Check the speaker output that amplifies audio from the terminal at far-end source, and set the bus assignment.
4. Click “AEC” at the right side of the screen.

5. Set the AEC details.



❶ Select “AEC”.

❷ Select the bus to which AEC-processed audio is output.
- Bus assignment of each input channel must be performed in advance.

❸ Select the reference signal.
- In general, select the audio from the terminal at far-end source.

❹ Use when multiple ATDM-0604 units are connected by Audio-Technica LINK.
- When turned ON, the signal selected in AEC Reference is sent to other ATDM-0604 units connected by Audio-Technica LINK.
- For other linked ATDM-0604 units, select “External” in “AEC Reference” to receive the reference signal.

❺ Select “High”/”Low” for the AEC effect.
- The factory default is set at “Low”.
- If the reverberation in the room is large, operation at “High” is recommended. You can measure the reverberation in a room by using “AEC Calibration”.

❻ Set the amount of NC (noise cancellation) to be used for AEC.
- The factory default is set at “20” (setting range is from 0 to 100).
- The larger the value, the larger the canceling effect.

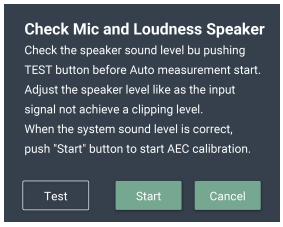
❼ Set reduction of residual echoes.
- The factory default is set at “ON”.

❽ Select “High”/”Low” for the NLP effect.
- The factory default is set at “Low”.
- It is linked with the “AEC Sensitivity” setting and changes. You can also change it later.

6. Turn ON the “AEC” button of the input channels you want to use AEC with.
   - Perform the bus assignment of each input channel in advance.

To measure the reverberation time of a room, perform “AEC Calibration”.

7. Measure the reverberation time of the room.
   - White noise is output when measuring, so check the levels of the output system and amplifiers in advance.
   - When you click “Test”, white noise is played from all output systems. For measurement, you must output sound from speakers playing at the local source. It is not required for the terminal at far-end source. Mute TV conference systems (codec) when measuring.
     In the Test, white noise volume is adjusted automatically to a level where microphone input does not clip, and then Test mode ends.



   - When you click “Start” after Test mode ends, measurement of the reverberation time starts. After it is complete, the reverberation time and delay time of the room are displayed.
   - If measurement fails (ends due to an error), increase the volume of the amplifiers and measure again.

The AEC cancel time of the ATDM-0604 is 160 ms. Setting the parameters below according to the measured reverberation time is recommended.

Measured reverberation time	AEC Sensitivity	NLP Sensitivity
160 ms or less	Low	Low
160 ms or more	High	High

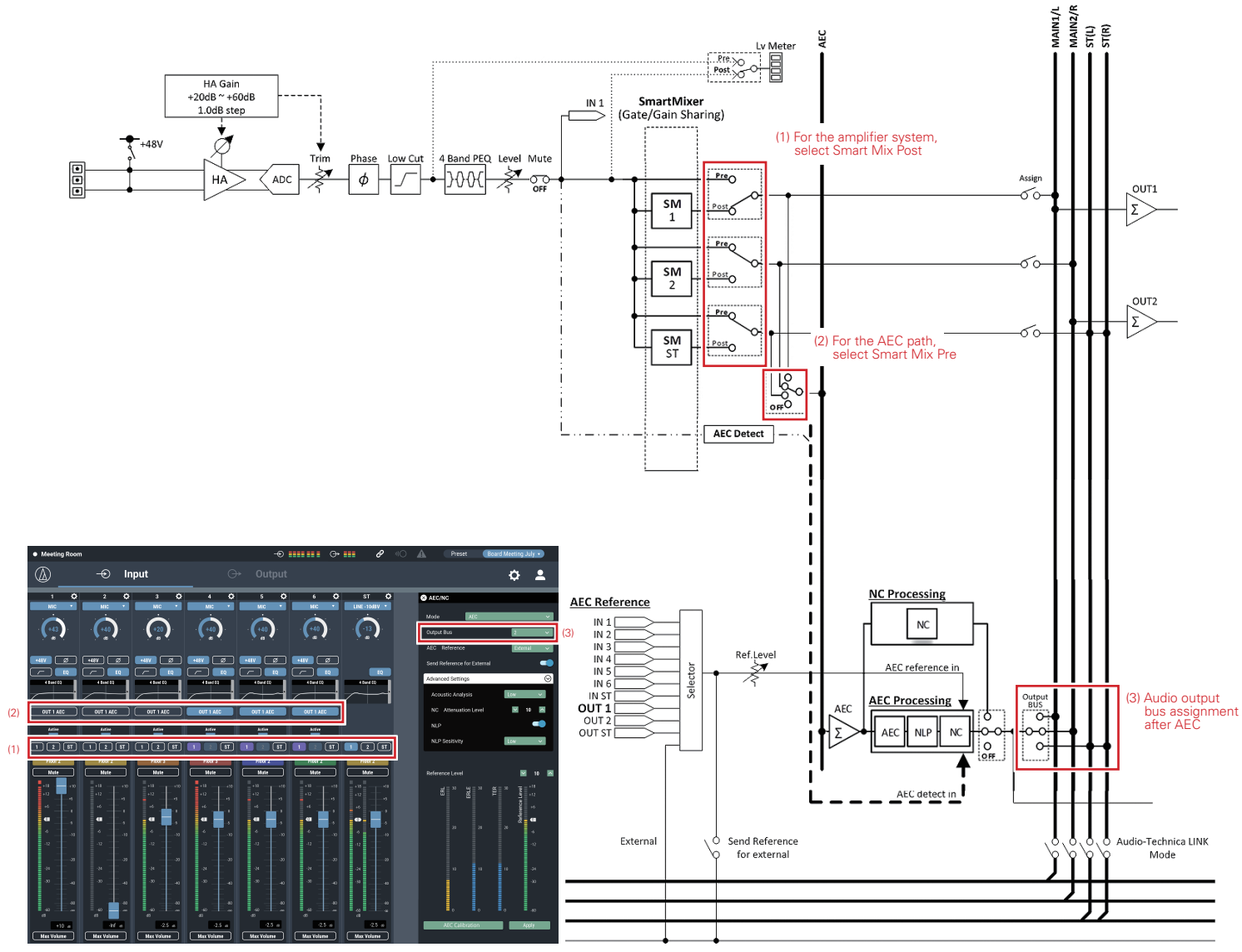
If you select “Low”, the sound quality deterioration of transmitted audio is minimal. However, residual echoes may be generated in rooms with a reverberation of 160 ms or more.

Preparing

Using with Smart Mix

Smart Mix is presumed to be used for the purpose of ensuring effective stable gain during self-amplification. For the signal to be sent to terminals at far-end source, selecting a Smart Mix Pre signal is recommended.
Select a Smart Mix Pre signal for the signal input to the AEC bus (signal sent back to remote terminals), and select a Smart Mix Post signal for the audio amplified at the local source to ensure effective stable gain.

(Example)
(1) For Out 1, assign the Smart Mix Post signal and signal from the the terminal at far-end source as the amplifier system at the local source.
(2) For the AEC bus, assign the Smart Mix Pre signal.
(3) For Out 2, assign the signal returned (after AEC processing) to the terminal at far-end source.

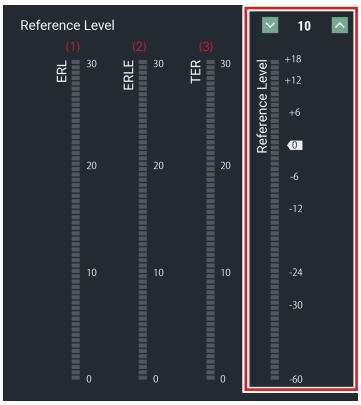


ON (Blue)	Assigned to an output bus. Audio signals not processed by SmartMixer are output even when SmartMixer is turned ON.
ON (Purple)	Audio signals processed by SmartMixer are output when SmartMixer is turned ON.
OFF	Not assigned to any output bus.

Adjusting

Adjusting the reference level

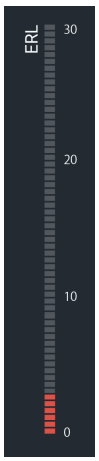
- The level of the signal specified for reference is displayed in the reference level meter. Adjust the "Reference Level" value at the top so that the peak is in the range of +12 to +18 dB. Also set to a level where the audio does not clip.
- AEC performance improves by increasing the signal (reference signal) from TV conference systems (codec) input to AEC (echo canceler) as much as possible at a level where it does not clip.



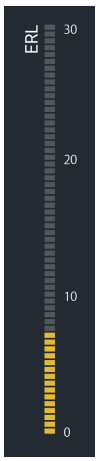
(1) The ERL meter displays the amount of canceling from AEC (echo canceler).

- The color of the meter changes from red to yellow to green according to the amount of canceling.
- Red: 5 dB or lower, Yellow: 5.5 to 10 dB, Green: 10.5 dB or higher (green indicates a high amount of canceling).

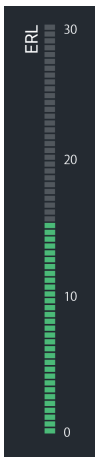
5 dB or lower: Red



5.5 to 10 dB: Yellow



10.5 dB or higher: Green



- If it continues to light in red, re-examine the following levels and adjust so that the meter turns yellow or green:
  - Reference level, gain and level of channel selected for reference input
  - Gain and level of microphone input channel

(2) The ERLE meter displays the amount of canceling from NLP and NC (noise canceler).

(3) The TER meter displays the sum of ERL and ERLE (total amount of canceling).

Troubleshooting

Symptom	Cause/Action
I want to check the effect of echo canceling.	Check the effect of echo canceling on the terminal at far-end source. To check at a local source, you can monitor the audio returned to the terminal at far-end source.
The audio of the remote terminal is low/high.	(1) AEC performance improves by increasing the signal (reference signal) from TV conference systems (codec) input to AEC (echo canceler) as much as possible at a level where it does not clip. If the audio from the TV conference system (codec) is low/high, adjust the volume on the TV conference system at first. Then adjust the reference level. (2) The reference signal input to AEC (echo canceler) and the terminal audio signal output at far-end source from the speaker are not linked. Therefore, changing the reference signal level after adjustment is not recommended. When adjusting the audio from the speaker (audio of the terminal at far-end source), adjust the output fader of the channel connected to the speaker or the volume of the speaker itself.
The audio from the speaker is low/high.	The reference signal input to AEC (echo canceler) and the terminal audio signal output at far-end source from the speaker are not linked. Therefore, changing the reference signal level after adjustment is not recommended. When adjusting the speaker audio (audio of the terminal at far-end source), adjust the output fader of the channel connected to the speaker or the volume of the speaker itself.
Reverberation measurement does not end properly (ended due to an error).	If reverberation measurement ends due to an error, even if you click "Start" after adjusting the white noise level input to the microphone with the "Test" button, increase the volume of the speaker itself and click "Start" again. If the delay time (time for audio to reach the microphone from the speaker) is 45 ms or more, measurement may not operate correctly. Reverberation measurement may also not end properly when using a TV for audio output of the remote terminal. In such cases, use external speakers instead of playing on a TV.
There are large residual echoes.	(1) AEC learning is performed when there is audio from the remote terminal. However, learning does not operate correctly during double-talk (when there is audio at both sources). It will sound like there are residual echoes due to balancing with the reference signal, such as when the audio (remote terminal side) from the speaker is extremely low or when the reference signal is too large for the echo level. If the audio from the TV conference system (codec) is low, adjust the volume on the TV conference system. Then adjust the reference level. (2) Residual echoes may be large even when the S/N and level of audio from the TV conference system (codec) are low. Check and adjust the audio (such as S/N, distortion, volume) of the TV conference system (codec). (3) Residual echoes may be large even when there is no difference in volume between the target sound (local source audio) and non-target sound (playback audio from the terminal at far-end source). Try adjusting the speaker volume or changing the positions of the microphone and speaker. (4) Residual echoes may be generated in rooms with a reverberation of 160 ms or more.

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