



**AUDIO MANAGEMENT CONTROLLER (AMC) MANUAL
WINDOWS AND OS X VERSION 10.3**



DESCRIPTION

The Blue Sky Audio Management Controller (AMC) is an 8-channel audio DSP platform with both 24-bit digital and analog I/O.

Each channel of the AMC has a sample rate converter (by stereo pair), a 31 band 1/3 octave equalizer, eight parametric / free assignable filters, individual channel delays, and lip-sync delay.

A 16x8 cross-point mixer allows any input to be mixed to any output.

The flexible bass management system can be customized on a channel-by-channel basis, or turned-off completely.

The AMC has 6 presets, each of which stores complete setup information, including filter setting, I/O configuration, delays, etc.

The AMC includes control software that is a Windows and OS X application that connects through the USB port.

The AMC includes SRO (Sound Room Optimization) software which includes an MLS based measurement system with auto room correction or expert manual mode, correcting the in- room speaker response to a user definable target curve.

Requires firmware and software 5.13 or above.

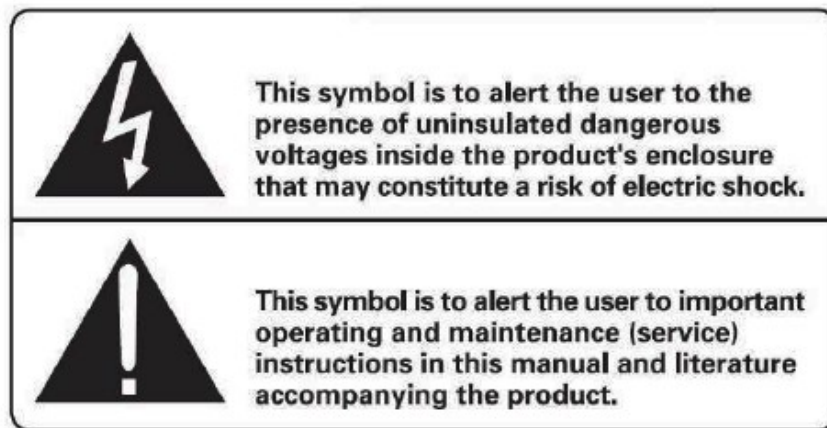
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AMC FEATURES

- o 8 balanced analog inputs and outputs with switchable +12 / +24 dBu maximum levels
- o 8 AES 110 ohm digital inputs and outputs, each transformer Isolated
- o Burr Brown / TI PCM1792A digital to analog converter with 132 dB SNR
- o Burr Brown / TI PCM4222 analog to digital converter with 124 dB SNR.
- o Cirrus Logic CS8422 sample rate converter with 140 dB SNR
- o National LME49760 op amps, with 55 MHz bandwidth and 20V/us slew rate
- o Analog / Digital I/O selectable in pairs.
- o Simultaneous digital and analog outputs
- o Adjustable analog and digital output offset
- o 16 in x 8 out cross mixer
- o Quad Analog Devices 56 bit fixed point processor
- o Digital input sample rate range 44.1 kHz to 192 kHz.
- o Internal sample rate 48 kHz or 96 kHz (switchable)
- o 31 Band 1/3 octave double-precision digital EQ per channel
- o 8 user definable 2nd order double precision digital filters per channel
- o 6 user defined presets
- o 4 line large lighted high contrast display on remote
- o Solo / Mute channel selection buttons.
- o Mute, Dim, and Ref gain buttons
- o Adjustable channel and lip sync delays
- o Adjustable channel calibration
- o SRO room optimization software
- o Firmware updatable through the USB port.

IMPORTANT SAFETY INSTRUCTIONS

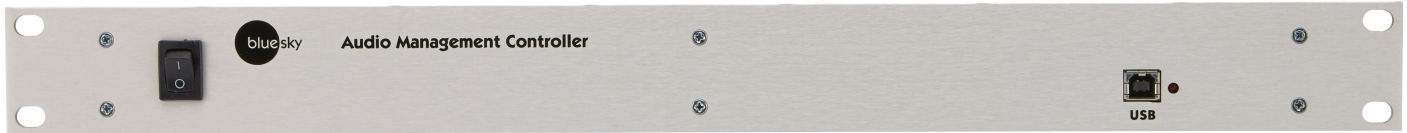


Warning: Permanent hearing loss may occur if studio speaker systems are used at high volume for any prolonged period of time. Please exercise good judgment when playing back your music material.

Warning: Please note, you can adapt over time to a higher volume of sound, which may sound normal but can be damaging to your hearing. Set your studio's overall volume to a safe level, and consult a trained professional if you have further questions.

1. Read Instructions.
2. Keep these Instructions.
3. Heed all Warnings.
4. Follow all Instructions.
5. Do not use near water.
6. Clean only with a dry cloth.
7. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
8. Unplug this apparatus during lightning storms or when unused for long periods of time.
9. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as a power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
10. The system must be placed on a firm, level surface where it is not exposed to dripping or splashing liquids.
11. Do not place flammable material above or beneath the AMC.
12. Before making connections to a Blue Sky AMC, ensure that the power is off and other components are in mute or stand-by mode.
13. Make sure all cable terminations are of the highest quality, free from frayed ends, short circuits, or cold solder joints. Be especially careful when connecting to terminals marked which may have hazardous voltages on them during operation.
14. Allow adequate ventilation for the rack.
15. **THERE ARE NO USER SERVICEABLE PARTS INSIDE A BLUE SKY AMC**

AMC FRONT PANEL

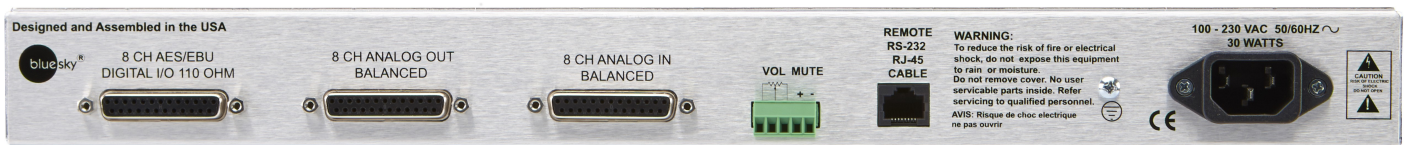


POWER Switch – Turns AMC on and off.

USB 2.0 Connector – used for updating firmware in the AMC rack and the AMC Control program.

STATUS / POWER LED – Indicates the AMC is powered. **When flashing** indicates internal microcontroller is operating normally.

AMC REAR PANEL



1. POWER

The AMC has switching power supplies that operates on 100-230 VAC 56/60 Hz. No voltage change switch required. Standard IEC 3 pin power connector.

2. CHANNEL ASSIGNMENTS

The AMC I/O connections use DB25 connectors wired to the TASCAM/ Avid protocol for both analog and digital. These DB25 cables are not supplied.

The channel assignments are SMPTE standard

1. Left
2. Right
3. Center

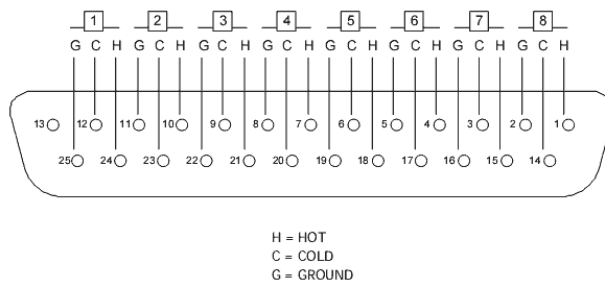
- 4. LFE
- 5. Left Surround
- 6. Right Surround
- 7. Left Rear
- 8. Right Rear

The channel assignments match the labels on the remote.

However, these channels labels are for reference only. Any channel can be used for any purpose desired. The only exception is the LFE channel which includes the bass management filters. Since these filters can be disabled (using the AMC Control Software), the LFE channel can be reconfigured as a standard channel like the others.

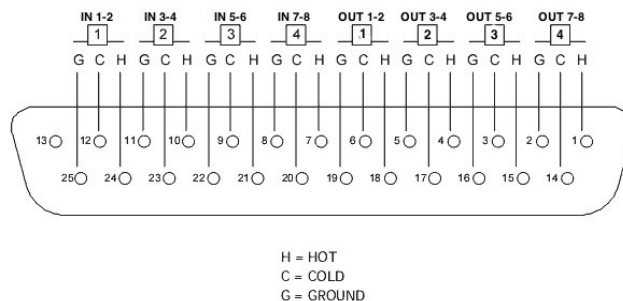
3.ANALOG I/O

The analog inputs and outputs are balanced with a switchable maximum level of +12/+24 dBu. Both analog and digital outputs are active irrespective of whether the inputs are digital or analog.



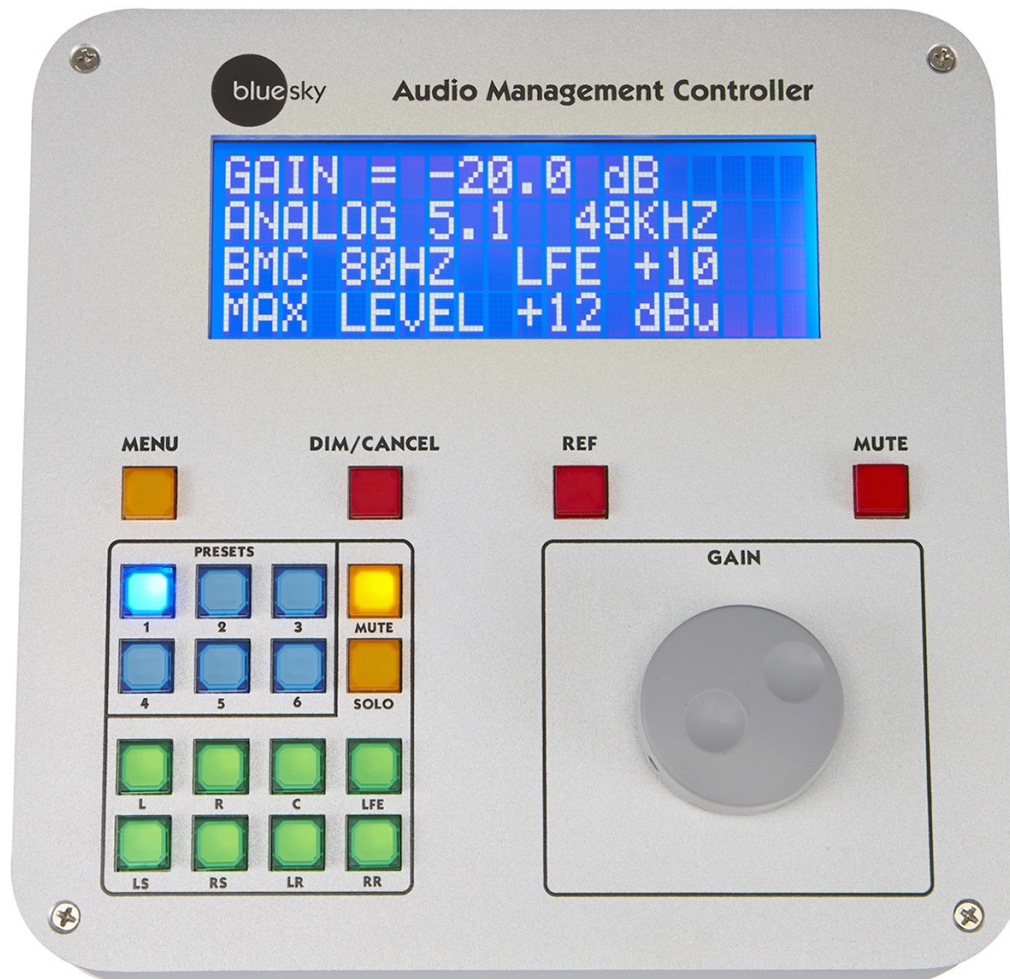
4.DIGITAL I/O

The digital inputs and outputs are AES/ EBU 110 impedance transformer isolated I/O. The digital inputs have built-in 140 dB dynamic range sample rate converters, which convert any digital input to the native sample rate. The internal sample rate can be set as a global parameter to 48 kHz or 96kHz through the menu on the remote. Changing the sample rate will reset the rack unit and restart at the new sample rate.



THE AMC REMOTE

FRONT PANEL



GAIN – changes the system gain in 1.0 dB increments . Also used to scroll through the menus and change parameters.

MUTE – mutes all channels, both digital and analog

REF – sets the system gain to a user defined reference level. The default setting is -20 dB. The default setting can be changed utilizing the remote menu or the AMC Control Software.

DIM/CANCEL – reduces the current system gain by the DIM value. The default setting is -10 dB. The default setting can be changed utilizing the menu or the AMC Control Software. The DIM/CANCEL switch is also used to exit the menu mode

MUTE MODE – the Solo/ Mute channel buttons operate in mute mode. Switching between Solo and Mute modes clears all solo/mute buttons

SOLO MODE – the Solo/ Mute channel buttons operate in a Solo Mode. Switching between Solo and Mute modes clears all solo/mute buttons.

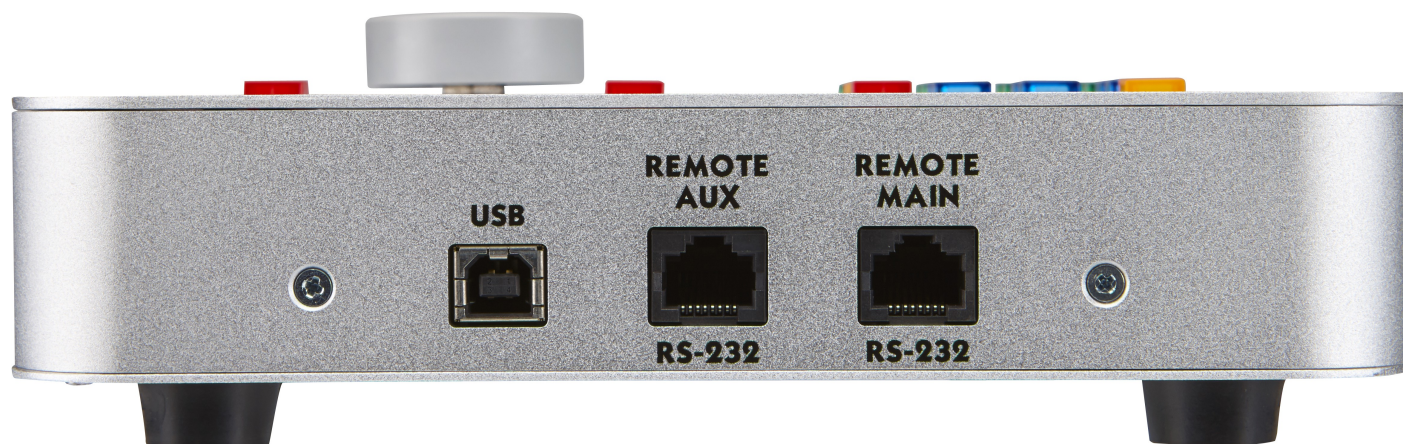
SOLO/MUTE – Solo's or Mutes that channel. Solo buttons can now be pressed in unison. For example if you want to solo L, C, R. so can press those buttons all at once.

PRESETS – loads the preset.

MENU – allows a limited number of parameters to be changed on a preset. When exiting the menu mode, the changed parameters are automatically stored in flash memory.

REMOTE MENU LOCKOUT- Access to the full menu can be restricted by requiring the user to enter a 4 digital access code. If this feature is activated, whenever the menu button is pressed, the user will have to use the preset buttons to input the correct 4 digital code to access the full menu. A limited user menu can be access by hitting the menu button again. This feature can be turned on or off and the access code changed using the AMC control software remote code.

REAR PANEL



USB 2.0 CONNECTOR - used for firmware updates to the remote

REMOTE MAIN RS232 - Connects the Remote to the AMC rack

REMOTE AUX RS232 - Connects the remote to a 2nd AMC rack for 16 channel operation

THE MENU

Menu Switch – enters the menu mode and switches between scroll and parameter modes.

In the Scroll mode, the gain control “scrolls” through the menu items.

In the Parameter mode, the gain control changes the selected parameter. To switch between modes, tap the menu key. The current mode is displayed at the bottom of the display.

Dim/Cancel switch - exits the menu mode and stores the changed values in the current preset.

Preset Buttons – when the remote lock out is on, used to input access code.

An example of using the **MENU** to change the left calibration to +3 dB.

1. Tap the menu switch.
2. Rotate the gain control to cycle through the menu items to left calibration.
3. Tap the menu switch to enter parameter mode.
4. Rotate the gain control CW or CCW until the display reads +3.0 dB.
5. Tap the menu key to go back to scroll mode.
6. Tap the dim/cancel switch to exit the menu and store the preset.
7. To change multiple items, follow 1-5 on each parameter and then hit the dim / cancel key when you have completed all your changes.

MENU ITEMS

1. **Channel Calibration** – sets the output gain offset for the selected channel. Used to balance channel levels.
2. **Channel Delay** – sets the time delay for the selected channel. Channel delay is used to time align each speaker to compensate for the unequal distances between the listener and the speaker. For example, a subwoofer is usually farther away from the listener than the front speakers, so the sound from the subwoofer arrives later than the sound from the front speakers. In this case you would add additional time delay to each of the front speakers to time align with the subwoofer. The time delays of each speaker can be measured using the

AMC Control software and the optional recommended measurement microphone and USB audio interface. (See the section on additional equipment you will need, below.)

3. **Lip Sync delay** – Many video displays have video processing delays which can cause the audio to be out of sync with the picture. To compensate for video delay, an overall audio time delay can be added to re-synchronize the audio with the picture.
4. **Ref Gain** – sets the system gain when Ref button is pressed
5. **Dim Gain** – sets the gain reduction when the DIM button is pressed
6. **+12/+24 analog max level switch** – Some studio monitors are high gain devices that have a nominal input level of around -10 dBu, and not +4 dBu. This switches the gain structure to +12 dB to optimize the signal to noise ratio. Only affects the analog inputs and outputs. When using digital IN and analog OUT, this parameter affects the maximum output level of the analog output.
7. **Channel pink noise** – Generates a low level pink noise signal on the digital and analog outputs of the selected channel; The pink noise signal is mainly used to trace down output channel wiring or to verify the AMC is outputting a signal.
8. **Restore to factory defaults** - clears all entered preset data and restores the factory default presets, which include the default target curve setup. Follow the prompts on the screen.
9. **System rate rate** – selects either 48 or 96khz as the system sample rate. Changing the sample rate will reset the system, so it is recommended that the user exit the AMC control software, because a reset will interrupt the USB connection.
10. **Digital input Lock Status** – indicates that the digital input is locked to a valid digital stream
11. **Bass Management ON/OFF**- If bass management is turn off, all crossovers are disable except for the LFE filter.
12. **SPL Display Offset Adjustment** – adjust the measured dBSPL to the current system gain. The default is -20 dB = 85 dBSPL. See Calibrating the System to Display dBSPL for more information.
13. **Display dBSPL On/Off** – turns dBSPL display on or off.
14. **EQ Filter Bypass** - When On bypasses all systems EQ including graphic equalizer and free filters. Does not affect actual EQ values.

USER MENU ITEMS - When the remote is locked, the user has access to REF gain, DIM gain, PINK noise, the digital input status screen, Bass Management On/Off, and EQ Bypass.

QUICK SETUP AND USE

The AMC comes with six default which are a mix of digital and analog.

Any preset can be reconfigured to analog or digital or a mix

The display has a short description of the presets. These presets can be modified on a limited basis using the menu on the remote or completely reconfigured using the AMC Control Software.

1. Connect Audio I/O cables to the AMC and your speaker system.
2. Connect AMC Remote to AMC Rack using supplied Cat 5/6 cable.
3. Connect power cable to AMC Rack.
4. Turn on Rack AC power switch.
5. Wait until front panel LED is flashing and remote mutes.
6. Power-up your speakers.
7. Hit mute button to cancel mute.
8. Enter menu and scroll to Pink Noise.
9. Hit Menu button to switch to parameter mode.
10. Scroll through pink noise channels to verify audio is coming from correct speakers.
Note: The level will be low.
11. Hit Menu to return to Menu scroll mode.
12. Hit Dim/Cancel to return to normal operation.

UPDATING THE FIRMWARE

DIFFERENCES BETWEEN UPDATING IN WINDOWS AND OS X

The only differences between updating using Windows or OS X is that with Windows you are required to use an installer to install the firmware updater on your computer. With OS X , the installers are apps that are self contained.

The firmware in both the remote and rack can be updated through the USB ports and the using the Blue Sky Firmware Tool. There are separate updaters for the Remote and Rack.

UPGRADING THE FIRMWARE IN THE AMC RACK

NOTE: Different versions of the AMC control software require firmware version numbers matching the AMC control software. For example, AMC control firmware 5.05 requires firmware version 5.05 be installed in the remote and rack. Letter versions modifier, like 5.05 B, will all work with AMC Control software of the same base number.

Note: The firmware can only be updated when the rack is powered down.

1. Install the Blue Sky AMC RACK Firmware X.XX update tool. The installation tool will create a Blue Sky in the Program Files (0x86) sub-directory and install the update program and the new hex file in that directory.
2. If you get a message that the program requires Elevation and will not run, right click on the installer and click Run As Administrator.
3. Power down the AMC RACK and plug-in the USB cable. If this is first time you've connected the AMC Rack to your computer you may get a message that the computer is installing drivers for the USB interface. Wait until that completes and the front panel LED flashes a couple of times a second.
4. Start the program and the dialog box will show
BLUE SKY
AMC RACK BOOTLOADER REV 1.00
and the currently installed firmware.
5. If the dialog windows says
BLUE SKY
AMC RACK REV x.xx
Application unable to communicate with the device
Power off the unit, disconnect the USB cable, and plug the cable back in and restart the program.

6. Hit the UPDATE FIRMWARE BUTTON
7. The updater will update the firmware and read the new firmware version.
8. Close the program, disconnect the USB cable and you are done

UPGRADING THE FIRMWARE IN THE AMC REMOTE

Note: The firmware can only be updated when the remote is disconnected from the rack or the rack is powered- down..

1. Install the Blue Sky AMC Remote Firmware X.XX update tool. The installation tool will create a Blue Sky in the Program Files (0x86) sub-directory and install the update program and the new hex file in that directory.
2. If you get a message that the program requires Elevation and will not run, right click on the installer and click Run As Administrator.
3. Disconnect AMC Remote and plug-in the USB cable. If this is first time you've connected the AMC Remote to your computer you may get a message that the computer is installing drivers for the USB interface.
4. Start the program and the dialog box will show
BLUE SKY
AMC Remote BOOTLOADER REV 1.00
and the currently installed firmware.
5. If the dialog windows says
BLUE SKY
AMC Remote REV x.xx
Application unable to communicate with the device
Power off the unit, disconnect the USB cable, and plug the cable back in and restart the program.
6. Hit the **UPDATE FIRMWARE BUTTON**
7. The updater will update the firmware and read the new firmware version.

Close the program, disconnect the USB cable and you are done

THE AMC CONTROL SOFTWARE

The AMC Control Software is available in two versions One is 32 bit Windows program that will run on both 32 and 64 bit versions of Windows 7, 8, and 10. The second is a OS X version that will run on Yosemite, EL Captain, and High Sierra. This program and is intended for use only with the Blue Sky AMC and will not run without the AMC is connected to the computer by USB.

Both versions of the AMC Control software are available for download. Contact Blue Sky for a download link.

INSTALLING THE AMC CONTROL SOFTWARE IN WINDOWS

Download the setup program and save it to your computer at a location where you can find it. Double-click of the setup program to install it. The installer will create a folder under the program files (0x86) called Blue Sky and install the program in that folder.

INSTALLING THE AMC CONTROL SOFTWARE IN OS X

Download the zip file and unzip it to your desktop or application folder.

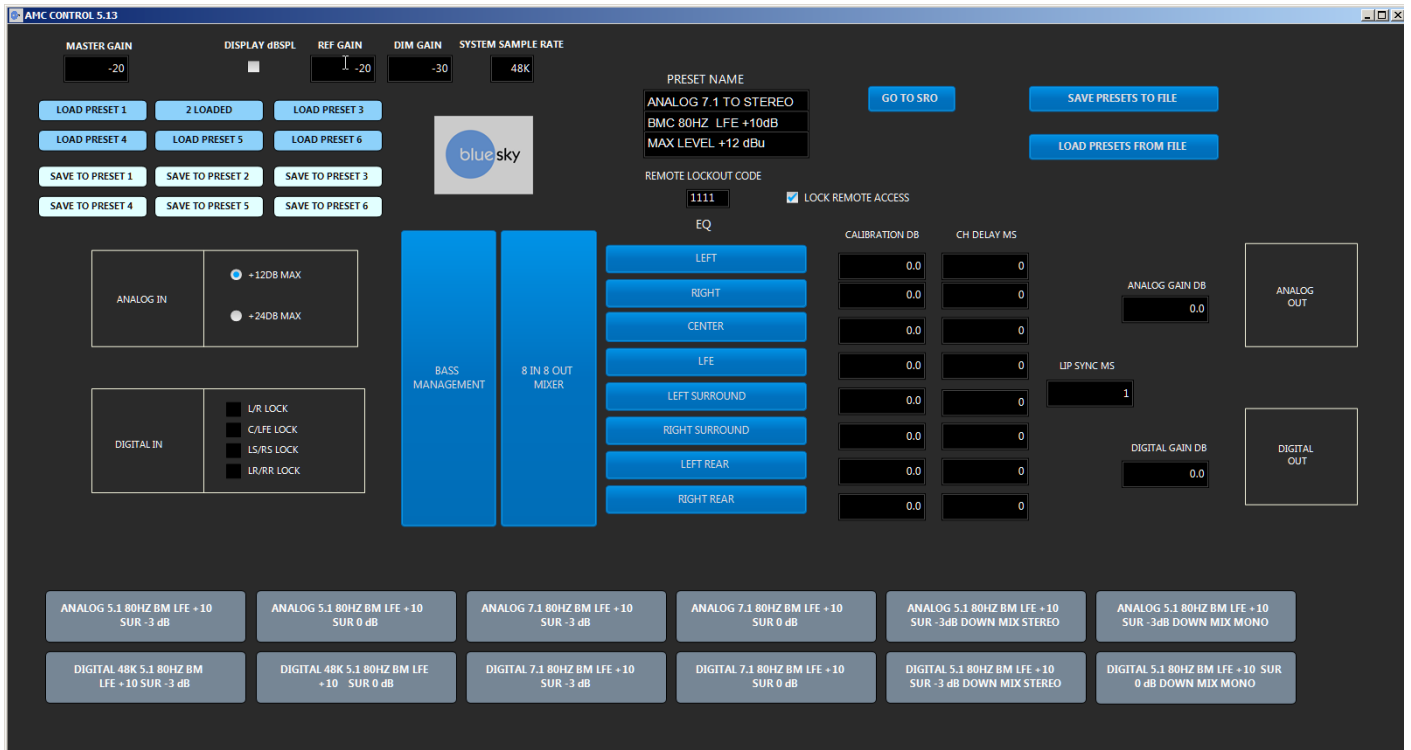
RUNNING THE PROGRAM

Turn on the AMC and wait until the red LED on the front of the AMC is flashing approximately once every two seconds and the remote mute button is lit..

Plug the USB cable into the front of the AMC. If this is the 1st time you have connected the AMC to your computer you may see a message that says USB detected, installing software. Wait till the computer is done and the LED on the front of the AMC goes back to flashing.

If everything is connected you should see the Main Screen:

THE AMC CONTROL MAIN SCREEN



When using the USB interface, the AMC rack and the software are linked so preset changes and parameter changes made on the remote or by the AMC program show on both. The remote update may lag behind the software by a couple of seconds.

NAVIGATING AROUND THE INTERFACE

The blue boxes represent items that are activated when clicked with your mouse. In some cases clicking a blue box will initiate an action. In other cases the box will open up another screen.

The black boxes with white text represent parameters that can be entered directly using the delete key, the backspace key, numerical keypad and the enter key.

The check boxes (square) or radio button (round) represent an either/or setting. For example, if you click the +12dBu Max, the +24dBu Max button is turned off

Master Gain - displays the current master gain of the AMC. This value is automatically updated if the gain control is moved, or if reference and/or dim gain are selected.

dBSPL – displays and edits current dBSPL at current Master Gain setting. This values tracks the Master Gain setting. This value is stored with each preset so when a single AMC is used with multiple speaker setup, each setup can have it own reference. If the DISPLAY dBSPL box is not checked, this box is not visible.

DISPLAY dB SPL – turn the dB SPL display on and off.

Reference Gain- displays the current reference gain setting. The reference gain for this preset can be modified directly by typing in the new value in the box. This value will also be updated if the reference gain setting is changed through the remote

Dim Gain- displays the current dim gain setting. The dim gain setting for this present can be modified directly by typing in value in this box. This value will also be updated if the dim gain setting is changed through the remote

System Sample Rate- shows the current internal sample rate of the AMC. This value can only be changed through the remote.

Loading a preset – loads a preset Click on the blue buttons in the upper left hand corner of the Presets can also be loaded by hitting a button on the remote, which will be indicated on the AMC screen.

Saving a preset – saves the currently loaded preset to the AMC rack. A loaded preset can be saved to itself or to any other preset location.

Preset display – these 3 lines of text are what will appears on the remote when a preset is loaded. Each line of text can be changed directly using the keyboard.

Remote Access Code - a 4 digit access code for the remote menu . Since the preset buttons are used to enter the code, only digits 1 to 6 are allowed.

Restrict Remote Menu Enable- when checked requires the user to enter the correct 4 digit code to access the full Remote Menu.

SRO- opens up the speaker room optimization panel.

Save Presets to File- pressing this button will open up a dialogue to save all presets to a text file. The text file is in a human readable form and has all the parameters the makeup the preset.

Load Presets From File-loads a previously saved preset file.

Analog +12dB/ +24 dB Max switch – Switch the analog IO between +12 and +24 dB maximum output level.

Digital in lock status box – shows whether a digital input has a valid digital signal attached.

16 In 8 Out Mixer- opens up the cross mixer panel (see **CROSS MIXER**)

Base Management- opens up the base management panel (see **Base Management**)

EQ buttons- opens up the channel equalizers(see **EQ**).

Channel Calibration – sets the relative balance between the channels. These values can be

entered directly in the boxes or entered automatically using the SRO procedure. See the Speaker Room Optimization (SRO) section below for more information.

Channel delay in milliseconds - sets the individual time delay for each channel output and is used to time align the speakers.

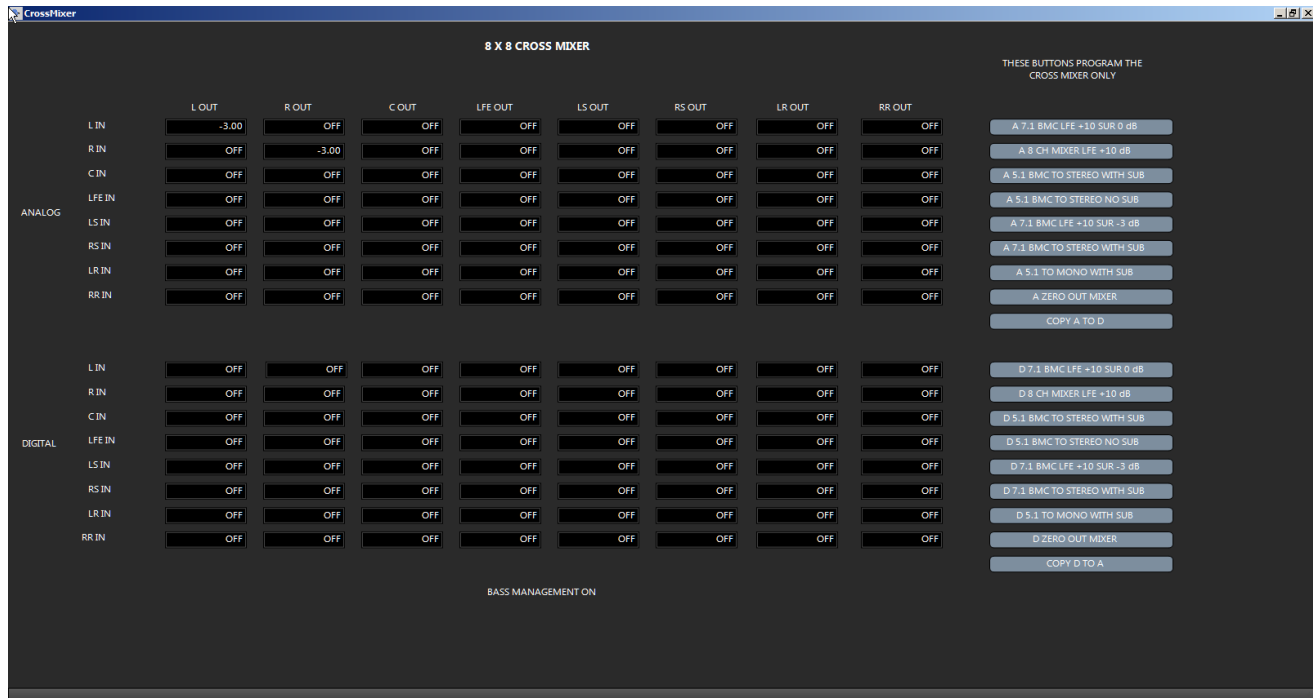
Lip sync delay in milliseconds- set some master time delay for all channels both digital and analog and is used mainly match audio to picture .

Analog gain dB - master offset for the analog outputs and is normally used when operating with digital in and analog out.

Digital gain dB - master offset of the digital outputs and is normally used when operating analog in to digital out

Grey preset setup buttons- the buttons along the bottom of the screen, set up the loaded preset to a common set up values.

CROSS MIXER



The cross mixer screen — when you click on the cross mixer box on the main screen it will open up a new screen as follows. The cross mixer screen shows how each inputs (analog and digital) are routed to each output. The gain can be entered directly in the box or to mute an input type in “off” or ”OFF” in the box. In addition to entering gain values directly in the boxes, you can now double click on the box to set the gain 0,-3 and OFF. The LFE box cycles from 10, 0, to OFF.

If bass management is turned OFF (see **Bass Management**), the non - LFE feeds to the LFE output channel will be disabled and displayed in red indicating that they cannot be changed. If in this state, the user will have to go to the base management screen and turn bass management **ON** before these values can be edited.

The gray buttons along the right side configure the mixer to common settings. These buttons only program the cross mixer and do not affect EQ or crossover values.

Note: In some cases, as in theatrical movies releases, the surrounds are 3 db down from the main speakers. If that is the case, you also want to drop the surround feeds to the subwoofer. For example, you would set LS IN to LS OUT at -3 dB, and then also set LS IN to LFE out at -3 dB.

To go back to the main AMC control screen click the X in the upper right-hand corner of the screen

BASS MANAGEMENT

The blue bass management button will bring up the following screen.



The bass management screen shows the bass management settings for each individual channel and the graphs show the resulting frequency response of the electrical crossovers without the effects of EQ.

The gray buttons along the bottom of the screen preset the crossovers to common values.

For each channel, the type of filter employed and the cutoff frequency of that filter can be selected.

The filter labels have the following meanings:

Bypass	No filter in circuit
LP2	2 nd order 12 dB/oct low pass filter with a Q of .707
LPBW4	Two LP2 filters in series resulting in a 24 dB/oct low pass
LP6	6th order Chebyshev 36 dB/oct filter (typical LFE Filter)
HP2	2 nd order 12 dB/oct high pass filter with a Q of .707
HPBW4	Two HP2 filters in series resulting in a 24 dB/oct high pass

For the feeds to the subwoofer, you have a choice of Bypass, LP2, LPBW4 and LP6 filters.

In addition to the low pass filters for the subwoofer, there are auxiliary high pass filters that can be used on each channel feed to the subwoofer. The choices for the high pass filter are Bypass, HP2

and HPBW4.

Normally these filters are used, when using bass management where you don't want the signal sent to the subwoofer to go down to 20 Hz.

For example, if you're doing editorial work on a soundtrack that is being mixed for a theatrical release, a bass managed system mix can result in too little bass when played back on the theatrical system. This is because front speakers in a theatrical system typically only go down to 40 Hz.

So to get better a translation, you could employ a 40 Hz HP2 or HPBW4 high pass filter on the left, center, and right channels.

The same holds true for surround speakers. In a typical theater setup the surrounds typically do not go down below 60 Hz. Again to get better translatability you may employ a 60 Hz high pass filter on the surround channels.

The AMC system also includes a high pass filter for the each channel.

These filters are not in the subwoofer feeds but on the individual channels. The choices are Bypass, HP2 or HPBW4.

The bypass setting is used when you're not using bass management.

HP2 or HPBW4 are used depending on the actual speaker attached to the channel. If the speaker is made for bass management, (IE Blue Sky SAT6D) then you use a HP2 set to 80 Hz. If however, if the attached speaker is a full range monitor that may go down to 50 or 40 Hz, you'd use a HPBW4 to get a better blend with the subwoofer.

Bass Management on/off - turns bass management on and off. When bass management is **OFF**, all crossovers are disabled except for the LFE filter. When in this mode, none of the filters on the screen can be modified which is indicated in red. To modify any of the filter settings make sure bass management is turned **ON**.

Grey Preset buttons The gray buttons along the bottom of the bass management screen are presets for common bass management setups. **Note:** these presets only affect values on the base management screen and do not program the cross mixer.

EQ



1/3 OCTAVE EQ

31 band EQ- the cut and boost of any band on EQ can be changed by moving the slider with the mouse. The frequency response will automatically reflect an EQ changes

EQ optimize button sets whether the 1/3 octave EQ is used for optimization in the SRO process

UNASSIGNED CHANNEL FILTERS

There are 8 uncommitted filters per channel that can be used for additional EQ beyond the 1/3 octave equalizer.

Optimize- sets whether the filter is used in the SRO optimization process

Active- selects whether the filter is in the signal processing path or bypassed

Filter type- a drop-down menu to select various types of filters available.

Frequency - sets the cutoff frequency of the filter. This value can be changed by typing a new frequency in the box or by double clicking the box and clicking any point on the graph

Q- sets the q of the filter , which can be changed by typing a new value in the box. The value can also be changed by double clicking the q edit box. A slider control will appear allowing Q to be adjusted in real time. Double click the gray area of the slider control to close it.

Boost -sets the cut or boost of the filter. The boost can also be changed by double clicking the boost edit box. A slider control will appear allowing boost to be adjusted in real time. Double click the gray area of the box to close it.

Note: Boost setting have no affect on LP2 or HP2 filters.

Max filter cut DB - sets the maximum amount of cut used in the SRO process, This setting affects the 1/3 octave EQ and uncommitted filters

Max filter boost DB- sets the maximum amount of boost used in the SRO process

Save to Presets - saves the displayed EQ setting to any preset location. This feature is commonly used to copy EQ data from preset to another.

Clear EQ - clears all EQ values on that preset .

Display EQ channel - switches between channel EQ's without having to close out the screen and open another window.

Bypass All EQ Button – This button bypassed all EQ setting without altering any EQ settings. Useful for auditioning trial eq values.

TARGET CURVES

The target curve represents the ideal response of the speaker after optimization. To review or adjust the Target curve for any speaker, open the SRO screen and click on the target curve you want to modify. Starting with Rev 5.05 all target curves are saved in the AMC Rack with the presets.



The target screen contains the following items:

Target Filters – the target filters are used to construct the target curves. In many situations the target filters are automatically selected from the values entered in the bass management panels, which is the default setup for Blue Sky speakers using bass management.

If the target curves are not appropriate for your application, you can construct a custom target curve using any or all filters.

Note: Not all the values in the boxes are used for all filters. For example, the slope, dB/oct, and Q are not used for HPBW4, etc. If you change a value and there is no change in the graph, that parameter is not used. Also, the HP Shelf and Low Pass Shelf are not “real” shelving filters but special target filters. “Real” shelving filters have slopes that are multiples of 6 dB /oct. For an example, in post-production, near-field monitors used for editing may require a 3-dB/oct roll-off above 4 kHz so the sound matches speakers on the dubbing stage. Although a 3 dB target curve can be constructed with conventional filters, it may take 6 or more separate filters and a lot of experimentation to get the target curve you want. However, with the special target shelf filters, it is much easier.

Target Scale Low and High Freq – the software uses the frequencies between these to calculate the avg. microphone level and this is used to adjust the target curve so it “floats’ with the drive level. These frequencies are usually selected to be in a flat portion of the measured curve.

Low and High Target Freq – the optimizer only works in the frequency range located between these two points. Any frequencies outside this range are excluded from the optimization process, allowing you to limit the range of optimization. For example, you may not want to try to optimize a subwoofer flat to 20 kHz. Or, for instance, you might only want to optimize for a narrow area between 100 Hz to 500 Hz. it’s best to keep the low target frequency at the -3 db point of the measured speaker. Trying to correct below this point usually leads to excessive boost at low frequencies due to noise floor issues.

GATE TIME MS – the AMC uses the maximum length frequency (MLS) method to measured the impulse response of each speaker. The impulse response is converted into frequency response by using a FFT with a gated time window time. The length of the gate control the low frequency limit of the measurement.

Grey preset buttons- the gray buttons along the bottom after optimization of the screen set the target curve for many common setups

Note:

All frequencies values can be set by directly entering frequencies enter directly or by double clicking the box and clicking any point on the frequency graph.

SPEAKER ROOM OPTIMIZATION (SRO)

OVERVIEW

SRO is a system for measuring the acoustic response of a speaker system and correcting the speaker system to a target frequency response.

Note: if a valid USB audio interface is not found the measurement function will be disabled.

The measurement portion of SRO uses a special noise signal called a maximum length sequence (MLS). Unlike white or pink noise, MLS signals have unique properties that allow them to be used to calculate the impulse response of a speaker, which contains the complete frequency, phase, and time response of the speaker.

Once, you have obtained the impulse response, with the use of a fast Fourier transform (FFT), it is easy to calculate the frequency response of the speaker. Once the frequency response is obtained, the next phase is optimizing.

During the optimization process, the uncorrected frequency response of the speaker is compared against a desired frequency response called the target curve.

The target curve can be an "X" curve, a flat frequency response curve or an arbitrary curve that the user created.

The software then compares the speaker response against the target and generates an error value. The error value is a quantitative measure of how well they match. The larger the error the worst the match.

The software uses filters (like a 1/3 octave equalizer) to correct the frequency response of the speaker to lower the over all error (IE. a better match).

It does this using a genetic mutation algorithm called BOO, which generates thousands of different EQ settings and determines which one gives the best match to the target curve

Once BOO picks the best match, the user has the option of accepting it or tweaking manually form there.

One last point. The SRO program will correct many frequency response problems but it does have limitations. It will not give repeated reliable results if the room is too noisy. It will not make a poorly designed room with poor acoustic treatment sound like a well designed room.

ADDITIONAL EQUIPMENT YOU WILL NEED

The Blue Sky SRO program uses an inexpensive USB audio interface and measurement microphone to generate test tones and measure the frequency response of the speakers attached to the AMC.

You will need the following:

1. Measurement microphone - the recommended choices are the Dayton Audio EMM-6 or Behringer ECM8000. However, it is possible to use other high quality other measurement microphones, but the above are known to work fine, and are relatively inexpensive.
2. USB Interface - the ART USB Dual PRE is the recommended USB audio interface used for measurement. It is an inexpensive system with dual microphone preamps, dual audio outputs, operates at 48 kHz and has a phantom power supply for the measurement microphones. It uses the built-in driver for windows.
3. Microphone stand.
4. 2 - 1/4" TRS- to XLR male microphone cables. One can be short (1.5 ft) for the loop back connection and one should be long enough to connect to the speaker.
5. XLR microphone cable for the measurement microphone

SETTING UP THE ART USB DUAL PRE in WINDOW

1. Plug the short TRS to XLR male cable from the Dual Pre right output to the Dual Pre right microphone input.
2. Set the mix fader to computer (Max CW).
3. Set the output level straight up (12 O'clock).
4. Press the phantom switch to on.
5. Press the power to on.
6. Plug the measurement microphone into the Dual Pre left microphone input.
7. Set the left gain to 16.
8. Set the right gain to 1.
9. Plug the USB cable from the computer into the ART USB interface on the back. If the 1st

time the device is connected to the USB port you'll get a driver installation message.

10. Setup the ART as the default playback device and set its Playback properties. Windows Control Panel-> Sound-> Playback ->USB Audio CODEC -> Set Default Properties->Advanced-> 16 bit, 48000Hz (DVD Quantity) -> OK.
11. Setup the ART Dual Pre as default recording device and set its recording properties. Windows Control Panel-> Sound->Recording->Microphone USB Audio CODEC ->Set Default Properties-> Listen-> Uncheck ->Listen to device Properties-> Levels-> 100. Properties-> Advanced-> 2 channel 16bit, 48000 Hz ->OK.

Note: If you disconnect the ART Dual Pre from your computer, you may have to go through this process again.

SETTING UP THE ART USB DUAL PRE IN OS X

1. Plug the short TRS to XLR male cable from the Dual Pre right output to the Dual Pre right microphone input.
2. Set the mix fader to computer (Max CW).
3. Set the output level straight up (12 O'clock).
4. Press the phantom switch to on.
5. Press the power to on.
6. Plug the measurement microphone into the Dual Pre left microphone input.
7. Set the left gain to 16.
8. Set the right gain to 1.
9. Plug the USB cable from the computer into the ART USB interface on the back. If the 1st time the device is connected to the USB port you'll get a driver installation message.
10. Go to System Preferences ->Sound and Verify the USB Audio CODEC is listed in the Input and Output Panel.
11. Go to Applications ->Utilities-> Audio MIDI Setup
USB Audio Codec ->Output-> Format 48000 2ch-16 bit Integer

Ch->Volume-> Both 0 dB

USB Audio Codec ->Input-> Format 48000 2ch-16 bit Integer

Note: If you disconnect the ART Dual Pre from your computer, you may have to go through this process again.

GUIDELINES ON MICROPHONE SETUP

Typical small diaphragm measurement microphones have an omni-directional response pattern over most of the audio band with a slight narrowing of the pattern as frequency of approach 20 kHz

Most speakers on the other hand, have an omni-directional pattern only at frequencies below 1kHz. Based on these characteristics, here are some general guidelines on setting up measurement microphones:

1. The height of the microphone should be placed at ear level.
2. Most of the frequency response problems in rooms are related to standing waves and boundary effects which occur at frequencies below 1KHz, and typically below 200 Hz. If this is the main area the user wants to focus on, the exact aiming of the microphone to the speakers is noncritical. The mic can be pointed at the speaker, or at an angle of 45°, or straight up. Many users find that straight up[gives the best response.
3. If you're interested in correcting frequencies over the full audio bandwidth, and the mixing position is within 1m to 2 meters, you should point the microphone towards the speakers for best results.
4. In larger rooms, where the speakers are many meters away from the mixing position, the direction the microphone is pointing is less critical, and the recommended microphone position is pointing straight up.
5. In all cases, if you are unsure of your microphone placement you should do a couple of trial measurements to see which position is best.

USING THE SRO PROGRAM (SIMPLE SET UP)

1. Connect the ART USB Dual Pre output to Analog 8 In on the AMC
2. Connect the ART USB cable to the a USB 2.0 port.
3. Using a microphone stand set the measurement microphone at your listening position and at ear height.
4. Connect the microphone to the **LEFT Input** on the ART USB Dual Pro. Set the **Left Gain** control on to 18.
5. Connect the **RIGHT Output** of the ART to the **RIGHT Input**. Set the **Right Gain** to 3.
6. Connect the **Left Output** of the ART Dual Pre to the **CH 8 analog** input on the **AMC**.
7. On the rear of the ART set the **MIX Knob** FCW to **Computer**.
8. On the rear of the ART set the **LEVEL** knob to 12 o'clock (straight up)
9. On the rear of the ART press the **PHANTOM IN**.
10. On the rear of the ART press the power switch in

STARTING THE SRO PROGRAM

Once the AMC Control program is running, click the SRO button in the right hand corner of the main screen. The following screen will pop up.



This screen shows the current state of the EQ, target filters, measured frequency response and corrected frequency response of all the channels. Clicking on any of the small graphs will open up a larger graph.

Measure- measures the selected speakers. You must have at least one speaker selected for the measure button to be active.

Optimize - Starts the optimization process on the selected the speaker response to the target curve. You must measure the speaker before the optimize button is active.

Clear EQ - clears the EQ on the selected channels.

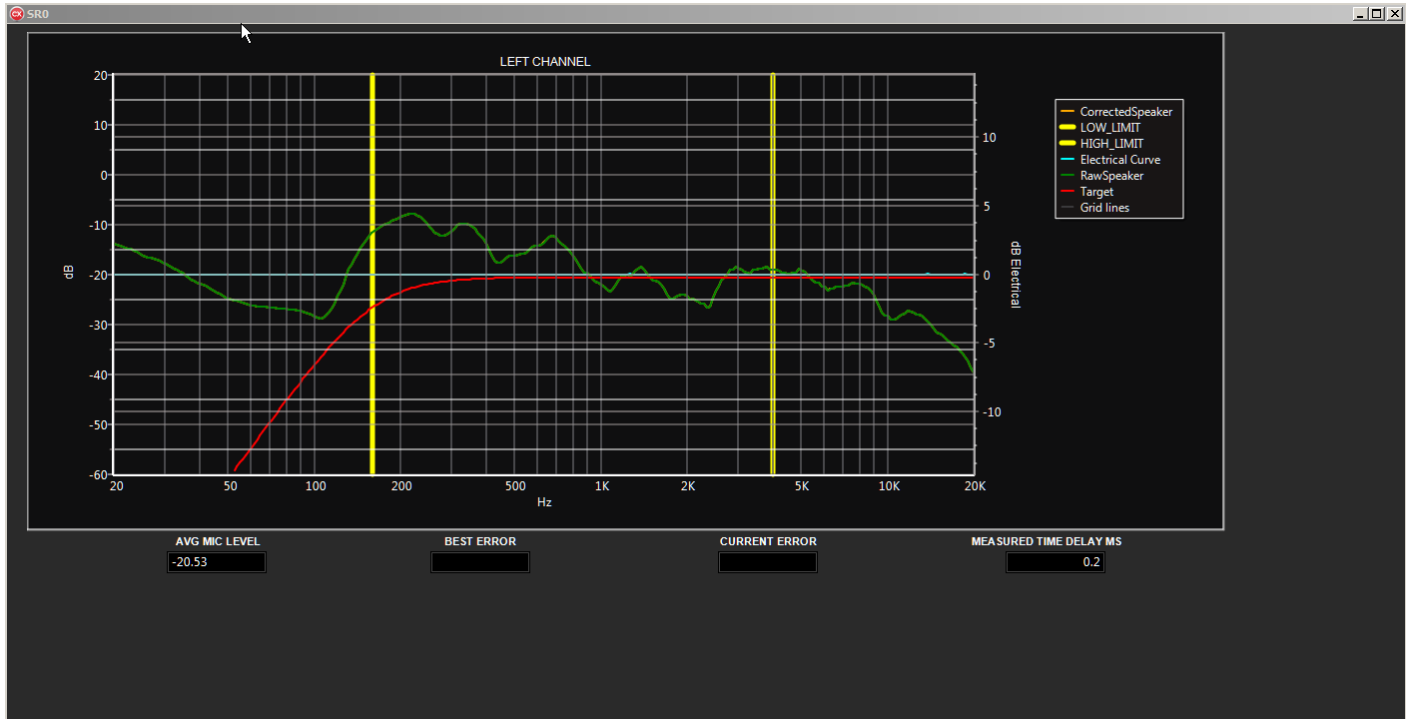
USB audio in - shows a compatible audio USB interface input, normally the ART Dual Pre

USB audio out- shows a compatible USB audio interface output normally the ART dual Pre

MAKING A MEASUREMENT

Set up the microphone and USB Audio Interface first!

FREQUENCY RESPONSE CURVE



GREEN curve is the measured frequency response.

RED curve is the target response.

BLUE curve is the electrical response of the EQ

Orange curve is the calculated corrected response

The two vertical yellow bars are the target range

AVG MIC LEVEL - measured microphone level. This is the average level between the Target scale low and high frequency limits.(Green lines on the target curves). The optimum level avg microphone level is -20 dB >

If the level is low, increase the gain on the remote control. If the measured response is too low, the noise floor of the room and or the microphone may prevent an accurate measurement.

Normally when optimizing a Blue Sky SAT6D, the remote gain control is set for 0dB.

BEST ERROR - during optimization, the program calculates deviation from the target curve and displays an error number. The best error is the closest match so far.

CURRENT ERROR - the current calculated error for this pass of optimization

MEASURED TIME DELAY - measured time delay between the speaker and the microphone in milliseconds. This includes any processing delays inside the AMC.

OPTIMIZING USING 1/3 OCTAVE FILTERS

1. Set up the desired target curves and the optimization frequency range
2. Select the 1/3 Octave for optimization and maximum and minimum cut and boost to use for optimization
3. Select and measure speakers you want to optimize
4. Press the **Optimize** button
5. The program will open a pop-up screen showing the speaker being optimize, the current results, and the best results so far. The optimization process calculates the least squared error between the target curve and the corrected frequency response over the range between the two yellow lines. The program will not try to optimize any filters or areas outside of the yellow lines. The program will automatically jump to the next speaker when the program can no longer find a better match. However if you're happy with the current results you can cancel optimization by double-clicking the blue stop optimization button.

Note - You can stop optimization at any time by double-clicking the **Stop Optimization** button.

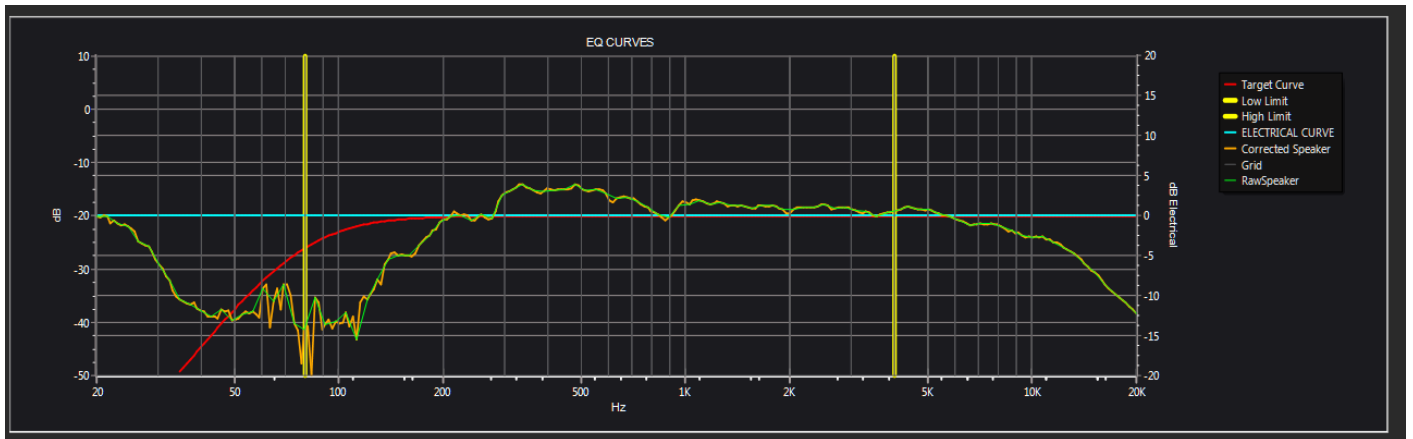
6. If you are happy with the results, click the **SAVE PRESET** button (on the Main panel) to save the EQ value to the flash memory of the AMC.
7. If you are measuring and optimizing more than one speaker, the optimization process will balance the level of each channel and adjust the time delay to time align the speakers with each other. Those values will show in the Ch Delay (ms) and Calibration (dB) on the main AMC control.

OPTIMIZING USING 8 UNASSIGNED FILTERS

The parametric filters are mainly used to reduce peaks in the frequency response or when you need to match an x curve response. As a general rule it is a bad idea to use parametric filters to fill in deep dips. Unlike optimizing using the 1/3 octave equalizer, optimizing using the free filter is more a semi-automatic process.

1. Define your target curve
2. Measure the speakers.
3. Go to the **EQ** page, and find the peaks you want to reduce.
4. Uncheck the "**OPTIMIZE USING 1/3 OCT EQ**" checkbox
5. Select the filters you want to use. IE one peak one filter etc.
6. Then one by one per filter double click the frequency box of the filter and then the peak on the frequency graph.
7. Go to the **Target page** and adjust the **LOW TARGET** frequency and **HIGH TARGET** frequency to include the desired frequency band. Because the optimizer will not adjust filter frequencies outside the Low and High target , include set the low limit below the lowest peak and the High frequency above the highest peak frequency.
8. Select the frequency range by adjusting the lower and upper target limits (vertical thick yellow lines).
9. Return to the main screen, click **OFF** the box **Optimize using 1/3 Octave EQ**.
10. Activate the number of filters you want to use by clicking the Filter Optimize Box.
11. Press the **OPTIMIZE**
12. The screen will show the optimization in process with live updates. The optimization process calculates the least squared error between the target curve and the corrected frequency response over the range between the two yellows lines. The program will not try to optimize any filters or areas outside of the yellow lines. However if you're happy with the current results you can cancel optimization by double-clicking the **STOP** button. When the optimization is complete the program will automatically jump to the EQ screens he can make any manual adjustments that you may desire.
13. If you are happy with the results, click the **SAVE PRESET** button to save the EQ value to the flash memory of the AMC.

To illustrate the process, here is a measurement of a left speaker

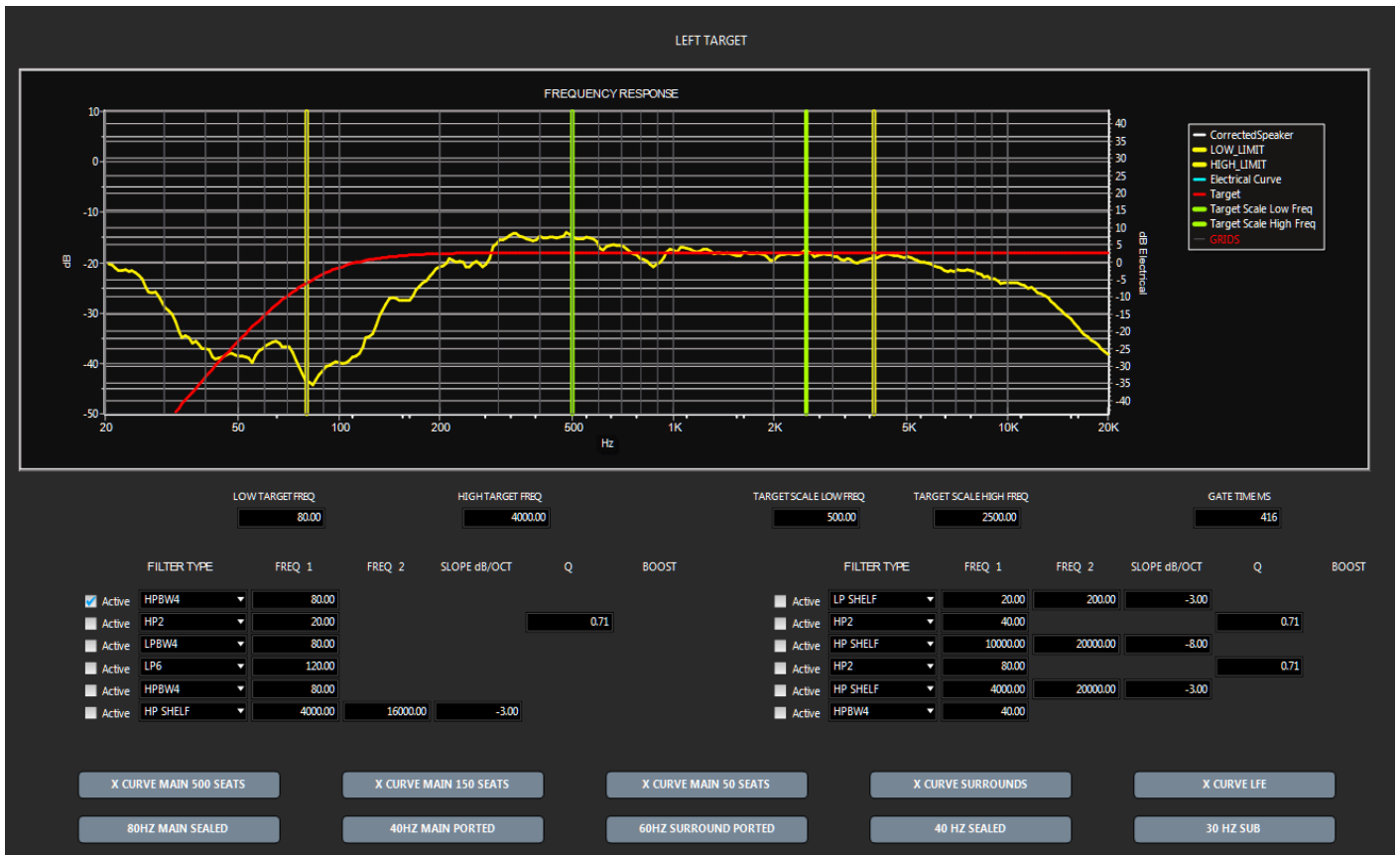


There is a broad peak at approximately 450 Hz, that we want to reduce using one parametric filter.

1. We have selected one parameter filter, double clicked on the frequency box and the graph to the approximate center of the peak. This sets 470 Hz in the frequency box.

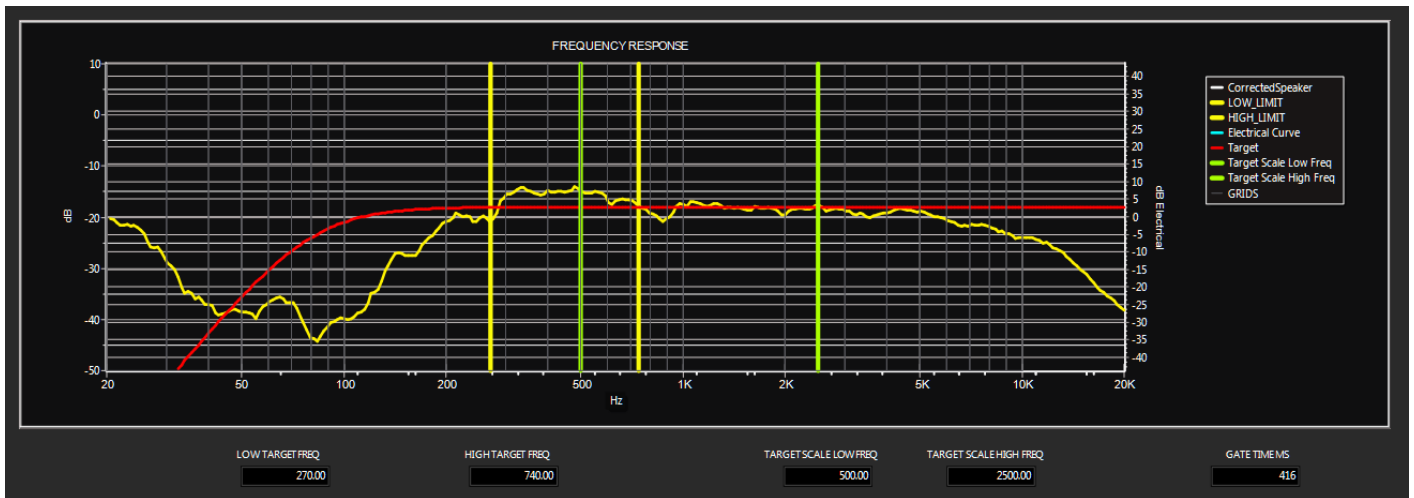


2. Go to the target curve screen and you can see the frequency range is the default 80 to 4 khz



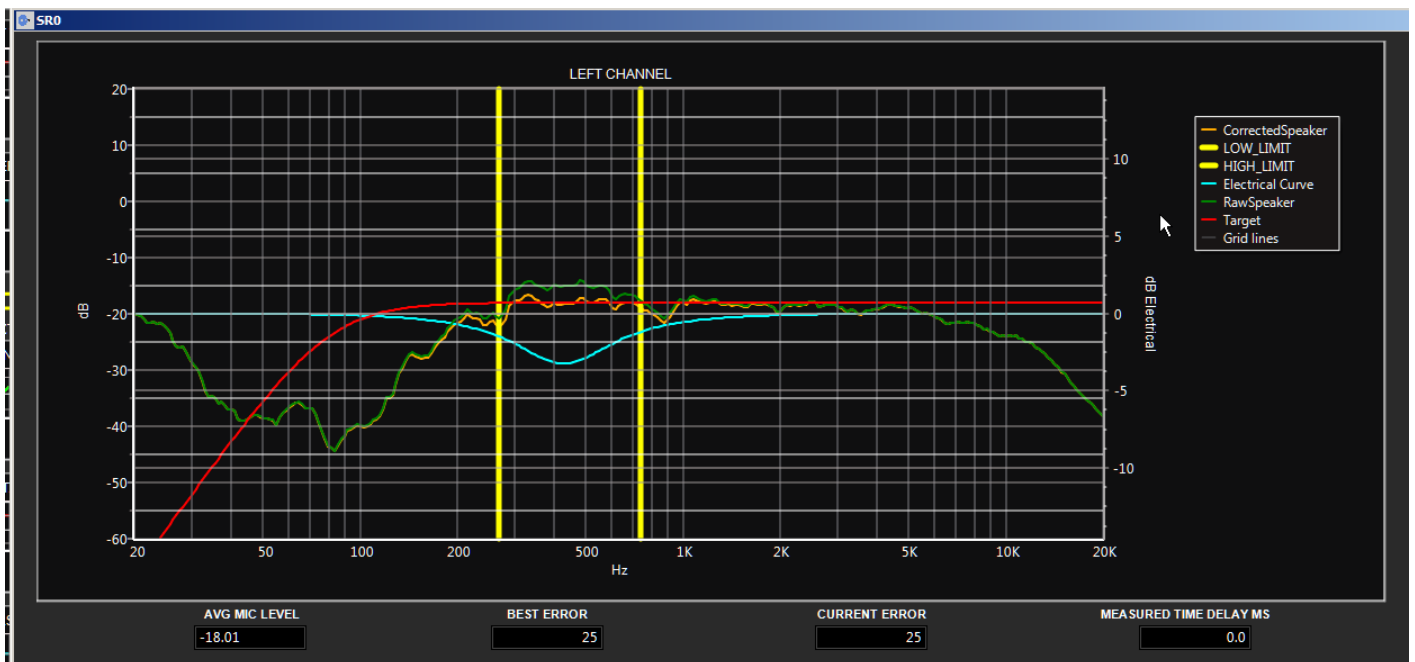
3. Double click on the LOW TARGET FREQ and the graph to set the low target to the low end of the peak.

4. Double Click the HIGH TARGET FREQ and the graph to the high target



5. Go to The SRO screen and hit **Optimize**.

Here is the result



CALIBRATING THE AMC TO DISPLAY dBSPL

Firmware and software versions 5.13 and above allow the AMC remote to display dBSPL in addition to system gain. The relationship between system gain and displayed dBSPL is a user define value that must be manually input after the system is equalized and each channel calibrated.

To set the correct dBSPL level do the following:

1. Download the Blue Sky Calibration Test Files at <http://abluesky.com/support/blue-sky-calibration-test-files>.
2. Complete EQ'ing and optimizing your speaker system including channel calibration.
3. Follow the Blue Sky Calibration instructions and measure the SPL of the center channel at the listening position.
4. Without changing the Remote Master Gain setting go into the menu and adjust the dBSPL setting to match the reading of your SPL meter. Alternately, you can directly enter the value on the AMC Control software.
5. Click the dBSPL Display checkbox.
6. Repeat for other presets if needed.
7. You will have to repeat the procedure, if you make significant EQ or level changes.

AMC SPECIFICATIONS

Analog Noise Floor -106 dBu / -96dBu (20 Hz - 20 kHz flat) +12/+24

Analog Dynamic Range 118 dB

Maximum Analog Input +12 dBu / +24 dBu

Maximum Analog Output +12 / +24 dBu

Analog THD + N, .002% +4 dBu In (20 Hz -20 kHz)

Digital THD + N .00002% -20 dBFS (20 Hz - 20 kHz)

Digital In Lock Range 44.1 kHz -192 kHz

Frequency Response 10 Hz – 22 kHz +0,-1dB

Lip Sync Delay 0- 176 ms @ 48 kHz

Channel Delay 0 -27 ms @ 48 kHz

Internal Processing Sample Rate 48 kHz / 96 kHz

Input power 90 to 240 V AC 50/60 Hz 42 watts

Chassis 19" rack 1 U high

Note: All specifications are typical and subject to change without notice.