



AUDYSSEY™
LABORATORIES

MultEQ-X User Guide

Table of Contents

Introduction	5
Getting Started	5
Important Safety Precautions	5
Audyssey Technologies Supported by MultEQ-X	5
• Setup	5
• MultEQ / MultEQ XT / MultEQ XT32	5
• Dynamic EQ.....	5
• Dynamic Volume.....	5
Software Compatibility and Installation.....	6
Installing MultEQ-X.....	6
Uninstalling MultEQ-X	6
Compatibility.....	6
Windows Requirements	6
Special Notes for Mac Users.....	6
Preparation of Audio Equipment	7
Amplifier or Preamplifier Configuration	7
Subwoofer Configuration	7
Amplifiers	7
Overview.....	7
Navigation	7
Files	8
Account Sign-In and Licenses.....	8
Sign-In.....	9
Licenses	11
MultEQ-X Calibration	13
Welcome	13
Connect.....	14
Troubleshooting Connection	14
Channel Selection.....	15
Microphone Selection	16
Adjust Sub Levels.....	17
Measure	19

Measuring the First Position.....	19
Measuring Subsequent Positions.....	20
Tips for Taking Measurements.....	20
More Measurement Features.....	21
Design Target Curve	23
Type.....	24
Channels.....	25
Cutoff Mode	25
Target Curve Components.....	26
Reasons to adjust the target curve.....	28
Filter Settings	29
Calibration Settings	30
Finalize.....	32
Dynamic EQ Reference Level Offset.....	32
Dynamic Volume Mode	33
Calibration Wrap-up	34
Audyssey Recommended Demos.....	35
Technical Support	36
Trademarks.....	36



AUDYSSEY

LABORATORIES

Create New Configuration

Open Existing Configuration

Introduction

Many Audyssey MultEQ® enabled products support calibration using the MultEQ-X PC application. Users run the MultEQ-X application, perform measurements, and transfer MultEQ filters from the desktop or laptop PC to the Audyssey MultEQ-enabled product. The steps for completing this installation are described in detail in this User Guide.

Getting Started

- Install the MultEQ-X software using the Microsoft Store built into Microsoft Windows 10 or 11. Search for Audyssey MultEQ-X, or open the following link (opens on Windows 10 or 11 computers): [Audyssey MultEQ-X in the Microsoft Store](#) See *Software Compatibility and Installation on page 6*
- Sign into the application using a Microsoft account. See *Sign-In on page 9*
- Purchase a license key for the target AVR. See **Error! Reference source not found.***Error! Bookmark not defined.*

Important Safety Precautions

Please review the product's owner's manual in detail to ensure safe operation before calibrating with MultEQ-X.

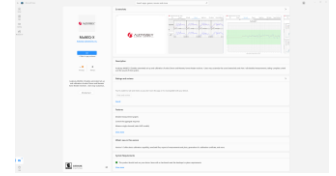
Audyssey Technologies Supported by MultEQ-X

- **Setup** – MultEQ-X measures the speaker system and calculates trims, delays, and suggested bass management settings based on the in-room acoustic response.
- **MultEQ / MultEQ XT / MultEQ XT32**– This technology automatically customizes your home theater system to overcome the acoustical problems specific to your room. An optimized audio system provides the most clear and balanced sound possible. It is the basis for the rest of Audyssey's technologies.
- **Dynamic EQ** – As the volume is turned up or down, Audyssey Dynamic EQ maintains consistent bass response, tonal balance, and surround impression.
- **Dynamic Volume** – This technology controls volume levels to eliminate spikes and raise soft dialog for more enjoyable television and movie viewing.

Software Compatibility and Installation

Installing MultEQ-X

Install the MultEQ-X software using the Microsoft Store built into Microsoft Windows 10 or 11. Search for Audyssey MultEQ-X, or open the following link (opens on Windows 10 or 11 computers): [Audyssey MultEQ-X in the Microsoft Store](#)



Uninstalling MultEQ-X

Find MultEQ-X on the Windows Start menu. Right click on the icon and select “Uninstall”

Compatibility

Windows Requirements

MultEQ-X runs on Windows 10 systems, version 1809 (October 2018 Update, AKA “Redstone 5”) Build 17763 or newer. The software is x64 native. Windows 11 is also supported.

Windows 11 ARM versions (running natively on a system with an ARM CPU) have been tested to run MultEQ-X x64 in emulation mode.

Special Notes for Mac Users

Apple Mac M1 support is not available at this time. Intel-based Mac computers CAN run Windows 10/11 in bootcamp or virtualization, and will run MultEQ-X well.

New Mac computers are based on the Apple M1 processor, which is an ARM-based processor. At the time of writing, they no longer officially support running Windows in Bootcamp. Running MultEQ-X in Windows ARM natively on the Mac M1 is not supported by Apple or Microsoft, and so MultEQ-X is not tested and not supported in this configuration.

Mac computers can also run Windows 11 ARM in emulation, such as with VMWare Parallels. This configuration is NOT supported because Windows 11 ARM would require x64 virtualization to run MultEQ-X, but multiple layers of emulation are not possible. Check the Windows Store page for an ARM version of MultEQ-X, which will be supported as soon as possible.

Preparation of Audio Equipment

Amplifier or Preamplifier Configuration

Set the Amp Assign, Pre-out Assign, XLR Out Polarity and Subwoofer Configuration in the receiver or preamplifier menus as necessary. This must be done before calibration start; speakers disabled in the Amp Assign will not show in MultEQ-X. If these settings are changed after completing the MultEQ-X calibration, MultEQ cannot be enabled and the calibration will have to be performed again with the new settings.

Subwoofer Configuration

Configure the input of each subwoofer to disable or bypass any low-pass filter present. This might be accomplished with a switch or by using a different input (sometimes labeled “LFE” or THX). If the low-pass filter cannot be defeated, turn it to its maximum frequency or THX setting. Bypassing the low-pass filter gives MultEQ-X the most flexibility in calculating filters and crossover values. This will provide the best blend between satellite and subwoofer speakers.

Any subwoofer gain controls should be set to their nominal settings, such as at the THX position or at 12 o'clock on a conventional level control.

Phase or polarity controls, if they exist, should be set to 0° or “normal.”

Disable any “Auto,” “Standby” or “Sleep” mode that may turn off the power to the subwoofer if no signal is received. This will ensure that the subwoofer is always on and ready to output the MultEQ test signal. Failure to disable this mode could mute the beginning of the test signal, giving inaccurate subwoofer measurements.

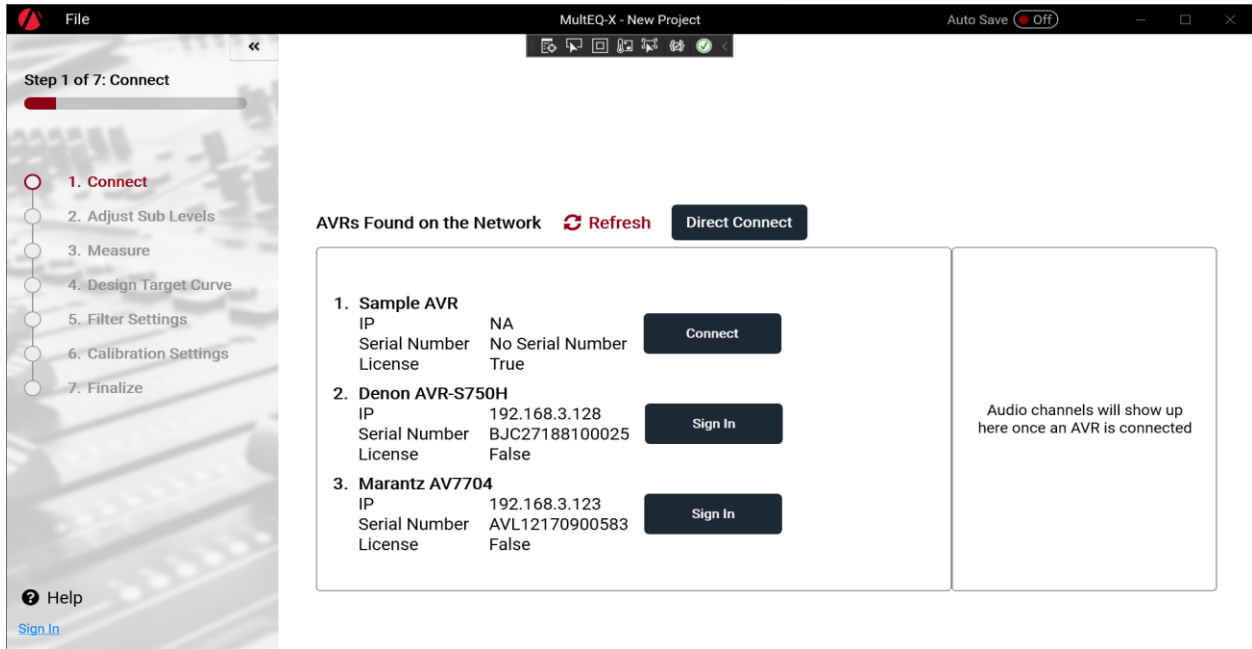
Amplifiers

Turn on all amplifiers, disabling any “Auto,” “Standby” or “Sleep” mode if applicable. If a gain control is present, turn it to its “THX” setting, if applicable.

Overview

Navigation

The MultEQ-X application consists of a series of screens leading the user through the calibration process. Navigate through the application by using the links in the Navigation (left) pane.



The Navigation pane will automatically collapse and pop-out as needed. The button [>>]/[<<] at the top of the Navigation pane can be used to override the automatic behavior.

Files

Upon opening MultEQ-X, you may choose to create a new configuration or open an existing configuration. A configuration is a file that contains all measurements and settings that are editable by the application.

On installation, the file extension “.mqx” is associated with MultEQ-X so that double clicking files in the Windows file system will open MultEQ-X and load the file.

Note that the connected AVR is NOT part of the file, and that a file may be used with a different make/model AVR, even if the channel configuration is different. In this case, some screens of the application will contain data that is greyed out because the associated channel is not present in the configuration of the currently selected AVR.

Use the File menu in the title bar to save and load .mqx configuration files.

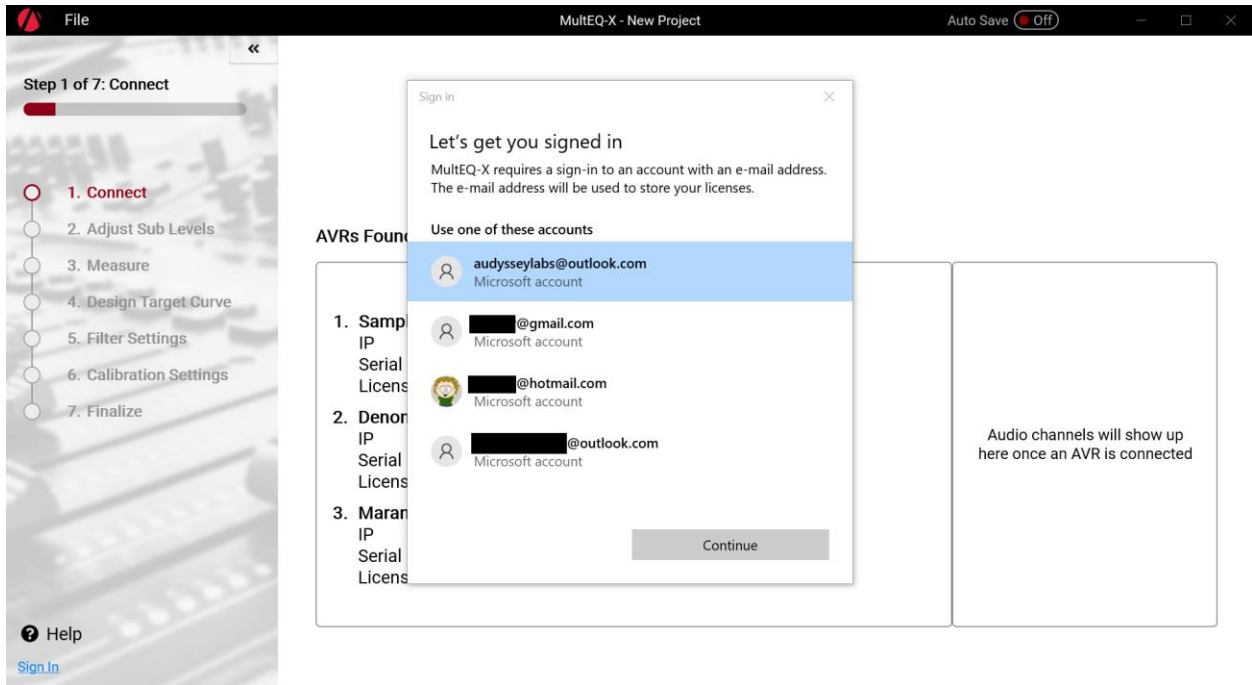
TIP: In order to save a “house” target curve, you may create a file by connecting to an AVR with the desired channels, then create the target curve before measuring. Save this file. Then, when you would like to use the target curve subsequently, open the file with the custom target curve(s) before connecting to an AVR and starting a new measurement set.

Account Sign-In and Licenses

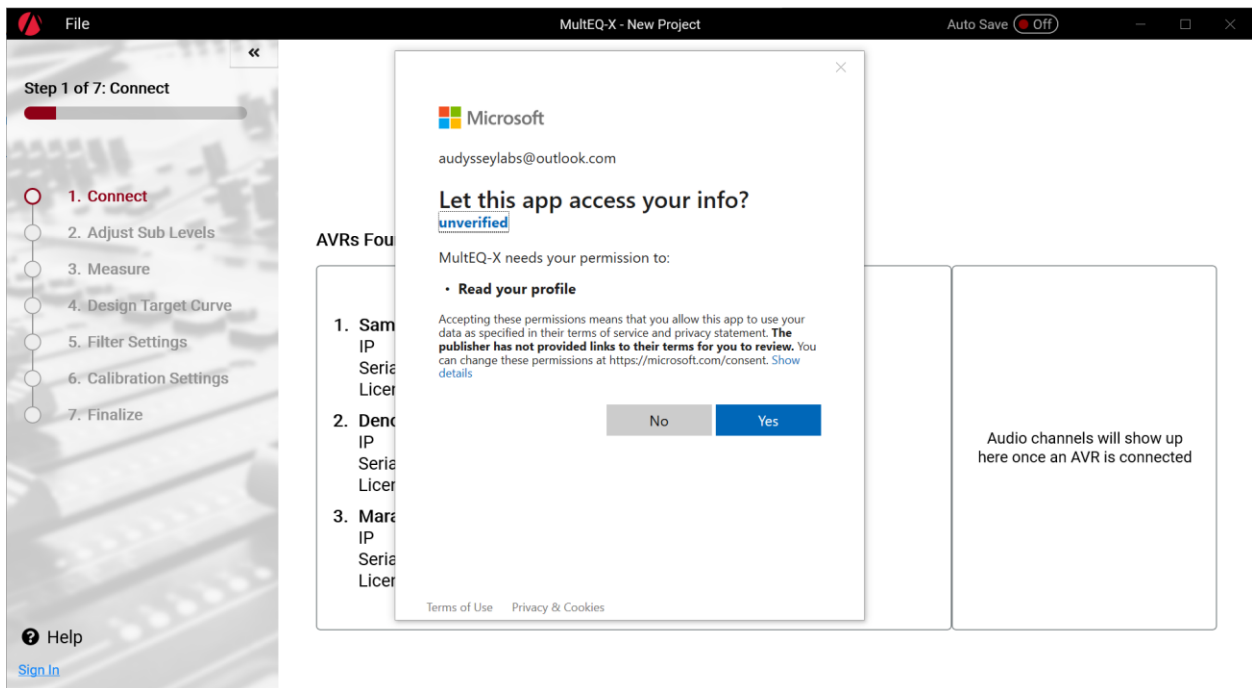
MultEQ-X may be used with the Sample AVR without sign-in. Calibration of your AVR requires sign-in and a valid license. A Microsoft account is required.

Sign-In

Click “Sign In” either on the Navigation pane or next to any listed AVR to sign into your Microsoft account



Select your account from the Windows system dialog that is displayed.



Click “Yes” to allow MultEQ-X to read your e-mail address from your account profile. This consent is required in order for you to use MultEQ-X with your AVR. Your e-mail address is the only information read from your profile, and it is used to associate your AVR licenses with your account. Your information will never be sold to any third party. Use of your e-mail address for contact purposes is exclusive to Audyssey Laboratories and is by your permission only. You may opt out on the user page of the application by clicking your username at the bottom of the Navigation pane. See the privacy policy at <https://www.audyssey.com/privacypolicy.pdf>

Licenses

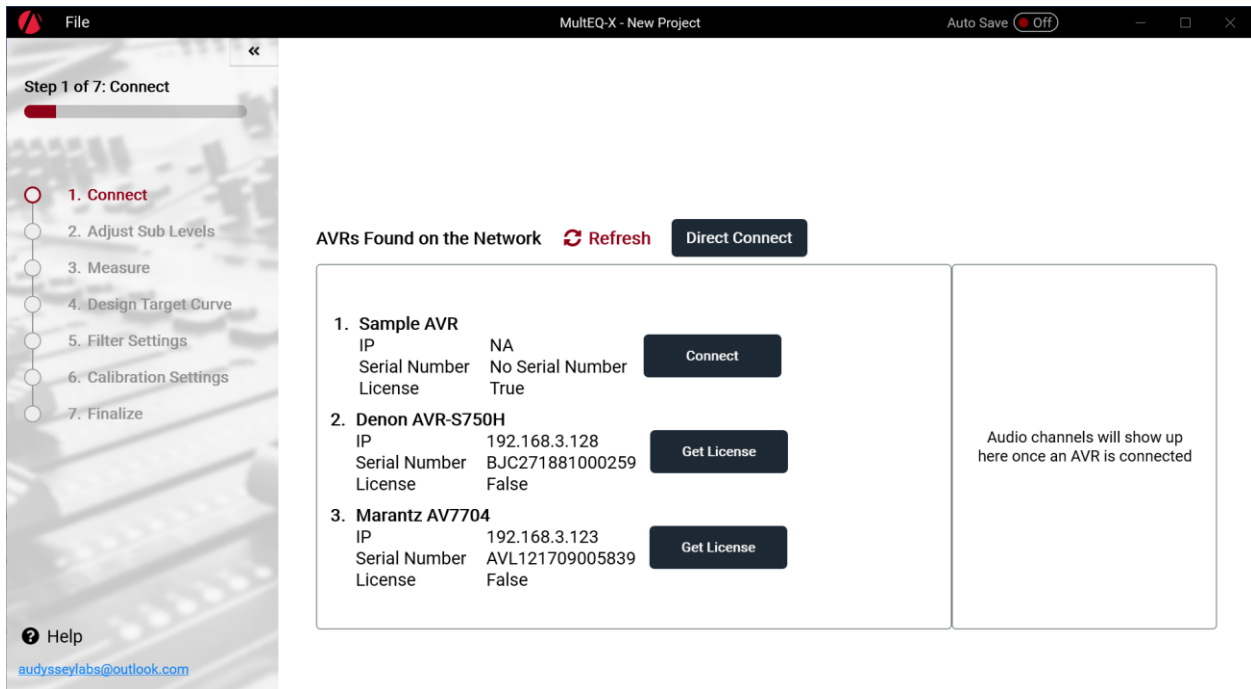
A license is required for every AVR to be calibrated. The license is specific to the exact serial number of the AVR that is connected. Licenses are NOT transferrable between users.

The licensing system requires communication over the Internet. Ensure the laptop / desktop PC is online and connected to the Internet before continuing.

When you upgrade or replace your AVR, a new license must be purchased. If your AVR is replaced under warranty or repaired in a way that the serial number changes, please contact [Audyssey Support](#) to arrange for an update to your registered serial number.

IMPORTANT: Regardless of the Microsoft Store account used to purchase the license, the license will be associated with the Microsoft Account you use to log into MultEQ-X. For most users, these will be the same account, but users who share a computer may have different accounts logged into each of MultEQ-X and the Microsoft Store.

Once you have logged into MultEQ-X, you will have a list of AVRs found on your network. See *Connect on page 14* for more information on connecting to an AVR. Discovered AVRs that have not yet been licensed will show up with a “Get License” button.

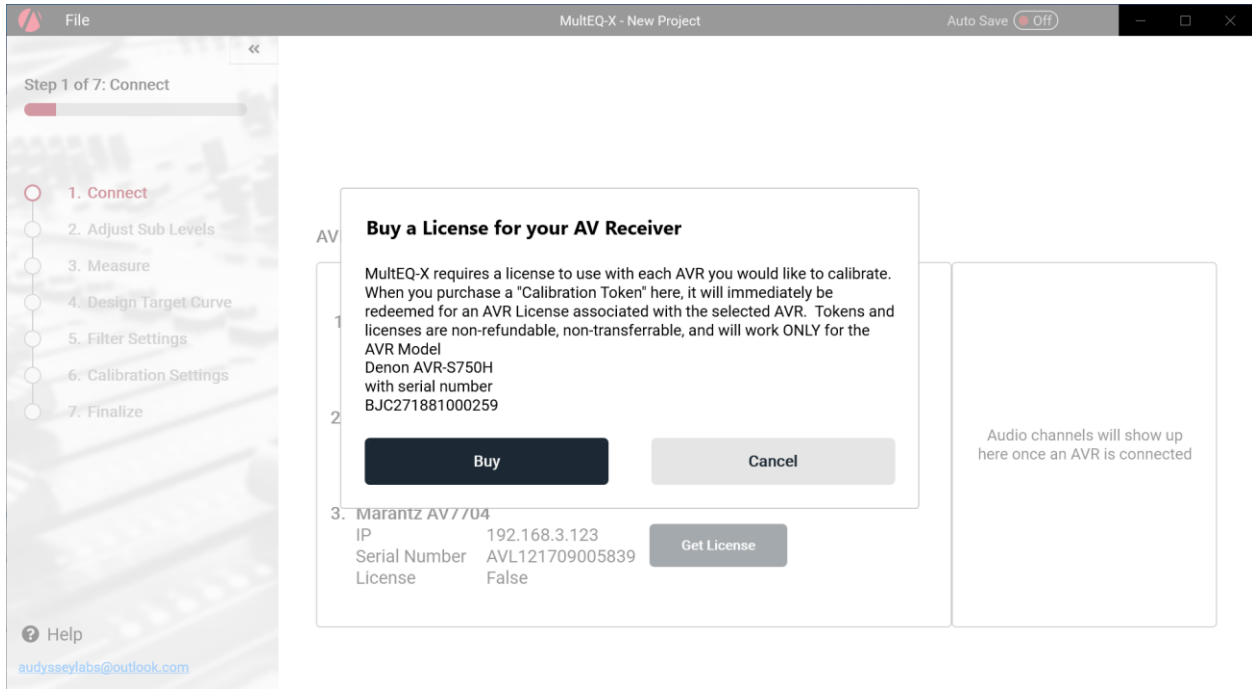


The screenshot shows the MultEQ-X software interface. The window title is "MultEQ-X - New Project" and the "Auto Save" status is "Off". On the left, a progress bar indicates "Step 1 of 7: Connect". A vertical list of steps is shown: 1. Connect (selected), 2. Adjust Sub Levels, 3. Measure, 4. Design Target Curve, 5. Filter Settings, 6. Calibration Settings, and 7. Finalize. A "Help" button and the email "audysseylabs@outlook.com" are at the bottom left. The main area displays "AVRs Found on the Network" with a "Refresh" button and a "Direct Connect" button. A table lists three AVRs:

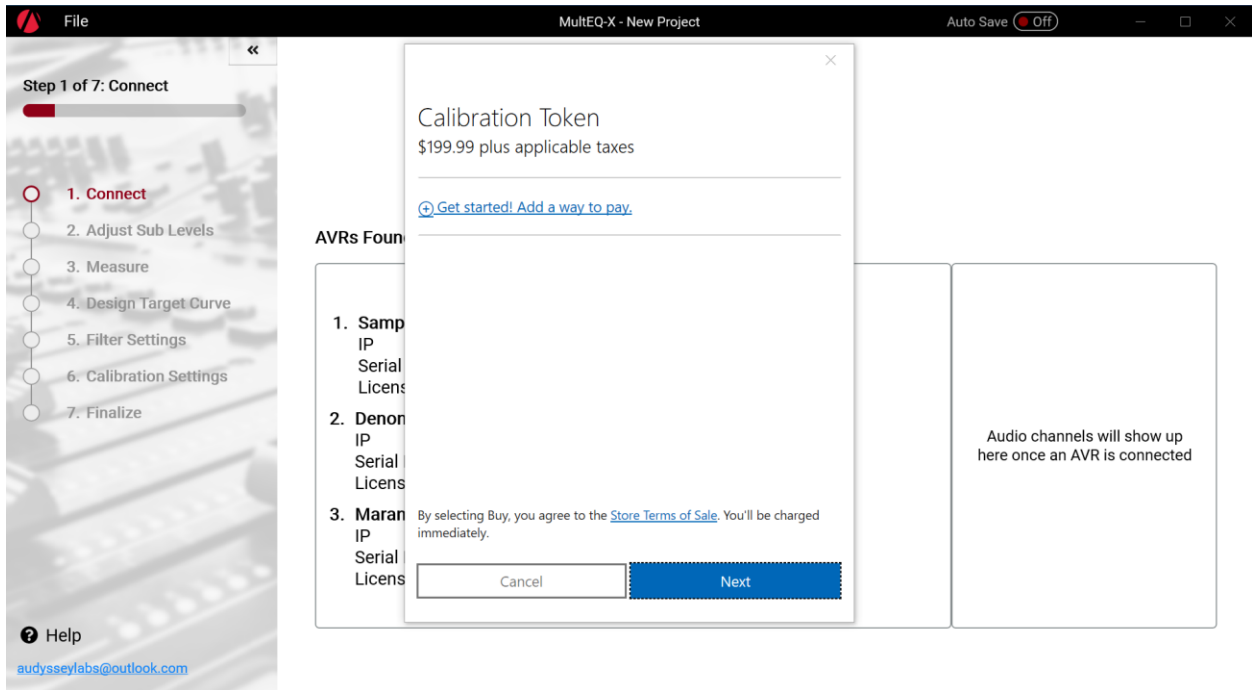
AVR Name	IP	Serial Number	License	Action
1. Sample AVR	NA	No Serial Number	True	Connect
2. Denon AVR-S750H	192.168.3.128	BJC271881000259	False	Get License
3. Marantz AV7704	192.168.3.123	AVL121709005839	False	Get License

To the right of the table, a message states: "Audio channels will show up here once an AVR is connected".

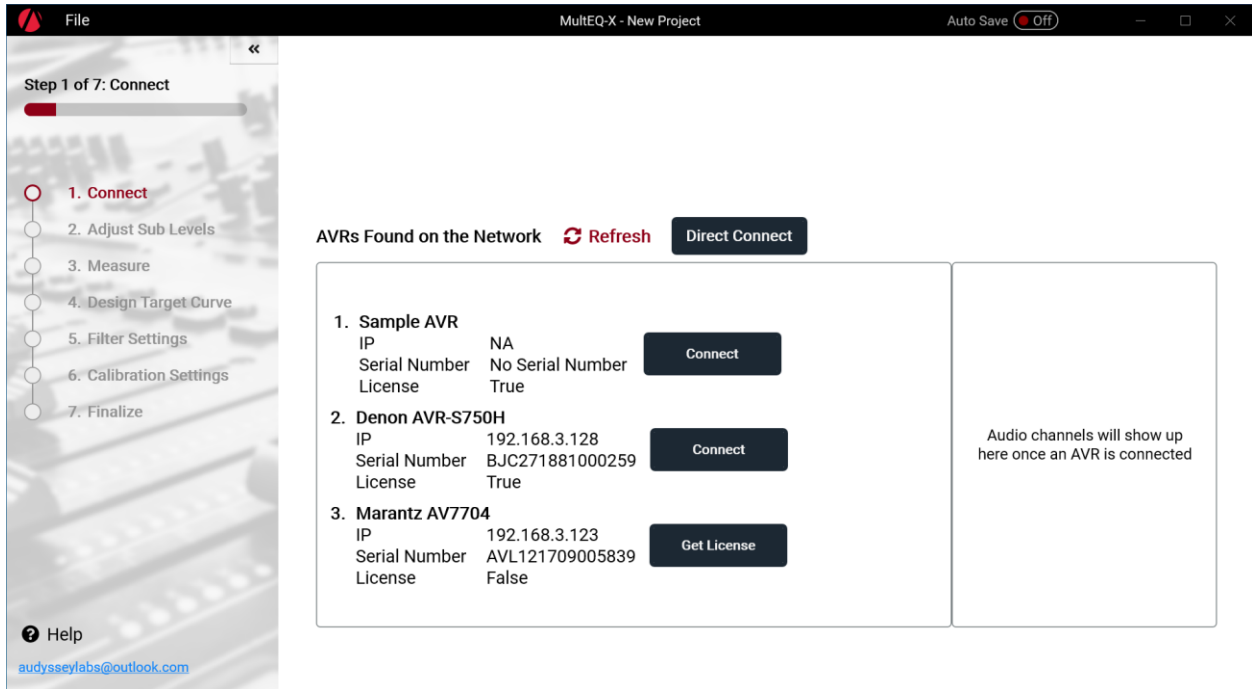
Click “Get License” to start the purchase process.



In the following dialog, double check that the AVR model and serial number are the ones that you wish to license. Check that you are logged in with the correct user account. Click “Buy” to proceed to the Microsoft in-app purchase experience.



Upon purchasing a license, the AVR will now show up in the list with a “Connect” button.



You may now proceed with calibrating the licensed AVR

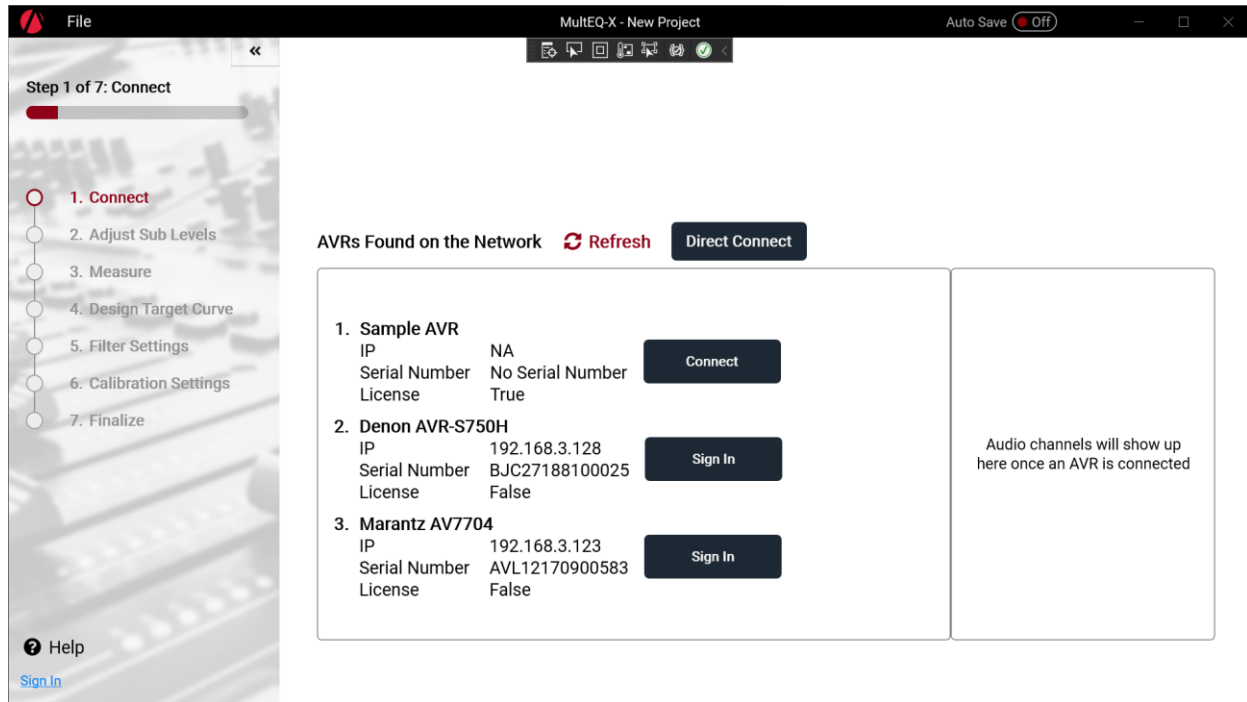
MultEQ-X Calibration

Welcome



The Welcome screen is displayed upon starting the MultEQ-X application. The version number of the application is shown in the lower right corner. Choose to create a new configuration or open an existing one. A “configuration” is the file into which all calibration data is saved.

Connect

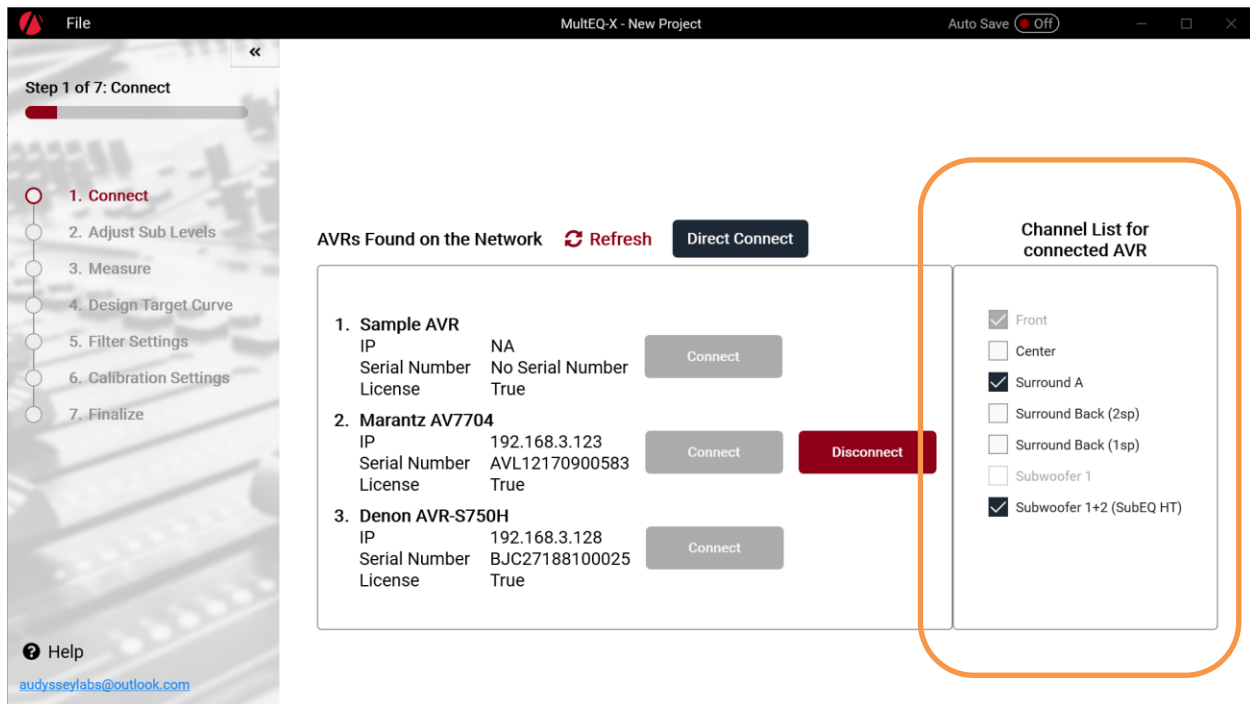


1. The list of AVRs found on the network will automatically populate.
2. If necessary, sign in.
3. If necessary, purchase a license for the AVR to be calibrated.
4. Click “Connect”. This will stop any audio on the AVR. If the AVR is off, it will be powered on. After several seconds, the channels supported by the AVR will show up in the channel list. NOTE: set the channel configuration before connecting to the AVR. The AVR channel configuration will determine which channels are available.

Troubleshooting Connection

1. Make sure both the AVR and PC/Laptop are connected to the same network. Wired connections are preferred and more reliable. Wireless connections also work.
2. If the AVR and Laptop / Desktop PC are on separate network segments (e.g. PC on 192.168.1.xxx and the AVR on 192.168.2.xxx), use the “Direct Connect” button to add the AVR by IP address.

Channel Selection



Once you have connected to an AVR, the available channels will show up in the pane on the right. The selected channels will reflect the current configuration of the AVR.

NOTE – only channels available in the AVR’s current channel configuration will be available. If your AVR has more channels that aren’t shown, you must disconnect, configure the channel options in the AVR, and reconnect MultEQ-X.

It is recommended that you select the available channels from the list, but not required. During the measurement process, MultEQ-X will automatically detect which channels are actually connected. These will be reflected in the final calibration.

Some channels require other channels to be selected first. For example, Surround Back channels require Surround A channels to be selected before you can use Surround Back. These channels will show up disabled in the UI until the channels they require are selected. Likewise, if a channel has other dependent channels selected you cannot unselect the first channel until the dependent channels are selected.

Some channels are mutually exclusive. You must choose only one of Surround Back (2sp) (two Surround Back speakers) or Surround Back (1sp) (one Surround Back speaker). The same is true for Subwoofer 1 vs. Subwoofer 1+2.

Microphone Selection

The “Adjust Sub Levels” and “Measurement” pages of the application allow selection of the microphone. At launch, the only microphone supported is the Audyssey ACM1h / ACM1hb microphone that is included with the AVR. However, support for existing pro customers is coming soon. Alternative microphones cannot be supported because the measurement system depends on having a signal directly into the AVR mic input.

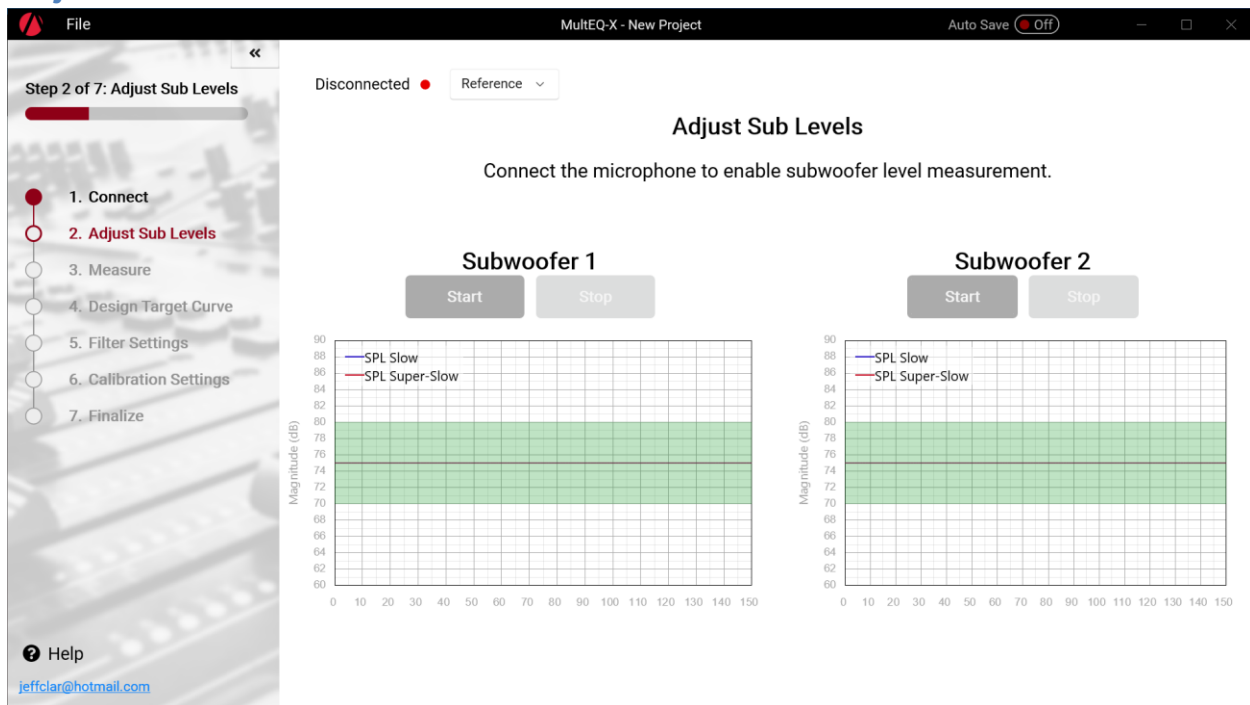


Figure 1 - Microphone and Preamp Serial Number

From the “Microphone” list, select the serial number that matches the microphone to be used for the calibration (Figure 1). To add a microphone, select “Add New Mic” from the microphone list.

Microphone connection status will be shown next to the microphone selection combination (drop-down) box. Ensure the microphone is Connected. Start/Measure buttons will be enabled only once a microphone is connected to the AVR.

Adjust Sub Levels



Some Audyssey MultEQ-enabled AVRs support a level-matching tool for setting subwoofer levels. The Subwoofer Level Matching tool makes sure that trims are always within the available range of the AVR or preamplifier.

NOTE: The measurement shown here is an approximation of the level. It is designed to help users get the subwoofer into a range where the trims of the AVR can correctly trim the subwoofer. It may not exactly match an SPL meter. Furthermore, this tool is useful only for the built-in noise with subwoofers. It is not applicable to full-range signals or other sources of noise.

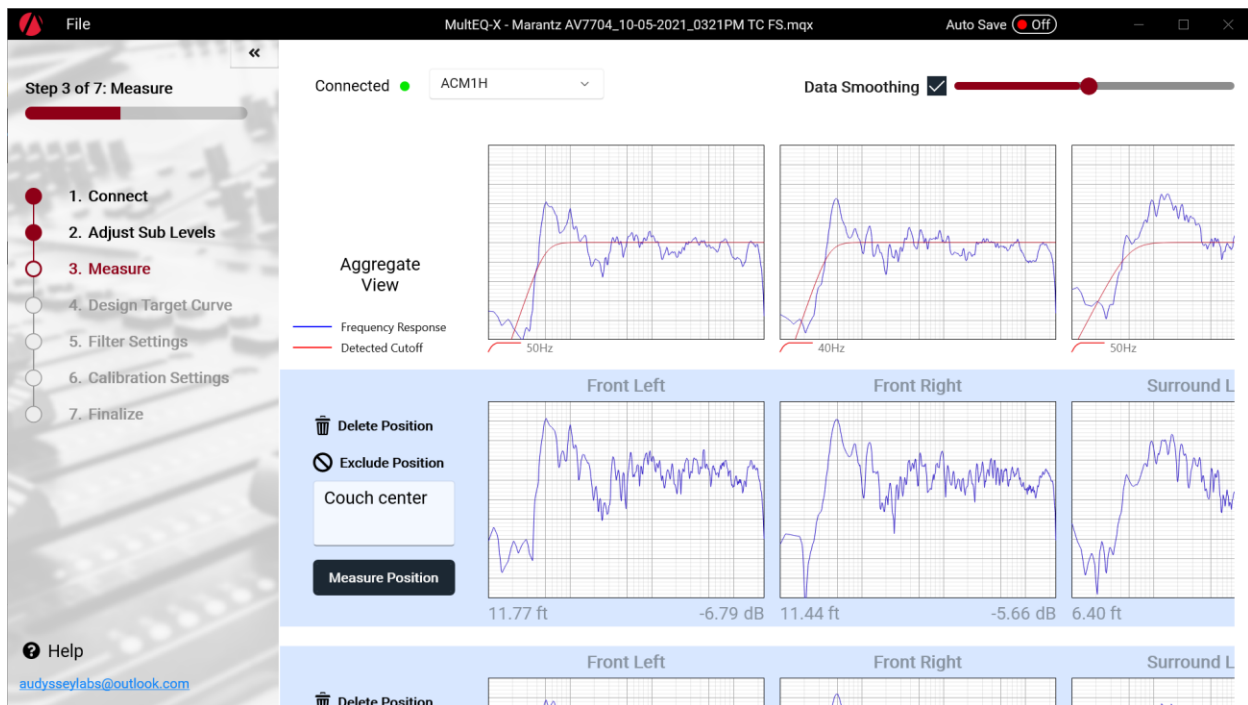
1. **Place the microphone at the main listening position** with its tip pointed directly at the ceiling. Connect the microphone to the microphone input of the product being calibrated.
2. **Click the “Start” button** to begin testing the level of the respective subwoofer. A band-limited pink noise test signal will be produced by the subwoofer. The “Level” field will remain blank for several seconds while data is acquired. Once a level is displayed, it may take several more seconds to stabilize.

SPL Raw - Moving Average – The measurement is a moving average. After about 5 seconds, the Level will be valid, though it may continue to fluctuate. In this case, every time the subwoofer’s gain knob is moved, wait 5 seconds for the level to stabilize again. This approximates the “Slow” setting on an SPL meter

SPL Super-Slow Moving Average – The “SPL Smoothed” is a “super-slow” moving average. This line takes longer to stabilize, but can provide a more accurate measurement.

3. **Adjust the level control on the subwoofer amplifier** until the reading indicates $75 \text{ dB} \pm 3 \text{ dB}$.
4. **Click the “Stop” button** to stop the measurement. Repeat these steps for each additional subwoofer.
5. Move on to the “Measure” screen when level-matching is complete.

Measure

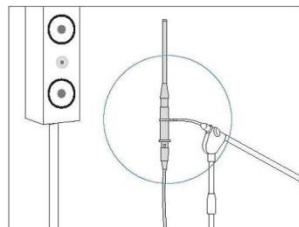
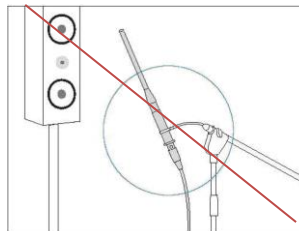


Measuring the First Position

1. **Position the microphone in the primary seating position** at ear height of a seated listener. If there is no single primary seating position, choose a location in the center of the primary seating area.

Note: The first measurement should be taken in the primary listening position because the software uses the first position to calculate the delays and trims that will be used in the calibration.

2. **Point the microphone tip directly at the ceiling** using a tripod.



3. **Do not hold the microphone** in your hand during measurements as this will produce inaccurate results.
4. **Connect the microphone** (or for Pro Kits, the preamplifier's output) to the microphone input of the product being calibrated.
5. **Click "Measure Position"** A series of test signals will be emitted from each speaker and recorded.
6. **Warnings.** Some warnings may be shown for the first position only.
 - Absolute polarity (the direction a speaker's cone moves when subjected to a voltage) is detected. If this warning is displayed, the wiring should be checked. If no problem is found, it is safe to ignore this warning.
 - Speaker/Zone mismatches are detected. For example, the user will be notified if a subwoofer is detected on a satellite channel or if no speaker is detected on a channel where a speaker was configured.
7. **Errors.** In some cases, the calibration cannot proceed until a problem is fixed.
 - *Microphone Disconnected* – check the microphone connection and try the measurement again.
 - *Noise Too High* – If the background noise exceeds a certain threshold, the system will not attempt to overcome it. The background noise must be reduced.
 - *Unable to achieve adequate Signal to Noise Ratio (SNR).* – The level of the test signal will be increased in an attempt to overcome background noise. Such level increases will occur at most twice per channel. If an adequate SNR is still not achieved, the background noise must be reduced.
 - A missing Left or Right Front speaker is considered an error.
 - If all speakers in the zone are undetected the calibration will not continue.
 - For receiver or preamplifier calibrations, a mismatch between the type of speaker detected and the zone configuration is considered an error.

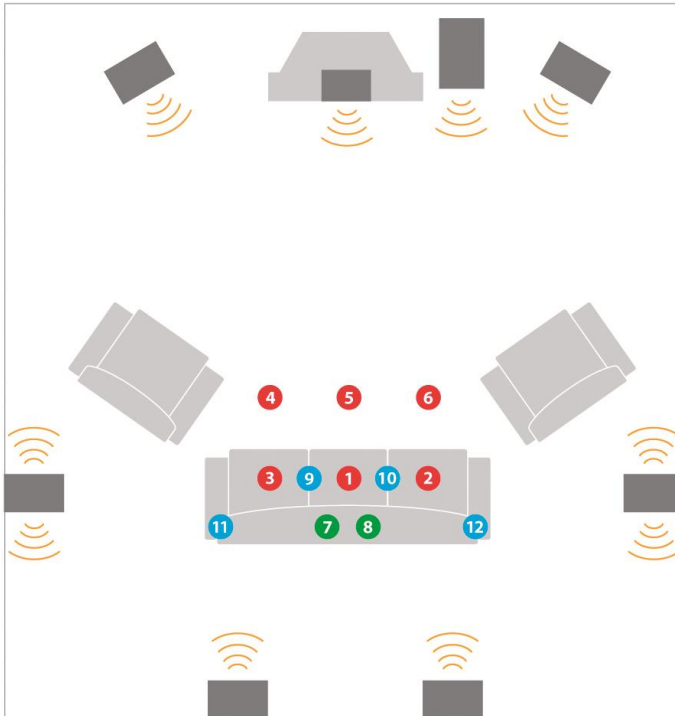
Measuring Subsequent Positions

1. **Move the microphone to the next listening location.** Even if there is only one listening position, move the microphone to positions in a sphere around that position (see *Creating a sweet spot* in the *Tips for Taking Measurements* section below).
2. **Click "Measure."**
3. **Audyssey recommends measuring at least 8 positions.** A minimum of 3 positions must be measured in order to continue past the "Measurement" screen.

Tips for Taking Measurements

1. **Refrain from talking**, during or between measurements or within several seconds of the last speaker measurement.
2. **Make the room as quiet as possible.** Background noise can disrupt the room measurements. Close windows and turn off cell phones, televisions, radios, air conditioners, fluorescent lights, home appliances, light dimmers or other devices.
3. **Do not sit or stand directly between any of the speakers and the microphone** during the room measurements.
4. **Measure only locations around the center of the listening area.**

5. **Avoid measuring near corners, walls, doorways or in extreme off-axis positions** unless listeners will normally be situated in these locations.
6. **Measure at least 8 positions.** Taking measurements in more positions increases the data that MultEQ-X can use to calculate the equalization filters. This improvement comes with diminishing returns. Measuring more than 8 or 10 positions in a small room rarely improves the quality of the calibration. The maximum number of measurements supported by MultEQ-X is 32.



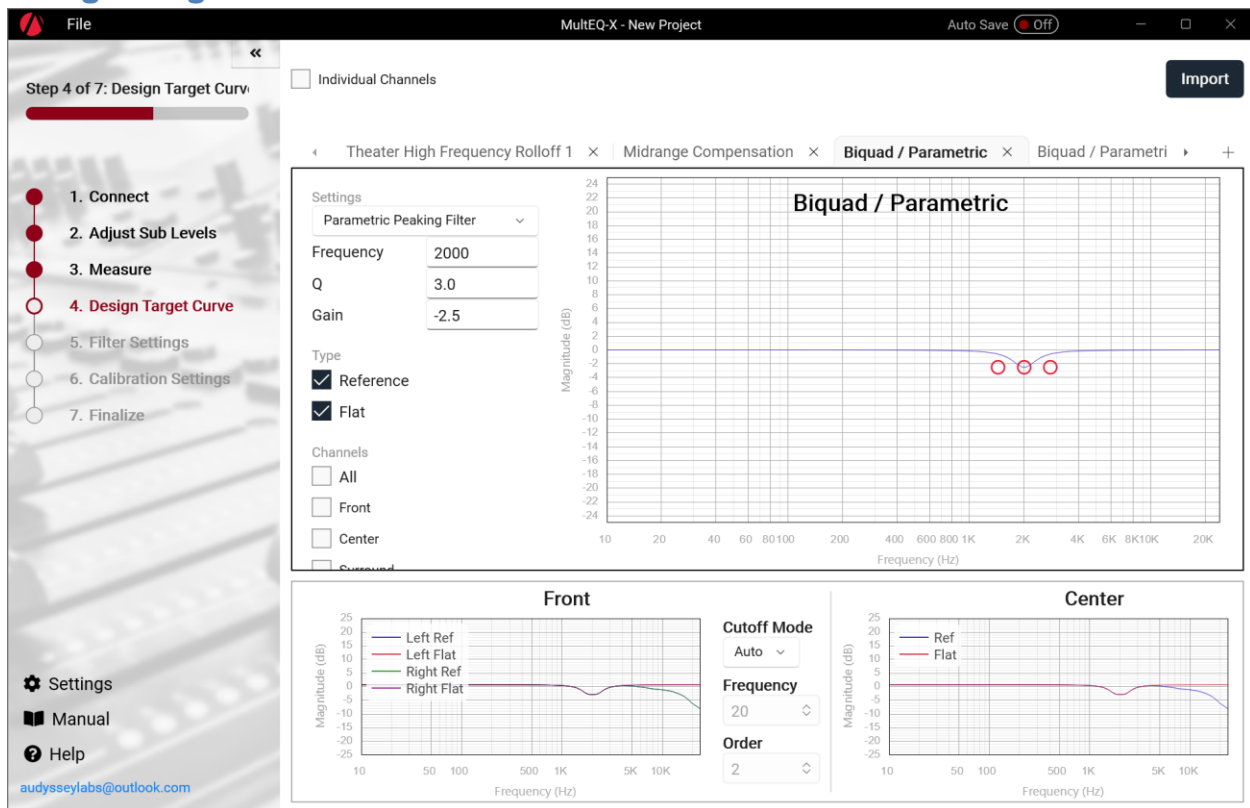
7. **Vary the height of the microphone** by a few inches between measurement positions to account for standing waves between the floor and ceiling.
8. **Creating a sweet spot.** If only one seating position will ever be used for listening, 6 or more measurements should still be taken. MultEQ requires information from the entire listening area, even if this area is the size of a person's head. Never measure a position more than once.

More Measurement Features

- **Delete Position** – Press this button to erase all measurements from the position. Do this if the microphone moved while measuring, noise interrupted the measurement, etc.
- **Exclude Position** – Press this button to exclude measurements for that position from being included in the Aggregate View (which is used for calculating MultEQ Filters).
- **Include Position** – Press this button to include an excluded measurement row
- **Context Menu** – right-click or long-press on an individual measurement to delete or exclude the individual measurement
- **Zoomed View** – click on a measurement to view a detailed frequency response plot.

- **Data Smoothing** – click the checkbox to enable or disable smoothing of the displayed frequency response, and move the slider to control how much smoothing is applied. This affects only the view of the data. It does not affect calculation of the MultEQ filter.

Design Target Curve



Designing a custom target curve can help match the sound to the room, customize the sound for preference, or deal with inherent loudspeaker characteristics. MultEQ-X provides a target curve design system that allows customizing the sound of each channel pair. The final target response for each channel pair is shown in the horizontally scrollable pane across the bottom of the Design Target Curve page. This pane also allows customization of the “Cutoff Mode” as described later in this section.

Target curves are customized by adding target curve “components” that are displayed as tabs. When each tab is selected, the settings for that target curve are shown to the left. All target curves allow the setting of the “Type” and “Channels” as follows.

Individual Channels

Use this checkbox to display individual channels for the target curve components. When checked, all channels show up, and target curve components can be added separately to the left and right channels of a given pair. This defaults to unchecked, as in most cases it is unwarranted to add target curves to channels separately. Most of the time, the target sound from any channel pair should be the same. Users may wish to EQ separately when attempting to manually EQ each speaker.

Import

Use the import button to import from Room EQ Wizard (REW) software. REW is the property of John Mulcahy, and neither are affiliated with Audyssey.

If importing data from REW, be sure to select the “Generic (96kHz)” equalizer type. To save the file, select “Export filter settings as text” – this option is located under the “Filter Tasks” heading, not on the EQ Filters page.

Support is provided for the following EQ types:

- PK – peaking (“parametric”) EQ with Frequency, Q and Gain.
- HP – Butterworth (2nd order) High Pass (fixed Q of 0.707)
- HP1 – First Order High Pass
- HPQ – High Pass (2nd order) with Q
- LP – Butterworth (2nd order) Low Pass (fixed Q of 0.707)
- LP1 – First Order Low Pass
- LPQ – Low Pass (2nd order) with Q
- LS – Low Shelf, shelving factor of 0.9 that is translated to Q based on gain
- LS 6dB – Low Shelf with shelving factor of 0.5 that is translated to Q based on gain
- LS 12dB – Low Shelf with shelving factor of 1.0 that is translated to Q based on gain
- LSQ – Low Shelf with Q – the recommended shelving option, directly imported.
- HS – High Shelf, shelving factor of 0.9 that is translated to Q based on gain
- HS 6dB – High Shelf with shelving factor of 0.5 that is translated to Q based on gain
- HS 12dB – High Shelf with shelving factor of 1.0 that is translated to Q based on gain
- HSQ – High Shelf with Q – the recommended shelving option, directly imported.

AP, NO, and Modal types are not supported.

Type

Most AVRs incorporating Audyssey MultEQ support two sets of filters (presets) installed in the AVR simultaneously. They are labeled Flat, and “Reference.” MultEQ-X gives users complete control over how these two presets are used. The descriptions that follow are the original guidelines for how to use the two curves. MultEQ-X users may use the two curves for any purpose. One may be music, the other movies. Or they can be used to A/B target curve changes when testing.

Flat

The Flat curve is a preset intended for use with content that already has a theater compensation applied. An example of this is movies on media that have already had THX Re-EQ applied. Many modern movies are already “optimized for home” and do not contain the theatrical soundtrack.

Reference

The Reference curve is intended to be used when the content is an original theatrical soundtrack. While movies are mixed on certified commercial dubbing stages, music and movies remixed for home have no traceability to a “reference” sound, so the choice of curve is up to the user’s preference.

Channels

The channels list in the target curve designer allows the user to assign target curve components to any or all of the channels in the system. The selected target curve component will apply only to the channel pairs that are checked.

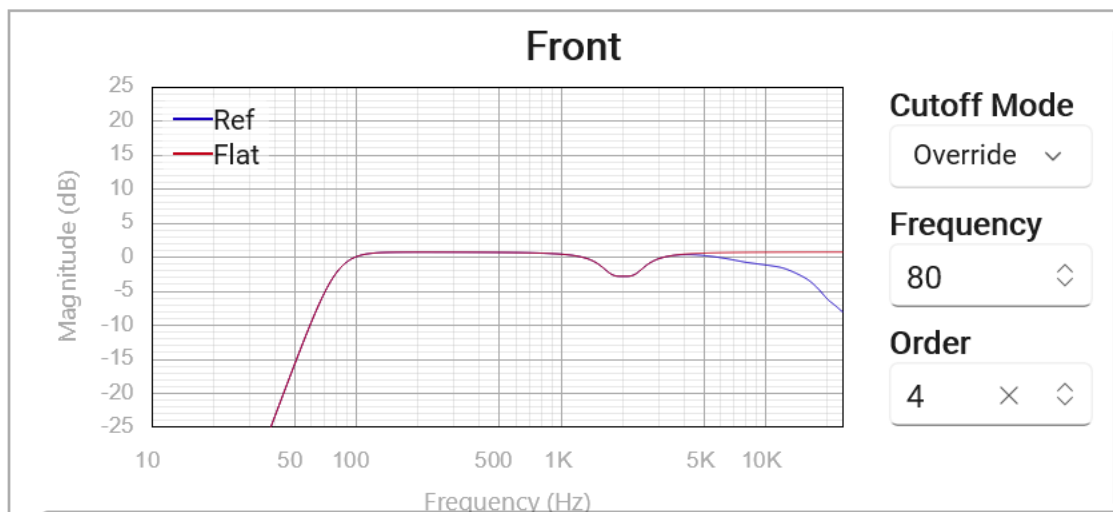
Cutoff Mode

Cutoff Mode determines how low frequencies will be handled by the EQ algorithm. The MultEQ algorithm automatically detects the low frequency roll-off of speakers *in the room*. Note that this may be quite different than the advertised low frequency range of the speaker, as room acoustics play a large roll. The default of satellite/full-range speakers is to match the higher detected cutoff of the of the two speakers in the pair pair. A default 2nd order high-pass filter is selected because it often works ideally with the AVR's built-in bass manager to create an ideal "Linkwitz-Riley" crossover network between the satellite and subwoofer. The user may override this setting to achieve different results.

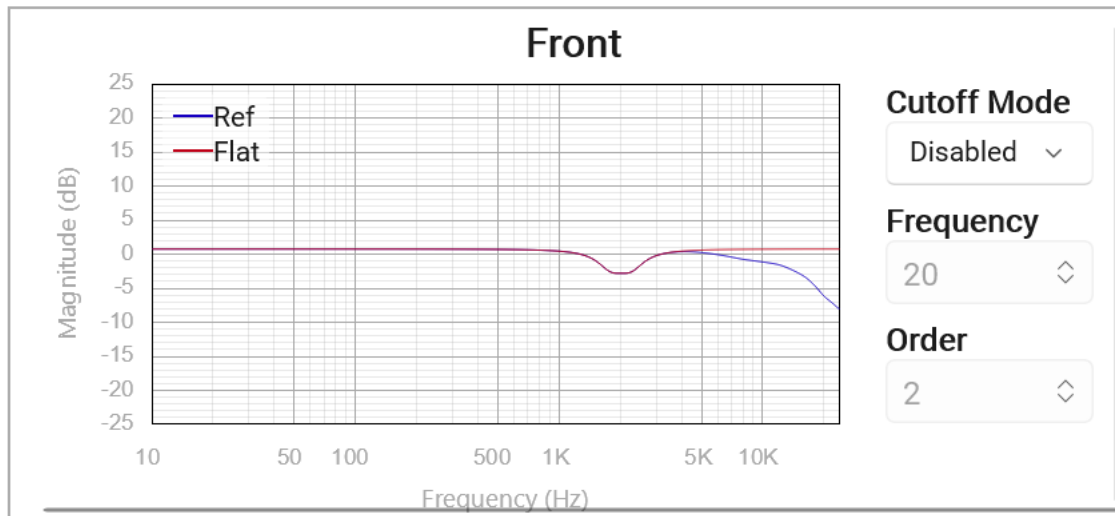
Cutoff Mode is closely related to "Low Frequency EQ Limit" (Filter Settings page) as well as the Bass Management Speaker Size and Frequency (Calibration Settings page). Use these three settings together to achieve the desired low frequency filtering.

NOTE: SPEAKER DAMAGE can result when overriding the Cutoff Mode if it is used in conjunction with changes to Low Frequency EQ Limit to over-boost the low frequencies of a speaker that cannot handle the additional power. MultEQ filters often provide up to 9dB of boost. This can increase the power (Watts) delivered to the speaker by up to **8 TIMES**. 10 Watts asked of the speaker becomes 80 Watts. Although systems incorporating MultEQ are designed not to overload their amplifiers, power is finite, and increasing the boost, especially in low frequencies which already carry much of the audio signal power, can result in a distorting amplifier. A distorting amplifier can output high frequencies that can quickly destroy ANY driver in the speaker.

You may switch the Cutoff Mode from Auto to either of the following options:



Override – The user may override the cutoff Frequency and Order. Lowering the frequency can subject the speaker to too much boost, and too much power. Raising the frequency can blend better with manual bass management. Changing the order to a higher number increases the steepness of the cutoff. Changing to a very high order / steep cutoff may tax the limits of EQ to match desired target curve. It is recommended to only use orders above 4 in order to match the existing steep roll-off of the speaker. Note that by matching the roll-off of the speaker, the net outcome is there is no EQ needed.



Disabled – the User may disable cutoff handling entirely. This can be dangerous for the amplifier and/or speakers, as described in the above note. However, it may be desirable on speakers where bass management is not used or where the low frequency response was incorrectly detected. Incorrect detection can happen if there is a large bump in the bass frequency response such that the system is triggered to see the low side of the bump as the roll-off. Note that the Low Frequency EQ Limit (Filter Settings page) will still limit how much EQ is applied to the low frequencies of the speaker.

Target Curve Components

The following target curve components can be added by clicking the “+” next to the tabs at the top of the page. By default, they apply to all channels. Application to preset Type depends on the component.

Theater Roll-offs are applied only to the Reference preset type by default. They can be applied to Flat as well if desired. The Reference preset includes the High frequency Roll-off 1 by default.

- a. **High Frequency Roll-off 1 (Default)** – This curve introduces a slight roll-off at high frequencies that accounts for the balance between direct and reflected sound for small to medium size rooms (room volume less than 2500 cu. ft.)
- b. **High Frequency Roll-off 2** – This curve introduces a slightly greater roll-off at high frequencies that restores the balance between direct and reflected sound for medium to large size rooms (room volume between 2500 and 5000 cu. ft.)
- c. **SMPTE 202M** – An international standard target curve is used for the high frequency roll-off applied in a typical 500-seat movie theater. It is appropriate for professional mixing spaces and dubbing stages that must be calibrated for film sound postproduction. It can also be used in extremely large playback spaces (room volume greater than 5000 cu. ft.)

Midrange Compensation – It is recommended that *Midrange Compensation* be enabled (default) for initial listening tests. This target curve adjustment is sometimes useful for correcting the directivity difference that occurs between the midrange and high frequency drivers of many speakers. It is possible to return to this screen later and disengage this option. In many cases, this adjustment will align closely to the dip that may already be seen in the measurements of the speaker. A common customization is to remove the default Midrange Compensation, and include target curve customization components to match the existing “natural” midrange dip of the speaker.

Tilt

Tilt is a convenient way to quickly and easily adjust the overall tonal balance. Dragging the frequency of the tilt does not affect the target response because target responses are automatically level aligned.

Biquad / Parametric

A Biquad is an engineering term for a 2nd order IIR (feedback) filter. MultEQ NEVER uses IIR feedback filters for ANY channel. All target curve components are used as frequency magnitude only. While they do still affect phase, MultEQ filters are always finite filters that attempt a best match (given the available computational power) to the target frequency response.

Many biquad configurations are available, but the most common is the “Parametric” EQ. This is a method of adding a boost or dip over a specified frequency range (the “bandwidth” of the filter). Audyssey calls this a “Parametric Peaking Filter” and it is the default type of biquad. The filter interpretation used here exhibits positive/negative gain symmetry. If you are importing parameters from another Parametric EQ implementation, make sure to check that the frequency response of your source parametric EQ has the same as that shown in MultEQ-X for the same parameters. Note that MultEQ-X models the response digitally, so warping at high frequencies is to be expected. The following parameters apply:

Frequency – the center frequency of the parametric EQ, in Hz.

Q – A unitless parameter that affects the “width” of the peaking EQ that is computed.

Gain – The gain, in decibels, where the parametric EQ peaks (at the center frequency)

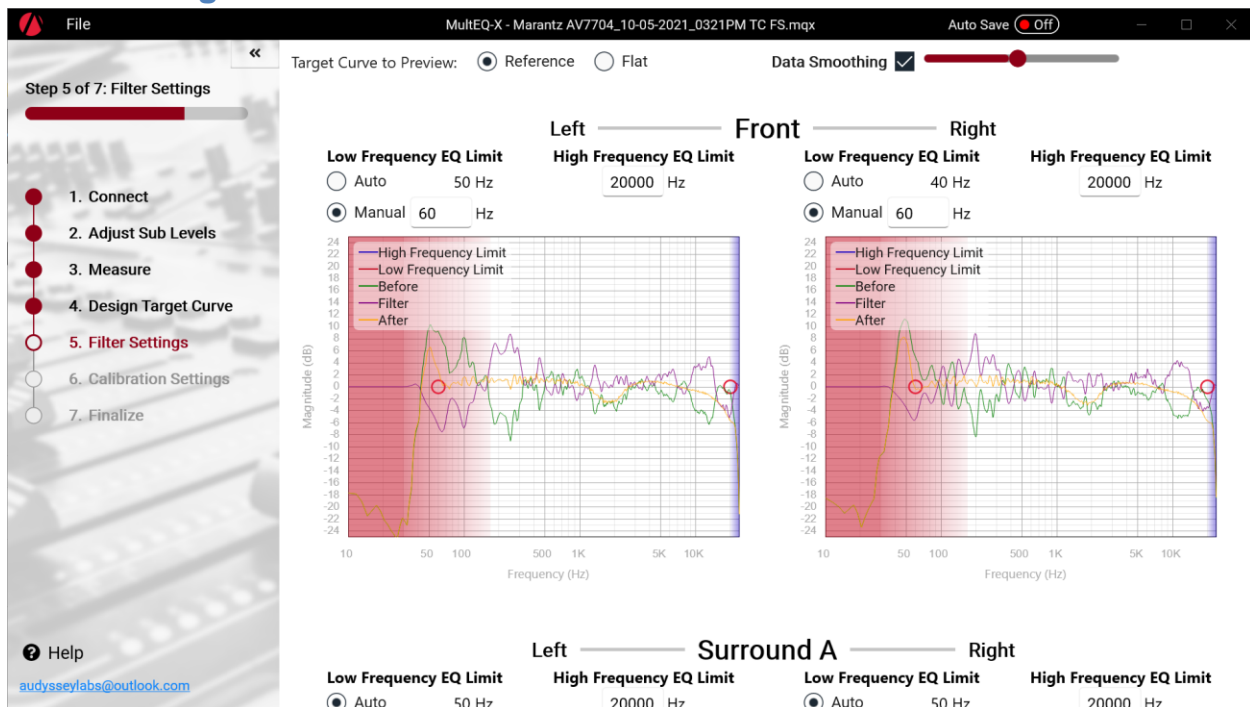
MultEQ-X includes a variety of other Biquad filter models, including several types of high/low pass filters and several types of shelving filters. The usage of these is similar to parametric EQ, though Q and/or gain may not be available for many types.

Reasons to adjust the target curve

The following are reasons a user may wish to adjust the target curve:

- Room size. Rooms outside the normal range may benefit from selection of a different “reference” curve.
- Matching bass boost. Some speakers have a natural bass boost. When MultEQ corrects the speaker response, the result will sound like less bass. Some users may wish to retain the emphasis, while smoothing the response.
- Adjusting the “midrange compensation.”
- Adjusting for other directivity complications that sometimes occur such that the perceived sound differs from the measured sound.

Filter Settings



Filter Settings allow the user to set the range over which the EQ filter will be computed. Normally, it is recommended to EQ over the automatic range – from the low frequency cutoff detected up to the top end of the audible frequency range.

WARNING: DAMAGE can result from lowering the Low Frequency EQ Limit when also requesting a boost in the low frequencies from the target curve. Check the “Filter” plot to ensure that the changes do not result in too much boost to the speaker at low frequencies. Distortion and/or damage may result.

Drag the control points on the plot, or type numbers in the edit boxes to change the low and high frequency EQ limits.

Calibration Settings

Channel Name	Detected	Trim (dB)	Distance (ft)	Detected Cutoff (Hz)	Enable Speaker
Front Left	✓	-7.8	11.77	50	<input type="checkbox"/>
Front Right	✓	-6.7	11.44	40	<input checked="" type="checkbox"/>
Surround Left A	✓	-2.4	6.40	50	<input checked="" type="checkbox"/>
Surround Right A	✓	-3.5	6.78	50	<input checked="" type="checkbox"/>
Subwoofer 1+2 (SubEQ HT)	✓	-5.7	16.65	20	<input checked="" type="checkbox"/>

The Calibration Settings page displays the following values calculated from the measured data.

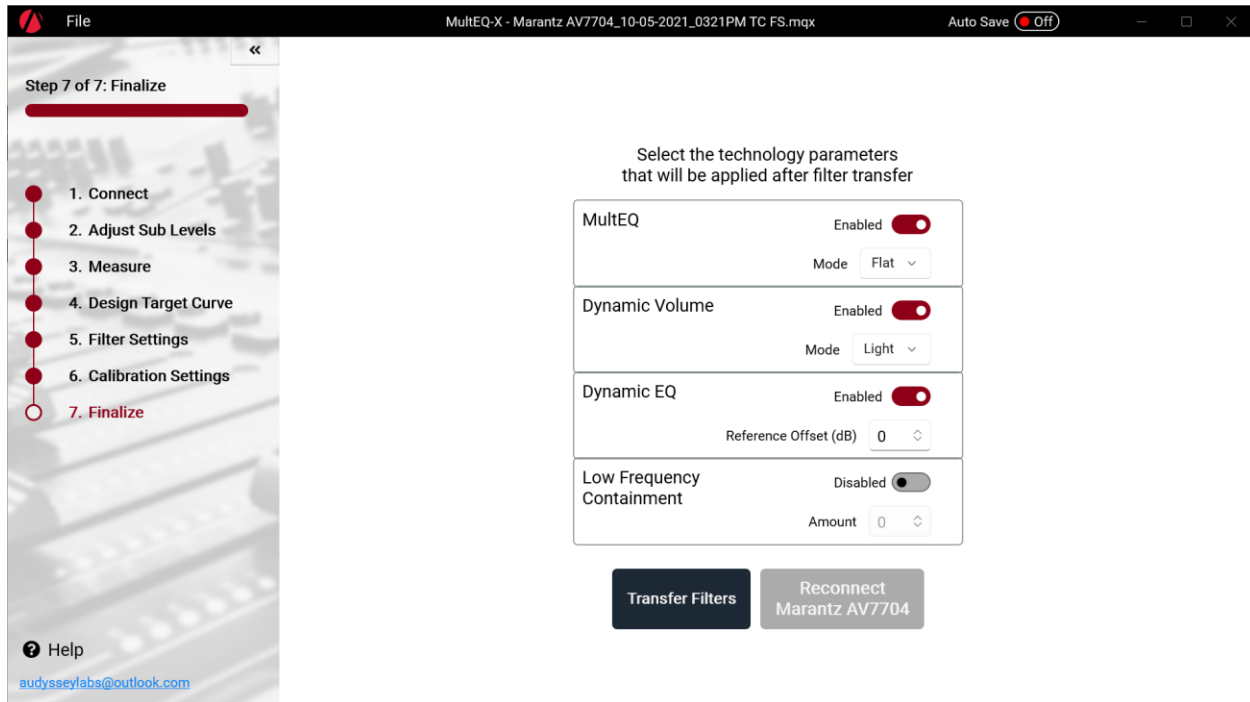
- **Trim** is displayed in dB. This number is an absolute Trim – the adjustment required such that movies will play at reference level with the volume knob at “0 dB” or the reference volume setting appropriate to the specific product.
- **Distance** may be displayed in either English (feet) or Metric (meters) units by clicking the “Dist” heading (in blue). The preamplifier or receiver will calculate delays to apply to each channel to time-align all speakers so they are effectively equidistant from the first measurement position.
- **Detected Cutoff** indicates the frequency at which the speaker appears to roll off in the low frequencies.
- **Enable Speaker** – select whether the speaker will be included in the calibration when transferred to the AVR.
- **Bass Management** settings are displayed in a drop-down selection box if a subwoofer was detected. If no subwoofer was detected, the front left and right speakers will reflect large, while the satellite speakers will allow bass management frequencies starting with their natural cutoff detected by MultEQ-X.

The “Large” setting should be used only when the low frequency capability of a speaker extends below 40 Hz. Even in this case, bass management may be a good idea for the following reasons.

- Audyssey ALFC technology provides higher resolution correction filters on the subwoofer channel than is possible for satellite speakers (XT32 allows the same low frequency resolution on satellite speakers as the subwoofer).

- Subwoofers usually can produce content below even a very capable full-range speaker.
- A subwoofer is usually better able to produce the lowest frequencies at a level higher than a full-range speaker with less audible distortion
- If no bass management is used, the subwoofer will produce no output when the system is in 2 channel mode.

Finalize



NOTE – enable/disable switches are NOT ACTIVELY sent to control the AVR settings. These switches set the initial state that will be applied when filters are transferred.

- **Transfer Filters** – Finalizes calculation and transfers the filters and calibration parameters (if applicable) to the product's permanent memor. This may take several minutes to complete.
- **Reconnect [AVR]** – After Transferring filters, the AVR exits calibration mode for immediate listening. Click this button to reenter calibration mode

Dynamic EQ Reference Level Offset

Audyssey Dynamic EQ uses the standard film mixing level as its reference. However, due to the lack of standardization outside the film industry, the reference level for other types of content may not match that of film content. In order to adjust Dynamic EQ for other reference levels, Dynamic EQ supports a Reference Level Offset of 5 dB, 10 dB and 15 dB.

- **0 dB** – Reference film level.
- **5 dB** – Suitable for listening to classical music and other content with an extremely wide dynamic range.
- **10 dB** – Suitable for viewing TV and listening to other audio sources with a moderately wide dynamic range.
- **15 dB** – Suitable for listening to pop, rock music and other content mixed at a high level.

Dynamic Volume Mode

- **Midnight** – This heavy setting adjusts volume the most, causing all sounds to be of roughly equal loudness.
- **Evening** – This medium setting prevents loud and soft content from differing greatly from average content level.
- **Day** – This light setting adjusts volume the least, but still prevents extreme differences in the loudest and softest passages of any content.

Calibration Wrap-up

1. **Lock the receiver / preamplifier settings** so they cannot be inadvertently changed. Changing the distance, delay and bass management settings will detract from the calibration. Additionally, the front-panel on some receivers will show the system as uncalibrated. In most cases, MultEQ filters can still be enabled, but they will be working without the added benefit of correct delays, trims and bass management.
2. **Instruct the customer** on proper use of the system. Outline when to use Dynamic Volume and explain the options for Dynamic EQ reference. Audyssey provides recommended demonstration content and instructions in the Appendix of this document. Let the customer know that the addition or removal of furniture, acoustic treatments or speakers necessitates recalibration.

Audyssey Recommended Demos

Open Range

Scene 7: “A Storm is Brewin”

MultEQ Instructions: This scene illustrates the improved timbre matching of speakers and the overall improvement in envelopment. Start with MultEQ Enabled, then listen approximately one minute into this scene until the first thunderclap and the intensifying rainfall. Leave MultEQ on for another 5-10 seconds, then turn MultEQ off and on a few times, alternating every 5-10 seconds. The improved timbre matching typically results in a more seamless sound to the rain-fall, and the rain itself may sound more coherent, as if each individual drop can be heard distinctly.

Dynamic EQ Instructions: During the intense rainfall, play the scene at a loud listening level for 15 seconds. Turn down the volume to -30dB, leaving Dynamic EQ on for about 10 seconds. Then, turn off Dynamic EQ, and repeat the process several times at this volume. This will demonstrate how Dynamic EQ maintains tonal balance and surround imaging at lower volume levels.

Almost Famous

Scene 7: “Fever Dog”

MultEQ Instructions: Wait until the band begins to perform, then switch MultEQ on and off every 10 seconds. In many rooms, you will notice improvements in the clarity of the lead singer’s voice and the imaging of the background instruments.

Dynamic EQ Instructions: Once the band begins playing, make sure the volume is set at a moderately loud level, then turn down the volume to around -30dB and leave it there for 10 seconds. Then, turn Dynamic EQ off, and repeat the process a few times. This will demonstrate how Dynamic EQ maintains bass response and surround imaging at lower volume levels.

The Patriot

Scene 2: “We Are At War”

MultEQ Instructions: This demo illustrates the improvement MultEQ makes to dialogue intelligibility, a common problem especially with older listeners. Wait until the general starts his speech, beginning at: “You all know why I’m here.” After a very brief pause, he’ll then say, “I’m not an orator, and I would not try to convince you of the worthiness of our cause.” Turn MultEQ off once he begins speaking after the word “orator”.

The Eagles – Hell Freezes Over

Scene 5: “Hotel California”

MultEQ Instructions: Start with MultEQ enabled. Wait until one minute into the performance, then turn MultEQ off and on as the music is playing.

Dynamic EQ Instructions: Begin the track with the volume near reference level. Wait until one minute into the performance, then point out that this is what the mix sounds like at near reference level. Drop the master volume to -30 dB, then turn Dynamic EQ on and off as the music is playing. Point out the change in balance when Dynamic EQ is disengaged—bass disappears, the soundstage collapses, and the higher frequencies change as well.

Standing in the Shadows of Motown

Scene 2: “Gerald Levert: Reach Out (I’ll Be There)”

Scene 4: “Joan Osborne: (Love Is Like A) Heat Wave”

MultEQ Instructions: Let the music play for 20 or 30 seconds to let the customer get used to the equalized sound before turning MultEQ off.

Dynamic EQ Instructions: Let the music play at a louder volume level for about 30 seconds, then turn it down to around -30dB. Let the music play for about 15 seconds, then turn Dynamic EQ off. Repeat the process several times.

Technical Support

Audyssey Laboratories, Inc

Audyssey provides free technical support to Audyssey installers. Technical support by phone is available from 9:00 A.M. to 5:00 P.M. (Pacific Standard Time). Product-specific questions should be addressed to the manufacturer's technical support contacts listed in the section *Installer-Ready Product Features* (Page **Error! Bookmark not defined.**).

Audyssey Installer Technical Support

Tel: (213) 625-4300 x0

Fax: (213) 625-4383

E-mail: techsupport@audyssey.com

Trademarks

THX is a trademark of THX Ltd., which may be registered in some jurisdictions. All rights reserved. Microsoft and Windows are trademarks of the Microsoft group of companies.

Denon is a trademark or registered trademark of D&M Holdings, Inc.

Marantz is a trademark or registered trademark of D&M Holdings, Inc.

Audyssey, MultEQ, Audyssey Dynamic EQ, Audyssey Dynamic Volume, Audyssey DSX and all other marks used herein are registered trademarks or trademarks of Audyssey Laboratories, Inc.

© 2022 Audyssey Laboratories, Inc. All rights reserved.