



AUDYSSEY

dARTS Audyssey MultEQ Pro User Guide

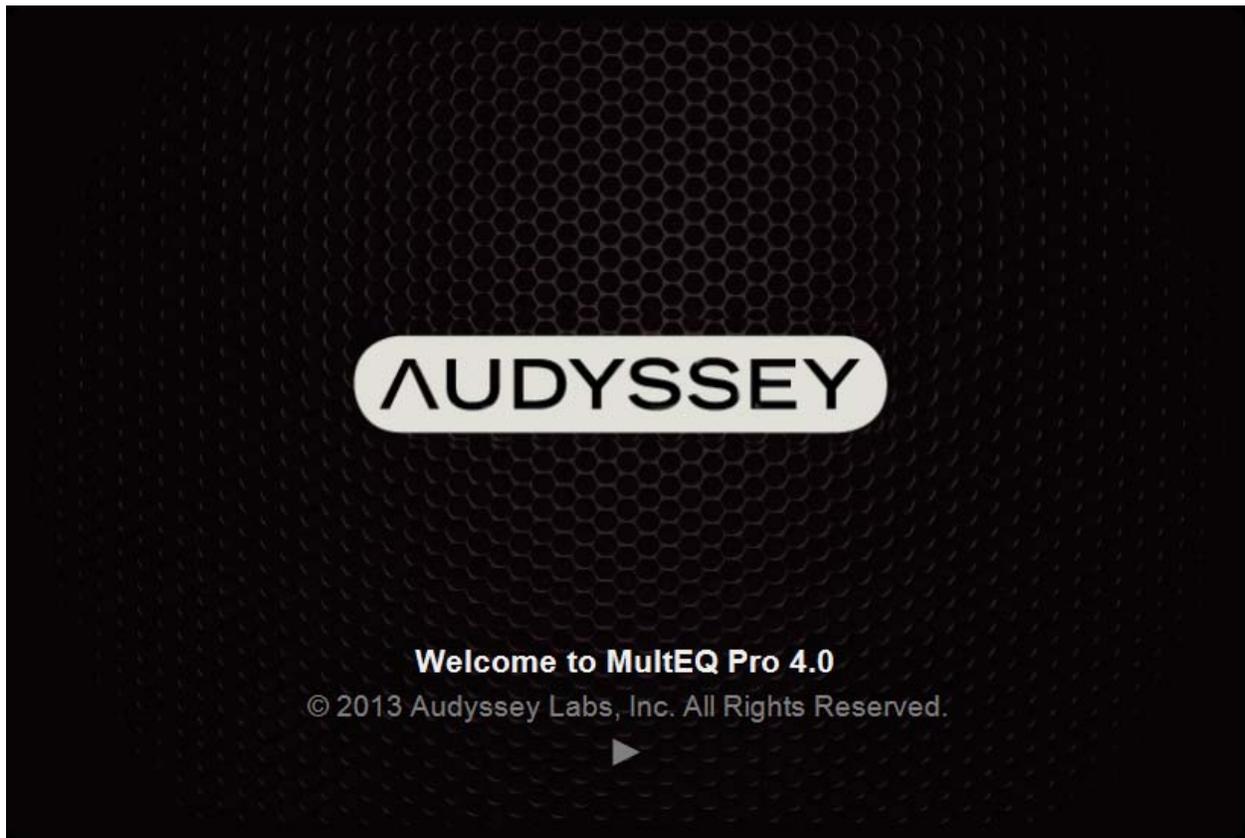
User Guide v4.0

© 2014 Audyssey Laboratories, Inc. All rights reserved.

Table of Contents

Introduction	1
Getting Started	1
Important Safety Precautions	1
The Audyssey Installer Kit	1
Kit Components	1
Previous Installer Kits	2
Software Installation and Configuration	3
Installing MultEQ Pro - Main Setup	3
Installing Microsoft .NET Framework 4.5	3
Installing MultEQ Pro	4
Calibration Setup	4
Connecting the Installer Kit Components	4
Performing the Calibration	6
Overview and Screen Sequence	6
Welcome	7
Product Selection	8
Options	9
Zone Configuration	10
Subwoofer Level Matching	11
Measurement	12
Measuring the First Position	12
Measuring Subsequent Positions	13
Tips for Taking Measurements	13
More Measurement Features	14
Detection Results	15
Target Sound Options	16
Target Curve Designer and Target Curve Editor	17
The Target Curve Designer	17
Using the Target Curve Editor	18
Save Results	20
Calibration Complete	21
Calibration Wrap-up	21

Appendix	22
Error Messages.....	22
Device Not Connected Error	22
Input Signal Too Low	22
USB Connection Failure (Connection Time Out).....	22
Polarity Errors	22
Disconnect Microphone	23



Introduction

dARTS supports professional calibration using the MultEQ® Pro PC application and the Audyssey Installer Kit. Installers bring the Installer Kit and a laptop to an installation site, run the MultEQ Pro application, perform measurements, and transfer MultEQ XT filters from the laptop to the DP4000IA V2. The steps for completing this installation are described in detail in this User Guide.

Getting Started

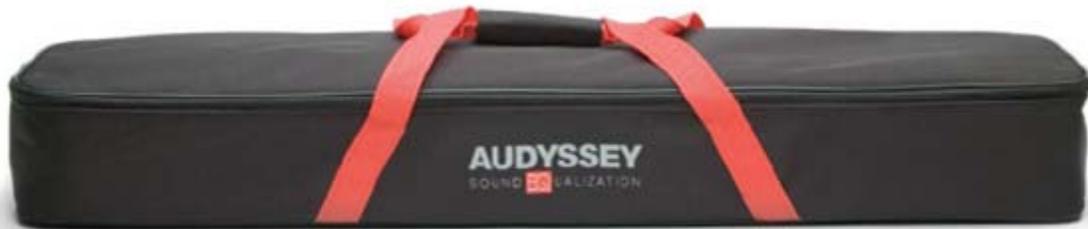
- Download the latest version of MultEQ Pro and the installation guide from www.phasetech.com
- Install the MultEQ Pro software on the computer to be used for calibration before going to the job. See *Software Installation and Configuration* (Page 3).

Important Safety Precautions

Please review the product's owner's manual in detail to ensure the DP4000IA V2 is properly connected and is safe to operate before calibrating with MultEQ Pro.

- **Do not** cascade other devices between the microphone preamp and the DP4000IA V2. Permanent damage may occur to each piece of equipment.

The Audyssey Installer Kit



Kit Components



MultEQ Pro Application CD and Setup Guide

Note The MultEQ Pro Application and User Guide for the DP4000IA V2 may be found on the included flash drive or on the Phasetech website.



Calibrated Microphone and Microphone Stand

Each microphone is calibrated by Audyssey and comes with a custom calibration curve that matches the microphone to a high-precision 1/4" reference microphone. The calibration curve for the microphone is stored on the MultEQ Pro application CD included with the kit.



Calibrated Preamplifier

This microphone preamplifier provides phantom power to the microphone and applies fixed gain amplification to the microphone signal. It has no external controls.

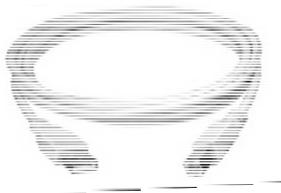
Warning: Only use the supplied Audyssey Calibrated Preamplifier. **Do not** use any other microphone preamplifier.



Microphone Mini-XLR Cables

The Installer Kit contains three 25 ft. mini-XLR cables. The cables are used to connect the microphone, preamp and Audyssey Installer-Ready Product. The cables can be linked together to provide 75 feet of length. Additional mini-XLR cables may be purchased separately and connected together for longer lengths.

For products with a balanced microphone input, place the longest length of cable between the preamplifier and the product. For products with an unbalanced (RCA) microphone input, place the longest length of cable between the microphone and the preamplifier.



10 ft. USB Cable

Audyssey Installer-Ready Products with USB communication may be connected to the laptop using the 10 ft. USB cable.

A longer cable (up to 16ft.), repeating extension cable or USB-over-CAT5 adapter set may be substituted if the laptop must be situated farther than 10 feet from the Audyssey Installer-Ready Product.

Previous Installer Kits

Items from previous versions of the Audyssey Installer Kit, such as the Audyssey MM01 Professional Calibration Microphone, can still be used for calibration with newer versions of MultEQ Pro as long as the microphone calibration file is copied into the new MultEQ Pro installation folder.

Software Installation and Configuration

Installing MultEQ Pro - Main Setup

Insert the MultEQ Pro USB flash drive into the computer. Launch the setup program manually by using Windows Explorer to browse the drive. Double click on the file MultEQPro 4.2.0.105.

Note: **Install Microsoft .NET** (Shown only if .NET Framework 4.5 is not detected)

Installing Microsoft .NET Framework 4.5

Microsoft .NET Framework 4.5 must be installed before installing, uninstalling or running the MultEQ Pro software. The Microsoft .NET Framework is a software component that can be added to the Microsoft Windows operating system.

The .NET Framework 4.5 installation program can be launched by clicking the link on the MultEQ Pro Main Setup screen. This option is not displayed if the setup program detects that .NET Framework 4.5 or later is already installed.

It is highly recommended that Windows Update is run after installation of .NET Framework 4.5 in order to receive the latest service packs and security updates from Microsoft. This is typically found on the Windows Start Menu under *All Programs*.

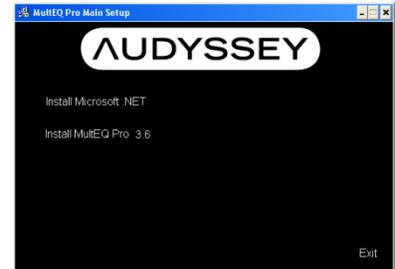


Figure 1 - Install Microsoft .NET Framework

Installing MultEQ Pro

Click “next” to begin the installation wizard (Figure 2). The software installation program will guide you through the MultEQ Pro application setup. The Audyssey End-User License Agreement (EULA) must be accepted to continue with installation of the MultEQ Pro application (Figure 3). Select the location where the application will be installed (Figure 4).

Once the MultEQ Pro installation is complete, the software application will appear in the “Audyssey Labs” folder on the Windows Start menu Repeat the MultEQ Pro installation for each laptop to be used for installations.

Calibration Setup

This section describes how to set up the equipment to perform a calibration.

Connecting the Installer Kit Components

- A** Connect a mini-XLR cable to the microphone.
- B** Place the microphone stand upright and extend the boom arm. Attach the microphone holder to the end of the boom arm. Insert the microphone into the holder so it points to the ceiling.

Figure 2 - Install MultEQ



Figure 2



Figure 3 - Accept the EULA

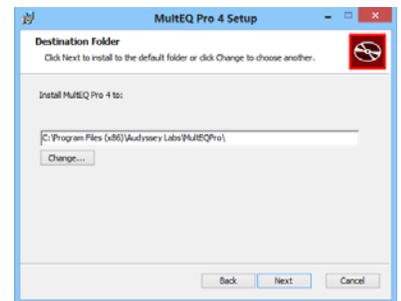
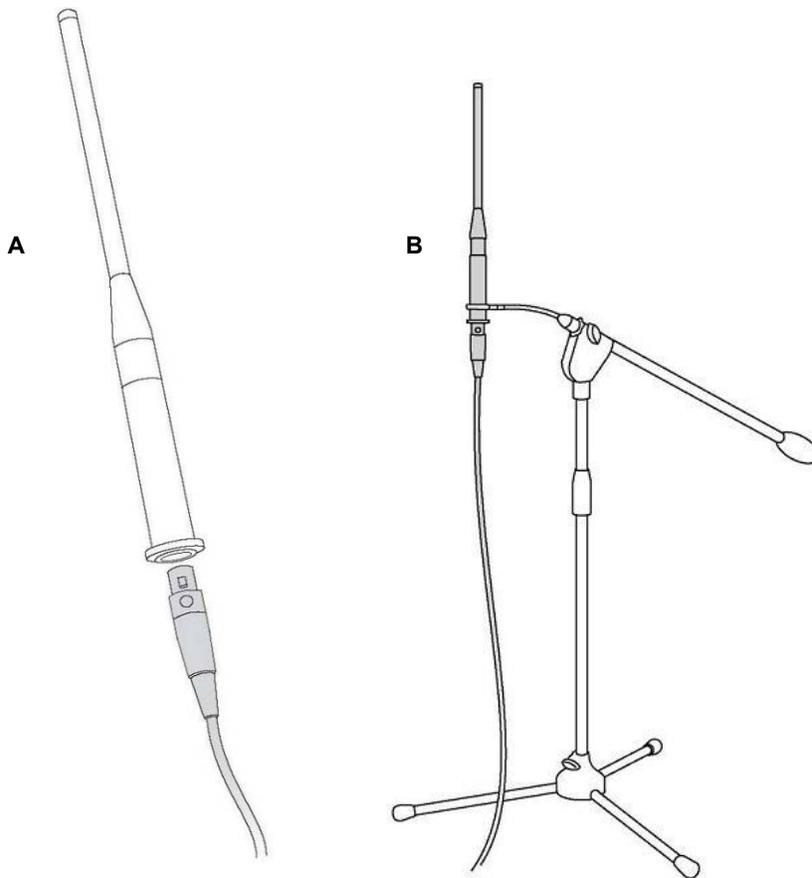
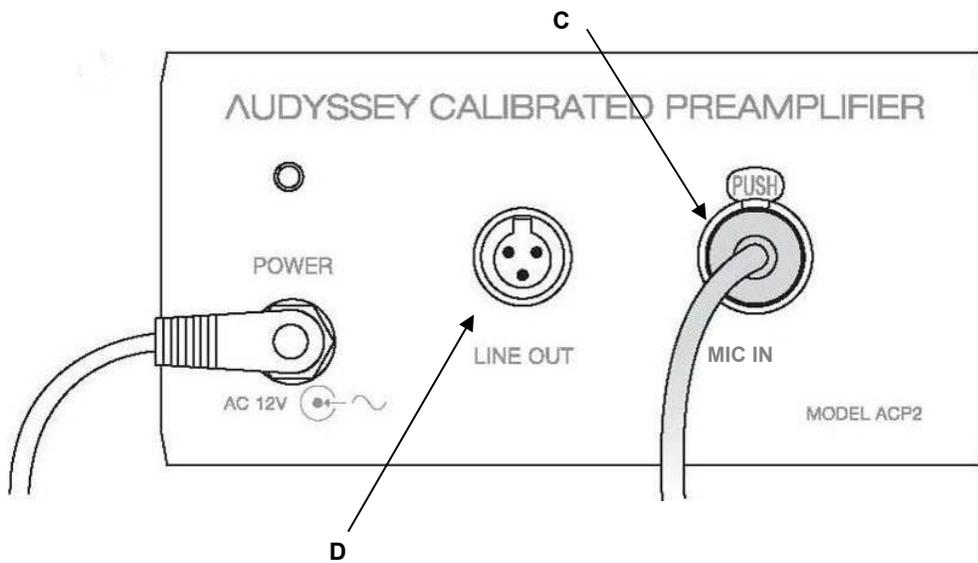


Figure 4 - Select Installation Folder



- C** Connect the mini-XLR cable from the microphone to the input (MIC IN) of the microphone preamp.
- D** Connect the mini-XLR adaptor to the audio input on the rear of the DP4000IA V2,



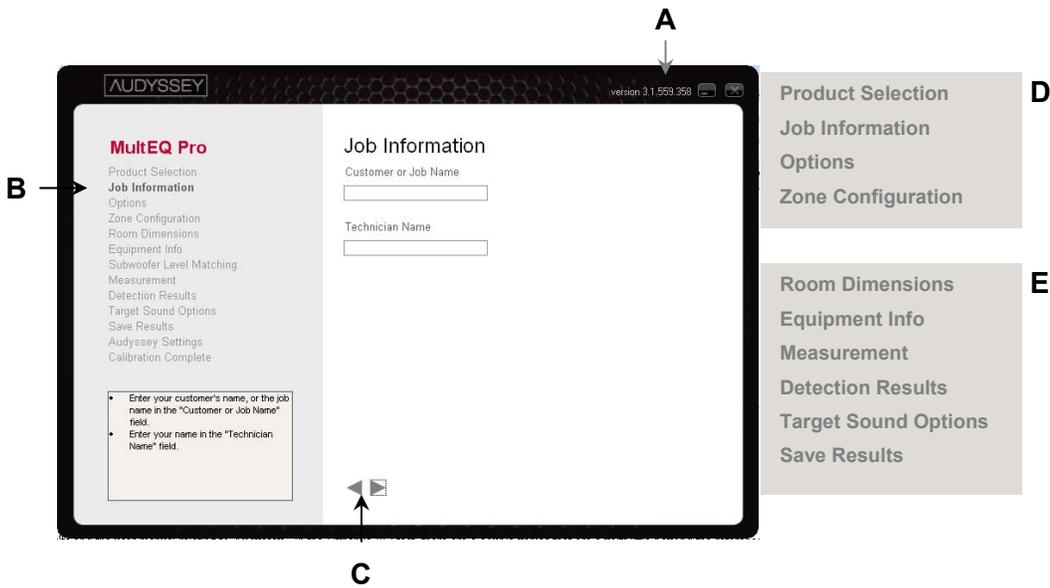
- E** Connect the laptop to DP4000IA V2 using the USB cable

- F Provide enough slack so that the cable will not be disconnected accidentally during calibration. An accidental disconnection usually requires the user to restart the entire process.
- G Connect the AC adapter and Power cable to the preamplifier.

Performing the Calibration

Overview and Screen Sequence

The MultEQ Pro application consists of a series of screens leading the user through the calibration process.



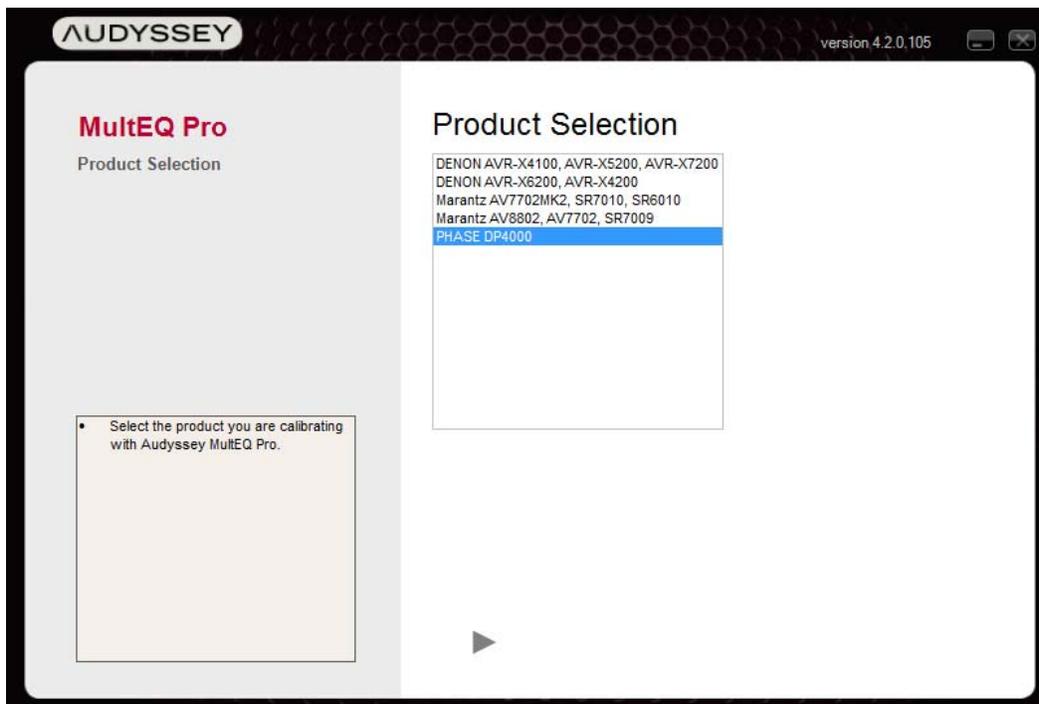
- A The MultEQ Pro version number is listed at the top right of the screen.
- B The sequence of screens is listed in the left column of the application to help track progress.
- C The current screen is highlighted in bold within the list.
- D Move forward and backward through the screens by clicking the “◀” (back) and “▶” (forward) buttons on each screen.
- E The Product Selection, Job Information, Options and Zone Configuration screens are used only once during a session.
- F The remaining screens are encountered once for each zone that is calibrated.

Welcome



The Welcome screen is displayed upon starting the MultEQ Pro application. Click the “▶” button to continue.

Product Selection



1. Choose the DP4000IA V2 from the list of Installer-Ready Products. Make sure the USB communication cable is connected and press the “▶” button.

Options

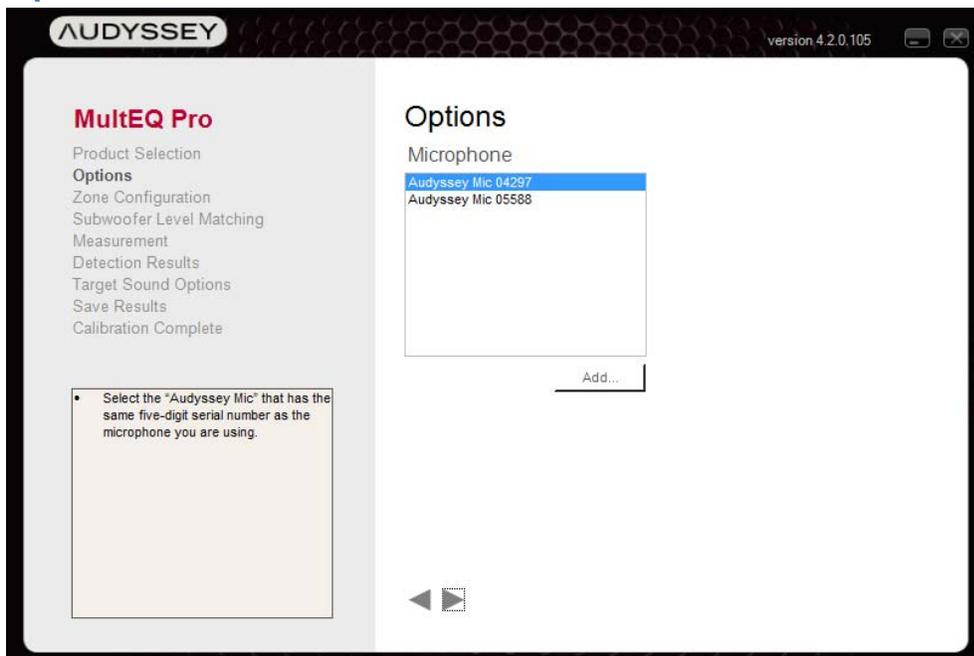
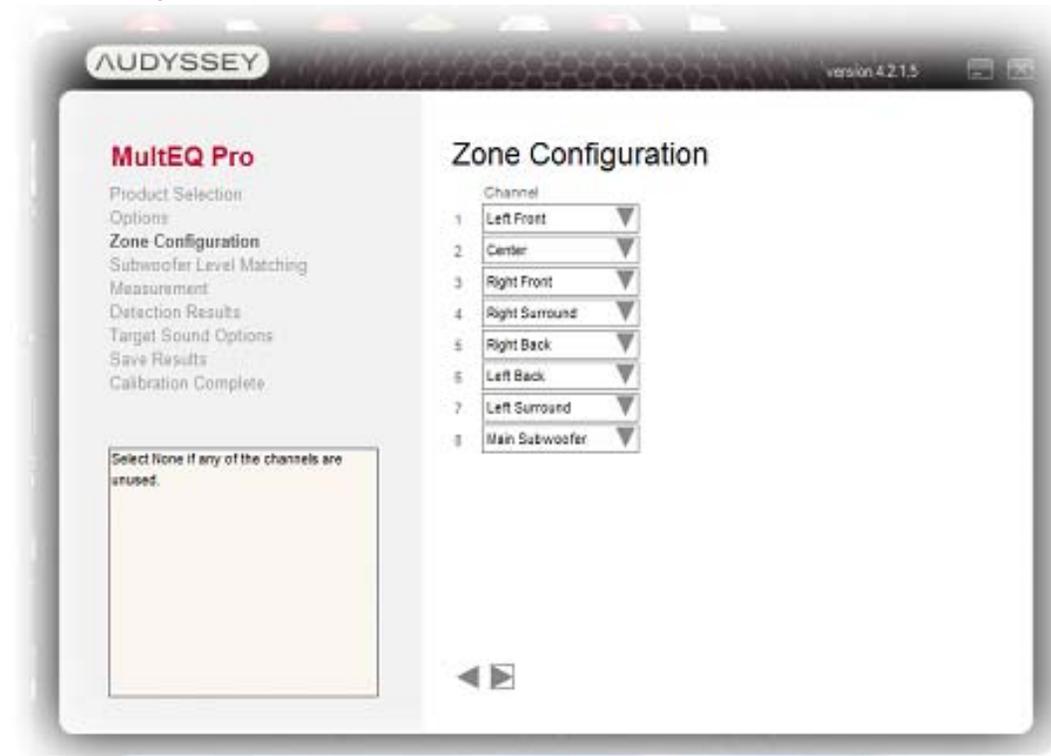


Figure 5 - Microphone and Preamp Serial Number

From the "Microphone" list, select the serial number that matches the microphone to be used for the calibration (Figure 5). Click the 'Add...' button to add a microphone.

Zone Configuration



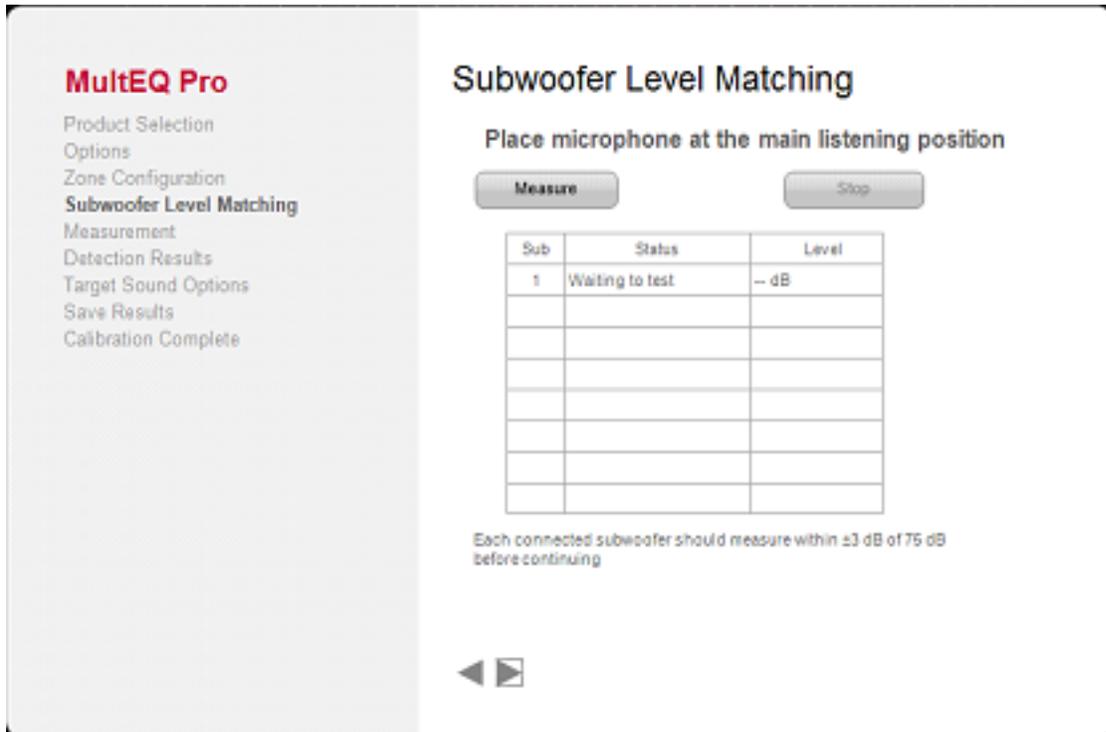
Using the drop down tabs choose the type of speaker for each position. For a 7.1 system use the default settings. For a 5.1 system set 5 and 6 to none. The numerical order on this screen corresponds to the order each speaker is measured and not the amp channel it is connected to.

For systems with 2 or 4 height or ceiling speakers using a second DP4000IA V2 set 1, 2, 3 and 8 to none. Leave the settings for 4,5,6,and 7 to the settings in the chart below.

Zone setting for 4 height or ceiling speakers		
Zone	Setting	Speaker
4	Right Surround	Right front Ceiling
5	Right Rear	Right rear Ceiling
6	Left Rear	Left rear Ceiling
7	Left Surround	Left front Ceiling

Zone setting for 2 height or ceiling speakers		
Zone	Setting	Speaker
4	Right Surround	Right front Ceiling
5	None	
6	None	
7	Left Surround	Left front Ceiling

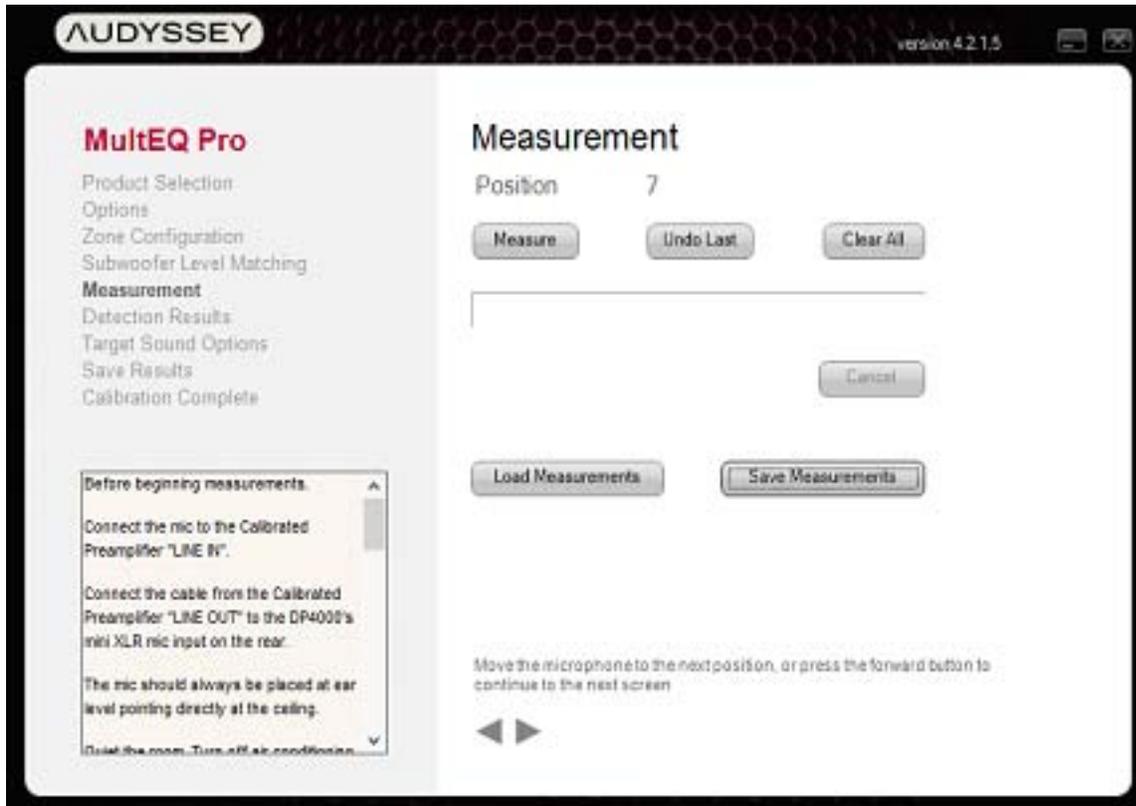
Subwoofer Level Matching



The Subwoofer Level Matching tool makes sure that trims are always within the available range of the DP4000IA V2.

1. **Place the microphone at the main listening position** with its tip pointed directly at the ceiling. Connect the output (LINE OUT) of the microphone preamplifier to the microphone input of the product being calibrated.
2. **Click the “Measure” button** to begin testing the level of the currently selected 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.
3. **Adjust the level control on the subwoofer amplifier** until the reading indicates $75 \text{ dB} \pm 3 \text{ dB}$.
4. **Press the “▶” button** to move to the “Measurement” screen once level matching of the subwoofers is complete.

Measurement



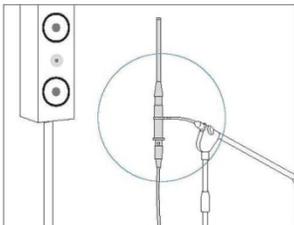
Before taking measurements, review the procedure for *Calibration Setup* (Page 4).

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. Do not hold the microphone in your hand during measurements as this will produce inaccurate results.



3. **Click "Measure."** A series of test signals will be emitted from each speaker and recorded.
4. **Warnings.** Some warnings may be shown for the first position only.

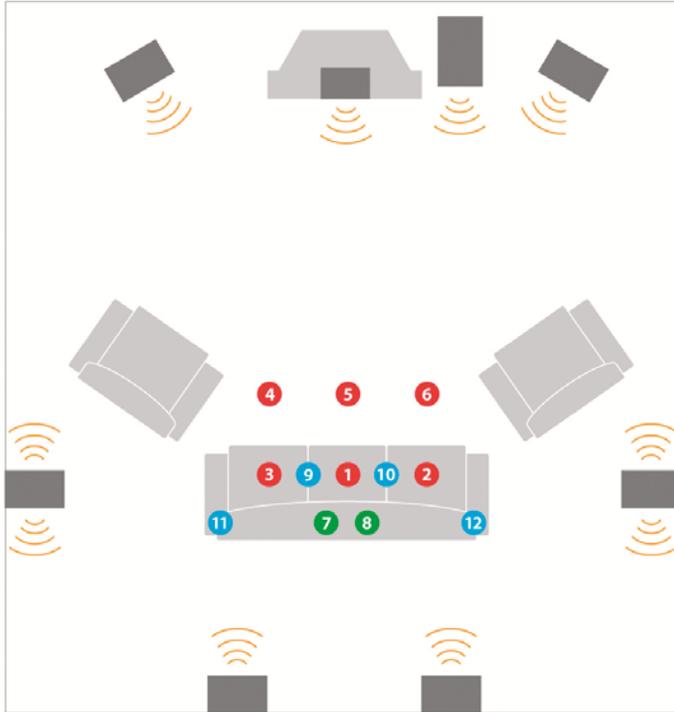
- Absolute polarity (the direction a speaker's cone moves when subjected to a voltage) is detected. If this warning is displayed, the wiring should be checked. If no problem is found, it is safe to ignore this warning.
 - Speaker mismatches are detected. For example, the user will be notified if a subwoofer is detected on a satellite channel or if no speaker is detected on a channel where a speaker was configured.
5. **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 3 times per channel. If an adequate SNR is still not achieved, the background noise must be reduced.
 - If all speakers in the zone are undetected the calibration will not continue.

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.
4. **It is recommended that each seating position be measured at ear height. Additionally measure at least 2 locations at ear height at a standing position.**

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 Pro 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 Pro 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.

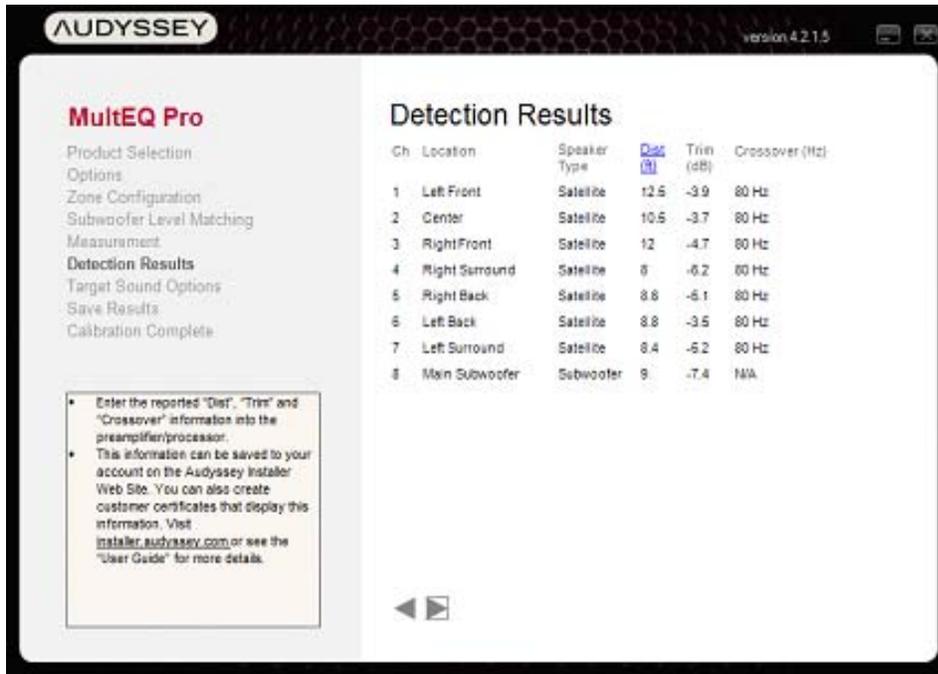
More Measurement Features

- **Undo Last** – Press this button to erase the previous measurement if the microphone moved while measuring, noise interrupted the measurement, etc.
- **Clear All** – Press this button to clear all measurements and start over with the first position.
- **Save Measurements** – Its recommended you save your measurements for future use. Press this button to save the current measurements to a file. A dialog will be displayed allowing the user to choose the location of the saved file.
- **Load Measurements** – Press this button to load a set of measurements from a file. Loading measurements will clear the current set of measurements. However, after loading measurements, more positions may be measured.

Load measurement files from the same product that was measured. It is valuable to make a note of the Zone Configuration settings in use when the measurement file is saved.

Be sure to enter the same Zone Configuration settings that were used when creating the measurement file that is to be loaded. MultEQ Pro will provide a warning message if these settings do not match. Continuing with a mismatched zone may result in incorrect equalization applied to one or more speakers

Detection Results



AUDYSSEY version 4.2.1.5

MultEQ Pro

Product Selection
Options
Zone Configuration
Subwoofer Level Matching
Measurement
Detection Results
Target Sound Options
Save Results
Calibration Complete

Detection Results

Ch	Location	Speaker Type	Dist (ft)	Trim (dB)	Crossover (Hz)
1	Left Front	Satellite	12.5	-3.9	80 Hz
2	Center	Satellite	10.5	-3.7	80 Hz
3	Right Front	Satellite	12	-4.7	80 Hz
4	Right Surround	Satellite	8	-6.2	80 Hz
5	Right Back	Satellite	8.8	-5.1	80 Hz
6	Left Back	Satellite	8.8	-3.5	80 Hz
7	Left Surround	Satellite	6.4	-6.2	80 Hz
8	Main Subwoofer	Subwoofer	9	-7.4	N/A

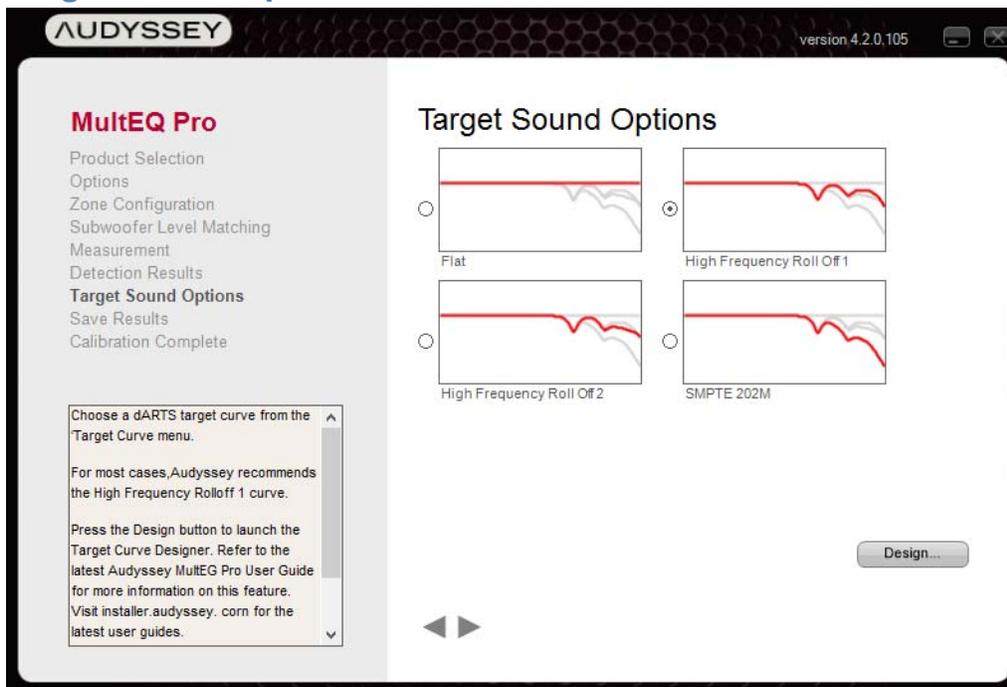
• Enter the reported "Dist", "Trim" and "Crossover" information into the preamplifier/processor.
• This information can be saved to your account on the Audyssey Installer Web Site. You can also create customer certificates that display this information. Visit installer.audyssey.com or see the "User Guide" for more details.

Enter the distance, trim and crossover value for each channel into the preamplifier.

The Detection Results Screen displays the following values calculated from the measured data.

- **Speaker Type** indicates whether the detected loudspeaker is a satellite or subwoofer.
- **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.
- **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.
- **Crossover options** dARTS systems always use an 80Hz crossover on all channels including the Sub-woofer

Target Sound Options



1. **Choose a Target Curve¹** to be used in computing the MultEQ XT Filters
 - a. **Flat** – A Flat target curve should not be used
 - b. **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.)
 - c. **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.)
 - d. **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.)
2. **Customize the target curve** – Press the “Design” button to launch the Target Curve Designer feature.
3. **Proceed to the next screen.** Correction filters will be calculated automatically.
 - A set of filters based on the user-selected target curve
 - A set of filters based on the Flat curve

¹ **Target Curves Explained** An audio system that reproduces sound with no coloration from 20 Hz to 20 kHz will not always produce the correct sound when combined with the acoustic response of a room. The main reason for this is that loudspeakers are much more directional at high frequencies than they are at low frequencies. This change in directivity causes the balance of direct sound and reflected (reverberant) sound to vary between the high and low ends of the frequency spectrum. The human ear perceives this imbalance as a “brightening” or emphasis of the high frequencies. A target curve compensates for this psychoacoustic effect by moderating the high frequency content.

Disconnect the Microphone

Warning: Disconnect the Calibrated Preamplifier's output (LINE OUT) from the product's microphone input before continuing. Leaving the microphone connected could cause feedback at levels that will damage the speakers.

Target Curve Designer and Target Curve Editor

The "Target Curve Designer" and "Target Curve Editor" windows are used to customize the frequency response of the base target curves on a channel-by-channel basis. All target curves on the "Target Sound Options" screen are affected by these edits.

The Target Curve Designer

The "Target Curve Designer" window allows creation of target curve modifiers and the assignment of individual modifiers to one or more channels.



- **Add New** – Add a new target curve modifier by clicking the "Add New" button. A file name is generated at the bottom of the "Name" column.
- **Load...** – Use the "Load..." button to choose a previously saved target curve modifier file. Only individual modifier files are saved and loaded. Channel assignments cannot be saved.
- **Save** – Use the "Save" button to choose a filename and location for the target curve modifier. The default save location is the "My Documents\Audyssey\Measurements" folder.
- **Select Channels** – Use the radio buttons to the right of the file names to select the channels to which each target curve modifier is applied. Each modifier may be applied to as many channels as desired. Each channel may have only one modifier applied to it.

- **Delete** – Use the "X" button to remove a target curve modifier from the list. If the file has been saved, this will not delete the file. However, changes made to the modifier since it was created, loaded or saved will be lost.
- **Done** – Exit the Target Curve Designer, applying the current configuration.
- **Edit** – Click the "Edit" button to launch the "Target Curve Editor" window. This window is used to edit the frequency response of the corresponding target curve modifier.

Using the Target Curve Editor

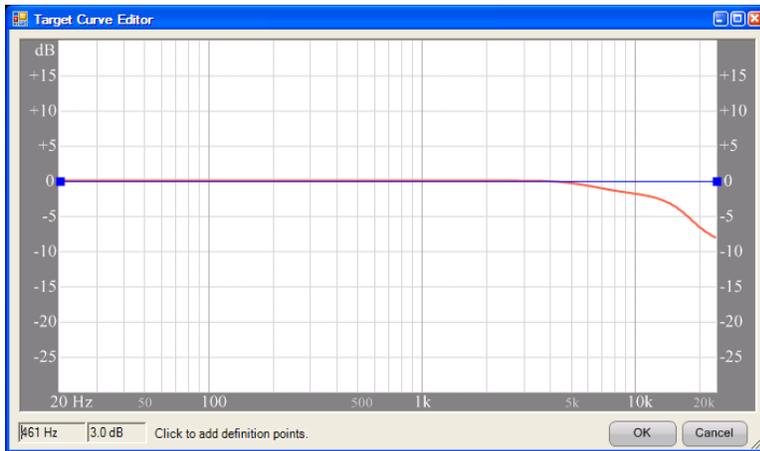


Figure 6 - Target Curve Editor - the *High Frequency Roll Off 1* target curve is shown with *Midrange Compensation* disabled (see *Target Sound Options*, page 16)

The "Target Curve Editor" is launched from the "Target Curve Designer" in order to edit a target curve modifier. A graph of the audible frequency spectrum is displayed, with the target curve modifier plotted in blue. The Audyssey base target curve that was selected on the *Target Sound Options* screen is displayed in the background so that the customized target curve can be viewed as the modifier is edited.

Placing and Adjusting Grips

Grips are control points that are used to edit the target curve modifier. They appear as blue squares on the target curve modifier and turn green when selected.

A grip is placed at each end of the graph by default. These two grips can never be moved horizontally or deleted, but they can be moved vertically.

Add new grips to the modifier by left-clicking the graph in the desired location. Grips may also be added by typing in the desired frequency and gain. Enter this information in the text boxes in the lower left corner of the window and press enter.

Control points must be separated by at least 1/3 octave. Clicking too close to an existing grip will not insert a new grip.

Limits of +/-3dB are imposed on the vertical range (gain) of the target curve modifier so that the target curve cannot consume the available headroom to the detriment of the equalization

range (Figure 7). Clicking or attempting to type in a number outside of this range will insert a grip at the nearest allowed gain value.

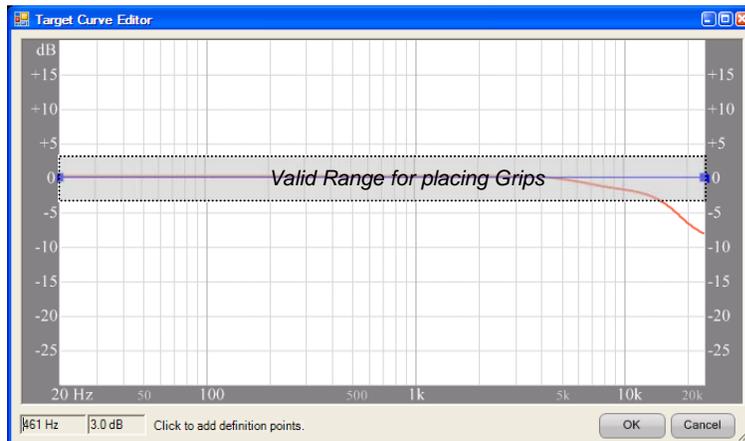


Figure 7 - Valid Gain Range

Move grips by dragging or editing values. To move a grip with the mouse, place the mouse pointer over it. Press and hold the left mouse button, then move the mouse to guide the cursor to the new location. To move the grip by typing in new values, select the grip, then type in the new values and press the “Enter” key. Alternatively, right-click on the grip to display its context menu and select “Enter Point Values.”

Select multiple grips by holding the CTRL key. Hold the CTRL key and left-click on each grip to be selected. Once selected, all grips may be moved as a single group.

Delete grips by selecting the grip and pressing the DELETE key. Alternatively, right click on the grip to display its context menu, then select “Delete Point(s)”.

When finished, apply the edits to the modifier by clicking the “OK” button in the bottom right corner of the window. To return the target curve modifier to its previous state, press the “Cancel” button. The “Target Curve Editor” window will close.

Spend some time placing grips and moving them to get a sense of how best to edit the modifier. Create several grips and move them in relation to each other, avoiding sharp peaks.

Save Results

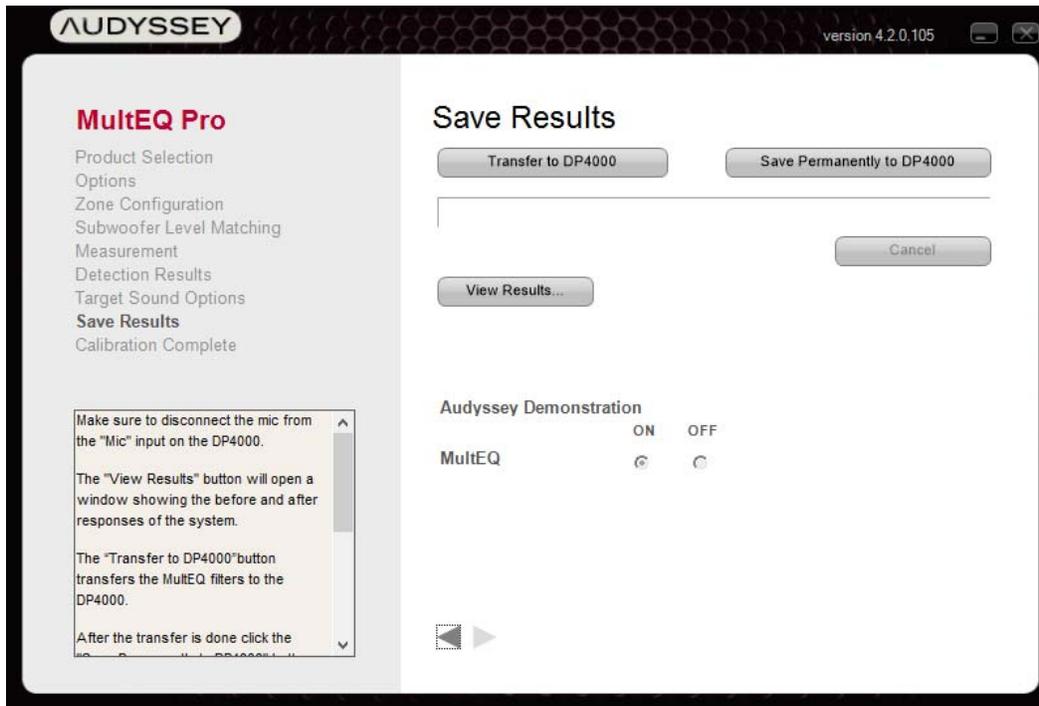
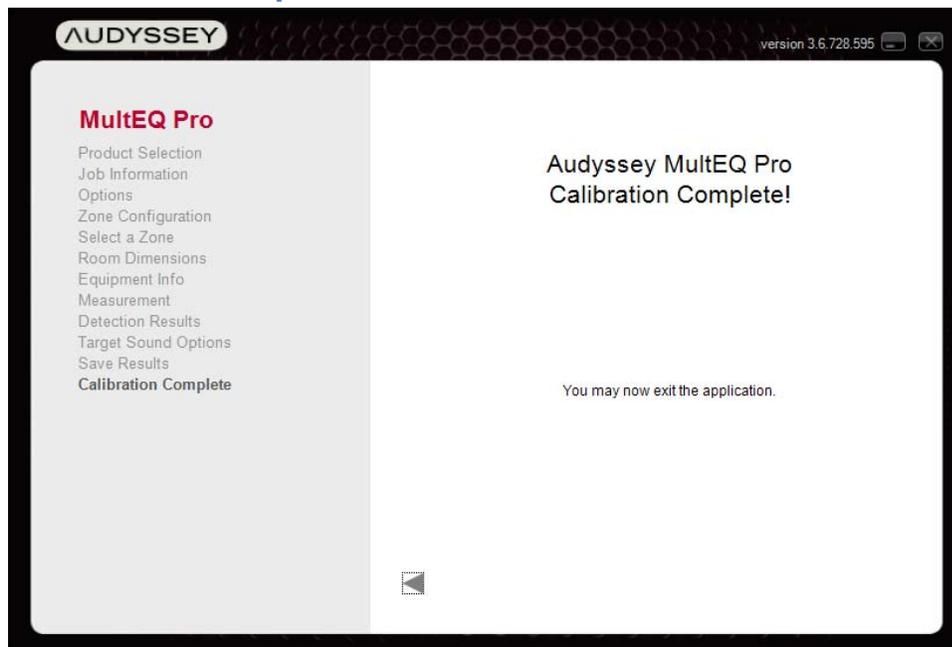


Figure 8 - Save Results

- **Transfer to DP4000IA**
- **Save Permanently to DP4000IA V2** – Once the target has been transferred to the DP4000IA V2 save then permanently by clicking this option.
- NOTE: Both the transfer and Save permanently must be performed.
- MultEQ can be turned on and off from this screen so you can listen to the effect it has.
- **NOTE: MultEQ must be set to on before continuing.**
- **View Results...** – Click the “View Results...” button to view a graphical display of the frequency response correction for each channel. The default HTML browser will automatically open a window displaying a Customer Certificate titled, “Audyssey MultEQ XT Room Correction Results.” If the filters have only been temporarily transferred using the “Transfer to [Product]” button, the certificate will display a “DRAFT” watermark over the content. To display the certificate without the “DRAFT” watermark, permanently save the filters, then click the “View Results...” button again.

To print the certificate, set printing margins to their minimum values. In Internet Explorer, open the File menu and select Page Setup. Enter “0” for all four margins. The browser will automatically adjust margins to their minimum values.

Calibration Complete



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. 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.
3. **Save a copy of the measurement.** This allows viewing and printing the customer certificate, equipment and calibration parameters at a later date.

Appendix

Error Messages

The error windows in this section may appear while using MultEQ Pro. Please contact Audyssey Technical Support if you request additional troubleshooting assistance.

Device Not Connected Error

This error message appears when MultEQ Pro does not detect a connection between the product and your laptop. Make sure the USB cable is securely connected.

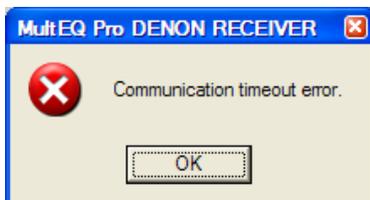
Input Signal Too Low

This window appears when MultEQ Pro does not detect a strong enough input signal to record a measurement. Check that the microphone is connected to the selected input. The preamp gain of the most recent installer kits are fixed and never require adjustment.



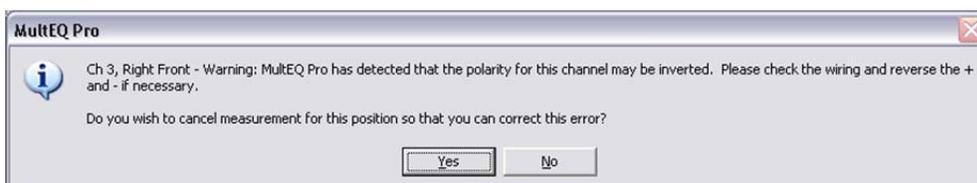
USB Connection Failure (Connection Time Out)

This message appears when MultEQ Pro does not detect a connection to the product. Check the USB to RS232 connection and try again.



Polarity Errors

In the case of polarity errors it is acceptable to continue with the MultEQ Pro application by clicking “No.” However, it is highly recommended that the validity of each warning be checked before continuing. Clicking “No,” finishing the calibration and later correcting for the problems listed in the window is not recommended.



Disconnect Microphone



An error message appears when exiting the MultEQ Pro application while the product is in calibration mode. Please make sure the microphone is disconnected, as not doing so could cause feedback at levels that will damage the speakers.

Trademarks

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

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.

© 2017 Audyssey Laboratories, Inc. All rights reserved.