

Real-World Acoustics™

by Eric Smith, Auralex Founder & President



What This Booklet Contains

The first section of Real-World Acoustics covers the most common mistakes people make in their control rooms and studios. The second section of the booklet covers the acoustical needs of voiceover artists. Even if you're not a voiceover person, though, I encourage you to read through the voiceover section, as it contains helpful information not contained in the first section. I have worked to keep repetition to a minimum. Last is a section on the reference disc I use to troubleshoot facilities' sound issues. Enjoy!

Free Resources To Help You With Your Studio

Auralex has some great resources available to you free of charge that could be enormously helpful to you as you construct or treat your space. Take advantage of them!

You can learn more about Auralex products and services at www.auralex.com, hear sound samples at www.auralexuniversity.com, learn about our premier custom-installation division at www.auralexelite.com and learn about about sound construction at www.acoustics101.com.

Acoustics 101™ is our free construction primer that tells you the right way to construct a sound-critical space. You can download the PDF on our homepage or visit www.acoustics101.com.

Our Personalized Room Analysis Form (PRAF)™ helps us advise you on the best way to treat your space. Click on the PRAF link on our homepage to fill out the digital version or print the form and submit it to our application specialists via fax, mail or e-mail. The beauty of our PRAF™ service is that the very same people who work on projects for our most famous clients will be the ones working on your project.

Remember: Auralex does not sell products direct to customers, only to our thousands of authorized dealers and distributors around the world. So, when you interact with us there is never going to be any pressure to buy anything from us. No strings attached. Just lots of helpful advice from people who know their stuff and are good at what they do.

Call Auralex toll-free at 800-959-3343 or e-mail auralexinfo@auralex.com to get your project started!



About The Author

Eric Smith is the president of Auralex Acoustics, an Indianapolis-based multinational company he founded in 1977 in an old one-car garage northwest of Indianapolis (shown here).

An accomplished drummer from age 6, Eric was offered the opportunity to tour with a country singer at age 10, was giving drum lessons for pay at age 12 & played in a band that opened for Aerosmith in '76 at age 17. Music led to a career as a prominent nightclub & mobile disc jockey; Eric entertained the Rolling Stones & their entourage at a private party in '89. Eric had a decades-long career as a radio personality, producer, production director & talkshow host in Indianapolis & Ft. Myers, FL.



Where It All Began

Eric has been on multiple boards of directors and is a frequent guest lecturer on topics such as acoustics, business ethics, entrepreneurship, various animal-related topics and more. He has guest lectured at Full Sail, SAE, Belmont University, Michael Wagener's Production Workshop, MTSU, Dark Horse Institute, Troy University, Purdue School of Engineering, Purdue School of Veterinary Medicine, the Art Institutes, the International Academy of Design & Technology, Butler University, Franklin College, NAMM, AES Workshop, PotLuckCon & more.

Auralex consults thousands of facilities a year and its client list includes the US government worldwide, the Rock & Roll Hall of Fame, the Lincoln Center, chart-topping GRAMMY® winners, a Beatle, the greatest basketball player of all time and 70% of the Fortune® 10.

Eric is married to his high school sweetheart, who is also a vegetarian and with whom he founded multiple animal charities & operated a nonprofit spay/neuter clinic. They care for dozens of special-needs animals at a private rescue facility and are the principals of Four On The Floor Pet Products, Inc., which is a charitable company focused on animals' wellbeing.

Questions about the content of this document? E-mail Eric Smith at AuralexPresident@gmail.com.

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On The Cover: Three studios designed by Carl Tatz Design utilizing Auralex products, and three studios done by Auralex or by Auralex customers. Think your facility, or some aspect of it, is worthy of consideration for a future version of the publication? Submit it to Robb Wenner at wenner@auralex.com.



The Most Often Overlooked Aspects Of Studio Acoustics

By Eric Smith
Auralex Founder & President
Revised 9-19-13

As we've said in our marketing materials for years: "In the beginning there was perfect sound...then man invented rooms.™"

Soundwaves interact with enclosed spaces in predictable, undesirable ways. Luckily, the field of acoustics is so mature now and our computing power so great that we have vast knowledge of what an enclosed space will do to soundwaves...and how to treat the space so as to yield an accurate, yet pleasant-sounding, environment. That last statement is key. *First accurate, then pleasing.*

With today's extraordinarily quiet electronics, digital recording and high-powered amplifiers and loudspeakers, acoustical control is far more important than it was even just a decade ago. The gear can so overexcite the room or expose its flaws that it's now imperative that we intervene. Without proper acoustical treatment, you'll never reap the full benefit of the audio and video (yes, video) gear you've invested in, as research studies have proven. Given the physics of sound propagation in enclosed spaces, your space is NOT immune and you WILL experience poor sound without proper treatment (and, often, construction techniques).

Granted, acoustics has been portrayed and perceived as a black art, but Auralex® practices Real-World Acoustics™ and makes acoustics as affordable and easy to understand as possible, offering a significant amount of free consulting and design assistance to help you attain the sound you desire. Note that there is a lot of misinformation about acoustics floating around the Internet, even among some well-known "experts," so please choose carefully and be selective about which forum posters' opinions you choose to believe. The prevalence of such misinformation is what spurred me to write this article.

The Basic Premise

Reflected sound is inherently inaccurate sound. Why? Because it will inherently differ in arrival time compared to the original sound and it will never have exactly the same frequency content as the original sound. Reflected sound that arrives within the critical, very short period after the original, direct sound is detrimental and must be dealt with if we're to hear accurately in our rooms. This includes both lateral and vertical reflections, despite some people's contentions. Proper acoustical treatment gives you a clean initial time delay (known as the ITD, the period between the direct sound and the beginning of the reflected sound) by especially controlling early reflections that come from the nearest room boundaries. In order to offer the maximum sonic precision, control rooms should have clean ITDs and short reverb tails. Why is this important? Because without proper acoustics, you're not giving your ear/brain mechanism the time it needs to latch onto the original, direct sound. Even though over time your ear/brain mechanism can "learn" an improperly treated or untreated room, it will ALWAYS have to siphon off its processing abilities (CPU cycles, if you will) in order to process the poor acoustics. This degrades one's focus and will be a detriment to a proper listening experience or performing quality work in the space. We hear time and time again from people after their rooms are properly treated that they are now more productive and can concentrate better. I have the luxury of spending a lot of time in top facilities that have been properly constructed and treated. It's amazing how I can feel my blood pressure and cortisol drop when I enter such a facility. My brain is sort of able to check off its list any concerns about improper construction and acoustics. You can feel this way about your facility, too. We'll help.

Types Of Room Modes

There are three ways in which soundwaves bounce around inside rooms. These are called room modes (bumps in response) and are categorized as axial, tangential and oblique modes. Axial modes involve two surfaces, either vertically or horizontally. Tangential modes involve four surfaces, either vertically or horizontally. Oblique modes involve six surfaces. The strongest modes and most problematic are the axial modes, particularly at low frequencies, so these are the ones we work hardest to control. The other types of modes do come into play, though, which is one of the reasons we implement bass trapping in as many horizontal and vertical corners as possible. Knowing your room's dimensions and the speed of sound, you can calculate your room's modes. You also can figure out where your room will have cancellations in its response, known as room nodes (nulls). Proper bass trapping is imperative to help negate the effects of room modes and nodes. More on that in a minute.

Tools Of The Trade

There are various types of acoustical treatments that can help tame your sound: **absorbers** (which remove sonic energy from the space), **diffusors** (which redirect, not remove), **bass traps** (tailored to absorbing low frequencies), **sound barriers** (which reduce the transmission of sound), **isolation devices** (which "float" devices from the structures on which they rest) and more, even including your **construction**. Choosing the proper treatments in each category (and knowing when not to use a particular type of treatment) will make your life easier and save you money in the long run. Some companies and designers too strongly advocate one type of treatment over another, but this is akin to always using a hammer even when a screwdriver is the proper tool for the job. It doesn't mean that a hammer is necessarily worse than a screwdriver; just that they serve different functions. Some people don't seem to get this.

While we're speaking of tools of the trade, it's important for you to know that there are vast differences in the chemistry of Auralex

Studiofoam-based products and many other brands of acoustical foam. Don't let this (>>>) happen to you.



Experience Matters...And Patterns Emerge

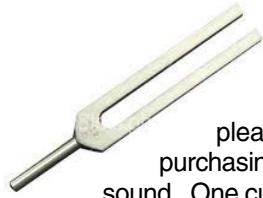
Having been in business since 1977, Auralex consults on thousands of facilities a year worldwide, including many GRAMMY-winners' facilities. With that large a project base, it's become clear that there are a number of key areas in which people often miss the mark, sometimes causing themselves additional problems that are difficult and expensive to remedy. Here is a short list of key topics we urge you to give attention to. These are some of the key points I discuss in my many multi-hour lectures, but are distilled for relative brevity here.

Sonic PROduction vs. REproduction

Depending on whether you're treating a control room, a tracking room, an isolation booth, a hi-fi listening room or other type of room, it is important that you first determine whether you desire sonic accuracy or you want the room to sound "good." The former yields sonic REproduction (meaning that the room interjects none of its own character), while the latter yields sonic PROduction (meaning that it does introduce its own sonic fingerprint). This is the first decision you must make in planning your room's construction, design and acoustical treatments. A recording studio's control room should always be neutral; a tracking room can exhibit its own character; iso booths can be either, depending on their intended usage, as can hi-fi rooms, depending on the owner's desires. Tread lightly, though. As a famous musician once said to me, regarding room ambience, "There's no knob for it." He was correctly stating that in a recording or monitoring situation, once ambient sound is captured by a microphone or has become a part of your monitor signal, there's no way to turn it down or get rid of it. This is why proper acoustical treatment matters. **Capture or monitor the cleanest sound possible.** Sometimes an inaccurate room can at first sound "better," similarly to how a louder signal always sounds "better" than a quieter version of the same signal, but beware this temptation. Extended listening will prove that a more accurate environment will stand the test of time and you won't tire of it over the long haul. Don't make your brain siphon off its CPU cycles trying to interpret a bad room.

Active vs. Passive

It is important that you understand that there are certain types/designs of acoustical treatments that resonate ("ring"), similarly to how a tuning fork does. These are called "active" devices. On the other hand, there are devices that do not (and cannot, by their very design) resonate; these are called "passive" devices. Unless you're a world-class scientist with vast knowledge AND nothing ever changes (moves) in your room AND you can perfectly control the temperature & humidity AND you can do fastidious physical measurements and never deviate from them AND additional people never enter the room, passive devices are a far smarter choice, as there's no way for them to bite you in the fanny, sonically speaking. I founded Auralex on the principal of passive control and this methodology has served us well over the nearly four decades we've been in in the acoustics business. Many companies' devices are *far more active* than you might think, so please choose very carefully. In fact, a lot of Auralex customers report that they've gotten expensive surprises when purchasing devices from other companies that proved to be far too active to be accurate, thus *hurting* the customers' sound. One customer reported that no matter how much repositioning and tweaking he did with another company's active devices, he couldn't make his room measure *better* rather than *worse*. He returned \$14,000 worth of devices (in 1998 dollars) and purchased Auralex treatments instead, saving considerable dollars AND improving his sound in the process.



A New Angle On Things...Or Not

It's a myth that a room must have angled surfaces in order to sound good. Yes, a tracking room with angles and lots of cubic space can exhibit a long, linear reverb tail, but understand that this falls under the heading of sonic PROduction, not REproduction, and there's no way to remove the ambience from your recordings once it's captured. Angled walls are not a necessity for good sound. In fact, if you get them wrong, you can do yourself much more harm than good, as modal anomalies can occur that are difficult to predict and treat properly. Spread, passive treatments can yield a very pleasing, controlled ambience in a tracking room without increasing the difficulty and expense of your construction, and without the potential sonic pitfalls that improperly angled walls can yield.

In a control room, where a short, dense, linear reverb time and highly accurate sound is desired, angled walls can be detrimental if done improperly and can actually shoot sound right back at the mix position if not properly oriented and treated. Fact is, it becomes much more difficult to model the sonic pathways and modal characteristics of a room with angled walls than a rectangular room. We feel it's far safer to build a rectangle and properly treat it than to take a shot in the dark at building an angled room. Don't forget, too, that treatments can be implemented in such a way as to make a room appear angled even though it's built perpendicular. Having said all that, if you really, really want to go angled, there's an angled control room diagram in our free publication and website *Acoustics 101*. Our engineers have run the numbers on this room and it is nearly ideal, once constructed correctly and properly treated.

If you desire a room that looks angled, you're better off building the room with perpendicular walls, but with a larger footprint so as to accommodate all the necessary trapping in such a way that the finished room appears angled. Let us help you attain this look.

Speaking of angles, if your control room has a vaulted ceiling I recommend that you hang acoustical clouds across the peak and place absorbers on the angled ceiling faces, thus making the acute angled area function as a beneficial bass trap and while potentially killing early reflections at the same time.

Don't Listen With Your Eyes

While we appreciate beautiful rooms as much as anyone, it's important to mention here that we advise you not to place form ahead of function. A pretty room that isn't soundproof or that exhibits poor internal acoustics



is a waste of your time and money, and will not be a space you'll enjoy as time passes. I urge you to be sure to allow room in your budget for getting the room right before you blow it all on gear. Emphasize purity of sound, which is after all the #1 purpose of your studio. You *can* have both accuracy and upscale aesthetics, as the photos in this booklet bear out.

While we're talking about form vs. function, I also want to mention that you should not be discouraged if you don't have the money to do an opulent studio that looks like it should appear in a coffee table book. While these rooms can be absolutely gorgeous and sound wonderful, don't mistakenly think that only a gorgeous room can sound good or accurate. That's not necessarily the case! If you can't afford an opulent-looking room, but desire the best sound your budget allows, call us. We'll wring every ounce of improvement out of the budget you give us to work with — regardless how many zeroes there are in it. We practice Real-World Acoustics™. **You CAN have a room like those you see in this booklet.** In fact, we developed the *Carl Tatz Signature Series* to help you do just that. Call or click for more information.



Think Broadband



When people think of acoustical treatments, they often think of relatively thin absorbers on the walls and ceilings. But this is just part of the battle: these thin treatments only absorb mids and highs well (that's a general statement and there are exceptions). Where most people go wrong is that they don't also implement dedicated so-called "bass traps" to control the low-frequency issues, which are far more detrimental and harder to control than mid/high issues. When someone describes a room as "dead" or "boomy," they're probably in a room with only mid/high absorption and without sufficient low-frequency control. Make sure you plan in your budget of both physical space and money for sufficient bass trapping or you'll chase sonic gremlins 'til the end of time. **Go broadband.** (There's much more on bass trapping later in this document.)

If you don't have the space to build your room the shape or size it really should be to attain excellent broadband results, there's still something you can do: mount your treatments to your room boundaries in such a way as to stand the treatments off the boundaries by an inch or two. This improves your treatments' overall absorption characteristics, giving you something for essentially nothing, and particularly improves the

treatments' low-frequency absorption characteristics. Put some fiber optic or tracklighting behind your panels, such as is shown here, and you'll end up with stellar looks AND sound. (Photo to the upper right courtesy Carl Tatz Design. Photo to the left is of a Roland tradeshow booth using Auralex products in a very effective manner.)

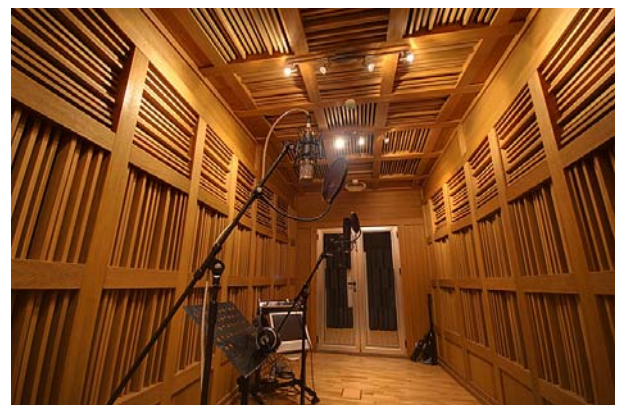
Diffusion Is Often Overused And Improperly Implemented

This one goes back to the early 1980s and plays into the earlier bullet point about the difference between PROduction and REproduction. Diffusion in a tracking room, which is allowed to subjectively sound "good" to a certain degree without being too detrimental, can be useful if properly understood and implemented. But some people put diffusors in their control rooms, on the front wall, the ceiling above the mix position, the side walls adjacent to the loudspeakers and on the back wall, none of which I think is desirable. In a control room, diffusion falls into the category of sonic PROduction; it is NOT putting back something that was missing from your sound, it is adding its own character (pleasing inaccuracy, but inaccuracy nonetheless) to your sound. Thus, I am not in favor of diffusion in control rooms.

Some people think that diffusion in control rooms is necessary to enlarge one's sweetspot and image, but I disagree and would ask, "At what cost?" Why trash the accuracy of your sound by introducing inaccurate, time-delayed reflections that were never part of the original signal? Please understand that you do not have a "diffusion deficiency" that needs treatment.

My years of experience have shown me that, contrary to popular belief, a sonic image gets BIGGER when proper absorption of early reflections and bass trapping are introduced, not smaller, and that diffusion is at best unnecessary and at worst, detrimental. Diffusion is not the panacea many promote it as being, so be careful about where you put diffusion and make sure you understand the ramifications of doing so. Don't diffuse into absorption. If you do choose to implement diffusion, realize its limitations and requirements.

And, though not the primary topic of this paper, diffusion has no place in large facilities like houses of worship or lecture halls, where lengthy reverb times equate to poor intelligibility anyway. I have heard diffusion work well in some concert halls, but not all. I



An extremely reflective room constructed of homemade diffusors. Good luck capturing a dry, present, intelligible recording in a space this reflective, then mixing it. The room looks great in pictures, but is a prime example of a space that PROduces sound instead of REproducing sound. It's likely that everything recorded in this room sounds the same.

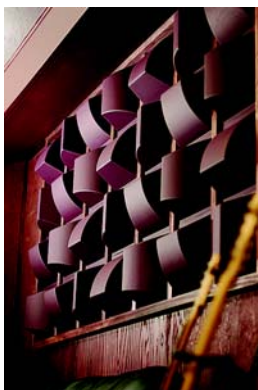


disagree with using diffusion in home theaters for the same reason I don't agree with diffusors' use in control rooms: they degrade the integrity of the original source material. To those who advocate using diffusion in home theaters, I say, "Would you presume to have a better idea about how Star Wars should sound than George Lucas does?" If not, then why would you want to implement false reflections that do not present to you exactly what Lucas heard when he mixed the film?

If you're desiring to diffuse, know the pitfalls. And don't forget that there is still a need for bass trapping...which leads me to mention that Auralex has some extremely effective diffusors that are also excellent bass traps when loaded and installed correctly. See the MiniFusors photo of just such an installation.

Understand, too, that there are various types of diffusors, some based on geometric shapes and some based on complex

mathematics. Some are made of molded plastic, some wood, some expanded polystyrene and other materials. Some are fabricated in such a way as to promote resonance, while others are sturdy and relatively inert. What some people call diffusors are at best refractors, so step carefully. No matter their design, diffusors all have different effective frequency ranges and different dispersion patterns, so make sure that you're choosing the proper tools for your project.



MiniFusors installed in an array that also functions as a bass trap.

In addition to pure diffusors, Auralex has a product called the WaveLens that yields diffusion-like benefits, but also can improve the effectiveness of adjacent absorption by redirecting specular soundwaves into the absorbers. Used as shown above, which is a photo of our products at the Rascal Flatts' studio (photo courtesy Carl Tatz Design), arrays of WaveLenses can make a relatively small space sound much larger and more linear. They also can couple two adjacent spaces.

Proper Construction Doesn't Cost...It SAVES

A poorly constructed, "floppy" room makes proper acoustics dramatically more difficult and expensive to attain, so we advise that you read our free publication *Acoustics 101*TM and follow its guidelines about how to build a room with just the right amount of rigidity AND controlled flex, such as is shown in the top two photos here. You can download the PDF of *Acoustics 101* on the homepage at www.auralex.com or by visiting www.acoustics101.com. Proper construction inherently improves your sound, particularly by smoothing your room's low-



U-Boats under floor joists

frequency anomalies, and will save you both time and money in acoustically treating your room. The late, great engineer (and nuclear physicist) Roger Nichols, who was Steely Dan's engineer, asked my permission to use *Acoustics 101* as a teaching guide in his Pro Tools[®] master classes, so you know you can trust its advice. The great Michael Wagener (Metallica, etc.) has said publicly that *Acoustics 101* was his "bible" when he built his studio complex, a tour of which can be seen on YouTube. I once gave a 3-hour lecture there and can attest that it is an awesome facility, no doubt due in part to *Acoustics 101*. *Acoustics 101* is chock full of helpful advice about HVAC, windows, etc., so take advantage of it.



SheetBlok on floor joists

Where people go wrong is in substituting other products for the ones we specify in *Acoustics 101*. I can't count how many times people have told me all the different materials they used, often telling me they did so 'cause they knew somebody whose cousin used to be in a band and they had a studio and they used... You get the picture. Save yourself headaches. Don't substitute for the conventional building materials we specify in *Acoustics 101*. Our time-tested system simply works. *Very well.*

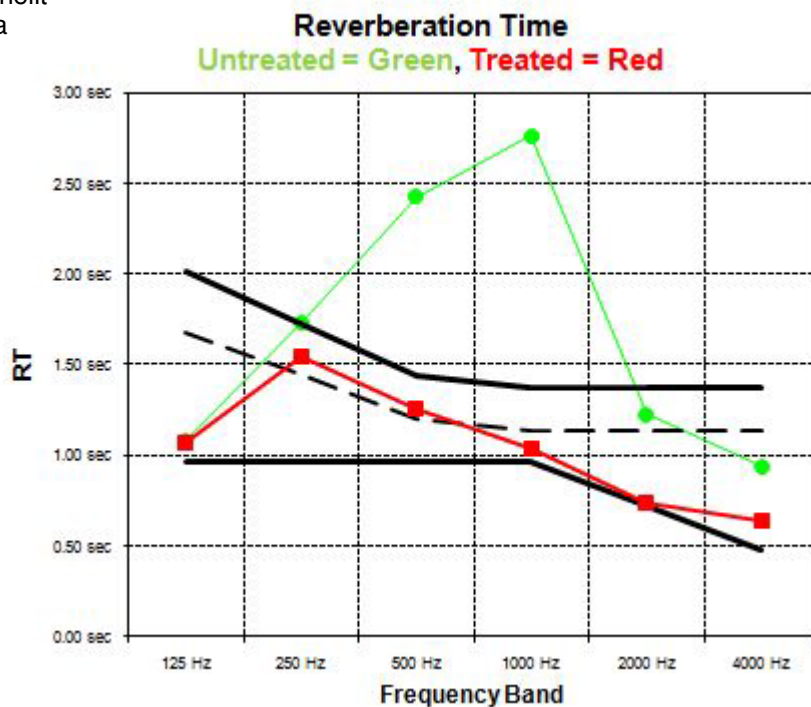
Three components we feel are critical to appropriate construction techniques are Auralex Mineral Fiber insulation (shown in all three photos to the right), SheetBlok Sound Barrier (shown in the top two photos) and our RC8 Resilient Channel strips (shown in the bottom photo). Mineral Fiber is much more dense than normal insulation, so it's better thermally and really helps improve the sound isolation of your space while at the same time improving your room acoustics, particularly at low frequencies. SheetBlok is only 1/8" thick, but is more effective than solid lead at stopping the transmission of sound. It also imparts some of the all-important controlled flex that is critical for sound isolation and improved low-frequency accuracy. RC8 Resilient Channel is used to stand your wall/ceiling layers off the studs or joists, thus improving your sound isolation *and* room acoustics. We have found these three products to be absolutely indispensable in constructing sound-critical spaces, so please give them your utmost consideration.



Many of you will be building a floor such as is shown in the top two photos. If you are, please do it correctly, whether it's in your control room, a drum riser in your tracking room, a stage in a nightclub or a stage in a church sanctuary, lest you forever kick yourself for cutting corners. Trust me, you don't want a lousy floor system to resonate like a bass drum. Doing it the right way allows the floor system to function as an effective bass trap that will benefit the acoustics *throughout the room* and keep boominess to a minimum. Our flooring system has worked for some of our most famous clients and will work for you, too. Trust it.

Large Room Acoustics vs. Small Room Acoustics

Without getting too deep into the physics of sound control, it is important to understand that we approach sound control differently based on the physical size and cubic footage of the space we're consulting. Large rooms such as convention centers, gymnasiums or houses of worship play by a different set of rules than do small spaces like control rooms, home theaters or hi-fi listening rooms. Larger rooms generally require a much lower percentage of treatment than do smaller rooms, and large rooms generally don't require dedicated bass trapping such as we use in small rooms. Be careful, as there are "experts" who don't seem to understand the difference between large room acoustics and small room acoustics. See the graph to the right, which shows how we attained better-than-ideal sound in a house of worship with a very small percentage of coverage.



"Ideal" Sound Is Absolutely Attainable

There are international standards for ideal acoustical parameters in various sizes and functions of spaces. The good news is that virtually every job Auralex consults is designed to yield ideal sound. Note that this is not *our* version of ideal sound, but the universally accepted version, fine-tuned over many decades. No matter what a particular space needs, ideal sound is attainable. Here's an example. We recently did a house of worship in which we were able to attain ideal sound (meaning, frequency content and reverberation time) with only 10% coverage of the walls and ceiling (see the testing graph shown here; the black lines outline the acceptable range, while the dotted line is considered "ideal" sound). In small rooms, this percentage of necessary coverage is generally much higher, but the same results can be expected. "Acoustically perfect" rooms are not the exception at Auralex; they're the norm.

Monitor Location & Orientation Are Key (Refer to the diagram later under the heading "Suggested Room Layout.")

Along with control of early reflections, proper physical alignment and positioning are key in attaining monitoring accuracy. Make absolutely sure that your monitors are the same distance from the center line, the same distance from you and that they're toed in (angled toward the center line) the same amount. Here's a trick. Once you determine, perhaps with a piece of marked string, that your monitors are the same distance from the center line and from your head, put your head in the mix position and, without moving your head, focus your eyes on the inside (facing each other) surfaces of the two monitors. You should see exactly the same amount of the inside surfaces showing, not more of one than the other. If they're not the same, tweak one until it's the same as the other. How do you know which one to tweak? Whichever one is pointing to a spot a couple feet behind your head already, assuming one is, is the one you do NOT want to tweak.

We advocate using most monitors in a vertical orientation, thus maintaining consistency of the arrival time at your ears of the various frequencies. Some types of monitors are designed to be used horizontally, such as D'Appolito arrays like the Dynaudio M1, of which I own two sets. Either way, be sure to physically isolate them from their resting surfaces, as discussed in the next section.

It is important to acoustically treat the front wall of your room, no matter whether it's a short or long distance to the walls or glass behind the monitors. Leaving this critical area untreated will introduce spillover reflections that will return to the mix position out of phase with the direct signal, thus making it very difficult to hear with any degree of articulation or accuracy. Therefore, I advise that you kill — in as broadband a fashion as space and budget allow — the early reflections to the left and right of your monitors, on the ceiling and behind the monitors, then fastidiously position your monitors with absolute symmetry. Designer Carl Tatz has found that 67.5" tweeter to tweeter is an appropriate distance; closer together and the image shrinks. Make sure your head is far INSIDE the point of the equilateral triangle you and your monitors form. Do not put your monitors closer together than the distance from one monitor to your head. We have found that putting your mix position 38% of the distance from the front wall to the back wall yields smoother bass response, as it gets your listening position away from a prominent room mode.

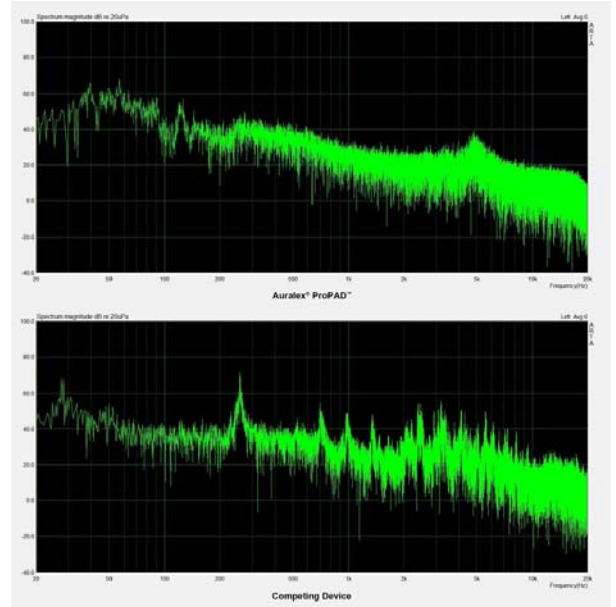
There are those who advocate *not* killing early reflections in control rooms, home theaters and hi-fi listening rooms. I strongly disagree with these people's line of thinking, as early reflections are sonic PROduction. These folks are misunderstanding the fact that reflections that arrive too close to the original sound (within 50-80 milliseconds) WILL be confusing to the ear/brain mechanism and WILL be perceived as being part of the original sound. (They probably know this, but they find the sound of these early reflections to be pleasing.) I say firmly that this is a very bad thing and should be avoided. **Kill your early reflections.** Your image will GROW, not shrink.

Don't forget that the front wall (whether it features a large flat-panel monitor or not) and the back wall are the primary generators of detrimental axial modes. Please be sure to adequately control these walls in a broadband fashion. Focus, too, on the vertical axial modes at the mixing console and at the mix position. Fix these two issues and provide adequate corner bass trapping in your vertical and horizontal corners, and you're 2/3 of the way to accurate sound.



Float Your Sound Producers

When objects resonate and produce sound (loudspeakers, subwoofers, guitar & bass amps, drums, pianos, etc.), they excite the surfaces on which they rest. This sympathetic vibration couples with the direct, original sound and degrades its quality. Why? Because the sympathetically resonating structure doesn't have the same sonic signature as the original sound producer and there is an inherent time delay with the resonance. To get around this, it is imperative that you float (physically isolate) your sound producers from their resting surfaces. Got monitors on speaker stands? Float them. Subwoofer directly on the floor? Float it. Otherwise, you're listening to the stands and the room construction, not just the signal coming out of the monitors and sub. The improvement in the purity of tone and frequency accuracy that this yields can be astounding. Auralex has a wide range of patented and patent-pending, yet affordable, floating devices that world-famous musicians swear by and which are just as useful on stage as in the studio. Do check them out, as they're a super-affordable way to improve your sound. (See our ProPAD studio monitor isolator in the photo on this page.) Don't forget that mic stands are susceptible to picking up vibrations from the floors on which they rest, too, particularly from HVAC, railroads, trucks and airplanes. Luckily, stopping this phenomenon is easy and affordable. Call us for advice.



By the way, remember earlier in the document when I spoke about my concerns about "active" acoustical devices? This can also apply to certain designs of floating devices. There's a brand of monitor isolator that, in addition to being more expensive than our various offerings, also resonates wildly. This thing sings like a canary, as verified by fastidious testing, which is exactly the problem it's supposed to *solve*, not *create*. Buyer beware. See the comparison graphs shown here, which were the result of testing an Auralex device against the competing device. Yikes. Notice all the resonance spikes in the competing device's sonic signature. The ProPAD's response is far more dense and linear, which is desirable.

Bass Trapping Is WAY Important

Both novices and professionals alike fail to implement enough bass trapping in their rooms, then they wonder why their recordings don't sound right ("translate") when played at other facilities or in their cars. The issue is that their rooms exhibit inaccurate low frequencies, so they're flying blind and are basing their sonic decisions on false information. They need bass trapping.

The Low-Frequency Paradox[®], as I termed it years ago, is that regardless whether you perceive that your room is exhibiting too MUCH or too LITTLE bass, you definitely need bass trapping. It is adaptogenic, helping you whether you have too much or too little. An added bonus is that properly controlling the lows will also pay dividends in the mids and highs, too, because the low-frequency harmonics are smoothed out. You'll sense that a mask was removed from your midrange, which will be much more articulate.

How important is bass trapping? VERY. In fact, one of the world's most respected and expensive studio designers, Tom Hidley, includes many FEET of intricate bass trapping in his side walls, ceiling and rear walls. Why? So that low frequencies only get heard ONCE; they are not reflected back to the listening position, time-delayed and differing in frequency content.

Vertical and horizontal corners are where most low frequency problems exist, but the most often overlooked place where a control room needs bass trapping is its rear wall. This is an issue we've even seen in the industry's most expensive, well known facilities, so please pay careful attention to it. Trapping the rear wall properly will pay enormous sonic dividends across the sonic spectrum, not just in the low end. No room to implement rear-wall bass trapping? Put movable, stand-mounted absorbers behind your mix position when you're doing critical work. Your sonic acuity will improve *dramatically*. Look at Auralex ProMAXes.



Another key point about low-frequency waves: they look for a way "out," so you'll find that smaller areas off of larger areas will tend to be bass-heavy. Notice how a shower or phone booth sounds, or even some portable or permanent iso booths that only have mid/high absorption? This phenomenon can work in your favor, though, so consider turning any small adjacent areas into bass traps. Unused closets and adjacent space you can steal to turn into bass traps can be quite helpful if treated correctly. Bear in mind that these stolen areas must be constructed properly or they will resonate or leak sound

in a potentially detrimental way that hurts you more than helps you. Build them just as solidly as your studio so they don't harm your sound. Follow our guidance in *Acoustics 101* and feel free to call us for practical suggestions.

We once saved the day in a multimillion dollar home theater (shown in the bottom photo on the previous page) that was pushing tens of thousands of watts of sound via a large number of the most expensive active studio monitors and subwoofers on the market...but had NO bass trapping designed into it. I convinced the contractor to rebuild per my spec's the center seating riser, thus making it a beneficial bass trap, but that wasn't enough. By crawling on my belly deep into the adjacent walls, I found some open cavities that had just enough space for us to use as bass traps. The contractors weren't happy, as it was difficult to drag tools and lumber and Auralex SheetBlok Sound Barrier back there to construct all these traps on both sides of the room, but the exercise paid off in spades: the room won the CEDIA Home Theater of the Year award in the top-dollar category. An industry heavyweight later told me that the room exhibited the "most accurate low end (he'd) ever heard in a home theater." Take this to heart. **Definitely implement a LOT of low-frequency absorption in your spaces.**

I was visiting a top commercial facility in the Dallas area and loved how they had trapped their iso booth, which was large enough to hold a half dozen or so people and had more reflective surface than I normally desire in a booth, yet sounded surprisingly controlled. How'd they achieve the natural, linear sound that I found so pleasing? They treated their walls with 1" Studiofoam Wedges, stood off the wall on a French cleat system (which we'll touch on later), and trapped their entire ceiling with our Venus Bass Traps, which develop an incredible absorption coefficient of 1.63 at 125Hz.

Don't believe what you read in certain books, though, and think that only DIY, hard-to-construct, scientifically intricate bass traps are the only way to properly control low frequencies. They are NOT and they tend to be active, as discussed earlier in this article, and can sabotage accurate sound if done improperly. Designed and implemented correctly, passive bass traps can be fantastically effective. As an example, Auralex has many passive traps, some of which are patented and one of which the Riverbank Acoustical Laboratory director said was *the most effective bass trap the lab had ever tested*. Passive traps are a much safer approach to treating your low-end problems and can actually save you considerable time and money versus building your own traps, then realizing you didn't build them correctly and that they're hurting your sound rather than helping it. We prefer passive traps over tuned resonators or diaphragmatic devices.

Here's a story about a famous L.A. recording studio where big-name stars record. I was there to consult them and was in a discussion with their chief engineer, who told me that a top rapper had recorded there but could never get enough bass to develop in the control room. He kept having more and more subwoofers brought in, but to no avail. He just wasn't hearing enough bass. It turns out that the problem was the diaphragmatic bass trap the control room's designer had implemented across the entire ceiling at the front of the room. The more the rapper's engineers tried to excite the room, the more the diaphragmatic absorber sucked up the bass. This is an excellent example of why we feel that trapping should be passive.

Here's another L.A. story, this one also involving a famous facility. The chief engineer asked me to assess their main control room's low-frequency characteristics, so I spent time listening to my reference disc (more on that later in the booklet) and walking the room. When I was finished, I told him that the room exhibited far too little bass at the mix position and far too much at other locations, primarily near the back wall, which is a telltale indicator of insufficient rear-wall trapping. He excitedly told me how much he agreed, saying that he didn't trust the room. Most importantly, though, he told me that the facility had previously had a number of top designers come in and redo the rear wall. Unsuccessfully.

Take a cue from Mr. Hidley and benefit from Auralex's decades of Real-World Acoustics™ experience: leave space and money to adequately trap your low frequencies, specifically at the rear wall. Your sound will gain height, width and depth to a greater degree than you can imagine, even if you don't have the money or space to exactly mimic Mr. Hidley's approach. Let us show you how to tame your bottom end — far better, faster and less expensively than you might think.



Sometimes It Only Takes A Little

Most rooms need a decent quantity and mix of the proper acoustical devices in order to sound their best, but once in awhile you'll get lucky and a lot of problems can be solved with a small amount of treatment — even a single panel.



Here's a real-world example to illustrate my point. A famous Nashville mastering engineer and I spent time in his control room and it sounded very good (meaning, accurate), except for one particular issue, which I didn't mention to him while we were working on a mastering project together. As I was leaving, though, I told him I was going to custom produce something for him that I thought he'd find helpful. I did and he was absolutely astounded by the improvement. He told me, quote, that the 2'x4' device "miraculously flattened everything below 80Hz and above 10KHz...and smoothed everything out in between!" When I ran into him and his wife at another facility, she hugged me and told me that my custom treatment had "changed his (mastering) life." This illustrates that sometimes a surgical approach is more effective than brute force. Your mileage may vary, of course, but Auralex can certainly help you stack the deck in your favor. (The single, custom panel is shown in the top photo to the right before we shipped it to the mastering engineer.)



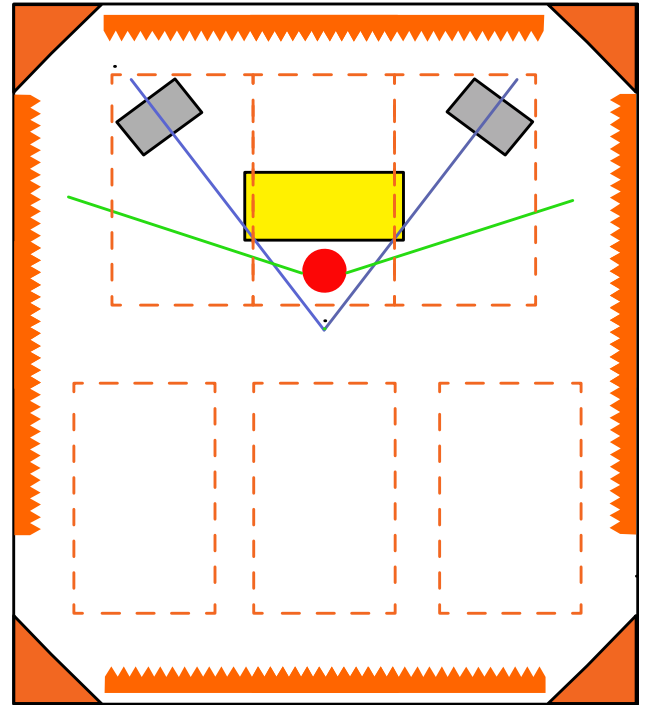
Another top Nashville engineer was amazed at the difference a few additional absorption panels and some monitor isolation and repositioning made in his control room. He told me that now he can hear even the most minute changes he makes in panning and that the stereo image is much more cohesive, deep and broad. His is a sweet monitoring environment; no guessing involved.

Another Nashville engineer, who is also a GRAMMY®-nominated songwriter, told me, after implementing proper treatments and realigning his monitors to the mix position, that his stereo image is “huge...with a lot of height...” and that he feels like he’s “inside the piano.” His wife said he “never wants to leave that room.” Interestingly, the fellow thought he was hearing a very faint “ssss....ssss....ssss” sound in his studio, which it turned out he indeed was. He thought he had a capacitor going bad in one of his active monitors, but it turned out to be *the candle on his console*, which his room was now quiet enough for him to hear. (The actual candle is shown here, along with a photo of the client, Ben Cooper.) Without being very expensive, Ben’s studio is truly one of the most accurate monitoring environments I’ve heard in a long time. Mackie 824s + proper treatments + proper installation technique + monitor isolation + good physical alignment and a little luck = success.

Suggested Room Layout

As I mentioned previously, just ‘cause you’ve seen angled rooms in glossy magazines don’t think that you have to build an angled room to have accurate sound. That’s not the case at all. In fact, unless done very carefully, angled rooms often cause more problems than they solve. I advise that you construct a rectangular room the best you can afford. I suggest you position your mix position at about 38% of the front-to-back distance, which generally gets you out of a modal hump. I suggest you treat your room as shown here, with trapping in the corners (and at the wall/ceiling junctures if your budget allows), a cloud above your mixer, serious treatment on your front and rear walls, conventional treatments on your side walls as far back as just behind your head and spread treatments on your rear ceiling and rear sidewalls. Your cloud can be suspended from the ceiling at an angle. Your other ceiling treatments can be suspended down away from the ceiling a few inches. Your front and back wall treatments should be stood off the wall 2”. Your sidewall treatments can be stood off the walls or mounted to them.

This studio would sound very accurate, with strong control of early reflections and the vertical and horizontal axial modes at the mix position. The tangential and oblique low-frequency modes would be well controlled by the corner trapping. Due to the spread treatments toward the rear of the room on the sidewalls and ceiling, the room would retain enough ambiance to be pleasing and comfortable, but still accurately controlled.



A suggested room layout. Treat your space like this and you'll be happy with the result.

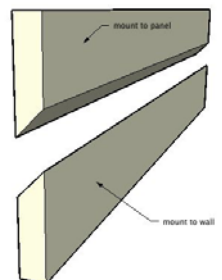
Here’s what you’re looking at in the drawing. The purple lines show where the loudspeakers’ tweeters cross, which is behind the head (red dot) of the engineer. The green lines indicate the 160-degree stereo image one typically hears when one’s monitors are set up correctly and one’s early reflections and room modes are properly controlled. Yes, it is common to hear an image that extends out beyond the loudspeakers. Still think you need diffusion to broaden your image? :-)

In a perfect world you wouldn’t have any windows in your control room. But chances are, if you’re in a preexisting facility you will have windows. This is not a deal-breaker sound-wise as long as the windows are either properly treated or properly positioned. You can fashion hanging or hinged panels to cover the windows when sound is more important than sight, or you can put stand-mounted treatments in front of the windows when appropriate. You can invest in those super-thick theater curtains, too, but they’re mighty expensive. We advise that if possible, put the windows behind you on the side walls so the monitors’ sound is hitting the glass at an angle and will reflect toward your rear-wall treatments, not bounce right back at you. If you’re building an angled room, this could work in your favor as long as the windows direct sound away from you, not toward you.

The same can be said for glass doors, which are reflectors just like windows are. If your doors are solid, not glassed, you can affix treatments to them, so they’re not as big a deal. Still, try to put entry doors at the rear of the room on the side walls and spaced far enough from the rear corners as to still leave room for proper bass trapping.

For Variability, Do The Slide

I’m a fan of offering people the ability to vary the acoustics in their tracking spaces (not control rooms). A good way to do this is to mount your absorbent or diffusive panels in not only a removable fashion, but a fashion that allows you to move them closer together or farther apart, or even reverse them or remove them. A favorite way of accomplish this is with a French cleat system. Not only is this super easy, but it also spaces your panels a little farther off the wall, making them function in a more broadband fashion and improving their acoustical performance for virtually nothing. Here’s how to accomplish a French cleat system.



Get the sturdiest, smoothest, straightest, hardest 1x4 lumber you can afford. Rip the lumber in half lengthwise and cut a 45-degree angle through the board like shown in the drawing. Stain, not paint, the pieces. Mount one piece to the wall and one piece to the

back of your panel. If you do this in a track that runs the whole length of your wall(s), you'll have the ability to remove panels at will or slide them together or apart. Build your panels with absorption on one side and diffusion on the other, such as Auralex MetroFusors or ProFusors, and you'll have the best of all worlds. Rotating the panels will instantly change the room's character.

Room Furnishings & Miscellaneous Thoughts

Proper construction and room treatments are must-do items, but once you get the room right, there's still plenty that you can do to maximize your setup so it benefits you sonically.

Large couches and overstuffed chairs are big enough to be decent low-frequency absorbers. Position them against the back wall or in the rear corners of your room if possible so they can do you the most good as natural bass traps.

Choose your lighting carefully and dampen your fixtures if needed so they don't ring at certain frequencies.

Use equipment racks that are no higher than table/console height if possible. If you do have to use taller racks, position them on your sides and angle them such that sound that strikes the faces of the gear will be reflected toward the rear of the room. Those angle-front gear racks that so many people put directly behind them are convenient, but the gear they contain is hard and reflective, thus it reflects sound right back at the mix position, which we definitely don't want. We prefer racks that are straight vertical in front or that gear be installed in racks that are positioned to your left and right. I once troubleshot a room for a top Nashville mix engineer and he had a tall rack of gear behind him and off to one side a bit. It was positioned perfectly to cause the room to sound asymmetrical and to reflect sound directly back at him, so we rigged a custom panel that he could hang on the rack when he wasn't needing quick access to the gear. He was pleased with the result. If you have no choice but to have tall racks of gear, perhaps leaning or hanging Auralex panels in front of the gear when you don't need ready access to it would work well for you, too.

You'll be spending a lot of time in the studio, so invest in the most comfortable, supportive chair you can. Your back will thank you.

Chairmats over carpet may seem like a good idea, but I've never found them to be long-lasting, especially considering how expensive they are. You're better off putting laminate flooring or tile in the area where you'll be scooting your chair, even if you carpet the rest of the control room.

If others share your office or residence, rig yourself a switch near the mix position so you can turn on a RECORDING sign or lightbulb to alert others that you're doing critical work. If you build your studio correctly and it's perfectly soundproof, perhaps you won't need a sign/bulb, but even then there is the chance that someone may burst in during some critical work or recording.

Even if you don't do surround work, I suggest running surround wire for loudspeakers, video devices, computer networking, etc., while you have the chance. Someday you may leave your facility and the space may become a home theater, at which time you'll wish you'd run the extra cable.

Acoustics is a game of inches, so be absolutely sure at all stages of construction and treatment that you do everything you can to achieve near-perfection. I'd hate for you to get to the end of the process and find that your shortcuts cost you the excellent sound or soundproofing you worked so hard for.

Be sure not to run your HVAC ducts in such a way that your supply duct for the control room dumps its air at the front of the room or near your mix position. Unless your ductwork is perfect, the noise and air turbulence will forever mask important sonic details.

Proper electrical grounding is of paramount importance in a studio, so put as much thought and effort into it as you can. The "star" grounding technique is popular in studios and requires that each outlet's ground run all the way back to the panel, not tie to an adjacent outlet in a daisychain fashion. Trust your electrician's opinion, but insist on the quietest ground scheme possible, even if it requires a little extra money and effort. You'll only get one chance to get it right, so don't skimp. Great gear and a well-constructed and well-treated room will show up your electrical flaws and your gear won't run optimally with a bad grounding scheme.

If your place has existing windows, consider installing an additional window or double-paned safety glass in front of your existing windows in order to improve sound isolation.

Ceiling fans are popular in some control rooms that are taller than most. Fans look great and add a comfortable vibe to your room, but they can be reflectors of sound when stationary and can be sporadic reflectors of sound when rotating. For this reason, we discourage you from having fans in the front of your room, preferring to have them be between your mix position and the rear of the room. Don't forget, too, that there is no such thing as a silent ceiling fan or motor, so the sound will add to the noise floor of your room and constantly cause your brain to siphon off its CPU cycles to accommodate the drone of the fan.

If you use some sort of auto-correction software to tune your monitors, do so after all the furnishings and gear are in your room, not before. This seems "duh," but you'd be surprised how many people, well, you know.



It may be redundant to mention this again, but I consider the rear wall to be of supreme importance in control rooms. Invest a lot of time, effort and money, if necessary, in getting your rear wall and its treatments right. If you don't, you'll want to hang yourself when you discover how inaccurate your frequency balance is at the mix position. If you call us, we'll tell you how to deal with the issue, but you'll be happier if you get it right in the first place. Let us help you.

Run & Gun Acoustics Without Losing Your Damage Deposit

Some of you may be looking at the suggested room layout and thinking, "That's great for some people, but my space is asymmetrical and I'm only renting it. I don't want to be mounting a bunch of stuff to the walls or ceiling, and I certainly can't put a bunch of money into modifying the room's construction. Am I out in the cold?" Luckily, not at all. You can achieve perfectly workable acoustics in most rooms without doing construction renovation...and without affixing acoustical treatments to your walls. (The one exception is regarding acoustical clouds, which we haven't figured out how to accomplish without rigid attachments to the ceiling.)

Auralex has a number of stand-mounted acoustical products, even bass traps, that perform very well and won't trash your walls or break your piggybank. We also have temporary mounting solutions that might allow you to go ahead and affix treatments to your walls without concern over wall damage. If you're dealing with an asymmetrical space, do what you can with stand-mounted treatments to make it as acoustically symmetrical as possible. We've heard this work wonders and look really slick to boot.

In addition, here are a couple tricks that just might make it possible for you to mount your treatments to the room boundaries and still not lose your damage deposit. We've had success using #4 or #6 finish nails (the kind without big heads) to impale treatments (Studiofoam, ProPanels, etc.) on the wall in a pretty removable fashion. Whether you use finish nails like we do or if you are very careful when you affix your treatments with screws, such as you would if you were mounting your treatments to pegboard, then affixing the pegboard to the walls or ceiling, you just might be able to fill your clean, small holes with a product called painter's putty. Do a careful job in filling the holes, then touch them up with paint cleanly and no one may be any the wiser that you'd ever had treatments there.



Choosing Treatments

A common question I get is how one chooses which types of acoustical products to use in one's facility. This is a good question, as there are so many choices. Even disregarding other companies' products, there are myriad choices in Auralex's product line alone. I understand how it could be confusing. So, here are my thoughts.

First, decide what your budget is. Be realistic. Don't expect to treat your whole studio for \$49, particularly if you have construction or soundproofing needs. If you're working with Auralex or another provider, don't fudge your budget number out of fear that you'll get soaked for extra treatments you don't really need. (If you're working with Auralex, you will not. We refuse to take advantage of customers just 'cause their budget is larger. It's common for us to tell people they don't need to spend as much as they budgeted.) Fudging your budget, by which I mean you're telling us you can spend X when in fact you could afford to spend 3X, just wastes everyone's time, so be realistic and honest. This will help us or another provider get you into the proper solutions more quickly.

Once you've determined your budget and are basing it on a realistic assessment of your needs (room acoustics, soundproofing, construction, new HVAC, new electrical, etc.), then you can begin to pare down your acoustical choices.

Your choices of absorbers, diffusers and bass traps are many, but I urge you to spend less time worrying about what type of absorber or diffuser to use than you do about what type of, and how many, bass traps. Yes, there are sonic differences among foam, fiberglass, "green" substrates (we have recycled cotton, newsprint, plastics, you name it), etc., but these are minimal, really, as are differences among different surface profiles like wedges, pyramids, flats, squared-off protrusions and more. (Wedges do perform the best, though, as based on our experience and testing labs'.) Base your decisions on budget and aesthetic. Truly, there are any number of ways I can treat any given room. I care less about what product you use than where in the room you put it, per the guidelines expressed in this booklet.

One way to take some of the guesswork out of treating your space is to use a tool such as Auralex's handy Interactive Kit Calculator (IKC) to choose a Studiofoam-based Roominators™ Kit. Access it online at www.auralex.com/ikc. It's fast and easy-to-use. You can also attain a look similar to that shown in many of the photos in this booklet of Carl Tatz-designed studios by choosing from Auralex's *Carl Tatz Signature Series* line of integrated products. See our website for more information. Great sound and appearance are within your grasp.



The Wrap-Up

Even though this article isn't meant to be all-inclusive and cover every acoustical anomaly you might run into, by now it should be clear that acoustical treatment definitely needs to be an important tool in your arsenal for fighting poor sound. Time-tested products that are trusted by the world's most notable musicians, plus extensive, free technical advice are readily available to you and are as close as your computer or telephone. Take advantage of all the resources that are available to you so you can get the most enjoyment out of the money and effort you've invested in audio. Make your sound the best it can be. **You absolutely can attain for yourself the excellent results I've outlined in this booklet, far more easily and affordably than you imagine.** I suggest you take advantage of Auralex's free Personalized Room Analysis™ service to get the ball rolling. Just fill out the PDF form on our website or download it and submit it to us (along with photos & drawings, if you wish). We'll make Real-World Acoustics™ work in your favor!

Real-World Acoustics For Voiceover

By Eric Smith
Auralex Founder & President
Revised 10-10-13 @ 12:15am

“In A World...”

Practically anyone who's seen a movie or seen a movie trailer on television has heard those words, which were written and read by the late, great “voice of God,” Don LaFontaine, perhaps the most recognizable voiceover artist ever. The words help to instantly transport us to a different place and time, and help us become receptive to the rest of the information the voiceover is about to convey. These three famous words have begun countless movie trailers, and they were recently the basis for a feature motion picture set in the voiceover industry (and filmed at the Marc Graue Voiceover Studio in Burbank, which uses select Auralex products; www.fixinthemix.com).

The power of those three words comes from two factors: their ability to instantly transport the listener to a different mindset and Mr. LaFontaine's incredible delivery of them. But these three simple words' power also comes from the audio quality with which they're spoken to us. Were we to hear them spoken by the same talent on the same microphone, but in a reverberant, noisy environment, they wouldn't have nearly the power over us that they do. It's the voice's intimacy that conveys the most power.

That's why acoustical control is so terribly important to voiceover artists, no matter whether they're reading commercials or movie trailers or books on tape or industrial films or any other type of spoken-word narration. Without proper acoustics, the message is diluted and we lose control over the listener's attention. We fail in our mission.



A MIX Magazine article about Auralex products being used in Don LaFontaine's private studio

Here's What I'm Gonna Do



The wall of the lobby of the Don LaFontaine Voiceover Lab, where Auralex's name is engraved

In this article, I'll explain what it takes for you to attain the level of major-league sound you hear from the world's top voiceover artists — many of whom depend on Auralex products to help them sound their best. You've “heard” Auralex on more movie trailers, commercials for the Fortune 50, books on tape, radio imaging, television show promos & intros, satellite broadcasts, podcasts, messages on hold, industrial narrations, etc., than you can possibly imagine. Literally. Those “In A World...” lines Don LaFontaine was so famous for? Done in his studio, outfitted with Auralex products. Not only that, though. Auralex products also treat the Don LaFontaine Voiceover Lab at the Screen Actors Guild building in Los Angeles, where I recently spent time interfacing with the Lab's directors and doing additional consulting. The Lab is the voiceover community's way of honoring Mr. LaFontaine's legacy and helping give back to up-&-coming voice talents, so Auralex felt it was quite worthy of our full support. (Learn more at <http://www.sagfoundation.org/actorscenter/lafontaine>) Our name is etched on the wall in the lobby, about which we're very proud. So, if you want to sound more like the major voice talents whose work you respect, read on. You've come to the right place.

My Background

Acoustics for voiceover is a topic I know quite a bit about, having been a major-market radio personality, production director and talkshow host, not to mention all the other types of voiceover I've done over the years. I've certainly worked in my share of studios that were supposedly professionally designed, but which sounded grossly inappropriate for broadcast and voiceover. In fact, my frustration with working in these types of substandard rooms was one of the reasons I founded Auralex in the first place. I know all too well what it's like to pot open a mic and hear w-a-y too much room tone and imbalanced frequency response. Because of this personal experience, and as the founder of Auralex, I am, if Don LaFontaine would allow me to borrow one of his pet phrases, “uniquely qualified” to help your voiceovers sound their best. I know what you're battling and what it takes to fix it.

Is It Voiceover? Or Voice Over? Or Voice-Over?

Different people spell it differently. I've always used voiceover, though I might also abbreviate it v/o throughout this article.



The Basic Premise Of Acoustics For Voiceover

In a nutshell, my job is to help get your room out of your way so the true sound of your voice...and ONLY your voice...is conveyed to your audience. *There is no place for room tone in voiceover.* Ever heard a video that was recorded only with the camera's built-in mic? Sounded horribly "roomy," didn't it, kinda like it was recorded in a cave. You don't want that. Now, there are some misguided people who post in v/o forums and miss the mark when they say that "a little room sound is beneficial," as I recently saw posted. Nothing could be further from the truth. What we want your audience to hear is your pure voice, with even and true frequency distribution. No false bass, no false treble and certainly no room tone. I'm going to show you how. Please be careful about what you read — or post — in forums, as there is a lot of misinformation out there.

To Do "In A World," You First Gotta Be In A Room Or In A Booth

Most of us doing voiceover and configuring studios for ourselves will be working in an all-in-one room that serves as both our office and our studio; I'll refer to this room as an all-in-one studio in this article. Some will have a separate pre-fab iso booth, either in the all-in-one studio with them or in an adjacent room, and still others will have a separate room that serves as their iso booth. There are pros and cons of each setup.

Going The Multi-Purpose Route

Having an all-in-one studio is by far the most convenient setup and takes up the least real estate, but presents more acoustical challenges, as there are more cubic feet, more reflective surfaces and more noise sources (such as computers, phones, fax machines, squeaky chairs, etc.). This *can* necessitate one's spending more time and money on soundproofing and ambient sound control than if one has a dedicated iso booth or iso room, both of which may be smaller and have less (or no) noise sources. But it doesn't have to; there are circumstances where you can get by with less treatment and less soundproofing.

With an all-in-one studio, you'll have to take steps to isolate your audio from the noise sources that might degrade the professionalism of what you're conveying. If you record to a little flash recorder, you may not have computer fan noise to deal with, but most v/o people don't record this way; they record to laptops or desktops that use fans to stay cool. Fan noise in the background of your voiceover is very uncool, so we have some tricks to tell you about later.

If the all-in-one studio is best suited to your needs, see the opening section of this booklet and follow my guidance on how to construct, layout and treat your room. In particular, pay attention to the diagram featuring the orange absorbers on the walls and ceiling in the section entitled Suggested Room Layout.

Going The Separate Room Route

Having a dedicated room that is not also your office and which serves as your iso booth/room can be a great solution if you have the real estate and if it's soundproof enough and if you attend properly to the room's acoustical and isolation needs. If you do, it can be quite a cocoon in which you feel free to emote and create without fear of outside intrusion. I euphemistically call my three-room studio The Womb. In my opinion, these dedicated v/o iso rooms can be many people's best option, but especially if they're on the small side and are properly treated with broadband (full frequency) acoustical control. Get yourself a bluetooth keyboard and mouse and control your computer from the other room. If you run control cables through the wall, follow our guidance as to the proper way to seal the penetrations so as to not trash your sound isolation.



Going The Iso Booth Route, Whether DIY or Pre-Fab

In certain circumstances, this can be your least expensive option and can be a timesaver, too. My issue with these booths is that they tend to be too small to include all the broadband acoustical treatments they need to sound proper. Have no fear, though. I've got tips that can help smooth out your booth's sound. If you do decide to go the pre-fab booth route, take comfort in knowing that the two largest brands of booths use Auralex products for sound control. If you want to build your own, follow the guidance in *Acoustics 101*.



Going Without Any Of Those Options

What if you don't have an all-in-one studio, or you do but you can't afford to treat it all? What if you have no separate iso room? What if you have no DIY or pre-fab booth? Are you out of luck? Perhaps not. In certain circumstances, you might just be able to get by really inexpensively and still attain excellent results without constructing & treating an entire space or without buying or building an iso booth. More on this in awhile. I'm going to refer you to some demos that will show just how good one can sound in a makeshift booth. Even if you do have an all-in-one studio or separate room in which you voice things, you might still benefit from my tricks, so read on.

WhisperRoom (top) and VocalBooth.com (bottom) isolation booths with Auralex Studiofoam

Same As It Ever Was

If you're doing up an all-in-one studio or iso room or iso booth, please pay attention to acoustical symmetry. Make the room as consistent and mirror-imaged as possible, and treat your room's surfaces consistently so as to not introduce sonic weirdness.

Factors That Degrade The Professionalism Of Your Voiceovers

Before I jump back into a discussion about acoustics for voiceover, here are some observations that I think you need to hear.

The biggest thing that degrades some people's voiceovers is that they lack talent. There. I said it. There are t-o-n-s of people in the world who've been told that they've got a "great" voice, but who sound amateurish. What do they lack? Based on my 40 years of experience, I'd say they lack the ability to interpret copy appropriately, which normally manifests as improper inflection. With good-quality gear being so affordable these days and with the proliferation of online v/o sites where anyone who pays a fee and posts a demo can be a "voice actor," it's too easy for average-sounding people to delude themselves into thinking they're voiceover artists. This is similar to how the internet has made it easy for anyone with an opinion and a keyboard to mistakenly think they're a writer. I urge you to take a critical listen to yourself and honestly tell yourself whether you've got what it takes to be a voice actor. If not, perhaps extra training can help you up your game. Or perhaps professional voiceover isn't the right fit for you. Perhaps you can do volunteer voiceover for local charities or educational institutions in an effort to give back to your community and improve your chops at the same time. What the world doesn't need is more substandard voice talents. Believe me, we've got plenty already.

How Important Is The Actual Quality Of Your Voice?

I think you can answer this for yourself if you put on your thinkin' cap. All you have to do is read my previous paragraph and think about some of the top voices you hear on TV, radio and more. Do all of these voice actors have "big" voices or sound like they ate gravel for breakfast? Not necessarily. Some of the most well-paid voiceover artists have guy-next-door voices, including some that are pretty high in pitch and which many people would never associate with a voiceover actor. Yet they succeed wildly in voiceover. Why? Because of their inflection and their ability to interpret copy in an attention-getting way that compels the listener. So, even if you weren't blessed with a movie trailer voice, you can still have a lucrative career in voiceover. You've just gotta be really good at it and find your niche.

Of course, having good copy chops isn't enough to make you successful, with or without a big voice. You've gotta have good soft skills, too, and be hungry enough to make a place for yourself in the voiceover marketplace. But don't get me started.

OK, What Really Does Degrade The Quality Of Some People's Voiceovers?

As a production director at a major-market 50KW radio station, I got in more than my share of outside tapes from people who had good voices, good interpretation and a sufficient level of overall talent, but their tapes (remember, this was before e-mail, FTP, ISDN, etc.) sounded lousy. What were the reasons? And what can you learn from this?

Tape hiss, a squeaky chair, intrusive noises from outside the studio, the wrong choice of mic, the wrong positioning of the mic (what's called "working the mic"), improper recording level (too hot or too quiet, which in those days would introduce tape hiss)...the list goes on.

But the biggest thing that I have found hurts the quality of a voiceover is: too much room tone.

Now, if you want to record or perform violin, piano, a choir, etc., room tone *can*, if properly managed, be a pleasant addition to your recording. But I reiterate: in voiceover at a professional level, there can be NO room tone. You should be able to play back a dry voice track (no music or sound effects) in your car with the engine off and not hear any room tone from the room in which you recorded the track.



Various Auralex diffusors

Absorb It. Don't Diffuse It.

While we're on the topic of controlling room tone, I'd like to mention the major tools at your disposal in controlling the ambient sound in your studio: absorbers, whether broadband or not, and bass traps. In music studios, concert halls and certain other settings, we often use acoustical products called diffusors, which reflect and redirect ambient sound without absorbing it, but these are not appropriate for use in voiceover studios, because they promote room tone, which is not what voiceover requires.

Broadband absorbers are absorptive panels that affect the whole range of frequencies, while bass traps are designed to primarily absorb frequencies below 250Hz. Properly chosen and implemented, these will tame your studio and make it sound fully pro.

There are plenty of absorptive panels, whether made from acoustical foam, fiberglass, mineral fiber, recycled organic materials,



St. Mary's Cathedral. Please don't let your room sound like this. That's not what you want for professional v/o.

recycled plastics and more, that can be appropriate for use in your studio. Some are better than others at providing the ambient sound control you require, and there are panels available in a wide range of styles, colors and finishes, not to mention prices. Auralex has all sorts of options from which to choose, so you're sure to find something that fits your aesthetics and budget.

Can't I Process The Room Tone Out?

Not really. EQ won't do it. Compressing can actually make it worse (and do you know many voice actors who don't compress themselves? Really?). Gating can help, but unless you get it set just right, it can make your audio sound unnatural. So there's really only one viable option: control your room or booth (or nearfield environment; more on that in a minute) well enough so that the direct signal from your voice is primarily what the microphone picks up. As the very talented Ross Vannelli once remarked to me, regarding room tone in any type of recording, "There's no knob for it." Ross meant that once you capture room tone, you can't later turn it down. (To learn more about Ross Vannelli and the rest of the incredibly talented Vannelli family, Google him and visit www.rossvannelli.com.)



An EQ curve with two frequencies notched out. Even if this *would* get rid of room tone, it would also degrade the sound of your voice tracks.

Now, I know that somewhere, someone is reading this and thinking to himself or herself, "Well, can't I just talk louder?" No, because this only excites your under-treated room MORE and gives you even MORE room tone. Plus, when you talk louder, you lose the ability to inflect and emote as much as you need to to perform a compelling read. You lose the ability to vary the intensity of your voice without giving away the secret of your room's ambient environment. I don't know about you, but I've heard performances where the talent's space sounded okay when they were speaking quietly, but became painfully intrusive when the talent spoke louder. This ruins the illusion. Don't be that guy or gal. Tame your room so you can exhibit all the voiceover capabilities you have without the room getting in the way.

How? Where? What?

Auralex offers a FREE service via our Personalized Room Analysis Form, available as a fillable PDF on our site. Via this no-charge service, we take your room's usage, dimensions and construction into account and then recommend the treatments your room needs in order to achieve your sonic goals. Rest assured: there is no pressure at all in this process, as Auralex does not sell direct to end-users. We only sell our products through our worldwide network of thousands of dealers on every continent. As such, the Auralex application specialists are simply here to function as advisors. You'll find the process painless and very helpful. In fact, the same people who will scope out your room are the same ones who do the same thing for our most famous clients, so the Personalized Room Analysis is quite a good offering for you to take advantage of.

Other Considerations

Even in a studio or booth with proper control of ambient sound (room tone), there are still other factors that can degrade the professionalism and impact of a voiceover. The biggest one that gives away the talent's environment and shatters the illusion of a voice emanating from free space (not in a room) is the noise from the room's HVAC system. (HVAC stands for heating, ventilating and air conditioning.) A serious studio or booth should have silent HVAC. You accomplish this by moving a lot of air slowly instead of moving a little air quickly, which is how HVAC systems normally function. We have plenty of free advice for you on how to accomplish this, so feel free to contact us. Also, be sure to download our free publication *Acoustics 101*, which many famous people have called their "bible" when they constructed their facilities and which someone notable once called "the best few dozen pages ever written on studio construction."



An Amana PTAC unit

We like split systems (Google it) and PTAC units (those heating and cooling units you find in motel rooms), but the latter requires that you build some doors in front of it so you can shutter it when recording. If you don't have the option of putting in dedicated HVAC for your v/o space, there are still things you can do to help quiet your HVAC. Will it be sufficiently quiet for you to put out professional voiceovers? Perhaps, but let your critical ear be your guide. Record something and play it back via headphones at a sufficient volume that you can hear the room and the HVAC noise.



One trick worked well recently for the exceptionally talented Pete Bunch (hear him at www.petebunch.com and be sure to notice all the Auralex products in his promo picture). Pete moved his studio into a space in a commercial office building, but the HVAC was far too loud for his needs. What'd he do? He took the register off the ceiling duct, stuffed a rolled-up piece of Auralex Studiofoam into it...and, while not perfect, it was quiet enough for him to do his major-account voiceovers. He said that at some point, he'll implement a proper plenum box for sound attenuation, but for now the Studiofoam is working just fine.

For those of you who have noisy HVAC, a plenum box can be a worthwhile investment. You buy or make one out of fiberglass

ductboard and you put it in the HVAC line before it exits into your room. The supply air goes into one corner of the plenum box and exits at the far opposite corner. The turbulence inside the box slows down the airflow and causes the air to interact more with the acoustically absorbent ductboard out of which the box is made.

You can also make yourself an air diffuser out of Studiofoam and pegboard, then suspend it in front of your ceiling or wall registers, thus slowing down the airflow and diverting the air out the sides.

Another option is to make one of your stud cavities your “duct” and line it with ductboard, as discussed in *Acoustics 101*. This, too, slows down your airflow and quiets its movement.

You might also consider different registers/louvers, as the most common ones can resonate and feature openings that might be too close together, thus encouraging whistling.

Another inexpensive thing you can do is to replace your metal ductwork with flexible ducting, which is the plastic-covered round ductwork you’ve seen that has a spiraling metal skeleton and is lined with fiberglass. Due to its construction, it doesn’t transmit as much ambient OR MECHANICAL sound as normal ductwork. If you don’t desire to replace all your duct with flex pipe, you can also just put in a section of flex pipe as a coupler, which breaks the mechanical connection between two pieces of metal duct. They also make dedicated duct silencers, but these can get pricey. *Acoustics 101* has plenty of tips for you, so check it out.

If you’re working in a pre-fab or DIY iso room or booth, you’ll need ventilation. But these spaces are often too small to include a PTAC-type unit in, and would suffer from a significant degradation of their soundproofing if HVAC were handled in certain ways. What to do? After all, no one likes to work in a hot, humid space. I suggest that you get some of the quietest fans you can find and that you build yourself an air intake and an air outlet. I suggest that you consider putting these on the wall that faces the butt end of your mic, where off-axis rejection is likely to be greatest. I suggest that you use the information in the previous few paragraphs and *Acoustics-101* to come up with a way to divert the air so it slows down and causes the least amount of sound possible; this will likely also increase your sound isolation from the outside world even when the fans are running and you’re “exposed,” sonically speaking. I suggest that you consider building some tightly sealed doors that you can close over the fans when they’re off, thus giving you back the sound isolation from the outside world you otherwise lost by cutting penetrations in your room/booth. Put the fans on a switch, preferably with a reostat so you can control the fans’ speed, and you’ll be in total control. I suggest that the supply (treated) air come into the booth near the floor and that the return (untreated) air be exhausted from the room near the top, given that heat rises. Put them at opposite ends of the wall that the butt end of your mic faces.

Computer fans are notoriously noisy, but there are some really quiet options out there these days. If you’re using a laptop, you might not be able to upgrade your fans, but if you’re using a desktop PC you can probably significantly quiet down your system by replacing its power supply, case fans and perhaps your video card. Whether you do this or not, I have found that a good place to put your PC is in some empty rackspace down below your work surface at which you sit or stand when doing your voiceovers. I do this in my studio and it works nicely. I cut a piece of Studiofoam to fit into the rack’s front and another that fits in the rack’s rear. The open cells of the Studiofoam allow for sufficient airflow, but still help to really contain the sound of the computer’s fans. Down low like that tends to put the fans far enough off axis that your mic won’t pick them up so much anyway. You can, of course, also invest in an isolation box that’s designed to cut down on computer noise, but these can be pricey and bulky. Try the Studiofoam trick first.



Auralex ProPanels and CT45 Bass Traps in a studio in Nashville, TN. Try varying the distance between you and a boundary, and alternating which direction you face. The differences in tonal character can be pronounced. Notice how the ProPanels are stood off the wall, which increases their absorption & looks great.

The Closer I Get To You...

The best way to control ambient sound in a room or booth is to catch the waves sooner rather than later. In fact, as I teased you earlier in this article, there are some instances where controlling sound in only the near field can be sufficient for professional-quality voiceovers. Later, I’ll tell you more about this trick, but here what I’m primarily speaking about is controlling the early reflections in your overall voiceover space. With strong control of your early reflections, in certain instances you can get by with less treatment around the rest of your room.

The quickest early reflection in many studios is from the ceiling. I am a fan of suspending an acoustical cloud from the ceiling above the mixing surface or speaking position, as well as controlling early lateral reflections. One of the most important things a voice talent can do, though, is to put broadband absorbers BEHIND himself or herself. You’d be amazed what a difference this can make in the quality of your voiceovers (or in your mixes, should you happen to be involved in mixing music in your control room, too). Auralex has a number of devices that shine when positioned behind a voice talent. Call or click to find out more, but specific products I love for this purpose are the Sunburst-360, the MAX-Wall, the ProMAX, the ProGo and the DeskMAX (for those of you who might be seated).

Acoustical clouds can be big, heavy, expensive things, but they don’t have to be. Get yourself some pegboard (masonite with holes

pre-drilled in it) and affix to its bottom and top some Auralex Studiofoam in any of our various flavors, the thicker, the better. Hang the cloud at an angle above you, which improves the cloud's low-frequency performance. Suspend it from J hooks you run into your ceiling. (Doing the J hook thing can degrade your sound isolation, so be careful how you do it, lest you trash all your soundproofing efforts and expenditures. *Acoustics 101* can help guide you.)

Soundproofing Vs. Ambient Sound Control

Many people mistakenly use the term “soundproofing” when referring to treatments designed to control room tone. To be clear, acoustical treatments you see on walls in studios are generally not designed to help keep inside sound in and outside sound out, which is what soundproofing really means. Soundproofing controls sound transmission, which is why soundproofing materials carry an STC rating, which stands for Sound Transmission Class and which applies a ranking to a product's ability to stop the transmission of sound through itself. While it's true that there are ways to build your anti-room tone panels so that they stop the transmission of sound, this is not how most such panels are built or installed.



What Goes Into Soundproofing A Space?

The right kind of mass, the right kind of construction technique, trapped air and good seals all contribute to soundproofing a space. There is plenty of information in our publication *Acoustics 101* about how to construct various levels of soundproof spaces, including advice on which common building materials to use and how to put them together to achieve the desired result. What we're trying to accomplish in building a sound-critical space, be it for voiceover, home theater, music practice, counseling, law enforcement or any other purpose, is to make a very heavy structure that includes plenty of trapped air, the right array of materials AND includes a designed-in amount of minute flexation. All of this together, if properly implemented, will yield a room that inherently sounds better and exhibits a high degree of sound isolation from the outside world.

You may not have the space, time, budget or need to construct a space from scratch or to demolish your existing space and build it according to the Auralex system. But if you do, know that we have absolutely got your back and can absolutely help you — probably for free — design and build a space that will yield just the sound characteristics you're looking for. Call or click to get the process started.

Now, if you don't have the desire, need or ability to build a room, there are still things we can advise that will greatly improve your sound transmission loss. We can advise on how you can add on to your existing walls and ceiling; how you can bulk up your windows; how you can bulk up your floor; how you can improve your doors' sound isolation and more. Check *Acoustics 101* or reach out to us for specifics. Sometimes adding a layer of our 1/8"-thick sound barrier, SheetBlok, is all it takes to get you to the level of sound isolation you require. We can tell you what corners you can cut and which ones you must not. Let us help you.

Doors

Hollow-core doors have no place in a serious studio, as they are way too low-density (and hollow) to be good at providing sound isolation. You can spend up to thousands of dollars on a sound-rated door, but you can also replace your hollow doors with solid-core slab doors from your local home improvement center. Fear not: slab doors are not very expensive. If you want to take it a step further, you can build yourself a composite door out of two slabs and some of our SheetBlok sound barrier.

Regardless which way you go, sealing your door with a proper threshold below it and proper closed-cell or rubber-gasket seals all around its perimeter is a must, lest your door system continue to leak sound into and out of your studio. Like slab doors, thresholds, wipes and seals are not expensive. You can find details in *Acoustics 101*.

Be sure to treat your door surfaces with the proper absorptive material, as they'll otherwise be kicking soundwaves back at you.

Windows

Next to doors, windows can be the biggest offenders when it comes to keeping sound in or out of your studio, so it's important to make them the best they can be.

Your choices are to buy expensive sound-rated windows; to replace the existing windows with conventional ones that exhibit greater sound transmission loss (STL) than yours; to bulk up the existing windows with adjunct materials that, if properly implemented, may yield the STL you need; or to leave what's there, but do what you can to keep sound from getting through the window in either direction.

Auralex doesn't sell windows, but we're happy to weigh in on whatever windows you're considering. Double-pane glass with excellent seals can be a good place to start, if properly chosen and installed, as discussed in *Acoustics 101*.

When it comes to bulking up your existing windows, there are a couple options. I've seen people install another whole window inside their room, thus yielding two windows with an airgap in between. If properly chosen and installed, this can be quite effective, especially if the two windows are not of the same type and don't use the same glass.

Another option, if you don't desire to have windows that actually open and shut, is to add a piece of laminated safety glass in front of your existing window. Just make sure that your existing window and the new glass are clean before installation, lest you forever be looking at dirt and fingerprints.

A third option is to add an adjunct product of the removable type in front of your existing window. Ask your Auralex representative more about your options.

Your last option — unless you also count taking out the window and framing in the hole — is to implement what we call a window plug. This can be as simple as a piece of dense acoustical foam, such as Auralex PlatFoam, or as involved as building yourself a plug out of lumber, rubber gasket, handles and Auralex acoustical foam. Voice talent Johnny George (see www.johnnygeorge.com), whom I've known and worked with for decades, successfully did battle with the neighbor's lawncare service by implementing window plugs that Auralex designed. You can read an article he wrote about the plugs, and see photos, at <http://www.voiceoverextra.com/article.htm?id=i7qe8ekx>.

Attending to your doors and windows alone can make an enormous improvement in controlling your sound transmission, as windows and doors are often more leaky than actual walls, ceilings and floors.

Other Sound-Isolating Considerations

When attempting to "soundproof" a room to one degree or another, think in terms of making your space watertight. Work to seal up any of the small penetrations that might otherwise sabotage your soundproofing efforts. Electrical outlets, and how wiring is actually run within and through wall, ceiling and floor structures, can have a bigger impact than you'd think. Ceiling can lights are a no-no; go with track lighting and seal the penetrations where the electrical wires come through. For further guidance, please refer to *Acoustics-101* for the proper way to run your cables and seal your penetrations, perhaps with the help of our StopGap acoustical sealant, which is not a lot of money but is extremely effective.

Floors And Flooring

Even if your existing walls (or new ones you build from scratch) are very occlusive to sound transmission, your floor could be your weak link, no matter whether it's made of wood or concrete. What's working against you is what's called flanking transmission. Let me explain.

Flanking occurs when two spaces share the same structural supports such as walls, ceilings and floors, and sound travels through the structure and under a wall, thus getting from one space to an adjacent space. This is why serious acoustical spaces are often built with a construction plan called "room within a room." Done properly, this construction system can yield near-total sound isolation. But many of you are in preexisting spaces that share framing or concrete with neighboring spaces. Left as-is, this can seriously degrade your sound isolation, even if you attend to your doors, windows, penetrations, etc. What to do. Have no fear. There is a pretty easy solution. It's not free, but it's not horribly expensive and it doesn't take up a lot of room.



The right way to build a floor by following the Auralex system. Even if you can't build a new floor, though, there are effective steps you can take.

If you're constructing a new floor entirely, this can also apply to you (as diagrammed in *Acoustics 101*), but I primarily mention it here for folks who are dealing with a retrofit situation.

What's the magic bullet in a retrofit situation? Our 1/8"-thick SheetBlok sound barrier.

If you have existing carpet and desire to keep it, but need additional sound isolation and/or to control flanking transmission, peel back your existing carpet and lay down a layer of SheetBlok, then put your carpet back down. That's it. The SheetBlok, which has an STC of 27 (better than similarly sized solid lead and a lot safer), will greatly improve your isolation AND the quality of the sound within your room. Need even more isolation? Roll out a second layer of SheetBlok, perpendicular to the first layer and with both layers' seams taped. You'll attain an STC of 35 or more, which, in conjunction with whatever degree of sound isolation your existing floor provides, might be enough to get you into the realm of the serious studio.

If you're desiring to change your room and want to put down a different type of flooring, perhaps hardwood, engineered flooring or tile, you too can benefit from the same SheetBlok methodology, but with perhaps even greater results. Let us help you decide the best plan of action so you reap the most out of your effort and investment.

So, what's the proper floor for a voiceover studio? Should it always be carpet or can it be reflective? This depends on how well you treat the rest of the room's surfaces. If your room has a lot of cabinets, desks, equipment, computers and other reflective surfaces, you might need the floor to be carpet in order to attain the overall level of sound control you need. If this is the case for you, you might be well served to carpet the rest of the room, but make the area where your chair is hardwood or laminate flooring or tile, thus making it easier to roll around. With a proper acoustical cloud suspended from your ceiling, the reflections from the floor will not continue to bounce around so much, thus the hard-surface floor might not degrade your audio. If it does, you can always put down an Oriental rug.

Speaking of which, Oriental rugs and other thin ones, or carpet over a subfloor with no pad, doesn't really contribute much beneficial to your studio's overall level of ambient sound absorption. If you're going to do what I described in the previous paragraph, I suggest that the carpet you install elsewhere in the room be pretty plush and that you install it over some pretty hefty pad, say 1/2". I did this in a couple different multi-purpose studios of mine over the years and found it to actually contribute nicely to the overall degree of ambient control.

They also make carpet pad that has a higher sound isolation rating than normal pad, so check into it. Roll out a layer of SheetBlok under whatever pad you go with and you'll really be benefiting from both ambient sound control and sound transmission loss.

Are We There Yet?

You've attended to your doors, windows, penetrations, flanking transmission, HVAC, lighting and anything else you can think of. Excellent. Now it's time to consider what it will take to control the room's sound so it will be appropriate for use as a voiceover studio. Actually, no it's not. Let's first talk a little about your equipment, as this can have a bearing on your room's acoustical treatments.

Good Gear Does Not A Good Voiceover Make, But It Can Help Make A Bad Voiceover

Is it easier to succeed in voiceover with expensive gear? I suppose it doesn't hurt, but you've still gotta have talent, a controlled environment, a work ethic, soft skills and connections, plus perhaps geographic proximity. I'm not saying that you should intentionally spend down on gear, mind you. If you can afford more expensive gear and already have the client list to help pay for it, knock yourself out. But don't delude yourself into thinking that you have to invest in uber-expensive gear first before you can begin to make a splash in the voiceover market. Not true. Plenty of excellent voiceovers have been done on modest gear. Heck, even today's cheapest gear is exponentially quieter and has more linear frequency response than some of the most expensive gear of a decade ago. There are mic preamps in little <\$200 mixers that rival expensive ones from days gone by. But putting expensive gear in an untreated room will actually sound far worse than putting less expensive gear in a properly tamed room.

The other thing that's important to mention about gear is that what works for one person's voice (and studio) may not necessarily be right for another person's voice. Just because so and so uses a ___ mic and a ___ preamp doesn't mean that's automatically what you should use. One size does NOT fit all. Try things out until you find a combination that you — and others with good, objective ears — feel is the most appropriate for your voice and the types of things you tend to read. This could include mics, preamps, compressors, limiters, de-essers, plug-in chains, exciters and more. Scrutinize everything until you find the magic combination.

Now, the gear you choose also needs to take into account the degree to which your studio is properly constructed and properly treated. Here's an example. Say you have an excellent dayjob or a trust fund and you decide to go blow \$8000 on one of the world's top condenser mics. To go with your new mic, you also spend \$7000 on a boutique preamp. But then you fire everything up and to your horror you realize that your new mic and preamp are soooooo sensitive that they pick up EVERY sound in your studio, from the HVAC to your squeaky chair to how your tracklight fixtures ring at certain frequencies, not to mention your computer fans, power amps and more. On top of that, you now discover that you don't really like the way your voice sounds through your new mic chain. Yikes.

On the other hand, you maybe could have found a less expensive mic, a less expensive preamp and some wonderful plug-ins or outboard gear that really sound perfect on your voice AND treated your room effectively.

Here's another example, one that takes us back to the early '80s. I was doing radio, nightclubs and voiceover and was searching for a new mic. I settled on the Shure SM5B (shown to the left), which was originally invented to be a television and film boom mic.

Because of its intended purpose, it exhibited a pretty tight pickup pattern, so it minimized room tone...and it just happened to sound great on my voice. I bought one and used it for decades, even buying more for my other studios at different locations. (I now have 5 or 6 of them, I think.) But then I got to paying too much attention to what others were using, so I decided it was time for me to invest in a Sennheiser MKH416 (shown to the right), which is arguably the de facto standard when it comes to movie trailer and broadcast voiceovers. I was so sure I was going to love the 416 that I bought two of them.



When the mics arrived, I plugged one in, put on some headphones and...hated what I heard. I was sure something was amiss, so I plugged in the second one. Same result. Befuddled, I plugged my trusty SM5B into one channel of one of my (not inexpensive)

tube preamp and plugged a 416 into the other channel. I similarly ran the mics through the two channels of the various pieces of processing gear I use, then into a clean mixer. I made sure that everything was set the same so I could switch back and forth between the two mics and hear them through the same processing chain and at the same volume. I put on my headphones and read some things. Boy was this an ear-opening experience. With the Sennheiser, which is a long shotgun mic and purported to have excellent off-axis rejection of room tone, I hear significantly more room tone than I heard with the Shure SM5B. I also did not prefer the sound of the Sennheiser on my voice, though some producers feel that the Sennheiser cuts through a mix better than other mics.



In the old days of analog mixing boards and dirty EQ circuitry, I feel it was more important to pick a mic that in and of itself sounded good as-is on one's voice without the need for adding EQ. This was because the circuitry back then (except for the uber-expensive circuits) was quite a bit dirtier than what we enjoy today. It added all sorts of phase anomalies to audio signals if pushed too far. Today, though, even some inexpensive analog EQs are amazingly clean...and many people are working primarily in the digital domain, where differences among the sound of various pieces of gear are often miniscule and where tweaking EQ doesn't add the phase anomalies that analog EQs were known to. As such, I don't think it's quite as critical today to be a purist and to say that one must choose a mic that sounds perfect on one's voice without EQ. So, in the context of my story — and in the context of some of the mic-comparison videos one can watch online, in which super-expensive mics are compared to \$200 mics and lower — I think that one can make some concessions when choosing a mic, then tailor its sound better to one's voice.

In the case of those of you who work out of all-in-one studios or iso rooms or iso booths that don't have super-silent HVAC, silent computers, perfect windows & doors, soundproof construction techniques, etc., I think it's perhaps as important to choose a mic that has a very tight pickup pattern, which would reject off-axis sound better.

Note that I am not saying that the Sennheiser 416 is a bad microphone. It's obviously not, or many of the world's top voice talents (beginning with the late, great Ernie Anderson) wouldn't be using it so successfully! I'm just saying that I did not prefer its sound on my particular voice nor its off-axis rejection in my particular all-in-one studio. Could I EQ and process it so it sounded better on my voice? Yes. I still own my two 416s. But can I change its pickup pattern and improve its off-axis rejection? Not really. There are things one can do to stack the rejection deck in one's favor though, as we'll discuss in the coming pages.

An Equipment Tip Or Two From My Years Of Experience

There is a particular piece of gear that I find absolutely wonderful. It's a small compressor that features excellent build quality and which puts out excellent audio. It's called the RNC 1773 (Really Nice Compressor) and you can buy one online for well under \$200. One of the world's top engineers, who makes his own uber-expensive compressor, said that if you can't afford his unit, you should



buy the RNC. That's high praise indeed. I own a number of RNCs and use one in my voiceover processing chain, along with other compressors and processing gear. I have no financial relationship with FMR Audio, the company that makes the RNC; I just highly recommend their product. Its audio is really transparent and natural sounding, so I find it to be a good fit for voiceover. Check it out.

Another piece of gear that I feel is indispensable for voiceover work is the Symetrix 528e (right), which has all sorts of functions built in, including the downward expansion and gating I speak of in the next section. I have no ties to Symetrix, but really like their 528e and own more than one.

Could You Please Open The Gate For Me?

Another piece of equipment that can really benefit a voice talent, if used correctly and gently, and with proper mic technique and orientation, is a gate, which allows audio above a certain volume to pass through while quieting the rest. This can make a less-than-optimal studio — one that exhibits too much room tone, HVAC noise, computer noise, lack of soundproofing, etc. — sound much quieter and more professional. The problem with gates is that if you don't get them set just right, you can hear them working and the beginnings and endings of words can seem clipped off. Gentle gating can be a godsend, though, so I recommend them here. Luckily, gates are not expensive these days. I just hopped over to eBay and found new units for less than \$100...and those included compressors and more. Gates are also available as software plug-ins and are included in most audio editing software. Using how to use a gate properly can really benefit your audio. But, like makeup, if people notice it, it's too much.



My favorite v/o headphones: the Sennheiser HD-25SP

Headphones? Hand Waving? Standing? Sitting?

In radio, it was a necessity that I wore headphones. I always thought I sounded awesome, but that's the problem with wearing headphones for voiceover: they can tend to make you sound too good. Further, I find that when I wear headphones, I'm always trying to speak over the bone-conduction factor that they promote (try speaking with your hands over your ears and notice how much more difficult it is to speak without hearing the natural sibilance of your voice; you primarily hear what's traveling through the bone structure of your skull). I find that I tend to lose nuance when working in headphones. For all these reasons — and I'm not alone in this opinion — I feel that voice talents do a better job when working without headphones.

Though it's more convenient to sit when doing v/o, many people advocate standing instead, as this allows one's diaphragm to fully extend, thus improving your breathing and giving your speech a more solid character. It allows you to be more of a voice actor than just a reader of copy. Standing is also better for your cardiovascular system and core strength than sitting. So, even if you sit for some of your reads, make it a habit to stand up part of the day, particularly if you're doing reads where speaking from your diaphragm is advantageous. This is one of the benefits of using an iso booth, I think. You can stand and deliver.

There's also the issue of the difference between voice acting and simple speaking. My good buddy and Auralex user Ed Victor (see www.edvictorvo.com), who's got oodles of talent and a client list to die for, including the Playboy Channel, did a good web video about how what he does with his hands can impact his reads. (Check on YouTube for episodes of *Straight Shootin' With The Big Gun*.) I also recently heard a voice talent say that someone told him that if they cut off his hands, he could no longer do voiceover, because he waved his arms around so much while doing his reads. Many find that punctuating certain words with hand motions helps them act out the script better. I do a little of this, but I don't go hog wild with it. I've watched some major voice talents work and do a lot of hand & arm motions, but it seems to me that this can be distracting and that it siphons off some of the brain's attention that might better be devoted to interpreting and delivering the copy. Not to mention that significant arm movements might make a sound that's picked up by the mic.

Speaking Of Things Picked Up By The Mic...

As I mentioned earlier, it's important to match your gear to your voice AND your room. The latter includes not only being concerned about the pickup pattern of your mic as it relates to the noises in your studio, but also the sonic character of your mic as it relates to your room or booth. Some mics greatly exaggerate the bottom end; others accentuate the top end pretty dramatically. It's important to know your mic's character and be sure it works with your room. It also pays to learn how to properly "work" your mic, as mic technique alone can help overcome certain shortcomings of your space. This occurs because of the changing ratio of direct to reflected sound.

While on this topic, let me mention something I think is very key. In fact, it's something I spend time discussing in my lectures:

"What matters most is what the mic hears, not what you hear." — *Me*

This means two things to me. One, your mic will hear your room differently than you do, so if you have a mic that has a really tight pickup pattern and it doesn't pick up as much room tone as other mics might, you *could* get by with less attention to HVAC noise, windows, doors, etc. Two, given that it is of critical importance that your recordings not exhibit any room tone, there is a chance that the degree of acoustical treatment required could make the room sound dryer than you might find comfortable. Have no fear: your mic will LOVE this, even though it might take a bit of getting used to on your part.

An example would be an iso booth, either pre-fab or DIY. It is common for these booths to feature a lot of coverage with acoustical panels, thus they are very dry internally, exhibiting virtually no reverberation. Some people find this dry an environment odd at first, which is because they're not accustomed to being in such well-controlled environments. Over time, one acclimates to this degree of control and one quits focusing on it. But the mic loves what it hears in this type of well-controlled environment. THAT is what matters.

Speaking Of Iso Booths...

As I mentioned before, I love iso booths IF they feature an adequate amount of bass absorption to go along with all the mid/high absorption people (and manufacturers) normally pack into them. If done correctly, what results is broadband absorption across the entire frequency range, yielding an even, natural character that the people who work in these booths find dry, but pleasing and comfortable. Without the bass absorption these booths need, they can sound bass-heavy, which some people term "boomy." Be advised that the smaller a room is, the MORE bass trapping it needs, not less. Also be advised that no matter if your room sounds bass heavy or bass thin, it needs bass trapping. Bass trapping is adaptogenic, meaning that it will regulate your room whether you have too much bass or too little.



Sunburst-360s

The issue is that bass absorption typically takes up cubic space — something in short supply in small iso booths. I have a couple suggestions. First, consider building a box (very solidly and properly, as generally outlined in the concepts diagrammed in *Acoustics 101*) and venting your iso booth into the box, where bass absorption will occur if the box is properly treated. This box can be on a sidewall of the booth or on the roof. Low frequencies look for a way out of an enclosed space; if you give them one and the area into which they escape is properly designed to absorb bass frequencies, the booth's sound will benefit. Second, if your iso booth is not a freestanding pre-fab or DIY booth, but rather a room or closet, consider what space is adjacent to you and from which you might steal some space to make a bass trap. I've instructed people on how to steal space in attics, adjacent closets, adjacent garages, you name it. You can cover the opening to the box with black acoustical cloth and affix the grill assembly with velcro for removability. If you need guidance on how to build such a bass box, see *Acoustics-101* or feel free to engage the Auralex application specialists free of charge.



Stand-Mounted LNRDs at different elevations



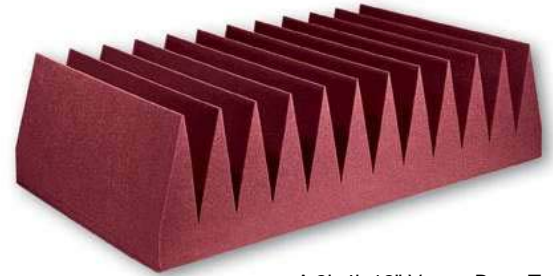
Sunburst Male Broadband Absorbers installed on the back wall of one of the Auralex studios. Consider doing this to a wall or your studio, iso room or iso booth for excellent low-frequency control.

There are other options, especially if you tend to work alone in your booth. One is to bring in Auralex stand-mounted bass traps, such as our stand-mounted LENRDs and our Sunburst-360s (pictured on the previous page), and stand them in any available space in the iso booth, especially corners. Another is to add certain Auralex products that can span the wall/ceiling junctures, where bass congregates and amplifies; these can also span vertical corners where two walls come together. Yet another is to make one wall of your iso booth a bass trap by treating it with bass traps such as the Auralex Venus Bass Trap, which is 12" thick and is a real serious bass absorber. Don't have 12" to accommodate a wall of Venus? Consider our Sunburst Broadband Absorbers. You can also ask Auralex application specialists for other, thinner options that will still bulk up the bass absorption in your booth without eating up undesired horizontal space.

If your room or booth is small horizontally, but is tall enough to accommodate it, you should consider either installing serious bass absorption on the ceiling or suspending a broadband acoustical cloud from the ceiling. I continue to be amazed at how much improvement people experience when we control their vertical reflections. There was a booth I was in in Dallas years ago. It was a long, thin booth and had a

hardwood floor and an enormous window all along one wall. There were movable panels of 1" Studiofoam Wedges along the opposite long wall and on the shorter walls at the ends of the booth. I was amazed at how linear and controlled the booth sounded, given its cubic space, all the reflective surfaces and the thinness of the acoustical treatments. But then the designer pointed out to me that he had treated the whole ceiling with Auralex's Venus Bass Traps. Boy, did they do an excellent job.

The bottom line is that your booth needs to sound linear so your mic picks up the most natural representation of your voice it possibly can. This saves you and the engineers who work with your tracks a lot of time futzing with your sound.



A 2'x4'x12" Venus Bass Trap

Angled Booths

It is especially important to include adequate bass trapping if you're going to work in a constructed booth that is angled rather than rectangular, as angles can introduce a lot of low-end weirdness. As discussed elsewhere in Real-World Acoustics, angled walls are not a requirement for a sound-critical space and may in fact cause you a lot of problems. I advise that you stay away from them, but otherwise make darned sure that you can pack in a lot of bass trapping. Acute angles are the worst, as I find them to cause all sorts of issues if not bass trapped. With the right mic, positioning and acoustical treatments, these booths have the capability of sounding okay, but don't go out of your way to build one.

What About Closets?

Many people ask me about recording in closets, so they bear mentioning here. These rooms are small and generally not constructed in a soundproof fashion, thus they might not be good long-term solutions for voiceover artists. They're also not exactly professional, so you can't shoot your YouTube videos in them or have clients over. But they can do in a pinch and generally sound pretty linear, which is due to the random nature of the clothes that hang in them and the depth thereof. But this random nature is also one of the things that makes them unviable for long-term use. Why? Because the clothes in a closet are dynamic; they don't stay the same over the long haul. So, your mic will pick up one sound one day and a totally different sound another day (or week, month or year). Not gonna work for a v/o pro whose accounts might require pickup lines and redos down the road. Now, put some stand-mounted acoustical treatments in there (and make sure to position them, you and the mic the same each time) and you've likely got a workable, consistent environment. Not soundproofed, perhaps, so you'll have to watch out for horns, planes, trucks, doorbells, railroads and thunderstorms, but serviceable.

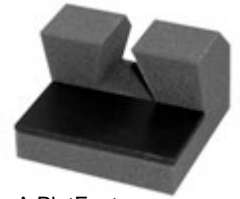
Planes, Trains and The Mics That Pick Them Up

In 1998, I was asked to consult a commercial studio complex that was in the flightpath of Dallas/Ft. Worth airport, and which happened to be less than 300 yards from a railway. The complex was attractive and was generally properly done by a big-name studio designer who shall remain nameless, but the designer had failed to provide the necessary amount of physical isolation (called "floating") to keep externally generated low frequencies from being transmitted into the studio. So, when the engineers would pot mics open to record voiceovers for their national clients, they were picking up all sorts of low-frequency information they didn't want and which they had to filter out, thus negatively altering the audio character of the voices they were recording. They solved their problem by building a floating floor on top of Auralex U-Boats (shown), which are incredibly affordable yet highly effective. You can benefit from this solution, too, even if you aren't doing new construction.





If you already have an iso booth, either pre-fab or DIY, and your mic's picking up too much extraneous low-frequency noise, you could raise your booth and float it on a platform supported by U-Boats. You could also float your mic stand with Auralex PlatFeet, which are super-affordable and super-quick to implement, but yield an amazing amount of acoustical isolation. Some of the recording industry's top engineers swear by PlatFeet. I highly recommend that you check them out, even if you don't perceive that you have low-end issues. You'll find that your entire audio spectrum seems to clarify. You'll also notice that the mic doesn't pick up as much noise when you move around while narrating.



A PlatFoot

If you're like me and you use a microphone boom arm, such as is made by the O.C. White Company, you can up your game a bit by isolating the mic boom from your furniture by cutting pads of SheetBlok and putting them in between where the mic boom and the furniture meet. The model shown here, which I own a few of, features a vertical pedestal into which the mic boom inserts, then the base of the pedestal screws to the furniture. What I do is screw the pedestal to a piece of 1x4 pine with SheetBlok in between the pedestal and the pine, and in between the pine and the console. I don't screw the pine to the console; I make the pine larger than the base of the pedestal, then use a screw-on clamp to hold the pine in place. Every piece of SheetBlok you work into such a mounting scheme gives you a little more isolation. Worth doing. Good voiceover is a game of inches, so control what you can. If you instead use a mic stand on your desk, either use PlatFeet to isolate it or put some SheetBlok under it.

If you don't have an iso booth, but rather an all-in-one room or iso room, do your best to make sure its floor is floated. If you can't reconstruct or construct it in the proper way, at least consider adding a layer or two of SheetBlok as part of your flooring system.

Positioning And Isolation Inside Your Room Or Booth

Because of the physics of sound propagation, soundwaves interact with enclosed spaces in sometimes unequal ways. This is based on asymmetry of your room (e.g., doors and windows and walls and bulkheads here, but not there) and the objects within the room. The same also applies to iso rooms and booths, especially if there are windows or if you followed my earlier advice and put bass trapping on one wall or the ceiling, or in certain corners or wall/ceiling junctures. My recommendation is to try moving your mic's position around until you find the spot that the mic deems to be the most natural. I suggest that you do this with headphones on, as this will more accurately allow you to hear what the mic hears, not what you hear. You'll likely find that the mic likes to be positioned in a certain spot (meaning, distance from the neighboring boundaries) and pointed at a certain angle and a certain direction. Remember how earlier I said that I love the sound of placing broadband absorbers behind a voice artist while they work? You might find that varying the angle of you and your mic, as well as the proximity to the boundary behind you in your room or booth, will make a big difference, especially if there is broadband absorption behind you.

As you might be aware, there are three types of room modes (reflection patterns): axial, tangential and oblique. How these interact with your enclosed space, and what acoustical treatments you include, will determine where the most naturally linear sound is in your room. There are mode calculators online, but you can also ask Auralex to run the numbers on your room for you for free. Suffice it to say that positioning in your room or booth matters, as do the actual dimensions of your space, but less so if proper acoustical treatments are implemented (as they catch all three types of modes). Likely the worst-sounding spot in your room is directly in the center, so try not to position yourself, your mic or your loudspeakers there. A delayed reflection is more detrimental than an early one, so plan accordingly.



The MudGuard

The other thing you can do is to isolate your mic from side and rear-end reflections, which bounce off your face and back into the mic to a greater degree than you think

they do. Most voice talents read from a computer monitor or piece of paper or tablet or large mobile phone or paper on a music stand, but these all are reflective surfaces that kick undesirable reflections back at the mic. Remember, some mics are designed to reduce (not eliminate) off-axis sounds, and other mics might exhibit great sound, but might not have tight pickup patterns, thus they're more prone to off-axis pickup. Luckily, Auralex invented some really inexpensive, but highly effective, products to solve this problem. Top voice talents (and GRAMMY-winning recording engineers) love them and you will, too. The devices I speak of are the Auralex MudGuard and Aural•Xpanders. The MudGuard is a mic shield you place on a mic stand, then position your mic inside of. Is ours the only mic shield on the market? No, but we feel that ours is the best sounding (most neutral) and least expensive. The other device, the Aural•Xpander, which is made of a special cut of Auralex Studiofoam, simply gets clipped in position behind your mic. It takes seconds, costs very little and is extremely effective at reducing off-axis sounds. Accomplished voice talent Ed Victor even did a webisode of *Straight Shootin' With The Big Gun* about the Aural•Xpander (and PlatFeet, discussed earlier), so look for it on YouTube or visit www.edvictorvo.com.



An Aural•Xpander

There also are portable microphone iso booths such as the Harlan Hogan Porta-Booth, which is powered by Auralex Studiofoam. Harlan has been a preeminent voice artist for years and is a true gentleman. His Porta-Booth line, and other products, are used by countless voice artists the world over. They're affordable, portable and effective, so check them out.

Other popular tools include windscreens, which are foam filters that fit over your mic, and pop filters, which are pantyhose stretched tightly over an embroidery hoop. :-) Both can be useful, but their applicability in your particular situation is predicated on your mic, your room, your mic technique, your processing and other factors. Be sure they aren't harming the fidelity of your audio.

In my opinion, the more you can tailor your sound organically (meaning, without using electronic fiddling), the more pure your sound will be. Mic positioning, proper construction, proper acoustical treatments, floating, etc., all play a part in controlling your signal's sound without introducing the sonic degradation that all processing to some degree imparts.

Go Stand In The Corner...Figuratively

Many people have a shortage of space and opt to put their workstation and mic in the corner of their room, which can work well, but only if broadband acoustical control is implemented. Without proper bass control, the corner will be quite falsely bass heavy and your mic will pick up an inaccurate representation of your voice. Plus, when you play your tracks back, they'll sound way off and you'll be flying blind. If you're planning to set your space up in this way, strongly consider implementing bass trapping in the vertical corner you face, plus at the trihedral corner (where the walls come together to meet the ceiling) and along the horizontal dihedral corners (where each wall meets the ceiling). A good way to do this is by using the Auralex ATOM-12 kit, but you can also accomplish similar control by layering our DST LENRD (pronounced Leonard) Bass Traps behind our corner-spanning products (e.g., our SonoLite Bass Trap, our CT45 ProPanels, our VersaTile, etc.). Do this and then hang an acoustical cloud up above you, plus treat the sidewalls near the corner. Stand some broadband absorbers behind you (e.g., Auralex MAX-Wall, Sunburst-360s, Stand-Mounted LENRD Bass Traps, ProMAX, ProGo, DeskMAX, etc.), at least when you're recording voice tracks, and you'll be very pleased with the results. Done correctly, and depending on how loudly you speak and how you process your voice, this can keep you from having to treat your entire room quite so much, or even at all.

Go Stand In The Corner...Literally

Another option, even if you treated the rest of your all-in-one room or iso room, is to literally stand in the corner, making the corner area a sort of makeshift booth. The acoustical treatments needed for this are identical to those stated in the previous paragraph, whether you face into the corner or face away from the corner and toward the room. In the latter case, it becomes even more important to put up an array of stand-mounted treatments across, but a few feet out from, the corner, making one wall of your triangular-shaped booth. Think this idea sounds decent, but that it won't allow your mic to hear little enough room tone to put out professional-level tracks? Think again. It can. For an example of what it sounds like, check out the demos of my buddy Chris Vournazos at <http://chrisvo.co/>, particularly the audiobook clips. Chris's studio is treated generally with Auralex, but he made himself a corner booth that, I think you'll agree, works quite nicely. Another major voice talent whose work sounds awesome out of his Auralex booth is Nashville's Jeff Bell, voice of Ford Trucks. Hear more at <http://jeffbellvoiceover.com>.

Another option is to hang two-sided Auralex composite panels from the ceiling, either as all three "walls" of the booth or just one or two. Again, J hooks and a few bucks' worth of materials and you've got a lot of variability and removability.

You can also make all three walls' treatments stand-mounted, thus affording total portability, adaptability and removability.

I am not at liberty to name specific names here, but I will tell you that some of the world's leading voice talents cut their tracks inside such portable, unconstructed Auralex "booths." One of the talents in particular is known for his worldwide work on broadcast television, radio, motion picture trailers, documentaries and more...and cuts them all with a Neumann mic inside an Auralex MAX-Wall "booth." Literally billions of people a year hear this man's work and he is incredibly well compensated, so don't think that a portable booth can't work well for you, if implemented correctly.

If you use stand-mounted, temporary solutions, including the leaning panels I mention in the next section, be sure to position them the same each time you work, lest your audio sound different from cut to cut.

Lean On Me

Another trick that works wonders, and which I use myself when doing v/o, is to lean acoustical panels up in front of any nearby reflective surfaces. In my cockpit (which is what it sorta looks like), I lean up Studiofoam panels in front of my monitors, my PC monitor, my rack equipment, etc., when I'm voicing. I also stand some Auralex Sunburst-360 Broadband Absorbers behind me.



The corner freestanding, makeshift booth of Chris Vournazos, made of Auralex Metro on portable composite panels. Note the cloud above. Some people may need a stand-mounted bass trap in the corner, but the quality of Chris's audio is outstanding. (Follow the link to the left to hear his audio demos.)

All this, in conjunction with the Studiofoam acoustical cloud above me and the room's bass trapping and general acoustical treatment, gives me a very present, controlled environment. You should consider treating your nearfield this way, as it allows total adaptability and portability. Especially pay attention to reflective surfaces that might be kicking soundwaves back at you and your mic. I also encourage you to lay a piece of Studiofoam on the mixer or desk in front of you so it can absorb those reflections. This also helps when you pass out from overwork and might otherwise smack your forehead on the keyboard.

If you prefer the cloth-covered look to a Studiofoam look, you can still lean up cloth-covered Auralex absorbers in front of nearby reflective surfaces or you can use our ProGo stand-mounted cloth-covered absorbers, which also have casters for portability.

Float Your Monitors

You might at first think that this has nothing to do with voiceover audio per se, but it does. It's inexpensive and quick to accomplish, but can make a huge difference in the accuracy of what you hear. I heartily recommend that you implement some monitor isolators, such as the patented Auralex MoPADs (shown), ProPADs or ProPAD-XLs so your studio monitors are acoustically isolated from the surfaces on which they rest. This is particularly important to voice actors, as they need to hear as accurate a representation as possible of their voice in order to make critical processing and editing decisions. It's especially important the lower your voice is or the louder you monitor, but it actually applies to all voice actors, both male and female. Furniture resonates wildly and will grossly color what you think you hear, so isolating your monitors is highly recommended.



If you use a subwoofer, you **MUST** float it, then accurately cross it over and calibrate it, lest it give you a false sense of bottom end. I recommend that you float it on one of the patented, yet inexpensive, Auralex isolation platforms to improve its accuracy AND to lessen the amount of low end that bleeds to your neighbors or other parts of your house or commercial space. Our GRAMMA, GreatGRAMMA, SubDudes and more can all be quite beneficial in this regard. None is expensive, but boy do they work.

Electronics By Your Mic

I did a read once and thought it was killer...until I played it back and realized that my cell phone had interfered terribly. Even with their ringer and vibration turned off, the wireless signal can interfere sometimes, so be careful. If you read your scripts from a phone or tablet, be sure that the electronic device isn't messing with your audio or putting out some weird high-frequency whine that your mic picks up.

Be Aware That Sometimes You Don't Sound Like Yourself

Your voice changes throughout the day and depending on what you've had to eat or drink lately, not to mention how much sleep you've had, how much stress you're under and how many other voice tracks you've done that day. These variations in your voice can make it tough to cut new lines and edit them into an existing production without having them sound noticeably different. When you voice things, make a note of the time of day. You might find that recording your pickup lines at the same time of day helps them fit in better.

It's Curtains For You...Maybe

Some studios have a lot of glass in them. This can really contribute noticeable and undesirable reflectivity to your voice tracks, so we recommend occluding the soundwaves that might otherwise reflect back at you off the glass. Even if you don't desire to have the glass covered up all the time, you'll benefit from covering it while you're recording your voice tracks. There are a few ways to accomplish this.

One is to use stand-mounted absorbers such as the Auralex ProGo, ProMAX, MAX-Wall, Sunburst-360, DeskMAX and others. These are designed to be acoustically effective, yet totally portable. By virtue of their not being mounted to the boundaries of your room, they preclude any wall damage and actually can be more effective in some ways than if they were mounted right to your room's surfaces. Of course, given their portability, you can also array them around you anywhere you desire.

Another option is to make yourself some acoustical panels and hang them in front of your glass from J or eye hooks when you're tracking. These are also portable, but are not freestanding, so they don't have the full range of adaptability that stand-mounted products do.

A third option is to install theater curtains in front of your windows, but especially a certain type: the type that has SheetBlok-type sound barrier material sewn inside. These are heavier and more sound-occlusive than plain theater curtains, thus they do a better job of controlling low frequencies than plain theater curtains that don't have sound barrier sewn inside. If your room layout is such that you don't really have the ability to install as much bass trapping as you really need at the room boundaries, as discussed elsewhere in this document, sound barrier-infused theater curtains can be an effective second choice or adjunct to whatever bass trapping you do have installed. (Note: If this is your situation, you should also consider our stand-mounted bass traps and broadband absorbers, as shown three or four pages back.) This type of theater curtain is much heavier than normal and costs considerably more than plain theater curtains or other types of acoustical treatments, so get out your gold card if you want to go this route. Note that for these to work best, they need to serpentine, not be stretched out straight and parallel to the glass.

Here's A Common Nightmare: Recording In Hotel Rooms And Other Non-Studio Locations

A challenging aspect about being a successful voice talent, especially one who becomes "the voice" of a station, channel, company or brand, is that you're always on call. You just never know when your major client (or clients) might need you to voice something.

Harlan Hogan told me a story over lunch one time in Chicago about a major voiceover guy who'd been a friend of Harlan's for years. They kept trying to set up a lunch date to catch up, but never could get it scheduled. The reason? The friend had landed some major voiceover clients (some were broadcast channels, I recall) who sent the fellow work throughout the day for their various shows, news broadcasts, etc. Heaven forbid there was a breaking news story, lest the fellow have to drop what he's doing in order to meet the urgent deadline and get something on the air. Anyway, Harlan told me that the fellow said that he had to stay at his house in order to voice whatever came in from his major clients, so could they just have lunch there? Boy, talk about being chained to your desk. Doesn't sound like much of a life.

I read about another major voice talent who had to fly his private plane into Burbank multiple times a day to do work for one of the major TV networks. Multiple times a day! In between, he flew back home to be there for scheduled sessions from his home studio via ISDN. Whew. Livin' the dream? Be careful what you wish for.

These days, with portable recording gear sounding so good, these fellows would have been able to be a little more mobile. But the problem is finding a place to record the tracks in a suitable acoustical environment.

Yes, products like Harlan's Porta-Booth can certainly help, but even they don't always cut down significantly enough on the room tone. What to do?

Well, some people go to extraordinary lengths in an attempt to be able to record on the road, primarily in hotel rooms. Sadly, the results are often so-so.

Ed Victor spends a lot of time in hotel rooms and has written extensively, as have others, about the trials and tribulations of doing so. He even sent me some funny (sad?) pictures of attempts to record under a blanket in a hotel room.

Another talent had a different idea, as shown to the right: put the mic in among a bunch of pillows and hope they soaked up the room ambience enough to get usable tracks.

Auralex has existing products that can help with these run-&-gun situations, either by themselves or in conjunction with products like the Harlan Hogan Porta-Booth. Our MAX-Wall, ProMAX and DeskMAX (pictured) are appropriate and effective, but may be too large to travel easily with. Rest assured that we are in development on what I think may be a great travel companion for voiceover artists on the road. I can't give you an ETA on this device, as we're still prototyping, but I believe it won't be a year from now that we introduce it.

Until then, the Auralex DeskMAX, perhaps in conjunction with a Porta-Booth or an Auralex MudGuard, is likely your best solution. It comes with stands and a gigbag that makes it easy to transport and set up quickly. It's perfect for podcasting, too. To attain good ambient sound control in a hotel room, multiple sets of DeskMAXes may be required, but the resulting audio should sound pretty darned good. Don't forget to put DeskMAXes beside you and behind you. Setting up in a corner, with the butt of the mic facing out into the room and the business end of the mic facing into the corner, is likely going to yield the most pleasing result.

If there's no DeskMAX available, a car can be a decent recording environment. It has to be in a quiet area, though, as it won't be entirely soundproof. It can prove to be more difficult to find a quiet enough area than you might think. If you do, it can help to stuff pillows or blankets between the steering wheel and the windshield (or on the rear deck, in front of the rear window), plus hang a blanket over the top of the driver's and passengers windows to help kill some of the glass's reflectivity. Try facing different directions and try both the front and the back seat. Good luck explaining yourself to the police when they come to ask what you're doing.



The Big Finish

By now, I hope that I've helped to put your mind at ease by showing you all sorts of ways that you can set up a quite workable recording environment in which to do voiceovers that sound up-close, present, non-reverberant and professional.

If you have the ability to construct yourself a space, please refer to *Acoustics 101* for practical, time-tested techniques to build yourself an effective — and cost-effective! — facility you can afford. If you've got a sizable budget, great. But if you don't, the Auralex application specialists can advise which corners might be cut without seriously degrading the quality of the finished project.

I founded Auralex on the premise that if we provide good, solid, no-pressure advice and back it up with best-in-class products at prices people can afford, we'll succeed. And, you know what? We have...since 1977.

Auralex doesn't sell directly to end-users, so there is never any "sales talk." We're simply here to advise and help you get the most out of whatever budget you have to work with. Our products are sold through thousands of dealers around the world on every continent and all over the internet, so you're free to choose the dealer you feel provides you the best combination of price and service. I assure you: when you interface with Auralex personnel, there will NOT be any pressure. Just helpful advice.

The beauty of the way Auralex is set up is that the very same application specialists who assist our most famous clients (see <http://www.auralex.com/famous/default.asp>) are the people who will be assisting you. Think about that. The same people who help chart-topping recording artists, the US government, the Rock & Roll Hall of Fame and tons of famous voice talents will be the same ones helping you with your project. For free.



I encourage you to take advantage of all the free resources available to you through Auralex. Visit our various websites: auralex.com, auralexuniversity.com, auralexelite.com and acoustics101.com. Fill out our free Personalized Room Analysis Form and submit it to us, along with photos, blueprints, video clips, napkin sketches or whatever you think we need to be able to best assist you. Call us up. Send us e-mail with any questions you might have. We will do our absolute best to help you attain the sound you desire.

I hope you've enjoyed this section on Real-World Acoustics For Voiceover. I encourage you to also read through the rest of the booklet so you can have a broader understanding of Real-

World Acoustics in general and the Auralex line of thinking in particular. This will help you put Real-World Acoustics For Voiceover in context.

If you have any questions about what I've written, or anything related but which I didn't cover here, feel free to drop me an e-mail at AuralexPresident@gmail.com. I might even include your questions, comments or photos in a future revision of this booklet.

Now get out there and do some great work!

ERIC



The Auralex Loudspeaker & Room Assessment Disc

With Tips For Assembling Your Own Disc & Using It For Critical Listening

By Eric Smith, Auralex Founder & President
June 10, 2013

My nearly four decades of troubleshooting room acoustics have taught me the importance of an illustrative reference disc. In particular, a reference disc whose cuts allow me to assess a room's low-frequency anomalies.

My disc has evolved slightly over the last nearly 20 years, but has remained remarkably consistent. I have found it useful in assessing the sonic accuracy of home hi-fi systems, control rooms, mastering rooms, nightclubs, automotive sound systems, PA systems (& the venues in which they're operated) and more. I know these cuts intimately and have used them to assess countless systems and rooms from coast to coast, including a number of famous ones. You'd be amazed at some of the issues I've heard by using this material. I think the disc is very good at helping me pinpoint acoustical issues. Other top consultants agree, as they've asked me for a copy of my disc to use in their own work. Are these the only cuts I would consider using? No, but they've worked for me a long time. Some of them I have edited, as there are only certain parts of the songs which I need to utilize in my assessments.

I think it's important to mention here that a reference disc should not necessarily contain only music you enjoy listening to. Rather, it's important that the disc contain cuts which exhibit some particular sonic characteristic which you can accurately hear on an accurate system...and which you inaccurately hear (or don't hear at all) on a poor system or in a poor room. Be discriminating.

Each cut on my disc contains one or more aspects I listen closely for. How accurately I hear them, and whether I hear them at all, tells me volumes about what the system/room combo is doing. The cuts can also help pinpoint faults of the playback equipment. It's not always in listening to the entire combination of instruments and voices that you'll find the details that will help you in your assessment, so learn to listen critically and really focus in on certain instruments, voices and effects. I like to listen to reverb tails. Also, though, pay attention to how emotionally engaging everything sounds to you. Once you become an experienced critical listener, you'll be able to sort of detach yourself from the technical details and trust your instincts as to whether stuff sounds "right."

It's important to mention that you should work only from original hi-res files of the audio cuts you desire to include on the disc. Don't use MP3s or other lossy files, as they are missing too much of the original material to be useful. FLAC files are fine. Resist the temptation to process the files so they "sound better" or are all the same volume on your disc. Leave them unadulterated.

Each cut is useful, but two go-to cuts on the disc are particularly valuable to me. Those are Dennis DeYoung's *Summertime*, on which Auralex products were utilized, and Earth Wind & Fire's *Getaway* (we've done nearly half a dozen studios for members of EW&F, including Maurice White). It's amazing how much I can learn about a room or playback system from just those two cuts, both of which exhibit sonic qualities that really show off the accuracy or weaknesses of a space's low-frequency abilities. If the owner of a facility is short on time and I don't have the luxury of listening to the entire disc, or even snippets of the disc's various cuts, I'll play parts of just these two tracks. Chances are that I'll learn everything I need to learn about a room/system in just a couple short minutes.

I was once listening to cuts from my disc in a control room I was consulting. On one of the Jennifer Warnes cuts, all of which are from a phenomenal album called *The Hunter*, I heard something I had never heard before. A percussion instrument used at the beginning of the song exhibited a totally different sound than I was accustomed to. But it was more than just the sound; it almost sounded like there were extra notes being played. I pointed this out to the facility's owner and we listened to it a few times, with me explaining how it normally sounded. Interestingly, though, the owner of the facility didn't take this occurrence the way I expected him to. He told me that his room must be the best one of all I'd ever heard, thus his room was showing me what was really on the track. I didn't want to get into too deep a discussion about this, so I moved on. Was his room fibbing to me? Yes, in a very odd way.

With my reference disc playing, I tend to listen at the mix position (at varying volumes from low to high) and at various positions in the room's corners and along its walls, particularly the back wall. Moving around like this tells me whether the room is consistent throughout with regard to bass response, or where the hotspots are. If the room exhibits inconsistencies throughout, moving around helps me know where the problem areas are, what the causes are, what additional acoustical treatments are needed and where they should be placed. This document would turn into a book if I launched into a full discussion of low-frequency anomalies in control rooms, but suffice it to say that these issues are my specialty and are the most common issues I run into in my consulting. I'll succinctly say that (a) one can never have too much bass trapping in a control room; (b) the back wall is the most often overlooked place where bass trapping is needed; (c) I favor passive trapping, not active; (d) low-frequency anomalies affect the rest of the frequency spectrum detrimentally, too; and (e) the Low-Frequency Paradox™, as I term it, is that no matter whether you perceive too much bass or not enough, you need bass trapping. Other consultants and I have discussed this topic and agree that once you get the low frequencies right, the rest fall into place.

When I listen, whether I'm assessing a control room or performance venue, I often will cup my hands around my ears, both facing forward AND facing backward, as this allows me to hear the direct sound better and the sound bouncing back from the rear of the room or venue. The differences between what I hear with and without my ears cupped can sometimes be quite dramatic, such as the time I was critically listening to a new concert hall. By cupping my hands in front of my ears from a location in the audience, I could clearly hear distinct delayed reflections coming from various surfaces at the rear of the hall. Note that I do not touch my hands to my ears or my head when I listen this way.

Here's a story for you. A famous producer was passing through a town and needed a place to record. He was going around and auditioning all the area's top studios. He visited a large commercial recording studio complex and put in a recording of a famous song he'd produced for one of the world's most notable bands. He listened for less than two minutes, turned down the music, popped the disc out, stood up, said, "Thank you"...and walked out. He'd heard everything he needed to hear. He could tell in just a couple minutes whether he trusted the sound of the facility's control room. That's how I feel about the two cuts referenced earlier. Gimme those and in less than 4 minutes I'll tell you whether your room is accurate or not.

Here's another story, this one based on a personal experience of mine. I was at the home studio of someone who's done some pretty famous work, and was there to consult him on what tweaks his setup could use. I changed the orientation of his monitors and then put in my reference disc. When I played the EWF cut, my head whipped around and I told him there was something terribly wrong. The half-open hi-hat splashes in the intro didn't sound at all like I knew they should; they were loose and excessively sibilant. I replayed the song's intro for him and he heard the anomaly instantly. I knew what the problem was: his front wall, which was proximate to his nearfield monitors, didn't feature absorption, so the mid and high frequencies were wrapping around the baffles of his nearfield monitors, spilling backward to the front wall and bouncing back to his mix position out of phase. He had some extra 4" absorptive panels in the other room, so I had him go get one and then I positioned it behind the monitors. The problem was instantly solved, the imaging was improved, the soundstage was improved and his setup was the most accurate it had ever been. He couldn't believe it. He blurted out, "You're sh-----g me! Just from putting that one panel there?????" Absolutely.

I was in Nashville and was consulting the home studio of a GRAMMY-nominated singer/songwriter. My reference disc showed me that his Auralex acoustical treatments were doing a fine job, but that his monitors were misaligned. After I tweaked the monitors' orientation and taught the fellow the right position in which to listen, I got ready to replay the Dennis DeYoung cut from my reference disc. But before I did, I told him what he was going to hear. He sat in the now-proper mix position and I started playback. His head whipped around and his face was full of excitement. "I feel like the piano is 9' tall and I'm inside it!" he said. This was due to my repositioning of his monitors and the efficiency of his Auralex treatments, yes, but also because I had taught him the proper position in which to monitor, which is 2-3 feet ahead of the point of the equilateral triangle, NOT at the point of the triangle. Lean forward until the stereo image broadens out beyond the loudspeakers. One hundred sixty degrees of stereo spread is customary.

Another Nashville anecdote also comes to mind. I was at a Music Row studio shared by a top producer/engineer duo and was there to discuss a possible studio redesign. They had a decent room and awesome gear, but my reference disc showed me that their monitors were out of physical alignment. I asked them if they minded if I repositioned their monitors for consistency; they told me to go ahead, not aware that their monitors had been out of whack. After repositioning, everything sounded like I expected it to.

I was asked to take a listen to a top west coast facility where oodles of famous people record. The chief engineer asked my opinion of the accuracy of their main control room. I listened, then expressed my opinion, which was not favorable (I'm cleaning this story up for you). He concurred, then told me that the facility had previously had the control room's acoustics redone by a number of consultants. Sadly, the room still exhibited dramatic inaccuracy in its low-frequency response, as shown to me by my reference disc. There was far too little bass at the mix position and far too much at other locations, specifically the rear of the room at the producer's couch.

These are just a handful of examples out of a lot of years of experience, but they're illustrative of how important a personal reference disc can be to you. Whether you burn an actual disc, play the files from your phone or from a thumb drive, referencing by using a consistent set of samples with which you're intimately familiar will serve you well over time.

I encourage you to either take a cue from me and use these cuts for reference or to put together your own disc. If you put together your own compilation, choose the cuts carefully and make sure they have the proper content that will expose a room's flaws. Once you really learn how to listen to the material and become intimately familiar with it, it will become invaluable to you as you troubleshoot room acoustics or playback systems.

Tracks Included On The Auralex Loudspeaker & Room Assessment Disc

By Eric Smith, Auralex Founder & President
June 10, 2013

1. Walk Between Raindrops — Donald Fagen
2. Come To Jesus — Mindy Smith
3. Sister Moon — Vanessa Williams
4. Somewhere Somebody — Jennifer Warnes
5. Rediscovery — Chicago
6. Morph The Cat — Donald Fagen
7. Summertime — Dennis DeYoung
8. Walter Whitman — Gino Vannelli
9. Tempted — Squeeze
10. Lights of Louisianne — Jennifer Warnes
11. Rock You Gently — Jennifer Warnes
12. Moon Over Madness — Gino Vannelli
13. Way Down Deep — Jennifer Warnes
14. Gregory Hines Tapping — Gino Vannelli
15. Getaway — Earth Wind & Fire
16. Take On Me — Aha
17. Return To Pooh Corner — Kenny Loggins (with Amy Grant)
18. Line 'Em Up — James Taylor
19. Flight Of The Cosmic Hippo — Bela Fleck
20. Hella Good — No Doubt
21. Goodness Gracious — Kevin Gilbert
22. The Power Of Two — Indigo Girls
23. Down To The River To Pray — Alison Krauss
24. Carrickfergus — Loudon Wainwright III
25. Hands All Over — Maroon 5
26. All I Got 2 — Amel Larrieux
27. Carrie — Cliff Richard
28. Over The Rainbow — Eva Cassidy

I work with WAV or FLAC versions of the files listed, though two cuts are high-bitrate MP3s. (This doesn't bother me too much, as the two cuts sound very true anyway and I primarily want them for their low end, not the high end where more audio data gets thrown away.)

I compile the tracks in Sound Forge, editing some of them, then save the resulting project as a WAV file. I import the WAV file into a CD Architect 5.2d project, then place Track IDs where I want them. I burn directly from CD Architect onto CD-Rs known to have low error rates.

There is a disparity in the volume levels of the different tracks, so be careful if you're listening at a loud volume. This is because these are direct rips and are unadulterated in any way. I did not want to alter their integrity by leveling their volumes.

There is an edit in Track 1 that isn't the smoothest, but it's functional and allowed me to cut out a lot of the song that I didn't need to include on the disc. The beginning and ending of the song are all I need when performing a room/system assessment. I believe you'll find the rest of the edits to be smoother and less obtrusive.

I also carry the separate tracks with me on a thumb drive, should a facility not have a CD drive or have a CD drive that's finicky about playing others' discs.

I hope you find these tracks as useful as I continue to.

This is just a sampling of the thousands of notable clients **Auralex®** has helped sound their best for over 35 years. ALL of our customers get the exact same consulting expertise and technical firepower – from small to mega-budget projects – so you can rest assured that the friendly, competent engineers at **Auralex®** will help your space be the absolute best it can be.

20th Century Fox • 3rd Eye Blind • Aaron Comess (Spin Doctors, Joan Osborne) • ABC Television & Radio Networks • CBS Television & Radio Networks • Adrian Belew • Andy Timmons (Danger Danger, Pawn Kings) • Anheuser-Busch • Apple • AT&T • Audix • Avid • Azden • Bang & Olufsen • Berklee College Of Music • Beyoncé • Bill Kreutzmann (The Grateful Dead) • Bill St. James (voiceover artist) • Blue Man Group • Bob Bergen (voiceover artist) • Bob Bullock (Shania Twain, George Strait) • Bootsy Collins • Brian May • Brigham Young University • Bruno Ravel (Danger Danger) • Carvin • Celine Dion • Chris Henderson (3 Doors Down) • Christopher Cross • Clint Black • Collective Soul • Crawford Post • Danny Seraphine (original drummer of Chicago, CTA) • D'arcy & Smashing Pumpkins • Dennis DeYoung • Digidesign • Discovery Channel • Disney • Doane Perry (Jethro Tull) • Don LaFontaine (late movie trailer god) • Doug Yowell (Duncan Sheik, Suzanne Vega) • Dr. Laura • Dreamworks • EA Sports • Ed Victor (voiceover artist) • Eddie Kramer (Zeppelin, Hendrix, Stones, AC/DC) • Eric Clapton • ESPN • Fender Museum • Ford Motor Company • Full Sail Center For The Recording Arts • Gibson Guitars • Gino & Ross Vannelli • Harpo Studios (Oprah) • James Taylor • James Young & Todd Sucherman (Styx) • JBL • Jeff Bell (voiceover artist) • Joe Bonamassa • John Blackwell (Prince, Patti LaBelle) • John Ferezik (Todd Rundgren) • John Kay (Steppenwolf) • Journey • Kaiser Permanente • Kenny Aronoff • Kevin Shirley (Led Zeppelin, Rush, Aerosmith) • Klipsch • Kyle Cook (Matchbox Twenty) • Lincoln Center • LucasArts • Manley • Martin-Logan • Maurice White • Metropolitan Museum of Art • Microsoft • MSNBC • NASA (Mission Control & Kennedy Space Center) • Nathan East • NBC Sports • NBC Television's "Chuck" • Nintendo • NSYNC • Omni Sound Studios • Opryland USA • Paul Reed Smith Guitars • Pelonis Acoustics (FutureDisc, Skywalker Sound) • Penn State University • Pete Anderson • Pete Moshay (Hall and Oates) • Peter Erskine (Steely Dan, Weather Report, etc.) • Peter Frampton • Peter Keys (Lynyrd Skynyrd) • Phil Buckman (voiceover artist) • Philip Bailey (Earth, Wind and Fire) • Premier Percussion • Presonus • Rascal Flatts • Rich Redmond (Jason Aldean) • Rock And Roll Hall of Fame + Museum • Roger Nichols • SAE (Nashville) • Sammy Hagar • Saul Zonana (Adrian Belew, Ace Frehley, Crash Test Dummies) • Schecter Guitars • Serj Tankian • Silicon Graphics • Shawn Pelton • Shure Bros • Snoop Dogg/Lion • Sony • SSL • Stone Temple Pilots • Stu Cook (Creedance Clearwater Revisted) • Studio 880 • Taylor Swift • Time Warner Cable • Tom Petty • Toyota • Travis Tritt • UCLA School of Music • Universal Audio • Universal Studios • US Government Worldwide • Van Romaine (Steve Morse band, Enrique Iglesias) • Vic Firth • Whitney Museum • Ziggy Marley • Zoro The Drummer (Lenny Kravitz, Earth, Wind & Fire) • and many more, including some we can't mention by name...

