Episode 236 - Pat Brown

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**Music:** *“Break Free” by Mike Green*

**Andy Leviss:** Hey everybody, welcome to another episode of Signal to Noise. I'm your host, Andy Leviss. As always, here in the virtual studio with me is my partner in crime, Sean Walker.

**Sean Walker:** Sup, y'all.

**Andy Leviss:** How you doing, Sean?

**Sean Walker:** I'm exhausted, man. I had a late night to an early morning and I'm, I'm burnt to the ground right now, if I'm going to be quite honest.

**Andy Leviss:** Work or play?

**Sean Walker:** Work. Always work, unfortunately. Well, not unfortunately. I'm thankful to have, uh, you know, plenty of work as a self employed person, I can't complain. But we had a client finishing up a Install that was a pretty big install for them.

And he says, Hey, can you come run monitors? And I was like, sure, no problem. And I walked into a construction zone, not a monitored rig. And so we ended up putting a bunch of stuff together and it was just, it was an all nighter and then early morning to come do this. And I need more coffee, man. That's where

**Andy Leviss:** I appreciate that. I was going to say, for the record, because I know it's usually the talk is about what whiskey Andy has for a podcast episode, this is solidly a coffee time of day recording.

**Sean Walker:** Yeah. Right. Totally.

**Andy Leviss:** we typically record quite late and leisurely, but it's bright and early, about 9am for Sean, noon for me and our guest.

And on that note, I'll introduce our guest, who is Pat Brown of SynodCon, one of the, I would say. The leading, or maybe the leading, uh, uh, professional educators in audio today, somebody I've had the pleasure of, uh, being acquainted with for almost two decades now, uh, having taken one of the Sonata Gunn trainings early on, and, uh, Pat has been on my short list of folks I wanted to get on the podcast and introduce to Sean and everybody else for a long time, so welcome, Pat.

**Pat Brown:** Thank you. It's good to be here. And, uh, we've, uh, discussed before the broadcast, we've got all three corners of the country covered, uh, between, uh, you know, all three locations, Florida, Seattle, and, uh, where'd you say you were, Andy?

**Andy Leviss:** I'm up here in New York, uh, getting ready to see if, uh, if we get all the snow they're forecasting this weekend, or none of the snow, because it typically goes one of the extremes when they, when everybody gets in a panic, and everybody's in a panic right now.

**Sean Walker:** You know, the

**Pat Brown:** technology's wonderful that we can do stuff like this. You know,

**Sean Walker:** the best part about all the snow is you just get to fire up a fire and some coffee and snuggle with the wife for a while. You don't have to worry about it. You know what I mean?

**Andy Leviss:** Right? And it's, we're celebrating her birthday this weekend, which of course, depending on when this airs, will spoil how long ago we recorded this or not, at least for the folks who, who

**Sean Walker:** Right.

**Andy Leviss:** stalk. Um,

**Pat Brown:** my solution was to retreat to Florida, you know, so I don't have snow.

**Andy Leviss:** That's the that's the way I'm about to go on vacation in Iceland, which is definitely going the opposite direction, uh, climate wise, from, uh, Florida.

But, uh, hopefully see some northern lights, uh, possibly see some volcano if that's still

**Sean Walker:** Dude, that'll be cool.

**Andy Leviss:** Yeah, it'll be cool one way or the other, like Reykjavik's an awesome place, the areas outside of it are beautiful, you know, I've been once before, uh, looking forward to that. But in the meantime, while we're here, we should talk some audio.

So Pat, why don't you give us like the quick recap for those who aren't, you know, caught up on what SonataCon is.

**Pat Brown:** Sure, sure, I'd be glad to do that. Uh, Synodcon is short for Synergetic Audio Concepts, so obviously with a name that long you look for ways to shorten it. And this company was formed in 1973 by Don and Carolyn Davis, and Don at that time was a vice president of Altec, Lansing, and sort of an engineering marketing guy, kind of a mix of the two.

And Don is one of the patent holders on the 1 3rd octave equalizer. You know, it goes back to a lot of the basic stuff that we all still depend on, but Don and Carolyn saw a need in the audio industry at that time to train, uh, installers, technicians, engineers, uh, because there was no training at that time.

So he left Alltech and they formed, uh, Synergetic Audio Concepts, which they shortened to Synodcon, and it was basically a roadshow that went from city to city doing seminars, you know, two and three day seminars. And, um, yeah, so that's the way it started. And they did that for quite a few years. And, uh, you know, the old SonatCon roadshow, we used to call it.

And when they came through my town, I, you know, I read their books for years and all their publications. And I always said, look, if they're in anywhere near me, I'm going to go catch one of these seminars. And, uh, so eventually they did get near me geographically and I was able to go. And, uh, wow, the rest is history.

I was blown away. Um, because I was contracting at that time and I had done a lot of systems, I was fairly knowledgeable by my own standards anyway, but I found that a lot of my systems didn't work as well as I expected them to. Some to the point of having to actually literally go in and take them out and replace them with something else.

And I couldn't understand why you just couldn't, uh, put anything into a reverberant room and have good speech intelligibility. And so I did stuff that looked great, but sounded terrible. And I went looking for a reason as to why. I had been through engineering school, and it's like, look, you know, these kinds of mistakes shouldn't happen to somebody that's got a technical background.

There's got to be some cause and effect here. And I went to the local electronics bookstore, and there was a big yellow book called Sound System Engineering by Don and Carolyn Davis. We still call it the yellow book. And thumbed

**Andy Leviss:** over my shoulder for where my copy is.

**Pat Brown:** Everybody's got a copy of that. You know, and it's in its fourth edition now, which is pretty crazy.

I'm actually one of the authors of the fourth, which is even crazier yet, because that's the book that got me started. And, you know, I read through that book. There was a lot of math. I understood very little of it. Read through

**Sean Walker:** Welcome to the club.

**Pat Brown:** some more. Read through it again, understood some more. And just Made it my goal to understand all of that before I die.

It was that kind of book and I've been working on it for over 40 years now and still haven't exhausted all the stuff that's just in that old basic book. And, you know, I don't want to say that it's, it's old stuff. It's the stuff that still matters. You know, if you look at modern systems, uh, and given the technology that we have today, you know, systems, uh, live or die by the loudspeaker in the room.

And the combination of the two. And there hasn't been a whole lot happen in technology to fix that. It still comes down to loudspeaker selection, placement, and room acoustics. And those are the mistakes I was making 40 years ago as to why my systems didn't work well. And they're still the mistakes people make today.

So I still harp on that stuff a lot. Because there's no signal processing fix for bad room acoustics. As much as we would like to have one.

**Andy Leviss:** Yeah, like there's, there's so much technology today trying to like, oh no, just you can put a speaker wherever you need to and just steer it another way. And that, that only gets you so far. There's no free lunch in that. Like

**Pat Brown:** yeah, there's a, there's a little bit you can do, but the, you know, if you get the right loudspeaker in the right place, you don't have to do a lot to it. It just works, you know? And so we, uh, that's what we try to teach. So, um,

**Sean Walker:** that to all my clients to say I need the right one in the right place. And your video wall can't go, your screens, forget your screens. Like

**Pat Brown:** yeah,

**Andy Leviss:** bane of every corporate event ever. Yeah, no, no, just it doesn't look good there. You need to put it over there.

**Sean Walker:** totally. I actually need more boxes in this hang. No, no, no. It'd be the way video. Okay, cool.

**Pat Brown:** yeah, no, it's, it's still like that. And, uh, yeah, that part hasn't changed and probably won't change. So yeah, we cover, you know, a lot of the. NewTek and all that too and, uh, signal processing and filtering and all of that, but it still comes down to loudspeakers and placement and room acoustics. And as an audio guy, I sometimes, you know, I tell clients that, look, if you've got X number of dollars to spend, fix the room.

You know, then that's going to make my job a lot easier designing a sound system for it. You know, don't build some disaster and then expect me to make it sound good with the sound system. Cause that's the wrong order. And those are the kinds of concepts that we try to convey in our, our seminars.

**Andy Leviss:** the good old, the only way you can tune a room is with a sledgehammer or a wrecking ball.

**Pat Brown:** Right. Right. Yeah. So anyway, I started sort of with the history and kind of bailed out of that, uh, but back to the history real quick, uh, I started, um, being the associate teacher for Don back in the early 1990s, uh, because his assistant that he would usually have come in and teach got sick. I happened to live an hour away from where their new headquarters was in Southern Indiana.

So, they called me and asked if I could come up and be the assistant instructor. And, oh, by the way, your topic, we want you to talk about speech intelligibility. And, if the, you know, if the listeners don't know, Don Davis is sort of, he was sort of the guy in that. So, it's like, great, I get to go talk about speech intelligibility in front of Don Davis.

So, I stayed up all night, like you, Sean, I pulled an all nighter. You know, trying to, right, trying to bone up on the topic and stuff, and I'm sure I botched it, but Don was very gracious and, um, they kept having me come back then as the assistant instructor for the class. And, you know, the whole topic of speech intelligibility, I know everything's mostly focused on music systems, but, but Don told me early on, he said, Pat, it's a lot harder to create a good speech system than it is a good music system.

And I sort of doubted that at the time. Uh, because it didn't seem logical to me that a music system needed more bandwidth and, you know, and what have you. But, you know, on one hand, you're, you're processing information and have to preserve information through the system. And on music systems, you know, that's true of speech, but on music systems, you can sort of get away with murder and it can still sound good.

You know, and with speech, we all have a reference as to what speech should sound like and we can all determine without instruments whether we can understand it or not. So it's a much tougher thing to restore intelligibility to a system than to broaden the bandwidth of a system and pump some bass through it and make everybody think it sounds good for music.

You know, so I sort of take the mindset that sound system design should be around order, maintaining order and structure, preservation of information, get that part right, and then later we can add channels, we can extend the bandwidth and we can make it sound good for music. But you can't do it the other way.

You can't just put anything in and then expect to understand speech over it.

**Sean Walker:** Totally.

**Pat Brown:** the first time it happens to you that you do that, you realize very quickly that, wow, I've got to go back to square one to fix this thing.

**Sean Walker:** what are some of your thoughts or design considerations about that when you're doing something for speech specifically or for intelligibility versus music? How do you get it? You know, what are some of the, like, the basics or the platforms of, well, this is going to be a speech system, so it has to do this, this, this, this, this, or, you know what I mean?

I need to not do that, that, that, that, that kind of a deal.

**Pat Brown:** well, it's, it's really sort of very fundamental. Um, you know, the, the most effective communication system ever known to humans is face to face conversation. You know, you've got good signal to noise ratio. You've got good direct to reverberant ratio if you're inside a room. You've got not only the audio and audible clues, but the visual clues.

And, you know, that's the best way to communicate. And we're wired for that in our brain's process. information very effectively in that medium. So I look at that and I say, okay, how can I extend that to a sound system? Because my sound system is going to have a face to face conversation with the audience.

And how do I make the audience feel, via the sound system, that they're in a face to face conversation with the talker? And we call that a talker. One of the old SynodCon things is that we don't have speakers. You know, because, uh, a speaker could be a loudspeaker, or it could be a talker. And somebody could say, go move the speaker three feet, and somebody might go move a box, and somebody might move me.

You know, we're both speakers. So we use the term talker, we use the term talker and loudspeaker just to clarify the difference between the two. So you like things that you, you know, with, that you have with, um, conversation. You know, single source is ideal and, uh, you know, good directivity, good pattern control.

You know, trying to keep distances as short as possible, and if you have to extend the distance from a loudspeaker, you know, we use loudspeaker directivity to do that. We don't just turn it up. You know, if you just crank up the system to reach the furthest listeners, uh, you're amplifying the bad stuff along with the good stuff.

But if you increase the pattern control of your loudspeaker, you can get more energy to the listener without creating more reverberation in the room. And that's, that's a very effective tool. And so just basic principles like that. And that's, that's the way I do it. I've have done it like that for, you know, almost half a century.

**Sean Walker:** So with more pattern control, you're talking about like more line length in an array or with a different speaker that is just designed or built, I'm going to say different or better, but how do you, how do you apply those in the real world?

**Pat Brown:** Sure. Um, it can be multiple ways of doing it, depending on the characteristics of the loudspeaker that you're, that you're working with. If you have. If you're using a, or designing a point source type system, and by point source we mean, you know, the sounds coming from sort of a single location in space, a box if you will, or a sort of a tightly packed array, you know, that's one, you know, way of delivering sound to an audience.

Uh, as you say, a line array is another way. So if I've got a point source system, it's not at all unusual to find that, you know, you pick this box and you hang it up there and You pick it, you know, half based on aesthetic reasons. It has to be small and out of sight because, you know, architects like that.

But you find out that you don't have sufficient pattern control with a small device like that. So you might have to go to a physically larger device because that's how you get pattern control. You have to have a larger source. It's a function of wavelength. So sometimes we go in and we say, okay, how do I have the same radiation pattern, maybe I still need a 90x50, but how do I have more, uh, control over that 90x50?

How do I have more energy inside the pattern than outside the pattern? And that will often mean just a physically larger device, maybe something horn loaded, you know, that you cover that audience with. And the other thing you're trying to do is extend the pattern control lower in frequency. You know, all of the, the little two way and three way boxes that we buy are physically small.

You know, most of those have good pattern control through the upper octaves, uh, because the wavelengths are short because frequency's high. But as you go down in frequency and the wavelengths get longer, those boxes lose control of the sound and the pattern spreads out. And if your pattern starts spreading out while you're still in the voice range, you know, that extra energy that's exciting that room can really ruin the intelligibility and the music clarity.

With regard to that, so I might go to a bigger box just to extend my pattern control maybe down to 250 Hz instead of 1000 Hz. And it can make a huge difference.

**Sean Walker:** You're talking, in like a smaller show, you're talking about going to something like a 12 or 15 inch box instead of a 5 or 8 inch box to have just a little more to it? Or,

**Pat Brown:** Well, it's

**Sean Walker:** do you do that in the

**Pat Brown:** yeah, it's probably going to be a box with a larger horn. You know, horn loading is the most effective way to increase the Directivity and the efficiency. And, uh, I have to tell you right up front, I'm a, I'm a horn guy, you know, and, and horn guys get a lot of, you know, a bad rep through the years, but you know, the, the horn has some amazing attributes to it.

Now I don't like big horns in small rooms, you know, they don't sound good. And if you go to the trade shows and go into a. heavily draped demo room, you know, the high directivity stuff doesn't necessarily sound musical, you know, and that's what you'll hear people say. Uh, and they'll switch to a smaller box next to it that's got less pattern control and it sounds better.

And, and I wouldn't argue that, but, but go into a 3, 000 seat room with all hard surfaces and repeat that demo, you know, and the horn loaded device will just eat the lunch of the smaller device because the pattern, it's just paper, rock, scissors. And in that venue, the pattern control trumps the, uh, you know, the attributes of the smaller device.

And so I like things that are horn loaded and physically large in big rooms. And as the room shrinks, you can relax those criteria. And there are great small loudspeakers that work well in small rooms. You don't wanna put little stuff in big rooms and, and put people a hundred feet from it, you know, because it's probably not gonna work very well.

**Andy Leviss:** And are there any tricks for like, because a lot of times we're demoing and evaluating either in a demo room at a trade show or in a warehouse. Are there any tricks for learning? What, what is going to translate better to a larger room? Or is it just knowing what you're looking for and just having to try it and in the larger space?

**Pat Brown:** You know, there's, there's no substitute for being, for taking stuff into the room and listening to it in situ, as we say in the environment that, that takes all of the variables into account. And I'm, you know, I'm an instrumentation guy. I do a lot of measurement work, but I'm a listener and I tell you, your ears are the most important, powerful.

reception tool that we have in our, our instruments can compliment our hearing, but they certainly don't replace our hearing. And if you want to hear the difference between boxes, hang them up there and A, B them and listen to them. And, uh, yeah, we can measure the daylights out of them, but it still comes down to what it sounds like.

And, you know, and some of that we can do with, uh, room modeling, you know, we have room modeling programs like EES and CAD Acoustic and things like this. And we can SIMulate the. You know, the actual room, uh, in software. And we can realize some of these benefits in that model because we can, in that model, you know, we select and place our loudspeakers and we can pick a seat and we can look at the direct to reverberant ratio at that seat.

And if you have good data on the loudspeakers and you've made a reasonably accurate room model, you can do that listening exercise. You know, virtually, uh, because it may not be practical to do it physically because maybe the room's not even built yet. So I'm, I'm a big proponent of room modeling used as a tool for loudspeaker selection and placement. And one of the other things that I do with a lot of my time is I measure loudspeakers to produce data for those programs. You know, I've, I've produced tons and tons of EASE data, as they call it, for manufacturers, and I can tell you that's a

**Andy Leviss:** so they'll like contract you to, to do the measurements for them.

**Pat Brown:** They do, yes. In fact, uh, I've got eight pallets of loudspeakers waiting for me when I go back to Indiana from Florida. That's going to take all of February, uh, to test.

**Sean Walker:** Dude, that's kind of fun. What's involved in that? What is it? Are you talking about like making the GLL files and stuff? Or just the measurement? Okay. What's involved in that? That sounds cool.

**Pat Brown:** it is cool. It's kind of fun. You know, there's a robot involved, so that's always fun, right?

**Andy Leviss:** Sold.

**Pat Brown:** Yeah.

**Sean Walker:** I'll bring coffee.

**Pat Brown:** Yeah. So, you know, you take the loudspeaker and you fasten it to what's essentially a robot. It's, it's, you know, it's a horizontal and vertical rotation system, uh, so that you can rotate it in a whole space to any angle relative to the microphone.

And you measure the response every five degrees. It could be any angular resolution, but five degrees is practical. And so I, you know, you spend a few hours getting this thing all mounted up and. You hit the go button and you come back in about five hours and you've got 2, 600 measurements of all of the points around that loudspeaker.

And then there's software that you use to crunch that into the GLL file so that it can be used in the modeling programs.

**Sean Walker:** Dude, cool.

**Andy Leviss:** And like, what kind of space is it? Like, do you have, is it like an anechoic chamber or like somewhere in between or like, what

**Pat Brown:** It's, it's in between. You know, Logic says, you know, you'd want an anechoic chamber for that. And that's true if you've got Boeing's resources. You know, because they can have a really big room that's anechoic. But when you look at the kinds of chambers that are practical, you know, for, you know, the sound reinforcement industry, you can't get a big enough anechoic chamber most of the time.

You need to be about 8 meters away with the microphone, so that's already a pretty big room, you know, and then you've, you've got to, you know, then you've got to get the loudspeaker in there, and some of these things, I mean, I've measured some Danley boxes that are 6 and 700 pounds. You know, so, so how do you get that into an anechoic chamber and rotate it in 3D space and be 8 meters away from it to get the data?

**Sean Walker:** How do you load that into a show?

**Pat Brown:** Right.

**Sean Walker:** Holy crap. No.

**Pat Brown:** Yeah. My, uh, first, uh, few iterations of this rotator, the speaker robot, uh, I bent them with some of the loudspeakers that I tried to test. yeah, I went from aluminum to steel. It's not going to bend anymore. Yeah,

**Sean Walker:** Totally.

**Pat Brown:** so you end up with a hemi anechoic chamber. And you find that if you, uh, you know, make the room anechoic for everything, but say, for instance, the floor surface, now you can put your mic on the floor and essentially make anechoic measurements in a room that's got a hard floor.

And if the room has a hard floor, I can drive in with a forklift and, you know, put the loudspeaker down. It doesn't matter what it weighs. And you use the mic in a ground plane on the floor, and you get anechoic data. And so that's how,

**Andy Leviss:** the mic is right on the floor. So the reflections are. Basically, basically they aren't right. Cause the

**Pat Brown:** they all happen at the microphone element. And so, essentially then, there are no wall reflections and things, because basically everything sort of gets there at the same time. You know, if you raise the mic up two feet off the floor, there's a reflection off the floor. And you'll see that in the data.

Totally corrupts the data. But if you put the microphone on the floor, that reflection arrives at the same time as the direct sound. And it's not a reflection anymore. It's actually direct sound. And if you do that properly, with the proper microphone, it's like the floor's not there. You just get a measurement that's 6 dB hotter overall because of the contribution from the floor.

**Andy Leviss:** Bonus.

**Pat Brown:** Yeah, so that's Crown's old PZM microphone. Uh, PZM mic or boundary mic. You know, most mic manufacturers have a version of a microphone that's designed to mount to a boundary.

**Sean Walker:** Yeah, totally.

**Pat Brown:** yeah, so you use that process.

**Sean Walker:** So how long have you been doing that? Years?

**Pat Brown:** Yeah, oh yeah, since 2005, I

**Sean Walker:** How many,

**Pat Brown:** set that up.

**Sean Walker:** many measurements or speakers have you measured where you, where you looked at and were like, well, this isn't gonna be good, and you got the data and were like, holy crap, that's way better than I thought. Or vice versa, where you're like, this is gonna be smoking and you got it back and you're like, really?

You know what I mean? And I don't need names or anything, just that, like, how often does the data surprise you, I guess is the question, is a more succinct way to ask the question.

**Pat Brown:** Yeah, no, that's a, that's a valid question. I, to be honest with you, you, to produce GLL files, you don't really look at it with that mindset. You know, I, I've got this box and my, job is to quantify what that box is doing, not pass judgment on what it's doing. And so, when a customer sends me a box, I rarely listen to it, other than just to make sure that there's nothing wrong with it.

Uh, because this is objective engineering data that's about the sound radiation of the box, and ease data doesn't tell you what the box sounds like. You know, you still have to listen to it to get that. This is to determine where the sound's going and at what level so that I can drop that into a room model and make decisions on placement and what have you.

**Sean Walker:** Yeah, I understand that. I, I was, I was talking about the, when you look at the data and you're like, this has a way better polar or whatever than I thought it would, or, you know what I mean?

**Pat Brown:** yeah, well that's common to do that, but I can't put numbers on it. I mean, there's, I've tested some really good loudspeakers. Over the years, you know, and very well behaved and obviously some not so. And it's just, but, but you know, loudspeakers get, get graded on a curve. And so you have to always consider what it's for.

Where is it going to be? How's it going to be mounted? And there are, you know, not everything out there is going to look like a studio monitor in terms of response because not everything needs to. All of our applications don't need. That kind of response. And when you get into aggressive pattern control, sometimes you have to sacrifice fidelity a bit to get the pattern control.

But that's a very worthwhile trade off. You know, because, yeah, I don't need high accuracy, necessarily, you know, to have good speech intelligibility. Which is a little counterintuitive, but true, nonetheless.

**Andy Leviss:** And by the same token, I would say like, for like a front fill or like an underbalc delay speaker, like I don't necessarily care what it's doing in like the bottom third of its response. I'm going to high pass above that anyway. Like what I care is like, is what it's doing in, in like the mids and highs.

**Pat Brown:** Yeah, there's different criteria for that than for the mains in that room. And you always have to consider that when you're sizing up a loudspeaker for an application. You know, you wouldn't take the under balcony thing and hang it up where the mains go, and you wouldn't take the mains and put them under the balcony.

You know, it's, it's all, all has to be appropriate for what it's for.

**Andy Leviss:** Although I did, uh, see a design recently that originally had, uh, it's a D& B system and it had, uh, Y10spect is the under balcony speakers, which seemed a little bit on the excessive side.

**Pat Brown:** Yeah,

**Andy Leviss:** And, uh, that got shuffled around and those got repurposed elsewhere and some adorable little, uh, 44Ss got put in his under balcony instead, which were a lot more appropriate for where they were going.

**Pat Brown:** well, I, I will admit that I've, there's a lot of times I walk into a space and You, you look at the sound system and it's like, what were they thinking? You know? And you, you never really know what they were thinking. Sometimes it on the surface appears to be maybe bad decisions, but then when you peel the onion and you see all of the details that went into that, it's like, well, they did a pretty good job with what they had available to them.

You know, that's, that's not unusual. Um, but then there's times where you walk in and. You know, my favorite is the line array columns on their side across the stage lip, around the front lip of the stage, you know, and those are going to have exactly the wrong pattern for front fills, but yet you'll see that done because the physical form factor fits quite nicely.

You know, you take this column, lay it on its side, hey, you know, it doesn't block the sight lines or the lights or anything, but then you've got about five degrees of horizontal coverage, you know, so you've got a lot of holes in the. in the coverage even though the form factor of the loudspeaker was right.

**Andy Leviss:** Yeah, I remember, I remember that being big when, like, when, uh, like, Meijer line arrays started coming out, and it's like, you know, well, if a UPM is great for a front fill, like, probably, like, one of those M1Ds or the other little box would be great, too, and then everything's the same box, and it's like, well, it is, as long as you don't move your head, like, two inches back and forth and fall in and out of the pattern.

**Pat Brown:** Yeah, yeah, so obviously we have, you know, we have to make choices that are appropriate for, for where it's at. And, uh, yeah, so,

**Andy Leviss:** So one thing I wanted to touch on, because in talking about the measuring the speakers, you mentioned ground plane measurements, and I feel like that's a thing that often in like live measurements, whether Smaart, SIM, any of the other systems comes up where I feel like folks start to have issues with reflections, particularly in low end, learn about ground plane, decide it's the best thing ever, start like doing all their measurements from the floor.

And I feel like folks typically circle back from that as they realize that's not what the audience is listening to. So for this circumstance, That's not where we want to measure. And I wonder if you can touch on in, in like that live, like. Portable use when a ground plane measurement might be useful or not.

**Pat Brown:** Sure, sure. Um, yeah, there's, there's various philosophies on that. And, you know, just to go back historically a little bit, because I remember Don Davis, you know, lecturing on this back, you know, the very first seminars, the SynodCon seminars that I went to, and You know, if you approach equalization intuitively, you put the microphone where the listener's ears are.

Because that just seems like that makes sense, right? This is where the people's head is, so put the mic there and you'll be looking at what they're hearing. And the point Don always made is that You know, if you do that in an empty room, and there's a strong reflection off of the floor, that reflection is going to have a profound effect on what you measure at ear height.

Because you're going to have a very strong reflection a few milliseconds after the direct sound, and your direct sound field is going to be full of acoustic comb filters. And so, if you've got an equalizer now, and, you know, and you're of the philosophy that the response should be flat, you're going to deploy a bunch of filters to try to smooth out That response.

And you look at your, you know, your graphic EQ and it's just all over the place. Or your parametric EQ, you've got 16 filters in and the response looks like the Swiss Alps. You know, so that was a very common thing. And what Don always pointed out is that what the audience is going to hear depends on the audience being there.

So, you know, when the crowds, people are good sound absorbers. And so when the crowd shows up, if you tune the system with the room empty and a strong floor reflection and the crowd shows up and they cover up that floor and absorb that floor reflection, you've now got the completely wrong curve for your system because you've put filters in for comb filtering that's not there.

Anymore. So that's sort of what got people started putting the mic on a ground plane is because the objective is to get rid of the floor bounce because the floor bounce keeps me from seeing what I can do with an equalizer. A, a turbine like is obfuscate, you know, it, it, it obfuscates. The proper setting of the EQ, but as you say, I mean, ground plane measurements, it's just a tool in the tool bag, and I still do it that way sometimes, but more often than not, what I'll do instead of a ground plane measurement is, I take a tall mic stand when I go in and tune a system.

You know, a tall mic stand, very tall, like 20 feet. And the reason for that is that if I've, let's just say, let's keep it SIMple. Let's say I've got a box overhead and it's aimed properly into the audience. And I want to do a couple of things. As I commissioned this system, I want to make sure it's working.

Okay. I want to make sure it has the proper response. And I want to deploy some filters to improve that response or change it, to make it more appropriate for the use of the system or whatever. Uh, if I put the mic at ear height, I really can't do that. Uh, if I put the mic on a ground plane, that's a step in the right direction, but maybe there's seats.

Maybe I can't put the mic on a ground plane. Uh, so what some people have done is like put a sheet of four by eight plywood on the, across the seats so that you can put the mic on a ground plane there. And I tuned a system with Don Davis back in the 90s. It's an, it was an arena system and all the seats were in place.

You couldn't do ground plane measurements. And so Don said, well, we need a, you know, three quarter inch sheet of plywood and we're going to do ground plane by laying the plywood on top of the seats and putting the mic, you know, in the middle of that plywood.

**Andy Leviss:** It's one of the big downsides of digital consoles getting smaller is we no longer have the fixie six frame heritage case covers to use instead of plywood.

**Pat Brown:** And those, I've seen those used and that works fine. Well, Don loved that method because Pat had to move the plywood. so after doing the upper balcony and stuff, it's like, there's got to be a better way. You know, and I

**Andy Leviss:** be quarter inch.

**Pat Brown:** Yeah, I sort of thought through it and say, you know, if the objective is to get rid of the reflection off the seats and the floor, you know, you can do that with a tall mic stand.

So put somebody in the seat, okay, and then go out in front of them between them and the loudspeaker with the tall mic stand and raise the mic up until they're looking through it. at the loudspeaker. And your mic now is up in a free field. There's nothing around it. So you can make your measurements up there and you can window out the remaining room reflections and you can get perfectly anechoic data in a very hot live arena by using a tall mic stand.

And you can do that because you're in the far field of the loudspeaker because you're so far away from it so the response doesn't really change. between where the mic is and where the listener is, other than maybe the the minor effects of additional air attenuation. So you can get great anechoic data with a tall mic stand without hauling around plywood and without using ground plane measurements.

And my standard kit's got a 22 foot mic stand in it, and I use it all the time.

**Sean Walker:** Where do you get a 22 foot mic stand?

**Pat Brown:** It's called a lighting stand. You know, if you go into the world of Manfrotto and those folks, there's tons of that stuff. And you just get the little fixture for the top that adapts it to the mic threads. You know, and you're good to go.

**Andy Leviss:** I will say like my favorite measurement, uh, mic stands on either side of the size spectrum come from Manfrotto. They also make the really nice little ones that'll go up to about head height for a seated person but collapse down small enough to pack like 12 of them in a Pelican 1510 or like an Attic 935.

**Pat Brown:** Yeah, that's right, and I've even, I've got nine of these stands. So, you know, when I tuned the Yum! Center in Louisville, Kentucky, we've set up nine microphones, all wireless. All 22 feet in the air for different elements of the array so that we could look at all of that stuff individually or SIMultaneously and have anechoic data.

If your data is not anechoic, you're not ready to deploy equalizer filters. Uh, because once you let the room into the measurement, everything becomes position dependent. And you'll do stuff that makes one seat look better to the detriment of another seat. So, you always start the process by getting the direct field correct.

And you can do that if you've got anechoic data. And I'm not saying that you're done after correcting the direct field, but you've done most of what you can do if you get that part right. And that's my first layer of equalization is for the direct field. If I have the luxury of, you know, having enough DSP available and what have you, I may put another DSP block with another set of parametric filters that I might do something.

based on the acoustic environment. But that's independent of the direct field. The direct field doesn't have to change no matter what happens in the room. That second set of filters may indeed change depending on the crowd size and what have you. So you sort of split it between two processing blocks so that you can change one part of it from night to night if you need to.

That's probably one of the most effective things that I've come up with. And I'm sure I didn't come up with it. If you think about it logically, I think anybody would do it that way. But it's one of the most effective things that I've done, you know, in my own work to get good sounding systems that are still flexible and versatile.

**Andy Leviss:** So while we're on the subject of tuning, I have one more deeper, more advanced question on that, although not super advanced. Then I want to take a step backwards, because we had another more basic chunk of this that we had said we wanted to talk about. But first, because it's a debate I've had with a few folks over the years, is order of operations.

If I've got underbalc delay speakers, I've gotta time align them and I've gotta EQ them to work with the mains. Which which order of delay versus EQ and why because I've heard that what sound like to me valid arguments either way that you've gotta EQ them first because that's gonna change where and how they time align or I've heard time align them first because that's gonna change How they work together tonally

**Pat Brown:** Okay, well, there's a variety of opinions on all of this stuff, so I'll just simply give you my opinion. And the very first thing I would do is get the mains right and the main floor coverage. Because that's what you're going to delay to. And so you want to get that part done, get the bandwidth established that that system's going to have before you even worry about underbalcs. And just leave those things turned off until you get your main floor work done. Because you've, you know, when you do the EQ of the main part, you've done, you know, you've got the job done for most of the audience, you know, the under balcony people is a minority chunk of the audience.

They're still important, but you do what you can for the most people first, and that's the main floor. And then, with that system operating, I'm gonna go back under that balcony, and I'm going to set the under box at the same level as the seated listener has out on the main floor. So that, you know, they're, you know, let's just say it's 85 A weighted.

If that's what the main floor is producing, I'm going to play some pink noise over the system, and I'm going to set that level under the balcony. And that gets them at approximately the same level and close is good enough. And most people that have been doing this for a while can just do that by ear. I mean, you can get out a sound level meter if you want to, but most of us could sit under there and say, you know, that's about right and be within a few DB.

**Andy Leviss:** and just to clarify for folks you're saying you're gonna leave the mains playing and then bring the Delays in to fill in to to match what the domains do in the area where they're

**Pat Brown:** Levelwise, no consideration of timing at this point, but levelwise. Okay, and so let's say we've done that now. We've got the mains done, we've got the underbalcs playing, we've got the levels basically matched between the two. The next thing I'm concerned with is timing, and we could put a microphone up and we could do some transfer function measurements and get the impulse response and measure the time differential between the mains and the under.

You could do it that way. The way I like to do it is, uh, take the signal processing block for the underbalcs, which, you know, there's going to be a delay in that, and set that at a very high number. Let's just make it 200 milliseconds. And then play a little wavelet over the system, which is just a little burst.

You know, a little signal burst. Sounds kind of like a click. And sit under that balcony, and you will be able to hear an obvious, massive time offset between the underbalcs and the mains. And that lets you know that you don't have the right delay setting. And as that's playing, the objective is to adjust the delay on the underbalcs to converge the sound from the mains and the under balcony sound.

And so you'll find that as you reduce that delay time on the underbalcs, You'll find that those two, uh, arrivals are merging together and, and you'll, you know, when you start out, there's an obvious time domain difference. You hear a click twice, but as you converge things, it eventually becomes tonal instead of, you know, an audible time offset.

And once you're in that tonal range, you know, you know, you're getting close. Okay, because your ear brain system is merging the two arrivals into one. And where you usually want to end up is with your underbalcs just after the mains, in terms of arrival. Because when you do that, your listener under the balcony, if done properly, will not have the impression that the sound's coming from the underbalcony loudspeaker.

You do it right, and the first arrival is what they lock onto, and that's the mains. And so if done properly, you should get complaints that the under balcony speakers aren't working. And when I got that complaint, I'd always say thank you. That means I got the delay set right.

**Andy Leviss:** I...first of all, I just want to flag that again because this, this suggestion of starting almost comically too long in the delay and working backwards just broke my brain of how, I can, I can already hear in my head how much easier that'll make it to fine than going the other direction because going the other direction, I feel like you've way too easily end up in a much more subtle range to get into the ballpark.

I, this...this might be the golden tip I just picked up this episode.

**Pat Brown:** Mess it up real bad and then fix it, you know, rather than the other way. Because...

**Sean Walker:** Story of my life.

**Pat Brown:** Yeah. It's a gradient and there's no exact right delay time. A lot of times I will, when I know I'm close and I'm in that tonal range, you know, which means I'm below 50 milliseconds. Sometimes I'll switch to a speech track and play that over the mains and then decrement the delay further until the acoustic image shifts to the mains.

And it's amazing how abrupt that is if you have the luxury of sitting there and adjusting the delay from an iPad or whatever. remotely, you know, and listening to speech. So we're back to that face to face conversation thing and close your eyes. And as you decrement that delay further, you know, below a 50 millisecond offset, there will come a point where the acoustic image shifts back to the mains.

And I always stop and I say, that's the right number. Now let's measure it and document it to see what the number is. But that's the right number, and it could be 5 milliseconds, it could be 20 milliseconds, depending on all the other variables, but that's the number that invokes the precedence effect so that the underbalcs are timed right with the mains.

**Andy Leviss:** yeah, and I've seen like numbers of milliseconds that you think shouldn't make that big a difference make a huge difference when it comes to things like that.

**Pat Brown:** Oh, it makes a massive difference. Yeah, just a few milliseconds is, has a horrific effect on the response of a system, and that's why recording studios go to such extents to eliminate that early energy. I mean, they're using, uh, you know, uh, studio monitors on the bridge of the console so they're not near the wall, or they're flush mounting the loudspeakers in the wall.

They're trying to eliminate that very early reflection because it totally, uh, dominates the imaging and the tonality of the loudspeaker. And in the studio world, they have a thing called the ITG, the initial time gap, and the objective in, uh, uh. A recording studio is to have the direct sound arrive from the monitors and then have maybe ten milliseconds go by before anything gets there from the room.

And that increases the clarity and the imaging with regard to the monitors. So you take that principle and you apply it to an auditorium or an arena for the same reason. You know. So that's, you know, we take some tricks from the studio world when we, even in big rooms.

**Andy Leviss:** So like on the studio side, like I know Sean, you've like in the in the signal noise discord shared some guidelines from you know folks Smaarter than either of us on placement for like near fields in the studio and is that i guess would that be one of the reasons that like they tend to tend to suggest having the speakers on the plane of the ears rather than above you and firing down towards you

**Sean Walker:** Totally. Yeah. So you've got, it's more direct to reverberant ratio and you're in the. The horde pattern, right? Of the, of the speaker. Cause it, the studio monitors have a pattern just like every other speaker does. They're not, they're not just spraying it everywhere. And a lot of people in the studio world don't think about the speakers the same way we do in live sound.

They don't think about pattern control of speakers. They don't think about tuning with DSP. They don't think about the positioning in the same way that we do. They totally think about positioning, but just not in the same like micro level that we do. In live sound is we're designing for rooms and stuff.

Uh, and I would say by and large, there's lots of people that do, but, but by and large, they're more thinking about putting a great pair of speakers, or maybe just an expensive pair of speakers on the bridge of the console and trying to get the back wall deadened, like you were talking about, Pat, so that it doesn't have a bunch of early reflections coming.

When they're, when they're listing, you know what I mean? The, the, the dead or the back wall can be, and if you can even build it so that it's got a bunch of absorption, you know, deep absorption, you can get some of those lower frequencies absorbed. It helps to clean that up a lot. And same with the sides and stuff.

**Pat Brown:** And diffusion, you know, if you can't soak it up, break it up.

**Sean Walker:** Totally.

**Pat Brown:** Yeah. And I think the main difference between the studio and, you know, live sound and auditoriums, they're thinking about a position with regard to an optimum response, where the engineer's head is, we have to cover an area and everybody that buys a ticket in that arena wants a good seat.

You know, so we, we don't just tune it so that there's one good spot, you know, and every, and it gets progressively worse everywhere else. You have to think in terms of area

**Sean Walker:** And in a studio, we're thinking about the, the one seat. As long as it sounds its best, everybody else kind of gets what they get. Like it's cool if it all sounds good everywhere, but really, as long as the mixed position sounds good, everybody else kind of gets what they get.

**Pat Brown:** well, yeah. And a great example of that is that in a recording studio, you know, I do a lot of testing of studio monitors, you know, to produce ease data, you know, for that. And you know, there's a lot of two way boxes with offset, woofer and tweeter. And we all know that in a crossover range, in a two way system like that, a lot of times there's You know, interference and some lobing that happens through crossover.

It's sort of normal, and a lot of times it doesn't really even matter. Um, but in a recording studio, you can take that two way box, and because of sight lines or whatever, you can rotate it 90 degrees and set it on its side. And it makes no difference in what the engineer hears, whether it's vertical or turned on its side.

**Sean Walker:** And a lot of them you can rotate the horns on so you can keep your pattern the way you need it to if you want.

**Pat Brown:** yeah. But if you took a two way box in a large auditorium and turned it on its side, you've just now changed the response for 100 seats. You know, because your interference at crossover is now spread over the horizontal plane, you know, and it's happening, you know, you're now looking at an area. It changes all the rules.

And in a recording studio, you know, you can rotate the loudspeaker, it doesn't matter. It matters a lot. in an auditorium.

**Sean Walker:** Totally.

**Andy Leviss:** so bringing it back around i said there was something a little more basic i want to dial it back for folks and i know one of the one of the big lessons Like, you tend to drive home in your training, uh, Pat is about gain structure and optimizing that and optimizing signal to noise, as it were, uh, appropriately enough.

Um, I wonder if, you know, before we wrap up, if you want to touch on that a little bit and kind of, kind of straighten out, like, some of the common, like, mistakes you see people make there or how to, how to make sure we're getting the most out of whatever system we're putting in the space?

**Pat Brown:** I think the logical way, you know, there's sort of two ways to look at gain structure and both work. You know, in audio, there's almost more than one way, almost always more than one way to do anything in audio. So I have several methods that I use depending on the other variables that I can wiggle for a particular thing.

So if you looked at sort of the textbook way of doing gain structure, you know, you think of your signal chain and let's say we've got You know, Microphone, Mixer, Signal Processing, Amplifier, Loudspeaker. It's sort of the classic way of doing, well, let's talk about how to do it the wrong way first. Turn everything on and max out the amplifier.

That's what still today, nine out of 10 people do. 'cause the philosophy is that, you know, uh, the amplifier's got a volume knob. I want all the watts from the amplifier, so I'm just gonna start by maxing that volume knob out so I get everything that amplifier's got. Okay. Unfortunately, that's generally does not produce a good gain structure because what that has done is it's made the amplifier so sensitive.

to the input voltage driving it, that you can never get your mixer up in the proper portion of its dynamic range to where it's quiet. So you max out the amplifier, you run the signal processing at unity, which means, you know, one volt in, one volt out. Now, all of a sudden, you know, when you turn up your console, before the meters even move on the console, You know, you're already clipping the power in, because you've got too much gain, you know, at the end of the signal chain.

And this is a big problem, because your meters don't move on your console, your signal's closer to the noise floor, you'll hear hiss. Usually audibly, um, and, and people think that's due to, you know, a bad console design or wire or northern lights or whatever, but, you know, it's not. It's because of bad gain structure.

So the quick way to fix that would be turn your amplifiers down or even off. Turn your mixer up, you know, with the mix playing or whatever, let's just say that we're playing some tracks or whatever and we've got a good mix playing, and run your mixer up so the meters are moving. You know, you don't want to be clipping the mixer, but you know, those manufacturers put those meters on there for a reason.

They're expensive for the, you know, to put them on there and you want to see them move. And so when you have the meters moving and the peaks are approaching the top of the mixer's dynamic range, you're in the optimum place in terms of the mixer's gain structure internally. You know, because now if you hit stop, the noise floor is down 80 or 90 dB.

You know, where in the previous example, if I hit stop, the noise floor is only down 40 dB. Well, that's a big difference. So I just got another 30 or 40 dB of signal to noise ratio by operating my mixer up so that the meters move. Very fundamental thing. And 9 times out of 10, that signal is going to be passed through the DSP without a lot of change to the signal level.

You know, usually, I mean, you're going to modify the signal, obviously, but it's not going to be a dramatic change in level. So let's just say one volt in and one volt out. So the last step of my gain structure now is with the amplifiers already, it's all the way down. So I'm not hearing anything in the audience.

Now I'm going to turn the amplifier up until I hit my target sound pressure level in the audience. And I'm applying just enough, uh, level increase to hit the target level. And you want to make sure you get there, so if the target is 85, or 80, or 90, A weighted, whatever the number is, have a meter going so that you know that you're hitting the target level.

And when you hit that target level, that's the proper setting of that amplifier control. And it may not be all the way up. In fact, I would say it's rarely. all the way up. Because if you go all the way up, it's going to be too loud. Okay, so let's just say that you're at 12 o'clock and you're only halfway up.

That's perfectly okay. You know, that amplifier doesn't get any better as you turn it up more. It's a very linear device. And, you know, you use the, you know, you use what you need of the amplifier. You don't have to use all of it. So that's what you would do. Now, the detractors of that approach would say, well, it's suicide to walk away from a job and leave level controls only turned up halfway.

And I would agree with that, because somebody is going to come along and max them out sooner or later. Guaranteed, it's going to happen. Okay? So, the next best thing is turn down the output stage of your DSP, so kill the level there, max out the amplifier, and then use the output stage of the DSP to adjust your playback level in the room.

**Andy Leviss:** And that gets into what was going to be my next question, which is that with a number of manufacturers that are doing powered speakers where the amp is built into the speaker and doesn't have level control, how and where would you do it?

**Pat Brown:** Yeah, the first thing I would ask is why would anybody build a loudspeaker, a powered loudspeaker, without a level control? Because that locks you in, in terms of establishing the gain structure of your system. You've taken away one of your most important adjustments without that level control. And to do it right then, you're going to have to drop, you're either going to have to do it with the output stage of the DSP, and that's okay, okay, but if you don't have the luxury of doing that, maybe there isn't a DSP, maybe you're coming right out of the mixer.

So, now it's like, I either operate my mixer in the dirt, In order to not be too loud or I turn my mixer up to get good signal to noise ratio there and it's too loud. So you're going to end up dropping a, an attenuator between the mixer and the powered loudspeaker, you know, and that's another thing that you've got to stick in line that you have to buy that or make it.

And it's kind of a kludge to start tacking stuff like that onto a system. So I think, I think powered loudspeakers are great. I test tons of them, but in my opinion, they all need level controls. Um, but again, maybe some exceptions to that based on the gain structure of the loudspeaker itself, but that's the general guideline in my opinion.

**Sean Walker:** All right, you said there was more than one way to skin the cat, what's the other way to do it to, to get your gain structure?

**Pat Brown:** Well

**Sean Walker:** look at it meters or is there like you can set the meters to all match

**Pat Brown:** well I sort of, I sort of described both ways. Yeah, I described the wrong way, which is to max out the amplifier to start with. The right way, which is to turn off the amplifier and get the mixer right, and then adjust the amplifier. And then the third way is to max out the amplifier and adjust it at the output of the DSP. There's three different ways.

**Sean Walker:** Thanks for the recap. I'm a little

**Pat Brown:** Just don't do it the first way, you know, don't just max out your amplifiers and then adjust everything, then throttle everything back, you know? Uh, because in front of it, because that's gonna be a non-optimal gain structure,

**Sean Walker:** You mean like every club sound system ever?

**Pat Brown:** most of them.

**Sean Walker:** Yeah.

**Pat Brown:** job security. It's the way I look at

**Sean Walker:** Yeah, right. Totally.

**Pat Brown:** Yeah. The, the real tough part is, you know, you're tempted to fix that for people. I mean, I've gone into churches where, you know, you turn on the system and you can hear hiss over the system. Let's just say it's a SIMple system. There's a mixer there and there's an amplifier and you look over and the amplifier is maxed out and the mixer is way down in the dirt.

Meters aren't moving, you know, and it's really tempting to reach down there and turn down that amplifier, turn the mixer up and then turn the amplifier back up, you know, 20 dB lower than the previous setting. And all of a sudden, you know, the noise goes away, you know, for free. Because you fixed the game structure.

I, I did that one time in a small church and the, the pastor was standing there and I did the adjustments and I said, what do you think? You know, cause it's quiet now, right? I said, what do you think? And he said, well, how do we know it's on? I said, all right, my job's done here. You know, that's good when you can't tell it's on, you know, without something playing over it.

**Andy Leviss:** yeah, we were, when we were talking about delays before, I, I was gonna say, I, one of the proudest accomplishments I, accomplishments I've had was I tuned a system for a Broadway show for some friends, then, then went back to see the show once it had opened and sat off in the, like, side, like, the you know, VIP boxes where I have like a dedicated box fill and going over to my friend who was the associate designer at an intermission and being like, did y'all cut the box fills or did we just nail it that well?

And they were like, no, they're, they're on and they're pumping. Like you, we just did a really good job tuning them. And it was like, all right, at the point that I'm the one who tuned it and I'm not sure it's on until it goes off. Like, I feel like that's a win and I'm gonna, I'm gonna. Pop that on the trophy shelf right

**Sean Walker:** You go, girl.

**Andy Leviss:** Right?

**Pat Brown:** It's always fun, if you can, just to turn them off and let them hear the system without them. And it's like, oh my gosh, they are doing something, aren't they? It's like, yes,

**Andy Leviss:** I love, I've also seen shows where for a producer who would always come in into the back of the room in the back corner where no audience is and complain that they couldn't hear it, where they've put in speakers dedicated for that one person just to like, you know, we know when the producer comes in, we unmute that speaker, he'll hear it loud by the back corner of the door where it won't bother anybody else and it'll get them off our back.

**Pat Brown:** You know, that's one of the things I always do in sizing up a room for a system, is ask, where is it the most important, you know, that it sounds good? You know, because that might be the front row. In one church, it may be the front row, because that's where You know, the big donor sits, but in another church, it's like no one ever sits in the front row, you know, and it may influence the way you design the system, because it can't sound perfect everywhere, you know.

**Sean Walker:** What?

**Pat Brown:** hey. Yeah,

**Sean Walker:** I

**Pat Brown:** that's another pet peeve that I've had over the years is, you know, the best response of the loudspeaker is on axis. You know, that's what that box is probably designed around is the on axis frequency response. But look how many venues you go into, and the on axis position of the loudspeaker is on an aisle.

And there's no one hearing the loudspeaker's optimum response.

**Sean Walker:** Totally.

**Pat Brown:** And I always look at it and say, okay, how do I point that loudspeaker into an audience? You know, because that's where it has to sound good. And don't waste your best response on aisles.

**Sean Walker:** to be a sticker, Andy. Don't waste your best response on aisles.

**Pat Brown:** I feel a t shirt coming on.

**Andy Leviss:** Right? T shirt and mug. Just

**Sean Walker:** Yeah, and he's got these QR codes he makes, he just, he punks people with it, like that old MTV show.

**Pat Brown:** Oh yeah.

**Andy Leviss:** Um. I mean, there's, we've, we've sort of covered both a broad swath and a deep swath, uh, here in the last hour, um, I mean, to wrap it up, Pat, is there like one or two tidbits of advice that, uh, that you find yourself giving over and over to folks that, you know, that make a big difference? Or like, what's, what's, what's a thing you would, uh You would leave folks with if they take one, one piece home from the, from this episode.

**Pat Brown:** Well, you know, audio is such a broad thing. And so there's not any one thing that you can do or tell people that does a lot. It's a, it's a, it's a series of things and they're mostly basic things. But what I encourage people to do is, is, and I'm not saying this because I'm in the training business, but learn your fundamentals, you know, and then with the knowledge of the fundamentals, you'll make good decisions in how you do audio.

And one consultant years ago said that anything in acoustics that seems obvious is probably wrong. Yeah. And so you need to learn your acoustic basics, your loudspeaker basics, your gain structure basics. And after that, uh, to quote the late Neil Muncy, uh, it's mostly horse sense, you know, after you understand those things.

And so that's what I encourage people to do. Get some training, whether you're reading books or taking our training or going to manufacture seminars. You can never get enough training. And make sure that you do that on a regular basis and make it a goal to improve your knowledge over time. You know, it doesn't all have to be by next month, but Purpose, you know, when I read sound system engineering the first time, I said, okay, in my lifetime, I'm going to understand this.

Well, you know, make it a month or make it a year and just purpose to gradually and consistently get better, uh, over time. And, and I always told my customers that what I did today is the best I know how to do, but I reserve the right to learn how to do it better. So if I come back next year, we may tweak a little bit and maybe we can make it even a little better yet.

**Sean Walker:** Nice.

**Andy Leviss:** Right on. And, and before, before we forget, Pat, if, if folks want to learn, uh, learn more from you, it's an odd kind of, where can they find you?

**Pat Brown:** Our alternate URL is www. prosoundtraining, no spaces, com, prosoundtraining.

**Andy Leviss:** and like I said, I've, I've taken these courses years ago and I'm actually probably overdue to like go back through the catalog and take, take some as refreshers and see what's updated since then. Uh, so

**Pat Brown:** Yeah, there's 11 courses that I've done, and then we have some Revit courses and stuff that other people have done. So, yeah, there's

**Sean Walker:** I'm gonna go get learnt, dawg. I'm gonna get learnt.

**Andy Leviss:** Awesome.

**Pat Brown:** We'll learn yet.

**Sean Walker:** Yeah.

**Andy Leviss:** it's, yeah, well it's,

**Sean Walker:** dude, somebody has to.

**Andy Leviss:** Yeah, and Pat, it's been great having you on, catching up with you after so long. Um, you know, thanks for all that, and we'll, I know we've, uh, we talked about having you and Brendon to talk a bit more about SynodCon and about, like, education generally, so we might have to have you two back on and do another, uh, chat about that sort of thing.

But,

**Pat Brown:** We're always open to that. Yeah, Brenda would have a lot to contribute to this discussion.

**Andy Leviss:** yeah, no, so we, but we appreciate you making the time for us today, and, uh, Thanks everybody for listening. This has been a another episode of Signal the Noise brought to you by our lovely sponsors at RCF and Allen and Heath. I'm Andy Leviss

**Sean Walker:** I'm Sean Walker.

**Andy Leviss:** and this was Pat Brown joining us. Thanks again and we'll catch you all on the next one.

**Sean Walker:** Thanks y'all.

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**Music:** *“Break Free” by Mike Green*

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