

# Audio Masterclass FAQ

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## *Table of Contents*

- 1. How do I create a better mix for worship?*
- 2. What framework should you use to organize your thought process of building a mix?*
- 3. How do you balance instruments and vocals?*
- 4. How do you prepare the sound for harmonizing?*
- 5. How do you make space for vocals when other instruments are playing in the same register?*
- 6. If the main instrument during a service is the congregation singing, how do you mix in light of that?*
- 7. How do I best mic, EQ, and mix instruments in my church's band?*
- 8. How do you mix mics for children and adult choir?*
- 9. How should drums be tuned if drums are traditional?*
- 10. How do you reign in the drums when they are too loud and drown out singing and other instruments (even un-mic'ed)?*
- 11. Is it necessary/advantageous to EQ a pastor or singer's mic to limit highs or lows, or just leave their voice natural?*
- 12. How can I have a consistent setup with the EQ with vocals and instruments?*
- 13. How much reverb is suitable for a worship environment?*
- 14. What is the best way to communicate with the bands on what you need as FOH mixer to help mix the room?*
- 15. How do you balance congregational feedback, especially with volunteers helping with sound?*
- 16. How can we get a good mix on our livestream with only one mix out?*
- 17. What are the best practices for consistent livestream volumes?*
- 18. With a balcony, how do you determine appropriate sound both upstairs and downstairs?*

19. *How should I make plans to acoustically treat a worship center?*
20. *How do I achieve the best possible sound from non-pro, inexperienced Jesus-loving volunteers? Where is the sweet spot between excellence and practicality?*
21. *How can you balance worship in a youth group where we're all growing as a team (band, sound, media), in a Christ-glorifying way, practicing both not just sounding good but having a heart of worship?*
22. *How can I fit in meaningful AV training with my volunteers when you're all so busy?*
23. *What are some methods or suggestions for tuning our ears to EQ vocals and instruments?*
24. *For those not trained in the equipment, what are the major things to be mindful of that is often overlooked?*
25. *How is personal worship possible while mixing?*
26. *How can you connect the gospel to mixing/setting up sound? How far is too far and no longer edifying the body?*
27. *How can I not grow weary in serving when life becomes demanding and it becomes difficult to serve joyfully and sacrificially?*
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## **1. How do I create a better mix for worship?**

This is the big one, right? Whole books could (and have been) written about this but let's walk through some of the big things that'll hopefully put you on the right path.

First, listen to lots and lots of music, especially in a similar style to what your church is doing. How can you make music sound good unless you know what good sounding music sounds like? Listen intentionally to how all the parts fit together. Which parts can I hear the most? How loud are the vocals compared to the band? How loud are the drums and bass compared to the rest of the band? What's happening when the singers aren't singing? Mixing is all about the relationship between each musical element, whether that's a single guitar and voice, or an 18 piece band.

Study (and experiment) how to get the best possible sound from the source. Lots of time is spent trying to fix audio from the board when perhaps the adjustments need to start on the stage. Are your mics in the best position? Are you using the correct mic for the job? Are your DI's working correctly? The better the sound you start with, the easier time you'll have mixing. I do want to throw out a small caution here. There are lots of good articles/videos/books on proper mic setup, but most of them are aimed at recording, not live sound. Most live sound mic'ing is closer to the source than what we would do when recording because we're contending with the loudspeakers in the room and other noise on the stage. That is, the closer we move the mic toward the source, the more direct sound we get versus bleed from other sources. I don't say this to give the impression that every mic needs to be right up on the source, but rather to give you pause when you read things like mics should be 15 feet away to capture the sound of your choir, which might sound great in a recording, but will almost certainly feedback on a Sunday morning.

Learn proper gain staging. In the simplest terms, gain is volume you add to a signal before any other process on the mixing board. Most boards will have colored meters showing the level of the signal coming in, and the sweet spot on most boards is somewhere in the yellow. We could go a lot more in depth about this, but having fairly consistent levels on the meters on your board from week to week, even if the players are different, can help you get to a finished sound faster.

Learn the tools used in mixing. The five most powerful tools in your mix bag are volume, pan, EQ, compression, and reverb. While there are lots of others tools that can make our lives easier (and maybe even more fun) a decent mixer should be able to achieve a great mix with just those five (and probably even a good mix with just the first three). We'll explore some of them in further questions.

Learn your specific gear. I already had many years of experience mixing recorded music before joining my church tech team as a volunteer (years before getting hired), but I had never used the mixing boards they had, or the wireless mics, or the livemixes, etc. Despite knowing how to mix, there was so much to learn! But every time I served I made it a goal to learn a feature or two of the gear and was bold to ask questions. I also made a point to write things down—I found myself forgetting way too much in between my times serving since I only served about once a month. My notes became a quick reference to answer questions I had already asked. Then, the more I did it, the less I had to check my notes.

Learn to use DCA's (or mix channels). I'll talk more about this on another question, but DCA's have become an essential tool for me, especially when we have large groups of musicians.

You may have noticed that audio has the potential to be hugely complicated, arguably the most complicated thing happening on a Sunday morning, consisting of many disciplines. Developing your ear and your skills takes time, and that's ok! To give you a bit of a road map, I've identified three phases that most people go through when developing their skills...

Phase 1: "I can tell if something sounds good or bad but can't tell you why." This is the most basic step and lots of people are naturally here (which is why I'm always happy to ask feedback from non-tech people—they know whether they like something or not), and this is good! It shows an ability to listen and be discerning. With knowledge and experience you'll move quickly to Phase 2.

Phase 2: "I can tell when something sounds bad and can identify the problem, but I don't know how to fix it." This phase comes as you learn to listen critically, to be able to pick out specific parts in a mix, understand how they fit together, and develop an ear for what good music should sound like and when something doesn't match up to that sound. However, while you are (hopefully) developing your mixing skills and an understanding of the tools used for mixing, those skills aren't fully developed enough to solve all the issues. This phase can be deceiving to the person who is in it, because often you can feel like you're getting worse, not better, but in reality you are getting better at listening and hearing issues that you wouldn't have noticed before, even if they've been there the whole time. When you get to this place, be encouraged, you're growing. Keep growing!

Phase 3: "I can tell when something sounds bad and I can fix it." Congrats! This is the goal for all who do audio. It takes a lot of experience to get here, and the transition from phase 2 to phase 3 is a gradual one. Even when you get here, there's still plenty more to learn, more than any one person can obtain over a lifetime.

I hope this encourages you to know that wherever you see yourself in this process, it's normal. Learning to be good at audio takes time and experience and more time, and that's ok. Take delight in how far you've come and work as for the Lord to grow further.

## **2. What framework should you use to organize your thought process of building a mix?**

There certainly isn't a single correct way to build a mix, but I'll share what I do and hopefully that'll point you in the right direction.

Before the band shows up (and, for me, before Sunday even) I get the mixing board set up with all of the correct inputs, outputs, and labels. (Being a full time Technical Director at my church, I have the ability to do this for my volunteer mixers as well. It makes it less stressful for everyone on a Sunday morning and less intimidating for new mixers. If you have the ability to do this as well, I highly recommend considering it.) I start with a template that has all of the basics for what we use— channels are laid out in the same order every time so it's quick and easy to find things, the most commonly used processing and very basic EQ is already loaded on individual channels (though the settings will need to be tweaked week to week), correct routing to effects like reverb as well as sends to the main speakers, monitors if we need them, etc etc etc. Certain things are going to be constant 99% of the time, and having them built out in a template rather than starting over every week is a huge time saver. With the template loaded and my input sheet handy, I then set up the channels that are specific to that week. At this point the stage has already been set and any last minute changes to my input sheet have been handwritten in, so I'm confident it matches the physical inputs on the stage. I go through and assign inputs to my channels while also renaming channels with the people's names that are playing that week (specifically the singers). I'll also assign outputs that go to the band's personal IEM mixers, set rough levels for any monitors, reassign any DCA's, and make adjustments to panning as necessary. Anything I can do to set myself up for success before the band comes in.

Once the band is prepared, I'll start with a line check. This gives an opportunity to correct any mistakes in setup or troubleshoot issues with inputs or instruments without having to interrupt rehearsal. It also allows me to set gain levels, which I try to do as early as possible because it affects the volume the musician's get in their ears, so I try to avoid touching it once they get their IEM mixes set. (A word of caution: vocalists typically sing louder than they talk, so if they check their mics by talking, be sure to allow some headroom in their gain because they will get louder.)

At this point, the band starts practicing and the race against the clock starts. I know that I have until they finish rehearsing, maybe 45 minutes, to be ready. Anything I don't get to in that time happens live, so it's imperative to do the most important things first. I'll start with all faders up (which is especially important for the person running lyrics) but I'll typically use the first song or two to get a rough mix of the band. I'll get my EQ, compression, and volume set for drums and

bass, which is the foundation of the mix. Then I move on to whatever the lead rhythm instrument is, usually piano or guitar, and then the rest of the instruments. It's a lot to accomplish in 4-8 minutes, but it's critical not to get lost in the weeds here. I could easily spend the whole rehearsal getting the drums perfectly dialed in, but I'd be in bad shape with everything else at the start of service.

By the second or third song I've got a decent static mix with the band and the vocalist are feeling warmed up, so it's time to turn my attention to them. I'm using this time to dial in EQ and compression (vocals are very dynamic so you'll want to set the compressor's threshold during big parts of the song, like the chorus, otherwise you might end up over-compressing. 3-5 dB of gain reduction at the big parts is pretty safe for a live setting). I'm also adjust volume and panning to get a good vocal blend, with melody center and just on top, and the harmonies a little to the sides and right underneath.

By this point, I should have all my instruments and vocals pretty dialed in with their processing. If I need to make tweaks I certainly can, but I should be close. My goal at this point is balancing volume, specifically in a way that I can take all of my channels and contain them into smaller and smaller mixes. Even a basic band can easily have 12 channels. Our church tends to be a bit bigger with about 25 on a normal week, and 50+ on a choir & orchestra week. I don't have enough fingers!! To combine channels into groups I prefer to use DCA's, which is basically a fader that controls multiple faders (if your board doesn't have DCA's, mix buses work a little differently but can have the same effect). So for example, I'll mix all of the individual drum channels to set the sound of the whole kit that I like, and then I'll put all of the drums into a DCA. The one DCA fader can now control the whole drum kit while maintaining the mix that I set. I'll do the same thing for keys, another for electric guitars, one for acoustic guitar, and finally bass, and I can use all those groupings to mix the whole band. Then all of those DCA's go into a single "BAND" DCA, so I can literally control the volume of the entire band with one fader. I'll also group my vocals into their own DCA. If I have more than four vocals (we can have up to eight!) I'll split them into two DCA's, usually either melody and harmony or men and women. Lastly, I'll have vocal effects like reverb and delay on its own DCA so I can blend that in depending on the song. Suddenly I've turned 25 faders into three or four! There's a lot of work that goes into the preparation, but once we get to the start of service I'd say about 80% of my mix comes just from those few faders, while the other 20% is making adjustments for singers switching to and from lead, instrument solos, and minor band adjustments from song to song.

I'll talk about this elsewhere, but as far as the mix itself goes, lead vocals (and instrument solos) are at the very front of the mix, with harmony vocals just below that and band just below still. Everything should feel like one cohesive group, but the vocals should be the most prominent thing. Regarding mixing the band, every instrument has a job, and understanding that job (both as a whole and within the specific song) will help you understand their place in the mix.

### **3. How do you balance instruments and vocals?**

In most songs, and especially in church music, vocals (and the lyrics we sing) are the most important thing. Whatever else is happening musically, the vocals should be clear and present. The ultimate goal is to find the sweet spot where the vocals are just on top of the instruments, so they sound in front of the band but still part of the band.

The unique consideration for church is that there is a third element to consideration: the congregation. You don't have any control over how loud the congregation sings, but you do have control over how loud the sound coming out of the speakers is compared to the congregation. For a church service, there's a sweet spot where the music is quiet enough that people can hear themselves (and the people around them) sing, but loud enough that they don't feel timid or self-conscious about their own singing. On occasion, especially when you have a confident congregation (or a conference full of musicians!) I'll look for a moment such as during an instrumental break to bring even the vocalists down just enough that the church can hear the church sing— what a glorious thing!

### **4. How do you prepare the sound for harmonizing?**

In the same way that the vocals should be just on top of the instruments so they are present while still blended, the melody should be just on top of the harmonies. One practical consideration for the mixer is knowing who is singing the melody. It sounds obvious, but it's not uncommon for singers to switch between melody and harmony, more typically from song to song, but sometimes even within a single song. Use rehearsal time to try to figure this out and don't hesitate to take notes. If you need to, don't be afraid to ask the music leader! If you missed it in rehearsal (or there just wasn't enough rehearsal) and you need to figure it out live, have some headphones and the cue button ready to listen to individual parts. With practice you should be able to pinpoint it within a few seconds.

## **5. How do you make space for vocals when other instruments are playing in the same register?**

EQ, panning, and/or volume should get the job done just about every time. EQ cuts (even small ones) in the instruments at the frequencies that are overlapping with the vocals, especially those in the high-mid range, can open up space for the vocals. I wouldn't necessarily make cuts to ALL instruments otherwise you'll get some weird holes in your mix when the vocals aren't in, but just those that are getting in the way the most.

Another option is panning the overlapping instruments away from the vocals. Of course this assuming you've got a good stereo image across your room, otherwise the people sitting on the left side might get a different mix than the people on the right. Even then, I try not to pan things as aggressively as I would with an album.

Last and certainly not least, turn the instruments down or the vocals up. Sometimes you can't hear something cause it's just not loud enough. It doesn't always have to be complicated.

Deciding which of these is the best solution depends on the scenario, and often it's a combination of things. With practice and experience finding the right tool for the job gets quicker and easier.

## **6. If the main instrument during a service is the congregation singing, how do you mix in light of that?**

First, it's good to have a well balanced mix of the people on stage with the vocals present and up front to help lead the congregation. A good overall mix will be the anchor for the church.

Second, it's important to be mindful and intentional with the volume of the music in the room. There's a sweet spot where the music is loud enough that people feel confident to sing, and quiet enough that they can still hear the congregation around them. I use a dB meter every single time and average about 82-85 dB on my meter, with rare peaks of loudness no more than 88 dB. For concerts, that might be 4-5 dB louder. Do keep in mind that FOH may not be the loudest spot in the room, so it's really important to measure multiple spots in the room (even during service if someone else is mixing and you can be discrete) and compensate if necessary. If you don't have



a dB meter, I highly recommend investing \$100-200 to get a dedicated one for the health of your church. (There are cheap and free dB meters for your phone, but they can be wildly inaccurate.)

## **7. How do I best mic, EQ, and mix instruments in my church's band?**

Understanding the function and relationships of different instruments is critical to mixing, both from a technical aspect and from a musical one as well. Functions can change, especially depending on the style of music that we are mixing, but likely the songs that we do each week won't stray too far from each other. For example, an electric bass can be a melodic instrument and do solos, but it's not an ordinary occurrence for worship music.

Starting with our example, electric bass carries the tonal low end of the band. I think of this as the weight of the mix. Too much and it makes everything else seem dull; not enough and the mix becomes thin and harsh. The main body of the bass is around 60-120 Hz (though the lowest note is technically lower than that). Things can get a bit muddy from 120 Hz til about 250 Hz. The presence of the bass is typically between 750-1.5 kHz. So you've got your low end that carries the weight and the top end that cuts through so you can better hear the tonality of the instrument. It's important to note that basses (and bass players) can sound very different from one another, some dark and heavy while others bright and plucky. Because of this you shouldn't just jump in cutting and boosting EQ. Make sure to listen to the instrument and shape it to fit with the ensemble.

Many electric bass players will plug their instruments directly into the mixing board through a DI box, making them one of the easier instruments to hook up. Occasionally they may run effects pedals in their chain and even virtual amps. On rare occasion a bass player might insist on playing through an amp. In this case you can either adjust the output of the amp so it balances with the rest of the band in the room, or if you need to get it into your system, some amps have direct outputs or you can mic it up similar to a guitar amp (which we'll look at soon).

Drum kits are curious because it's a bunch of single instruments that make up one whole instrument, and a goal of your mix should be finding that cohesion. They are the power behind your band. If too quiet the band will sound wimpy; too loud and they'll overpower everything. It's typical for kick and snare to be at the same perceived volume, with toms about there too. The fundamental of the kick is typically between 50-80 Hz with some click in the high-mids, which can help if you're having trouble hearing the kick in a mix even if you feel the low end.

Snare has body in the low-mids, and the crack up in the 3-6k area. If the drums sound muddy, cutting in the area of 400 Hz is a good place to look first. Cymbals greatly affect the brightness of the instrument and can be brought up or down depending on what's needed for the song. They also cut extremely well through a mix since they'll likely be the highest frequency in the band. You'll have some presence down in the 5 kHz range but they'll extend up well past 10 kHz. Again, the goal is to make all the individual pieces, though they serve different functions, sound like a whole.

Drums are one of the biggest examples we see of the differences between recording and sound reinforcement. If the drums are in a large space or in an enclosure, I'd mic it more like I'm recording: kick (in front, near the hole if there is one-- how far in or out of the hole can change the amount of low-end), snare top (back edge, pointing center snare), snare bottom (back edge, pointing at the snares), each tom (similar to snare), maybe hihat, left and right overhead (a couple feet above, equidistant from the center snare drum). The biggest difference is that in a recording I'd keep the overhead mics fairly high to capture the whole kit, whereas in live sound I'd bring them a bit closer to the cymbals because the farther they are from the drums, the more they'll pick up non-drum sounds. If the drums can be heard a bit and just need a little help, I might do a 4-mic setup: kick, snare, left and right overhead. On the other hand, if the drums are out in the open and can loudly be heard in the room already, I may do very little to mic them because they don't need more volume! The one mic I'll always include is the kick drum. The low-end thump from the kick that we love so much comes from putting a mic right up on it and push it through the speakers. The snare and cymbals are most likely to be heard without amplification, and the most likely to bleed into other mics on stage anyway. If the musicians are wearing IEM's I'll put a mic on the snare so they can hear it in their mix, but won't put it in the main speakers. (See Appendix Figures 1-4 to see drum mic positions)

Piano can be either a rhythm or lead instrument. If there's a lot of solo piano happening or you don't have a bass player, I'd keep the full frequency range of the piano. But in a band context with bass, I'd consider dipping the low end a bit. Too many conflicting low frequency elements is a quick way to muddy up your mix. If the piano sounds dark or needs to cut through the mix more, a wide boost in the 3-5k range will help. Piano is one of the few instruments that compression can quickly sound unnatural on so I'll often omit it, but if I do need to compress it I'll use a slow attack time and not more than a few dB of gain reduction.

Piano can be tricky to mic because it's a large instrument and often is open to picking up bleed from other sources. If you're able and you use the piano often, it's worth considering having

internal mics professionally installed, either with tiny mics such as the DPA 4099 or a boundary mic like the Crown PCC 160. This would allow you to easily connect your piano to the mixing board, whether lid open or closed. Another option is to open the lid and use condenser mics on stands, either one near the center or two at bass and treble side. It's worth doing some testing to find where the best position is for your piano, and accounting for reflections off the lid and potential phase issues. Lastly, with the lid down, you can place mics near the hammers, giving it a bit punchier sound. (See Appendix Figures 5-7)

Acoustic guitars add harmonic content to the song but can also be very percussive. The high frequency “tika tika” sound of the pick can have a shaker-like quality to it. Like the piano, if the acoustic guitar is the primary instrument, especially in a small band, I’ll keep most of the frequency range, only rolling off the very bottom end, sub-100 Hz. If it’s a dense mix and the acoustic guitar is adding more of a textural element than a tonal anchor, I’ll focus more on the bright top end. One big thing to watch out with acoustic guitars is that they can have a wide dynamic range, especially if the player switches between fingerpicking and strumming. You might need to find a separate gain setting for each style.

Many acoustic guitars that people use for live performance have internal pickups built in, allowing them to connect through a DI box. If the guitar doesn't, I believe the next best option is a pickup that fits across the sound hole. This allows the freedom of movement granted by a pickup but without having to make modifications to the guitar. If you must mic the guitar (great for recording, not as much for live performance), I'd recommend a small-diaphragm condenser mic pointed around the 12<sup>th</sup> fret or where the neck meets the body. (See Appendix Figures 8-9) You might think the sound hole is the best place to mic, but a lot of low-end energy bursts from the sound hole and is really quite unpleasant to listen to.

The sound of electric guitars varies widely depending on the player and their style. They can be heavy and distorted, clean and sparkly, ethereal and atmospheric—nearly anything the mind can imagine. That said, most guitar tones are based on the amps they are played through (even if virtual), and most guitar amps start to roll off above 5 kHz, so if you’re getting a lot of fizzy junk, check the high frequencies above first. Your 3-5k range can give some presence, but also gets harsh and overwhelming very quickly. The body of the electric guitar is down in the low-mids with the tone in the high-mids. Very clean electric guitars can sometimes benefit from compression, but distortion is its own form of compression, so if the guitar is crunchy you probably won’t need to add more. Plus, if the electric guitarist is good and experienced, they’re probably already doing a lot to shape their tone how they want it. Lastly, if there’s an

instrumental break in a song, there's a good chance it'll go to electric guitar, so I always keep their fader nearby in case I need to boost it for a solo/melody/riff.

Many electric guitarists use pedal boards with amp simulators for live performance. Most of them sound great and they're very simple to hook in to the audio system, either by DI or XLR depending on the outputs. Occasionally an electric guitarist will still use an amp, and like I mentioned with bass amps you can either adjust the volume so it balances with the rest of the band in the room, or you can put a mic on it. (We use a Radial SGI box that the guitarist can plug into on stage, which then goes to an amp behind the stage, allowing us to mic a real amp without the noise of the amp being on stage.) You can alter the tone of the amp quite a bit depending on how you mic it, but a good starting point is a dynamic mic (like a Shure SM57) right in front of the grill cloth, pointed half way between the center and edge of the speaker. If you can't see the speaker because of the grill cloth, my favorite trick is taking a flashlight and putting it directly against the grill cloth, allowing you to see right through it! (See Appendix Figures 10-11)

Keyboards are tricky cause they can be literally anything, from mild pads to pipe organ to a full orchestra. Listen to what your keys player is doing in rehearsal and if necessary carve out frequencies that are conflicting with other instruments. Also, watch out for volume jumps and dips if they change patches. Hopefully things will be set up correctly on the keyboard side to avoid that, but sometimes they slip through.

By the way, if you're interested in learning more about mic techniques for live sound, Shure has a few live sound e-booklets on their website that are definitely worth reading.

Finding the right balance between all the instruments takes time and experience, but listening to a lot of well-made music and mixing as often as you're able will help you to find those relationships faster and easier.

While we're talking about mixing, let's take a moment to discuss panning. Panning allows you to spread sounds across the stereo field, creating a sense of width in the music as well as separating conflicting sounds so that they can be heard more easily. It's like taking a picture of your friends-- if you line them all up in front of one another, it'll be harder to see the farther back they are; if you have them spread out a lot, you can see them each clearly but they don't look like they have any relationship; however, if you put them near each other, but still side to side, everyone

can be seen and they all look like they belong together. The difficulty with panning, especially in a live context, is that it assumes that the listener can hear the whole stereo field. Many rooms aren't designed in a way to allow both a left and right speaker to be audible in every part of the room, so some (even many) people will hear more of one speaker than the other, and they may not hear the one they're farthest from at all. Keep that in mind when you're building your mix. In most situations I would keep panning something all the way left or right to a minimum, instead favoring a narrower mix, and if the stereo image in the room is particularly bad I may even consider mixing in mono.

## **8. How do you mix mics for children and adult choir?**

Choir mics for live sound are always a constant battle between picking up the full presence of the choir and feedback. The farther the mics are from the choir, the more you'll capture the sound of the choir as a whole, but the more you'll also get unwanted noise like on-stage instruments and the sound coming from the main speakers (and thus increased risk of feedback). The closer the mics are to the choir, the higher chance you'll lose the sound of singers that are further from the mics and even start picking up individual singers, but you'll also get less unwanted noise compared to the wanted sound of singing. It definitely takes time to find the right balance for your choir in your room.

For mics, I'd recommend cardioid condenser mics. A small diaphragm pencil mic would do, but there are also tiny mics made specifically for choirs by companies like DPA and Audix. We use six for our adult choir loft, but when the kids sing they usually stand on risers so I'll do about one mic per riser. Your needs will depend on the size of the choir. It definitely helps having the choir closer together rather than spread out, and as far away from the main speakers as your stage allows. Angling the back of the mics (where you get the most rejection) towards speakers/wedges/unwanted noise can help too.

I'd highly recommend putting all your choir mics on a DCA fader or in a stereo mix bus so that once you set a good balance for all of the mics together, you can then just use one fader to control the volume of all of them at once. It's also good to use rehearsal time to test where your feedback threshold is, that is, how loud you can push them before producing feedback, so that you're aware not to go any louder than that in service.

Panning can also help with preventing feedback. If you're only using a couple mics, pan them opposite of their position on stage so that the speaker the audio is coming from is farther from the mic. If you have many mics, try panning them hard left and right alternatively. It's worth experimenting with different settings to squeeze even an extra few dB of headroom out of your mics.

Lastly, EQ your choir to get rid of as much unwanted noise as possible (like low frequency rumble). If you can determine what frequencies will feedback first, you can also do sharp, narrow cuts at those frequencies. Just take care not to cut out too much of the sound you do want.

### **9. How should drums be tuned if drums are traditional?**

If you're asking about drum tuning (that is, adjusting drum head tension with a drum key), I would let the drummer handle that. It's always helpful to have at least a basic understanding of how each instrument works on a mechanical level even if you're not able to play the instrument yourself, but I leave the details of caring for the instrument to the performers.

If you're asking about mixing a drum kit, I talk about that in question #7.

### **10. How do you reign in the drums when they are too loud and drown out singing and other instruments (even un-mic'ed)?**

I've found that with most audio problems, there's no single silver bullet solution without any downsides. So many of the decisions we make come with compromise, and this is certainly no exception. The difficulty of this one is that, although there are quite a few potential solutions, there are also very strong opinions about each of them and almost assuredly someone will be inconvenienced, whether that's the drummer, the congregation, or you.

Let's imagine a scenario so we all have the same context (even if your scenario is different, the same principles will apply). We're in a medium-sized room and have a regular attendance of 400-500 people. The building belongs to the church so things like drums can be permanently set up, and the band each week is a different mix of volunteer musicians who are all quite good. They all monitor through IEM's. While the drummers are good, the drums are fully exposed and so loud that they are regularly hitting high 90's on the SPL meter.

Since this is an ongoing problem, I would start by talking with the music director, that is, whoever is scheduling musicians, putting together songs, etc. Explain the situation clearly from your viewpoint and offer up some solutions. The music director will more likely have the authority and relationship with the drummers to enact the necessary changes, and if money needs to be spent, they would need to be a part of that too.

Let's break down some of the problems before we get to solutions. Drum sets are one of the loudest instruments and easily hit over 100 dB on their own, considerably louder than you want your whole mix to be. When the drums are overpowering, even without using a single mic, the mixer has two options: 1) Let the drums be loud and mix everything else at the correct volume for church (probably 85-ish dB), meaning you won't be able to hear the rest of the music well, including vocals, and the mix will be way off balance. 2) Raise the volume of the rest of the musicians to match the drums, creating a well balanced mix that is way, way too loud. The problem is exacerbated by the fact that the snare and cymbals will most likely bleed prominently into the vocal mics, so as you're raising the volume of the vocals to get them above the drums, you're also adding even more drums. At this point the mixer is no longer in charge of the volume of the mix, the drummer is. If you have a bigger room, you also run into greater inconsistencies in the room. If the drums are considerably louder at the front of the room than they are by the time the sound gets to FOH, the people in the front rows will get a much heavier drum sound than the people in the back.

The first and most basic solution is to ask the drummers to play quieter. While this is a good place to start and sometimes enough for a one-off problem, it probably won't be enough for our example scenario. Playing quietly while maintaining feel and energy is really tricky on drums, and it is also difficult to be consistent with as the drummers feel the excitement and nerves of playing in front of others. Plus, as people we tend to forget, so you can expect to have to remind them week to week which gets annoying for everyone.

The next simplest option is finding an alternative to drumsticks. The most common ones are bundle sticks (also known as hot rods or lightning rods), nano sticks, wood brushes, and wire brushes. These can typically reduce volume by 5-10 dB, but the more volume reduction you get, the more it changes both the tone of the drums and the feel for the drummer.

The next option is to get darker or quieter sounding drums and cymbals. Some drums just naturally aren't as loud or bright. Alternatively, there are replacements heads and cymbals that

are designed to be more muted and will work with your current hardware. The downside is that it can significantly change the tone of your drums.

Another option is not using a drum kit at all. Using a cajon or djembe, paired with hand percussion like shakers and tambourine, can still be a perfectly good rhythm section without the volume of a full kit.

The last option is using a drum shield or a full drum enclosure. While these will give the most volume reduction and still allow you to use a full mic'ed kit (the best sounding option in my opinion), many drummers have anywhere from a mild dislike to a strong disdain for them because it separates them from the band. I've only ever had one drummer tell me they prefer the drum enclosure because they can play freely without having to hold back. Drum shields are clear, free standing acrylic panels that go around the front and sides of the drum kit (there are little ones that only cover cymbals but I've personally found them ineffective). They are open at the top and back so there is still sound that escapes, but they greatly help reduce sound from the front, shielding both the singers (and bleed into their mics) as well as the front rows of congregation. Full enclosures completely surround the drums, including top and back, and sometimes contain further sound dampening in them. This hugely reduces outside volume of drums so that the congregation typically only hears the drums in the mix and not from the stage. They are large and semi-permanent, so space considerations are a factor. I would also definitely only recommend these with IEM's and not wedge monitors— while enclosures are quiet on the outside, they're still very loud on the inside and the drummers will want some sort of ear protection.

While the solution may not be the preference of everyone, it is a solvable issue for the health and happiness of your church.

### **11. Is it necessary/advantageous to EQ a pastor or singer's mic to limit highs or lows, or just leave their voice natural?**

I think there's a little bit of a false premise in this question (and an easy one to make, so please don't think I'm picking on the asker) because I don't believe any voice through a microphone is natural. Almost every microphone has some sort of frequency curve to it, and because of proximity effect, that curve can even change based on the position of the singer (not to mention



other factors down the line). Now that's not necessarily a bad thing— many microphones are tuned to be flattering on the source. Often with vocal mics there's a boost in the high-mids that help them cut through a mix. But I say that because I don't want anyone to have the impression that there's some sort of audio purity that is lost when using EQ or any other processing for that matter. We're just using the tools we have to do the best job we can with the sound that's given to us.

To speak to the original question, yes I do think it is sometimes necessary and often advantageous to EQ a vocal mic. EQ has two primary functions related to frequency balance: correction and enhancement. Correction fixes frequency problems as well as removes unwanted noise. A high pass filter (sometimes also called a low cut filter) is a simple example of this. In a most male voices there's not much happening below 80 Hz, but the microphone can pick up and amplify unwanted noises in that low region, such as footsteps vibrating through a mic stand or someone handling the mic. Rolling off those low frequencies can remove the unwanted noises without affecting the quality of the voice (just be sure not to set your filter too high or you will start cutting into the voice). Another example from our system is that our vocal mic's are too thick around 250 Hz, causing the voices to be wooly and build up way too much in the low-mids. A wide dip of just 3-4 dB in that area cleans it up and restores the voices to a more natural sound. A third example is that one of our usual speakers has a slight whistle in the high-mids when he talks. I've identified what frequency that whistle is at and like a scalpel have done a narrow, deep cut at that frequency. The precision of the cut eliminates the whistle and the narrowness ensures that the good frequencies around it aren't affected. For enhancement we're looking to bring out the qualities that we like. For example, a small, wide boost in the 4k-6k area can help a vocal sound more present and cut through a mix.

Like all mixing decisions, care needs to be taken with how much we process. If we become too heavy handed with our EQ we run the risk of doing more damage than good. Cutting too much low-mid can make the audio sound hollow while adding too much can make it boomy or muddy. Boosting too much high frequencies can make them harsh or cutting too much can make it dull and lifeless. Continually be training your ears to internalize what good audio sounds like and practice the technical skills to achieve that result.

## **12. How can I have a consistent setup with the EQ with vocals and instruments?**

For instruments and vocalists that are used often, like a drum kits that is permanently set up or a worship leader that is there most weeks, dial in your settings and save them as a template or preset or if need be a piece of paper. Tweaks may need to be made but this can at least serve as a starting point. For anything that changes regularly, it gets trickier because it's up to the discretion and skills of the mixer. The difficulty is that no two guitars sound the same, and even the same guitar can sound different in the hands of a different player, and this is true with all instruments. If your mixers are inexperienced, training can be helpful and training them together can help with consistency. If they are experienced, find music that you can play for them as examples of the sound you want and talk through what it is about that sound that is important to you.

## **13. How much reverb is suitable for a worship environment?**

I presume we're talking about how much reverb is appropriate to add to a mix, and not acoustic treatment in the room (which will be addressed in a different question). That said, the natural reverberation of the room you're in is a big part of the equation! If you're in a small, dry room, adding a bit of reverb to the vocals and maybe acoustic guitars could help smooth things out and decrease the sense that the musicians are 6 inches in front of the congregation. If you're in a big reflective room, you won't need to add as much because it's already present, in the same way that if the drums are loud in the room you don't need to add more to the mix just to have it in the mix. Sound reinforcement is different than recording. I also find that the more live mics are on stage, the less reverb you typically need to add because all those mics are picking up the sound of the room/speakers and amplifying it.

Regarding what to add reverb to, vocals are the biggest one. From there I'd also consider orchestral instruments and acoustic guitars. I wouldn't typically add reverb to a drum kit (expect maybe the snare, to taste). I would also avoid low frequency instruments like bass, as well as electric guitar since they usually bring their own effects.

Now as to the particulars about how much to add, that's a tough one. I've been working in audio for decades and it's still the thing I second guess myself about the most. But personally I would rather error on the side of too little than too much reverb because clarity is more important to me than space, especially in a church service. As an alternative, if you feel like you need more space but reverb is muddying up your mix, consider a light delay along with or instead of reverb.

Finally, I don't add any reverb to the pastor/announcers. If anything I'm trying to get rid of as much as I can, especially if my pastor is using an omnidirectional mic (which is common for headset mics). As before, I value clarity over space when it comes to the preaching of God's word.

#### **14. What is the best way to communicate with the bands on what you need as FOH mixer to help mix the room?**

The first and most important thing is to build relationships. This takes time and effort, but there needs to be a great level of trust between the band and FOH. The band can't hear what you're doing in the room, and enough musicians have been burned by bad mixers that some choose to view a new mixer with mistrust until respect is earned. That said, an approachable, friendly attitude will go a long way. Learn their names. Have small conversations before and after. Get to know them. Ask about their playing and their gear. Ask about their lives and families. This isn't some ploy but rather genuine care that we share as part of serving in ministry— it just happens that as a side effect it can make your job easier too.

When making requests, there's a couple ways of going about it. One is to ask directly. "Would it be possible to turn down the volume on your guitar amp a bit? I definitely don't want to mess up your tone, but it's very loud in the room and I think we can give the congregation a better experience if there's any room to go lower on the amp so I can balance it better in the mix." In the scenario, I know what the problem is and I know what the solution is. I also show an understanding of the perspective of the guitarist— the volume of an amp doesn't just control how loud it is but can also affect its timbre. I'm also trying to frame it in a win-win-win scenario: lowering the volume makes mixing easier for me, gives the congregation a better experience, and makes the guitarist look better because of that experience. Lastly, I pose it as a question, not a demand. If the guitarist comes back and says no, it's our job to do the best with what we're given.

The other way is to pose a problem and ask the musician for a solution. "The guitar amp is really loud in the room and I'm worried it's going to be overpowering for the people near the front. Is there anything we can do to prevent that? I'd really appreciate your help." The problem is stated, and then we are humbly deferring to the musician as the expert of their instrument. It gives them the opportunity to be helpful rather than feeling like we're taking something away from them. And perhaps they can offer up a good solution that is better for them that we didn't consider, like

facing the amp another direction or setting it up back stage. Or maybe they say there's nothing they can do, and we're back where we started, but nothing is lost from asking.

There is one last thing I want to mention here, which is it's important to understand both the authority structure and preferred method of communication of your church. Depending on the scenario it might be perfectly ok to make requests directly from the musician, but alternatively it might be expected of you to make all requests through the music director. This can be a good thing because if you and the music director are on the same page, then the requests are made upon their authority rather than you just politely asking. This can be especially useful in situations that are sensitive, like musicians that are difficult to deal with or issues that may unintentionally hurt someone's feelings if handled incorrectly (in the same way that I'd rather have tech feedback go through me than directed at our teenage volunteers).

Remember that the musicians and FOH are both on the same team and striving to glorify God through our service. When we approach others in that manner, not only can we potentially solve audio problems but make some new friends along the way.

### **15. How do you balance congregational feedback, especially with volunteers helping with sound?**

It's good for the congregation to have an avenue for feedback, but it's also good for volunteers to have an advocate and a shield, someone to filter that feedback, since not all feedback is useful and not all feedback is delivered in a helpful manner. If the feedback comes through outside of service, such as an email, I'd recommend there be an audio director or tech director that can take the feedback and has the authority to decide what to do with it. If the feedback is in-person, directed at the volunteer, train your volunteers ahead of time how they should react, whether that's to politely say thanks for the help or redirect them to the director or whatever is appropriate to the situation.

As for what to actually do with the feedback, that's highly dependent on the feedback, though any response should be made with grace and kindness.

Some comments can be incorrect. They say, “The music was too loud and could permanently damage my hearing,” but you were measuring with a dedicated SPL meter, hitting no louder than 85 dB, and you’ve tested the room to know that’s consistent throughout. At this point it may or may not be worth reassuring the congregant of your levels, but regardless it’s good in such scenarios to be able to verify your claims if needed.

Some comments may be technically incorrect but are actually just mistated. They say, “The music was too loud,” but you checked your levels and they were fine. However, what they actually meant was, “I couldn’t hear the vocals well,” but in their mind that translated to the music being too loud. It can sometimes be difficult to interpret meaning, but I think it’s at least worth giving comments like these a second thought and examine the service to know if there are things that can be improved.

Some comments can be clear and correct. They say, “The music sounded great but I was having a difficult time hearing the singers.” If this is true, it can be a good reminder to your volunteer (whether or not you share the actual comment is up to you).

Some comments are clear but only preference. They say, “I wish we didn’t have drums in church.” There’s nothing invalid about these views per se, but we need to be careful about changing policy based on the preferences of one or two people.

I have noticed it’s rare that we get feedback that we don’t already know. We know when mistakes are made or when things don’t sound right before anyone else says anything, and we are often our own harshest critics. When feedback does come in that is worth sharing with volunteers, be gentle because they may already be thinking it themselves. And remember to share good feedback too!

## **16. How can we get a good mix on our livestream with only one mix out?**

The biggest trouble with having your FOH mix also be your livestream mix is that you’re making decisions for the room that you’re in rather than the home viewer. This creates a few challenges that hopefully we can sidestep once we’ve identified them.

Before we talk problems though, it's worth looking at your board to see if it has mix or matrix buses that you can use for a separate livestream output rather than pulling directly from the master fader. If you do, you can send each channel of your mix to the bus post-fader (meaning everything you do to your mix also goes to the bus) but you can use different processing on your livestream output than your main speaker output. We'll try to look at both options when we talk about solutions.

**Problem #1:** We make EQ choices to compensate for problems with our room. Often our church rooms have acoustical issues, like a build up in the low-mids, that we can correct with EQ on the master channel. While this makes the audio better in the room, it'll make it worse for the people watching the livestream that don't need that correction.

If you're taking the livestream feed from your main out, see if there's a way to do your room correction EQ directly on your room speakers rather than the mixing board. Larger speakers systems often have software processing you can access with a computer. Smaller speakers sometimes have it directly on the speaker. Just be sure whatever changes you make are actually an improvement and not making things worse.

If you have your livestream output through a bus, you can correct the room on your master while omitting it on the bus.

**Problem #2:** The volume in the room sounds good but is too quiet on the livestream. If the volume of the speakers is too high, you won't need to drive your mixing board to full volume. On its own this isn't a huge problem, but it does mean that your livestream output will also be low. You can remedy this by turning your speaker volume down allowing you to turn your mixer volume up, or if you're running a separate bus, you can add a compressor/limiter to the bus and boost the output to the appropriate volume.

**Problem #3:** Loud instruments in the room can be heard without amplification. This exemplifies one of the differences between recording and sound reinforcement. If your drums are so loud in the room that you don't need to run them through your sound system, they're also not going to come through in the livestream (except maybe unintentionally through other mics). This is a trickier problem to solve than the previous ones. One option is to try to bring down the volume of the loud instrument so that you can bring it up more in the mix, either by dampening the

instrument or moving it farther from the congregation. Alternatively, if you're running a livestream bus, you might be able to send extra volume on those channels (even post-fader) to bring them up on the livestream. (You can also use this ability to add audience mics to the livestream but not in the room.) The danger, of course, is that you're making mix decisions for the livestream that you can't hear. If there's a consistency every week that you're able to test and monitor, it might be worth it, but you'll need to decide for your situation how risk-adverse you are.

## **17. What are the best practices for consistent livestream volumes?**

If your livestream is coming off the FOH board, try to be consistent in the room from week to week (which you should aim to do regardless). Try to stay in a consistent dB range with music using an SPL meter, and use the meters on your mixing board to stay within a consistent range for pastors/announcers.

If you have a separate board in its own room for your livestream mix, be consistent with how you set the volume on your speakers so that you're bringing the volume of the faders up to the appropriate volume in the room rather than constantly changing speaker volume and losing your sense of perspective. You can also get a professional metering tool like the TC Electronic Clarity M, though it can be a bit of a learning curve if you're not familiar with audio metering specifications.

I've also found that being consistent on the front end, namely gain staging, will set you up to be more consistent with fader levels, and thus more consistent with overall volume.

All of this gets more complicated when you have different people mixing from week to week. In this case it's even more important to have set standards to work within, dictated either by a director or, if there is no director, consensus among the audio team. Similar methodologies can help produce similar results, but I'm also fully aware that you can get the same results even if the process isn't the same, which is fine as long as the results indeed are the same.

## **18. With a balcony, how do you determine appropriate sound both upstairs and downstairs?**

With any room the goal is to have a sound system that is properly designed and set up to provide the most even, consistent sound throughout the whole room. This is not a simple task, especially with two levels, and the more complicated the scenario, the more likely a professional installer should be consulted.

With that said, let's say you have your room, as-is, and you're doing your best to make it work. The first step is to listen to what your room actually sounds like. Put on some music in a similar style to your Sunday morning, about the same level as your Sunday morning, and walk around the seating areas. No matter how good your system is the sound will change as you walk, so stop frequently to take in the sound from a stationary position (which is how most people will experience a service anyway, right?). You'll most likely notice one of three things: 1) The sound stays pretty consistent no matter what seat you're in. Congrats, this is the best case scenario! You can mix with confidence that everyone is getting a similar experience. 2) The sound changes pretty dramatically depending on where you are, with some parts dark, some bright, some boomy, areas where it's hard to hear the vocals, etc. If it's bad, it might be worth bringing a professional out to tune the system, and at worst, maybe consider a full upgrade. 3) The sound is pretty consistent throughout the room except at FOH. This can happen if the FOH position is in a weird spot or not planned out well when the room was designed. It is possible to mentally compensate for this, even if not ideal. For example, if you notice that there's a bit less low end at FOH than the rest of the room, you might have to intentionally mix the bass a little bit louder than you normally would. Do note that the sound of the room will change as it fills up with people, so it's worth (discretely) getting a sense for how the room sounds during a service as well (with someone else mixing, of course).

It's also worth doing the walk around test with pink noise and an SPL meter. Even if the frequency spectrum is good across the room, you might get spots that are louder than others. If you get a reading of 85 dB at FOH and 88 dB in other parts in the room, you may need to keep levels lower than you normally would, compensating for other sections that are louder.

The last factor worth considering, and the one you can't test by yourself, is stage noise. If you have a lot of sound coming directly from instruments on the stage— drums, guitar amps, brass, etc— the mix (and volume) will sound different closer to the stage. Since FOH is typically closer to the back, as mixers we are often unaware of just how much the stage noise is affecting the



front rows. Because of that though I don't think there's a good way to compensate, making the mix worse in the rest of the room to help those closest to the stage, in an area we can't even hear. If that is a significant problem at your church, consider finding ways to reduce the sound coming from the stage.

### **19. How should I make plans to acoustically treat a worship center?**

This is one instance I'd highly recommend consulting a professional. Maybe they do everything from testing to design to install, maybe there are parts of the labor you can help with if costs are a concern, but acoustics are such a specialized field (and even more so with larger spaces) that it's worth bringing in someone with knowledge and experience, because if done incorrectly it can not only be ineffective but even make things worse.

With that said, it's still good to educate yourself. The more you know, the better you can ask questions, understand what acoustic treatment can and can't do for you, and wisely use the church's resources. There are some good articles and videos on manufacturers' websites, such as GIK and RealTraps. Most of these are aimed at DIY small studios, but they're presented in a way that's clear and understandable, and the principles of how sound travels and interacts with a room are the same, even if the specific solutions might look a bit different for a church.

### **20. How do I achieve the best possible sound from non-pro, inexperienced Jesus-loving volunteers? Where is the sweet spot between excellence and practicality?**

First of all, it's wonderful that they want to volunteer! Churches run off of volunteers, both practically and biblically, and I believe with all my heart they are an essential part of the church. Along with that though, it's ok to set guidelines and requirements for serving in specific positions. Would you let someone play the drums for service that isn't willing to practice the drums? Would you let someone sing on worship team who isn't willing to learn the songs? So the first thing I would ask myself is, even if they are inexperienced now (which is fine, we all start somewhere!), is there a desire to learn, to train, to get better where they want to serve? Hopefully the answer is yes and you can capitalize on that desire by encouraging training, at church or formally or through self-study. If you want you can even require certain milestones of training be met before specific positions are open to them. The goal is definitely not to scare people away, but to set reasonable expectations for service; not an expectation of perfection, but a desire for betterment and a pursuit of excellence.

Now, that's for the long term. Training, education, practice, and experience all take time. In the short term, try to simplify things as much as you're able. Try to keep setups consistent, or at least similar, from week to week. If you have at least one person that is experienced and excellent in their abilities, have them create templates and workflows that give the training volunteers a head start on their mix. (And if you don't have someone like that, see if you can borrow or temporarily hire someone like that from a local church.) If it's within your ability, maybe even ask about scaling back the band for a period if that's contributing to the complexities of the task. It's not reasonable to expect them to run when they're learning to walk. And, of course, cultivate an environment of graciousness around those that are learning. Audio is teachable, but that doesn't mean it's not difficult.

**21. How can you balance worship in a youth group where we're all growing as a team (band, sound, media), in a Christ-glorifying way, practicing both not just sounding good but having a heart of worship?**

I love this question! While this is true in any ministry, I think it's especially important for leadership in youth group to model that heart of worship that you're looking for. Youth group has the potential to be really fertile ground for training, both technically and spiritually (and both for students and adults). Students are very sharp and can be very astute judges of quality, but they also understand what it's like to be in a period of learning. Adults tend to have an expectation that other adults already have things figured out, but youth can have more patience for people that are learning because that's where they are in life too. Their expectations aren't lower, but their perspective is different. However, they are going to look to their leadership to know what's acceptable and what's expected of them. If the leaders are impatient, if they are disrespectful, if they are mocking when mistakes are made or things don't work as intended, it gives the students permission to act that way as well (and go even farther). But if the leadership is encouraging, honoring, patient, and forgiving, and the expectation for the students is the same, they are more likely to rise up to it.

I've also noticed that tech has a tendency to attract youth that struggle to fit in with their peers. It's healthy and good to provide opportunities for them to interact with other students, whether that's the musicians or other attendees. At the same time, it's good as a leader to understand that tech can be a safe place for them and a rare opportunity to build friendships when they might struggle to do so in other contexts.

On a technical level, it's not that different than main service. Microphones are microphones, guitars are guitars, and media is media. So just like in main service, everyone does the best they can with their task and pursues excellence through learning and doing. The one advantage is that the requirements for youth group tech are often simpler because the bands are typically smaller and the services are less rigid, and so the learning curve might be more gradual than it is in a main service.

## **22. How can I fit in meaningful AV training with my volunteers when you're all so busy?**

This one is tough and something we struggle with too. We've tried doing video training for our volunteers but most people won't watch them. We've done special training days but it takes a lot of time to prepare and it's hard to coordinate getting people to show up on an evening or Saturday because that time is precious. The most successful method I've found is shadowing, especially in low stakes environments like rehearsals. Invite people in to watch, explain the process, and over time find small tasks for them to do to build confidence and comfortability.

The difficult truth is that the people who will excel the most are the ones that are interested in and dedicated to pursuing it themselves. Very occasionally that happens at church— people that are willing to show up to serve at lots of services, lots of rehearsals, lots of events. More often though it's people that are already pursuing it in their free time, practicing at home, reading book and articles, watching videos, even going to school for it. That's not to say that only those people will be able to serve, but it does often mean that those are the people that will be given the most complicated tasks. Or from a different vantage, the more complicated the need, the less likely that someone with a casual interest will be able to do it.

But there are still lots of jobs for people who want to serve the church in tech but not become experts in it. They may not be able to program your lights, but they can change cues during a service. They may not be able to load your slides, but they can follow the music and trigger them at the right time. They may not be able to mix a full band, but they can mix an acoustic guitar and singer for youth group or a couple mics at a women's talk or a pastor for a memorial. Those things are no less of a blessing to the church and to the tech leads!

### **23. What are some methods or suggestions for tuning our ears to EQ vocals and instruments?**

I don't have specific recommended resources for you (something I'm realizing I need to fix) but a good place to start is learning from others, whether that's someone experienced at your church or well established books/magazines/videos or even a class at your local college. The point being, there are lots of resources available so you don't need to figure it out from nothing. Getting a vocabulary in your head helps so when you think "This bass sounds boomy. Where is boomy?" you relate that to 60-100 Hz, or "This vocal sounds nasal" and you reach for 600-1.5k.

Then it's building experience, doing reps like you're at the gym. Find some multitrack recordings online that you can download (legally, of course), put them in a DAW (there are some great free/cheap ones like Reaper), and experiment with EQ on all the instruments. Listen to the frequency ranges each instrument takes up and use some filters to listen to different parts of the frequency range. Use one EQ to mess up the audio a little and another EQ to try to fix it by ear. Listen to all the instruments together and see how changing the EQ affects the whole mix. This is one of those situations where there's not substitute for experience, but with good material by your side you can have focused, intentional experience.

### **24. For those not trained in the equipment, what are the major things to be mindful of that is often overlooked?**

The biggest and often most daunting piece of equipment is the mixing board. Mixing boards are very logical— if you can learn what one row of knobs, buttons, and fader do, most of the other rows are the same thing. The most commonly used tools like gain, volume, EQ, and compression are going to be in obvious, surface-level places. In modern digital boards, the more complicated functions might be buried in menus on the screens, but a lot of times if you think "Huh, it sure would be nice if I could..." you probably can, you just need to know where it's located on the board. Lastly, most mixing board manufacturers have decent tutorials online that can give you a huge head start.

The second most common equipment is probably microphones. Having a basic understanding of types of mics (dynamic, condenser, ribbon, etc) and polar patterns (cardioid, omni, figure 8, etc) and how to choose the correct one for each situation will make your life so much easier when it comes time to mix.

## **25. How is personal worship possible while mixing?**

I think it's necessary to acknowledge that mixing can be worship. "...whatever you do, do all for the glory of God." (1 Cor 10:31) Setting lights can be worship. Wrapping cables can be worship. Hitting spacebar to change slides can be worship. Serving in tech, the way that we worship on a Sunday morning is going to look different than most other people, but when we serve with a desire to glorify God and a heart for building up the church, that is no less worship than singing.

When the pastor prays or gives a moment for personal prayer and we need to do so while watching the stage for the next thing to happen, you can still pray with your eyes open. Scripture talks about praying without ceasing, praying at all times, rejoicing in the Lord always— while I firmly believe it's good to approach prayer with a posture of submission and humility, the Lord hears our prayers and knows our heart at all times, whether that's at a mixing board or driving a car or taking a jog.

That said, mixing (and tech in general) can be distracting, can feel like work, can overwhelm us to a point that our hearts are focused on the task rather than God. If this is the case, try to identify what's causing that and look for ways to remedy it. If you're feeling nervous, would that be eased by practice and experience? If you're stressed, are there ways to prepare better before Sunday or find more helpers to relieve the pressure?

Finally, I think it's worth saying that I know several people that are very tech minded, even experienced in live audio mixing, that just can not feel worshipful while serving in tech, and so they don't. They find other ways to serve the church body and that's ok. They don't exclude themselves from serving altogether, but I would rather they serve in a different capacity and be spiritually fed than to serve on tech and have church become a burden.

## **26. How can you connect the gospel to mixing/setting up sound? How far is too far and no longer edifying the body?**

As already discussed, there's a huge service aspect to it— we serve to be more Christ-like, to glorify God, and to build up the church. We are also amplifying word of God in reading and preaching, and providing assistance with corporate worship.

I think it's no longer edifying the body when it becomes more human focused than God focused, when it becomes more of a show or entertainment than worship. There's nothing inherently wrong with fancy lights or loud music or giant screens or haze (and some churches have used them to great effect), but it is possible to let those things become a distraction from what we should be focused on.

**27. How can I not grow weary in serving when life becomes demanding and it becomes difficult to serve joyfully and sacrificially?**

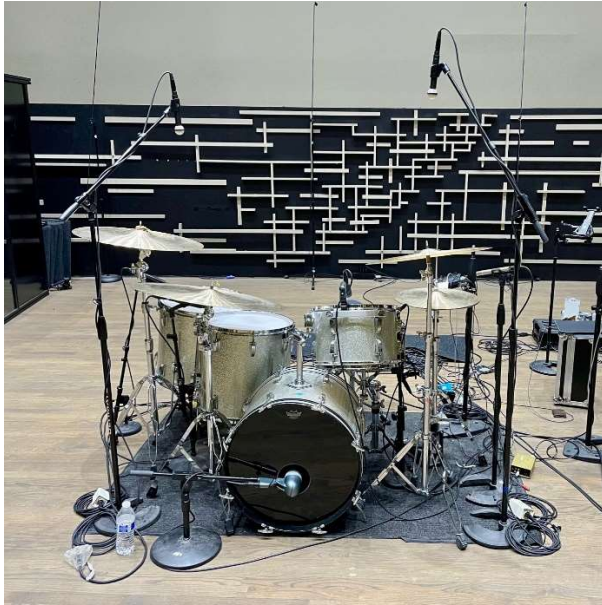
We talked about this quite a lot at the class, but here are a few big things to remember:

Remember why you serve— You serve to glorify God and build up the church as Jesus himself demonstrated throughout his earthly mission.

Remember who you serve— First and foremost, you serve God in all things, whether others notice or not. You also serve the body, from the congregation to the musicians to the tech team to the pastors to the people that take out the trash, not only by the work you do but also, perhaps even more so, by the relationships you form and cultivate.

Remember that you are finite— God has made you for work, and God has also made you for rest. By design, you cannot do everything! Ask for help, trust in the reliance of others, and remember to be fed even as you help feed others.

## Appendix



**Figure 1: Drums Front**



**Figure 2: Drums Back**

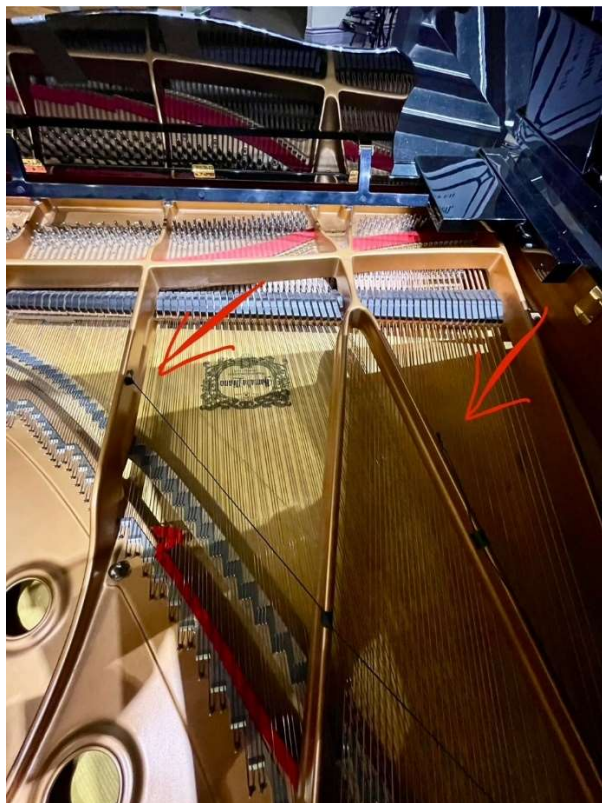


**Figure 3: Kick**



**Figure 4: Snare**

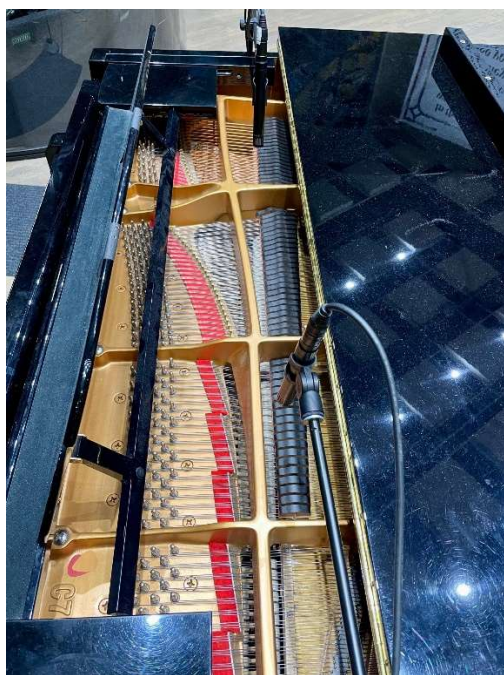




**Figure 5: Piano Internal Mics**



**Figure 6: Piano Open**

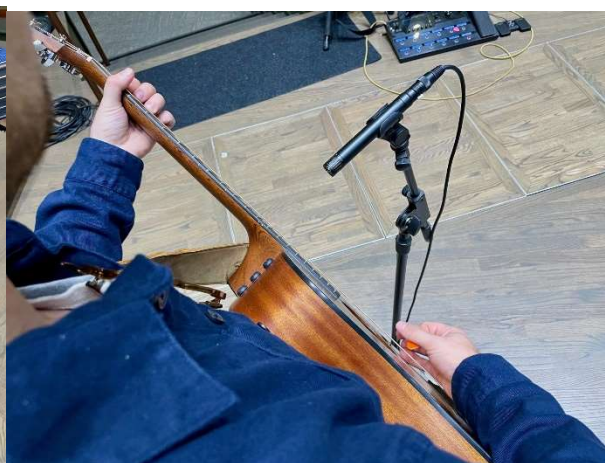


**Figure 7: Piano Closed**





**Figure 8: Acoustic Guitar**



**Figure 9: Acoustic Guitar**



**Figure 10: Guitar Amp**



**Figure 11: Guitar Amp with Light**