



GETTING THE MOST OUT OF IN-EAR MONITORS

by Doug Gould, Worship MD

PERFORMERS AND ENGINEERS HAVE TOUTED the benefits of in-ear monitoring (IEM) for decades. This guide focuses on maximizing the effectiveness of these devices. I include some best practices. I also list accessories and added components that can enhance your personal mixes and make you aware of how best to protect your hearing and well-being. Last but not least, these tips will help you perform better.



In 2002, while working as the market development manager for Shure, I was tasked with educating different market segments on applications for our products, including IEMs. The worship market was then, and remains, one of the largest segments requiring attention, as the people operating sound in most churches are volunteers and not professional sound technicians.

As a worship leader, musician and tech, I soon found that much of my time was spent helping volunteers learn the basics of sound production and best practices. At that time, IEMs were not new — they'd been around since the late 1970s — however, personal monitoring was a foreign concept to most church worship teams because they didn't understand the "why." I wanted to show them the why and help them realize all the benefits IEMs could offer.

I first needed to find out how many houses of worship used IEMs. So, during the audio classes I taught, I asked who used them; I rarely saw more than one or two hands raised. Today, it's a vastly different story. The numbers have flipped, and many more churches use IEMs for their worship bands. However, it seems that a

love-hate relationship exists between worship and tech teams struggling to find the benefit for everyone within the team and band.

WHERE DO WE START?

First, what kind of earphones do you use? Do you own your own IEMs, or do you use ones that belong to the church? The advantage of owning your own is twofold: first, you get used to how they feel, and second, you become more familiar with how they sound. The more you use something, the more comfortable you become with the quality and fit.

There are two general categories of personal monitors, and depending on the shape and size of your ear canals, one may be more suitable for you than the other. Universal earphones (not earbuds) can be bought off the shelf or online and are suitable for about 80% of the population. They sound as good as custom earphones (made specifically for your ear) for much less money. Universal earphones will usually come with a variety of sleeves or tips that help when inserting them into the ear canal. The tips should be comfortable and fit snugly, reducing outside ambient noise.

One of the most important things tips and sleeves are designed to do is seal the ear canal, allowing you to hear the full-frequency response of your mix. If the earphones are not appropriately sealed, bass response will be feeble (drummers and bass players should take special note of this).

The sleeve or tip you choose should also provide isolation from ambient/outside noise like drums, guitar amps and reflections from the room. Isolation is very important for getting the best mix at the lowest volume level. Typically, earphones with the right sleeve can reduce outside external sound and noise by 25dB to 30dB. Below are examples of typical earphone tips and sleeves.



You can also get custom sleeves for your universal earphones, which is much less expensive than buying custom earphones.

When using IEMs, isolation is one of the hardest things to get used to. It quite literally sounds and feels like sticking your fingers in your ears. There are ways to solve this issue without removing one of the earphones, which in most situations is not healthy or helpful. I will address solutions to this problem later.

Universal earphones range in price from \$100-\$400+ off the shelf. Here are links to some popular universal IEM manufacturers:

- [Sensaphonics](#)
- [Alclair](#)
- [JH Audio](#)
- [64 Audio](#)
- [Ultimate Ears](#)
- [Westone](#)
- [Clear Tune Monitors](#)

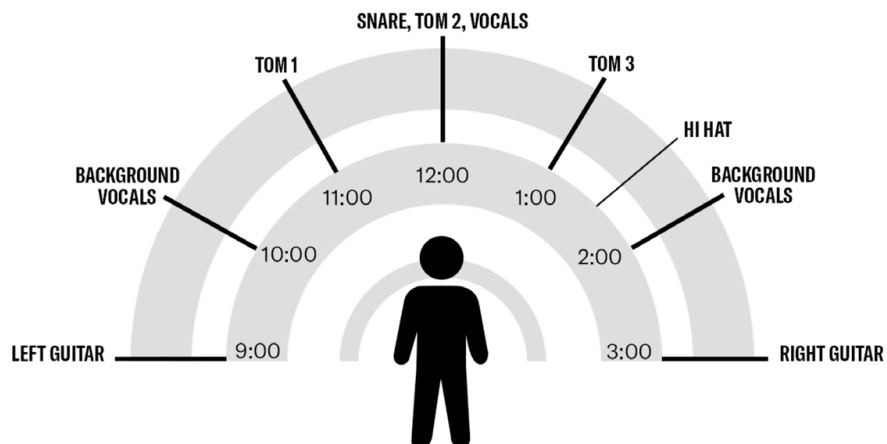
Custom earphones, in contrast, require a trip to an audiologist, who makes molds of your ear canals and then sends them to a custom earphone manufacturer. The advantage of custom earphones isn't an increase in sound quality but a better fit. They're a perfect match because they've been built specifically for your ear canal. Of course, you'll pay a higher price: from \$150-\$1,000+. The other advantage (or disadvantage, depending on your view) is that there are more drivers in a custom earphone than in a universal earphone.

What's a driver? It's another name for a speaker, like woofers and tweeters, joined together to create a fuller frequency range. Universal earphones are limited to single, dual, triple and quad drivers. Some custom earphones now advertise as many as 16 drivers.

MONO VS. STEREO

IEM systems work best with a stereo signal. In my opinion, this is the most helpful benefit of in-ear monitors. Stereo mixes are the most natural way to hear your mix; after all, if God wanted you to hear in mono, he would have put one ear in the center of your forehead. Stereo allows us to physically localize the source of sounds.

If I lead worship from center stage, I can pan the mix channel for every vocalist and musician on stage relative to my position in the stereo field. If singers are to the right, pan their mix channel to the right. Continue this for all the channels. Remember that there are several points on the panning scale; it's not just hard left, right and center — there are placement degrees throughout the pan. Think of it like a clock; your hard left is nine o'clock, the center is 12 o'clock and hard right is three, and everything else falls in the positions in between.



When the mix channels are correctly panned, the mix in your earphones will make sense. Your eyes and ears make the connection that each sound is coming from where you see it. The sound from the guitarist to your left is coming from the left, as is everybody else around you.

When listening in mono, as you may be doing, the only way to highlight what you need to hear is by adjusting the sound level of each mix input, i.e., less of the keyboards and more lead vocal. Keep in mind, if you want to appear louder in your mix, don't start by turning yourself up — turn everything else down. Because a stereo mix allows you to place each band element in the proper spatial position, it sounds more natural and, at the same time, requires less level adjustment and much less EQ.

Before we get too deep into the weeds, there are a couple of things to determine. Where is the monitor mix coming from: the front-of-house (FOH) console, a personal monitoring device or a software app? If the mix comes from the FOH console, it must have a stereo send to receive a stereo mix.

For example, if your mixing console has six aux busses (pre/post monitor/EFX sends), you're limited to six mono mixes or three stereo mixes. This doesn't leave a lot of options for multiple musicians who may want different mixes or a recording or live stream mix, for instance. Ensure your console can deliver the aux mixes needed to satisfy the different band and room requirements. Churches often look at how many inputs they need now without carefully considering how many outputs (mixes/busses) they'll require in the future.

If your FOH console doesn't have enough capacity, you can purchase personal monitor mixers that work as a separate networked system and aren't dependent on the physical outputs of the FOH console. These systems allow each musician to create their own mix. Aviom was the forerunner of this technology, and since then, many personal hardware monitor mixers and app software have been introduced.

If you have a digital console, the brand may have a proprietary hardware monitor mixer. However, with the advent of audio over a network, you can use any brand of personal hardware mixer with any brand console that uses this network approach.

If you have a console with an integrated Dante-enabled card, you can use any of the following personal monitor mixers with your desk:

- [Aviom](#)
- [LiveMix](#)
- [HearBack](#)
- [MyMix](#)

When I visit churches, I always look to see if they use IEMs. If they use hardware like Aviom, I check the levels of each unit. Nearly 100% of the time, every channel is all the way up and panned to the center. So, along with a musician or vocalist standing next to me, we'll don headphones and listen to the mix together. I start by bringing down all volume levels to 50%, then pan the singers and musicians relative to our position on stage. Doing these two things makes a huge difference, and frowns immediately turn upside down into smiles.

In my opinion, this is the best reason to use in-ear monitors — they're safer for your ears because of reduced volume levels and give you a more natural sound. Once you've heard your mix in stereo, you'll never want to return to mono mixes again.

CREATE YOUR OWN MONITOR MIX

Using iOS- and Android-based monitor apps, like Monitor Mix from Yamaha, musicians and vocalists can create their own stereo mixes at any time while on stage. All settings and mixes can be saved and recalled. You can adjust panning, level, EQ, solo and mute, assign channels to groups and more. Wouldn't it be nice if you didn't have to ask the audio engineer to fix your mix constantly?



By setting up a closed Wi-Fi router and connecting it to your digital console, you can create a private network for the band to log in and create their monitor mixes. You won't be able to hear your mix through the phone — you'll still need earphones and a wired or wireless headphone amp connected to the audio system. Then, you can adjust your mix personally, on the fly, through the phone.

Whether you're creating your mix from a personal monitor mixer or your phone, arrange your channels into groups. No vocalist or guitar player wants eight drum channels taking up 16 of the available channels. Group similar instruments and vocals together: drums in one group, electric guitars in another, acoustic guitar, keys, backup singers, etc. Also, to reduce confusion, mix with fewer faders. I play keys, and my hands, like most musicians, are occupied. Therefore, I have the whole band in one group. With one fader or knob, I can turn down the whole band; I don't need to turn down 15 channels to turn myself up.

I WANT TO HEAR THEM SING!

Earlier, I said that isolation from outside sounds and noise is one of the major benefits of IEMs. However, people often find it difficult to get used to.

If the IEM is fitted correctly in your ear, which it should be, you'll have difficulty hearing anything outside your ears. That's a good thing. Imagine a bass player standing right next to a drummer while he's slamming on his ride cymbal. Wouldn't it be nice not to be able to hear that? However, isolation could be considered a weakness, especially if you're someone like Chris Tomlin, who loves to listen to the congregation singing, or you're someone who wants to hear the room.

If you're in this camp, you probably pull out one of your ear monitors. Please don't do this because it's unsafe for your ear — especially on loud stages — and your mix will be compromised! I include a link at the bottom of this article for more information about this. So, how do you keep both ear monitors in and hear the room simultaneously? With ambient microphones. Simply set up a pair of microphones on or near the stage — and behind the PA — and point them at the audience. (Never aim them at the PA's loudspeakers).



Attenuate the lower frequencies of the microphones using hi-pass filter/low-cut. Orient the microphone's stereo placement so that the mic on the left is coming out of the left side of the in-ear mix. You don't want somebody standing on the right side of the congregation saying, "Hallelujah," and it comes out in the left ear of the worship leader. This would be very disconcerting and confusing.

For this technique, condenser mics are better than dynamics, and shotgun mics are also very effective. Adjust how much of the room you want to hear in your mix. You don't need much, and it's much more effective than reverb. Be sure that the ambient mics' audio is NOT included in the house mix that the congregation hears. However, you can include it in your live stream or broadcast mix. Here is an excellent article for ambient mic'ing: "[Tips for Ambient Stage Mic'ing.](#)"

ASI Audio has a product that has ambient microphones built into the ear monitor, which lets you adjust along with your mix. Having ambient microphones in your ears offers the best solution in terms of orientation; no matter where you are on stage, you have the perfect placement of the room's stereo image and your surroundings.

If you turn around 180 degrees, you will still have the proper orientation. This can't happen with a pair of remote stationary microphones. Look at this great article from Aviom: "[Personal Mixing on Stage and in the Studio.](#)"

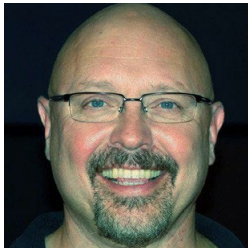
LISTENING SAFETY

Whether you use IEMs or stage monitors, you must pay close attention to your hearing health. Loud music can cause long-term issues, jeopardizing your musical career and affecting your life in general. Sustained exposure to an average volume of 85 dB is potentially damaging and could result in hearing loss, distortion, tinnitus, hyperacusis and diplacusis. To learn more, including how to protect yourself, I urge you to visit one or more of these websites:

- [Hearing Education and Awareness for Rockers](#)
- [National Hearing Conservation Association](#)
- [The House Institute](#)
- [Turn it to the Left](#)

IN CONCLUSION

In-ear monitors offer a precise and customizable listening experience for musicians and singers. They enable them to hear their monitor mix clearly, protect their hearing from loud environments and be more effective on stage.



ABOUT THE AUTHOR

Doug Gould is the CEO and Founder of Worship MD and has been a Pro Audio and Music Technology industry veteran for nearly 30 years, serving in management roles at Shure, Tascam and E-Mu Systems. Doug has served as a worship leader, musician and sound tech at various churches throughout his career.

Over the last 18 years, Doug has been a very effective presenter at hundreds of worship conferences throughout North America and beyond, focusing his experience on consulting and teaching.

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Doug can be reached at worshipmd.com or by email: doug@worshipmd.com. You can also find him on Facebook at facebook.com/officialworshipmd.

For more about Yamaha, please visit usa.yamaha.com/house-of-worship. Keep up on what's happening by following our Facebook group: facebook.com/groups/YamahaWorship.