AV MADE EZ GUIDE *TO* Church AUDIO

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INTRODUCTION

The concept of AV Made EZ was born in 2016 to address the growing complexity of audiovisual systems in primarily volunteer based environments. Working with schools and churches, the goal has always been to develop strategies that deliver the needed technological outcome through the simplest user interface possible.

The hard truth is this:
To be heard clearly, seen remotely, consistently present, and kept secure...
Technology is necessary.
For some, it's a necessary evil that requires them to adapt to new skills not before required by their profession. Someone needs to make it EZ.
The AV Made EZ approach has required us to go against the status quo in many ways as we battle a trend of technological excess and "nerd-ego".

The fact that you are reading this e-book lets me know that the work we are doing is worthwhile.
Our heart is to serve you in such a way as to eliminate undue complexities so that you can focus on the thing you were made to do.
Thank you for allowing us that opportunity.

Here to Serve,

SOUND SCIENCE

Effectively understanding Church Audio starts with understanding the basic science of audio. There are many parameters for measuring audio but these two are most critical to understand...

Volume

In a church audio setting, volume (more accurately referred to as Sound Pressure Level or SPL) is the physical loudness of the audio in the sanctuary.

Pitch

In a church audio setting, pitch refers to the perceived frequency of a sound—whether a singer's voice or an instrument sounds high or low.

SOUND SCIENCE

VOLUME

Volume must be balanced to ensure clarity and engagement without causing listener fatigue.
Unlike a simple turn of a knob, managing volume in a worship space involves balancing two distinct layers:

Acoustic vs. Reinforced Sound: The mix of live sound from the stage (like a loud drum kit or choir) with the sound coming out of the loudspeakers.

Perceived Loudness (Dynamics): How loud the room feels to the congregation. A clear, distortion-free mix at 90 dB often feels quieter and more comfortable than a harsh, muddy mix at 80 dB.

SOUND SCIENCE

PITCH

Managing pitch effectively is crucial for several reasons:

Musical Harmony: Ensuring praise team vocalists and instruments stay "in tune" with each other to prevent distracting dissonance.

Acoustic Clarity: Different rooms emphasize different frequencies. High-pitched feedback or muddy, low-pitched rumble can be controlled using EQ adjustments on the mixing console.

Intelligibility: Ensuring the pastor's spoken word sits in a clear pitch range so the congregation can easily understand every word without ear strain.

SOUND REINFORCEMENT

Natural acoustic audio is centralized so you must be in close proximity to the source for it to be loud (volume) and clear (tone). That's why equipment exists to "reinforce" the naturally occuring audio so that audio can be boosted and distributed to every listener as equally as possible.

Audio Reinforcement is the use of microphones, audio consoles, amplifiers, and loudspeakers to amplify and balance the voices, instruments, and media. Its primary goals are achieving high speech intelligibility and delivering balanced, comfortable sound for the entire congregation.

Why Reinforcement Matters in Worship

- Speech Intelligibility: Ensures every listener, even in the back row, can clearly understand.
- Acoustic Management: Overcomes the natural, often muddy echoes (reverberation) found in sanctuaries.
- Congregational Engagement: Balances worship bands and choirs so the vocals remain the focal point.

SOUND REINFORCEMENT

Core Sound Reinforcement System Components

- Inputs: Microphones for the pastor/speakers, vocalists, and instruments, as well as direct connections (DI boxes) for keyboards and guitars.
- Processing & Mixing: The mixing console (where a sound engineer controls volume and tone) and digital signal processors used to clear up audio frequencies.
- Outputs: Amplifiers and loudspeakers tailored to distribute sound evenly across the entire seating area without "dead spots" or jarring volume jumps.

SOUND REINFORCEMENT

Inputs

Microphones for The Spoken Word

- **Lavalier (Lapel) Microphones:** Small, clip-on microphones that attach discreetly to a pastor’s tie or lapel. They provide hands-free operation and are often part of wireless beltpack systems.
- **Headset / Earworn Microphones:** These are worn around the ear and position a tiny capsule near the speaker's mouth. Because they stay a consistent distance from the mouth, they provide better volume and feedback rejection than standard lapel mics.
- **Podium / Lectern Microphones:** Typically long, flexible "gooseneck" condenser microphones placed on the pulpit. They are designed to capture a speaker who may be standing at a slight distance but never leaves the pulpit.

SOUND REINFORCEMENT

Inputs

Microphones for Worship Teams & Singers

- **Handheld Dynamic Microphones:** The most common microphone in live sound. Famous models, like the standard Shure SM58, are exceptionally rugged, reject high background stage noise, and are used by worship leaders and backup singers.

- **Handheld Condenser Microphones:** Often used by lead vocalists who want studio-quality vocal clarity and crispness. They are highly sensitive and can capture subtle vocal nuances, but require "phantom power" supplied by the mixing board.

SOUND REINFORCEMENT

INPUTS

Microphones for Choirs & Instruments

- **Choir Microphones:** Usually lightweight, stand-mounted or hanging condenser microphones. They are specifically designed with a wide pickup angle to blend and capture group vocals clearly from several feet away.

- **Instrument Microphones**: Specialized microphones designed for the unique frequencies of drums, acoustic guitars, and pianos. Dynamics are used for loud, punchy instruments like snare drums or guitar amps, while delicate condensers are used to capture the acoustic resonance of a grand piano.

SOUND REINFORCEMENT

INPUTS

Microphones for Broadcast

- **Congregational / Ambient Mics: C**ondenser microphones positioned to point at the pews. They are essential for capturing the congregation's prayers, singing, or applause to create an immersive, natural audio mix for the church livestream or recording.

SOUND REINFORCEMENT

INPUTS

Instruments and Other “Non-Microphone” Inputs

- **Instrument Inputs -** These signals come directly from electric instruments before being boosted. They require an “instrument cable” and a DI (Direct Injection) box to convert them to the right signal so the mixer can process them.
  This includes: Electric Guitars & Basses, Acoustic-Electric Guitars, Electric Keyboards, and Electric Drums

- **Line-Level Inputs -** Line-level signals have a much higher voltage than mics or instruments. These are the standard output levels for electronic gear, playback devices, and stage processors.
  This includes: Media Players, Computers, Cell Phone, or other devices that connect with a 3.5mm auxiliary (aux) cable or RCA cable.

SOUND REINFORCEMENT

PROCESSING and MIXING

AUDIO MIXERS

- An audio mixer is the central hub of a church's sound system, allowing the operator to combine, balance, and route various inputs (microphones, instruments, computers) into a cohesive output.
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    - Analog Mixers: Feature a "one-knob-per-function" physical layout. They are praised for their ease of use, making them highly accessible for volunteer-led or smaller church sound teams. However, they are bulkier and lack the ability to save presets (scenes) or feature extensive built-in effects.
    - Digital Mixers: Operate using digital processing and LCD touchscreens, routing signals via internal software. Modern digital boards are the industry standard for churches due to their ability to save and instantly recall mix configurations.

SOUND REINFORCEMENT

PROCESSING and MIXING

AUDIO PROCESSORS

- Audio processors shape and correct the audio signal to ensure it doesn't damage the speakers, and remains intelligible.
  - Equalizers (EQ): Adjust the tonal balance of specific frequencies, letting technicians cut out harsh frequencies or boost warmth in a pastor's voice. This is available on most mixers, but is also deployed as standalone hardware for room correction.
  - Compressors/Limiters: Manage the dynamic range of an audio signal. A compressor automatically turns down loud, sudden peaks (like a loud singer or a shouted sentence) to prevent the sound from hurting the congregation's ears or clipping the audio. Limiters act as an absolute volume ceiling to protect the speakers.
  - Digital Signal Processors (DSP): Comprehensive, all-in-one processors that handle zone routing, volume, and speaker management. These are typically installed behind the scenes to tune the sanctuary’s acoustic response.

SOUND REINFORCEMENT

OUTPUTS

From the mixer/processors, the audio must be routed to different, often unique, destinations.

- **Main PA (Front of House) -** Sends the primary mixed sound to the entire congregation.
- **Monitor Systems -** Sends customized audio mixes to the stage so they can hear themselves and each other.
- **Broadcast and Streaming -** Sends to off-campus viewers or overflow rooms.
- **Assistive Listening and Auxiliary -** Provides audio feeds for accessibility or remote areas within the church facility.

SOUND REINFORCEMENT

OUTPUTS: AMPLIFIERS

An amplifier is the hardware that boosts weak audio signals from your mixing console to a power level strong enough to drive your speakers. Without it, the sound from your microphones and instruments would be inaudible to the congregation.
Church amplifiers serve different distinct roles based on how the building's sound system is designed:

- **Main Sanctuary Amplification** - For the primary worship space, amplifiers provide the heavy-duty power needed for large loudspeakers and subwoofers.

- **Distributed Audio Amplification** -Most churches use a constant-voltage system (often called 70V or 100V distributed lines). This allows the amplifier to send sound to dozens of smaller speakers (like those in nurseries, hallways, foyers, or cry rooms) using thin, lightweight wiring without losing audio quality over long distances.

SOUND REINFORCEMENT

OUTPUTS: SPEAKERS

The speakers are perhaps the most unique items in a church sound system. They vary drastically in size and application.

- **Main Speakers (Front-of-House / FOH) -** The primary speakers covering the main seating area. They might include:
  - **Full Range Speakers** - Designed to accoodate most if not all of the needed frequencies that are produced. In smaller, less demanding worship services, these are all that is needed for the Main Speaker System
  - **Subwoofers** - Large speakers designed to reproduce only the lowest frequencies. This is needed in large spaces or more demanding services to reinforce what the mains cannot accomplsh alone.
  - **Fill Speakers -** Smaller speakers placed throughout the room to "fill" in areas where the main speakers can't reach.

- **Stage Monitors -** Speakers facing the stage or in-ear systems. These allow the pastor, worship leaders, and musicians to hear themselves clearly.

SOUND ADVICE

As a church audio volunteer, your role is absolutely vital—you are the bridge between the stage and the congregation. Focus on learning the signal flow, prioritize serving the congregation by remaining a calm, invisible presence, and don't be afraid to ask questions.

Top 5 Keys for Success

- **Learn the Signal Flow First:** Before mastering the mixing board, understand how sound gets from the microphone to the speakers. Knowing where a signal goes makes troubleshooting dead mics or bad cables incredibly easy.
- **Be a Servant Leader:** Technical roles happen in the shadows. If the congregation notices you, it's usually because something went wrong. Focus on humility, serving the musicians, and helping the pastor communicate clearly.
- **Show Up Early, Prepare, and Participate:** Arrive early to help with setup, check mic batteries, and review the order of service. Make sure to actively participate and engage in the service yourself—you are ultimately part of the worship team.
- **Take Detailed Notes:** Keep a notebook or use resources like this one. Jot down channel names, lead instruments for different songs, and specific EQ or fader adjustments.
- **Take Your Time:** You won't be an expert overnight. Remember that mastering this vital skill is a very rewarding journey but you will never arrive at a final destination. So, absorb as much as you can as you go and relax! You are now one of the cool kids.

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THANK YOU

NOW GET TO IT!

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