



## What components are needed for a sound system?

*The worship staff receives a number of similar inquiries on worship-related topics from across the church.*

*These responses should not be considered the final word on the topic, but useful guides that are to be considered in respect to local context with pastoral sensitivity.*

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The pace of technology can be difficult to grasp. Technology that at one time cost churches thousands of dollars to utilize now would cost hundreds of dollars. The cost of technology continues to diminish. At the same time the performance of technology continues to increase. With the pace of technology in mind, it is difficult to give specific examples and recommendations for any type of electronic equipment. Today's technology may be obsolete in the near future. This article serves as a brief overview of the possible components needed to implement sound reinforcement in worship.

### Principles

“Regardless of musical style or instrumentation, leadership confidently supports and enables the voice of the congregation. Likewise, the voice of a soloist, cantor, assisting minister, or presiding minister is most effective when it does not overwhelm or dominate the congregation’s voice” ([Principles for Worship](#), Application M-2F). “The acoustics of a room and the physical arrangement of the assembly are best suited for worship when they contribute to the vitality of a congregation’s song” ([Principles for Worship](#), Application M-3F). “Worshiping communities are encouraged to make use of the entire dynamic spectrum, including silence. Organs, synthesizers, drums, and other instruments make possible far louder sounds than any assembly can produce through singing. While louder sound levels are typical in some genres of music, care for ears and voices encourages appropriate and sensitive choices regarding the decibel level of music” ([Principles for Worship](#), Application M-12E).

### Source

When beginning to consider live sound reinforcement, one must take into account the source. What is producing the sound that needs reinforcement? Is it a solo voice? Choral ensemble? String quartet? Piano? Acoustic guitar? Djembe? The possibilities of how to reinforce each sound source are numerous. Some techniques for reinforcement are better than others. Knowing some general information about how the source produces its sound will be beneficial. Knowing the frequency spectrum of the source will also be helpful. In some cases research may be required to better understand a source and thus know which

is the best approach for sound reinforcement. It is also entirely possible that the source does not require sound reinforcement, a thought that can be easily overlooked where sound systems are constantly in use.

### **Microphone or interface**

Microphones and interfaces are two common ways of capturing a sound source. There are many different types of microphones. Dynamic microphones work best in close proximity to the sound source and can work with louder volume levels. An example of a dynamic microphone is a Shure SM58. Condenser microphones work best at a distance from the sound source and can work with softer volume levels. An example of a condenser microphone is an AKG C451B. Microphones also have polar patterns that determine how sensitive they are to sound sources coming from different angles. There are other types of microphones but dynamic and condenser microphones are the most commonly used in worship applications. An interface can be any device by which a sound source connects to a sound system. For acoustic guitars and pianos this might be an electronic pickup. For synthesizers or bass guitars this might be a direct box. The microphone or audio interface take the originally produced sound and convert it into an electrical signal.

### **Cabling or wireless**

Once the microphone or audio interface has converted the sound source into an electrical signal, it begins its travel to the output through either a cable or wireless signal. Microphones usually use an XLR cable. Instruments such as guitars usually use a ¼ inch cable. A wireless transmitter and receiver can transmit signals without the use of cables.

### **Mixer and effects**

The sound source is captured by a microphone or audio interface and transmitted as an electrical signal via cable or wireless transmitter to an audio mixer. The mixer collects all the audio signals arriving from multiple sound sources and gives the operator control of each of them individually. The mixer (also known as a sound board) allows each of the sounds to be “mixed” together for balance and blend. Mixer size is based on the number of channels it has, which is the number of sound sources it can mix. Mixers often come with built in equalizers that allow different frequency levels to be either boosted or cut back on each channel. Other effects make come built in to the mixer allowing the sound source to be modified in different ways. If not built in, effects can be added using outboard units. Common signal processors and effects applied to audio signals include noise gate, equalizer, compression, and reverb. Mixers sometimes include preamplifiers to prepare the audio source to be amplified. Mixers and amplifiers can be combined into the same unit (often called a combo).

### **Amplifier**

The sound source is captured by a microphone or audio interface, transmitted via cable or wireless transmitter, collected into an audio mixer, and then sent to an amplifier. The amplifier takes the electrical signal and boosts it for output through a speaker.

### **Speaker**

The final output of the reinforced sound is the speaker. The original sound source arrives at the speaker through some combination of the components previously listed. Speaker cabinets (also known as enclosures) often have more than one type of speaker driver

contained in it. These include woofers, tweeters, horns, and subwoofers. Sometimes these speaker drivers are located in separate enclosures and utilize a crossover to send the appropriate frequency to its proper driver. Speakers can be located on the ground, elevated on a stand, or flown from the ceiling. Speakers are positioned so that the assembly can easily hear the sound being reinforced. When speakers are used to help the musician or presenter hear themselves they are called monitors. Amplifiers and speakers can be combined into the same unit (often called a powered speaker).

## RESOURCES

### Frequently Asked Questions

- ↳ What is the role of silence in worship?
- ↳ Can technology help lead congregational singing?
- ↳ How do we choose a new organ?
- ↳ How can our worship services be more welcoming to people with disabilities?
- ↳ How can a worship band be used in Lutheran worship?

### Resources Available for Download on the ELCA Website

- 📄 *Principles for Worship*. Minneapolis: Augsburg Fortress, 2002. (Available in English and Spanish)
- 📄 *The Place Where We Worship*. Chicago: ELCA, 2010.

### Resources Available from Augsburg Fortress

- 📖 *Leading Worship Matters: A Sourcebook for Preparing Worship Leaders*. Minneapolis: Augsburg Fortress, 2013.
- 📖 Brugh, Lorraine S. and Gordon W. Lathrop. *Using Evangelical Lutheran*
- 📖 *Worship: The Sunday Assembly*. Minneapolis: Augsburg Fortress, 2008.

### Other Resources

- 📖 Boonstra, Gregg J. *Mixing Sound for Church: An Application Guide for the Audio Technician*. Oklahoma City: ColRy Publishing, 2016.
- 📖 Eiche, Jon F, ed. *Guide to Sound Systems for Worship*. Buena Park: Yamaha, 1990.
- 📖 Gibson, Bill. *The Ultimate Church Sound Operator's Handbook - 2nd Edition (Music Pro Guides)*. New York: Hal Leonard, 2012.
- 📖 Herring, Brad. *Sound, Lighting and Video: A Resource for Worship*. Burlington: Focal Press, 2009.
- 📖 Hohenstein, Ben. *Sound System Basics for the Church Musician*. Association of Lutheran Church Musicians: In Tempo. 2018, No. 2. 16-18.
- 📖 Park, Lonnie. *Church Sound Systems*. Milwaukee: Hal Leonard, 2001.
- 📄 Shure Learning Center  
(<http://www.shure.com/americas/support/training/materials>)
- 📄 Technologies for Worship Magazine (<http://www.tfwm.com>)

-  Wasem, James. *Great Church Sound: A Guide for the Volunteer*. Missoula: Great Sound Institute, 2015.
-  White, Paul. *Basic Live Sound*. London: SMT, 2006.
-  Worship Facilities Magazine (<http://www.worshipfacilities.com>)

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