

**SHURE**<sup>®</sup>  
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A Shure Educational Publication

# INTRODUCTION

Wireless Microphone Systems and  
Personal Monitor Systems for  
**HOUSES OF WORSHIP**

By Crispin Tapia





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# Houses of Worship

Introduction to  
**HOUSES OF WORSHIP**

**CHAPTER 1**

---

**INTRODUCTION**

To hear the word, is to see the light. The importance of capturing and reproducing good audio is always critical for houses of worship. Whether it is for live services, a pre-recorded audio or video message or communication to a single person, a daily prayer to a few, a weekly message to hundreds, or a holiday message to thousands or even millions, microphones are the first link in the chain. Wireless microphone systems and in ear monitor systems facilitate flexible worship environments, improve performance in challenging acoustic environments, and can help create the desired worship experience in modern, media enhanced services.



# Introduction

## The purpose of this booklet

The goal of this booklet is to provide a solid understanding of the selection and operation of three key audio technologies that may be used to create an optimal sound platform for your house of worship.

These technologies are:

- Wireless microphone systems – to untether the pastor and musicians from their fixed spots on the stage without sacrificing any sound clarity,
- Personal monitoring systems – to allow the singers and musicians to hear the mixes they want at levels that are comfortable to them, and
- Earphones – to provide better sound isolation and aesthetics for all who use them.

Of course there are additional advantages to wireless microphones, personal monitoring systems and earphones. There are also some tips and techniques to make it easier for you to incorporate them into your worship service.

We hope that by the time you reach the end of this booklet, you...

1. more fully understand the benefits and applications of these increasingly-popular audio products,
2. gain some insights into how to select the system or systems that match your specific needs and budget, and
3. learn some ways to use these products most effectively.

For those interested in further discussions on wireless microphone systems, personal monitors and earphones or sound reinforcement in general, Shure offers a full range of educational publications for both experts and novices alike. You can find more information about our complimentary guides in Chapter VI of this booklet or view the entire list at **[www.shure.com/support/publications](http://www.shure.com/support/publications)**. Additionally, Shure applications engineers are always available to answer your specific questions and concerns. For more personal attention, simply call your local Shure office at one of the numbers listed on the back of this booklet.

We, at Shure, fully understand that our audio solutions are simply a conduit between your faith and your congregation. We hope this booklet helps you better understand how you can use today's technologies to express your worship more clearly and more easily.

## HOUSES OF WORSHIP

### Why it's a good time to learn more about wireless microphone systems and personal monitors

These innovative audio products have gone through a dramatic change in the past few years. The costs for these systems have decreased considerably and their features have become more sophisticated, more user-friendly and far more adaptable to the widest range of needs.

Therefore, it is now possible for people who are less technical and have smaller budgets to use these audio products to provide dramatically improved sound for the congregation as well as more control and flexibility for the praise and worship team.

It has also become far easier for less technical users to gain the benefits of these systems without the long learning curve once associated with wireless microphone systems and personal monitors.

Houses of worship have unique audio challenges and needs that are easily addressed by wireless microphone systems and personal monitors. These include the configuration of the space itself, as well as the various expectations and desires of the worship team and the worshippers.

There are two more reasons to consider upgrading your sound platform to include these technologies: *hearing conservation and vocal strain*. There has been a great deal of research lately on the hearing loss of people who are constantly exposed to sound, even if the sound is not always overly loud. There has also been more understanding of the vocal strain caused by having to continually sing over high volume. Since worship team members are often part of multiple services weekly, if not daily, these two reasons, alone, would merit considering personal monitors and earphones for your services.

All in all, the benefits of including wireless microphone systems and personal monitors into your house of worship will likely more than pay for themselves in the added richness of the overall sound for your congregation and the increased control for those who use them.



## CHAPTER 2

# WIRELESS MICROPHONE SYSTEMS

### Descriptions /Types

Before we can get into the advantages of ‘unplugging’ your worship team or any tips and techniques for getting as much as you can from your wireless microphone systems, it’s a good idea to get a basic understanding of their components and operating concepts.

This first section includes a brief overview of wireless microphone systems in order to add some context to the components or technical aspects we discuss later in this chapter.

**Wireless microphone systems include three components:**

1. a microphone (or an input device such as a guitar pickup),
2. a transmitter, and
3. a receiver.



Example of a handheld transmitter



Example of a wireless receiver

1. The microphone (or pick-up) can be any of the following:
  - a handheld microphone (often, this will have the transmitter built into its base)
  - a headworn vocal microphone
  - a lavalier (lapel) vocal microphone
  - a clip-on instrument mic
  - a guitar/bass pickup (which replaces the microphone since it is a direct output to the transmitter via a cable.)
2. The transmitter is either built into the base of the microphone, as is the case with a handheld microphone, or is a body pack that clips onto the belt or clothing of the user. Its function is to convert the audio signal from the microphone to a radio signal and send this signal to the receiver.

**Important to note:** These radio signals are sent from the transmitter to the receiver on a predetermined radio frequency – in the same way your local radio and television stations transmit their broadcasts.

## Introduction to HOUSES OF WORSHIP

3. The *receiver* is placed in a location where it can easily receive the transmitted radio waves. The receiver's output cable is plugged into the sound system in the same place you would plug the cable from a wired microphone.

The key difference between a wired and wireless microphone system is that the user of a wireless system is not attached to the cable – making him or her free to roam the worship space unhindered.

### The benefits to using wireless microphone systems in a House of Worship



If you think wireless microphone systems have sound and clarity issues, then you will be happy to hear that those days are gone. As the prices have come down, the quality and features have increased. With very little effort you should be able to find a wireless microphone system that you can afford and which provides the sound quality you desire.

However, it is far more likely you are already using wireless microphones in your house of worship, so we will spend most of this chapter discussing ways you can increase the value of having these systems and who might benefit from them the most.

The initial advantages of wireless microphones in a house of worship are fairly apparent:

1. Cable-free mobility for the pastor, worship leader and worship musicians
2. Fewer cables, which provides a cleaner, less cumbersome worship space

Let's look at these two main advantages individually.

**Greater mobility** – As praise bands become more elaborate and the congregations' expectations of more interaction increases, other musicians, such as the horn player and the guitarist, are finding that the cable on the wired microphone is limiting their ability to bring their worship closer to – and often into – the congregation.

Additionally, the pastor might want to lend a voice to the praise band. With a wireless microphone, he or she can simply walk across the platform and join in.

**A cleaner worship space** – Again, as praise bands become more elaborate, as more and more guest speakers are added to the platform, the number of people who need to be miked increases. This results in the need for more and more microphone cables and stands.

Wireless systems eliminate the cables on the platform and allow new presenters and musicians



to join the celebration without adding yet another cable to the clutter.

*For example:* you want to feature a member of the choir in the song. Simply hand her the pre-set wireless microphone and she can walk forward on the platform and add her voice to the worship without adding another cable to the stage.

Then, when her part is over, she can hand the microphone to the next featured singer or step back and rejoin the choir.



## Let's look at a few basic set-ups for the people we have mentioned thus far:

### ***A pastor***

Any of the following:

1. A handheld microphone with a built-in transmitter
2. A headset microphone with a bodypack transmitter
3. A lavalier microphone with a bodypack transmitter

### ***Why the pastor's best option is a headset microphone:***

The closer you can position the microphone to the sound source, in this case the pastor's mouth, the better.

A lavalier microphone is usually attached to the robe or lapel, which positions the microphone a few inches away from the sound source and not in the sound's direct path. For this reason, the sound is not as clear and becomes softer and louder when the pastor looks from side to side or up and down.

A headset microphone allows you to position the microphone right at the pastor's mouth or jaw line. When the pastor looks left or right – or even swivels to look behind – the microphone stays positioned at the mouth and the sound level remains the same.

It also enables higher gain-before-feedback. This lets you increase the pastor's volume level – as needed of course – with less risk of feedback. Since placing microphones as close to the sound sources as possible is the best way to avoid feedback, a headset microphone is a better choice for this reason than a lavalier.

Many pastors might object to the headset microphone for aesthetic reasons and there is very little reason to argue this point. But if you want to convince your pastor to go this route, you might want to try this little test: make recordings of two rehearsals, one using a lavalier microphone and one using a headset. When you play the recordings back, the pastor should hear the dramatic difference in sound clarity and consistency and can then decide just how much sound quality is being traded for aesthetics.

Also: headset microphones now come in a variety of colors and profiles. You might want to try to find one that matches the pastor's skin color and is less visually distracting to the congregation.

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### ***A praise leader or choir director***

Same choices as the pastor.

### ***A guitar or bass player***

Short instrument cable and a bodypack transmitter

### ***A few words on wireless systems for guitar players:***

In the past, wireless systems provided less than optimal sound reproduction for guitar players, especially bass players. Current wireless systems, with their ability to faithfully reproduce the lower ranges, come far closer to matching the sound you get from a wired instrument. More sophisticated models can actually provide sound that is indistinguishable from a wired instrument.

This means you have the confidence to help when the bass player asks, “Can you do something about all these wires?”



### ***A horn or woodwind player***

Clip-on instrument mic and a bodypack transmitter

### ***Guest presenters and a spare system***

Often, you will find you need another wireless system for a special guest or additional singer, for example. Since it is hard to determine beforehand what you need or what their microphone preference might be, it's best to get a system that includes multiple microphone choices, such as headset, lavalier, and a handheld mic.

But remember that each additional microphone will still need its own dedicated receiver on its own frequency.

### ***Drummers, keyboard players, and choir members***

Since not everyone on the platform will benefit from the added freedom of wireless, you should consider the “Mobility Test” (See Chapter V) before rushing to provide each musician and singer with a system of his or her own. Our recommendation is that anyone who is assigned a fixed position on the platform (such as drummers, keyboard players and choir members) be provided with wired microphones. While the cost for wireless systems has decreased and the ease-of-use has increased, there is still no reason to provide a wireless system to anyone who will not benefit from the lack of wires.

## Even more applications for wireless microphone systems:

### Congregation participation

A handheld wireless microphone gives the pastor and the praise leader the opportunity to let one or more of the members of the congregation add a few words or sing one or two lines of a hymn.

### Going from the lobby to the platform

More and more pastors are greeting the congregation as they arrive. Why shouldn't they be able to be heard by the entire congregation while doing so? With a wireless microphone system (and remote antennas), the pastor can be in the lobby or even outside while preaching to those already seated.

Then, as the last of the congregation arrives, he can begin the sermon as he walks into the main area, down the aisle and onto the platform.



Example of a wireless lavalier (lapel clip-on microphone)



Example of a wireless headworn microphone

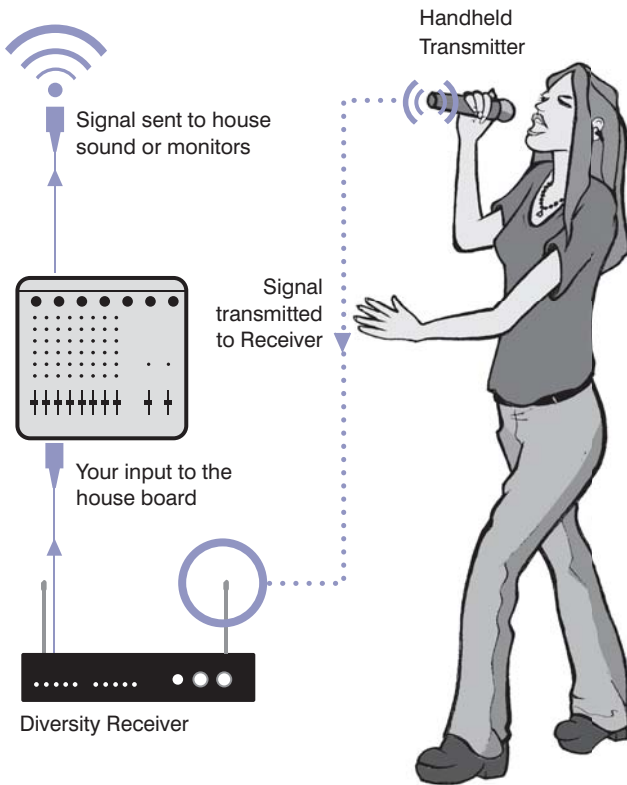


Example of a wireless guitar cable

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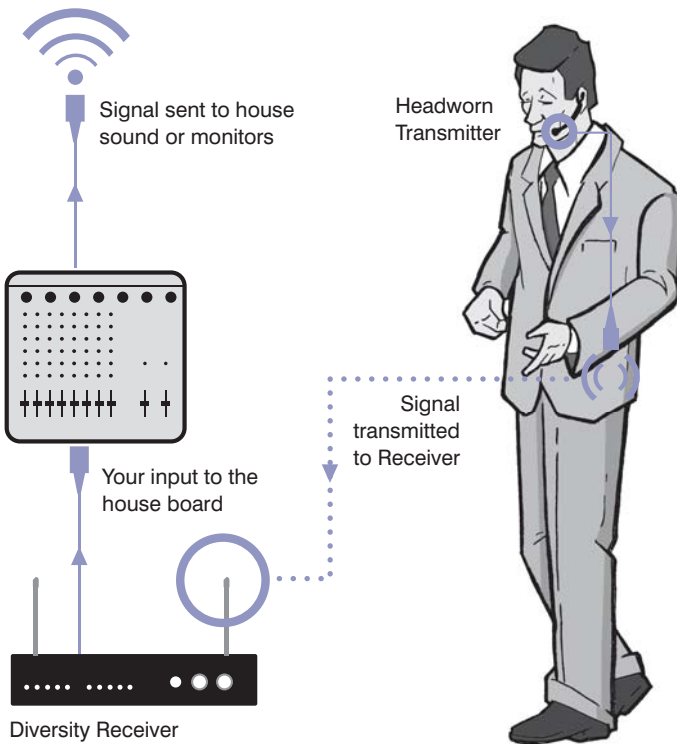
**WIRELESS MICROPHONE SYSTEM:**

**Handheld User**



## WIRELESS MICROPHONE SYSTEM:

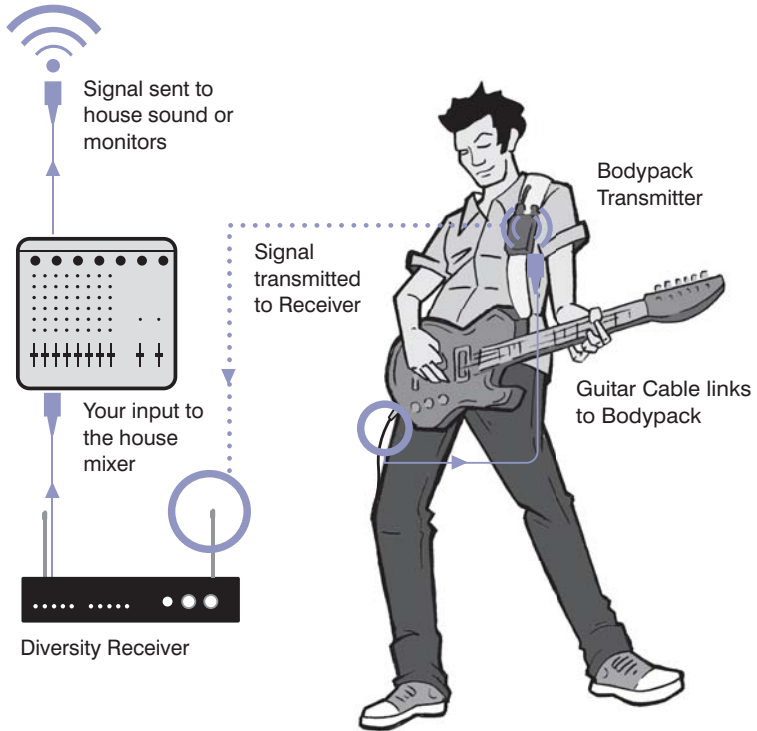
### Headworn User



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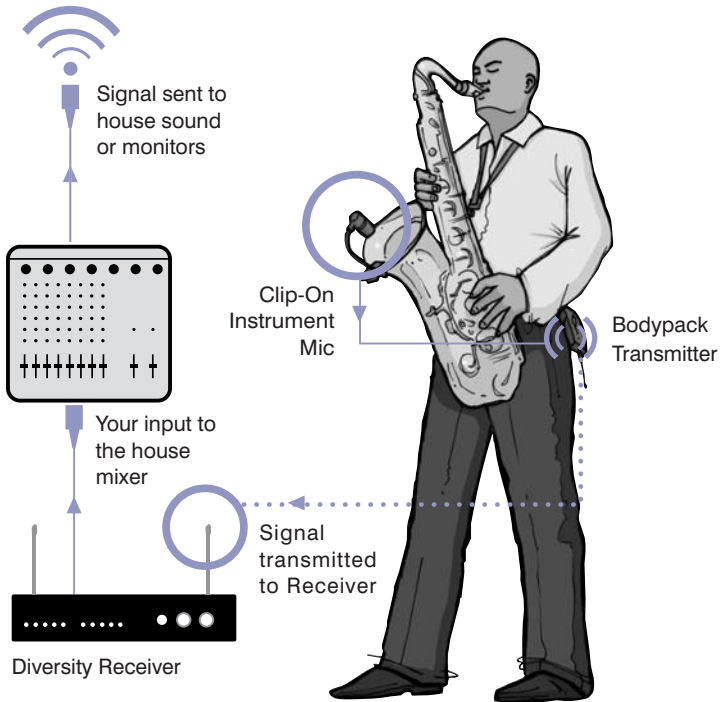
**WIRELESS MICROPHONE SYSTEM:**

**Guitarist/Bass**



## WIRELESS MICROPHONE SYSTEM:

### Instrumental User

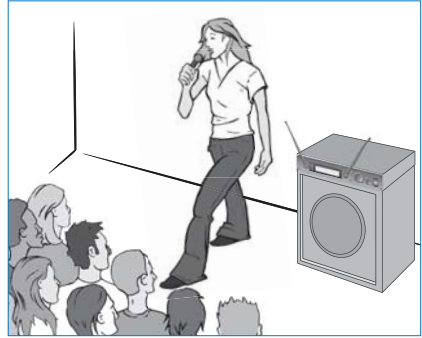


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### Outreach systems

Wireless microphone systems can also be used outside of the house of worship, either for dedications on the grounds or for taking into the community. In situations such as these, they greatly increase mobility and crowd participation without adding any complicated wiring.

Imagine having the sound system with loudspeakers and other sound equipment against a wall 10-20 feet away from where people might walk. Then imagine using a wireless microphone system to eliminate the cable that connects the pastor to the speakers. Now you have optimum flexibility for your event and no wires for anyone to trip over.



Example of an outreach system

### Other areas, live events, and portable churches

Wireless microphone systems are also perfect for other house of worship activities and events such as passion plays, community forums, and more. All the same advantages ... none of the cables. This makes for a more aesthetically appealing presentation, especially for holiday pageants.

They are also optimum for 'portable churches,' which rent space or move from location to location, since they eliminate any need to run wires and making packing up easier and faster. [See Chapter V for a further discussion on mobility for portable churches.]

#### ***Holiday pageants and wireless lavalier microphones.***

Through advances in wireless microphone technology, and the availability of more affordable systems, your holiday pageants can now include the freedom of movement that was formerly only available to professional theaters.

Bodypack transmitters are small and easy to conceal. Also, you can have many wireless systems in use at once. All this makes wireless microphones a great way to provide exceptional audio for all the main speaking and singing roles.

While we suggested earlier that you consider a headset microphone for your pastor, we suggest that you use lavalieres for your theater productions. They are easy to hide in costumes and wigs. They can even be taped right to a pair of glasses! This allows the congregation to hear each player clearly without seeing the microphones.

It also allows each person to concentrate on what is important: the production, not the microphone!



Additionally, wireless microphone systems can provide cordless sound to meeting rooms and fellowship halls, especially where people might be asking questions of the speakers. With wireless microphones, participants can share their experiences without having to shuffle out of their seats to where a wired microphone might be located.

Wireless microphones are perfect when it is more convenient and less disruptive for the microphone to go to the talker instead of the talker to the microphone.

## **Some considerations and technical details for more effective wireless operation**

### **Frequency Ranges**

Every wireless microphone system transmits and receives sound on a specific radio frequency. These frequencies are mainly grouped into two large bands, or ranges: VHF and UHF.

VHF means very high frequency and UHF means ultra high frequency. Each of these ranges has their advantages and limits. To understand the “whys” of frequency limitations would require a fairly technical discussion (see “Additional Resources” for guides on where to learn more), but for the purposes of selecting the proper wireless system, there are some simple guidelines and useful generalities:

- Each wireless system must be on a different frequency.
- Most wireless microphones share the same frequencies used by TV stations, both VHF and UHF. Since TV stations are much more powerful than wireless microphones – and since the Federal Communications Commission (FCC) requires you to do so – you need to avoid local TV channels.
- You also have to avoid frequencies that are already used within your house of worship or those in use by other organizations nearby.
- Most manufacturers have online tools to help you select the best range based on your model and location. They can also help select the right frequencies when multiple systems are used.



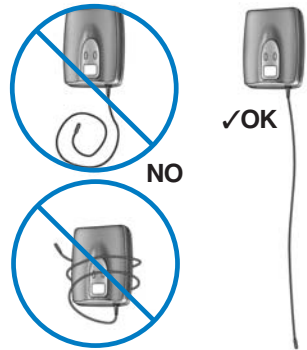
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### Receiver and antenna placement

Wireless microphone systems include antennas on both the receiver and transmitter.

Antennas range in shape, size and even quantity. Some can be obvious; such as on bodypack transmitters while others are located internally; such as for many handheld transmitters. Some receivers, for example, have two antennas (called *diversity*) while others only have one (called *non-diversity*).

Here, again, the discussion can quickly become technical, so we have outlined a few basic principles to help you avoid interference and increase the likelihood you will get clear audio.

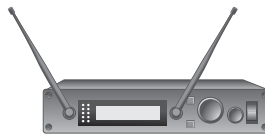


Proper and improper antenna positions

- Antennas of bodypacks should always be kept as clear as possible from obstructive surfaces or materials. Never curl up the antenna into a pocket, or wrap it around the bodypack.
- Remote or receiver antennas should be placed above the congregation or other obstructions so the transmitter and the receiving antenna can 'see' each other. This is called 'line of sight.'
- Never let antennas touch one another.
- When mounting receivers onto racks:
  1. keep them a few feet or rack spaces away from CD/DAT, DSP, and digital effects units as this may cause interference and
  2. make sure you have not compromised 'line of sight,' which usually means you should mount the antennas in the front.



Example of a single antenna receiver



Example of a diversity receiver

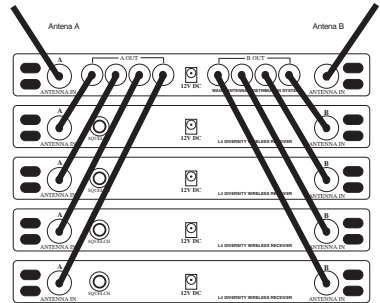


Example of a remote antenna

- Single antenna receivers are usually more affordable, but they are also more susceptible to loss of signal (called dropouts).

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- Diversity receivers provide superior performance in any environment and when budget allows, are preferable.
- Remote antennas are recommended when wireless microphone systems are being used in more than one location (such as when the pastor walks in from outside, through the lobby and into the auditorium).
- For locations where a great number of wireless microphone systems are being operated at once, you can use an antenna distribution system. An antenna distribution system reduces the total number of antennas needed and can help improve overall performance.



Antenna distribution system

### **Power**

Unlike wired microphones, all wireless microphone transmitters require batteries. As the batteries run down, the performance of the wireless system begins to suffer. For this reason, keep these tips in mind:

- Use fresh batteries. Weak batteries can cause short range and distortion.
- Check your batteries before each service. We actually recommend using new batteries for each service.
- Alkaline batteries are recommended since they provide longer, more consistent life than rechargeable or basic (carbon-zinc) batteries for wireless applications. While lithium batteries can last longer, the difference in cost might not be worth the additional life.
- Rechargeable batteries are not desirable as they usually last less than three hours and are not as strong initially as alkaline batteries. In fact, rechargeable batteries don't typically start with enough power needed for a wireless system.

### **How to select the right wireless microphone systems for your House of Worship**

While the best idea is always to discuss your requirements with a sound contractor or an applications specialist at the manufacturer before making a final decision, it's generally just a matter of asking yourself four questions:

#### **1. Which microphone/transmitter configurations best fit our needs?**

# HOUSES OF WORSHIP

Earlier we have shown the components of a wireless system and some of the set-ups that best fit the individuals who might be using them. Count the number of users and/or rooms that might require any of the following configurations:

- Handheld microphone (with built-in transmitter)
- Headworn microphone with bodypack
- Lavalier microphone with bodypack
- Clip-on microphone with bodypack
- Instrument cable with bodypack



## 2. *Where do we intend to use our wireless systems?*

### *One location? Many locations?*

*One location* – If you intend to use your wireless microphone system(s) in one location, you only need to make sure you select a system that operates on frequencies compatible with your locations VHF or UHF broadcast TV channel frequencies.

*Multiple locations* – If you intend to use your wireless system(s) in different towns or neighborhoods, you will likely encounter different active TV channels. Here, you should make sure your system(s) are frequency-agile (that is, allow you to change frequencies as you move from location to location).

You will also want to consider mounting your receiver(s) in a small rack case to make it easier to transport – especially if you are bringing more than one wireless system with you.

*International* – Very few wireless microphone systems work worldwide. If you are planning to use your wireless systems in foreign locations, you need to be even more careful about frequency selection (especially since you might be violating the laws of that country by operating on reserved frequencies). It is best to rent or borrow systems in other countries.

**Tip:** visit [www.shure.com/frequency](http://www.shure.com/frequency) to learn more about which frequency ranges are best for your requirements.

## 3. *Do we need one system or many systems?*

*One system* – if you are operating one system in a location where no other wireless systems are in use, then you will not have any multisystem needs to manage.

*Multiple systems* – If you plan to use more than one wireless system, you will need to carefully select frequencies to make sure that each system is compatible with the others. Also, there is a limit to the number of wireless systems that can be used in one location, which brings us to the final consideration:

#### **4. How much do we want to spend?**

The adage that you ‘get what you pay for’ holds true with wireless systems. While the prices have come down and the features have improved, you still need to weigh your budget against your needs – especially when you are buying multiple systems for one location.

Better wireless systems allow you to operate more units at the same time without interference and are able to operate across larger bands of frequencies.

The key to any wireless system is the confidence you have in its ability to provide sound clarity that rivals its wired cousins. Your need for user-friendly features to locate open frequencies, avoid dropouts, and get clear consistent sound has not gone unnoticed by the manufacturers of these systems. More and more wireless systems are now including increasingly sophisticated technologies, such as ‘autoscan’ and ‘Audio Reference Companding,’ to help users get the sound and signal they want without having to worry about the technical issues. Before making any major system purchases, you might want to spend a little time researching the latest features and comparing their costs and benefits to your needs and budget.

#### ***The last word on wireless:***

Obviously the most important issue to keep in mind when making any decision about sound equipment for your facility is the benefit to the congregation. With all things being equal as far as what is heard, you should appreciate that the advantages of wireless are visual as well as audible; the front of the platform looks neater without all the cables. And giving your vocalists, pastors or worship leaders the freedom to move around and concentrate on their message could add significantly to the impact of a service.



### **Questions about wireless microphone systems:**

This booklet was created as a direct result of the many questions we, at Shure, have received from the House of Worship community about wireless microphone systems, personal monitoring systems and earphones. We have tried to answer most of these questions within the text itself, but some did not quite fit, were questions about our proprietary solutions, or required a more direct response. Answers to these questions are included in the Questions and Answers sections at the end of the three main chapters. If you do not see the answers to your specific questions, you will find more in Chapter VI, *Taking Your Sound To The Next Level*.

#### **Is there anything specific to a House of Worship that might cause interference?**

Yes. The house of worship across the street or any other organization within 100 yards might also be using wireless microphone systems. These systems could be set on frequencies that interfere with yours. If you suspect they might be using wireless systems, you should ask them which frequencies they are using and avoid these when selecting your systems.

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Additional sources of interference include:

- robes with a significant amount of metal threading
- digital devices or digital processors (such as CD or DAT players/recorders, DVD players, computers, Digital Signal Processors) located too near the wireless receivers

### **How many wireless systems can I use at one time?**

This varies by frequency, model and manufacturer. While you can use a significant number of total wireless systems at the same time you need to be careful to coordinate the frequencies correctly. This is covered somewhat within this booklet, but it's best to contact a sound contractor, your audio representative, or the manufacturer if you want to use more than the number of microphones indicated by the model you choose.

### **How can I make sure that the multiple systems are not interfering with each other?**

First, it is always a good idea to consult the manufacturer's guidelines for frequency selection.

Second, you might want to perform a listening test. Turn all of the systems on at once. Put the transmitters where they will be during the service.

Then take each transmitter and, while talking or singing, walk around the entire worship platform and even up into the back rows. You will then determine if there is any interference and check for dropouts at the same time.

Note that this will only help you determine if your own systems are compatible. Systems being used by nearby organizations might still cause interference. If you are unsure where the interference may be coming from, contact the manufacturer of your wireless system.

### **Can I mix and match wireless systems from multiple manufacturers?**

Yes, but here again frequency coordination could be an issue. It's best to contact a sound contractor, your audio representative, or one of the two manufacturers directly before doing so.

### **Do wireless microphones increase the likelihood of feedback?**

Not because they are wireless, but because of the ability to take the microphones places where the feedback might occur. (I.e. the pastor walking in front of a loudspeaker)

### **Can I bring my wireless microphone on the road with me? ...to other houses of worship?**

This is covered within this booklet, but the short answer is: maybe. It depends on the frequency at which your system is set. If it is on the same frequency as a local TV channel or another wireless system, you will have trouble. If you know you will need to travel before you purchase the system, you should consider one that is frequency agile or can automatically search for open frequencies.



**What is ARC?** ARC or Audio Reference Companding is a proprietary Shure solution that enables a wireless microphone to sound more like a wired microphone, with less noise and greater dynamic range than other wireless systems.

***Tell me straight. Don't wired microphones sound better and aren't they easier to use?***

Many people believe wired microphones sound better than their wireless counterparts, but this gap has closed dramatically in recent years. Additionally, most people now believe that the added mobility of wireless microphones more than offsets any perceived difference in sound.

## **Digital Wireless Systems**

Recent advancements in digital wireless microphone technology and design have given the user of wireless microphones access to better sounding, better performing systems. This digital technology has positives and negatives.

### **Positives:**

- *More natural wired-like sound.* The limitations of analog wireless required a compression stage in the transmitters and expanders in the receivers. In digital systems there is no need for this. Digital wireless systems can preserve full dynamic range and audio quality without the subtle but unwanted changes to the original sound of the microphone or guitar.
- *More simultaneous systems.* When implemented properly, digital wireless systems create less problems and conflicts with other wireless systems. If you anticipate the need for significant expansion of your wireless mic/instrument use, digital systems are worth considering.
- *Operation outside of the TV band.* Some digital wireless systems operate in frequency ranges not shared by television broadcast, so the number of TV stations broadcasting in a particular city will not have any effect on the systems.

### **Negatives:**

- *Latency.* Because it takes a little time to make the analog to digital (and subsequent digital to analog) conversion in digital wireless systems, there is always some inherent delay or “latency” in the signal as it gets processed, transmitted, and processed again. Too much of this latency is distracting to the user and can create timing problems with musicians.
- *Operation outside the TV band.* Yes, this is a positive and a negative. Because operation outside the TV band also puts you in the same frequency range as unlicensed consumer devices, there is a chance that you may get some interference from unexpected sources. Some systems in the unlicensed, non-TV frequency bands have built in some protection by using “frequency hopping” or spread spectrum techniques.
- *Cost.* There is usually some premium to pay for digital wireless above the price of similar analog wireless.

# Introduction to HOUSES OF WORSHIP

## CHAPTER 3

### PERSONAL MONITORING SYSTEMS

#### Descriptions/Types

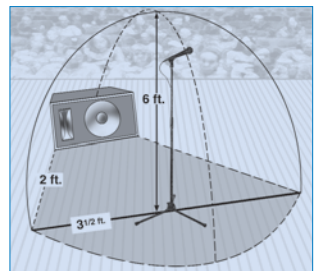
Praise and worship leaders and musicians all need to hear themselves as they speak, sing and play. Otherwise, they will have little idea if they are on key, on cue, or even on at all. For this reason, they need to monitor their sound.

Traditionally these monitors have been speakers (called *floor monitors* or *floor wedges*) aimed towards the individual – instead of towards the congregation – and often include just a portion of the overall mix.

As you have likely heard, the sound on the platform itself is usually loud, confusing, and requires the musician to stand in front of a monitor loudspeaker in order to make any sense of what he or she is hearing.

#### There are many downsides to floor monitors:

- **They are the major reason why the platform is so loud.** So loud, in fact, that the main members of the worship team have trouble hearing and being heard. When musicians can't hear themselves and ask to have their monitor volumes increased, they frequently get involved in a "volume war," creating an endless cycle of ever-increasing levels on the platform.
- **The congregation in the first few rows can hear these speakers.** This increases the overall volume of what they hear while decreasing the overall clarity – especially since they are hearing only parts of the full sound from in front of them and the entire sound from behind or sides. Since the congregation has to concentrate more to hear clearly, they get tired more quickly (this phenomenon is called listener fatigue) which dramatically decreases the overall impact of your service.
- **They negatively affect the quality of the sound.** Monitors can be reflected off a wall behind the platform and cause echoing and timing problems. Additionally they only provide a 'mono' sound to the people using them, making them inferior to other modes of monitoring.
- **Floor monitors limit mobility,** since the praise leader and the musicians must stand in a 'sweet spot' to hear themselves play.



Sweet spot created by a monitor wedge



- **The monitors and cables used to operate them make for a messy platform**, hinder line-of-sight for the people in the front, and add obstructions for the worship team.
- **Floor monitors are the primary cause of feedback.** The #1 reason for feedback is when a microphone picks up sound from a loudspeaker. Since the floor monitors point directly at people using microphones, the likelihood of feedback is considerable.
- **They are heavy and hard to transport to other venues.** This is a large concern for bands that take their worship on the road and for portable churches.
- **There are hidden costs to floor monitors**, since they also require amps and cables, as well as possibly an EQ system.
- **Last, but far from least, floor monitors increase the risk of damage to your hearing.** Most musicians like to turn their monitors up to hear themselves better, which, if done too much and too often, can lead to serious and permanent hearing loss.

So the question now, is: "If floor monitors are not ideal, why do so many houses of worship still use them?" The answer is simple: because only recently have good in-ear monitor options become more affordable and accessible.

Now that personal monitoring systems are appearing on the platforms of even the smallest houses of worship, it's a good time to understand their advantages, learn how to select the personal monitor systems for your needs, and find ways to maximize your investment in this technology.

**First, let's look at a typical personal monitor system:**

Personal monitor systems come in both wired and wireless versions:



Example of a wired personal monitor system



Example of a wireless personal monitor system

**Wired personal monitor systems include two main components:**

1. Bodypack receiver – receives the sound via an input cable directly from the mixer; often includes controls and status lights
2. Earphones – connect to the bodypack and direct the sound into the ear canal of the user

## Introduction to HOUSES OF WORSHIP

**Wireless personal monitor systems include three main components:**

1. A transmitter – converts the sound from the mixer into an RF signal, the same as done by wireless microphone transmitters
2. A wireless bodypack receiver – receives the RF signal from the transmitter and converts it back into sound
3. Earphones – the same as used for wired versions



Single-driver earphones with ultra soft flex sleeves

### **Earphone foams and sleeves**

While the earphone is a critical component to any personal monitor system, there is a component to the earphone that is just as critical to the entire in-ear monitoring experience: the sleeves.

Made from rubber or foam, these ‘sleeves’ attach to the end of the earphone and are the only part of the system that makes direct contact with your ear. For this reason, they must be comfortable, secure, and isolate correctly.



Triple-flange sleeves



A selection of earphone sleeves

Some personal monitor systems come with a collection of these sleeves in various sizes. Since everyone’s ears are different, finding the proper sleeves is, possibly, the most important aspect to getting the best sound from your personal monitor system.

It is important to consider all of the following tips and techniques:

- The earphones should come with a number of sleeve options such as foam and rubber, as well as small, medium, and large. Make sure all the people using earphones try all the various sizes and types, not just the ones that “look” right.
- Of the sleeves that come with the earphones, the foam type that expand to fit the ear canal usually provide the most isolation. Make sure everyone tries these before settling for rubber ones.
- Consider a custom-molded sleeve. Talk to your audiologist or contact a company that provides these. Since they will be made to precisely fit the user’s ear canals, they will provide the best combination of isolation and comfort.

**Optional components:**

While the praise and worship team members can get all the advantages of using personal monitors 'straight out of the box,' there are a few components that are worth considering.

***Personal monitor mixers***

This type of mixer gives the user control over his or her own mix without affecting the signal path to the main house mixer.

A personal monitor mixer puts more control on the platform instead of relying so heavily on the person at the soundboard ... if that person even exists. Also, once set, the personal monitor mixer 'remembers' these settings so your praise ministry can have the same mix at every service.

This is of particular interest to 'portable churches' (churches that rent space on an hourly basis), which require fast set-up and tear down, but refuse to sacrifice sound quality for speed.

A personal monitor mixer is also useful for praise bands that travel and want to bring their pre-set mixes with them. This allows the control they need without relying too heavily on the person running the sound at the house of worship.

***Hybrid bodypack receivers***

These receivers are capable of working with either wired or wireless systems. If your budget only allows for wired monitors, but you expect to be able to upgrade to wireless in the near future, hybrid bodypacks might be a good idea. This also lets you match your monitor configuration to the particular need of the musician, since there are times when a wired system is the better choice (e.g. a drummer). Additionally, there are systems that can be used wired and wireless at the same time for added flexibility and adaptability (such as a click track plus a mix of the service).

***Digital mixer***

When used with personal monitors, digital mixers can recall your individual mixes time after time, exactly as they were rehearsed in every environment regardless of any acoustic challenges.



Example of a digital mixer



Example of a hybrid bodypack

## Introduction to HOUSES OF WORSHIP

### ***Ambient microphones and other ways to solve isolation issues***

No discussion on Optional Components for Personal Monitoring would be complete without some consideration of how to add the congregation into the mix, ambient microphones in general, or how to feel the music. These topics are discussed in a later section entitled “Is too much isolation too much of a good thing?”



Example of ambient miking

### ***What is “Distributed Audio” and what does it have to do with Personal Monitoring?***

Distributed audio refers to devices that accept analog audio from a mixer or other source, convert this signal to digital audio, then send this signal to a destination via Category 5 (CAT-5) cable (which is high performance digital transmission cable also used for Ethernet connections). At the end point it can be converted back to analog and used however necessary.

The devices at the receiving end of the distributed audio network can be DSP devices, digital mixers, or an individual multi-channel “personal mixer” for monitoring.

The advantage of using a distributed audio system is the increased distance allowed between devices, plus the fact that CAT-5 lines are often already installed in many facilities.

Distributed audio therefore becomes very useful for monitoring systems since getting multi-channel mixes to many people becomes that much easier. Also, you can transmit the personal mix to anyone who wants the added mobility of wireless but also wants a customized multi-channel mix they can control with the personal mixer.

## **The benefits to using personal monitoring systems in a House of Worship**

Personal monitors allow the pastor, praise leader, musicians and choir leader to personally hear just what they want without affecting what others hear. These systems are comfortable, wearable amplification devices that are designed to replace floor wedges with earphones that are worn ‘in ear.’

The advantages for the people on the platform and the overall house of worship sound are numerous:

### ***Greater control:***

Personal monitors provide the ability to select precisely which mixes the user wants to hear. They allow the user to control the volume and balance of these mixes.

More advanced systems let the users hear two different mixes and control the levels of these mixes.

Examples of this would include:

- The entire praise band as one mix AND the vocals as the second mix
- The sound from the platform as one mix AND the congregation through ambient microphones as the second mix
- The pastor (discreetly) as one mix AND the praise band as the other
- Or for the drummer: The praise band as one mix AND the click track as the other

### ***Lower volume levels with higher sound quality:***

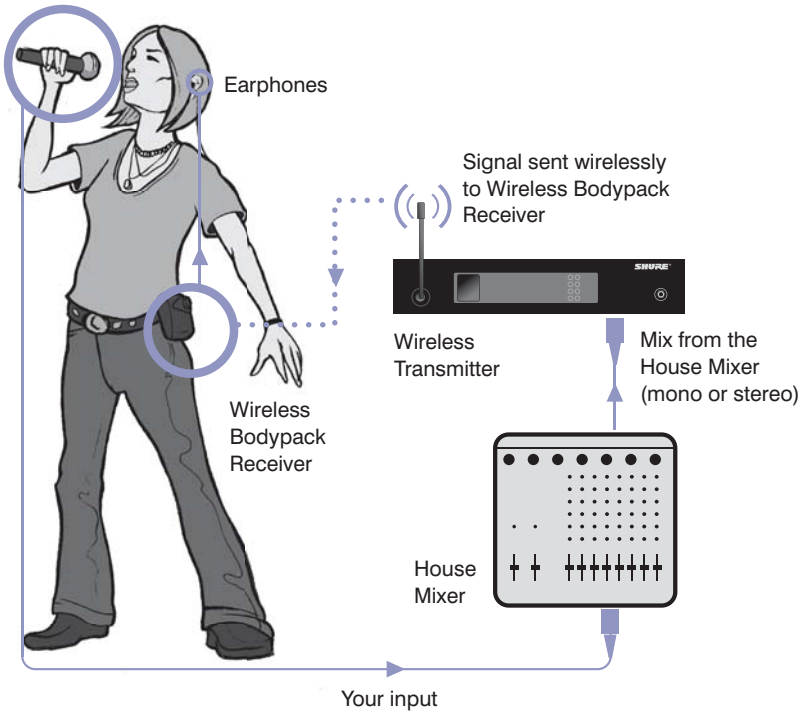
When the musicians and others are ‘in ear’ they enjoy high-fidelity sound at lower volume levels and with less interruption from outside noise.

Let’s say, for example, the music is especially loud (which could be good). Should a musician decide to increase their monitor volume ever so slightly, they can do so by using a control at their waist instead of having to signal to (and wait for) the sound engineer. Plus, the increase in sound cannot be heard by anyone else on the platform, which avoids any resulting ‘volume wars’ where the other musicians must now increase their monitors to hear over this additional platform noise.

Introduction to  
**HOUSES OF WORSHIP**

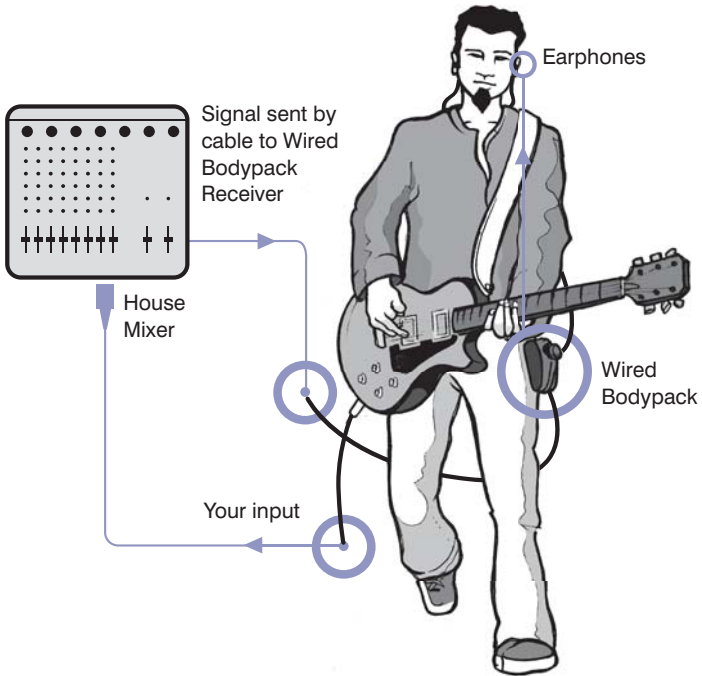
**PERSONAL MONITOR SYSTEM:**

**Vocalist Setup**



## PERSONAL MONITOR SYSTEM:

### Guitarist Setup



## HOUSES OF WORSHIP

### ***A few words on the importance of hearing conservation:***

We have touched on this earlier and we strongly believe that if you consider personal in-ear monitors for no other reason, you should consider them for hearing conservation benefits.

The potential danger of continual exposure to performance-level sound has been shown to cause permanent and significant hearing loss. This is why hearing conservation should be of serious concern to anyone who is a regular participant in auditorium-level sound and for those who recommend audio solutions.

Please note that people can still suffer hearing damage while using a personal monitoring system. Using any audio equipment improperly, without the limiter engaged, or at high-volume sound levels can be damaging to hearing.

For more information, talk to an audiologist or your doctor.

### ***Decreased vocal strain:***

In order to compete with the sound coming from the floor wedges, singers often sing louder than necessary. This causes vocal strain and, unless the sound engineer is able to lower this sound level, also decreases the quality of the music. When the singers have the ability to better adjust what they hear, they do not need to sing louder to hear themselves, so they can sing more naturally. This is better for their throats and, of course, for the congregation's ears.

**Tip:** You might notice that when some singers try personal monitors for the first time, they will have a tendency to “under sing.” This is because they hear themselves so well now they believe they are singing loudly enough. A good trick here is to turn their mix down somewhat so that they will produce the necessary level from their voice.

### ***Virtually no chance of feedback:***

Feedback is caused by sound from loudspeakers leaking into live microphones. The louder the sound and the closer the speakers are to the microphones, the more likely you'll get degraded sound for the audience and, when the volume is too great, feedback.

Since personal monitors do not throw sound back towards the microphones, as wedges do, the chances for feedback from this source are eliminated.

### ***Portability:***

This is an important benefit, of course, for touring groups, but it is a major time and back saver for those churches which meet in rented spaces, such as schools, hotels, etc. Why lug around floor monitors, racks of amplifiers, equalizers (EQs), and cables, when you can have a small bag with your whole monitor system in it?



***Greater mobility:***

When the sound is directly in the musician's ear, it makes little difference where he stands on the platform ... or off. He will hear the same mix at the same levels, which allows for more movement and interactivity. Suddenly, the entire platform is his "sweet spot".

Obviously this is more of a benefit for those who choose wireless personal monitor systems.

***Fewer platform perils:***

Here again, what you lose is what you gain. With personal monitors, you eliminate the floor wedges as well as the cables attached to them. This provides a cleaner, more aesthetically pleasing worship space with fewer boxes and cords to trip over.

***The #1 reason to use Personal Monitors? Improved sound quality for everyone:***

The most important benefit of using personal monitors in a house of worship is the overall improved sound clarity for everyone involved. All houses of worship, regardless of the acoustic challenges they often present, will benefit from personal, in-the-ear, monitor systems. And the benefits will be obvious to the congregation.

**What else can you do with personal monitor systems?**

On the following pages, we have outlined a few additional uses that are applicable to houses of worship. We expect that once you have decided to include personal monitors in your house of worship, you will find many more.



## Introduction to HOUSES OF WORSHIP

### ***Enable discreet communications***

Pastors, praise leaders, and choir leaders can receive spoken cues and information during the service, either from others on the platform or even people elsewhere in the house.

Here are two examples of how this might work:

1. Provide your pastor with a lavalier microphone that goes only into the praise leader's mix. In this way, the pastor can give the praise leader cues, such as changing the hymn or increasing the length of a particular song.
2. Add the producer's microphone to the pastor's mix. Now the pastor can receive cues from the person responsible for making sure the service runs smoothly.

Other times a user might want to receive spoken cues include:

- Providing timely information or details to the pastor or others during community meetings.
- To prompt on-stage directions or missing lines to actors in theatre productions and skits.
- Whenever you feel that someone might need to receive information discreetly.

### ***Cue to the next part of the service.***

More and more houses of worship are including pre-recorded music or events into their services. Personal monitor systems allow the wearers to hear these recorded events as they are being faded into the service. The musicians can soften their music accordingly or add any lead-ins right on cue. This provides the congregation with a more seamless experience.

### ***Bring the service to a conference room or the nursery***

Personal Monitor Systems can also be used to bring audio to another part of your church. Let's say you want to bring the sound of the service to the Nursery and you don't want to punch holes through the walls to lay speaker wire...

It's just like setting up a wireless mix for a musician on the platform. Place the bodypack for the personal monitor system onto a powered loudspeaker in the nursery. Insert the personal monitor's earphone jack output into the loudspeaker's input. This should let the people in the nursery hear the entire mix.

If you add ambient sound [See "Add the congregation to the mix" later in this chapter] you can provide the Nursery – or any room – with the complete audio experience.

Not only do you have halls without walls, you have just created what is technically referred to as a "Point-to-Point" wireless system.

**Tip:** By using a ‘battery eliminator,’ you can power the bodypack from an electrical outlet, which will save you from having to ever replace batteries.

### **Better rehearsals**

It is very infrequent that the praise band has the luxury of rehearsing on the actual platform. Personal monitors can quickly turn the worst rooms into a great place to practice, allowing you to hear more clearly by virtually eliminating the rehearsal room’s poor acoustics.

#### ***Is too much isolation too much of a good thing?***

Personal monitors are designed to help improve the overall sound and provide isolation from platform noise and other distractions. It is this ability to create isolation from outside sound that allows people to listen to their mix at a more comfortable level. This level is typically lower than that of the platform.

One of the challenges, however, is to make sure the people on the platform are not entirely cut off from the service.

Here are two ways to help users get the isolation they need, yet feel as though they are taking full part in the worship. In other words...

*Here’s how you can make personal monitors sound really great:*

#### ***Add the congregation to the mix***

With a few strategically placed microphones, you can add the sounds of the congregation to the mix that is being sent to the personal monitor systems.

Once you have done so, the praise leader and other musicians will be able to hear the congregation without having to resort to removing one of the two earphones, which should be discouraged since doing so eliminates most of the benefits that the personal monitors provide.

#### ***Some tips and techniques for ambient miking:***

- *Place the ambient microphones on the edges of the platform facing the house. It is best to position the microphones in front of, above, and aimed towards the faces of the congregation.*
- *Do not place the microphones in the congregation.*
- *Make sure the microphones are properly oriented, so the microphones send signals to the correct ear. For example: It is important that sounds from the left side of the house are heard in the left ear of anyone monitoring the sound.*

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- *When selecting which microphones to use, treat the congregation as you would a large group of singers. Condenser microphones with a cardioid polar pattern are usually best.*
- *Do not be tempted to use shotgun microphones.*
- *Overhead (ceiling-mounted) microphones can be used, but are often far less effective and harder to control than on-platform microphones.*



### **Let the musicians 'feel' the music**

Try a 'butt-kicker' (also called drum throne shaker) to recreate the vibrations that drummers and bass players hear and feel when low-frequency sounds are amplified. Placed on the user's stool or beneath a riser, they provide physical vibrations along with the music.



Example of a drum throne shaker

## How to select the right personal monitor systems for your House of Worship.

When selecting personal monitoring systems for your house of worship, you need to answer all of the following questions:

1. How many people will be using monitors?
2. Will the users be stationary or will they want to move freely around the platform?
3. Can they share monitor mixes or will they need to have their own?
4. Stereo or mono?
5. What is the best use of your budget?

Answering these questions correctly, and fully, before purchasing personal monitor systems will help assure you have the flexibility to meet the widest variety of services and that you have used your budget most wisely. With that in mind, let's look at each of these questions individually:

### 1. How many people need monitors?

First, consider the benefits to all of the people on the platform. Then decide if a personal monitor makes sense for each of these members of your worship ministry.

**The praise leader** – can hear her band and/or her instrument with no distractions; can sing at a level that is comfortable and more natural; can receive cues from the pastor or off-platform, as well as give her own cues back; can select what other mixes she wants to hear.



## Introduction to HOUSES OF WORSHIP

**The members of the praise band**, including guitarists, drummer, bass player, background vocalists, keyboardist, etc. – will be able to hear their own sounds without the ‘volume war’ associated with floor monitors; can hear the click track directly; can receive cues from the praise leader.

**Tip:** You probably already know which members of your praise band are the biggest ‘volume war’ offenders. This could be the best place to start when trying to get your team to adopt personal monitors.



**The choir leader** – all the same benefits as the praise leader. Choir leaders most commonly use personal monitors to hear the blend of the choir in the background.

**The lead singers or the choir soloist** – can sing at a level that is comfortable and more natural; can receive cues from the praise leader; can select what other mixes to hear; can stop worrying about echo or reverberation.

**Note:** Since choir members do not commonly monitor their sound, there is rarely a need to consider giving anyone except the soloist a personal monitor system.

**The pastor** – can benefit from being certain his or her message is heard more clearly; can speak and hear at levels that are more comfortable and natural; has the ability to receive discreet cues and other information; can choose which mixes he or she wants to hear.

**Audio/Tech engineer** – will also find many uses for a personal monitor system. A great technique that is employed by many audio engineers is using in-ear monitors to select the right spot for microphone placement, especially for room miking. When listening to the microphone with in-ear monitors, the audio engineer will hear only what the microphone hears and none of the reflections from walls or other obstructions. This makes selection of the best locations for microphones an easier and more accurate process. This is also useful when placing microphones in front of loud instruments like guitar amps and kick drums. The engineer can walk right to the front of the amp cabinet with a microphone and position the microphone for the best sound – without being exposed to the louder than normal sound pressure levels.

## **2. Will the users be stationary or will they want to move freely around the platform?**

Now that you have counted the number of people who might need personal monitors, determine whether or not they need to move freely around the platform. This will help you decide whether they can use wired personal monitors (which are less expensive) or if they might need the mobility of a wireless personal monitor. [See Chapter V for a further discussion on mobility.]

A good rule of thumb is as follows:

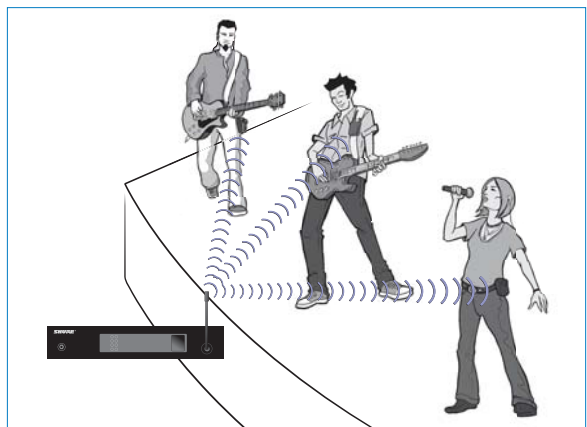
- Get wired versions for the drummer, keyboardist and back-up singers – all will likely remain in a fixed place during the service.
- Choose wireless versions for the praise leader, guitarists, the pastor and any soloists – as they will benefit more from the freedom to move about the platform. It is also a good idea to get the choir leader a wireless system, since he or she is standing in a place where cables might cause other ministry members to trip as they go by.

## **3. Can they share monitor mixes or will they need to have their own?**

First determine how many mixes are presently used and if this number of mixes would suffice.

Then, alongside where you noted whether each user required a wired or wireless version, make an additional notation. This one is for whether they can share the overall mix or might need to have a personal mix.

**Shared mix** – Everyone sharing a monitor mix will be listening to the same exact mix. So long as they can all agree, sharing a mix is an easier and more cost-effective way of providing ‘in ear’ monitoring for a larger number of people.



A single personal monitor transmitter can send the same mix to multiple receivers.

## HOUSES OF WORSHIP

**Tip:** When two or more users are able to share the same mix, you need only give them backpack receivers and can use a single wireless transmitter to send this mix to them all. For example: If a few members of a praise band want to hear the same mix, they can utilize the same wireless transmitter. This will let you provide two or more users with wireless monitoring for a lower cost than if they all have their own transmitter.

Remember: Every mix requires its own transmitter, but each person who monitors that mix only requires a receiver.

**Personal mix** – The situation may occur, where each user has their own requirements for monitoring. Everyone wants to hear a mix that’s a little different from the rest. Each unique mix would require a dedicated transmitter.

**Tip:** If your current mixing console does not distribute enough mixes (“auxes”) to support all the mixes you need, you might reconsider sharing mixes. The other options would be investing in a dedicated monitor mixer, or upgrading your console.

#### 4. *Mono or stereo ... or more?*

In *mono*, both earphones reproduce the same audio. Not optimal, certainly, but often this is the lowest cost solution.

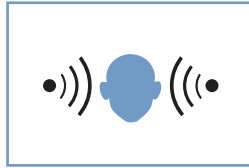
In *stereo*, the earphones produce the fullest, most accurate monitor sound available. These include both a Left and a Right signal – just like your CD player and stereo system – and also enables lower listening levels by separating sounds spatially instead of purely by volume. For example, this lets a praise band with two guitar players hear one guitar in the left ear and the other guitar in the right ear, creating a more realistic listening environment. Also: If you include the congregation as one of the mixes, a stereo system will allow you to hear them more naturally, with sounds from the left side of the house coming through to your left ear, for example. In short: *If you can afford stereo, which most systems now provide, it is well worth the additional cost.*

**Note:** You need to make sure your present mixing console has the ability to transmit a stereo mix, or you might not be able to use this feature.

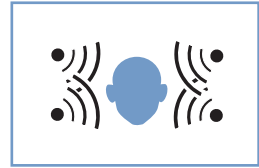




Mono



Stereo



MixMode®

There is also...

- dual-mono; in which one stereo transmitter sends out two monaural mixes. In this case the users decide which mix to hear by using the pan control on their receiver.
- MixMode®, which is a proprietary Shure solution that allows you to hear two separate signals (such as a vocal and a band mix; or the band and a discreet communications channel) in both ears. With MixMode, the user can control the ‘blend’ or the relative volume levels of these two mixes with the balance (pan) control.

### **5. Determine your budget.**

As with any purchasing decision, the amount you can afford to spend becomes a factor in what product features are ‘need to haves’ and which are ‘nice to haves.’

Fortunately, the increased popularity of personal monitor systems has resulted in a wider variety of options to meet nearly any budget. Also, you can easily upgrade and add systems over time. (See Chapter V, “Start Small.”)

## Introduction to HOUSES OF WORSHIP

### Questions about Personal Monitor systems:

#### Can we try a Personal Monitor system before we buy one?

This is possibly the most common question we receive.

The answer is “yes,” but it is unlikely you will get this answer at your local audio retailer, since they are probably not set up to do so. There is a good chance your sound contractor or audio representative can help arrange a trial. If not, contact the manufacturer directly. Often, they can help arrange a demonstration unit.

#### They feel strange, but everyone says I will get used to them.

##### How long will that take?

You should get the hang of inserting and wearing the earphones after just a few rehearsals or services. Adding the congregation’s participation to the mix, by use of ambient microphones, can help remove some of the isolation. Either way, as with any new technology, you will soon get used to them and will just as quickly wonder how you expressed your worship without them.

#### Do I need a transmitter for everyone using a personal monitor system?

No. In many cases, more than one user can share the same transmitter, so long as they listen to the same mix and each have their own bodypack receiver, and earphones.

#### What if some band members want a personal monitor and some don’t?

For maximum benefit, it is recommended that all band members be ‘in ear.’ In situations where some band members resist or budget does not allow you to provide personal monitors to every one in the band, it’s acceptable to dip your toe in the water when bringing in these new technologies.

Some people take more time adopting earphones and forcing them to use something that makes them uncomfortable might affect their worship... which is not a good result.

While giving personal monitor systems to only one or two members of your praise band will not remove all the cables and wedges from the platform (which is the ultimate goal) it *will* decrease the number of wedges you require and will certainly help lessen the ‘volume wars.’

Eventually your more reluctant team members will begin to see the advantages of personal monitor systems and might even dive in themselves.



**I only have one output available on the mixer and I use that for the wedges.**

**How can I add personal monitors?**

Most personal monitor systems can also be used as pass-through devices for other personal monitors or floor monitors.

Here's how to do it:

1. Connect the input of the personal monitor transmitter to the monitor or aux output of the mixer.
2. You can now connect the floor monitor amplifier to the loop outputs on the personal monitor transmitter. Or you could connect another personal monitor system. In fact, you can daisy chain as many of these together as you want.

This lets you maximize the soundboard's one output. Also, users can change the volume they hear in their ears without affecting the level of the sound going to the other monitors.

**Can I use a reverb unit or some sort of digital processor on my in-ear mix?**

Yes, of course. But note that you are adding a little more delay in the signal that could be an issue with timing. Try any set up before you use it live to make sure there are no issues.

**We have a lot of stained glass windows in our church.**

**Does this affect my choice of monitoring systems?**

Yes, if you mean whether you select floor wedges or personal monitoring systems. Stained glass windows (or *any* glass windows, in fact) are some of many architectural details specific to houses of worship that can cause reverberation and acoustic issues. Personal monitoring systems can help decrease the overall volume, which helps clean up the sound in reverberant houses of worship.

**Can personal monitoring systems help with recording and broadcast needs?**

Yes. Directors and producers looking to capture the service on CD/DVD can benefit from personal monitors. You can also use the monitor mix to record your music.

Contact your sound contractor or the manufacturer for more details on the added value of personal monitors or personal monitoring in these situations.

# Introduction to HOUSES OF WORSHIP

## CHAPTER 4

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### EARPHONES

We have already discussed earphones as part of the personal monitor system as well as how to provide your worship ministry with the proper sleeves for fit, comfort, and isolation. (All in Chapter III.)

The purpose of this chapter is to consider the advantage of earphones on their own. There are a few reasons to consider using earphones in your house of worship, regardless of whether or not you decide to use personal monitoring systems:

1. They provide an improved level of sound clarity
2. They are more aesthetically-pleasing than headphones
3. They can easily integrate with other audio products you currently use



Examples of ...

headphones



earbuds



earphones

### Improved sound clarity

All the premium components in a signal path are rendered ineffective by a low-quality listening device. You have already experienced this phenomenon with your cell phone and your CD or MP3 player. The same holds true on the worship platform.

When considering which listening device to use, you need to consider two key concepts: isolation and precise sound reproduction. In both cases, more is better.

#### ***Isolation***

Whenever you see a singer put their hands over their ears – even when they are wearing headphones – you are seeing a symptom of a lack of isolation.

Simply put, isolation is the ability of the listening device to eliminate background noise. Better isolation means fewer distractions from unwanted sounds and the ability to listen at lower – and safer – volume levels.

Vocalists will also tend not to ‘over sing.’ That is, they will not feel they need to compete vocally with what is coming into their ears. This, too, will result in more natural, textured vocals.

For purposes of isolation, listening devices can be ranked in the following order, from best to worst:

**Earphones** – since these include sleeves that can precisely match the contours of the ear canal, they provide maximum isolation from background and ambient sound.

**Headphones** – the isolation provided by headphones varies considerably, depending on how well they cover the ears, their shape, the quality of the materials used, and the usage for which they were intended. (Note: many headphones were not designed for live sound or use in large, open spaces.)

**Earbuds** – basically, these are tiny, often low-quality earphones that sit just inside the pinna of the ear. Earbuds are designed for aesthetic purposes or to meet smaller budgets, not primarily for sound quality. They usually provide very little isolation.

***Another advantage to proper isolation: less “bleed through.”***

How often have you sat next to someone wearing headphones and you can hear their music almost as well as they can? This is called ‘bleed through’ and it is distracting on the platform and in the congregation as well. Proper isolation lets the listener hear at lower volumes, decreases the overall volume required, and isolates the sound from others.

***Precision sound reproduction***

The internal working of headphones, earbuds, and earphones vary considerably and a discussion on types and benefits can quickly become overly technical even for an advanced user.

Before you invest in a large number of listening devices for your house of worship, it is best to try a few of them. Some retail stores will have a selection of headphones and earbuds for you to sample. Fewer will let you try earphones, which is unfortunate since these often provide the best sound quality. The good news is that there are many sound contractors, audio equipment representatives, and manufacturers that understand the importance of the house of worship market and would be happy to let you sample products prior to purchase. If you ask around, you will most likely be rewarded with earphones you can try. Where is the best place to try earphones? At rehearsal with your team, of course.

# HOUSES OF WORSHIP

## Earphones are more aesthetically pleasing

As house of worship sound becomes richer and more complicated, the people on the platform need to isolate their own sounds better. This has resulted in more and more people, especially the lead and backup singers, wearing headphones. While helping the singers provide richer sound, the headphones are distracting to the congregation and make it harder for the worshippers to connect, personally, with these members of the worship team.

### **More connection for the congregation.**

Earphones fit snugly in the ear and utilize thin cables that go under the collar so they cannot be seen at all from the congregation. And, as discussed above, they provide superior isolation, so the vocalists can sing at more natural levels.

### **So, who gets earphones?**

All personal monitor system users should include earphones as part of their system, so the praise band, the choir leader and pastor should already be “in ear.” If not, and they wear headphones, you should replace these headphones with earphones as they look more natural, receive better quality audio at lower volumes, and do not distract others with their ‘bleed through.’

While the same argument can be made for giving earphones to everyone on the platform who now wears headphones, it really comes down to your budget.

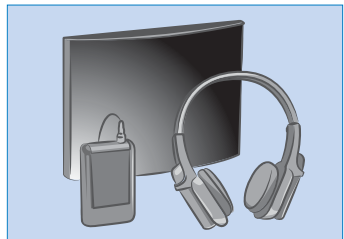
Unless you are purchasing high-end headphones, you will probably spend more per set on earphones than you do on headphones.



## Earphones can be used with other audio products as well.

So far, we have discussed using earphones as part of a personal monitor system and as a replacement for headphones while on the platform. The good news is that earphones can replace headphones in *nearly all* applications, such as:

- **Personal monitor systems that did not come with isolating earphones, such as Hear Back and Aviom.** There is no reason you have to use the headphone or earbud supplied with the system you have now. You can add all the advantages of isolating earphones by simply unplugging the current headphones and plugging in the earphones you want.
- **Assistive listening systems,** such as those provided by Phonic Ear, Gentner, and more. Here, again, simply use isolating earphones instead of the headphones provided.



An example of an assistive listening device.

**Note:** While you might need to have a container of sleeves on hand for congregation members using assistive listening systems, you should find that the lower-profile and increased sound quality (for both the user and the people sitting near the user) are well worth the added effort.

• **Consumer products**, including CD players and MP3 players, such as iPods. Isolating earphones have become extremely popular for people who enjoy hearing the subtleties of their music. This means you can enjoy better sound quality when you are away from the church and get more value from every set of earphones you purchase.

### Questions about earphones:

#### How do I know I have the earphones in correctly?

First... are they comfortable? They should be snug, but not painful to wear. Second... do they provide the isolation you require? You should be able to listen to your mix at fairly low levels without distraction from the other sounds on the platform.

#### Should I use only one earphone or should I keep both in while I sing?

For optimum performance and hearing protection, you really should wear both earphones. Removing one of the earphones will take away many of the system's advantages. If you feel detached from the worship, there are ways to mix in ambient mics to eliminate this isolation.

#### Everything sounds 'hollow' to me but no one else is having this problem. Is it me?

It's not you, but it might be your ears. Everyone's ears are different and everyone hears sound somewhat differently.

Try different sleeves until you find the best fit. Using foam sleeves (instead of rubber ones) is usually a good way to solve this, but you might also want to look into having custom sleeves made to fit.

Companies such as Sensaphonics can provide custom sleeves and help answer any questions you may have.



## CHAPTER 5

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### WIRELESS MICROPHONE AND PERSONAL MONITORS: GETTING STARTED.

Now that we have looked at wireless microphone systems and wireless personal monitoring systems separately, let's consider them as a total solution and how you might be able to bring them into your house of worship.

#### Start Small

Something you might realize fairly quickly is that this could get expensive.

Since you probably already have the audio systems you require for your day-to-day needs and daily services – no matter how good they might sound or look – adding new technologies will seem like a luxury, instead of a necessity.

If this is the case, you are not alone. Houses of worship have to make their limited budgets go farther than most other organizations. The good news is that the costs for these systems are coming down and the better news is that just a few systems can make a huge difference in the overall sound quality and aesthetics of your service.

You probably already have one or more people using a wireless microphone system. Consider giving one of these users a wireless personal monitor system, as well, and completely untethering him for the services.

Whether this is the praise leader, who can now wander freely around the platform, or the pastor, who can get closer to or into his congregation, you will have given them freedom and removed the cords that follow them around the platform – both of which will increase their connection to the congregation.

#### Take the 'Mobility Test'

You have already seen the advantages of each system and since there are no disadvantages to providing users with both systems, the question that needs to be answered is: wired or wireless? How do you decide which members of the praise team get both wireless microphone systems and wireless personal monitoring systems? Who gets only wired versions? And should any of them have a combination of the two?

The rule of thumb here is that it's either all wired or all wireless. It is rarely, if ever, a combination of the two.

As you went through the members of the worship team determining who might need a wireless microphone system and then went through the same list deciding who might need a wired or wireless personal monitor, you should have seen that the same people who needed wireless microphones also needed wireless monitors.

The reason for this is **mobility**.



Either they can benefit from mobility or they cannot. Either they will use their newfound freedom or they will not.

If you have a young, rambunctious guitar player as part of your praise band, she will probably make very good use of her ability to move around without wires or losing her mix. If the bass player is more sedate, perhaps wired systems will do just fine.

A drummer, for example, will probably have no need for a wireless microphone system or wireless monitoring since he is in a fixed location and you can easily hide the cords that connect his systems to the mixer.

Don't forget that removing the cords also cleans up the worship space, which provides a better visual experience for the congregation.

### **Three Applications That Can Really Benefit:**

#### ***Wireless in Drama Productions***

Shure offers a booklet entitled 'Audio Systems Guide for Theater Performances' which covers much of this in greater detail. You can get this guide for free by calling Shure or visiting [www.shure.com/support/publications](http://www.shure.com/support/publications). Much of it applies to drama productions in houses of worship, therefore we will not go into too much depth on this subject here.

However, drama productions, skits, and other presentations are becoming more and more part of the overall worship. Wireless microphone systems and wireless personal monitoring systems can ...



- blend in with even the simplest costumes to provide clear audio with no distractions.
- allow the actors to discreetly hear the director's feed or music cues – and even dialogue prompts during the performance – without the knowledge of the congregation.
- clean up the overall sound in the house, since there is less need for monitor loudspeakers.
- let people speak more naturally, allowing the audience to hear all the subtleties of the dialogue.

## Introduction to HOUSES OF WORSHIP

### **Portable Churches or Off-site Services**

Your wireless microphone systems and personal monitoring systems can quickly turn even the sparsest room into a great worship space.

Since you have fewer cables to tape down, no bulky wedges to carry, and the mixes and levels can all be preset, you can be set up and start the service far faster than you might expect. You can also tear down quickly, allowing you more time on the service and less time packing up.

One praise leader for a 'portable church' describes his solution as follows:

*"I have a small rack with all the systems in it preset. I have a briefcase with all of our wireless mics and monitors in it. That's all I need. And I know we'll get a consistent mix right out of the briefcase.*

*All the time we used to spend setting up has been eliminated and there is almost nothing to unload from the van or load back up once we are at our time limit.*

*When you're a portable church and you're paying for the room by the hour, every minute you save is huge to us and our worshippers."*

### **Christian Touring Rock Bands and Traveling Praise Bands**

For bands that travel, personal monitoring systems are becoming more and more common. Beyond the ability to clearly hear the desired mixes wherever you are on the stage or platform, your band will also realize the following advantages:

- far less equipment to transport
- faster set-up
- more consistent mixes
- certainty that you will always have enough monitor mixes (by use of an optional monitor mixer)
- less reliance on the skills or availability of the on-site monitor or sound engineer

Additionally, by using wireless systems throughout, you can work with nearly any space without fear of adding cables to an already crowded area or having to wait for the entire performance to end before collecting all your gear.

All in all, with the combination of wireless microphone systems and personal monitor systems, you put the control in your team's hands and leave less to chance.

## **CHAPTER 6**

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### **TAKING YOUR SOUND TO THE NEXT LEVEL**

No single booklet, no matter how lengthy, can serve as a complete HOW TO guide for the diverse needs of house of worship sound or the range of people – from volunteers to experts – who are tasked with coordinating the systems that deliver this sound.

For this reason, we have tried very hard to keep our focus on wireless microphone systems and personal monitoring systems, as well as the other components and systems they directly touch. We have also tried to present this material in a way that is accessible to any reader, even those who have just recently been asked to help with the sound system.

The good news is that we, at Shure, have plenty of resources available for those who are looking to design or improve their house of worship sound:

#### **How to learn more**

*For more educational booklets...*

- Look at our growing list of Shure publications online at **[www.shure.com/support/publications](http://www.shure.com/support/publications)**

These guides are available free of charge either online or by mail. To request your complimentary copies, call one of the phone numbers listed on the back of this booklet.

Available publications include:

- Audio Systems Guide for Houses of Worship
- Selection and Operation of Wireless Microphone Systems
- Selection and Operation of Personal Monitor Systems
- Audio Systems Guide for Theater Performances

These publications include both more general and more technical discussions of systems, solutions, acoustics and the nature of sound itself. They also include additional lists of resources for the topics they cover.

*For answers to any specific questions...*

- Visit our online knowledgebase at **<http://shure.custhelp.com/>**  
or
- Contact our Applications Group toll-free at 1-800-25-SHURE (in the US) or via e-mail at **[support@shure.com](mailto:support@shure.com)**.

**CHAPTER 7**

**A FEW PRODUCT CHARTS TO SIMPLIFY THE PURCHASE PROCESS**

Shure Wireless Microphone Systems

Model Number	Number Compatible Systems	Budget	Special Features	Analog/Digital
<b>PGX</b>	<b>18</b>	<b>\$\$</b>	Application specific UHF wireless systems for performers in charge of their own sound. Simple, powerful systems for reliable performances.	Analog
<b>PGXD</b>	<b>5</b>	<b>\$\$</b>	Combining trusted Shure microphones with state of the art digital wireless technology, PGX Digital delivers stunning sound and a strong, clean RF signal.	Digital
<b>SLX®</b>	<b>30</b>	<b>\$\$\$</b>	Out-of-the-box solution, UHF Wireless that features innovative automatic set up features and great sound.	Analog
<b>ULX®</b>	<b>62</b>	<b>\$\$\$</b>	Full featured UHF wireless choices for experienced engineers and installations that require powerful solutions.	Analog
<b>ULXD</b>	<b>150</b>	<b>\$\$\$\$</b>	Uncompromising audio clarity and extremely efficient RF performance with rugged, intelligent, encryption-enabled hardware. Advanced rechargeability options eliminate the need for disposable batteries while extending usage times and life cycle.	Digital
<b>UHF-R®</b>	<b>160</b>	<b>\$\$\$\$\$</b>	UHF Wireless + Wireless Workbench 5, premier wireless technology that redefines wireless for the largest, most demanding applications.	Analog
<b>Axient</b>	<b>180</b>	<b>\$\$\$\$\$\$</b>	Ultimate control for the most extreme RF challenges. Features a suite of unprecedented technologies that underpin a range of new wireless audio capabilities. Learn more at <a href="http://www.axient.net">www.axient.net</a>	Analog

Shure Personal Monitoring Systems

Model Number	Number Compatible Systems	Budget	Special Features	Analog/Digital
<b>PSM®200</b>	<b>4</b>	<b>\$</b>	Affordable, full featured entry to personal monitor systems.	Analog
<b>PSM®900</b>	<b>20</b>	<b>\$\$\$</b>	Unparalleled audio quality, robust RF performance, category leading controls.	Analog
<b>PSM®1000</b>	<b>20</b>	<b>\$\$\$\$</b>	The most advanced Shure PSM System. Full-rack, dual-channel, networkable transmitter, diversity bodypack receiver delivers pristine RF signal and audio quality.	Analog

Shure Earphones

Model Number	Budget	Special Features
<b>SE215</b>	<b>\$</b>	Dynamic MicroDriver, detailed sound with enhanced bass.
<b>SE315</b>	<b>\$\$</b>	Single High Definition MicroDriver + Tuned Bassport, full range sound quality.
<b>SE425</b>	<b>\$\$\$</b>	Dual High Definition Microdrivers, accurate and balanced sound quality.
<b>SE535</b>	<b>\$\$\$\$</b>	Triple High Definition Microdrivers, spacious sound quality with rich bass.

## ABOUT THE AUTHOR

**Crispin Tapia** is an **Applications Engineer** at Shure Incorporated and has been with the company for more than ten years. Crispin has earned both a degree in Psychology from the University of Illinois – Chicago, and a degree in Audio Engineering from Columbia College Chicago. His responsibilities at Shure include conducting product-training seminars for Shure dealers, Shure staff, and end users. His technical publications have been popular additions to the Shure library of educational booklets. He has been an active rock musician in the Chicago area for more than 30 years. When not performing live with a band, he spends time writing and recording music in his home studio.

## **Additional Shure Publications Available:**

Printed and electronic versions of the following guides are available free of charge. To obtain your complimentary copies, call one of the phone numbers listed below or visit [www.shure.com](http://www.shure.com).

- Selection and Operation of Wireless Microphone Systems
- Selection and Operation of Personal Monitor Systems
- Audio Systems Guide For Houses of Worship
- Audio Systems Guide For Theater Performances

## **Our Dedication to Quality Products**

Shure offers a complete line of microphones and wireless microphone systems for everyone from first-time users to professionals in the music industry—for nearly every possible application.

For over eight decades, the Shure name has been synonymous with quality audio. All Shure products are designed to provide consistent, high-quality performance under the most extreme real-life operating conditions.



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