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INTRODUCTION

Wireless Microphone Systems and Personal Monitor Systems for

HOUSES OF WORSHIP

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CHAPTER 1

INTRODUCTION

There's a strong sense of presence as the circle of bowed heads and clasped hands breaks, ready to meet the challenge of the day.

As the worship leader observes the eyes and faces of each member of the team – from the pastor to the back-up vocalists – he senses a peace and a confidence knowing that they've done their job of practice and preparation and that every note is in place.

As they mount the platform and begin the service, they immediately see – and feel – that they have made a connection with the worshippers in attendance.

Certainly the worship team has done their part to assure a meaningful message is delivered. However, there is even more here than meets the eye…or the ear. There is also audio technology.

Audio technology that …

- Lets the praise and worship leader hear a consistent mix, sing at levels that are comfortable, and be heard clearly from anywhere on the platform.
- Gives the musicians the ability to choose which mixes they want to hear and the confidence that their instruments are perfectly complementing the complete sound.
- Removes the tangle of cords, cleaning up the platform and allowing everyone to concentrate on the worship.
- Actually makes the service easier and simpler from a technical standpoint.
- Puts more control at the fingertips of the users.
- Cleans up the front-of-house sound and helps provide the same clarity throughout the sanctuary.
- Enables discreet communications between the praise and worship leaders and the musicians … the audio and media ministers with praise and worship leaders and musicians … the pastor and the team.

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 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/literature***. 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.

Introduction to

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

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 lavaliere (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 wireless 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.

3. The *receiver* is placed in a location that 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 lavaliere 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 lavaliere 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 directly in front of 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 lavaliere.

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 lavaliere 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 apparent to the congregation.

A praise leader

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 version. More sophisticated models can actually provide sound that is indistinguishable from a wired microphone.

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, lavaliere, and a handheld mic.

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

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 … sing one or two lines of a hymn … or express an "Amen!" for all to hear.

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.

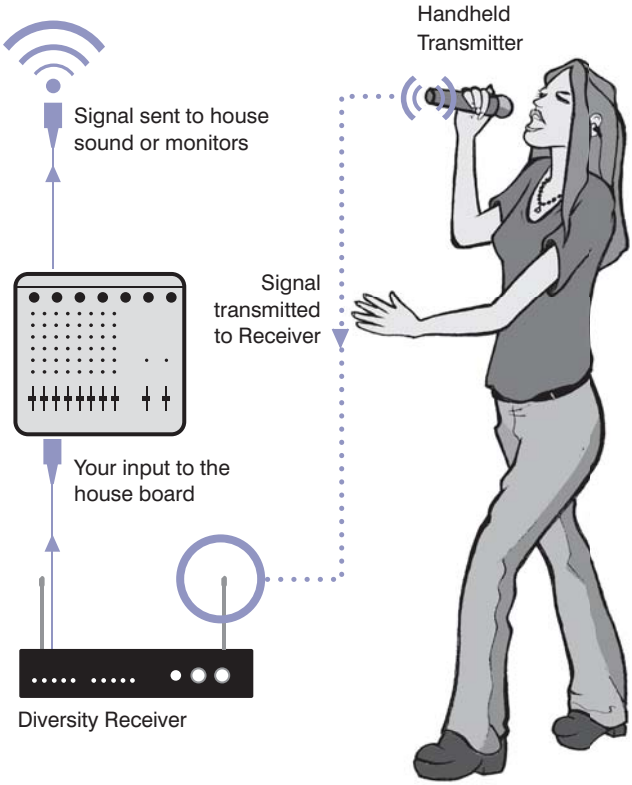
Example of a wireless lavalier (lapel clip-on microphone)

Example of a wireless headworn microphone

Example of a wireless guitar cable

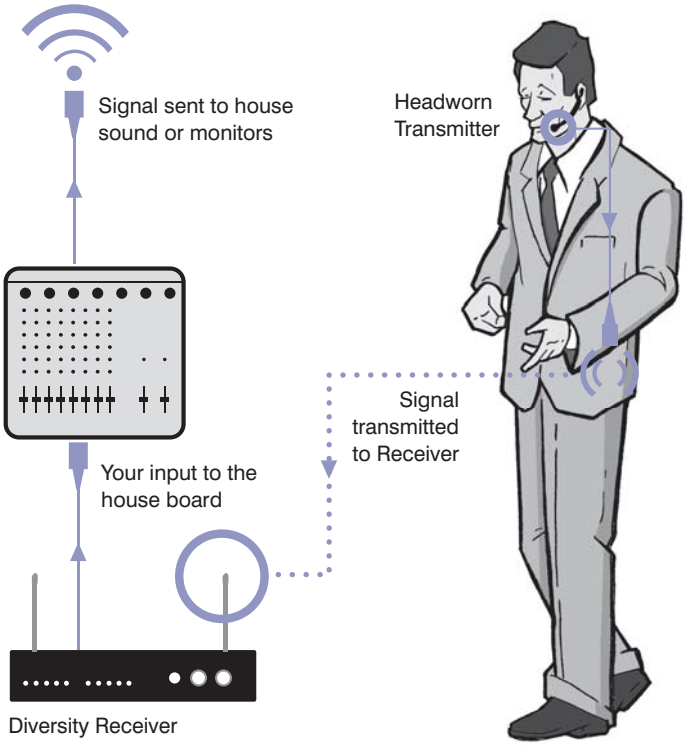
WIRELESS MICROPHONE SYSTEM:

Handheld User



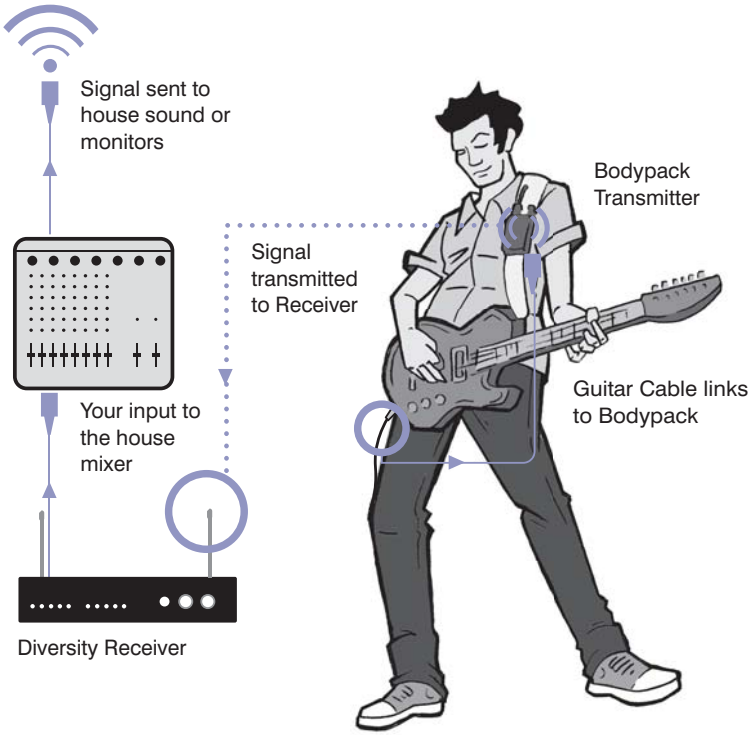
WIRELESS MICROPHONE SYSTEM:

Headworn User



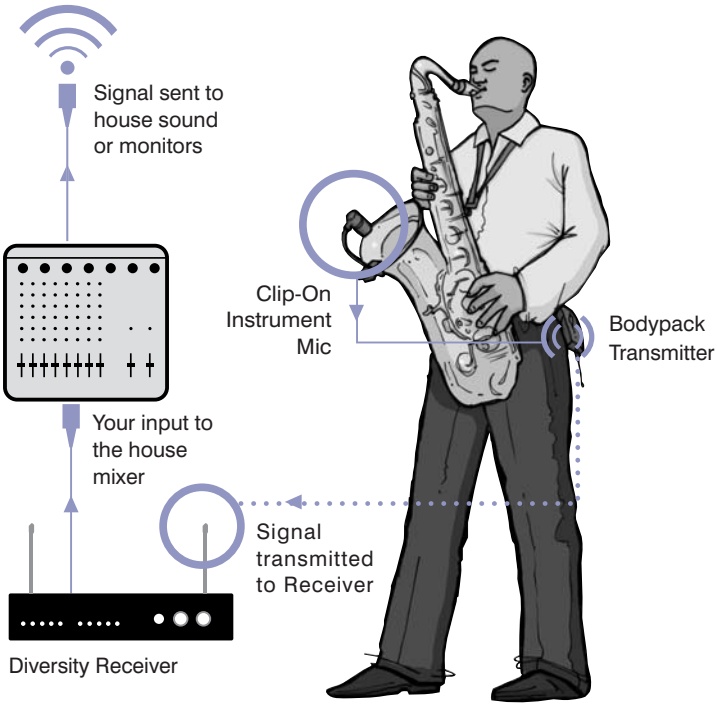
WIRELESS MICROPHONE SYSTEM:

Guitarist/Bass



WIRELESS MICROPHONE SYSTEM:

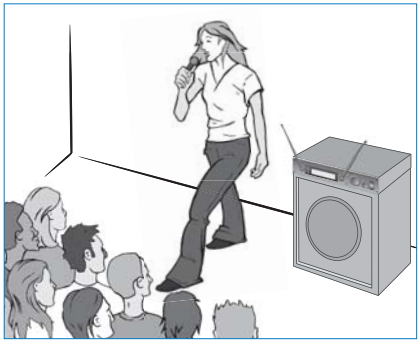
Instrumental User



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 theater productions, skits, 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 lavaliere 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.

UHF vs. VHF. What is the difference and which should I select?

First of all, while there are some differences in the radio behavior of VHF and UHF systems, there is no inherent difference in audio quality. The quality of the wireless system itself makes the largest difference to the quality of the sound. And, yes, you can use both VHF and UHF systems in the same location.

That being said, there are some generalities that might help you better determine which option is best for you.

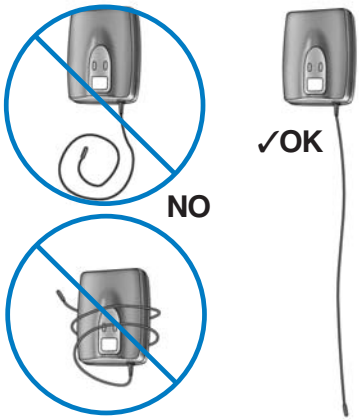
- **UHF is usually recommended if**… You need to use more than 5 or 6 wireless systems at the same time; You use them in "crowded" radio environments such as cities or places where there are many other houses of worship nearby; You want the flexibility to take your system to other US cities; You're able to spend a little extra funds to enable flexibility for future needs.
- **VHF is usually recommended if**…You use fewer than 5 systems at the same time; You use them in "open" (less crowded) radio environments; You do not plan to take your system outside of your local area; your budget is more limited.

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.'

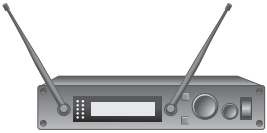
- Never let antennas touch one another.

- 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



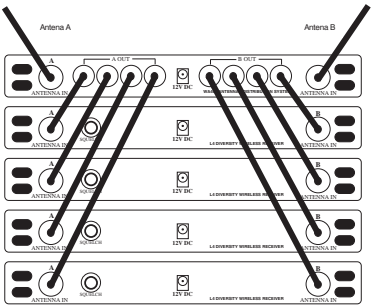
Example of a diversity receiver

Example of a remote antenna

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

- 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).



Antenna distribution system

- 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.

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, 7.2 volts out of the box vs. 9 volts from a fresh alkaline.

Remember that a wireless system is only as good as its ability to transmit signals from the microphone to the receiver. The weaker the batteries, the weaker the signal.

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?***

   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
   - Lavaliere 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* 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.

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.

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.

Audio
Reference
Companding

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.

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 the 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 a specific spot in order to make any sense of what he or she is hearing.

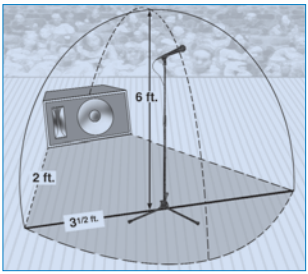
There are many downsides to floor monitors:

- ***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 finds 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 right into your ears

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

Triple-flange 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.

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 ones 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.

Example of a personal monitor mixer

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 monitor of the service).

Example of a hybrid bodypack

Example of a digital mixer

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.

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.

There is also the added benefit of the audio limiter function built into many in-ear systems that helps with hearing protection. While headphones can certainly be used, earphones provide better isolation, and are much less conspicuous and cumbersome.

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:

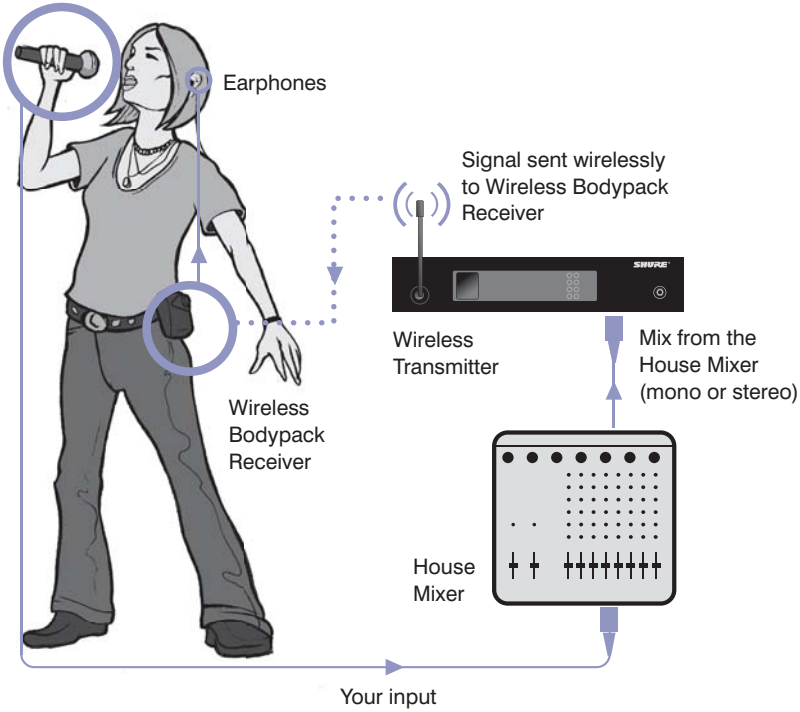
When the musicians and others are 'in ear' they enjoy high-fidelity sound at lower volume levels and with less interruption from outside noise.

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.

Additionally, personal monitor mixers, unlike floor wedges, allow the wearer to hear stereo mixes and/or adjust the relative level of these mixes using the balance control. [See "Mono or stereo … or more?" later in this chapter for further discussion on this.]

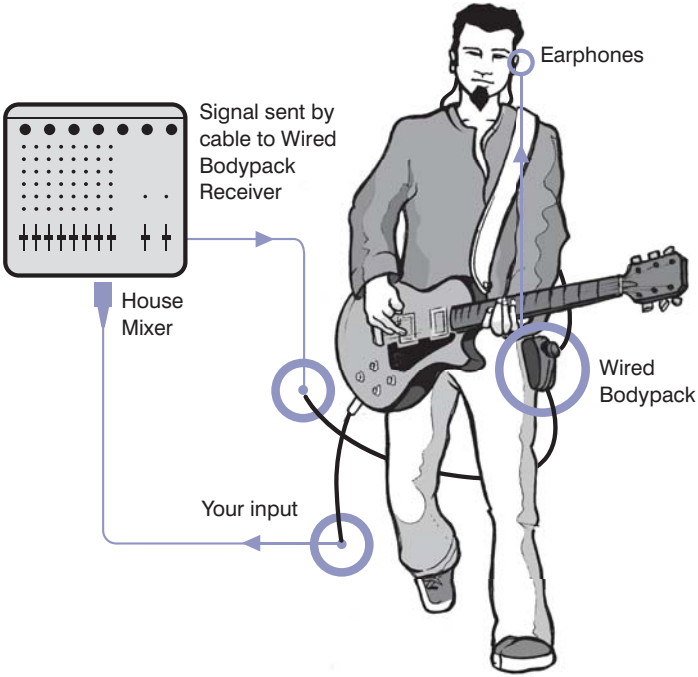
PERSONAL MONITOR SYSTEM:

Vocalist Setup



PERSONAL MONITOR SYSTEM:

Guitarist Setup



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, or learn more at ***www.shure.com/hearing.***

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 lower this sound, also decreases the quality of the overall 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? 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. From the congregation to the worship team… from the front of the house to the very back seats.

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.

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 lavaliere 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 walls without halls, 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 performing 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 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.

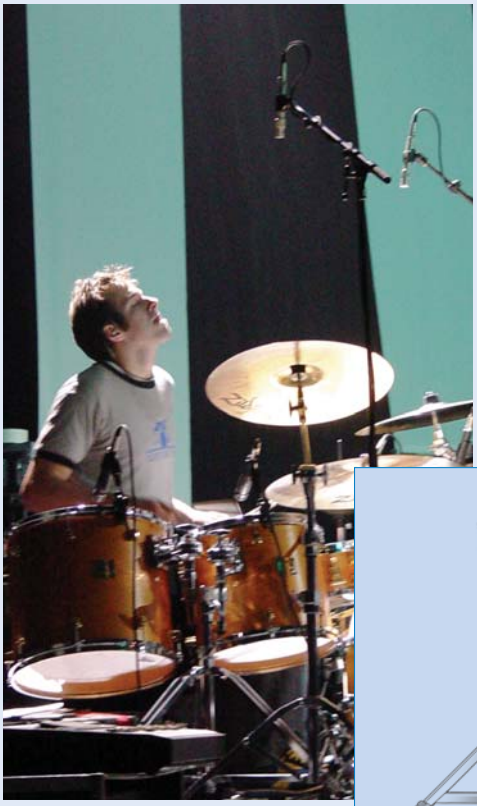
Some tips and techniques for ambient miking:

- *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.*

- *When selecting which microphones to use, treat the congregation as you would a large group of singers. Condenser style microphones with an omnidirectional 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 'buttkicker' (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 his band and/or his 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 his own cues back; can select what other mixes he or she wants to hear.

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 – all 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 who will likely remain in a fixed place during the service.

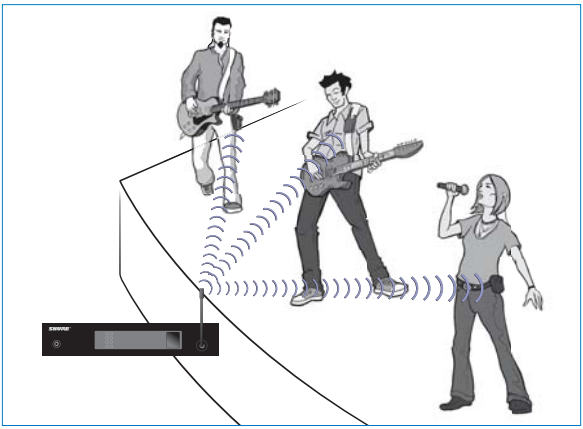
- Choose wireless versions for the praise leader, guitarists, the pastor and any soloists – as they will benefit more from the freedom to move about the platform. It is also a good idea to get the choir leader a wireless system, since he or she is standing in a place where cables might cause other ministry 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.

Tip: When two or more users are able to share the same mix, you need only give them bodypack 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 music ministers will likely need to hear more than just the praise band. The praise leader and choir leader will want to design a custom mix for themselves. Likely the praise leader will want to hear the congregation via a mix provided by ambient microphones, so he will need a personalized mix. Vocalists, guitar players, and many drummers, also want to be able to isolate their own sounds from the rest of the band or add unique sounds such as (for the drummer) a click-track. In these cases, as well as any many others, the ability to create a personal mix is preferable and worth the added cost and effort.

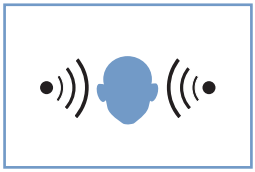
Tip: If your current mixing console does not distribute enough mixes (auxes) to support all the mixes you need, you might consider… sharing mixes, using personal monitor mixers, adding a Shure Auxpander (designed to expand the auxiliary output capabilities of any standard mixing console), investing in a dedicated monitor mixer, or even upgrading your console.

4. *Mono or stereo … or more?*

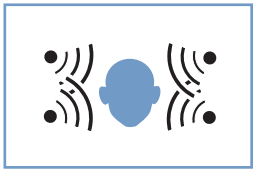
In *mono*, both earphones reproduce the same audio. Not optimal, certainly, but often this is the lowest cost solution.

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.*

Mono



Stereo



MixMode®

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

There is also…

- dual-mono; where you can get a different mono mix in each ear, and

- 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. MixMode is popular, especially, with praise band leaders.

It is important to test – and appreciate – all these options prior to settling on any particular choice. That being said, it's best to select at least stereo options for all the users if budget allows.

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.")

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?

Both wearing the earphones and the isolation they provide does take a little getting used to. Adding the congregation's reaction 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.

What's happening? I'm playing "Amazing Grace" but I'm hearing a newscast.

This is interference from a local television station. Since wireless monitoring transmits sound on unused television channels, it helps to choose a model that lets you search effortlessly between frequencies. This should help eliminate unwanted interference from outside sources.

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-though 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 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.

CHAPTER 4

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 headphones. 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.

So how can the non-technical user get a good idea of which earphones, headphones or earbuds provide the best sound reproduction? The answer is simple: try them.

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.

Tip: Do not use the music they provide; bring your own CD. Different listening devices do better and worse for high and low frequency sounds and the CDs the manufacturers provide take this into consideration. In other words, they will supply music that sounds best on their products. When you listen using your own CD you will…

- know what you are hearing or missing, and
- be better able to compare apples to apples

Another tip: Perform your tests in both quiet and noisy places. While your music might sound better in an enclosed room, you are trying to duplicate the sound on the platform, which is anything but enclosed!

What's the best place to try earphones? At rehearsal with your team, of course.

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.

Avoid 'headphone hair.'

Your worship team has spent a great deal of time and energy looking their best. Unlike bulky headphones, wearing earphones will not disturb their hair or any head coverings. They can easily wear earphones with hats, scarves, etc.

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.

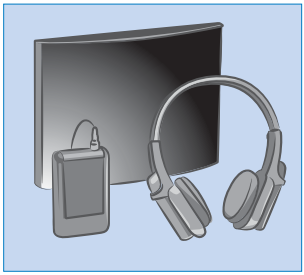
Unless you are purchasing high-end headphones, you will probably spend more per set on earphones than you do on headphones.

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 quality, 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

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, he will probably make very good use of his ability to move around without wires or losing his 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/literature.* 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.

Easter and Christmas pageants are often a focus of the year's worship. Wireless systems can help improve the overall experience for the people on the platform, the musicians accompanying the presentation, as well and those riveted to their seats.

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

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/literature***

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 ***www.shure.com/kbase.***
  or
- Contact our Applications Group toll–free at 1-800-25-SHURE (in the US) or via e-mail at ***support@shure.com.***

Our Applications Group would be happy to answer any questions you might have about your sound system.

CHAPTER 7

A FEW PRODUCT CHARTS TO SIMPLIFY THE PURCHASE PROCESS

Shure Wireless Microphone Systems

Model Number	Number Compatible Systems	Budget	Special Features
PGX	12	$	Affordable, application-specific wireless systems, innovative automatic setup features, reliable performance, Audio Reference Companding for exceptional wireless clarity.
SLX®	20	$$	Smart, hardworking wireless, innovative automatic setup features, Audio Reference Companding for exceptional wireless clarity.
ULX®	40	$$$	Sophisticated, scalable wireless. Full featured choices for houses of worship that require powerful solutions, Audio Reference Companding for exceptional wireless clarity.
UHF-R®	108	$$$$	Premium wireless technology and performance for the most demanding houses of worship, unprecedented flexibility and versatility. Multiple system operation, interchangeable components, choice of single or dual channel diversity receivers.

Shure Personal Monitoring Systems

Model Number	Number Compatible Systems	Budget	Special Features
PSM®200	4	$	Affordable, full-featured entry to personal monitoring, practical alternative to floor wedges, versatile components that grow with changing praise and worship band needs.
PSM®400	8	$$	Clear, consistent monitor mixes. Versatile and professional quality monitoring, priced to be accessible to worship musicians.
PSM®600	10	$$$	Wired and wireless personal monitoring options, rugged and reliable, superb sound.
PSM®700	20	$$$$	Wireless monitoring solutions for professional use, advanced controls and features for large, demanding house of worship needs.

PSM400

PSM700

Shure Earphones

Model Number	Budget	Special Features
SCL2	$	Dynamic driver earphones, single high energy drivers deliver full range sound and isolation from outside noise.
SCL3	$$	Single driver earphones, single low mass/high energy drivers for high fidelity full-range sound and isolation from outside noise.
SCL5	$$$	Dual driver earphones, dual low mass/high energy drivers with an inline crossover for incredibly accurate, full-range sound and great isolation from outside noise.

ABOUT THE AUTHORS

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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.

- 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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