Brad Herring

SOUND, LIGHTING & VIDEO

A RESOURCE FOR WORSHIP

"I like the conversational, friendly tone. It makes the material seem accessible to the reader. It's as if the author is seated next to the reader at the mixing console and is pointing out things to watch for."

– Bruce Bartlett, audio engineer and author of *Practical Recording Techniques*

"I really like Brad's heart for the local church. I think he approaches the subject in a genuine and honest manner that is encouraging."

– Mike Sessler, ChurchTech Arts

"I'm very excited about having this book available for my church, and for churches where I assist in ministry."

– David Scott, Worship Leader and Associate director of Georgia Festival Chorus

"What a great book! Brad has taken his years of audio/visual training and personal experience and produced an excellent resource for every Worship Leader and every Audio Visual Tech. From the most basic sound, lighting and video systems to fairly complex systems, Brad has put together an encyclopedia of knowledge that builds on the basics to provide an easy transition to larger and more sophisticated systems. Not only does he address the 'how to,' but the 'why we should and why we should not's' associated with this important area of our ministry. Brad has a heart for excellence in Worship that resounds throughout the book. Whether you are a beginner or a seasoned veteran, I heartily recommend this book to you. I believe that you, like I, will count it one of your most valuable tools in ministry."

– Dennis J. Brown, Associate Pastor Worship Arts, First Baptist Church

"Finally! Thank you, Brad Herring and Focal Press, for bringing us a terrific overview of Technical Production for Houses of Worship. Your experience, skill, and artistry are evident throughout. I especially appreciate your attitude of humility and step-by-step suggestions for dealing with 'choir complaints.' This immediately is required reading for my production volunteers."

– John Weygandt, Scenic and Lighting Designer, Willow Creek Community Church

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Sound, Lighting and Video: A Resource for Worship

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Brad Herring

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Foreword

FROM THE HEART OF BRAD

When I first undertook this project, it was with some in trepidation. There is simply so much material to cover, it seemed like too much information to discuss in one book. Perhaps this is why to date, such a comprehensive book has not been written.

After some research and many outlines and drafts we came up with the layout of this book. We all believe this will be a tremendous help to ministries worldwide. The introduction section is critical for vision casting and overall analysis of media systems in the Worship environment. The rest of the book places emphasis on systems and interconnections with helpful advice on using these systems.

There are many people who have contributed years of knowledge, and timeless help to make sure this book is accurate and helpful. Without them, this project would not be nearly as comprehensive as it has become.

I'd like to especially thank David Scott, Rob Dillard, Mike Meads, John Curtis, Mike Sessler, David Hepburn, Osabuohien P. Amienyi and Bruce Bartlett for their technical expertise and of course, my parents and Becky (my loving and supportive wife) – without your support and patience this would have been impossible.

God is doing incredible things and Media and Creative Arts Ministries are playing a huge role! Churches are able to connect with people in ways never before possible. With the emergence of video, dramatic arts, contemporary worship, and new delivery formats we are able to reach more people and speak to them more specifically than ever before.

These are exciting times! My one piece of advice to any church reading this book – don't simply change because the church down the street or across town is changing – do what God has called you to do – and do it with fervor. There is a specific thing that God has called you and your ministry to do – make sure you know what that is and pursue it full force. If everyone went to contemporary or blended worship, who would be relevant to the people who desperately desire traditional worship? What would become of those people? Likewise, if everyone catered to the 30/40 year olds, who would be there for the young singles? We all have our spot in ministry that God has called us to! Sometimes it's an entire church calling, other times it's a departmental calling – regardless God has a calling on YOUR life. Seek it out and go full speed ahead!

In every instance, media and creative arts can help you communicate to the masses – the trick is learning how to apply it appropriately so that the message is received and the teaching reinforced in a way that makes it easy for the people to apply it.

Don't simply change because the church down the street or across town is changing – do what God has called you to do – and do it with fervor.

So, pray. Then pray some more. And when you get done with that – pray again. Make SURE you hear from God and know the direction He has for you and your ministry. Love your people – both your flock, the volunteers and paid staff that put in countless hours preparing for and supporting services.

I believe if we look at Scripture and analyze the life of Christ we will quickly see that He was about people. He spent almost all of His time cultivating the one on one relationship. I believe if Jesus were to come today instead of 2000+ years ago He would not embrace media, but instead He would choose 12 people. What we do – it's ultimately about loving people and we need to be careful to not lose sight of that.

In fairness, I do believe that those 12 people and likewise those that they raise up would most definitely use media and every other tool available to them to further the Gospel and reach people with the life changing message of Jesus! That being said, I encourage you to do the same! Whatever it takes – reach the lost, disciple the believer, and raise up leaders. I firmly believe that Media and Creative Arts Ministry can assist you in doing this. I believe this book will prove to be a vital resource that will help cast vision and provide quick reference for years to come.

God bless. Be strong. Think outside of the box. Reach a lost and dieing world.

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I could not have done this without you all.

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Introduction

A HISTORY OF MEDIA AND MEDIA DELIVERY

To understand how the world of audio/visual affects our worship today, I believe we need to first look at the history of media and the delivery process of both Worship and the Gospel message.

Many people will make the argument that the church does not need sound, lighting, video systems and drama. They will argue this principle on many grounds. But I believe we can look back in history and learn how worship (including Biblical teaching practices) have evolved and see clearly how media is a key component for the church of today.

Although this book is not about drama, it is interesting to note that drama has been vastly used as a vehicle for religious expression – people were looking for ways to communicate the Gospel truth and began to caravan and put on stage shows. This concept was not different than many of our churches today – they wanted to be relevant to the people of their generation. They wanted to speak to them in ways that communicated clearly God's love, and what better way to do that than drama? So, when you look at the purist form of the work, we see it being something that glorified God.

This takes us back to our primary discussion – Media in Worship.

In the days of Jesus, Paul, John, and the other Biblical heroes that we read and study, they were blessed with a world of architecture that assisted in the reproduction of the human voice. As you might recall from your history books, electrical power had not yet been discovered and obviously, loudspeaker technology was centuries away. A solution must be found – and that solution was to build places of theater and worship that allowed the voice to be heard very clearly over long distances.

When Jesus taught, scholars believe he often found natural places that easily amplified the voice making it possible for him to teach to the multitudes.

Today, however, we live in a very different world. Today we have technology that reproduces the human voice and projects it to literally tens of thousands of people at once. So architects and many church builders find themselves more worried about the aesthetic component of construction versus the acoustic qualities and function of the worship center.

While this makes for a visually appealing room, it creates many challenges for sound systems, lighting systems, and video systems. It also destroys the concept

of "Jesus didn't use things like this" – He didn't have to, we however, are often forced to.

The modern day House of Worship is typically a rectangle or fan design. All too often, rectangular designs come with short ceilings. This is not ideal for sound, video, or lighting. Likewise, fan shaped Worship areas offer challenges with sight lines, consistent seat to seat audio coverage, and in facilities without catwalks – properly lighting the alter or stage area.

The History of Early A/V Systems

Early Audio/Visual systems incorporated basic flood lighting or in some cases track lighting. Sound systems usually consisted of column speakers that eventually moved to center cluster arrays. Often, these arrays were stadium horns with mid-range cabinets added to the mix. The idea was localization of the spoken word. (By localization I mean the ability for the ear to ascertain where the source of the sound is coming from). It made sense as the majority of the service was spoken and much of the music was acoustic in nature. Video systems were rarely used, and if they were used it was normally more of a portable system utilizing PowerPoint™ at best.

As music becomes more of the forefront in worship, we see a trend towards left/right stereo systems. Likewise, lighting systems upgrade to more theatrical styles (but still usually a basic PAR CAN or similar point and shoot light sources). Video systems become more popular, but still primarily rely on PowerPoint™.

Quickly it was realized that the left/right speaker system had its drawbacks. While it sounded pretty good for music, it lost its localization for voice. It was also difficult to achieve consistent coverage patterns in true stereo throughout the auditorium.

The recognition of these problems led to the creation of a Left/Center/Right system design. With this system, the voice was typically channeled in the center cluster while musical instruments were placed in the stereo feed. This was the best of both worlds, but required a lot of equipment and additional training on mixing techniques.

As speaker technology evolved, we see line array technology emerge on the worship scene. While not applicable for every situation, line-array systems present the ability to evenly cover an auditorium while reproducing an excellent sound. We still see line-arrays combined with center clusters (to take into consideration localization issues), but often the arrays are closer together than a left/right system, thus minimizing the localization problem. We also see center line-arrays as well.

The Modern Day House of Worship

Today, lighting systems are very theatrical based in many modern Houses of Worship. It's not uncommon to see moving lights as well as ellipsoidal instruments and PAR Cans. Video systems are quickly becoming hi-definition with

wide-format 16:9 screens, IMAG (Image Magnification) is common, and dynamic video content is quickly becoming more common. Houses of Worship are moving from PowerPoint™ to dynamic worship presentation software like Easy Worship, Media Shout, Sunday Plus, and Pro-Presenter. The modern day church is utilizing systems that rival any theater you would visit. The result is a dynamic presentation of the Gospel that captures the attention of the congregant and speaks to them in a relevant media savvy method.

Lets review our earlier comment and stated belief that if Jesus came today that He would still choose 12 people. Think about how Jesus taught. Can you imagine him on a stage while 30 moving lights swept around Him? Does His teaching method strike you as someone who would have produced fancy video productions? While no one has the definitive answers obviously, I'd like to say that I think not. The Gospel is strong and it stands on it's own.

The result of modern hi-tech delivery methods is a dynamic presentation of the Gospel that captures the attention of the congregant and speaks to them in a relevant media savvy method.

That's huge.

No video. No fancy sound system or screaming worship concert. Twelve sold out people, and He Himself sold out. Dedicated to God and determined to save a lost and dying world.

Media systems are not a necessity. Regardless of our generation – the Gospel message on it's own is relevant. The truth does proceed from it. God's Word will not return void – that's a promise. However, media systems can strengthen our message, improve retention, and speak to people in ways that traditional communicators just can't.

Now, once again – balance. Like stated earlier, I believe that some of those 12 people would most definitely use media if the timetable of history were today versus 2000+ years ago. But here's the key – everything we do with media must ultimately be PEOPLE oriented. Because that's what this is all about. Reaching people with the saving Gospel message and helping to usher people to the throne of Worship as a corporate body.

Here's the key – everything we do with media must ultimately be PEOPLE oriented.

We simply must be able to overcome today's construction obstacles and present people with a clear and concise message of Hope and provide them with barrier free environments that encourage un-encumbered worship. That's what media ultimately does in church worship. We must also understand that people today are inundated with media content – it's everywhere we turn. Television, radio, internet, sporting events – we simply can't escape modern media pushes. Almost every young person you look at today has iPod earpieces crammed in their ears or are walking in a daze as their fingers quickly tap out cryptic text messages. Podcasts are the rage and it's virtually impossible to visit a website without a pop-up.

Ask yourself – where is God in all these pushes? It's a fair question. Think about your last few Internet surf sessions. Consider all the pop ups you encountered. How many of them pointed you to the Gospel or offered eternal hope?

Tell me the last time you saw something on Television that grabbed your attention and spoke to you and allowed the Holy Spirit to convict you and grow you? Okay – it does happen some, but again – it's not the norm. As believers – as people with the most amazing news in the world – we poorly use this and all other media outlets to spread our message of hope and salvation. Christian films are by and large terrible. The production values are so low that they come across cheesy and as a result, are often irrelevant to the viewer. The acting is often so terrible that the message is lost because it's so obviously trite. I'm not saying every Christian work is this way that's not the case, but I am saying the vast majority lacks the credibility for a lost audience to stay captured and catch the message.

It's a shame. Such an opportunity just squandered away.

Then there is the argument of the modern House of Worship being a theater that is merely spectacle with no substance. And to an extent, I'd agree that this argument can be true. However, in some instances, there is a proven effectiveness in using high-tech solutions to capture the seeker or the non-believer. As a church we must be careful, if you get people in the building and don't communicate clearly God's love and His plan for their lives, then disciple them in truth, and help develop their personal relationship with Christ – what's the point? If your goal is not to do this, go tour with a rock band and stop wasting the church's resources and time. We should be about bringing people closer to God and developing relationships. Media in worship should be pointed at achieving these goals.

A pastor's primary tool is the Word of God – Scripture itself. A minister of music's primary tool is the score written on paper (or in today's world, a fancy flat-panel display). A youth minister's tool is often activities and being free to be goofy around kids. A small group leader or Sunday School teacher's tool is curriculum. YOUR TOOL IS MEDIA. It's your opportunity to create something that will speak directly into someone's life and change it forever! Or, you could just choose to be a button pusher and barely squeak by every Sunday. The choice is really yours. But isn't it exciting to realize that you – someone who is normally considered a 'behind-the-scenes' person has the opportunity with every meeting, to present something that speaks directly to the people in attendance? What a great concept!

As people who are interested in using media and creative arts in worship we simply MUST BE ABOUT CHANGING LIVES.

Paul asks the question in the book of Romans, "How will people know if they don't hear". Sure, Paul's talking about the role of evangelism and sharing verbally the saving grace of Jesus Christ, but in today's society, a pastor without a sound system or a recording facility or even good video projection is

OFTEN NOT HEARD. This is a serious conundrum. You, as a person passionate about media, or entrusted in the role of media support, are not a button pusher – YOU ARE AN INTEGRAL PART OF WORSHIP.

If you don't understand this, you need to stop right now and reconsider your reason for being involved in media ministry. Because this is key! This is everything. Without you, the Word is not heard, the Word is not seen, the Word is not taken to the masses. Without you, the people don't hear, and that, my friend, is what is all about.

As time continues, acoustically perfect environments become harder and harder to find. Furthermore, we begin to realize that IMAG (Image Magnification) helps larger groups relate to the primary communicator, and ultimately we go full circle to our early beginnings and realize that we can, once again, present the Gospel with dramatic arts. However, now with technologies that didn't exist back then, we can use media to emphasize the message. Media has become integral to worship – obviously not the act of worship itself, but definitely the process and the effectiveness of unobstructed corporate worship and clear concise teaching.

Systems Integration

It's important to think of Sound, Lighting, and Video as three in one. One of the most common mistakes churches make is thinking of sound, video and lighting as three independent systems. Most churches today struggle with the most fundamental success in audio reproduction. Many of these churches want to incorporate video – often they are pressured to do so from many sources. The church becomes so driven to add video, they skip over lighting. A poorly implemented lighting system will often times allow light spillage onto the video screens, thus washing out the image. The end result is a mediocre video projection system that looks bad and combined with a poor audio system, sounds bad as well.

Given the example above, when you think about sound, lighting, and video as one large media system you have one poorly performing media system versus three individual systems operating at various efficiencies.

When you think about this way, it doesn't make any sense to implement one system without properly implementing the others as well.

I firmly believe that audio is the base of your media ministry. I visit and work with a lot of different churches. It never fails – when I attend a service that is well mixed with a good sound system the congregants are involved in worship. The majority of people are participating in singing and responsive readings. Likewise, a poorly mixed system or a poorly designed sound system yields the opposite results – very few people outwardly participating.

A well mixed service on a quality sound system instills confidence in the people. They can clearly hear the worship leader and more easily engage. Likewise,

a poor sound system can actually deter ministry growth. I've worked with churches that are seeing steady decline in choir, orchestra, and praise team activity. On the surface, it appears to be a staffing problem – often blamed on the minister of music or the worship pastor. However, many times, the problem is really poor technology. The people simply can't work with the existing system – and remember, these people are not technically savvy – many times they don't know how to communicate with us. They simply grow frustrated and move on to other ministry areas.

I am reminded of an example of this. I was called out to a church once to sort out a problem. The pastor was frustrated because the choir was complaining weekly about the sound quality. They kept saying they couldn't hear. The sound engineer was frustrated because he felt like he was cranking the system and didn't understand how they couldn't hear. I showed up, and sure enough – the people were frustrated. So, I made my way to the sound booth to speak with the engineer. He was clearly on edge. He looked at me and said "Brad, watch this." He proceeded to bring up the stage monitor system without the front of house speakers. From 120 feet away, we were measuring 80 db at the front of house position from ONLY the stage monitors. The sound engineer looked at me and queried, "How can they not hear that?" I had to admit, I was perplexed. I was quickly understanding his frustration.

I made my way back to stage, thinking the whole time, "What is going on here?". As I made my way to the choir I began to pray. As I approached the choir, God laid on my heart a simple question to ask the choir. I looked at the group of singers and asked them "WHAT can you not hear?". Their response (almost in unison) was "EACH OTHER!! We can't hear anything but those speakers – they are too loud!".

I think I heard the sound engineers head hit the sound console as it dropped in ultimate despair! But the lesson here was realizing that all to often, non-technical people don't know how to communicate with technical people. We have to know how to ask the right questions to solve the problem. So, many times, poorly designed media systems can actually deter ministry team growth and in some cases actually decline in participation. We need to be savvy enough to realize this and fix the problem.

Video projection systems are VERY dependent on lighting – both stage lighting and ambient lighting. Without addressing the lighting in your facility it is foolhardy to plunge full speed ahead with video projection. Likewise, dynamic video content is really driven home with good audio. Often, video projects include subject matter like "man on the street interviews" or testimonies. If the sounds system can't handle the task, the video is for naught.

Instead, these three systems should be thought of as one big integrated system. First, sit down and determine your immediate needs as well as your long-term goals and needs. Then design your system to meet these goals.

I recommend starting with your sound system. I believe it is the key to unencumbered worship. Your sound needs to be tight. Spend money on training your media teams. Go to conferences, invest in one-on-one training, and purchase video- and book-based training products. Your investment in training will pay off many times over. Your people will be more confident and less frustrated. They will perform their tasks better and worship will be facilitated.

Next, focus on your lighting and ambient lighting. If your goals include extensive video and creative arts development, you simply have to control ambient light. You have to be able to dim your house lights, and you need at least basic stage lighting control. In a more advanced contemporary service you need moving lights and haze along with more detailed traditional lighting plots.

Finally, once your sound and lighting systems are in place, add the video. Now, you can buy adequate projectors versus wasting money on super high lumen projectors simple to overcome bad lighting. You can also make educated decisions on things like screen gain, rear projection vs. front projection, and other equipment related needs.

If you follow this line of thinking in systems integration you will have a more efficient system that will perform optimally. It's simply good use of ministry dollars.

I can't stress this enough. Media systems should be well thought out as a whole. Most of all – get the basics right. If you continually find yourself with the wrong words on the screen, experiencing feedback, late microphone cues, improperly lit stage areas, unplugged microphones, and other such problems your media ministry will never grow like it should – it will never have the positive effect that you are working so hard to get. Once you get the basics down, and properly integrate systems, you will begin to see lives changed.

Our job as media ministry people is to support those called to preach, teach, and lead in worship. We have a huge roll in ministry. We are the support staff that enable the anointed ones to see their calling to fruition.

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PART 1
SOUND

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CHAPTER 1

Anatomy of a Sound System

THE HEART OF EACH SOUND SYSTEM IS THE SAME

A modern-day House of Worship sound system can be as complicated as the day is long. Many systems today have integrated digital signal processing (DSP), digital mixing consoles, automixers, complicated matrix systems, complex delay systems, and more! However, when you get down to it, every sound system is ultimately the same.

Think of a professional sound system as if it were an automobile. You have your basic entry-level vehicle – it often has no air conditioning and is simply a motor, a transmission, a steering wheel, four tires, and a few seats. Getting to 60 miles per hour takes forever and is celebrated when it happens. But this vehicle gets you from point A to point B and doesn't cost much.

Conversely, you have the high-end luxury car. Leather interior, biometric recognition systems, integrated GPS, super sound-dampening materials for an enjoyable ride, a motor, a transmission, a steering wheel, four tires, and a few seats. This car gets to 60 miles per hour in the blink of an eye – often exceeding 100 miles per hour without the driver knowing it. It cruises down the road – its occupants in complete comfort – and gets from point A to point B – however, at a premium price.

One vehicle definitely performs better than the other – there is no question. But, at the heart – both vehicles ultimately work the same. There is a motor, a transmission, four tires, and a few seats. If you can drive one, you can drive the other. Perhaps you don't know how to work some of the high-end features such as the integrated GPS, right off the bat, but you can crank the car, put it in drive, and get from point A to point B. Likewise, if you commonly drive the high-end vehicle, you can get in the entry-level car, crank it, and get where you are going (although you might have to rely on some old-school methods such as reading a map).

A sound system is no different. Despite their size and design, ultimately they are all operated the same way. If you can operate one sound system, you can operate any of them. Perhaps you won't be able to use all the extra equipment tethered to it, but you will be able to fire up a microphone or CD player and

get sound out of the speakers. You will be able to perform a rudimentary mix and get through the event.

A GOOD SOUND ENGINEER MAKES OR BREAKS THE SOUND SYSTEM — NOT THE OTHER WAY AROUND

A sound system is only as good as its operator. I'd say that at least 75 percent of the churches I visit could get much more effectiveness out of their sound system if only the operator knew the fundamentals of sound and mixed accordingly. Most of the problems we encounter in church sound systems are not the direct result of a poorly designed sound system, but the result of poorly trained operators. Solid and consistent training of the basics of sound is absolutely critical to the success of the modern-day House of Worship. A bad sound system design can still achieve quite a bit in the hands of a qualified and well-trained operator.

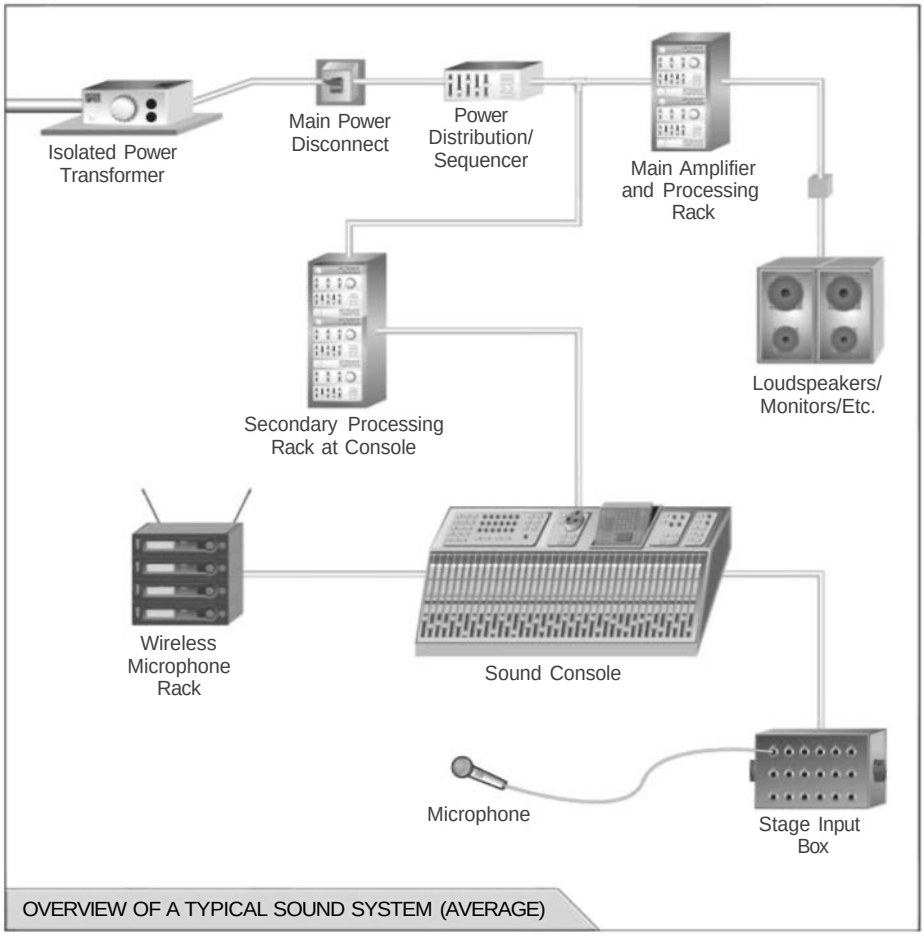

FIGURE 1.1
Overview of an average sound system layout.

You Do Get What You Pay For

While training is important so that your sound engineer can perform optimally it's obvious that a well-designed sound system will allow that person to truly excel. Going back to the car analogy, it might be possible for a highly skilled driver to perform well at the races with an old clunker, but a finely tuned sports car, in the same hands, will far exceed the results of the clunker. Keep in mind, when planning a sound system, that you get what you pay for. But, perhaps more importantly, your sound system is only as good as the weakest link.

TIP

A preamp is an amplifier that boosts the sound signal prior to it entering the signal path in the console. A cheaper preamp will often alter the true sound and can adversely alter the reproduction of the sound.

You can spend all the money in the world on speakers and amplifiers but cheap out on the console (sound mixing board) and your system will not perform as it should. The console will prevent the signal from being the best it can be. Usually, due to cheap preamps, the signal coming into the board will suffer, because as it passes through the signal path it will continue to pick up excess noise, and this noise floor will be present in the system. The result will be a less–than-adequate reproduction of sound.

Time after time churches upgrade their old analog console for a new digital console – and they are blown away. They have better gain control, the signal is cleaner, and the system is performing better than ever. Often, they are astonished. This is true in all aspects of your sound system – not just the sound console. So pay close attention to every piece of equipment (and cable) that you choose.

In all your media systems, don't go cheap on the components that are difficult or impossible to change once the system is installed. Make sure to spend the money where it counts (cables, patch panels, connectors, power, etc.). These are the things that can't easily be changed down the road. Other items, such as consoles, microphones, and stage monitors are a little easier to upgrade later on and might be bargaining chips for your "value" engineer if need be. But I urge you – STAND STRONG. Nothing is worse than not having the tools you need to do ministry because you lost (or worse yet, didn't fight) at the "value" engineering meetings.

Are You Grounded?

Often overlooked, and rarely understood, it's important for a sound system to be on its own circuits with its own isolated ground. Done properly, the power for the sound system will run back to an isolated transformer specifically for the sound system.

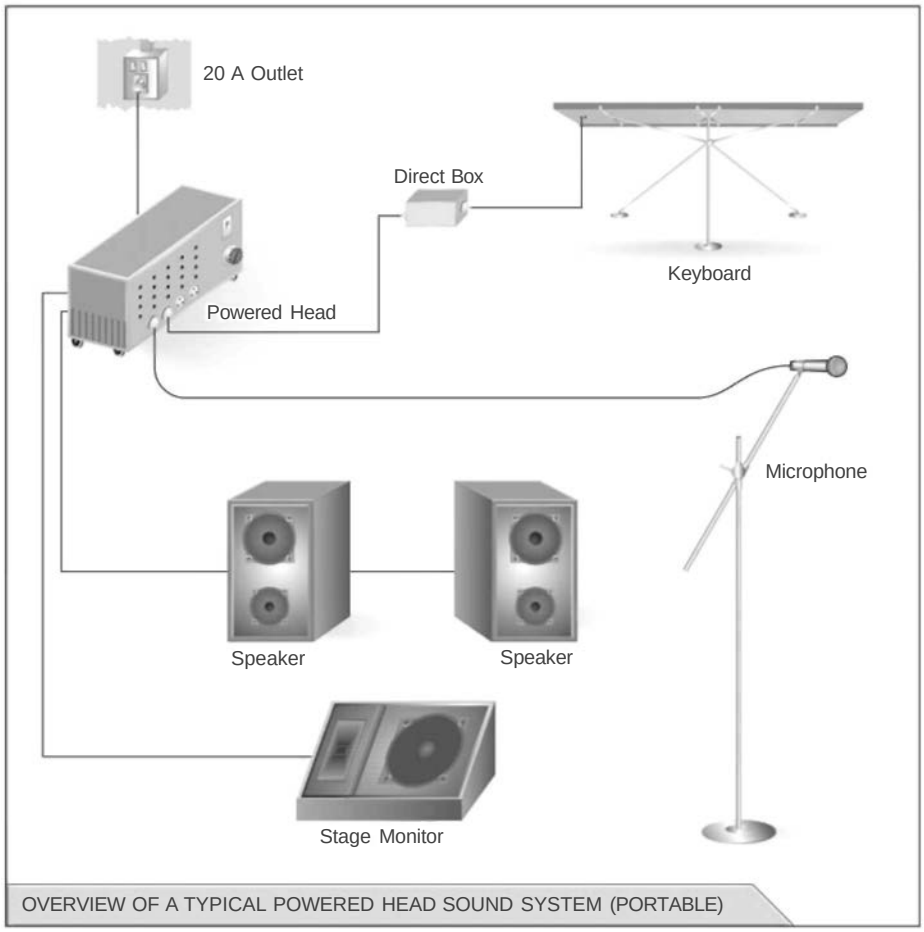

FIGURE 1.2
Overview of a small portable sound system.

This is the single most important thing you can do to reduce hum and interference noises.

Once you get this isolated ground – protect it! Don't plug a moving light, orchestra light, or other non-sound-related device into the sound power. These devices can add noise through the power line that can cause operational problems and poor sound quality. Likewise, don't go plugging your guitar amps or other sound devices into building power. The second you do, you defeat the whole process.

COMPONENTS OF A BASIC SOUND SYSTEM

The Mixing Console

At the heart of every sound system is the mixing console. This is the centerpiece of any sound system. Most likely, when someone says "sound system"

you think of the large console on the floor of an arena with a confident-looking person (often dressed in black) standing behind it. The mixing console is the central heart of any sound system.

Realizing that at the time of this writing, over 80 percent of churches in America are comprised of 100 people or less, most of the sound systems encountered are very rudimentary. Often the mixing console will be a powered mixer (in other words the primary mix controls, system equalization, effects processing and amplification will all be built together as one unit). However, larger congregations will have need for a larger mixing console. Many of these congregations will turn to digital mixers and many will also use submixers.

When you first approach any typical mixing console, it's common to be a little intimidated. At first glance, all you see are rows upon rows of different-color knobs and controls. It looks like a beast – and that's when you stand behind a small mixer! When you find yourself in front of a 48- or 52-channel console, or, heaven forbid, a large-format digital mixer, you might just want to dive for cover!

Relax. That's a standard feeling. But here's the secret: if you learn about 16 button/knob functions you can run almost any console out there! That's right – all those buttons and knobs and controls that look so intimidating are really duplicating the same function per channel. And regardless of the type or size of the console, just like with the automobile example, they all work pretty much the same. With the knowledge of a handful of controls you can operate almost any console out there!

So, take a breath, grab a cup of coffee, and let's explore the typical mixing console.

Lets start off by taking a typical console and breaking it into two primary sections – the input section and the output section.

The input section is where you manipulate your various input sources (microphones, playback devices, effects returns, etc.). The output section is where you route the various signals to the different outboard components of the sound system (processing, amplification, powered speakers, stage monitors, etc.).

FIGURE 1.3
A typical mixing console for an average-sized church. Mackie 1604VLZ shown here. Photo courtesy of Mackie Designs Inc. All rights reserved.

Input Section

Let's look first at the input section. Often, this is where the first wave of intimidation comes for newer users. Don't despair. The input section is easy. Each channel will consist of an intermediate volume control

FIGURE 1.4
Rear Connections of a Mackie 1604 Mixing Console.
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(usually a fader, but in some cases it will be a knob). This control is almost always located at the bottom of the channel strip. Above this strip will be a section of knobs that control the equalization of the channel's inputs, and another section of knobs that control the auxiliary sends for the channel. Finally, at the very top of the channel you will usually find a GAIN control (sometimes called TRIM). This is the master volume control for the channel.

The controls on one channel duplicate across the entire input section! So, if you look at Figure 1.5a of a typical channel strip, you will see the volume fader, auxiliary, equalization, and gain controls. Now, when you look at the channel in more detail, you'll notice the Auxiliary knobs all do the same job and the equalization knobs work like you'd expect. See – this is already getting simpler. Let's take a look at each control and discuss how it works.

GAIN CONTROL

As mentioned earlier, the Gain (sometimes referred to as Trim) is almost always going to be located at the top of the channel strip. For practical purposes, you can think of this as the master volume control on the channel. This is the knob that the old saying is very true of: "A little bit will do you." The Gain control is actually affecting the gain of the preamp.

I like to explain volume structure for a sound system much like a water supply system. When you visualize how water works – you have different control stations. Think about the main water cut-off to the house. If you turn it a little bit, water gushes out. Likewise, if you turn the faucet to the kitchen sink on the same amount, water trickles in comparison.

Now, think of that example when you consider your Gain control. The Gain control acts like the main water cut-off – turn it a little bit, and you get a lot of volume proportionally. Your fader or volume control on the channel acts more like your kitchen faucet – move it the same amount as the Gain control and you get much less volume proportionally.

Another function (usually located near the Gain control) is the PAD control. This is a great feature for certain input devices (such as CD players). Some

signals come into the console at a higher db level – you know you are experiencing this when the GAIN is all the way down and you can barely touch the fader without blasting yourself through the back wall! If you engage the PAD it will reduce the signal and allow you to build proper gain structure. One key benefit to using the PAD with higher signals is that it will allow you more manipulation of the signal with the fader – you can now use the fader to make small, minute changes to the signal, whereas without the pad you could not. This gives you more ability to craft your mix.

FIGURE 1.5
Typical input channel strip. Mackie 1604 Mixing Input Channel Console shown. Photo courtesy of Mackie Designs Inc. All rights reserved.

THE FADER

If the GAIN is your big volume control, the fader is your small volume control. This allows you more finite control of the signal and is the primary control you use for your mix. While your mix is ultimately a concert of all these functions, the fader is your primary control for fine-tuning the mix. This will be explained in more detail later in the "Gain Structure" section.

Also near the fader (usually just above it) is the MUTE button. This button allows you to quickly mute the channel without changing a bunch of settings or moving the fader. Check your specific console manual to see if the MUTE button also mutes your auxiliary outputs as well as the main outputs and subgroups – some consoles differ in this regard.

AUXILIARY CONTROLS

Usually, the next bank of controls is the Auxiliary knobs. It's not uncommon for people to not realize what this group of knobs do.

It's helpful to think of them as simple signal splitters. The auxiliary section will usually contain between 2 and 16 knobs, depending on your console and its purpose. Each Auxiliary control will usually have a master Auxiliary control (although not always) and will have its own output jack on the back of the board.

Imagine that channel one has a keyboard input. The channel, without Auxiliary controls, will take the sound of that keyboard, route it to the subgroups (if the console has them), and then to the main outputs. That's great – except you need that sound in other places too! You might need it to go to the stage monitors, a CD recording or video feed, a hearing-assist feed, or any other output source other than the main speakers.

The Auxiliary controls allow you to do just that. The more Auxiliary controls you have, the more places you can route the signal. This is why many consoles designated for mixing stage monitors have so many Auxiliary controls – they want to be able to send each signal to many places. Auxiliary controls give you a great deal of flexibility and are very useful for live and recording mixing.