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TECHNOLOGY SPOTLIGHT

Grace Polaris Church

REVIEW:

SHURE MV88 AND MV88+

Out of the Box:

WAVES CA1000 AND CA2000 COMMERCIAL AUDIO DSP ENGINES

SESCOM SES-IL-LPTT MICROPHONE SWITCH

RIEDEL DISTAG DISTANCE MONITOR

YAMAHA RIVAGE PM5 MIXING SYSTEM

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EDITORIAL NOTE

It is hard to believe that: *"Less than a month ago all of August still stretched before us - long and golden and reassuring, like an endless period of delicious sleep."*— Lauren Oliver

Yet, here we are, rolling into the fall, several months into a pandemic many of us were hoping would be – at the very least – fading away, much like the summer is. Traditionally, our August issue is a "How-To" cornucopia of information, and this year that holds true – accept that we've stuffed it to overflowing with articles ranging all over the AVL landscape. Our Tech Spotlight looks at Grace Polaris Church, and features a very informative Q&A with Phillip Hagood, the General Manager at InteRise, about the benefits of immersive audio.

We were also thrilled to be able to talk to Trent Walker, the Senior Audio Engineer for the Tabernacle Choir at Temple Square about how he captures the "joyful noise" of the choir and orchestra. Nick Dillard, a LifeChurch filmmaker, walks us through the creation of Switch's music video for "Count Me In", and Emmy-winner Zak Holley shares how he sets up an easy-to-use live stream.

This months' Best In Show columns feature Intercom Solutions from Pliant Technologies, Streaming and IP-Capable Camera Solutions from JVC Professional and Loudspeaker Solutions from EAW. We also review Shure's MV88 and MV88+, and Out of the Box showcases Waves CA1000 and CA2000 Commercial Audio DSP Engines, Sescom's SES-IL-LPTT Microphone Switch. Riedel's DisTag Distance Monitor and Yamaha's RIVAGE PM5 Mixing System.

Heading into the fall, we will continue to provide double the editorial with a strong focus on education. We are also very interested in finding a few houses of worship we can talk to about Christmas productions (live or virtual or both?), feature in our Technology Spotlights, and review new equipment serving the worship AVL market. Interested in contributing and being a part of our team? Please call or text me at 705-500-4978 or email me at mm@tfwm.com – I'd love to talk to you.

We'd also like to remind you to check out CFX's exciting plans for a VIRTUAL church conference opening October 5th – with 60 days of custom content sessions designed and tailored for houses of worship by 20+ industry leaders and a virtual exhibit hall, there really is something for everyone. You can learn more at www.churchfacilitiesexpo.com

As always, stay safe – we will catch you again in September!

Michelle Makariak

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Worship Summit 2020: Connecting Your Church with an Online Community

The global pandemic has changed the way Christian communities worship and interact. Right now, the congregation cannot safely gather together for church on Sundays so most of the communication has to be done online. A challenge many pastors and worship teams are facing is learning how to connect with people through video sermons and small group Zoom meetings. For some, the technology is difficult to navigate and for others, the virtual experience simply isn't as genuine.

Times of uncertainty are when your congregation need God and worship the most. It's up to you to figure out how to bring people together online and keep people engaged. Below is information on the upcoming live Worship Summit held on **July 29 at https://worshipsummit.live** . This free virtual conference will teach your worship team everything they need to know about living in a digital age and communicating online.

With a full day of educational content planned for virtual attendees, including performances by some great church bands between conference speakers, the Worship Summit will focus on live streaming as well as how to connect with people using tools like Zoom.

Part of the conference is also geared toward worship band leaders. Musicians will have the opportunity to discuss audio and recording equipment for creating clear worship music. Worship Summit presents a unique opportunity for attendees to collaborate with speakers and other attendees, network with other pastors, church leaders, and media teams and learn everything you need to know about live streaming.

Video production isn't easy, which is why this conference is such a great opportunity for your worship team. You can learn how to plan your content and create videos that will effectively spread the message of God in your community. T

Listen Technologies Names Sam Nord Vice President of Global Sales

Listen Technologies Corporation has promoted Sam Nord to vice president of global sales. In this role, Nord works with Listen Technologies' partners to sell the company's audio and content solutions to their customer bases. He will also oversee Listen Technologies' outside and inside sales teams.

"We're happy to recognize Sam and promote him to vice president of global sales at Listen Technologies," said Russ Gentner, CEO of Listen Technologies. "Sam's enthusiasm, leadership and advocacy for his team, the industry, and our partners and customers, are unparalleled. He and his team have been instrumental in helping Listen Technologies increase its product offerings and expand the application of our solutions."

Nord has spent his entire career in the AV industry. He joined Listen Technologies in 2013, after having been a customer for many years in previous roles as a dealer and integrator. Most recently, he was director of global sales at Listen Technologies. Under his leadership, the sales team achieved record year-over-year growth.

Nord's experience as an integrator has helped him anticipate what customers want, as well as the solutions that will meet their needs. T

EAW Names North Coast Marketing as Representative for Ohio, Western Pennsylvania, West Virginia and Kentucky

Eastern Acoustic Works (EAW®) has named Erie, PA-based North Coast Marketing as its manufacturer's representative serving Ohio, Western Pennsylvania, West Virginia and Kentucky. The agreement encompasses the entire EAW product catalog including EAW's new ADAPTive Series with its Anya and Anna loudspeakers and Otto subwoofer.

"Representing EAW gives us the opportunity to provide the very best cutting-edge pro audio products available on the market today," says Dennis Cray, principal owner of North Coast Marketing. "EAW integrates perfectly into our line card, which now includes the very best in microphones and signal processing, amplification as well as the loudspeaker itself. In addition, EAW's digitally steerable new ADAPTive line of speakers sets the standard that all other manufacturers are trying to achieve. EAW's product quality and innovation are second to none, and I am excited to be back representing such a prestigious company."

Based in Erie, Pennsylvania, North Coast Marketing has served the audio industry for more than two decades as a manufacturer's representative company specializing in high-quality professional audio equipment, backed by dedicated, timely support. T

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Renkus-Heinz Puts Sound Where It's Wanted: On the Congregation

The Fort Garry Mennonite Brethren Church in Winnipeg, Manitoba is, according to its head pastor Carl Heppner, "a vibrant faith community where people of all ages and backgrounds can find a place to belong." It is also a contemporary church known in the area for incorporating a full band into its services. And that is why, when it came time to upgrade its audio capabilities, the church went with a system backed by Renkus-Heinz.

"The church wanted a cutting-edge system, from audio to video," said Myron Dyck of Golden West Sound Design, the integrator who installed the new AV system. "What we installed encompasses everything from IP video distribution and projection, stage lighting and acoustical treatment, and the absolute best sound possible. So, that meant going with Renkus-Heinz."

Dyck said he turns to Renkus-Heinz when clients are seeking audio that provides excellent clarity and intelligibility. One major benefit of utilizing Renkus-Heinz in an installation is the ability to leverage the power of the company's cutting-edge digital beam steering technology. With Renkus-Heinz digitally steerable arrays, integrators are empowered to put sound where you want it: on the congregation. The result? Superior sound in any environment.

"I knew this would be a Renkus-Heinz install from the start," Dyck said. "The church was looking for a high level of quality both for the band and in speech intelligibility. Renkus-Heinz is creating some of the most impressive products on the market today, and I always appreciate the recommendations they make as to what will work best. I can take the information they provide in terms of design work and show the client exactly what they can expect in terms of coverage."

Fort Garry Mennonite Brethren Church is a 300-seat, A-frame facility that, in the past found it challenging to achieve consistent coverage from front to back. When the church fills to capacity, that lack of coverage had been a huge detriment to the message being delivered.

To remedy this, Dyck turned to Renkus-Heinz' ICLive X Series, which brings a new level of flexibility to integrators and contractors seeking to improve sound in any space – no matter the size or shape. ICLive X is a complete system consisting of two freely combinable, steerable-array modules, the ICLX and ICLXL, and a matching subwoofer, the ICLX-118S.

For the Winnipeg installation, Dyck installed two ICLive XL loudspeakers and two ICLive X loudspeakers in matching arrays at the front of the hall.

"Everything about it is excellent," Dyck said. "It was relatively easy to hang and install up against the ceiling using custom made mounts, and we had perfect coverage immediately. Everyone is extremely happy with the end result." T

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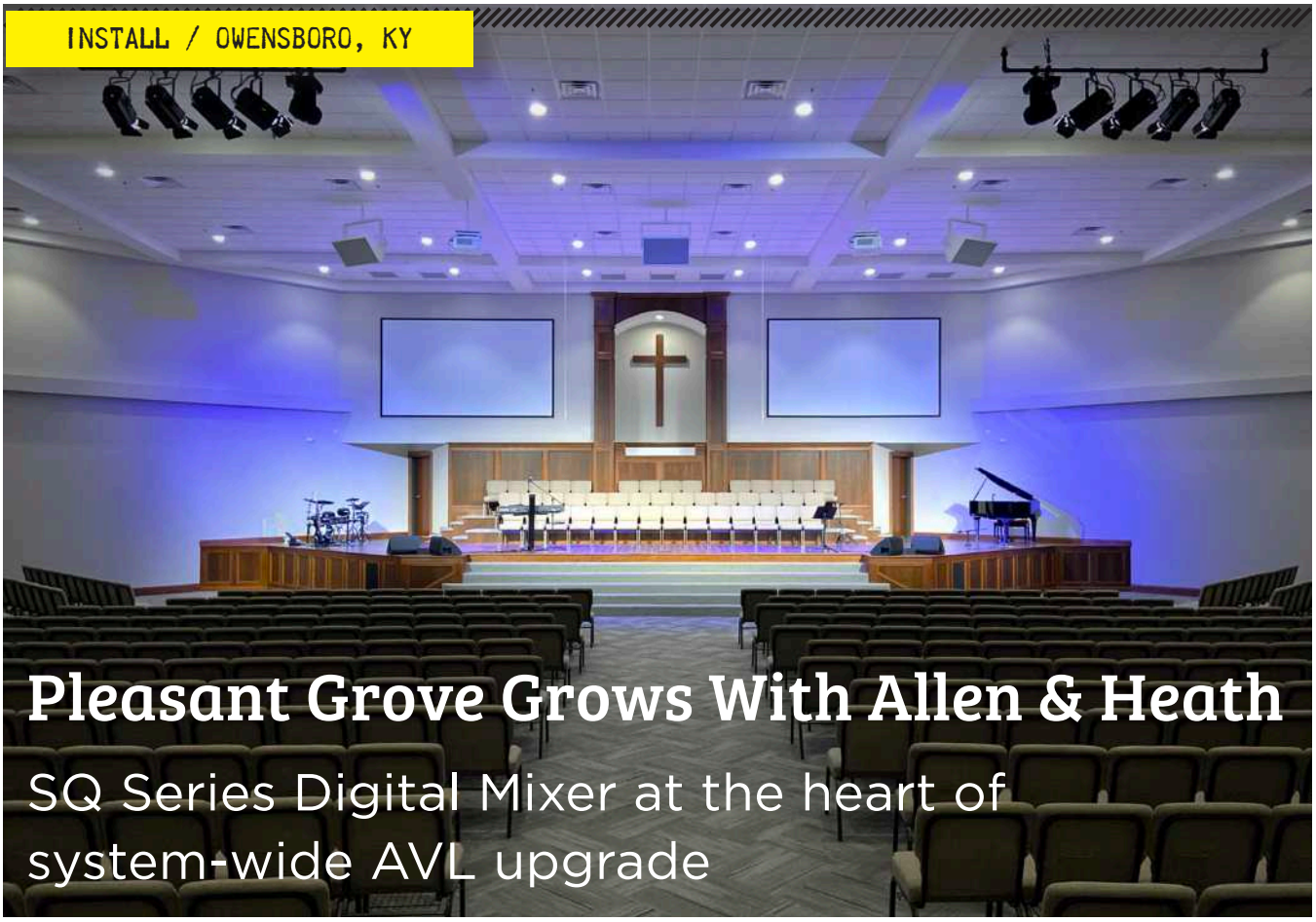

Pleasant Grove Grows With Allen & Heath

SQ Series Digital Mixer at the heart of system-wide AVL upgrade

Founded in 1835, Pleasant Grove Baptist Church has come a long way from its founding in an Owensboro, Kentucky log cabin. Just as the church has weathered over 185 years of growing pains and trials and tribulations, the congregation pivoted to social media and streaming services to stay connected in a socially-distanced world. As the church family begins to return to in-person services (at a 33% limited seating capacity with many health and safety precautions in place), an Allen & Heath SQ-7 console and ME personal monitoring system is there to sonically greet them.

"The audio quality difference is night and day," says Alex Peake, Integration Specialist at JCA Media. "The church had been using another digital console brand before and immediately noted how much easier it is navigating and configuring the SQ. The musicians also appreciated the sonic difference in their in-ear mixes with the ME-1 over what they had before. It is important to provide a system like ME to get the tech out of the way and let the musicians focus on playing and worshiping again."

JCA Media was able to deliver a flexible and cost-effective audio system design due to the compatibility of the SQ series with stage boxes such as the AR2412 and AB168 and the plug and play integration with the Allen & Heath ME personal monitoring system. The SQ4U personal mixing app is used by the praise band to control their own stage mix from Android or iOS devices and free up the audio engineer to focus on the front of house sound.

"It really was amazing how simple this board was to learn and the layout made navigating through the board a breeze," notes David Rogers, Pleasant Grove Minister of Music. "We are loving the multitrack recording, assignable SoftKeys, and how fast you can fly through the desk. Our broadcast mix has never sounded better. It's also astonishing how quickly our bands have adapted to the ME units. Each volunteer is able to use their gifts in a better way because of these in-ear mixers. Our church can now push forward in proclaiming the Gospel online in a much clearer, more powerful, and professional manner."

In addition to the major mixing console upgrade, Pleasant Grove also stepped up their PA system and lighting. The SQ-7 connects to a full complement of Danley loudspeakers and power amplifiers, including the SH69 full range point source mains. An array of Chauvet Pro fresnels, spots and battens help set the visual mood.

"We were especially excited to see this one come together," Peake adds. "Even with the scale of this system upgrade and the challenging environment we're all working in, we came out the other side with a great sounding system that just works like a charm." T

PHOTO: A RECENT PLEASANT GROVE BAPTIST CHURCH AVL UPGRADE FEATURES AN ALLEN & HEATH SQ-7, ME PERSONAL MONITORING, DANLEY PA AND CHAUVET LIGHTING
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Waves CA1000 and CA2000 Commercial Audio DSP Engines

Waves Audio has announced the first products of its new Waves Commercial Audio line: the Waves CA1000 and CA2000 Commercial Audio DSP Engines.

Waves Commercial Audio DSP engines dramatically improve audio playback quality and speech intelligibility in any Dante®-based A/V installation. Each product is a single-box software-plus-hardware turnkey solution, featuring over two dozen premium Waves processors, with professionally pre-configured, integrator-ready audio processing presets. Waves CA products enable A/V system integrators and installers to deliver superior sound quality for corporate, commercial, government, educational, entertainment, sports and house-of-worship installations.

The Waves CA1000 and CA2000 Professional DSP Engine units help solve common audio challenges and integrate easily into new or existing A/V installations using Dante audio networking. Waves CA1000 and CA2000 include 19 professionally curated audio processing presets that solve challenges with playback quality, speech intelligibility via a wide array of microphones and amplification systems, feedback elimination, voice processing without loss of tonality, and more. These presets are based on over two-dozen low-latency Waves premium plugins, which can be further customized and stored by the integrator based on their unique room or zone requirements. They are designed to tame and control common problems that can occur at installations with media playback, wireless mics, meeting room/table mics, lectern/pulpit mics and broadcast/streaming.

Each of the presets can be customized and locked-in for individual channels, groups or zones, to deliver optimal results based on the IO, PA and room.

The CA1000 can be configured to process up to 16x16 bidirectional audio channels, and the CA2000 can be configured to process up to 64x64 bidirectional audio channels over the Dante network.

Designed to deliver superior results in space-limited installations, the CA1000 and CA2000 units are either surface or rack-mountable.

CA1000/CA2000 features:

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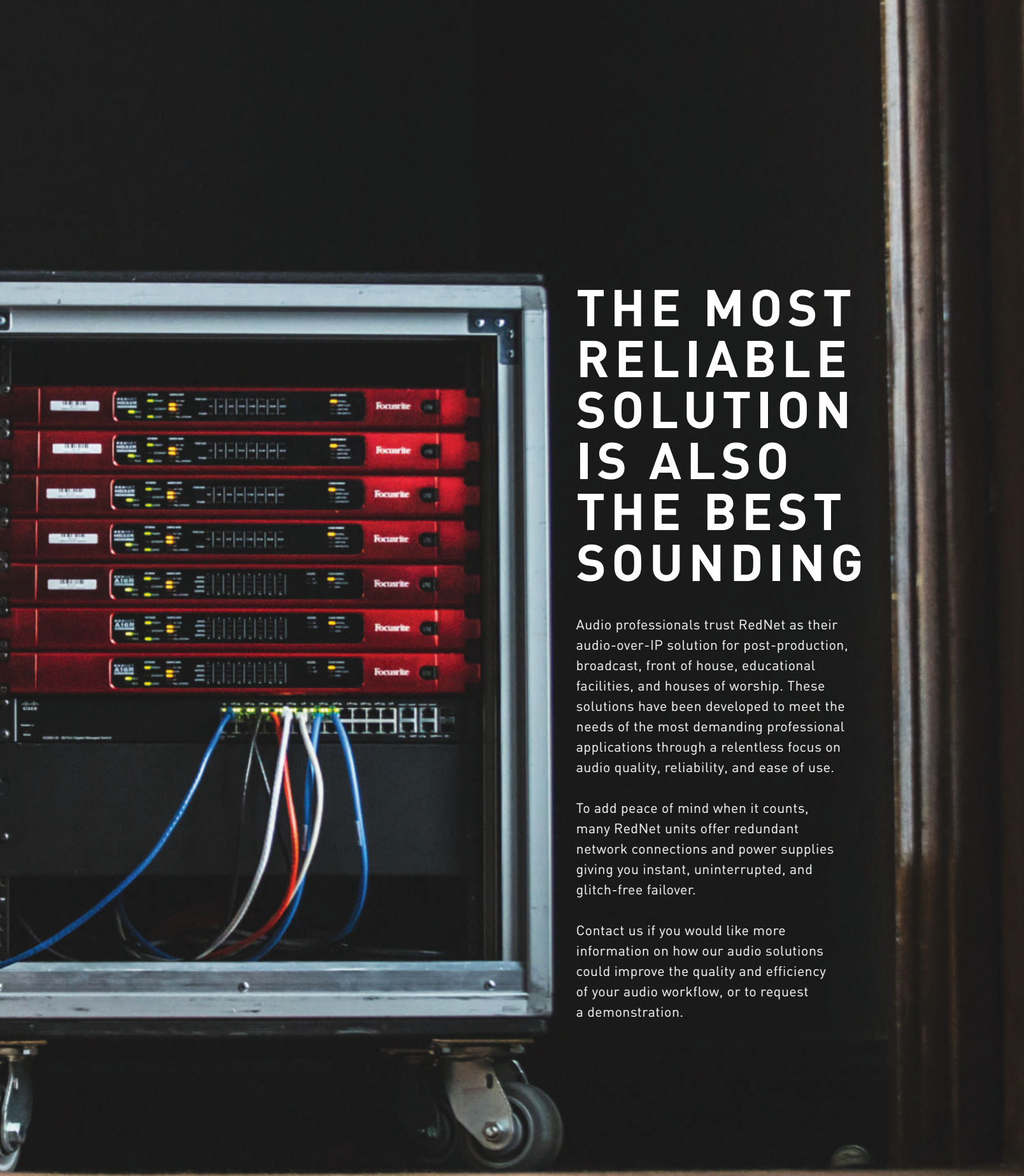

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Sescom SES-IL-LPTT Microphone Switch

Do you wish you had on/off audio control on your favorite mic? Need to kill audio quickly without running to the soundboard or calling for the sound guy? Add an on/off button to any mic or line signal XLR input with the new Sescom SES-IL-LPTT microphone switch. This passive XLR connector switch needs no power supply and easily plugs directly into the end of your microphone without adding more cables and weight. The output end plugs directly into your mic cable.

The lightweight switch features a readily identifiable red button that, when pressed, turns on communication and allows signal to pass, and, when pressed again, mutes the signal entirely. The button securely latches after each press to ensure reliable operation during live performances.

The switch also detects whether phantom power is present in the signal. If phantom power is present, a blue LED will illuminate when the signal is activated. The light remains dark if there is no phantom power.

Ideal for anyone who cannot control the soundboard but needs to mute and activate a mic, this switch is an easy-to-use solution for houses of worship to use in live performances, recording, podcasts, lectures, sermons, streaming and more. Musician and Sescom Technical Support, Dan McCabe comments, "The SES-IL-LPTT microphone switch handily plugs right into microphones like it was meant to be there and there is no popping when pressing the button to turn the signal off or on. The user can quickly kill the mic in a pinch without needing to adjust board levels, and the "cough" feature allows the signal to be momentarily cut so that a worship leader, for example, can speak to bandmates without the audience hearing."

The XLR female input and XLR male output are labeled at the appropriate ends so there is no question about which end to plug into the microphone and which end to connect to the cable. Cost-effective and easy to install, the unit is housed in a lightweight, streamlined, and rugged case to deliver years of trouble-free use.

The SES-IL-LPTT also conveniently serves as a 'cough' switch at any event to temporarily turn the sound off when an unwanted noise occurs and just as easily can be turned back on.

Also available in a more rugged inline model is the SES-MKP-LPTT that is installed between two XLR cables and is housed in a durable black anodized aluminum shell for repeated, trouble-free, quick control of mic or line level audio signals. Perfect for mounting to a desk to instantly mute mics during podcasts, lectures, house of worship services, and more. T

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Riedel DisTag Distance Monitor

Riedel Communications today introduced DisTag, an all-new distance monitoring device. Worn around the neck or carried in a pocket, DisTag is a reliable and precise instrument that immediately alerts its wearer via haptic, visual, and acoustic signals whenever the mandatory minimum distance to other people is about to be breached.

"After weeks of quarantines and other limitations due to the coronavirus pandemic, our society is gradually returning to normal — but it's a new type of normal. Slowing the spread of the virus is still a number one priority as key industries, organizations, and institutions start to reopen and people begin returning to work," said Thomas Riedel, Founder and CEO, Riedel Communications. "In recent months, we've learned as a community to adapt to new behavior patterns and situations, and a fundamental aspect is for employees, visitors, and customers to maintain a safe distance between each other. That's where the new DisTag device comes into play."

Featuring a compact and minimalist design, DisTag is ideal for media and event production, industrial operations, retailers, medical facilities, public and cultural institutions, and schools and universities. The device offers three signal levels: a two-stage vibration alarm (haptic), a two-stage LED signal (visual), and a two-stage sound signal (acoustic). The proximity limits of the warning signals can be individually defined and adjusted in accordance with local regulations for social distance.

Jacky Voss, Corporate Business Development Manager at Riedel, added, "With its small size (93 mm by 41 mm) and low weight (61 grams), the device is compact, comfortable, and hardly even noticeable to users. DisTag can be used virtually anywhere, whether indoors or out, and its integrated battery provides power for up to 12 hours. And, as it requires no additional infrastructure, it is easy to expand the system at any time – all that is needed are more DisTags!" T

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YAMAHA

RIVAGE PM5 Mixing System

The Yamaha RIVAGE PM Series is highly regarded for its outstanding sonic quality and flexible control. The new RIVAGE PM5 Mixing System packs undiluted RIVAGE PM power and performance into a lightweight, intuitive console that is surprisingly slim. The CS-R5 control surface for the RIVAGE PM5 system features three large touch screens and a condensed selected channel section that contribute to smooth and intuitive operation. The addition of a third display screen has made it possible to offer a more touch-centric interface in a compact, significantly lighter console that is easier to transport, set up and operate in a wide range of venues.

The physical depth of the console has been significantly reduced for more comfortable operation and improved sightlines. The PM5 features the same fader configuration as the rest of the RIVAGE PM series, with three bays of 12 faders each (the small PM10 console, the CS-R10-S has 2 banks of 12 faders). The combination of touch screens and selected channel controls offer functionality and intuitive operation that are familiar to RIVAGE PM series users while offering easy entry for CL and QL series console users as well.

To maximize the advantages of the three large touch-panel screens on the CS-R5, the depth of the control surface has been reduced to bring the screens and controls within easy reach for comfortable, stress-free operation while simultaneously contributing to improved sightlines. The meters located beside each fader offer precise tracking and outstanding visibility that make fine level adjustments easy. At just 42 kilograms the CS-R5 control surface is also remarkably lightweight and can be easily carried and maneuvered by just two people.

The new DSP-RX engine provides 120 inputs, 48 mix buses and 24 matrices, while the DSP-RX-EX engine has 288 inputs, 72 mix buses and 36 matrices, as well as 512 slots for plug-ins compared to 384 slots in the other DSP engines.

While the PM7 console has the DSP built-in, each of the other console models which use the external DSPs can be used with any of the DSP models and all of the consoles and DSPs utilize the same I/O racks and the same firmware so there is file compatibility throughout the Rivage lineup. That means whichever control surface is used, sound, features and basic operation remain consistent. The system's Dual Console function makes it possible to use a second control surface as a sidecar. Any control surface can be used for FOH one day, as a monitor console the next, and then as a sidecar as the need arises. All models feature the same basic fader configuration with up to three bays of 12 faders.(except the CS-R10-S small PM10 console which has 24+2 faders) so that the same fader layout can be maintained when using different control surfaces on different days of a tour, for example.

Like the RIVAGE PM10 and PM7, the PM5 and PM3 offer direct compatibility with two audio networks: the Yamaha TWINLANe network that can simultaneously carry up to 400 audio channels with extremely low latency, and the Dante audio network from Audinate that is standard in CL and QL series digital consoles and a range of other Yamaha Pro Audio products. The new systems fully inherit the underlying Yamaha RIVAGE PM philosophy: any compatible I/O rack can be used to capture the on-stage sound accurately, without coloration, allowing creative touches to be added as required. T

Available now.

SALT 2020 is going VIRTUAL!

"For Such A Time As This"..... was the theme for the SALT19 Conference last October. Little did we know how relevant and impactful those 6 words would be today. God knew what he was doing when he placed **YOU** in the position you are in **TODAY!** He knew that your ministry work would be more vital than ever.

We have heard the needs and we want to come along side you as you navigate all of he changes in how we do church. So, we are excited to announce **SALT 2020 Virtual!** This will be a gathering like no other and we are excited about the opportunity to engage with you this October on this virtual platform.

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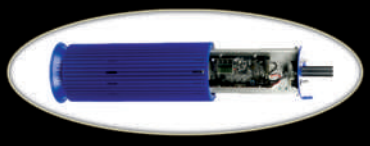
Basic Guidelines and Best Practices

A communication system is a critical component for production work, yet an amazing number of houses of worship forgo their usage. The checklist below gives basic guidelines and best practices for using a com system:

1. Remember – it's a party line. Everyone and anyone could be listening. Don't say anything you're not willing for everyone to hear.
2. When you're not talking, turn off the microphone. This reduces background noises and other noises.
3. Always turn your microphone off before donning or removing the headset.
4. Use only the number of stations needed – this will reduce non-production personnel using them, as well as mitigate the chances of a microphone being left on and generating noise in the system.
5. If you are using an un-balanced system remember to re-null your system based off the number of stations plugged in to the system for maximum efficiency.
6. If you are using wireless intercoms always have extra batteries on hand – it's inevitable that batteries will fail (or fail to be charged) when you need them the most.
7. Many systems include a paging feature that allows you to make calls over the PA. Always check to make sure this feature is disengaged before each use.
8. Consider using a telephone handset in place of a production headset for onstage use and other locations that need discretion or do not need to be "always on".
9. A beacon light is a great idea for the sound board and other locations where you might need to reach people but they might not be on headset. A beacon light simply flashes when the CALL button has been activated as a visual attention getting device to request someone pick up the headset.
10. Prior to the congregation arriving get everyone on headset and do a full headset check. Make sure everyone can hear each other and all systems are working. Address any issues before opening the doors.
11. At the end of each service neatly coil all cables and mitigate any trip hazards
12. Consider a wall station at each permanent location that allows you to hang the beltpack, headset and cable neatly on the wall out of the way of traffic. T

The Light Source INC



The Light Source Mini-Pendant is the perfect LED downlight for going places such as houses of worship, theaters and auditoriums. Its unique features include 9 adjustable beam angle settings from 81° to 56°, which are obtained by rotating the lens ring. Easily accessible electronics slide out like a drawer when the two levers on the top of the fixture are compressed. Using only 80 Watts of power, the Mini-Pendant puts out an amazing 4,423 maximum lumens. Smooth, even lighting dims all the way to zero output without flickering. The attractive stream-lined casing serves as a great heat sink, providing convection cooling which eliminates the need for noisy fans. Made in the USA and guaranteed for 10 years, The Light Source Mini-Pendant is definitely going places.

thelightsource.com

Streaming Church During Shelter-in-place

How Faith Church Streamed from Their Pastor's Home

The rise of COVID-19 has been the impetus many churches needed to fully explore livestreaming. As many states imposed shelter-in-place orders, churches needed to quickly figure out how to continue normal ministry content while facing the increasingly challenging circumstances imposed by the virus. For many, part of the solution included setting up streaming from their pastors' homes as a means of keeping the church engaged while still adhering to measures that required minimal staff to keep their team healthy and safe. Now, as restrictions ease, many of these same churches have committed to maintaining and even growing their live stream ministry.

One of the churches that quickly implemented a stream-from-home solution was Faith Church in St. Louis, MO. While their setup may be more produced than many, it provides an example of a model for churches big and small to continue growing their live-stream ministry. Bryan Weddle, IT Director, recently spoke during the Church Online Streaming Summit about what Faith Church was doing.

One of Faith Church's campuses is a mobile load-in site that was closed due to coronavirus, so their team decided to use this existing equipment at their pastor's home to stream. Bryan explains that they used their mobile video and audio rack in the garage and ran cables to the living room for cameras and a confidence monitor.

Faith is using this new portable studio to provide content from their pastor both on Sundays and throughout the week. "One of the things that we've focused on right now is that while everybody has so much downtime, we're trying to fill this downtime with as much positive content as we possibly can," Bryan explained. "There's so much negative news going around, they've gotta be encouraged and lifted up in this time."

As to connectivity for streaming, Bryan said they simply used their pastor's cable home internet connection for streaming through Living As One. Because of Living As One's Resilient Streaming Protocol, smooth streaming is possible without buffering even on inconsistent home internet connections. "We did [streaming] from Tuesday to Sunday, 14 services, some prerecorded, and we never had one issue," says Bryan.

With all other streaming options, whenever the internet has problems, your users will be watching a pixelated stream or a buffering wheel. After the second buffering wheel, 70% of your online viewers have already left. Living As One has the only protocol to resend and correct data on a two-minute delay, thus reducing stream complaints by over 85% on average.

Some things to keep in mind when considering streaming from pastors' homes:

It doesn't need to be fancy

Even a single camera can be effective. Your church is looking for authentic content at this time; it doesn't need to be polished.

Focus on lighting and audio

In a house, lighting and audio can be much harder to control than on a stage, but it's critical to ensure that the message is clear and not distracted. Use a good sound-isolating microphone and remember front-lighting for your pastor, whether through something like low-cost LED panels or using soft natural lighting from a window (rather than shooting into a window).

Plan your connection and encoding

720p video can be streamed on around 4-6Mbps upload or 1080p on 8-12Mbps. Home internet connections can be unpredictable! Living As One can help provide smooth streaming without buffering even on inconsistent connections (or even 4g hotspots).

If all else fails, pre-record

Having your pastor pre-record elements and post them as simulated live events through Church Online Platform can be a great way to keep your audience engaged if streaming is not an option, but you will lack the experience and interaction provided by live content. T

Church Live Streaming:

The Why and How to Green Screen

BY DREW APPOLONIA

Last month we wrote about getting started with live streaming and the basics that will get any house of worship service online. Live streaming your service doesn't have to be complicated and what we discussed last month is more than enough to reach your community during the pandemic. But a lot of you are already going beyond the basics and are ready for tips and steps for lighting, set up, and positioning yourself for a green screen right at home, or wherever you may be streaming from.

Let's start with what a green screen is. Green screens, or chroma keying, are typically used for visual effects, where a video or image is layered together with your stream. Green screens let you drop in any background image that you want behind the main subject in the foreground. This tactic has been used by the film production world for decades. It's what your local meteorologist uses to point out key things on the weather map. Once the footage has been filmed, the colored background is removed digitally in post-production. It's then replaced with other footage. Shooting on green screens is a fun and practical way to creatively get around the problems of shooting on location – such as an unfinished garage or empty church. They are a great way to create engaging church service video announcements with visually stimulating backgrounds. For an example, Church on the Move from Oklahoma, shoots most of its church announcements with a green screen, , a small addition that really amps up the production value to super high quality – here is an example (https://vimeo.com/126752573)

If you're ready to get the most out of your services or announcements, here are some tips to help you use what you have at home, or find out how to easily rent, to pull off a successful green screen shoot from just about anywhere.

All you really need to create and utilize a greenscreen is a digital

camera, a computer, some sort of Chroma Key photography software, and green screen material or a kit. We'll talk about how you can create the screen from things you can find at a craft store or how you can rent one to try out if you're interested in what the pros use. You'll also want some good lighting equipment, which we'll review, and then you need a virtual background – which can be something you shot and created, or you can download free virtual sets for churches like the ones available from PTZOptics.

Setting Up Your Green Screen

You can buy a green screen or rent a kit, or if you're just trying to create a green screen for Zoom, craft paper or poster board is an affordable way to quickly chroma key yourself.

Once you have your hands on a small green screen kit you can hang it from a backdrop stand, make sure the screen is as taught and flat as possible. You may need to even steam out your screen. Having creases or folds that create shadows or slight changes in the uniformity of color will make keying more difficult. If your screen isn't sewn to a tension loop, you can toss it into the dryer.

Lighting a Green Screen

One of the biggest challenges with green screens is lighting your screen correctly. Make sure that the light is even across the whole screen. Like with the creases, you want to avoid shadows. Light the screen from every direction possible. If there are any hot spots or shadows caused by your lights being too close to the screen, then march them back a bit until it starts looking even again. Ideally, you want the green screen to be just a tad brighter than how you'll be lighting yourself.

If you're doing the blue or green poster board from an office supply store approach and taping it to the wall, you should use a couple of lamps to light it evenly from both sides. The cameras built into laptops and phones are pretty wide, so you might need at least four poster panels to actually fill the view.

Shooting on green screens is a fun and practical way to creatively get around the problems of shooting on location – such as an unfinished garage or empty church.

Avoid Green Spill

You want to stand or sit a few feet away from the screen to avoid any spill bouncing off of the screen onto you. That is what's happening when it looks like someone is outlined by a haze. When you see weird outlines and artifacts like this, it means you're standing too close to your screen and getting spill. This isn't a big deal if you're just on Zoom but it can be really obvious on large screens. You may still get a tiny bit of outline action even when standing at the correct distance but this looks much more realistic than if you were standing too close.

How to Light Yourself

Lighting yourself or the subject within the video will depend on the style of the scene you'll be keying in. A three-point lighting setup is the broadcast standard for lighting a subject. This consists of your main "Key" light positioned in front and to the side of your subject, a "Fill" light placed to the opposite side to fill in shadows, and a "Hair" or back light pointing at the subject from behind to help separate them from the background. If you don't mind a little contrast, you can probably get by without a fill. Hair lights are often the first to be forgotten, but they are incredibly important for pulling off a pro level green screen look.

Some important tips: You absolutely cannot wear green. Don't have the subject wear or hold anything green or else the areas will be transparent once chroma-keyed. Also, reflective materials are also not recommended. Shiny objects (e.g. glasses, large jewelry, props, etc.) will pick up the green from the screen and will also be rendered transparent.

Why Green or Blue?

The reason why blue and green are used for this is because they sit at the opposite ends of red and orange – the colors most commonly found in various skin tones. Usually you won't be wearing both green and blue clothing. If you are wearing one or the other, pick the opposite for keying. Blue tends to spill less but takes more light to look right. Green tends to perform better for daylight keying, or daylight-looking scenes. Blue is better for night/night-looking scenes.

Once you have all those pieces down, the new background can be composited (i.e. two images or video streams layered together) into the shot and the chroma key will single out the selected color (usually green) and digitally remove it by rendering it transparent. This lets the other image to show through.

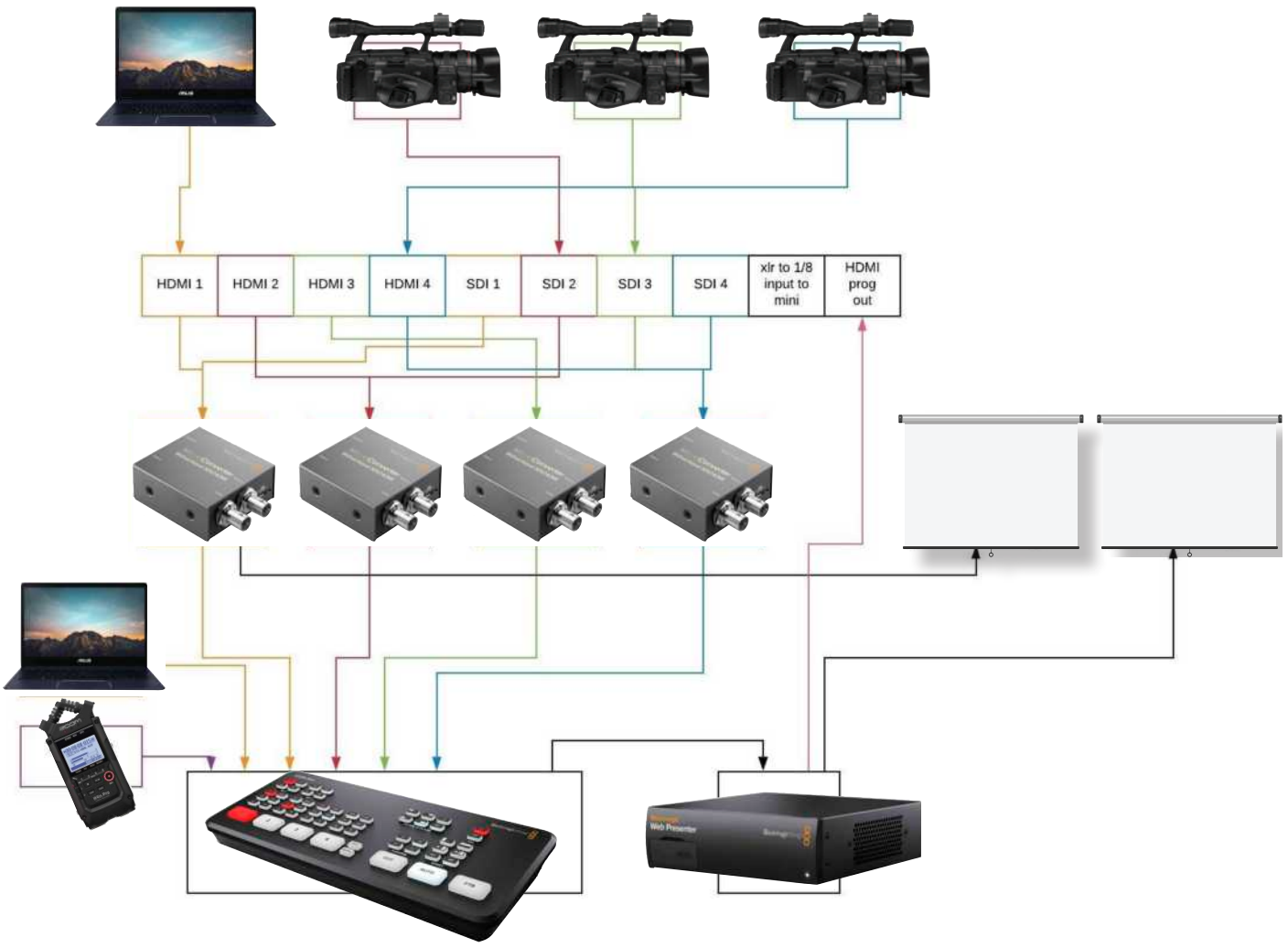
Next month, I'll be sharing more tips to increase the production value of your virtual religious services for an even more polished and professional look, especially as you're planning for the holiday season. We will take a look at how to incorporate multicamera feeds into the live stream, and the best tips for using pre-recorded content mixed with live content in a seamless way. T

Drew Appoloni *is the Video Manager at BorrowLenses - www.borrowlenses.com*

THIS IS HOW...

I Create an Easy-to-use Live Streaming Solution

BY ZAK HOLLEY



As a Los Angeles-based video engineer, I had been closely watching the rise of streaming for a while. Not only is streaming applicable across markets, such as worship, but with today's affordable tools, it's easier than ever. This has allowed anyone, regardless of budget or ability, to connect with a remote audience and share their content.

In January 2020, I drew up and created a streaming solution based around Blackmagic Design gear. Being already familiar with their ATEM Television Studio switcher and Web Presenter, I then started drawing up a rack-mounted system that would create an easier workflow from the already-released products. When the ATEM Mini Pro was released. I ordered an ATEM Mini Pro and began redrawing my system.

Personnally I am a fan of HD-SDI, so my first thought was to incorporate Blackmagic Design's Micro Converter BiDirectional

SDI/HDMI. Putting four of these converters in the flypack, I had the ability to take SDI inputs. This worked great and has saved me so many times in the field. I then made a custom patch panel on the back of the rack starting with four SDI inputs and adding four HDMI inputs. This gave me the ability to mix and match. An XLR input, Cat5 input and a fifth converter was added, so I could output program HDMI or HD-SDI.

I added a two-rack unit power strip inside of the rack to power everything then added USB hubs to power the converters via Micro USB. For quality control, a Blackmagic Design's SmartView Duo 7" monitor was added which allowed me to view a program on one monitor and my Aux on the second monitor. I also added the Web Presenter, giving me an option to provide a backup stream if need be.

Since upgrading to the ATEM Mini Pro, I've been able to take advantage of its new tools, which have helped streamline my workflow. The added features especially helped my workflow when it came to streaming and recording, as the ATEM Mini Pro features direct streaming via Ethernet, as well as direct recording to USB flash disks in H.264. The ATEM Mini Pro also cut out the need for a separate HyperDeck Studio Mini recorder, as I can now record to SSD as well. Zoom sees my ATEM Mini Pro as a webcam via its USB output, creating very professional multi-source meetings. Additionally, the ATEM's software is packed with so many features, and my personal favorites are the chroma keyer and downstream key.

As for cameras, I've hooked up Sony FS7s all the way to steadicam rigs using the ATEM software. You aren't limited to certain cameras with this software. Blackmagic Design's cameras are by far the best given the camera control features available in the software, but I've had success with lock-off shots using Marshall's POV cameras and GoPros. For a recent gig, we used Panasonic He130s with remote operators and had no issues. I've yet to find a camera the switcher doesn't like.

Once everything was up and running with the flypack, a local church in Downey, California, reached out to me. They saw that I had a simple live streaming solution and wanted to work on getting up and running so they could stream their Easter service. The only issue I had come across was the 3.5mm audio input, but since the recent updates, that is no longer a problem . I have since built four systems, and they seem to be a hot rental.

As of now, my workflow has consisted of mainly HD 1080p signals. The need for 4K hasn't come up yet, as most platforms don't allow you to stream in 4K. In the future as bandwidth improves, I could see that being a cool feature for new products, but for now, I don't have the need in my workflow. I personally love how seamless Blackmagic Design products work together, and they are priced so competitively that it's an easy buy from the consumer standpoint.

For distribution, YouTube and Facebook make it super easy to go live, and I love how any content you put up they archive. YouTube is the easiest platform to share your links, and everyone is familiar with the site.

It is easy to repurpose this rack for other workflows. You really have so many options, for example, I recently repurposed one rack to be used just for Zoom meetings. Between the HyperDeck Studio Mini, the Web Presenter and the ATEM software, you can be live streaming in no time. I'd also like to thank the online community and all of the tips and tricks I have learned from others. Anytime I had a question or needed a solution, it has been quick and easy with the many users worldwide. T

SINCE UPGRADING TO THE ATEM MINI PRO, I'VE BEEN ABLE TO TAKE ADVANTAGE OF ITS NEW TOOLS, WHICH HAVE HELPED STREAMLINE MY WORKFLOW.

Zachery Holley *is a 29-year old Los Angeles based video engineer and Local 600 ICG member. He has been working in television for 8 years, and received an Emmy for his contributions on HAIRSPRAY LIVE!*

Intercom Solutions from Pliant Technologies

SMALLER CHURCHES

Pliant's MicroCom M digital wireless intercom offers a simple and affordable coms solution for any budget, making it easily accessible for smaller houses of worship. Available in both 900MHz (where legal) and 2.4GHz for worldwide use, MicroCom M provides single channel, full-duplex, multi-user intercom for applications where high-quality audio, excellent range, and low-cost are essential. Delivering the performance needed for smaller worship facilities, MicroCom M has the ability to have up to five full-duplex users plus you can also have unlimited, listen only users. Because the MicroCom M does not need a base station, it can provide flexibility and portability for churches, even when setting up in temporary locations. The system features small, water-resistant lightweight beltpacks and provides excellent sound quality and ease-of-use. It also provides a long-life 10-hour fixed lithium ion battery, making MicroCom M a great solution for longer events. While intended for professional use, the system is fast and simple to set-up and very user-friendly, which is an essential feature for a HoW that is using less-technical staff and volunteers. In addition, MicroCom M offers exceptional sound and range in comparison to other intercom systems at this price point, providing more features and enhanced performance to users with smaller budgets.

MID-SIZE CHURCHES

MicroCom XR, which offers an affordable, rugged and simple-to-operate solution where solid wireless performance is required, is an ideal coms solution for mid-size house of worship facilities. Available in both 900MHz (where legal) and 2.4GHz for worldwide use, MicroCom XR features a two-channel intercom system that allows up to 10 full-duplex users, a Shared User mode for mostly listen users and a listen only mode. A 5-user full-duplex extended range option is also available for even greater RF coverage. Without the need for a base station, the MicroCom XR provides flexibility for mid-size facilities and mobile house of worship events. A 12-hour (field-replaceable) battery life, and optional drop in charger means you are always ready for any event. Additionally, MicroCom XR features an easy to read OLED display, and is IP67-rated. The system's small, water-resistant, lightweight beltpacks have been built to endure the wear and tear of everyday use and outside elements. Additionally, MicroCom XR features advanced license free RF technology with features that are designed specifically for production use. MicroCom XR offers exceptional sound quality and excellent range, providing more features and performance for budgets conscious users. Additionally, Pliant's range of SmartBoom headsets has been expanded to include versions for use with MicroCom M and XR beltpacks. This includes Pliant's recently updated SmartBoom LITE and SmartBoom PRO headsets, which offer improved audio quality.

LARGER CHURCHES

For large house of worship facilities and mega churches, Pliant's CrewCom digital wireless intercom system is an ideal solution as it provides large zone-based coverage and simple expansion capabilities. The innovative, professional wireless system is available in multiple frequency bands, 900MHz (where legal) and 2.4GHz worldwide, including CE versions that meet European Union conformity requirements. CrewCom features excellent 7KHz voice quality, 4 volume control belt packs, as well as an available 2 volume fully-featured professional full-duplex radio packs, and a host of user features. The system's advanced capabilities offer roaming connectivity for multiple users in numerous areas, unparalleled range, and unprecedented scalability as well as provide full connectivity to all standard wired intercom systems. With CrewCom, production crews of all sizes can easily and quickly deploy communications solutions to connect more people in more places than ever before – even in multiple buildings or campuses. It is a versatile communications solution built on a highly scalable platform in which a family of products utilizes a proprietary network and is ideal for solving communication challenges including tough RF environments, complex communications routing, and excellent reliability, which can be challenging with other wireless intercom systems. For large houses of worship, CrewCom offers a significant price advantage. Featuring 64 always-available Conferences, the system provides the unique flexibility of a built-in matrix without the high cost. Additionally, with volunteers being an integral part of a church, CrewCom reduces the need for user training by offering easy system setup along with the most user-friendly radio pack on the market. T

Streaming and IP-Capable Camera Solutions from JVC Professional

From broadcast to streaming, JVC offers a complete line of professional equipment that perfectly complements the house of worship market. This includes a wide array of camcorders, PTZ cameras, monitors and studio controllers, among other things. JVC Professional Video is focused on providing AV professionals in the church market with the latest camera and monitor solutions. With its latest CONNECTED CAM™ series of camcorders, JVC is spearheading streaming for churches of all sizes.

SMALLER CHURCHES

JVC's GY-HM250 is an easy-to-use professional camcorder that delivers stunning, 4K Ultra-HD video, and is ideal for HD streaming of weddings, school, family and church events. Using the company's latest IP communications engine, the GY-HM250 enables operators to remotely control vital camera and lens functions from computers or smart devices. It can also stream HD content directly to popular platforms such as Facebook, YouTube, Twitch and other CDNs. JVC's ongoing collaboration with the Facebook Live technology team enables users to login to their Facebook account directly from the camera and publish live streams with a push of the button, no PC or outboard encoders needed.

Designed for enhanced single-camera production, the GY-HM250U offers lower-third and full-screen titling solutions for recorded or streamed HD video output without an external CG or production switcher. With this function, custom, integrated graphics, logos and icons can also be added to live streams using a browser-equipped device.

The incorporated Advanced Streaming Technology (AST) includes Zixi powered forward error correction with ARQ and SMPTE 2022, delivering high-quality streams even under challenging conditions. The camera also features a 12x optical zoom lens with new tele-macro focus mode, as well as a 4K CMOS sensor that records directly to SDHC/SDXC memory cards and adds Zero Config capability for one-click configuration when joining a shared LAN network with other cameras.

MID-SIZED CHURCHES

Part of JVC's 500 Series, the handheld CONNECTED CAM™ GY-HC500 is a fully capable 4K Ultra-HD production camcorder with advanced recording, and sophisticated built-in streaming and connectivity. It is designed to optimize both image processing and IP performance and boasts advanced low latency, return video and IFB capabilities. These features make this camcorder ideal for remote HOW production.

To keep pace with the evolving video landscape, the GY-HC500 features high-performance 1080 60p/50p live streaming with advanced Secure Reliable Transport (SRT) QoS, and a full complement of IP remote control and viewing features. With the optional KA-EN200G encoder, incredibly efficient HEVC/H.265 compression streaming is also possible. This is especially important to the current production environment as churches rely on equipment that provides high-quality video alternatives for streamed services and events. The ability to build off a church's existing IP infrastructure allows users to reach their maximum production potential while simultaneously keeping cost and complexity to a minimum.

The GY-HC500 is capable of 4K Ultra-HD/HDR recording to SSD or SDHC/SDXC media in a wide variety of formats. Other recording capabilities include Ultra-HD ProRes 422 10-bit at 50/60p to SSD media as well as HD in ProRes 422 and 422HQ formats. Additional features include a one-inch CMOS 4K image sensor for enhanced dynamic range; manual lens functions such as 20x optical zoom for optimal magnification and 40x dynamic zoom for 4K pixel mapping and seamless HD zoom. Its practical auto focus and assist functions provide highly accurate, stable focusing essential to 4K production.

LARGER CHURCHES

The CONNECTED CAM™ GY-HC900 is a unique and innovative broadcast-quality camcorder that doesn't compromise on image or connectivity. It's equipped with a streamlined ENG workflow that's reliable and cost-effective, and a powerful communications engine for production over IP. This enables recording and low-latency streaming, along with simultaneous decoding for return video and IFB.

The pastor or presenter can engage in two-way conversation with return video/audio back to production while streaming live—without external boxes or backpacks. JVC also offers a comprehensive fiber solution for those HOW facilities that have a dedicated broadcast studio. High-quality, 10-bit low-latency live streaming is possible with the optional HEVC/H.265 plug-in KA-EN200 encoder (KA-EN200) and the Secure Reliable Transport (SRT) open streaming protocol. The camera supports recording contribution quality ProRes HD422 files to SSD media via the optional KA-MC100 adapter. SSD recording can also be used in backup mode, while dual memory card slots are provided for SDHC/SDXC media. It also features three 2/3-inch CMOS sensors and an F1.4 prism sensor that delivers high sensitivity, low-noise and wide dynamic range.

Advanced connectivity features include a snap-on SFE-CAM-bonded LTE transceiver, Ethernet and built-in wireless LAN, 3G-SDI input/output, HDMI output and USB host for network function, among other things. At the heart of the camera is production-quality imaging that adapts to a variety of lenses and automatically corrects for aberration. High-quality lower-third or full-screen graphic overlays are also available. T

Loudspeaker Solutions from EAW

SMALLER CHURCHES

Ideal for small houses of worship and venues, EAW's RADIUS (RSX) Series is designed to achieve optimal sonic performance that has never been easier or more accessible. The line includes a range of self-powered loudspeakers and subwoofers, offering various models for small houses of worship. This includes two-way and three-way self-powered loudspeakers, a two-way self-powered stage monitor, 12-inch and 18-inch self-powered subwoofers, and a dual 18-inch self-powered subwoofer. Designed to streamline setup and deliver maximum results in minimum time, RADIUS couples unique and intelligent features with EAW's signature acoustical design to deliver solutions for small churches and other venues. The RADIUS articulated array features OptiLogic™, providing automatic array self-detection and instant optimization including air loss compensation and more. This drastically cuts down on setup and tuning time. The RSX line has proven EAW acoustical design and DSP including Focusing™ and DynO™ offering a pristine impulse response at all output levels. Focusing corrects inherent acoustical anomalies to deliver immaculate impulse response throughout the entire coverage pattern. DynO intelligently preserves a clean impulse response even at the highest output levels. The EAWmosaic™ app, allows HOW personnel to optimize the system from anywhere in the venue, plus intuitive room design and prediction in a single, comprehensive application. With the proven sonic performance of EAW's acoustic design and DSP mastery plus full Dante integration across the line, RADIUS delivers an intelligent and flexible system to fit any budget.

MID-SIZED CHURCHES

The new KF810P installation line array is a premium loudspeaker boasting a very high output to size/weight ratio. It offers best-in-class output, true broadband pattern control and integrated 3-way performance. The KF line arrays bring next-level fidelity and control to traditional mechanically articulated array formats. It provides big performance from fewer, more compact arrays and precision audience focusing for true flexibility, making it a scalable solution for medium-sized houses of worship. It incorporates various design features tailored for the installation and HOW markets: clean aesthetics offered in black or white, invisible wiring, and concealed 3-point rigging. It operates in the 50 Hz to 20 kHz range, measures in at 12.6" x 32.9" x 17.4" and weighs 90lbs, offering a very high SPL-to-weight ratio. Its nominal beam-width is 110- or 80-degrees horizontally and 10-degrees vertically. It is equipped with EAW's patent pending Isophasic wave guide technology, which transforms the acoustic input source to a true Isophasic output. The KF810P also incorporates several unique core technologies including phase aligned LF, symmetry of sources and a concentric summation array (CSA). It features EAW's renowned sound quality and clarity at any volume level.

LARGER CHURCHES

EAW ADAPTive Series is a complete, self-contained, high-power sound reinforcement system that adapts all performance parameters electronically, allowing it to be used in virtually any application. Adaptive systems have the unique ability to assess and then perfectly match the three-dimensional performance requirements of any venue. Great for large scale HOW scenarios, the ADAPTive series includes the Anya and Anna three-way full-range array modules, and the Otto Adaptive subwoofer. Each Anya module includes 14 x 1-in exit / 35mm voice coil HF compression drivers loaded on a proprietary HF horn that expands to fill nearly the entire face of the enclosure. Anna provides all the benefits of Adaptive performance in a high-output mid-sized enclosure, and Otto is the world's first Adaptive subwoofer, utilizing two Offset Aperture-loaded woofers paired with independent on-board amplification, processing and networking. The line's incredibly small array size – typically half the size of traditional line arrays for similar SPL and performance – fits nicely above video screens, preserving sight lines while maintaining incredibly accurate coverage. It is also highly useful in reverberant spaces to increase intelligibility and not excite the room acoustics. The ADAPTive Series utilizes a high-resolution array of discretely powered and processed acoustical devices in concert with powerful EAW Resolution software to create optimized results without the need for physical reconfiguration. Adaptive systems can autonomously determine their array configuration, continuously analyze every system element and even heal the system coverage in the unlikely event of a fault. T

Church Acoustics: Past, Present and Future Challenges

BY JIM DEGRANDIS

Some may think that streaming services and megachurch services have different acoustic requirements. This is only partially accurate. If you are delivering a message, the requirements are pretty straight forward – the message needs to be heard and understood clearly and comfortably. How you attain that requirement depends on your environment, and the type of service.

STREAMING THE MESSAGE

Acknowledging the current social situation, it has become necessary to address this problem. Some churches have been streaming their services for years, and while they have worked through many of the technological issues, many are finding new challenges with acoustics.

Some churches continue to stream their services from the same space where they have always worshipped – the main hall. This room may now be mostly empty – if not entirely – and this leads us to one facet of acoustics that is rarely stressed… People absorb sound. If you have a completely empty hall, it is acoustically different than the populated service of the past. If you are streaming from an empty space, you do not need the house speakers – if there are people who want to hear the house speakers, turn them way down. You may need to close dividers, or place additional acoustic material in the space to reduce the energy which

PHOTO: WHEN STREAMING IN AN EMPTY HALL, THERE ARE NO PEOPLE TO ABSORB THE SOUND. ADDING ADDITIONAL ACOUSTIC MATERIAL AND TURNING OFF THE HOUSE SPEAKERS CAN IMPROVE THE SOUND QUALITY.
PHOTO CREDIT: BO VANDALL OF SOUND SOLUTIONS

would normally be absorbed by the attendees. Even if your acoustic treatments were sufficient in the past, it may be a different story in an empty house.

To combat this, other facilities have moved their streaming to smaller offices, or even homes, to broadcast their services. While the future may see more of this, it can introduce a few acoustic challenges. First, the space will likely be a room with hard, flat walls and few soft furnishings. Heavy theater curtains, acoustic panels, carpeting and other absorbers can be used to diminish noticeable sound reflections and flutter. If you're having a 2-way group meeting, your speakers can cause feedback, and every other person with an open mic can be adding to the mix. Virtual conferences in poor acoustic environments will compound the problem, as the poor acoustics of one space can be retransmitted to other spaces, which then add their signature, and so on.

Sound transmission in streaming environments can be problematic as well. If you are streaming from the church hall, this is likely less of an issue - unless your hall is in a multi-tenant structure that has other businesses generating noise. I'm mostly speaking of the streaming from more unorthodox locations like home offices. Homes are historically not broadcast studios by construction and design; however, this is exactly the function we are now performing in these spaces. Sound treatment inside the room is only one part of the issue. Interior doors at home are generally hollow and do not have seals to keep out sound – they are more visual privacy barriers than acoustic barriers. If you can, replace the door with an insulated door, then add weather seals and a door "sweep" across the bottom to block sound leaking around the door. If these options are not possible, you can use barrier material or soundproofing blankets to add a layer of acoustic protection.

The walls and ceiling of a residence are also not made the same as a broadcast studio, and while going into the full construction of a studio is beyond the scope of this article, there are some changes that can be made to improve the performance of these spaces. Adding acoustic barrier material to the walls, which can be hung similar to wallpaper, will help to block sound by increasing the wall's mass. You can then add an acoustical wall carpet over the barrier, to help cut down the reflections and flutter from the walls.

These same solutions improve acoustics for multi-tenant structures as well. They block sound travelling through the walls, both in and out. All facilities can benefit from increasing the sound isolation of the main hall. It helps to overcome external noise, and less sound leaks out – which can sometimes instigate noise complaints from neighbors. If you have a modern worship service with amplified instruments, this is even more crucial. Neighbor noise complaints about contemporary music are increasingly common – and as population centers get more congested, this will undoubtedly escalate in the future.

Neighbor noise complaints about contemporary music are increasingly common – and as population centers get more congested, this will undoubtedly escalate in the future.

Larger facilities have the benefit of space – even having a large parking lot will help to separate the neighbors acoustically by the virtue of the distance between them. This isn't perfect however, as bass frequencies travel farther through obstructions. A bass-heavy service, even in a larger church, can still be audible over great distances. Controlling sound near the source is always the most effective solution. Sound vibrations will travel through a structure, so hanging speakers with isolation hangers and decoupling subwoofers from the structure is a good start.

Louder doesn't mean you can hear it better - it just means it's louder.

Having better acoustics means that your environment is more conducive to listening, understanding, and enjoying what you are hearing. You don't have to make it louder to hear it better… just improve the acoustic environment where the message is being delivered. Historically the answer has been to make it louder – with more speakers, or louder systems. It only needs to be loud enough to hear and understand everything. By controlling the overall volume, you will have less sound leaking out, fewer complaints from neighbors, and less hearing fatigue and damage for those attending the service.

That's right… I said hearing damage. The National Institute for Occupational Safety and Health (NIOSH) recommends less than 15 minutes of exposure to 100dBA sound levels. Many churches use the same PA gear that is used in music venues – which can easily reach 110dBA. This can quickly cause long term hearing damage. Louder doesn't mean clearer – it's just louder. Fix the acoustics of the room and turn the volume down, your ears will thank you, and it will actually sound better. T

Jim DeGrandis *is a Research & Development Engineer at Acoustics First Corporation, member of the Acoustical Society of America (ASA), and works with ASTM International on researching new acoustic testing methods. Jim frequently lectures about acoustic phenomena, simulation, and architectural acoustic design.*

IT-Friendly DSP Solutions
for Churches of Any Size from Xilica

Xilica XTouch Premium Touch Controls

While almost any worship facility requires a DSP, the smaller churches are perhaps the greatest challenge. They typically lack instrumentation, outside of a piano, an organ, or occasionally an acoustic guitar. Often, there are no instruments at all. This makes voice the primary focus, whether for a single speaker/performer or a choral presentation.

In any case, smaller churches often lack dedicated on-site teams that understand how the core AV technologies support their musical efforts. Volunteers nearly always operate the equipment. This will typically remove hands-on components, like front of house mixers, from the production workflow.

The voice and spare instrumentation that does exist will still require processing and amplification. For smaller worship systems, Xilica's Solaro QR1 offers an ideal DSP platform to process individual microphones for speech and dynamic vocal performances with exceptional audio quality. It also brings the benefits of a space-saving footprint, flexible modularity, and touch-based control, and lives on the IP network.

The Xilica Solaro QR1 is a quarter-rack-width processor built for discreet, low-profile installation – a perfect design for smaller churches. Premium grade microphone pre-amps, a 48kHz sampling rate, and advanced audio tools ensure high-fidelity audio quality, especially strengthened through the QR1's 40-bit floating-point processor.

The QR1's modularity allows customers to specify the system to meet the worship facility's demand. In fact, the system is expandable enough to support medium-sized facilities that have more a more substantial musical presence. While the Xilica Solaro QR1 is a strong performer for small churches with a modest microphone array, the frame can be populated to serve larger Dante-enabled systems with analog or digital mixers.

This is an important value proposition for both smaller and medium-sized churches as audio requirement changes. The Xilica Solaro QR1 protects long-term investments through cost-reducing, field-swappable adjustments to serve new capabilities. Cards be changed or removed to serve different configurations, and new I/O options can be added through unused slots – the QR1 offers eight user-configured slots – or through Xilica Solaro XIO expansion frames that futureproof the system for years to come.

Xilica's Designer programming software, along with Xilica XTouch all-glass touchscreens, support the "ease of use" factor that's so important in volunteer-run AV operations. Using these systems, integrators can create a simple touchscreen application with volume control for each microphone.

For the smallest churches, the systems operator can manage settings for the pastor's main microphone at the Ambo, as well as for wireless microphones used by the vocalist, small choir and/or pianist/organist. Medium sized churches have the flexibility to run multiple microphones through a mixer for larger services, or turn off the mixer and direct microphone feeds though the Solaro QR1.

Once the system is right-sized for the church, integrators can use Xilica Designer to map out their connections for routing signals to the foyer, choir room, loudspeakers and subwoofers. Together with exceptional audio quality and programming the appropriate commands and preset for operations, integrators have a dependable small-church DSP architecture that is properly tuned, correctly wired, and reliably commissioned with the appropriate commands and presets.

In larger churches, the DSP interoperates with a broader AV universe.

While the DSP remains at the center of the core technical architecture, it will often extend to monitors, projection and lighting systems, as well as a more diverse stable of audio equipment. This is where Xilica's easy-to-configure open architecture framework, field-swappable and scalable modularity, and Dante-enabled interoperability amplify the value of using Xilica DSPs in worship.

The Xilica Solaro FR1 brings these benefits and more to larger worship facilities. Offering twice the native capacity with 16 individual card slots, the compact 1RU system provides integrators with the same freedom to customize and scale DSP configurations to suit any AV operation. The modular value proposition is amplified in larger churches, where integrators can simplify I/O configurations, reduce SKUs, and eliminate backorders that slow system expansion.

Just the Gear

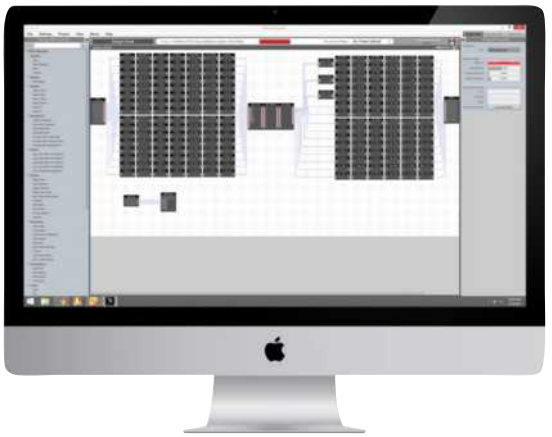
- Xilica Solaro QR1
- Xilica Solaro FR1
- Xilica Solaro I/O Option Cards
- Xilica Solaro XIO Expansion Frames
- Xilica Designer Software
- Xilica XTouch Premium Touch Controls
- Xilica XWP Wall Controls

Its wide range of I/O options include up to 32 analog, AES/EBU, Dante and/or AEC channels, as well as up to 64 GPIO channels to trigger video, relay and lighting systems in the same ecosystem. Xilica Solaro XIO expansion frames are available to accommodate future growth.

As large worship facilities transition their AV systems to IP networks, Xilica's IT-friendly design positions the Solaro FR1 for AV over IP performance. Leveraging a standard fiber infrastructure and common network switches, integrators can program the Solaro FR1 to process and manage AV signals between multiple send and receive points. The DSP is now serving children's rooms, function rooms, meeting spaces and common areas in addition to moving audio through the main sanctuary. Positioning network drops to optimize DSP performance over IP becomes as important as populating the Solaro FR1 frame with the right application cards.

The Solaro FR1 provides exceptional audio quality and signal processing, same as its lighter weight sibling, the Solaro QR1. In addition to dual-core Linux processing, a 40-bit floating point processor and premium grade microphone pre-amps, the FR1 boosts audio quality options with selectable 48/96kHz sampling for Dante audio. A user-installable rear module creates capacity for 64x64 Dante networked audio channels, which can move audio between

Xiica-Solaro-IOCards


XILICA-Xilica Designer Software

more than 1500 Dante-enabled products from more than 400 manufacturers.

Xilica's Designer software and varied control options also bring greater return value in larger churches. Using Designer, third-party Dante device programming with the Solaro FR1 is simple, with built-in native integration with products from Adamson, Bose, NEC, Powersoft and Yamaha among many others, Enhanced third-party control allows integrators to control anything for which they have the control string, including DMX lighting, blinds, HVAC systems, and windows and doors.

Larger churches also mean more events, and often larger crowds. While larger churches will more likely a tech-savvy technology manager on staff, that technician won't always be present. Xilica's ease of use on the control side is therefore just as important in larger churches that sometimes require operation through non-technical users. Xilica's XTouch all-glass screens compatible with free iOS/Android apps and PC/Mac platforms (using Xilica's native control software), as well as third-party control systems more often used in very large AV systems.

Xilica-Solaro-QR1-Back

For example, a larger worship service with a full band and a large choir will have a much larger array of instruments and voices to capture, process and route through the church's diverse spaces. The Solaro FR1, coupled with a professional digital audio mixer, can be programmed with the presets and commands required to produce an event without intimidation. These are easily recallable on Xilica's intuitive XTouch touchscreens, and/or XWP Control low-cost, low-profile wall controls.

Using these Xilica application features and control platforms, integrators can store each vocalist's voice and each instrumentalist's settings before an event, ensuring that the sound system that will essentially perform as commissioned in advance. These settings are easily recalled with Xilica's do-it-yourself function, with all faders and EQ levels moving to the right settings upon pressing the button. T

Creating a Music Video for Switch's Count Me In

BY NICK DILLARD, LIFE.CHURCH FILMMAKER

Count Me In is the latest video from the band Switch, which is made up of worship pastors from Life.Church. They wanted to write a song about dealing with anxiety, and really wanted to highlight that theme, while also providing some encouragement in musical form for people to relate to. When it came time for us to shoot the video, we worked with our motion designer Taylor Madden first to create a lyric video, before starting on a more traditional video. With the lyric video, we wanted to showcase the disconnectedness anxiety causes, versus having connections to help overcome that anxiety, and thought it would be a cool aesthetic to add two TVs to highlight this idea. By incorporating a darker, static TV for anxiety, and a TV with a clear, colorful signal, we were able to bring this idea to life.

The Idea

Obviously, when it came time to create the more traditional video, we wanted it to have a similar feeling, so we started with static vs connectedness as our guiding principle. With Switch, it's all about having a modern sound with the truth of the Gospel, so we wanted to provide something on the same level that we were striving for and pulling from. Gathering information from different sites, we started discussing how to create the aesthetic for the music video that was still on brand with the lyric video.

From there, wanting to further display the static and color imagery, we used LED tube lights (specifically Quasars and Astera Titan Tubes) since they have settings that cause the lights to flicker, like static, as well as a rainbow color scroll to mimic the color shown on the tube TV's.

In terms of different scenes, one of the things I really like to do is to create a playground of sorts where we could build a set that would deliver a great shot no matter where we were in relation to Cassidy Estevez, one of the members of Switch and the talent in the video. We really wanted to maximize the space so that we could play. What I like about that is that when you

build scenes where you can play around, it gets your creative juices flowing. We had super creative professionals on set that had some really great ideas, and really liked playing with the angles and shots. One of the scenes I really liked was when we hung a Quasar tube that ran through a gamut of colors over Cassidy, as she sang and spun it around her. Having that space and creativity on set really allowed us to pivot and also be able to change some of our ideas on the fly if they weren't working out.

We mapped out which scenes and shots in advance for Cassidy to be in, but were more focused on adjusting and finding the best frame as we shot the film. We used different lenses to find the shots and the frame, which allowed for different options in post and allowed us to choose what worked best within the edit.

We really wanted to pull people in right from the beginning, so we used movement to draw people into the video from the very first frame. And while we wanted movement on some shots and parts of the song, we also wanted to create intrigue when the camera was static. For example, in the scenes where we had really tight closeups of Cassidy's eyes, we made sure to show the catch-light reflecting in her eyes to draw people into the soul of the song. We even used the flashlight on our phones when necessary.

In terms of storyboarding, we weren't as specific as getting certain shots at certain points but instead certain scenes at certain points. This would give us some space to be creative in within those specific scenes.

The Equipment

Knowing what we were looking for in terms of the feel of the video, it was very important that we had the right camera, lenses and equipment to bring the vision to life. For example, camera movement was very important because we wanted to match the emotion of the song as well as the energy of Cassidy. To do this, we used a Matthews Doorway Dolly for the first two days of production and a Dana Dolly on the final day so we could get nice smooth movements.

EQUIPMENT USED

- C500 Mark II
- Kowa Anamorphic lens kit with diopters
- Matthews Doorway Dolly
- Quasars
- DJI Wireless Follow Focus System
- Atomos Sumo 19-inch HDR Monitor
- Small HD 7-inch 703 Bolt Director's Monitor
- Teradek Bolt 500 XT
- Zacuto Baseplate Kit
- Dana Dolly (rail system)
- Lighting through dmx with Jands Vista
- Astera Titan Tubes
- Edited within Premiere Pro

We had a DJI wireless follow-focus system and Teradek Bolt 500XT , which sent a feed to an Atomos SUMO 19" monitor to help us pull focus and look at the image, and a second feed going to the director's monitor, which was a small HD 703-bolt so Jonathan Meisner, our director, could give Cassidy specific feedback based on what he was seeing onscreen. The set was pretty minimalistic because we didn't want to over complicate things.

We chose the Canon C500 Mark II 5.9K camera and paired it with Kowa anamorphic lenses because we wanted to match the quality and feel of the inspiration we gathered in pre-production. The Kowas provided the great character we felt was necessary for the end product. We also recorded proxies because we wanted to utilize the full capabilities of the camera by recording 5.9k RAW. However, editing raw clips can be extremely taxing on your computer and time-consuming. Recording proxies provided a much smaller version of the video that could then be linked to the RAW file. This way, we could edit with the proxies but then toggle to the RAW files seamlessly when we were color-grading and exporting the final file.

Being able to shoot in 5.9K was super – we knew we wanted to deliver in 4K, which is the standard now. Having that extra resolution was really nice because it allowed us options in post when we didn't have a clear opinion on set. An example would be the scenes with just the tube tv's. We knew we wanted movement on those scenes but didn't know which scenes to put on the tv's. So we filmed a bunch of different options on the tv's with the camera on a tripod, then in Premiere we were able to make those decisions and do a digital zoom to create movement but without having to sacrifice resolution since we had 5.9k resolution within a 4k timeline. The great thing about this camera is that there are so many recording options, from RAW to Proxy, and an entire gamut of options in between, that gave us the option to adjust file formats and sizes to make sure we weren't exceeding card space. These options can eliminate a ton of stress, which allowed us to really focus on the creative.

We've always been Canon fans and have never really had a problem with them – they are brilliant to work, and they're so good at what they do, it's like having a really great friend that can deliver ALL THE TIME. We were familiar with the system from shooting with the C200, so making the switch to the C500 Mark II was very easy. We already spoke the language of the camera and could communicate with it so well that we were able to build on that familiarity to deliver really strong images. One of the things we say at our church is that 'Excellence Honors God and also inspires people.' The great thing about the Canon C500 Mark II is that it gives us the ability to deliver really high-quality images at a reasonable price point, thus providing excellent content while stewarding our resources well. T

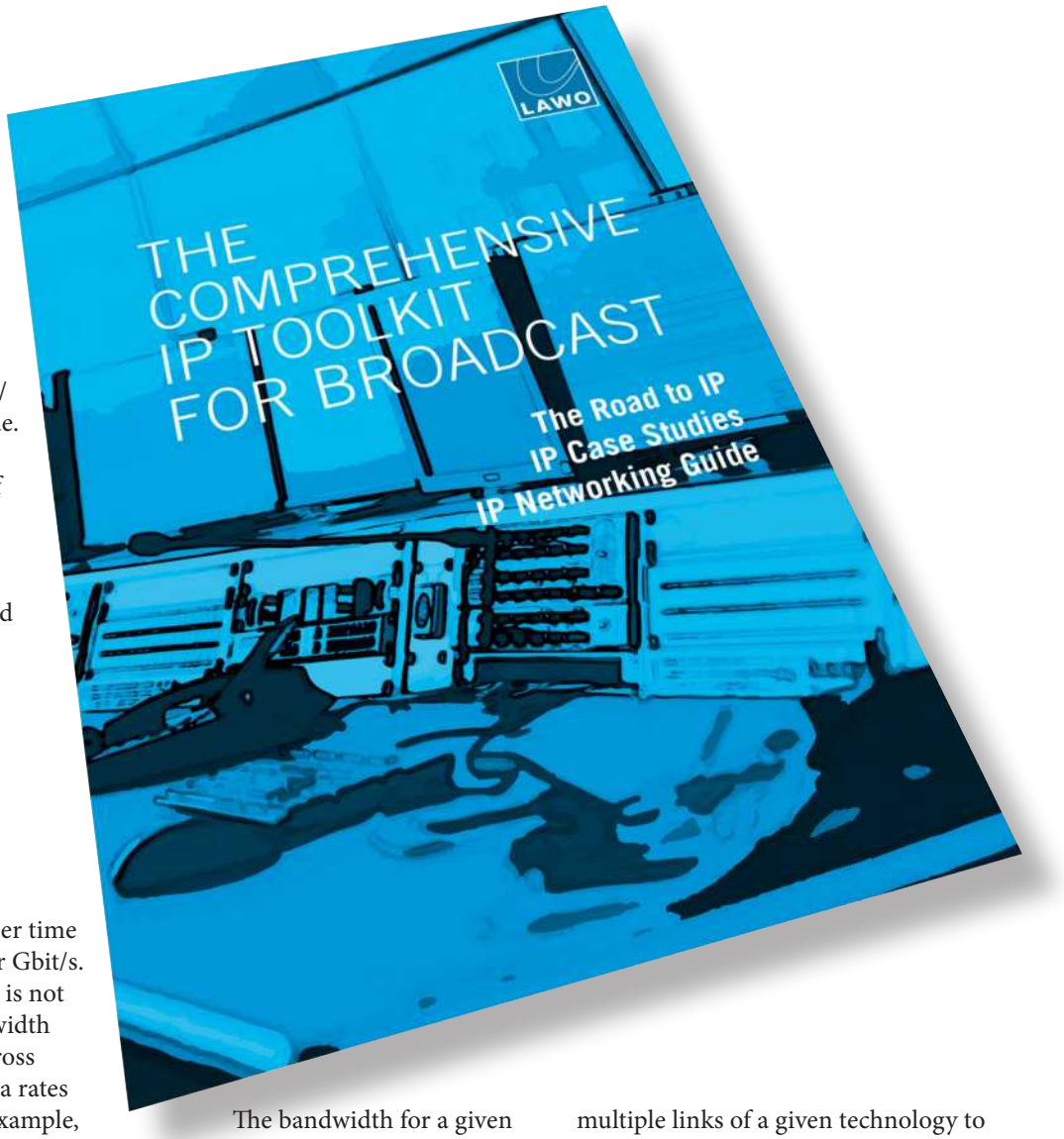
Nick Dillard *is a Life. Church Filmmaker*

Book Excerpt

IP Networking Guide for Video and Audio Applications

With the rapid growth of video streaming in houses of worship, understanding IP networking is a must. OUr friends at LAWO have made a massive IP Networking Guide available for free download at: https://www.lawo.com/support/know-how/ip-networking-guide.html

Below, we share just some of the information found within.



GENERAL OVERVIEW

Network performance is defined by the following criteria:

- Bandwidth
- Latency
- Packet Delay Variation
- Error rate

Bandwidth

The bandwidth describes the amount of data that can be transported over the network per time unit. The usual unit is Mbit/s or Gbit/s. When bandwidth is specified it is not always clear whether the bandwidth given is the net bitrate or the gross bitrate, but for Ethernet the data rates given are the net bitrates. For example, 100BaseT Ethernet provides 100Mbit/s usable data rate, while the amount of data on the physical connection is 125Mbit/s including the coding necessary to transport the data safely.

The bandwidth for a given technology is fixed. There is no way of increasing the bandwidth of e.g. 100Mbit/s Ethernet, except by changing to another technology such as 1000Mbit/s Ethernet (you can combine multiple links of a given technology to increase the available bandwidth, but that comes with other drawbacks).

For networks dedicated to media transport the bandwidth is determined by the bandwidth each media stream

has and the amount of media stream that need to be transported over a single link. E.g. 1 HD-SDI signal has a bandwidth of 1.485GBit/s, encapsulated as SMPTE ST2022-6 the bandwidth increases to 1.57GBit/s, so if you need to transport 3 HD video signals, the link needs to support at least 4.71GBit/s. Leaving aside 5GBit/s Ethernet, the choice in this case would be a 10GBit/s Ethernet connection.

Latency

Latency describes the time that the information needs to travel from source to destination.

The most basic foundation is the speed of light (roughly 300'000'000 meters / second in vacuum); no information can travel faster. Depending on the medium used to transport the information, the time is longer. E.g. in optical fibers the index of refraction is 1.5, meaning that the light travels 1.5 times slower than in a vacuum. That results in approximately 5µs of latency for every kilometer of fiber.

Of course latency is added for other elements in the data's path as well: packetizing of data, encoding, queueing in active network elements, etc.

For networks dedicated to media transport you want to minimize latency as latency ultimately translates into delay between the actual event and the representation of the event on screens or speakers. Since the distance between source and destination is usually fixed, only the processing on the path can be influenced, e.g. by limiting the amount of active network elements in the data path and limiting the processing in source and destination.

Packet Delay Variation

Packet delay variation ("PDV") is a measurement for the difference of the one-way, end-to-end delay of packets. Sometimes this is also referred to as "network jitter".

In an ideal network all packets would take the same time to travel from the source to the destination, but in real networks various factors cause this time to vary. When the packets are handled by an active network element such as a switch, the processing of the packets depends on the processing load of that switch. The load is mainly related to the number of concurrent packets to process and the complexity of the processing. Due to the "bursty" nature of data transport in Ethernet networks, the load varies quickly and thus influences the packet delay variation.

Packet delay variation can only be counteracted by adding buffers at the receiving end. The incoming data is first written to a buffer. Once the buffer is filled with an amount of data which can compensate the longest packet delay variation that you expect on the network (plus a little safety), the receiving device can start reading data from the buffer using a constant rate.

For networks dedicated to media transport you want to minimize packet delay variation, because the buffers you need to add in order to compensate for the packet delay variation add to the unwanted latency in the signal path. This is usually done by limiting the amount of active network elements in the data path and using techniques like Quality of Service (QoS) to prioritize the processing of data packets carrying real-time media over other traffic.

Error rate

The error rate describes the amount of data that has been altered on the path from source to destination. In data networks this is usually related to corrupted packets (bit errors) or lost packets. Bit errors are usually compensated by adding some redundancy to the data being transported, often in the form of error correction data transported on the physical transport layer in addition to the actual data. Only errors that cannot be corrected by these measures will be noticeable to the user of the network and will need to be handled by higher protocol layers.

Since bit errors happen randomly, the error rate describes a probability in the form of percentage of packets likely to be affected by errors.

Lost packets are usually caused by overloading one or multiple network elements in the data path. E.g. if two sources try to send 1GBit/s each to a destination connected to the network with a 1GBit/s connection only half of the packets can actually be forwarded, the rest of them needs to be dropped.

For networks dedicated to real-time media transport you want low error rates. Bit errors can be compensated by higher protocol layers, e.g. by adding redundancy to the data transported which allows reconstructing the original data, even if some packets are corrupted or lost on the transport.

Lost packets caused by overloaded paths in the network can only be handled by careful network design and management, including but not limited to correct choice of bandwidth and prioritization of traffic using Quality-of-Service.

Another method of dealing with lost data for video streams on the application layer is concealment: replacing missing data from previous video frames or from another part of the same frame. However, this is only the last resort and it is preferable to ensure that all packets are arriving at the destination.

Lost synchronization information can be compensated by the "flywheel" design (keeping the last known speed until new sync information is received).

ADDITIONAL FACTORS

Another factor to be observed is packet reordering: When data is transported over different network paths, it can happen that a packet that has been created first arrives at the destination after packets created later. In order to correctly process the data from the packets, these packets need to be sorted back into order before processing. Allowing for packets to be re- ordered also necessitates a larger buffer, causing more latency in processing.

In more complex networks it can also happen that a packet is duplicated and arrives twice at the destination. The device reading the data from the network and the protocols need to provide measures to identify and discard duplicate packets.

Physical Layer

The physical connections for Ethernet can either be copper cables or fiber (optical) cables.

Copper

Copper connections are established using twisted-pair cables, which are available in different categories. Gigabit Ethernet requires at least category 5e while category 6 cables (or higher) are recommended for longer distances. The connectors that terminate the copper cables are called "RJ45".

The maximum distance for Ethernet with copper cables is defined as 100m (328ft) in the Ethernet standard. However, the distance achievable depends on the quality of the cable, the quality of the connectors and the number of connectors. It is therefore recommended to plan for a cable length of no more than 70-80m.

If you need to cover more distance, active network elements can be used to refresh the signal (e.g. a switch), but the use of optical cables is highly recommended.

While there is the possibility to transport 10Gigabit Ethernet over copper cables, it is common to use fiber cables.

Fiber

Fiber cables exist of two varieties, multimode and single (or mono) mode, and come with a wide range of connectors. The multimode cables are suitable for distances up to 550m with 1GBit/s and up to 300m with 10GBit/s. Single-mode fibers are suitable for distances up to 80km with 10GBit/s or even higher.

Please be aware that any fiber connection longer than 10km will require individual tuning of the fibers and the lasers to cater for the exact transmission power levels.

SFP Connectors

Many devices today offer a choice of connector, by providing an "intermediate" connector called the "small form-factor pluggable" (SFP) or its enhanced version for higher data rates SFP+.

The device side of the SFP connector is standardized while the connector side can provide copper connections (on RJ45) or different types of fiber connections (with LC connectors). When choosing an SFP, make sure pick the correct type:

- Data rate: 100Mb/s, 1Gb/s, 10Gb/s
- Connector: Copper with RJ45 connector, Fiber with LC connector
- Fiber type and distance: Multimode (up to 550m for 1GBit/s, up to 300m for 10GBit/s) vs. Single-mode (1km, 10km, 40km, 80km)

For short distances (~ up to 30m) SFP modules with direct attached fiber cables exist (AOC – Active Optical Cable).

While there are copper cables with SFP connectors we strongly recommend not to use them as they have proven to cause interoperability issues. Use AOCs instead.

Some devices (especially switches) might require approved SFPs and will reject non-approved ones. T

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INCREMENTALLY MIGRATING TO AUDIO-OVER-IP IN HOUSES OF WORSHIP

BY BRAD PRICE

While the industry is abuzz with talk about networked audio, many houses of worship have perfectly functional pieces of non-networked audio gear that still provides value and is nowhere near "end of life." This creates a dilemma: does one wait until all the equipment is old and problematic before making the leap to networking? Is it truly all-or-nothing, or is there an intermediate path that gets one started on networking without sacrificing perfectly functional gear?

Fortunately, there are abundant ways for existing gear to be connected to a network with no compromises in performance - only additional capabilities. This means that houses of worship can migrate to networking incrementally, changing out equipment until the entire system is "native" to Audio-over-IP (AoIP).

Adapting to the Network

A quick look through the marketplace of networked audio products reveals countless converters and I/O devices to fill these needs. These converters come in all shapes and sizes, and can convert analog, AES3 and other formats to common AoIP protocols and vice versa. There are endless varieties to suit general purpose uses or highly specific needs, and they are available at a wide range of price points. Many incorporate Power over Ethernet (PoE), which simplifies installation by allowing devices to obtain power directly from their network connection.

These converters - or more suitably, adapters - can be used to provide network I/O to existing audio gear, providing many of the benefits of AoIP without making a complete top-to-bottom commitment. This can save money and allow for a gradual transition to a completely networked system.

For example, one may wish to replace a troublesome, noise-prone analog snake that runs from a stage in a church sanctuary to the front of house (FOH) analog mixer. Using a partial network approach, one could install an AoIP stage box in the sanctuary that is connected via a single Ethernet cable to a multi-channel AoIP-to-analog converter that connects to the analog inputs of the mixer. The result will be clean, noise-free signals that work right now, and are already in AoIP format for use with an eventual replacement for the mixer.

Racks of amplifiers and long runs of heavy speaker cable can be replaced with powered speakers and networking easily, delivering many of the benefits of AoIP without a wholesale system replacement. Powered speakers may already be network-enabled or may use compact PoE powered AoIP adapters to connect their analog inputs to network audio. This eliminates the need for heavy, bespoke speaker cables that are difficult to install or change, replacing

them with lightweight, multipurpose Ethernet that can go further and do more.

Transitioning to powered speakers with network capabilities or adapters instantly allows houses of worship to extend audio into lobbies, overflow areas and classrooms. Rather than having hundreds of feet of noisy, unreliable speaker wire run through a building to a few specific endpoints, the ubiquitous network can simply provide Ethernet jacks in all rooms, allowing powered speakers and associated adapters to be plugged in and used no matter where in the building they are located, with absolutely no degradation of performance or quality.

For houses of worship seeking to better serve their community with online services, a partial use of AoIP can streamline the process. The very same network adapters that allow an analog mixer to send its output to the network also allow those signals to be sent simultaneously to any connected PC or Mac computer as pure digital audio. This in turn connects your live audio to the streaming service of your choice, with no need for specialized hardware.

Getting Started with Pain Points

Each house of worship is different, and each has an AV system in various states of functionality. Some may have the latest and greatest gear, while others are getting by with some very old pieces that are hanging by a thread in terms of reliability or noise.

The key to getting value out of incremental change is to identify the weakest areas of your system and then to determine if networking strengthens it, weakens it or does nothing at all. For example, if an old mixer has very noisy mic inputs, no amount of networking helps - you simply need to repair or replace the mixer. But if the areas of great need involve distance, installation of cables, or scaling to multiple endpoints, then networking should be considered - especially if a fully networked approach is being considered for the future. Money spent on analog equipment may be money lost.

If an old mixer has very noisy mic inputs, no amount of networking helps - you simply need to repair or replace the mixer. But if the areas of great need involve distance, installation of cables, or scaling to multiple endpoints, then networking should be considered...

For example, if your place of worship is in dire need of more speakers in different rooms, a partially networked approach is probably a very good idea. Not only will AoIP address questions of scale and distance, but any gear purchased and used this way will be perfectly suited to a complete network overhaul in the future. Alternatively, simply adding more analog speaker wires to solve the problem is expensive and likely to be completely outdated by an eventual network conversion.

Similarly, when replacing any multi-channel analog devices such as stage boxes, a partial networking solution should be considered. Analog replacements are expensive, bulky and one of the first items to be eliminated in a fully networked system.

What networking knowledge is needed?

Today's AoIP solutions are designed for AV people and end-users, not network engineers. Basic working knowledge of IP networking is useful, but the finer and more difficult aspects are fortunately rarely required. Common solutions in the Audio-over-IP space automatically discover and set up devices for use, making these systems very much "plug and play" for most house of worship applications.

Configuration is then completely straightforward using intuitive software tools on regular PCs and Macs. Just as modern smartphones hide daunting complexity behind friendly interfaces, modern AoIP provides users with an experience that "just works" the vast majority of the time.

You can find training for AoIP offered for free by many solution vendors. These training or certification programs are targeted at network "newbies" who wish to transfer their AV knowledge into a new realm and are ideal for preparing any house of worship for the almost inevitable transition to networked audio - and video, too. T

Brad Price *is the Senior Product Marketing Manager at Audinate*

Proper Microphone Hygiene

BY BO BRINK

No matter where you turn, keeping healthy through the coronavirus pandemic is a hot-button topic. In the house of worship industry, we've seen a large increase in parishes offering remote broadcasts of services to ensure safety. With some regions reducing restrictions, traditional in-church and even outdoor, social distanced services, rather than virtual services, are becoming more common.

As a result, many houses of worship have implemented protocols that will ensure the safety of everyone from parishioners to preachers. Among these is continued cleaning and sanitizing efforts throughout the facilities, including equipment – like microphones.

In houses of worship, especially smaller ones with tighter budgets, microphones are used in many ways and often change hands regularly. While some are mounted in the ceiling or on instruments, worship mics are most often held in a hand or affixed on clothing. In these cases, spit, sweat and skin can leave traces on the microphone and cables. So, how can microphones be kept clean? Below are some guidelines for sanitizing different types of mics and accessories, while also keeping them in great working order.

Lavaliers and Headsets

To clean lavalier and headset microphones, remove all grids, caps and foam windscreens. Then, rinse them in demineralized water and wipe them gently with a damp cloth. This allows for a proper rinse and for the water to evaporate fully. No cleaning fluids should be used - you will only need demineralized water.

To disinfect lavaliers and headset mics, wipe down the surfaces with a cloth moistened sparingly with an isopropyl alcohol and water solution*. This also applies to headsets, clips, booms, grids and adapters.

Handheld and Pencil Microphones

To clean handheld and pencil microphones, remove the grid (if possible) and clean it with lukewarm water and soap. After drying, replace it over the capsule. Wipe down the surface of the rest of the mic with a cloth moistened with water and soap.

Please note that there is a difference between cleaning and disinfecting mics and accessories. Cleaning involves physically removing dirt and germs with soap and water, while disinfecting mics means killing germs with a proper chemical agent, like isopropyl alcohol

To disinfect handheld and pencil microphones, wipe down their surface with a cloth moistened sparingly with an isopropyl alcohol and water solution*. Make sure that no isopropyl alcohol comes into contact with the microphone membrane.

All Microphones

After cleaning as directed above, leave the microphones to dry for 72 hours before reuse. Some germs die at high temperatures, so it is possible to place some mics in an oven at 60°C (140° F) for an hour (please note, this will age the microphone slightly).

*Pure isopropyl alcohol evaporates too quickly on surfaces to kill germs and should instead be mixed with water (at a 2/10 ratio of water to alcohol). This ensures that the disinfectant properties will be extended for enough time to work properly.

Cables

To clean cables, rub them gently with olive or coconut oil. This will remove residue like paint or sweat, and will leave the cable hygienic and fit for use. Alternatively, wipe them with lukewarm water and soap. Do not splash soapy water into connectors or microphones. Afterwards, leave them to dry on their own for at least 72 hours – this will allow time for germs to die.

With a wavelength of 185-254 nm, UVC light, also known as UVGI (ultraviolet germicidal irradiation), kills or inactivates microorganisms by destroying nucleic acids and disrupting their DNA, making it impossible for them to perform vital cellular functions. Conversely, the performance and condition of most cables will not be affected by a UV-C treatment. Please note that UVGI disinfection is dependent upon line-of-sight, so make sure to expose as much cable to the light as possible and repeat treatment if necessary. Observe instructions of use for your equipment in order to protect yourself from the harmful radiation.

Unfortunately, cables cannot be disinfected with isopropyl alcohol or other harsh chemicals, as this will make the cable jacket brittle over time. We recommend being very thorough when cleaning cables to remove as many germs as possible.

Foam Windscreens

To clean foam windscreens, both large and small, remove them from the mics and wash them gently with warm water and soap and let them dry for at least 72 hours. Unfortunately, foam windscreens cannot be disinfected with isopropyl alcohol or other harsh chemicals.

Please note that there is a difference between cleaning and disinfecting mics and accessories. Cleaning involves physically removing dirt and germs with soap and water, while disinfecting mics means killing germs with a proper chemical agent, like isopropyl alcohol. To ensure that your mics are clean and germ free, you should first clean them and then disinfect them when appropriate. And, remember, the most definite way to keep everyone happy and healthy is to practice good personal hygiene. T

Bo Brink *is the Global Application Support Specialist with DPA Microphones*

HOW TO USE OBS to Live Stream Church Services

BY PAUL RICHARDS

Did you know that one of the most powerful software options you can use to live stream church services is free? There are several ways to set up a streaming system for your church. Some are as simple as setting up an iPhone and streaming your service right to Facebook Live. But if you are looking to improve the quality of your live stream, you may be ready to invest in a more professional setup. Fortunately, with a couple of cameras, a PC or Mac, and some free software, you can have professional-quality results without a huge investment.

OBS (Open Broadcaster Software) is a free, open-source software package, designed for live streaming and recording video and audio. It's available for Windows, Mac, and Linux. One of the greatest features of OBS is that it is always improving. Just a few years ago, the interface was a bit intimidating. The latest version is much easier to understand and use. It even comes with a Quickstart feature that walks you through getting everything ready to go.

Ready to try it out? Here is how to Use OBS to Live Stream Church Services.

Step One: Download and Install the Software

Just go to https://obsproject.com/ and download the software for your machine. You can choose from Windows, macOS, or Linux versions. You may want to go ahead and bookmark that page. OBS has many resources to help you get up and running and deal with any problems you may run into along the way. Once you have downloaded the software, go ahead and install it.

Step Two: Run the Auto-Configuration Wizard

If you are already experienced with setting up live streaming software, you may decide to skip this. If you are new to OBS or streaming in general, this feature can save you a lot of time and frustration. It should load automatically. If not, you can run it from the "tools" menu. The audio-configuration wizard will run some tests on your system to optimize settings for your computer. This will give you good starting settings for recording quality, video resolution, bitrate, and encoding. It can even help you get connected to your streaming provider if you already have one. Don't worry if you don't understand everything yet.

You can learn as you go – and you can always go back and adjust these settings later.

Step Three: Add Your Video Sources

Another helpful feature of OBS is its ability to handle nearly any kind of video source. Whether you are using a simple USB webcam, capturing the contents of your screen, or connecting broadcast-quality cameras via a capture device, setup is easy. For example, you may want to connect your camera via USB for an easy plug and play option. Or you may want to install the camera in a location that's further away, using SDI cabling for a 100' run and then converting the SDI to USB at your computer with an SDI to USB capture card. OBS even makes it simple if you are choosing to connect via IP (Internet Protocol) using RSPS. Adding sources is as simple as finding the "sources" box at the bottom of the screen and clicking the "+." You can add as many sources as you like.

> The audio-configuration wizard will run some tests on your system to optimize settings for your computer, which will give you good starting settings for recording quality, video resolution, bitrate, and encoding.

Step Four: Add Your Audio Sources

OBS is initially set up to capture the default system sound input on your computer. That usually means if your computer has a built-in mic or you have one plugged in, that will show up as your source. While it is possible to plug a microphone right into your computer's microphone jack, you will likely want something a bit higher quality. There may be a USB audio interface connected to your church's soundboard or other microphones. In some cases, it might be USB microphones plugged directly into your computer. Either way, OBS makes it simple to add these as audio sources.

Step Five: Set Up Scenes

Unless you are using a simple, one-camera setup, scenes will become an essential part of your OBS setup. Scenes allow you to set up your sources to make switching quick and easy. You may be switching from one camera to another, from a camera to a title slide, a slide to prerecorded video, or anything else you have connected to OBS. To get started, click on the "Studio Mode" button in the bottom right corner of the screen. This will show you a split view of two essential windows, Program and Preview.

The program window shows you exactly what is going out to your live stream or recording. When you are "live," this is what people will see. Your Preview window displays what is up next. Whatever is in that window is what will go to the Program window when you hit the transition button. You can set up as many scenes as you want, and you can always modify them. Just make sure, if you are live, that you are only changing what is in the Preview window.

Step Six: Run a Test Recording

Before you get to the streaming part, it is best to record some footage to see how everything looks. Just hit the "Start Recording" button in the lower right of the screen. This is an excellent time to experiment with switching between scenes. Be sure to try out all your scenes so you can get a feel for how everything looks. When you are done, hit "Stop Recording." To find out where OBS has saved your recording, go to File -> Show Recordings. You can always change the destination for those recordings in the "Settings" menu.

Step Seven: Connect to Your Streaming Service

If you already had the information, you may have taken care of this while running the auto-configuration wizard. If not, just click "Settings" in the lower right corner. Click on the "Stream" tab, choose your provider, and enter your stream key. You will likely still need to do some scheduling and setup with your streaming provider, but this will finish up your installation in OBS.

Step Eight: Test, Test, Test

OBS makes things pretty straightforward, but there is always a chance that something will go wrong. Don't wait until Sunday morning to find out. Do plenty of testing of your live stream to look for any issues and ensure that you have mastered the operation of OBS. If you run into trouble, head back to the OBS website. There is plenty of documentation and a massive user community to help you figure it out. ■

Paul Richards *is the Chief Streaming Officer for PTZOptics. He also leads a small team of video production professionals known as the StreamGeeks. Richards, teaches over 35,000 students on Udemy and is the author of several books including "Helping Your Church Live Stream" and "The Unofficial Guide to Open Broadcaster Software."*

Syncing Your Stream

BY TIM ADAMS

With the vast majority of churches jumping into live streaming out of sheer necessity, rather than desire, one of the issues that can crop up is audio properly syncing with your video. This is often due to sound coming from the front of house (FOH) audio mixer while video exists inside its own sandbox.

Audio data takes up much less bandwidth than video data and as such, syncing issues can occur, often with video lagging behind the audio. In these situations, it becomes necessary to "delay" the audio to allow the video to catch up. But how does one go about doing this?

The easiest way I have found is to use any audio delay functionality built into the switcher itself. Because the video switcher is where the audio and video are primarily getting married together into one signal, it makes sense that this is where the delay would occur. Of course, it also helps ease any potential issues adding an audio delay at the audio mixer could inadvertently create, as well.

Two other options are available to you: first, you can try to delay from the output you are using from the audio mixer itself. Many digital audio mixer manufacturers include the ability to delay a sub-group output or even an Aux Send, but you'll have to check with your mixer's manual and/or manufacturer directly to check. The other, and perhaps more popular method for smaller churches is to run the audio signal directly into the camera or one of the cameras in the video system.

While this might seem like a good idea, if you have multiple cameras, you are relying on built-in audio mixing capabilities in your video switcher to allow you to use the audio from

that video source even when you do not have that video source selected on your program bus. I would argue that if your mixer has this level of audio mixing functionality built in, it likely also has an external audio input capability that you would be better to utilize. What happens if that camera suddenly dies or shuts down? Your audio feed disappears. It's always better to have your own, separate audio feed from the cameras.

If you are running an analog audio mixer, never fear! External audio delay devices exist, and you simply route your Aux Send or Subgroup output to the input of the delay device then run the output of the delay into your video switcher and you'll be able to fix any sync issues you may run into.

Those are the methods for fixing sync issues, but how do you know how much delay to put in? The rule of thumb is that you have roughly 17ms per frame of video, assuming you are shooting at 60 frames per second. According to BiAmp Systems' website, the audio can arrive between 45ms early and up to 125ms after the video before it becomes noticeable. Working our mathematical magic, this equals out to roughly 3.5 frames prior and seven frames after. My general advice is to keep it to under four frames; any more than that will be noticeable to the casual viewer.

Unfortunately, getting your audio and video to sync is largely an exercise in using your eyes and ears. Aim for excellence, not perfection as I have found from my many years of video production that when you fiddle and fuss over perfect sync, your senses begin to fool and mess with you. Take a break, if you need to, but generally you should be between one and two frames off in most situations, according to my experience. That means if you dial in 45ms of delay, you should be pretty darn close. Remember, there is an 80ms window of leeway available to you in order to dial in your sync so don't fuss over 10ms here or there.

The trick with finding your sync is to be as in control of not only WHERE the audio and video come together, but HOW they come together. Many video switchers these days, as I mentioned, include fairly comprehensive audio mixing functionality and this means EQ, compression and delay capabilities. It's important that you become familiar with these functions sooner rather than later. Just because your audio and video is in sync now doesn't mean it always will be. Why would it change? Good question, but I have found it's better to be prepared rather than be left scratching your head, asking yourself what to do next.

One thing I will make sure to mention is that the ideal situation for a multi-camera live streaming system is to have a dedicated audio mixer of your own, located in your booth with a dedicated person operating it every service. While this does constitute a significant investment over and above what many people consider necessary, I have found that it offers the best of the best in terms of having a true, dedicated audio mix. And if the current COVID situation has driven one point home, it's that we should be prioritizing our online audiences as much as in-person congregations.

The additional benefit of having a dedicated audio mixer for the video system is that your audio recording, if you have that need, can be accomplished by the video team on their mixer. Their system would be much more well suited for this purpose as they are doing a dedicated recording mix, anyway.

Audio and video sync issues are annoying at best, and disastrous at worst and there really is no reason why you should have to put up with them. The technology exists to do away with it and provide a seamless audio/video experience for your live stream viewers. It does take a little investigation and process, but the results are well worth that investment of time and your viewers will thank you, particularly if their experience has been sub-optimal. And you will have removed one more stumbling block for those who are seeking to worship our great God! T

The ideal situation for a multi-camera live streaming system is to have a dedicated audio mixer of your own, located in your booth with a dedicated person operating it every service.

Tim Adams *spent over 20 years volunteering in church technical ministry and now focuses on helping small churches achieve technical excellence through equipment upgrades, training, sharing best practices and teaching leadership how to cast God-sized vision.*

GLOSSARY OF TERMS

As a volunteer church tech, half the challenge of doing your job is understanding the terminology. Below, we are very happy to share with you some terms and definitions put together by our friends at AUDIX Microphones in regards to common microphone parlance.

AMPERE (AMP):

Named after André-Marie Ampère, one of the main discoverers of electromagnetism. The ampere, more commonly referred to as amp, (symbol: A) is the SI unit of electric current. 1 amp (A) = 1 Coulumb of charge per second = 6.2414 million electrons flowing past a point in 1 second. To measure current (I) you divide the voltage (V) by the resistance (R).

AUDIO:

"I hear" in Latin. More commonly known as anything pertaining to sound.

BALANCED:

A circuit that carries information by means of two equal but opposite polarity signals, on two separate conductors. Concerning microphones this is accomplished generally by using a cable with two conductors and a shield. The advantage of a balanced circuit is that it helps to eliminate stray noise or hum coming from AC lines, lights, or other equipment.

CAPACITANCE:

The measure of the electrical effect of a capacitor. The SI unit of measure is the farad, named after Michael Faraday.

CAPACITOR:

An electronic circuit component that has the ability to store and electrical charge. The formula used to determine capacitance is C = Q/V where C is capacitance in farads, Q is the quantity of stored electrical charge in coulombs, and V is voltage. Therefore, stored electric charge can be calculated using the formula: Q = CV. The difference in potential or voltage of the capacitor can be calculated using the formula: V = Q/C

COIL:

Also known as "voice coil." The coil is comprised of wire of a specified type and size that is wound to a specified electrical inductance and placed (attached) beneath the diaphragm of the microphone capsule. It is the coil moving within the gap of a magnetic pole piece that transforms the audio sound wave into an electrical signal. This "moving coil" technology is the basis for dynamic microphones.

CONDENSER MICROPHONE:

Also known as a capacitor microphone, operating on the principle of varying the capacitance between two plates: one solid, fixed metal plate and one very thin, flexible plastic diaphragm on to which has been deposited an extremely thin metal coating to make it electrically conductive. When the plates are electrically charged any movement of the diaphragm caused by vibrations in the air will cause the capacitance to change, and this change is then translated into a voltage and amplified to produce an audio signal.

Q (electrical charge in coulombs) = C (capacity in farads) x V (voltage).

CONDUCTANCE:

The measure of how easily electricity flows along a certain path. The SI unit of measure is the siemens, named after the German inventor Werner von Siemens who is credited with making the first moving coil loudspeaker.

CURRENT (ELECTRIC):

Electric current is the flow of electric charge. Audio signals are always Alternating Current (AC), meaning the current reverses direction each time the signal waveform passes zero. In contrast, Direct Current (DC) from a battery always moves in same direction. The SI unit of electric current intensity is the ampere.

DYNAMIC MICROPHONE:

Also known as "moving coil" microphone; based on the principle of electromagnetic induction. When sound enters through the windscreen of the microphone, the sound wave moves the diaphragm. When the diaphragm vibrates, the coil moves in the magnetic field, producing a varying current in the coil through electromagnetic induction, thereby converting acoustic

energy into an electrical signal.

Dynamic microphones are robust, relatively inexpensive and resistant to moisture making them ideal for live sound reinforcement.

ELECTRET (CONDENSER) MICROPHONE:

Also known as a prepolarized condenser, whereby the back plate of the condenser is permanently charged. This advantage of an electret is that it can operate on lower voltages, can be battery operated, and can be miniaturized for a wide variety of applications.

DECIBEL (dB):

Named after Alexander Graham Bell, a decibel is literally one tenth of a bel. The bel is defined as the common logarithm of the ration of two powers. It is a relative term and is always tied to a specific reference.

In acoustics, where 0 dB SPL is referred to as the threshold of hearing, here is a chart depicting various levels of sound in dB and corresponding Pascal.

0 dB = 0.00002 Pa Threshold of Hearing

60 dB = 0.02 Pa Business Office

80 dB = .2 Pa Shop Noise

94 dB = 1 Pa Large Truck

100 dB = 2 Pa Jackhammer

120 dB = 20 Pa Airplane Take-Off

140 dB = 200 Pa Jet engine - threshold of Pain

DIAPHRAGM:

The thin membrane in a microphone capsule that reacts to incoming sound waves.

DYNAMIC RANGE:

In condenser microphones, the measurement in dB of the maximum sound pressure a capsule can handle (before distortion) minus the noise floor (self noise) of the circuitry.

FEEDBACK:

Relative to acoustics, acoustic feedback is the condition that occurs when an amplified sound enters a microphone and is re-amplified until a steady howl or whistle is heard.

FREQUENCY:

The measurement in cycles per second at which sound repeats itself (vibrates).

FREQUENCY RANGE:

The range of frequencies that a microphone can reproduce, for example 50 Hz – 15 kHz. This figure should also be qualified by a +/-dB measurement such as +/-3 dB or +/- 6 dB. This result can vary dramatically depending on other factors such as +/- dB, proximity of the sound source to the capsule, directionality of the sound source to the capsule, sound pressure level of the sound source.

FREQUENCY RESPONSE CURVE:

An X-Y graph depicting how a microphone reacts to different frequencies. The plot is measured in dB on the vertical (X) axis, and hertz on the horizontal (Y) axis. Results can vary dramatically depending on where the measurements are conducted (free field, anechoic chamber, other), the source of the measurement equipment, proximity of the sound source to the capsule, directionality of the sound source to the capsule, sound pressure level of the sound source.

GAIN:

In electronics, gain is amount of increase in the power or amplitude of a signal by an amplifier. Also called voltage gain and current gain. Gain is usually expressed in decibels.

GAIN BEFORE FEEDBACK:

In a sound system, the level of gain that can be achieved in either the main speakers or the monitors before feedback occurs.

HERTZ (Hz):

Named after Heinrich Hertz, the SI symbol to indicate frequency at which sound vibrates in cycles per second.

IMPEDANCE:

Expressed in ohms, The measure of the total resistance to the current flow in an alternating current circuit. Most microphones are classified as being either high impedance (10,000 ohms or greater) or low impedance (50 ohms to 600 ohms).

INDUCTANCE:

The measure of the effect of an inductor. The SI unit of measure for inductance is the henry, named after American physicist Joseph Henry.

INDUCTION:

The electromagnetic process by which a varying magnetic field causes an electric current to exist in a conductor.

INDUCTOR:

An inductor is a passive electrical component that can store energy in a magnetic field created by the electric current passing through it. An inductor's ability to store magnetic energy is measured by its inductance, in units of henries. Inductors are sometimes called "chokes" as they are used in audio circuits to filter out unwanted high frequency interference.

An "ideal inductor" has inductance, but no resistance or capacitance, and does not dissipate energy.

LOUDNESS:

Like the decibel, loudness is a relative term. A widely used "rule of thumb" for the loudness of a particular sound is that the sound must be increased in intensity by a factor of ten for the sound to be perceived as twice as loud. A common way of stating it is that it takes 10 violins to sound twice as loud as one violin and then 100 violins to sound twice as loud again.

OFF-AXIS REJECTION:

The ability of a microphone to eliminate unwanted noise coming from the PA system or other instruments on stage.

OHM:

Named after the German physicist Georg Ohm, the ohm is the SI unit of measure for resistance (R).

OHM'S LAW:

Applies to electrical circuits; it states that the current through a conductor between two points is directly proportional to the potential difference (i.e.

voltage drop or voltage) across the two points, and inversely proportional to the resistance between them.

The mathematical equation that describes this relationship is: I = V/R where I is the current in amperes, V is the potential difference in volts, and R is the resistance (measured in ohms, also equivalent to volts per ampere).

PASCAL (Pa):

The SI unit of pressure named after French scientist Blaise Pascal, equal to 1 newton per square meter. International standards have established 1 pascal (Pa) as 94dB SPL. This reference point is now accepted for measuring the sensitivity and signal-to-noise ratio of microphones. In sound, 0 dB or the threshold of hearing is equal to 20 micropascal.

PHANTOM POWER:

The ability to provide the voltage needed to power a condenser microphone through a standard 3 conductor microphone cable. The source is generally either a mixing console (mixer), a microphone preamp, or a standalone phantom power supply.

POLAR PATTERN RESPONSE (aka PICKUP PATTERN):

A chart or graph depicting a microphone's sensitivity relative to the angle of an audio signal at a particular frequency. Types of polar patterns include cardioid, hypercardioid, omni-directional, figure-8, supercardioid and hemicardioid. A typical spec sheet will show the polar pattern of a microphone at a specific frequency of 1000 Hz with 94 dB SPL.

PAD:

An electronic circuit or device designed to attenuate the output sensitivity of a microphone or microphone preamp. This allows more control at the microphone element and can prevent a loud signal from becoming distorted.

PHASE:

Phase refers to the comparison of two or more given wave forms in time.

PHASE CANCELLATION:

When two wave forms arrive at a given space at different times, it can cause some frequencies to cancel each other out. The result can be a thin, unnatural, and incomplete sound. In the case of microphones, when two microphones are placed in close proximity to each other (less than 18 inches apart for example), this phenomenon can occur.

RESISTANCE:

The characteristic of electronic conductors which resists or opposes electric current. See OHM. The reciprocal of resistance is conductance.

RESISTOR:

An electronic circuit component which resists or opposes the flow of an electrical current. A resistor has no appreciable inductance or capacitance.

SELF-NOISE:

Also known as "noise floor". In condenser microphones, the inherent noise in a circuitry measured in decibels.

SENSITIVITY:

Typically microphone sensitivity specifications are derived by producing a 1 kHz tone at a constant sound pressure level of 94 dB (1 pascal). This measurement is a miniscule figure expressed in mV/Pa (millivolts per pascal). The same measurement is sometimes shown terms of a negative – dB format which depicts an older standard using 74 dB of SPL (0.1 pascal) instead of 94 dB.

SI:

International Systems of Units, the world's most widely used and oldest system of measurement.

SIGNAL:

An audio signal is a representation of sound waves in a different form. In microphones, the acoustic signal is converted to an electrical voltage and then converted back to an acoustic signal through the loudspeaker.

SIGNAL TO NOISE RATIO:

In condenser microphones, the ratio of the signal produced at 94 dB relative to the noise floor (self-noise) of the microphone's circuitry, measured in terms of decibels.

SOUND PRESSURE LEVEL (SPL):

The relative measurement of sound in decibels where 0 dB = 20 micropascals = 0.0002 microbars.

TRANSDUCER:

A device that converts one form of energy into another. A microphone capsule, for example, converts acoustic energy to electrical. Conversely, a loudspeaker converts electrical energy back into acoustic.

TRANSFORMER:

A device consisting of two or more coils of wire wound on a common core of soft iron or other magnetically permeable material. In audio, transformers are utilized to step up audio voltages from a very low impedance device such as a microphone into a more suitable impedance for mixing boards, recording devices, or mic preamps.

TRANSIENT:

A rapid, non-repeating sound such as is created by the attack of a percussive musical instrument.

TRANSIENT RESPONSE:

The ability of a microphone to capture transients.

UNBALANCED:

A circuit that carries information by means of one signal on a single conductor. Unbalanced cable usually consists of a single conductor and a shield as in instrument cables, coaxial cable, patch cords, and high impedance mic cable.

VOLT:

Named in honor of the Lombard physicist Alessandro Volta (1745–1827) the volt is defined as the potential difference across a conductor when a current of one ampere dissipates one watt of power. T

Learn more at www.audixusa.com

Bose Professional Introduces Bose Church with a 12-Week Giveaway

Bose Professional has announced its Bose Church Giveaway, beginning August 10 and running for 12 weeks, where church leaders can enter to win a weekly prize. Winners have a choice between a Bose S1 Pro multi-position portable PA or a pair of the new Noise Cancelling Headphones 700 UC.

To enter for a chance to win, entrants must be in a worship leadership role — such as Pastor, Worship Leader, or Church Tech Director — and respond to a weekly post in the Bose Professional promotion through their Facebook account. Responses need to include the tag #BoseChurchGiveaway. Additional information and full official rules are available on the **Bose Church Giveaway** webpage and listen to the **BOSE Church Podcast** to stay informed.

The Bose Church initiative provides the guidance, information and products to aid church leaders in the know-how needed to engage their congregants through the power of

sound. Approaching this community-oriented, educational endeavor in a new way, Bose Professional has integrated this knowledge resource with a chance to win equipment that helps church leaders connect with their congregation.

With its built-in mixer, two combo XLR-1/4" inputs and multiple-position auto EQ, the S1 Pro provides churches with ultra-portable, battery-powered amplification for both music and the spoken word — whether it's for a spontaneous outdoor cookout or a planned event. The NCH 700 UC empower confident collaboration with its adaptive eight-microphone system so wearers can comfortably work through meetings, and the 11 levels of noise cancellation help church leaders carve out more productive concentration times.

"Bose is passionate about building incredible audio experiences and they understand the unifying power of sound and its role in the Church," stated Don Allensworth, founder and president of The NewGround Group. "Their knowledge and expertise provide church leaders access to easy-to-use design tools, an outstanding line of pro audio loudspeakers, and a quality support team to ensure your success. Their commitment to quality sound truly supports your vision from the parking lot to pew." T

A Q&A with Trent Walker,

Senior Audio Engineer for the Tabernacle Choir at Temple Square

"O come, let us sing unto the LORD: let us make a joyful noise to the rock of our salvation. Let us come before his presence with thanksgiving, and make a joyful noise unto him with psalms."

Psalms 95:1-2, KJV

Trent Walker has a passion for music. He was nominated for a Grammy in 2008 and has recorded 14 #1 Albums. Meticulous about sound and devoted to creating an auditory experience that captures each angelic high and riveting bass of the choir and orchestra, Trent recently spoke to us about the importance of using microphones that faithfully capture the sound – and the spirit – of the music.

TFWM: What types of mics do you currently use for the Tabernacle Choir and Orchestra at Temple Square, and the many guest performers you host?

Trent: We currently use Royer S-F2 microphones for the choir and solo instruments, with Royer R-121 mics on the harps, cello, and harpsichord. For our main left and right orchestra stereo hang, we use Royer's R-122V tube microphones, and for the room mic, we use a Royer SF-24V for rear channels in the 5.1 mix.

These are all ribbon mics – why is this?

Trent: We use ribbon mics for specific reasons:

Normally, in classical recording, the traditional way to record an orchestra is to hang a Decca tree, which works great when you are doing Handle's Messiah or traditional classical music, but doesn't work great if you are going from a classical piece to a Broadway piece or something more contemporary. The solution is to close mic everything with ribbons, which gives me phenomenal flexibility. I leave them lower in the mix for traditional classical works where I lean more on the room sound, and I push them higher in the mix when we switch to more contemporary pieces where greater definition or individual level control of the different instruments is needed.

It's very important to close mic the instruments so they don't pick up bleed from the other instruments around them. Ribbon mics, close to the source, are very clean and control bleed nicely. Once I quit using condenser mics and changed to strictly ribbons, it became much easier to control the mix because I didn't have the problem of the added highs and brittleness condenser mics often generate.

What does Royer bring to the table for you in terms of audio capture?

Trent: Adding the Royer microphones made all the instruments sound bright and smooth, which is important because I mic every instrument, and I use ribbon mics on everything except the strings (I use contact mics on those).

The Royer dBoosters increase the gain of the ribbon microphones and make them come alive. I have dBoosters on every non-powered ribbon mic we use; even ones that are not Royers, which means every woodwind, brass and harp instrument has ribbons on them. The main orchestra left and right mics are Royer R-122Vs (tube version) and I use a Royer SF-24V overhead mic on the drum kit.

A huge part of our choir sound is the Royer SF-2 active ribbons, and all my recordings have to be in 5.1, so the rear of the hall must be mic'd as well. I do that by using a Royer SF-24V.

What is it about ribbon mics – and Royer mics specifically – that you like?

Trent: The Royer mics sound like butter, with silky smooth tone, and they don't seem to add a lot of top end that's not there at the instrument; condenser mics tend to smear the sound or add additional top end that is not needed or natural. With Royer mics, I don't have to worry about EQ; they track really nicely, and they sound completely natural. If you want a mic to sound like the instrument, Royer ribbons capture and translate sound without a lot of artifacts. Ribbons are warm mics, but you also need to have good pre-amps. I use lots of API Pre's, and there is a company called DirectOut Technology which makes an amazing digitally controlled pre-amp, which I also use a lot of. My control room is about 2000 feet away from the studio, so I need to be able to control my preamps remotely – and the D/O Techs are a great option for this.

We've been recording with Royer's for years and they are now permanently installed in the tabernacle and conference center because of the clarity of sound and tone they provide.

We've had really good luck with the quality of the Royer microphones as well. We use them day in and day out; they're workhorses. We've never had any issues with our Royer mics, going back at least 15 years to when we first purchased our Royer 121's. We've been adding to the arsenal over the years, to ensure that the quality of sound is always at the level of excellence we strive for.

You mentioned the Royer's are work horses – how many shows do you do a year with them?

Trent: We do a weekly broadcast, which is 52 shows, all our Christmas shows, our summer series, plus all the one-offs, so we probably average about 80 shows a year, not counting our tours which happen every two years. Every recording is broadcast, so not only are we producing for a live audience, but also for broadcast. The live side is just as critical as the broadcast, and the ribbon mics are a big factor in keeping the audio transparent and natural, which is one of the main reasons why the Royer's are now permanently installed. The consistency between what our audience hears live and what our at-home audience hears over the broadcast is unbelievable.

What have you worked on most recently?

Trent: We've just produced a new CD titled When You Believe, A Night At The Movies, and there's an incredible Avenger's Medley that has Royer microphones all over it. In fact they're all over this entire CD, which just went to #1 on Billboards Classical Crossover Charts. It's available for download at https://deseretbook.com/p/cd-when-you-believe-a-night-at-the-movies-ep?variant_id=185477-cd-albumLINKS

TFWM: *We'd like to thank Trent for taking the time to talk to us – check out the Tabernacle Choir YouTube Channel and let the music transport you!*

HOW TO PRODUCE AN ONLINE EVENT

BY HOLLAND DAVIS

COVID-19 has placed everyone in a new reality. Every church is looking for ways to leverage technology to produce interesting content that not only serves their local community, but also has lasting impact. The problem with online content is it's permanent. It's out there forever. So it's really in your best interest to take a step back and examine the content you are producing. Here are a few things to pay attention to.

BEGINNINGS AND ENDINGS

There is nothing more embarrassing than knowing that your goofy conversations are being broadcast live because the video stream started 5 minutes before the start time. I know from experience. A simple fix for us... we put up a logo, mute all channels and play music until it's time to start. When it's time to start, we switch the logo to a live camera, unmute the channels and go. It's crude, but it works.

For our main service, we run a pre-produced opening that we purchased from Envato Elements. Envato Elements offers an annual subscription program that gives you unlimited access to graphics, video templates, presentation templates, sound effects, stock videos and so much more. It's worth the investment. For our endings we made a very simple video in iMovie that was voiced over by my wife. It simply says thank you for watching and here's our website.

MULTITRACK THE AUDIO

Most boards double as digital audio interfaces. We use a Behringer X-Air and we record directly to computer via USB. It allows us to record a video production live and then go back and remix, add effects and master the audio. We also record the live mixed version (in case we got it right the first time). Most multi-tracking software like Logic, Adobe Audition or Pro-Tools will automatically recognize your Digital Mixing Console as a sound source so it's really as simple as plug and play. When multi-tracking audio, a good rule of thumb is to record it as clean as possible without effects.

Once you have a produced track, you can sync the audio using a video editing software like iMovie, Final Cut Pro or Adobe Premier. One thing I like about using Adobe products is for a monthly subscription fee, you have access to Adobe Photoshop, Premier, Illustrator, After Effects, Audition... all things Adobe. When I want to do something simply and quickly my default is iMovie.

CREATE MOMENTS

When you're producing an online event, it's all about creating a series of moments using the individual elements to communicate a message. The elements could be music, speaking, scripture reading, message intro, testimony or even a short film. The key is to create a story board that links the elements together in a way that keeps your attention, but it's key to remember that each element by itself must create a moment for the viewer. As strange as that sounds, when you're watching something online you don't have the experience of being in a room with other people, surrounded by

The sound and visuals have to do the work of everything that you're missing by being in a room with others. It's important to plan and execute meaningful and moving content.

sound, feeling the dynamics of the music, the energy of the crowd. Instead, you have a limited experience of sound and visuals. That's it. The sound and visuals have to do the work of everything that you're missing by being in a room with others. It's important to plan and execute meaningful and moving content. How do you know if it's moving and meaningful? I use a simple test: if it doesn't move you, it won't move anyone else.

LINK MOMENTS TOGETHER

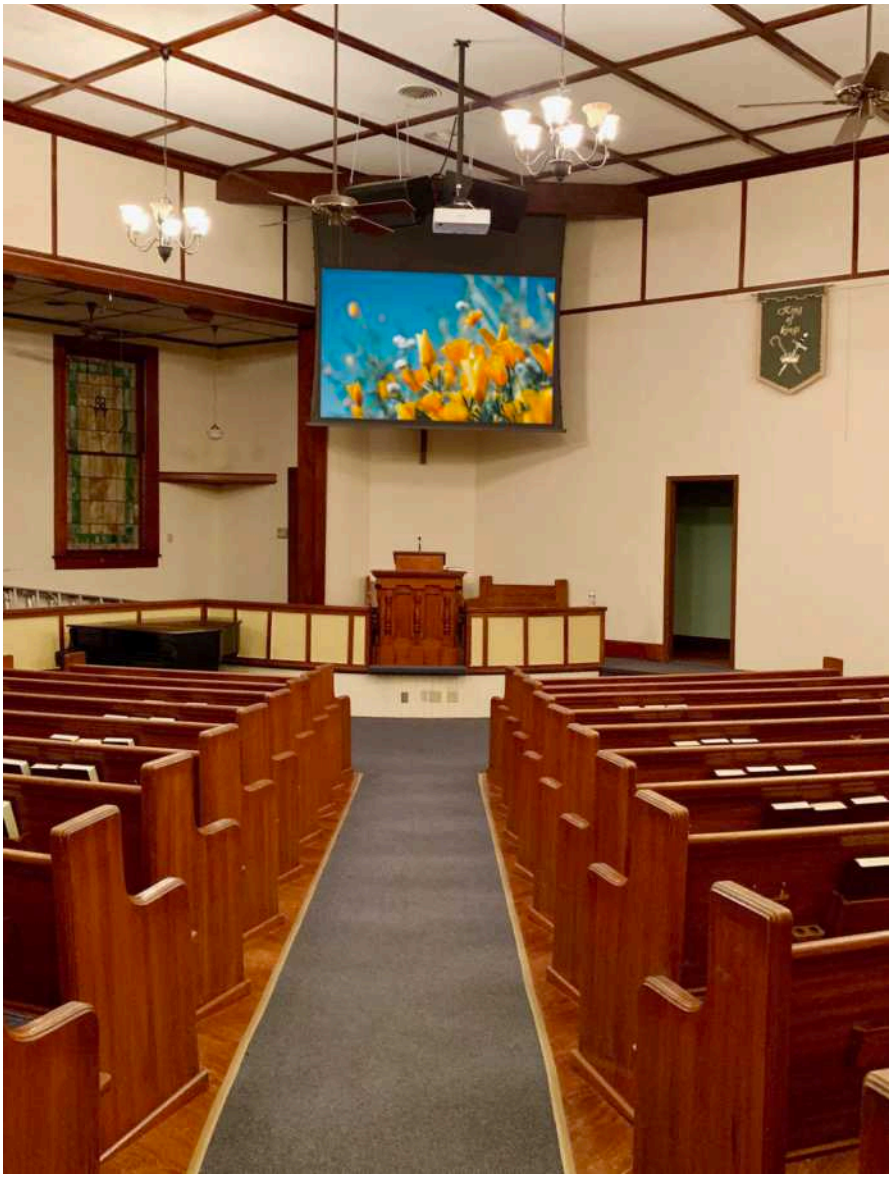
During a race, how you pass the baton is essential. The same is true in producing an online event. I work with a local festival called Light At The Lighthouse. We are hosting a live online music festival September 26 on Facebook and YouTube at 6:30 pm PST. We have artists like Christafari, Gary Rea, Christina Reynolds, Caleb Quaye (from Elton John), Holland Davis (me), Remedy Drive and many others. Our event producer, David Podue, created a story board taking into consideration what each artist contributed and how they fit together. Then our hosts, Bill Fleury and Mark Mohr from Christafari, filmed segments between each act introducing the artist and highlighting the significance of their involvement. The opening segment will feature Cynthia Garrett, author of "I Choose Victory." The presence of a consistent host and the conversational way they introduce the artists creates a fun and seamless flow from artist to artist. Not only can this method be used with events, this method can be adapted to worship services that tie the individual elements together to communicate a single message.

USE THE PREMIER FUNCTION

Once you have an online event produced, use the premier function on You Tube and Facebook to bring special attention to your event. When you broadcast a premier, your audience will be alerted automatically. I would also list your event on Eventbrite.com. It's been our experience that events listed on Eventbrite.com are often listed in local papers for free.

To watch the Light At The Lighthouse Virtual Music Festival visit http://www.lightatthelighthouse.org.

Holland Davis *is a teaching pastor, veteran worship leader and author. He is the Senior Pastor of Calvary Chapel San Clemente and CEO of worshipsong.com. You can follow him on twitter or Instagram @ hollanddavis*



Environmental Projection Considersations

Integrating large projection displays without spoiling the holy aesthetics of your church sanctuary

BY DAVE RODGERS

Your feet ring hollow upon the aisle stones as you walk through the nave. In this time, it's impossible to avoid recollecting this old church's past. Over the years, how many gatherings has this place hosted, for services, holidays, to remember those who have passed or to celebrate new life and new beginnings? Now, we are in a media age. Large visual displays are no longer an option; they are a requirement. As important as they are in displaying song lyrics or scripture, you walk a fine line between the true message or a banal light show. Always remember the purpose upon the sanctity of holy ground.

What is Environmental Projection? Simply put, environmental protection, or EP, is an immersive visual display for houses of worship. It involves a combination of large presentation screens with structural projection mapping. By using the right content, environmental projection can bathe the atmosphere of church sanctuaries in colorful mood lighting, cloudscapes, wallpapers of craggy stones, nature and inspiring text, or images of architectural wonder.

It's more than showing the big picture to a congregation; it enhances the worshiper's involvement while drawing the congregation into a deeper sense of community through an inspirational experience.

Getting Started – Bluntly said, if you are not a professional, you should hire a professional. There are plenty of DIY projects that you can do in order to achieve a big-screen image in your church but environmental projection takes it to the next level. Putting up a projector and screen will bring the big picture into your sanctuary but environmental projection brings the congregation into the picture. This will require the right combination of projector(s), projection surfaces, processors, software, and the proper content. By following this formula, it will be a lot easier to stay on the same page with your integrator.

Projectors – Large churches require commercial projectors. Regardless if there is control over ambient light, mega-churches and other large congregations typically require a projector throw distance that is comparable to a large public theater. This means a projector with an output of 7,500 – 20,000 or more, lumens is essential. Prices for these are typically at around $15,000 to 25,000. Although there are brighter, better and even more costly options available, most large church production teams I've met with don't need to go there. Good brands to

PHOTO: ENVIRONMENTAL PROJECTION STARTS WITH A PERFECTLY PLACED SCREEN: GT1610123CG - ELECTRIC MOTORIZED TAB-TENSION WALL OR HANGING SCREEN, 16:10 ASPECT RATIO, 123" DIAGONAL VIEWING AREA, CINEMA GREY PROJECTION SCREEN MATERIAL (COURTESY SEVERTSON SCREENS)

consider for this are Barco, Canon, DPI, EIKI, Maxell, NEC, Optima, Panasonic and Sony.

For smaller congregations, it's your lucky day. I recommend a commercial grade projector with an output of about 5000 lumens or more. These typically sell for around the $3,500 to $9,000 range and it will definitely be worth your while. I have a personal preference for Epson projectors in this category because of their reliability to cost, though you won't go wrong with the other brands I mentioned so long as the price is comparable. For small congregations on a budget, you may be able to swing 3,500 lumens and get away with it so long as you have good control over your interior light levels. Good brands such as BenQ, Epson, Optima, and ViewSonic projectors for small congregations can be obtained for about $800 to $1600.

Professional's note: Always determine what the "throw distance" or space between your projector's lens and the projection surface requirements are before buying gear. Different projector models have different spacing requirements.

Projection Surfaces - Screens – Projection screens are one of the most overlooked variables in church design. For environmental projection, it's the proverbial elephant in the room. There are two elements of Environmental Projection surfaces; the projection screen and projection mapping.

When placing your projection screen, make certain that your screen does not conflict with the structural qualities of the sanctuary. Use hanging retractable screens for high ceilings, or free-standing screens for situations where a wall or ceiling installation isn't practical. Nice open wall spaces make for an easy installation of either a fixed-frame or electric retractable screen. For most presentations, a 150" to 275" screen will suffice but working with a professional will maximize the use of your space. Projection screens have a variety of specialty materials to choose from but the most common solution for environmental projection is matte white or very light matte gray. As long as there is reasonable control over environmental lighting, a well-calibrated projector will deliver stunning imagery over a well-made screen material.

*Professional's Note: If you use mechanized screens, always have a spare free-standing projection screen as a backup ('pull-up' model preferred).

Projection Mapping – "Mapping" is a technology that will map out the room and then animate it with projected content that virtually augments reality. This is where the immersion part comes into play. You are no longer just watching a projected image; you feel like you are part of it. Color and imagery both set the mood for the event while maintaining audience engagement through a breathtaking level of visual appeal. Companies like LightForm create devices that work with projectors to create a custom projected display that will fit your structure down to the most minute ridge or crevice. There is virtually no limit to the colorful, interactive experience as beautiful patterns festoon the sanctuary from floor to ceiling.

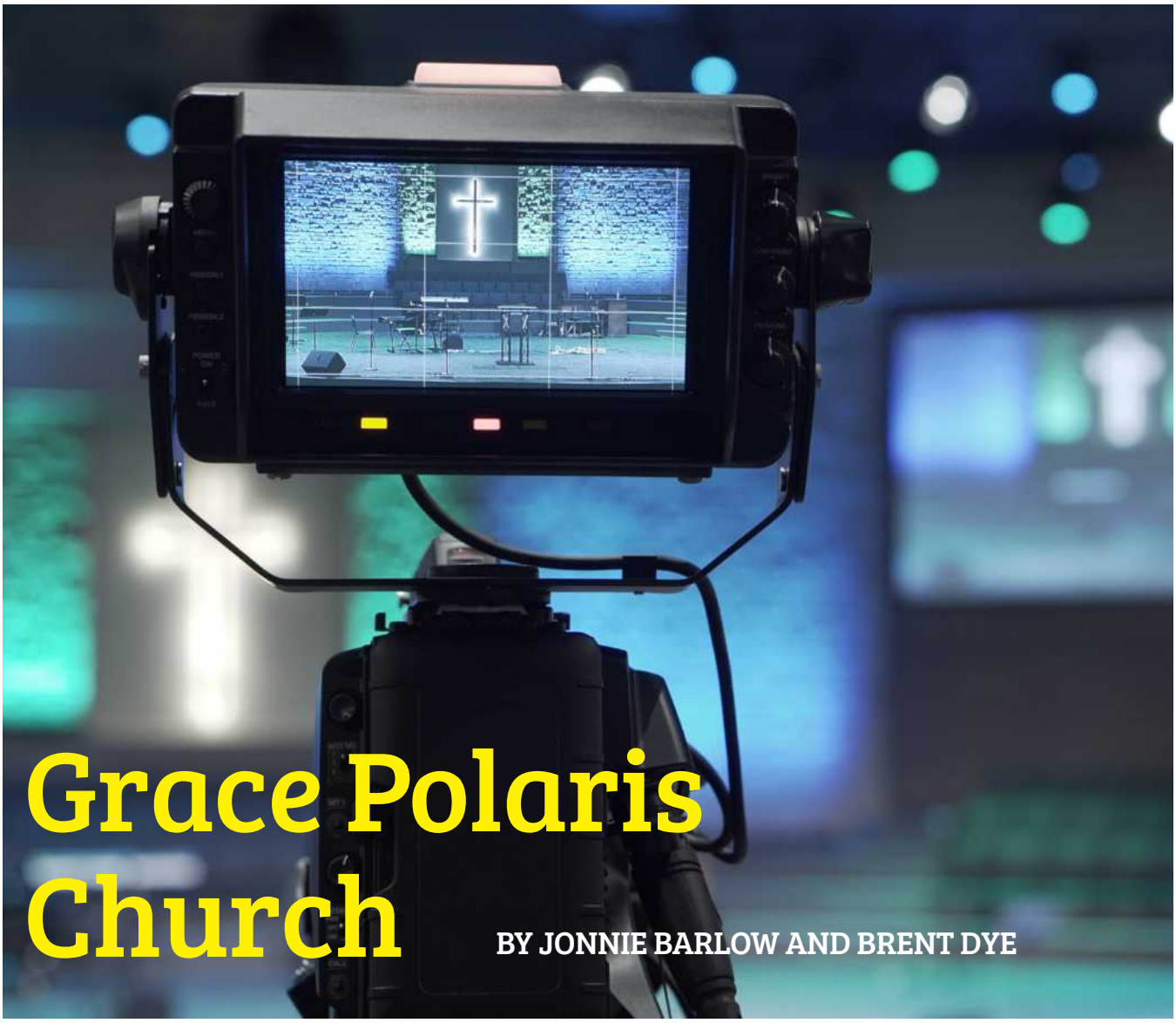
Additional Gear – A variety of "edge-blending" and "multi-screen" processors allow the production team to coordinate multiple video sources that synchronize with one another. This also includes synchronization between the various projection displays and the projection mapping as well. Companies like Matrox, AvenView, or Christie Digital offer great solutions but for more simplified applications of edge-blending or image stacking, many projectors now have internal processors.

Software and Video Content: Depending on what you want, software is available for the most basic to the more sophisticated presentations. Starting from the floor up, "single screen" software will accommodate the usual PowerPoint or even alternatives such as Beautiful.ai, Canva, Google Slides, Keynote, Microsoft Sway, Prezi, Slidebean, Slides, Visme, or Zoho Show . Use a "dual screen" software such as ProPresenter for running a cursor between two screens and linking two visual display units (VDU) into a continuous display. "Multi-layer mixing applications" are more a tool for professional DJs and broadcast engineers. Possibly, the best known software for this is VDMX. This enables coordination of multiple VDUs as well as image stacking and dissolve.

In regards to content, the sky's the limit. Systems like LightForm makes customized mapping a cinch. There are also online libraries of mapping content ranging from colors, patterns, stone, brick, landscapes, beautiful skies, text, and a limitless variety of pre-made designs. A quick search of "projection mapping content" will give you many options.

While environmental projection may require an expert's touch, these basic elements give you an inside window as to how the process comes together. We captivate those willing to hear the message not only with our words but within the environment we have prepared for them. Your design should be spirit-led in creating an atmosphere of worship and inspiration. The immersion blends the beauty of the message into a visual dreamscape. T

Dave Rodgers, *is a professional author and AV marketing manager. He has over 20 years of experience in the audio-visual and wireless communications industries and has made numerous television, radio and editorial appearances providing installers and do-it-yourselfers with easy solutions toward creating larger-than-life big screen applications.*



Grace Polaris Church

BY JONNIE BARLOW AND BRENT DYE

Grace Polaris Church, located on the ever-expanding north side of Columbus, Ohio, has seen a lot of changes during its 54 years of worship and ministry. What began as a basement bible study has grown into a congregation of over a thousand, and a warehouse-sized church building constructed in the middle of a cornfield is now surrounded by bustling commercial centers and packed, diverse neighborhoods. Through all this change and growth, though, one thing has remained steadfast: our mission to honor God by multiplying devoted followers of Jesus through worship, community, training, and witness.

Early in its lifespan, one of the core commitments that Grace Polaris Church made was to use the creative arts—especially music—in fulfilling that mission. Under the leadership of former Worship & Media director Randy Kettering, the church began a full-fledged choir and orchestra program that continues to this day, which led to many expanded worship and outreach opportunities: public choral performances, touring musical groups, multi-day worship conferences, an annual Christmas pageant that drew in 24,000 guests at its peak, and a 1993 Billy Graham crusade that the church helped organize. To enhance and compliment those events, Grace became an early adopter of live video in services, working with secondhand equipment and a lot of ingenuity to piece together a functional system.

Of course, everything that's cutting-edge eventually becomes outdated, and soon twenty-plus years of broadcast innovation passed us by. In the era of smartphones and live-streaming, we were still working with SD analog equipment and VCR recorders. We used a Commodore Amiga for character generation and titles, and our newest cameras were from the early 90s. Prayer and duct tape wouldn't hold this system together forever. That fact, coupled with a dated building very much in need of design updates, made it clear that we were in need of a full-renovation and tech upgrade, so in 2016 we began planning and fundraising for that project.

Since we're a church with a fairly limited budget, this was

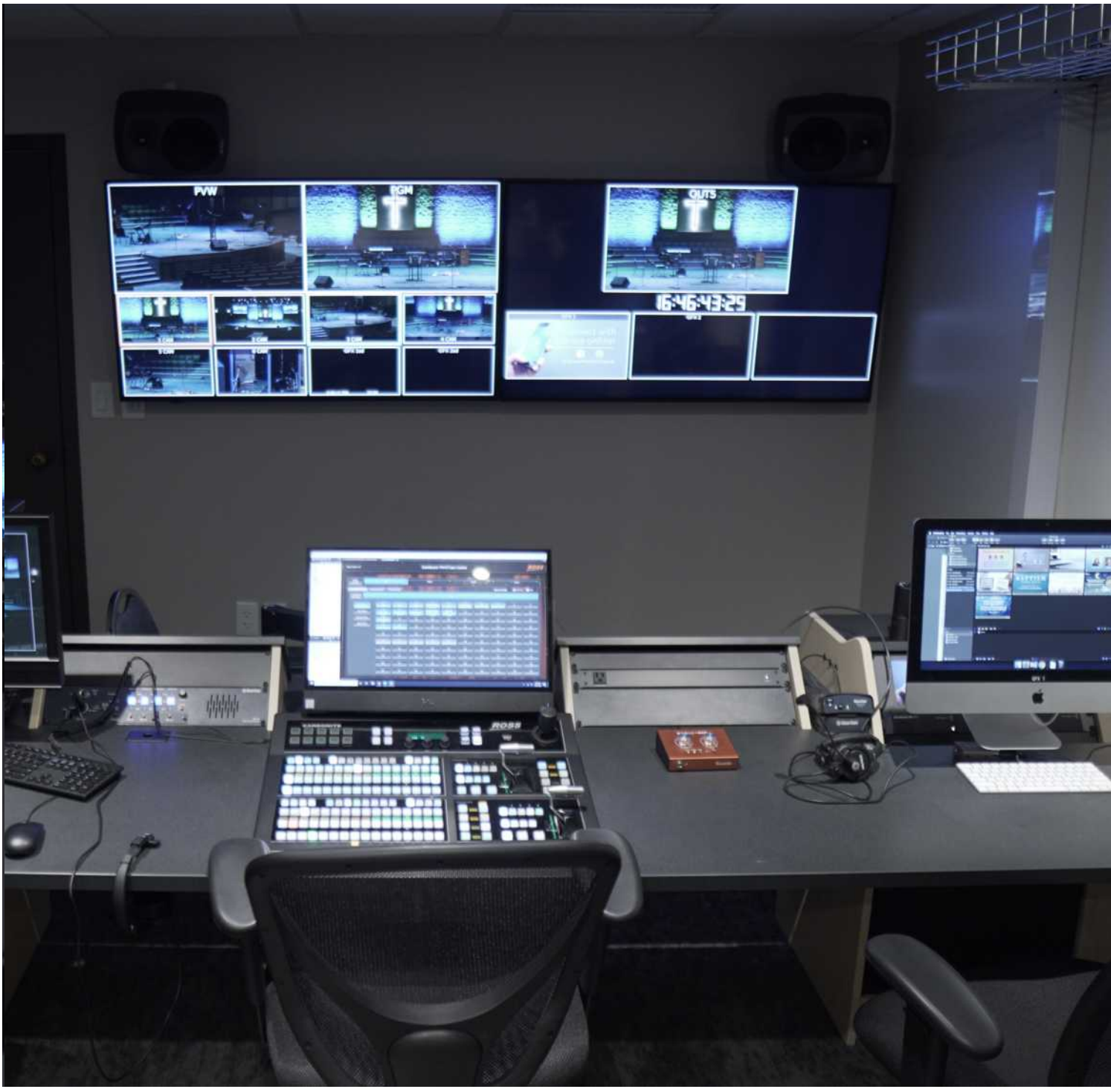
one of the most challenging parts of the entire process. We had to balance the needs of the tech departments with the needs of the rest of the building's renovation. We wanted to get equipment that would work reliably and accomplish our goals, but we also needed to make wise use of our congregation's gifts. We wanted to continue using the arts to facilitate worship, but we didn't want to invest so much that it became a distraction. And we wanted to plan for the future, so that the system could be easily expanded and updated down the line. To help us balance all these factors, we decided we wanted to work with an integrator who could help us navigate everything. This was especially beneficial because I—the head of video production—had been working in the industry for less than a year and was woefully ill-equipped to handle such long-lasting decisions.

We looked at several local integrators, but none of them seemed equipped to handle a project as comprehensive as our overhaul. That's when we found Interise, headquartered in Nashville, and decided to start a conversation with them. From the first time they set foot in our church building, it was clear that they were the right choice. They were knowledgeable about every kind of gear, but they also listened and welcomed our input. They understood our budget limits, and they had a plan to meet all our goals despite those constraints. They were

also just great people to work with, which became especially important when our renovation had to be delayed and we ended up working with them for a year longer than originally planned

When this delay happened, Interise immediately proved invaluable by helping us make partial steps to improve our tech. Specifically, we all agreed we couldn't really function for another year with the old projection system in place. For over a decade, we had been operating with a pair of Eiki LC-X2 projectors, whose 2700 ANSI Lumen brightness and SXGA resolution were woefully inadequate to service our 2000-seat auditorium. When you can barely read white text over a black background, you know that you're in need of a contrast upgrade!

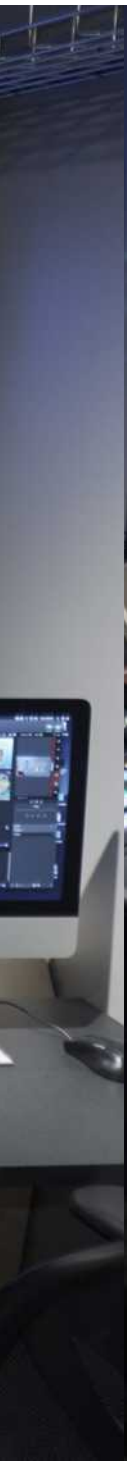
Thankfully, we were able to develop a plan that allowed us to upgrade our projectors as a half-step toward the full renovation. With a Decimator MD-HX to upscale and convert our existing analog signal, we were able to use our existing coaxial cabling infrastructure to carry HD-SDI signals to our new DPI M-Vision 18K projectors. The result was an immediate and immense in-room improvement with minimal sunk costs that would detract from the eventual full upgrade budget. When we were able to move forward with the full process, we



simply upgraded our infrastructure to higher-bandwidth cabling to allow us to operate on the 3G-SDI standard.

Our projection solution also had to take into account the old placement of the screens, which were at the far edges of our sanctuary. Interise had to come up with a rigging schematic that would work with what we had, knowing they would then have to re-think the rigging once the new screens, closer to the stage and built into the walls, were added. Working through these kinds of issues is a perfect example of why an integrator was so valuable, as we were free to continue focusing on our main week-to-week responsibilities while they solved problems and moved forward on the final, full upgrade plan.

Once the renovation began in earnest, Interise began the tangible work of coordinating and installing the new system. One of the first tasks was to implement an updated network of conduit throughout the auditorium. This is often overlooked, but it means that future expansion of our system is much easier. Never again will we have to wait thirty years before making a tech upgrade.



GEAR LIST
GRACE POLARIS

AUDIO
14 Nexo STM M28
6 Nexo RS18
5 Nexo PS10
8-Nexo ID24
Avid S6l-32D
Avid Stage 64
Waves Soundgrid
Shure QLXD wireless mic package
QSC Q-SYS

VIDEO
2 Digital Projection M-Vision Laser 18k
1 Ross Carbonite Ultra
1 Ross CB2 Panel
1 Ross Video NK-3G34
4 Ross Pivot Cameras
2 Sony HXCFB80SN Cameras
1 AJA KiPro UltraHD
ClearCom 4 channel intercom system
Christie UHD55 displays

LIGHTING
1 Obsidian Control NX2
38 ETC Source 4wrd
16 Chauvet R1x Wash
8 Chauvet R2x Wash
6 Chauvet Ovation FD-205WW
12 Chauvet Ovation FD-105WW
12 Chauvet Colordash Batten
Pathway DMX distribution

After the physical building upgrade was mostly complete, Interise returned to begin installing all of our gear. They created five pipes for theatrical lighting, each at different depths in the room. This allows for great flexibility, and gives us even coverage, detailed backlight, and creative color across the whole of our large stage. We have several kinds of fixtures, with Elation KL Fresnel 8's providing stage wash, Elation WW Profile HP's providing focused light, and a variety of Chauvet Rogue R1X's and R2X's providing color and effects. The whole system is driven by an Obsidian NX2 control board, which allows for in-depth programming but can still easily be run by a volunteer on Sunday morning. Lighting is one of the areas that Interise was able to help us find significant savings by using our existing leko bodies and lenses and simply upgrading them to the Elation lighting engines.

The main PA system was hung about the same as lighting. The room was in desperate need of a technical upgrade to bring us into the 21st century. Most everything was being done in the analog domain, so we were restricted in our ability to route signals or make changes quickly. The system upgrades, implemented by InteRise Solutions, has changed all of that. Now we are in the digital domain and have the infrastructure that allows us to route signals (audio & video) where needed.

With a full choir and orchestra, rhythm section, worship singers, stem tracks, drama, pastors etc., we needed a mixing console that could provide a high channel count, flexible routing and ease of use for our volunteers. The Avid S6L-32D was chosen because it could do all those things, and more. In addition, we wanted the ability to do multitrack recordings and perform virtual soundchecks, and Pro Tools integrated seamlessly to provide 128 tracks of recording and playback capabilities. Channel processing and FX are done with a compliment of Waves and Avid plugins.

Our main goals for the PA was achieving full frequency response, uniform coverage and good intelligibility. InteRise came up with a design consisting of a seven box, two hang, Nexo STM28 array and six RS18 subs, located under the stage. For the main floor fills, Nexo PS 10 and ID24 boxes are used, all powered by Nexo NXAMP4X4 amplifiers. Martin Audio CDD-Live 12 powered speakers are used to provide balcony delay fills. Stage monitors are also CDD-Live 12 powered speakers. Choir monitoring is accomplished with flown Meyer UPA-1s, which were used as fills in our previous system. All wedge monitors are aux fed from FOH.

In-ear monitoring for singers and the rhythm section is a combination of a wireless Shure PSM300 system and wired Whirlwind HATTXL headphone amps. Monitoring originates with a Dante fed Mackie DL32R mixer. Each musician has, and can adjust, their own mix from the Mackie via a phone or tablet connected to a closed wi-fi network.

The wireless mic package spec'd by InteRise, is a Shure QLXD system with a mix of handheld and bodypack transmitters. Shure Beta 87 heads are used on the handhelds. Countryman B3 and E6 mics, which the church already owned, are used on the bodypacks.

In the past, the audio feed for video was just a 2-mix coming from the FOH console. Our desire was to improve the audio mix for videos and streaming. The audio for video feed is now made up of group stem mixes at FOH. Those stems are then sent through the Dante network to an Allen & Heath SQ-5 mixer in the video production suite, where a final mix is done for video recording and streaming. None of this was possible with our old system.

Once again, Interise found us savings by providing access to high-quality used equipment through the touring side of their company.

With so many savings, we were able to implement a much more fully-featured video system than had originally been planned. Driving our system, we have a 1 M/E Ross Carbonite Black switcher with a 2 M/E control panel, which makes it easy to drive the screens in our auditorium as well as simulcast feeds throughout our campus and a live-stream. This is layered on top of a Ross NK Router that makes it easy to reconfigure our setup for special events or add new equipment down the line.

On the front end, our two Sony HXC FB-80N cameras boast excellent image quality, and their wide dynamic range means that every part of our auditorium shows up well on camera, no matter how dramatic the lighting. These two main cameras are supplemented by four Ross PivotCams to give even more options on a budget, and these integrate directly with the switcher so they can easily be controlled by the TD or a separate operator. Graphics and titles are supplied by two iMacs running ProPresenter, a system that we've been working with for many years.

Of course, all this new equipment could have been totally overwhelming to a team that's almost entirely volunteers, but this is again where Interise really stepped up. Over the course

of two days, they coordinated in-depth training with our core team to make sure we really understood the system. They were able to show us the full power of the system, while also focusing in on the minimum necessary for a normal Sunday morning. Even once the pandemic hit, they continued to make themselves as available as possible, conducting training over video call and never being more than an email or phone call away.

With it all said and done, it's clear that this renovation and upgrade could not have come at a better time. Beginning in January 2019, the renovation was supposed to conclude in early 2020, with the first service scheduled in the "new" building on March 22nd, 2020. Little did we know that March 13th would mark the start of COVID quarantine in Ohio, and that our church would have to exist online-only for the next several months. Clearly God's timing is superior, as our new modern system was completed the very week we needed it most. Though we weren't able to have the grand reopening we expected, we're so thankful that the new technology enabled our church to continue "meeting" even though we had to be apart.

Now that we're back to meeting in-person, the response to the updated facility and technology have been fantastic. Improved lighting means that everything can be clearly seen throughout the whole room. Improved audio means that our worship band, choir, and orchestra sound better than they ever have, no matter where in the room you sit. Improved video means that the worship service can be highlighted and captured like never before, and it allows those who still have to remain at home to continue being members of our church each and every week.

In this uncertain time, we don't know what the future holds, or when we might be able to return to some of the larger-scale, more creative ministries that our church loves. What we do know is that thanks to God's provision and many people's hard work we're prepared for whatever might come our way. Interise was an invaluable part of that making that happen, and our established relationship means that we always have them in our corner when we have another need. Grace Polaris Church is well-equipped for another fifty years of ministry—as long as we don't have to wait quite that long for another technology upgrade. T

Jonathan Barlow *is the Creative & Live Video Producer at Grace Polaris Church in Columbus, Ohio. He oversees weekly service live production, as well as planning large creative events throughout the year and supervising the recent AVL upgrade.*

Brent Dye *has worked in pro audio for more than 25 years, including freelance engineer and studio owner. He is currently serving as FOH and studio engineer at Grace Polaris Church.*

Immersive Audio: Why Does It Matter?

Q&A with Philip Hagood; General Manager, InteRise

TFWM: What is Immersive Audio in Live Sound?

Philip: Immersive audio in the live sound application is a style of designing and deploying a large number of speakers with overlapping coverage for the purpose of consistent tonality and localization throughout the audience area. It is not as complex as it sounds, and it is a concept that has been around for years – most of us are aware of this idea through "surround sound" in movies and cinema. In a cinema environment, surround sound is a tool that helps the audience feel like they are apart of the film and not merely spectators. The goal of immersive audio in the live sound environment is the same to create a listening experience that engages the listeners in an effective and visceral way.

How Does this Apply to a Church Live Sound System?

Philip: Most ministries and churches across the world look and operate very differently but the goal is the same; to create an accessible environment to understand the gospel message and facilitate active engagement and discipleship between the individuals that comprise the Church. Immersive audio systems allow for a powerful and effective toolbox to meet those goals, but up until recently the systems have been too expensive and complex for most ministries. Over the

last several years, many of the highly regarded manufacturers in the AV industry have released products that eliminate many of the traditional barriers to entry within immersive audio. Features like graphical interface, infrastructure and connectivity, and the sheer amount of equipment needed have posed challenges for most churches with volunteer operators and limited budgets. This new technology eliminates many of those obstacles with a well-engineered and streamlined solution that starts at the inputs all the way to the speakers.

How Can a Church Utilize This Technology?

Philip: Here is where we really get into the meat and potatoes of this technology in a church environment. Imagine a typical modern church worship space it is likely a large fan-shape room, possibly with a balcony and raked seating on the sides leading to that balcony. These ultra-wide rooms allow for a more intimate connection between those on stage and those in the audience by putting the listeners in closer physical proximity to the people on stage versus a traditional performing arts venue or concert stage. The downside of this fan-shaped room is that it creates a particular challenge in speaker coverage and all too often we are left with a choice between even coverage and imaging for the listeners. In the battle between these two concepts coverage wins out because you would rather someone hear the message in mono than not be able to hear or understand in stereo. This issue has been addressed with large distributed systems, left / center / right clusters, and most recently large line arrays. As technology has progressed, speaker systems do a better job of covering this style of room, but there are always sections of seating that get neglected for the benefit of the remainder of the seats - typically the extreme sides or raked balcony seating. With the new immersive options that we now have, we can eliminate many of those problem areas while also allowing for audio imaging to create a more engaging experience. Immersive audio systems typically consist of a larger number of small speakers than a traditional speaker design. For example, instead of using two line arrays with five "fill" speaker positions, you would deploy 10 small "main" speakers with 6 to 8 "fill" speaker positions. This is a larger quantity of speakers overall but the net impact to cost will typically be reduced over the line array system since the speakers are smaller boxes with lower power requirements. An additional piece of hardware that acts as the "brain" of the immersive sound system will also be needed. This is where you will see differences between manufacturers. Sufficed to say, there are many nuanced differences between how those processors are accomplishing the result, but they are all accomplishing a very similar task.

Creating an audio system that allows our brains to "feel" like we are in the middle of what is happening and creates a tangible and visceral experience during a service helps break down the barrier of a "concert" environment that can sometimes happen in modern styled church services.

Why Does Imaging Matter?

Philip: Imaging in audio systems can be the difference in watching and participating. Imagine if you were still using standard definition black and white cameras and video equipment. You can argue that it still accomplishes the task - it magnifies the person on stage and allows for transmission of that image around a building and the world via web streaming. However, the effectiveness would be limited because the experience is unengaging to the viewer. The concept is the same in imaging with immersive audio systems. Just because you can hear what is happening on stage, doesn't mean that you feel connected and engaged. Creating an audio system that allows our brains to "feel" like we are in the middle of what is happening and creates a tangible and visceral experience during a service. This helps break down the barrier of a "concert" environment that can sometimes happen in modern styled church services. Through immersive audio you not only are able to hear what is happening but also feel like you are engaged in the experience.

Should My Church Get an Immersive System?

Philip: Immersive audio, while incredibly effective and powerful, is not a fix-all. The only perfect solution for a church is one that the leadership understands and can see the value in for their ministry. Immersive audio is more complex to operate, even with the amazing improvements in the interface and deployment. A trusted integrator, who knows your needs, budget, and ministry, is a requirement when considering a more complex system like immersive. If an integrator pitches a product or gimmick without taking the time to really hear and understand your vision and needs, run away! The value in an integrator, and paying a premium price for design and equipment, is that they can create complex solutions and present them in an accessible way. Immersive audio needs to be heard to be believed. There are several churches around the country that have invested in immersive audio, and, if you are considering it, you should hear those facilities and discuss the experience with their staff.

Immersive audio is an incredibly powerful tool that will continue to permeate churches because of its ability to change a speaker system from a basic need to a creative tool for effective engagement in the gospel message. T

Shure MV88 and MV88+

BY CHRIS FOREMAN, SPEAKAV, LLC

I recently acquired a new iPhone SE, one of the few modern smart phones small enough to fit comfortably in the pocket of my jeans. I soon learned that it has a very capable camera and processor but the internal microphone is monophonic and designed primarily for phone conversations.

So, I searched for external microphones designed to work with my iPhone and selected the MV88 from Shure. Shure advertises the MV88 as a product that can turn your phone into an audio recording studio or video camera for recording or live streaming. Based on my experience, that's no exaggeration. It's a well-designed professional microphone system with accessories to meet a wide variety of applications for churches and other users.

There are actually three MV88 products, all part of the Shure "Motiv" family. One is just the microphone with windscreen and carrying case. The others are kits designed for a greater variety of audio and video applications. All three share the same rotatable capsule with a pair of matched 1 cm condenser microphone cartridges, mid-side stereo architecture and choice of adjustable-width cardioid mono, bidirectional mono and mid-side stereo operational modes. I purchased the MV88+ kit which includes Shure's excellent SE215 earphones.

Shure offers a free ShurePlus™ MOTIV audio recording app for IOS and Android devices featuring uncompressed 24-bit/48 kHz wav recording, five DSP preset modes, versatile microphone controls, 5-band EQ and compression/limiting. A companion MOTIV video recording app allows the user to quickly move back to the audio app for microphone adjustments.

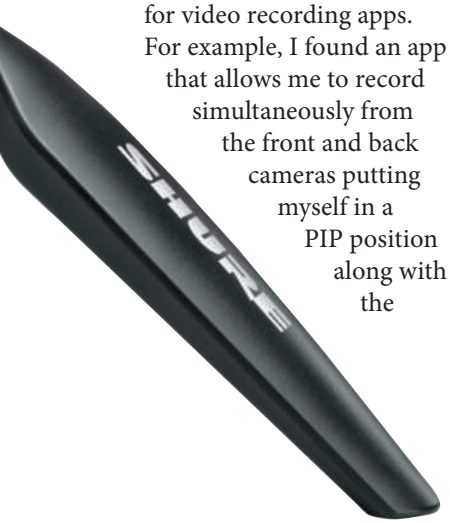
The basic MV88 is small, self-contained and plugs directly into an iPhone or iPad. In contrast, the MV88+ kit versions work with Android as well as Apple phones and tablets and include accessories for versatile audio and video recording or live streaming. The microphone in the two kit versions trades versatility for convenience. Instead of plugging directly into a phone, the MV88+ mic uses a cable to connect to the phone and includes an earphone connector that's not on the basic MV88.

The combination of the MV88 with the right smart phone creates a versatile video and audio system that churches can use to record worship services, children's programs, special events,

testimonials, on-the-spot interviews and more.

With the right smart phone, the MV88 is more than just a replacement for a dedicated video camera or portable audio recorder. For starters, the MV88 microphone is certainly superior to the microphones in all but the highest quality dedicated video cameras and equal to or better than the mics in the best portable audio recorders. The processing versatility of the phone is another major advantage to the MV88 over a dedicated video camera or portable audio recorder.

There are several excellent and low-cost smart phone apps for audio recording that convert the MV88 and your smart phone into a very high-quality stereo audio recording platform. The same is true for video recording apps. For example, I found an app that allows me to record simultaneously from the front and back cameras putting myself in a PIP position along with the person I'm interviewing. Shure says you can even live stream directly to Facebook or Instagram (etc.) by giving those apps permission to use the external mic. These features would not be available on a dedicated video camera.



There are disadvantages to using a phone in place of a dedicated video camera as well. My iPhone SE, for example, has a single camera with a fixed lens. Thus, it can only do digital zoom (no optical zoom) and I doubt it matches the lens quality of a professional video camera. And, while the MV88 is easy to set up and use, a dedicated video camera doesn't require assembly for each use. And, the Shure Motiv apps, while very capable, are somewhat bare-bones in comparison to audio recording apps like Garage Band or the better video recording apps.

I was concerned that the combination of video recording and the power required by the MV88 microphone would drain my phone's battery quickly and my iPhone's battery was down several percentage points during the first 15 minutes of recording. Your experience will be very phone-dependent but other reviewers report two hours or more battery life for continuous recording which should meet most needs. I also worry about the small and potentially fragile lightning connector on the basic MV88. However, the mic itself is just over 40 grams (under 1.5 oz) so a careful user shouldn't have a problem.

What about cost? If you add the cost of the MV88+ kit to the cost of an upper-tier smart phone (with dual cameras, etc.) you'll rival the cost of a mid-priced video camera. However, if you already have a smart phone with a decent camera, as I did, this is a low-cost way to acquire truly professional audio and video recording and streaming capabilities.

For large churches, the MV88+ with a smart phone could be a versatile addition to your existing video camera complement and audio recording capabilities. For small churches, the MV88+ with an existing smart phone could be a low-cost way to begin video recording in worship services or for a YouTube channel or Facebook live stream. I've recorded parts of a rehearsal at my church which I've posted to our SpeakAV YouTube channel – check them out. T

Chris Foreman *attends Berean Church in Lincoln, Nebraska, and is a Partner at SpeakAV, a content marketing and consulting group. Foreman has held engineering, marketing and management positions at several pro audio companies and is widely published. He co-authored "Audio Engineering for Sound Reinforcement" with consultant John Eargle.*

CHRIS' REPORT

FUNCTIONALITY	★★★★½
FLEXIBILITY	★★★★★
EASE OF USE	★★★★½
COST	★★★★
OVERALL VALUE	★★★★★

PRODUCT SHOWCASE

1/ ACT Lighting
grandMA3 onPC command wing XT
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2/ Atlona
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http://atlona.com

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