

COMPASS
POINT
BIBLE
CHURCH

The JBL line array system flown above the dais.

The Compass Point Bible Church in Burlington, ON is a house of worship that arose out of discussions within the congregations and ministers of two existing Burlington Churches, starting in the spring of 2004. The Brant Bible Church was expanding its congregation and ministry beyond its available facilities. The Park Bible Church was just around the corner and had a larger 1,200-seat sanctuary. Although there were many factors that brought them together beyond a simple marriage of convenience, in November of 2004 they decided to join forces at the Kerns Road Campus under the name of Compass Point Bible Church.

The new Compass Point is still operating the Brant Church facility at the Eaglesfield Campus, so they have both churches operating with a number of services each Sunday as well as numerous other activities throughout the week.

Why is this congregation expanding when it seems other more traditional churches are struggling to maintain, let alone grow, their congregations? I attended the New Year's Day Service at the Kerns Campus; there were several hundred people in attendance, and although I'm sure there are many spiritual reasons, a large part of the appeal is the music.

The Brant Church had started expanding their Contemporary Service program some years back and I think there's a fairly clear and obvious relationship between the appeal of this service format and the expanding congregation.

The Contemporary Service is conducted largely by a worship group in concert with the pastoral staff. The worship group is what would be called "the band" in secular terms. At the service I attended it consisted of bass guitar, drums, acoustic guitar, two electric guitars, electronic keyboard and four vocalists. The service opened with some remarks from the pastor and then went straight into three songs in a row – not Hymns or Psalms, but contemporary songs written within the last few years. The congregation was standing and singing along to the songs with the lyrics projected onto large video screens above either side of the front dais. The worship group was integral to the whole service and played and sang throughout.

At other times Compass Point presents dramatic and musical productions and often incorporates these into the services.

Needless to say, with the requirement for clear and intelligible speech and the additional focus on music and drama and the instrumentation involved, the church needed the benefit of a good and comprehensive sound system.

The larger Kerns campus had an existing sound system that was 20 years old; it was well past its time and needed to be replaced. It was determined that Compass Point should have the best system they could afford and they looked to Marv Reimer, the member of the Pastoral Staff responsible for Music and Worship to determine what was needed.

Marv acts as the Director of the music and technical end of things and has been with the church for 18 years so they trusted his judgment.

Marv in turn looked to David Yake of Yake Engineering Systems whom he had worked with for a number of years at the original Brant Church to design and install a top-notch system that would serve the church's needs for years to come.

What To Do Before You Put In The Sound System...

The first step was to model the facility into EASE. This quickly determined that acoustic treatment would be required or no sound system was going to be able to perform properly. There was a very large, hard and flat back wall that was fairly obviously a problem, but there were also four walls, two on either

was the optimum choice. This would provide complete coverage of the main sanctuary from a single point source with a variance of no more than 3dB from front to back. Russ Noble, a product specialist with Soundcraft Canada, the Canadian JBL distributor brought in a ground-stacked demo system of four JBL Vertec VT4888 line array modules as well as some JBL PD Series "conventional" cabinets. The PD system was capable of providing full coverage with a variance of only 6dB, but even though the Vertec Line Array system was almost three times the price it was decided that the clarity and imaging it provided would be well worth the price.

The installed system consists of seven VT4888 modules, hung in a single centre array, powered by Crown I-T4000 amplifiers. Line arrays were new to Yake Engineering, but they worked closely with JBL and the install went very smoothly.



side, angled at about 45 degrees to the Chancel that would also be problematic.

Yake installed about 4" of compressed fibreglass in frames covered with material on the offending surfaces. This is the equivalent of a foot of conventional fibreglass insulation and provides about 90 per cent absorption down to 120 Hz.

A dedicated isolated audio AC power distro was installed with an ETA PD420VS 80 amp sequential power system. This eliminated the hums and buzzes they had previously been susceptible to, as well as the bangs and Oops! Factor as people randomly searched around for breakers.

The effect of the clean power and acoustic treatment was so dramatic that upon hearing the difference several members of the congregation thought they had already installed the new sound system.

The Output System

Based on further EASE modelling it was determined that a line array speaker system

Because the VT system is designed for touring, the rigging is very quick – it went up in less than a day, including bringing it down a couple of times to adjust the cabinet angles. For their drama presentations in particular the church wanted to be able to literally "shake the foundation", so they chose two JBL SRX728S dual 18" subwoofers powered by Crown I-T6000 amplifiers. With 136dB peak output capability they may want to be careful they don't get what they wished for.

The wedge-shaped configuration for the 1,000 seats of the main pews, all on one level with no balconies is ideally suited to the line array coverage pattern. There is actually a midrange null point at about 1,000 Hz directly down the centre line, which is an inherent artifact of the cross-firing midrange speakers. However, this is a non-issue since it conveniently lines up with the centre aisle, so no seats are affected. There are about 100 additional seats in each of two side alcoves that are clearly out of the line array coverage. A JBL PD5212/64 speaker cabinet is focused at each alcove. The horn-loaded 12" bass



speaker provides very tight focus down to 300 Hz, so there is very little interference between the main and side-fill systems. Likewise the VT4888 is capable of

good bass response with the seven elements providing directional vertical pattern control below 180 Hz, and full frequency response as low as 60 Hz. This means the subs can be crossed over at 85 Hz so they are totally non-directional. The result is very controlled and even coverage with minimal interaction or interference between the various speaker systems.

All control settings, EQ etc. are on-board the Crown amps. There are 64 available filter sets on each amp so no system controller is required. This provides a very clean signal path directly from the mixer to the amplifiers. The recommended JBL settings were used as the starting point and there was minimal additional tuning required other than adjusting for

have been ideal for storing mix, control and EQ presets, but that was not in the budget. The Soundcraft MH3-48 Mixing console provides a lot of flexibility and control. It actually is a 48-channel console, not subject to the new mixer marketing math (MMM) that claims a mixer with four mic preamps is somehow magically a 16-channel board. No, this console actually has 48 mono mic/line inputs plus four stereo line inputs. The Soundcraft MH3 has many channels, many features and a lot of flexibility but the layout is very clean and the operation is very intuitive once you wrap your mind around VCA controls.

With the old 32-channel mixer they had to use "all their fingers and toes," the channel count on the MH3 gives them a great degree of flexibility and the VCA groups provide very convenient control.

Features like integral LED bargraph metering for all inputs and outputs, channel mutes flashing when they are under master VCA mute control and individual Phantom power LEDs on the front AND back of each



Crown I-T series amplifiers backstage.

Equipment List

Control Console

- 1 Soundcraft MH3-48 console

Main Speaker System

- 7 JBL VT4888 line array speakers
- 1 JBL VT4888-AF line array speaker
- 2 JBL SRX728S 18" subwoofers

Sidefill Speaker System

- 2 JBL PD5212/64 side-fill loudspeakers

Amplification

- 5 Crown I-T4000 power amplifiers
- 2 Crown I-T6000 power amplifiers
- 1 Middle Atlantic equipment rack
- 1 ETA PD420VS 80 amp sequential power up/down

Platform Monitor System

- 4 JBL MP412 floor monitors, 2-way 12"
- 2 dbx 220i digital system processor

Personal Monitor Mixing System

- 1 Aviom AN-16i 16-channel input
- 1 Aviom AN-16-D digital distribution unit
- 6 Aviom AN-16II personal monitor mixers
- 3 Shure E3 in-ear wireless stereo isolation headphones
- 3 Shure PSM200 wireless personal monitor systems

Various Processing Devices

- 1 Lexicon MX200 dual reverb/multi-effects processor
- 1 dbx 1066 dual channel compressor/limiter/gate

Wireless Microphone System

- 4 Audio-Technica AT892cT4 miniaturized headset microphones
- 3 AKG WMS400HT/C handheld wireless system with C900 capsule

Drum Kit

- 2 Audio-Technica AE5100 cardioid condenser microphones
- 2 Shure SM57 dynamic microphones
- 2 Audio-Technica ATM25 High Energy dynamic microphones
- 1 AKG D112 kick drum microphone



The Soundcraft MH3-48 console at Front of House.

the variances due to the different cabinet angle settings. These range from 4 degrees between boxes at the top to 10 degrees at the bottom.

The biggest adjustments were made to the side PD boxes employing delay and some equalization to seamlessly match them to the Array.

FOH

There are eight different mix operators and three different worship groups involved with the services on a rotating schedule – all of them volunteers, who in real life are truckers or accountants or business managers, not sound technicians or professional musicians. The system is not simple, but all system control settings are pre-set and locked out at the I-Tec amplifiers so there's no adjustments allowed – there have also been no adjustments required.

Given the many variables of operators and Worship Groups a digital console would

input provides great visual reference for the operators and systems techs.

The old mixer was of the (incomprehensible to me) format whereby the channel mutes only worked on the main outputs – the aux sends were still live! Why would you ever want the Aux sends live when the channel is off?

Anyway, with 12 aux sends it's a good thing they mute on command. One of the auxs is dedicated to the subs, so they can selectively mix bass into the system.

Marv says, "We love those subs! It's allowed us to turn the bass guitar level on stage way down and get it into the main mix. The JBLs sound infinitely better than the stage amp."

The Stage

With four instrument amps on stage as well as a piano and drum kit, there's quite a bit of level coming right off the stage. (The day I

was there they were using an electronic drum kit but only because they had a slight accident during setup and punched a hole through the snare drum). They are also currently running four stage monitor mixes from the FOH console, which is not only very nerve wracking for the mix engineer having to mix by "sense of smell" in the perilous feedback zone, but also adds to the overall stage volume, which in turn clutters and impedes the control of the main house mix. (A second electric guitar was not the norm, and in the haste of setup and switching over the drum kit the additional guitar amp was set facing directly out at the audience with the result that it was too loud, making it not possible to blend it into the house mix).

To overcome the stage volume situation they have purchased (but not yet installed) an Aviom 16-channel Personal Monitor Mix system. They will be able to take 16 individual balanced direct outputs from the Soundcraft fed into the Aviom AN-16i input module at the FOH position and send them via Cat-5 to the on-stage Aviom 16D Digital Distribution Unit. This will feed six individual AN-16II Personal Monitor Mixers and a combination of headphones and four Shure PSM200 wireless in-ear systems with Shure E3 isolation ear sets.

This should reduce the stage volume dramatically. The stage amps will not need to project across the stage to the other musicians – they could even use load boxes and take a direct feed or use isolation chambers and eliminate on-stage amps entirely. They could potentially eliminate stage monitor speakers as well, although they may well find they need some amplified sound because not everyone who comes on stage will necessarily have headphones. They may also find that with no sound coming off the stage they will need to provide some additional front-fill speakers for the nearest rows and to lower the audio image down from the centre array to the stage.

The in-ear monitors take some getting used to; you are cut off from your normal acoustic references – your ears and your eyes are no longer giving you the same sound source reference. If you turn your head to look at another player your normal binaural image reference is missing because the sound doesn't change with direction.

You are also cut off from your audience. To remedy this there are usually some ambient mics focused at the audience – in this case the congregation, brought into the mix.

We also use our ears for balance and some people find they stumble around a bit before they get used to having the ear buds in. The biggest change however, is that you can hear everything so clearly that there's no room for mistakes, so you can't be fudging on that chord anymore, it just becomes much too obvious.

So Many Wireless

The church already had eight channels of Shure L4 VHF wireless operating in the 180-200 MHz range and three Sennheiser EM 100

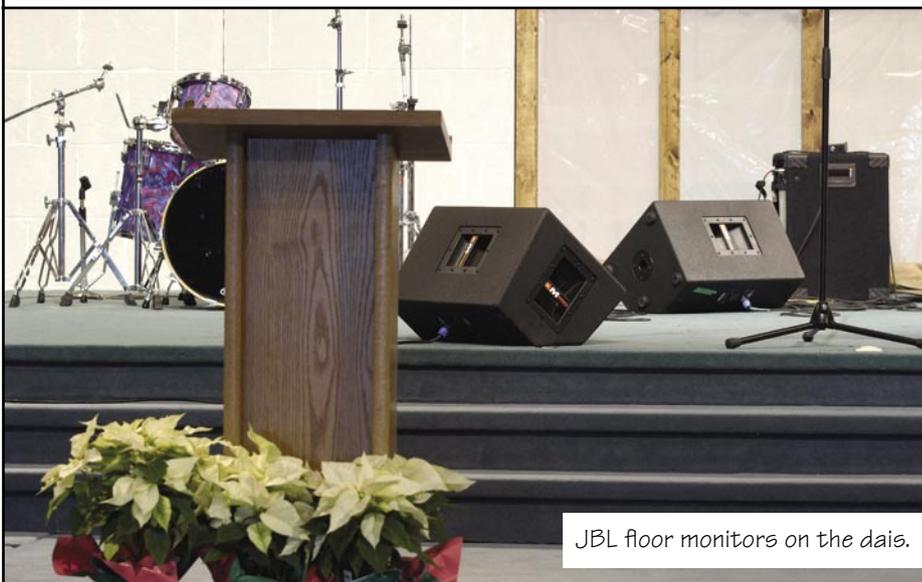
UHF systems at 638 MHz. Three more AKG SR400 systems at 650 MHz were added. It's a testament to the quality of all the systems and their frequency agile capabilities that they all operate with no interference – even using multiple individual antennas. There was a maze of aerials in the back equipment room as far away from the stage as you could get that would have made me very nervous. I would have wanted some master antennas and a distribution system, but it all seems to work, so it's pretty hard to convince anyone they should spend additional money.

The AKG channel selection program

crew of eight, and it's a good thing they were so well coordinated and able to get everything up and running so quickly because there was a wedding scheduled for that Friday. Russ Noble ended up tuning the system on Thursday night during the wedding rehearsal. It all came together and the system was used for the wedding and for the church services that Sunday.

I heard every word of the Senior Pastor's opening remarks as he spoke into a handheld wireless – the first and most important indicator that the system is working well.

New Year's Day happened to be the first



was used to determine all the operating frequencies. The need for doing the channel selection carefully was clearly demonstrated at their Christmas Pageant. They found that the 14 available wireless channels just weren't going to be quite enough for the show so they borrowed an additional channel from the other church. It had always worked fine and these ones worked fine, but, the simple act of adding another channel into the equation without proper frequency coordination introduced a whole series of intermodulations that messed everything up until the rogue channel was adjusted to fit.

I was surprised to see that they used wireless mics in positions that didn't really require it – at the piano and for the acoustic guitar player for instance. Conventional wisdom would have it that a wired microphone is always going to sound better because it's not going through companding and all the extra circuitry; it's also going to be inherently more reliable, but it may be that the wireless mics are just better quality than any of the wired mics they own and the wireless are just more convenient. The new AKG systems get 32 hours of operation out of a single AA battery, so that's certainly very convenient.

day for Dan Barber as a new pastor which was the cause of some confusion when I introduced myself and they started to put a lav mic on me – I hadn't intended to check out the system that closely. When they did get the mic on Dan, and *not* me, he was also not only clear, but easy to hear – which is different than simply hearing. The system was effortless – understandable knowing the quality of the components and the installation as well as the huge amounts of headroom available.

As I said, that morning was a bit of a scramble. Reimer was over at the other church and didn't have the opportunity to reset the board for this worship group from the previous settings, and there was the additional guitar amp and the electronic drums. The Aviom monitoring system has not been installed so there were still stage volume issues, with the result that the Worship Group was not as perfectly clear as the spoken word, but it still sounded fine – you just know that it will continue to improve as they work through all the changes. I understand that riding a thoroughbred horse is a bit more involved than sitting on the County Fair pony. ●

Come Together

The installation started on Monday the second week of August 2005. Yake sent in a



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