

# CX

LIGHTING | AUDIO | VIDEO | STAGING | INTEGRATION

## UNDERCUTTING

An Open Letter to the Industry

## OPTO PROJECTS

Custom Solutions for Unusual Productions

## HAIR

The Tribal Love Rock Musical 2019 and 1969 compared!

# THE COMMUNICATIONS ISSUE

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- > WI-FI FOR GIGS
- > TWO WAY RADIOS
- > NBN
- > 5GHZ & DECT

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- CMI Training and Showcase
- d&b launch A-Series
- Meyer Sound Asia
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- Allen & Heath turns 50

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- Andy Stewart
- Jenny Barrett
- John O'Brien
- Duncan Fry

## ROAD TEST

- Robe T1 Profile
- ShowPRO Neptune Hybrid
- Chauvet DJ H4 IP X6

## ROADSKILLS

- Guy Sebastian
- Jimmy Barnes
- Hayden James



Further information on inside cover.



60° x 60°



100° x 100°



## THE MULTIPURPOSE POINT-SOURCE

dBTechnologies

# POINT. WELL MADE.



## THE MULTIPURPOSE POINT-SOURCE

400W RMS ACTIVE 2-WAY SPEAKER

LF 2x 5" (1" V.C.), HF 1x 1" (1.4" V.C.)

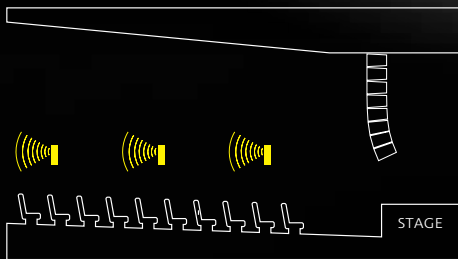
AVAILABLE WITH 60° x 60° OR 100° x 100° COVERAGE

MOST COMPACT RDNET CONTROLLED CABINET

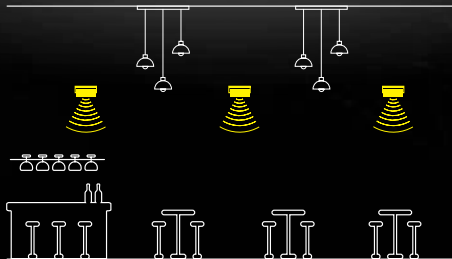
MAXIMUM VERSATILITY IN TOUR-GRADE APPLICATIONS OR FIXED INSTALLATIONS



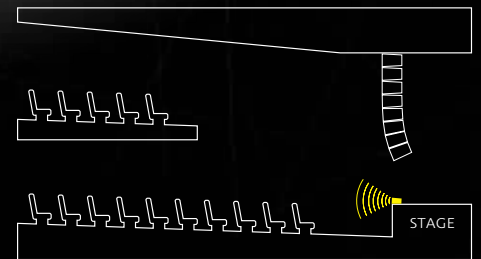
VERTICAL INSTALLATION



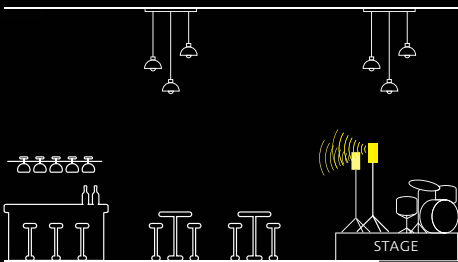
HORIZONTAL INSTALLATION



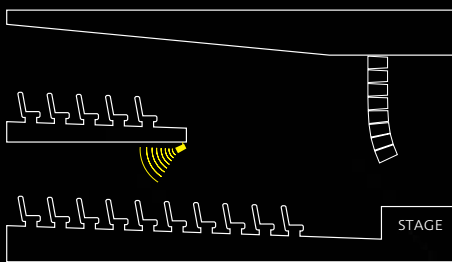
FRONT-FILL



POLE-MOUNTING



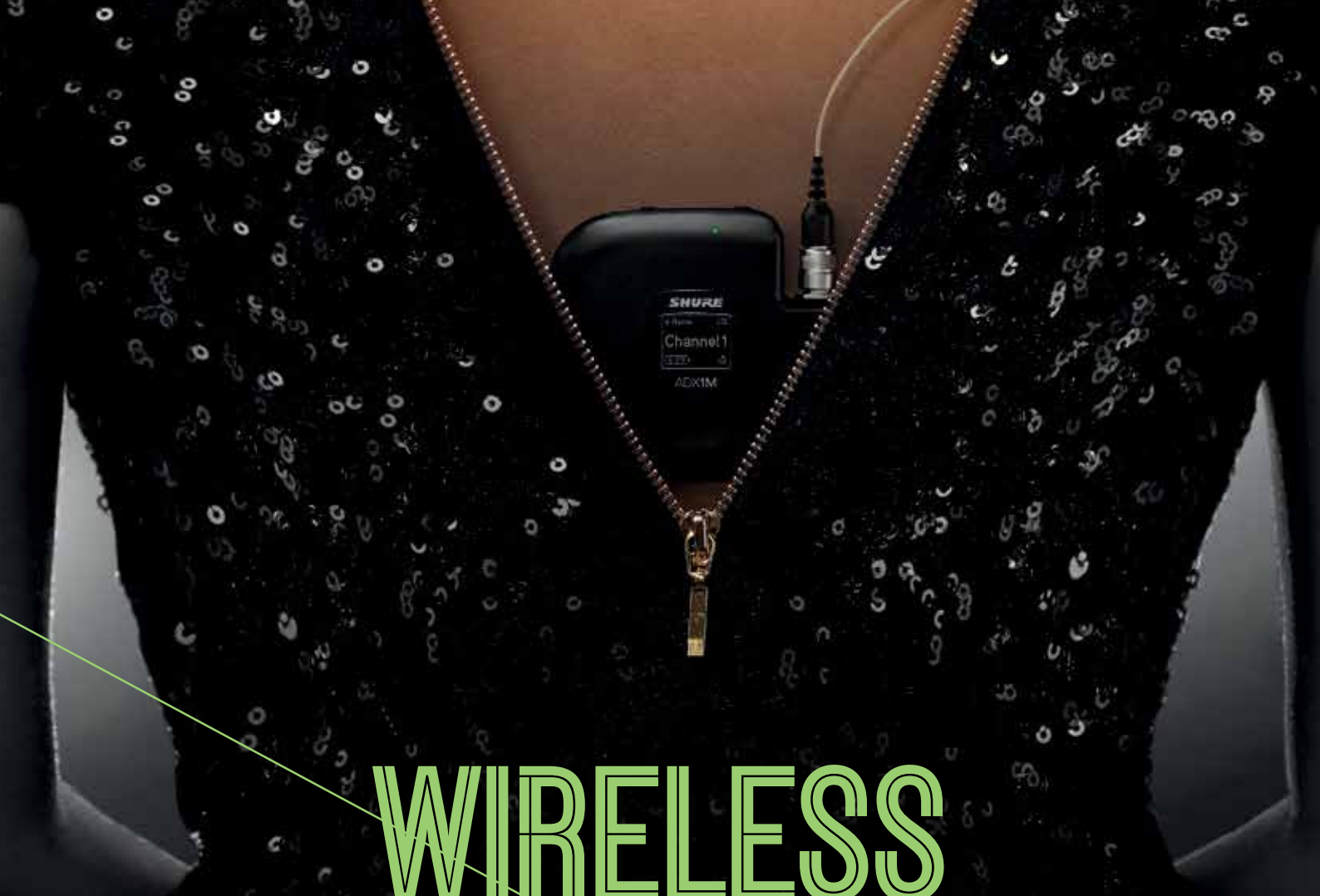
UNDER-BALCONY



### VIO X205 2-WAY ACTIVE POINT-SOURCE SPEAKER

|                                |                          |
|--------------------------------|--------------------------|
| Max SPL.....                   | 126 dB                   |
| Frequenc Response [-6dB] ..... | 80 - 20,000 Hz           |
| HF .....                       | 1x 1", 1.4" v.c          |
| LF .....                       | 2x 5", 1" v.c            |
| VIO X205-60 Directivity.....   | 60° x 60°                |
| VIO X205-100 Directivity.....  | 100° x 100°              |
| Amplifier .....                | 400 W RMS                |
| Processing.....                | FIR Linear Phase Filters |
| Width.....                     | 150 mm [5.9 in]          |
| Height.....                    | 485 mm [19 in]           |
| Depth.....                     | 240 mm [9.4 in]          |
| Weight.....                    | 7.8 Kg [17.2 lbs]        |

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\* Contents Photo – Guy Sebastian. Credit: Troy Constable

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Locked Bag 30, Epping NSW 1710 Australia

Phone: +61 2 408 498 180

Email: mail@juliusmedia.com

Editor: Jason Allen

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JBL SRX800

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by **HARMAN**

# Live music industry stunned as Minister commits to consultation only after new legislation is passed

Australia's peak live music industry bodies called again on NSW Premier, Gladys Berejiklian, to immediately convene an industry roundtable after a meeting between The Australian Festival Association, Live Performance Australia, APRA AMCOS, and Minister Dominello in late October failed to provide certainty for the industry.

Live Performance Australia's Chief Executive, Evelyn Richardson, said, "The industry has, since February, repeatedly called for establishment of an industry roundtable to work together to ensure safety at music festivals for all patrons.

"While Minister Dominello confirmed at a meeting with us that he will during the second reading of the draft Bill publicly commit to ongoing industry consultation, it was made clear that this would only occur after the legislation was passed, with no industry input.

"We believe the government needs to commit to establishing an industry roundtable that would bring together representatives of the festivals and live music sector together with government representatives from tourism, police, health, liquor and gaming, and the arts to ensure there is ongoing formal consultation in the short and long-term. This is best practice and is reflected in other jurisdictions around the world including in Victoria.

"At the very least, this should be reflected in the new legislation. The roundtable needs to happen quickly and certainly before the summer break.

"Music festivals are a cornerstone of NSW's cultural fabric and they also support thousands of jobs and economic activity in our cities, regional centres and country towns.

"The music festival sector is worth \$100 million nationally and NSW currently has

the largest market share with more than 50 percent of those revenues generated in NSW. Last year in NSW, more than 400,000 people attended a music festival, that's 43 percent of the national figure. And 20,000 more than the year before.

"It would be a major blow for fans, artists and all those people in communities across NSW who benefit culturally and economically from music festivals, if we were to see music festivals forced to leave.

"The industry's aim has always been to work with government to develop a more workable regulatory framework for improving safety at festivals. The draft legislation in its current form is unworkable. However, we believe a music industry roundtable where both government and industry work together can support our shared objectives. Failing that we call on the parliament to reject the legislation," she said.

Fohhn's Christian Bollinger



## CMI Music & Audio's Official JBL VTX-Series Training and Commercial Audio Showcase

In mid-October, engineers, system techs, and business owners from across Australia descended on CMI Music & Audio's Melbourne Headquarters to take part in the first ever JBL VTX-Series training held in Australia.

Graduating from the two-day workshop with VTX A-Series certification, participants took a deep dive into JBL's flagship array covering everything from JBL's software

ecosystem, networking, iTech amplifiers, optimisation, rigging and transportation, before flying A8 and A12 systems for a listening and evaluation session.



JBL's Eric Stahlhammer



CMI's Peter Trojkovic with Mueller-BBM's Bernd Noack and CMI's Nathan Brady

Making the trip from Harman's Northridge, California headquarters to deliver the training was Eric Stahlhammer, JBL's high-performance sound system Product Manager.

"Having the opportunity to ask questions and learn first-hand from the minds that conceive, develop and implement these systems for the world stage was invaluable. Especially for a business such as ours who has made a considerable investment in JBL and Crown," said Ruwan Sena, Director at Gold Coast based, Luna Audio.

"With increasing demand for JBL's VTX-Series across both touring and high-end fixed

# Real-Time Employment Platform Crew Pond First Public Beta

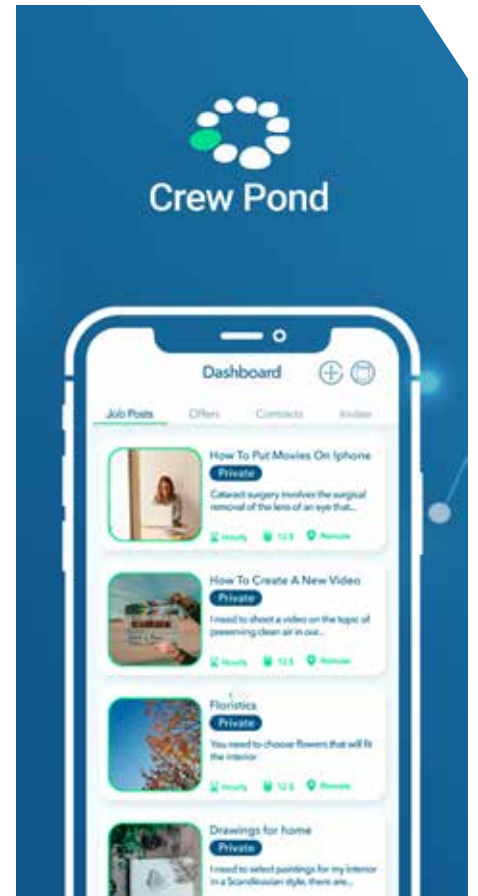
**Crew Pond is a real-time human resource platform that has been built to take the massive on-boarding costs out of employing the right people for the job. Crew Pond launched its first public beta for iOS in early October via the App Store. The beta is exclusively for the Hospitality and Events sectors, with additional industries to be added. Android and web-based platforms will follow.**

Jamie McEwen, CEO of Crew Pond said: "We've invested so much time into building the best features into Crew Pond to make things like connecting the right people to the right employers easy and affordable for everyone. With features that allow you to keep track of your best contractors, calendars for scheduling and easy invoicing, it doesn't matter if you're a small business or larger company, we make the recruitment process easy!"

Australian employment statistics tell us that Aussies are ready to change the way that they look for work and find employees:

- It takes an average of 68 days to fill in a vacant position
- Some insiders suggest an average of 50-60 applicants per job
- Work-life balance is the number one thing Australian professionals look for in a new role
- The average cost per hire is around \$5,000

"As an employer and employee in the Audio Visual industry, I've felt every one of these stats and it wasn't fun," continued Jamie. "After talking with friends doing business across multiple industries, I realised that everyone was in the same boat. I knew that there had to be a better way, and the reality was that there wasn't, so 15 months ago, Crew Pond was born."



Tascam's Erisa Sato

installations, it was a great opportunity for system users to receive factory training for the first time in Australia" said Chris Noonan, CMI's Product Manager for Audio Brands.

The JBL training comes hot on the heels of CMI's Commercial Audio Showcase event earlier in the month. An opportunity to meet and speak with technical experts from leading manufacturers, the two-day event saw international representatives from Tascam, Fohhn, and Müller-BBM educate, inspire, and demonstrate audio solutions from both the installation and production markets to a who's who of Australia's audio consultants and engineers.



JBL VTX Training at CMI

Tascam's Product Planning Manager Erisa Sato and Sales Manager Kai Saito presented their utility Dante solutions, which include seven models of economical, half-rack sized, four channel break in/out units equipped with DSP and a matrix mixer. Fohhn's Christian Bollinger presented a listening session that covered a large part of Fohhn's range for install, before the crowd went outside to hear a flown rig of Fohhn Focus Modular that demonstrated that an incredibly powerful, flexible, and steerable array is more than at home pumping out full-range music from the side of the biggest stages.

With digital acoustic enhancement and immersive audio the current buzz in the industry, Bernd Noack, Project Manager for electronic variable room acoustics at Müller-BBM, presented a thorough look at their Vivace and Vicello acoustic enhancement systems. Recent technological and manufacturing advances in digital audio processing and networked signal distribution have made acoustic enhancement affordable to the vast majority of venues and rooms, and Müller-BBM's systems offer great flexibility, even being capable of immersive audio and spatialisation with custom modified versions of their control software.

# D&B AUDIOTECHNIK LAUNCH A-SERIES IN APAC

**d&b audiotechnik recently hosted an invitation-only audience at the Singapore Esplanade theatre for the launch of the A-Series augmented array loudspeaker system within the APAC market. The more than one hundred and eighty AV professionals in attendance were presented with thorough insights into the development of the A-Series system, and an impressive demonstration of its many unique sonic possibilities.**

"The A-Series augmented array provides our customers with a new set of scalable solutions that work as a standalone system or in combination with the full range of d&b systems," said d&b Product Manager, Wolfgang Schulz. "The flexibility of the splay angles, the Midrange Directivity Control function and the ArrayProcessing capabilities enable the A-Series to address a huge range of applications with coverage consistency that is unparalleled."

Engineered to be extremely adaptable, the

A-Series introduces a unique loudspeaker concept that combines advanced waveguide design with d&b enabling technologies. The system's variable splay angles allow arrays to adapt precisely to venue shapes in fine increments, while Midrange Directivity Control provides one-button acoustic optimization directly from d&b amplifiers. With the flexible splay angles, the A-Series system addresses a wide range of medium-size applications where the highest level of coverage flexibility is paramount.

Additionally, the A-Series comprises the AL60 and AL90 loudspeakers, with ALi60 and ALi90 offering cabinets designed specifically for permanent installation. Designed for medium-scale applications, the AL60/ALi60 and AL90/ALi90 can be set up in arrays of two to four loudspeakers and deployed horizontally or vertically, covering areas of fifty to one hundred and fifty degrees.

For more information: [dbaudio.com/global/en/this-is-a-series/](http://dbaudio.com/global/en/this-is-a-series/)



A-Series



Wolfgang Schulz

## Meyer Sound Asia Established with Singapore Office

**Sharpening its focus on the fast-growing markets of the Far East and Oceania, Meyer Sound Laboratories, Inc. has established Meyer Sound Asia as a new entity to guide marketing and technical support operations throughout the region. Strategically headquartered in Singapore, Meyer Sound Asia will coordinate efforts with national distributors across a broad region extending from Australia and New Zealand through Southeast Asia and beyond.**

"We have seen tremendous growth in this region over the past few years and we're committed to building that momentum into the future," says Meyer Sound Senior Vice President of Marketing John McMahon. "We are expanding our company presence with a full team dedicated to business development,



Andrew Poh, Salmah El Haissane, and Chris D'bais

design services and after-sale technical support specifically for Asia and Oceania. The best solution was to establish Meyer Sound Asia with an office in Singapore, a hub city with quick access to all countries in the region."

Heading the technical team in Singapore is Technical Sales Support Specialist Andrew Poh, who brings to Meyer Sound a wealth of experience in system design and integration from prior positions with a global acoustical consulting firm and a major audio manufacturer. Also based in Singapore is Salmah El Haissane, Marketing & PR Coordinator for Asia. Additional technical support and administrative personnel will be added to Meyer Sound's Singapore team in the coming months.

"For a solutions-based tech company, having

more 'boots on the ground' in the same time zones is a no-brainer," notes Sales Manager for Oceania and Southeast Asia Chris D'bais. "With a growing and highly skilled team based in Asia, we will not only support local customers but also global tours coming through the region and help coordinate large installation projects working with international partners. Providing direct access to factory support — including design services, tech support and sales management — means we can offer the personal connection to our regional customers that Meyer Sound is known for worldwide."

The new Singapore office augments Meyer Sound's direct presence throughout Asia and Oceania, with existing company sales offices continuing in India (Mumbai) and the Middle East (Dubai).

# WHERE WILL IT TAKE YOU?



## NEW A SERIES LINE SOURCE

The new A15 and A10 systems deliver renowned L-Acoustics concert performance and reliability for audiences from 50 to 5,000. Mounted on a pole, stacked on the companion KS21 or flown in vertical or horizontal arrays, the new A Series combines plug-and-play ease and international market acceptance. This versatile solution, with adjustable directivity, scales with the needs of your company and is your gateway to the L-Acoustics rental network. A Series can take you anywhere you want to ~~go~~ **www.l-acoustics.com**

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## Robe supports Culture at the 2019 NAIDOC Awards and Ubud Village Jazz Festival

**Elite Event Technology, one of Australia's leading rental and production companies, supplied lighting equipment and crew for the 2019 NAIDOC Awards which celebrated the history, culture and outstanding achievements - at community, national and international level - of Australian Aboriginal and Torres Strait Islander peoples.**

This high-profile event featured a mix of live performance and awards presentations and was hosted by media personalities Sean Choolburra and Elaine Crombie at the National Convention Centre Canberra in front of a live audience of 1,200, and broadcast live on SBS's NITV channel.

The lighting design by Tom Wright featured an all-Robe moving light rig with 12 BMFL Spots, 12 BMFL WashBeams, 26 LEDWash 300+s, 12 LED Wash600s and 14 MMX Spots.

Tom explained that they were looking to create a lot of warmth onstage with a big emphasis on theatrical side light. Stage depth was limited as video was squeezed into the space. Being able to shape the light was important and they also wanted a big look, so putting lights in all the gaps between the onstage LED screens at different heights both filled the void spaces and offered powerful looks.

BMFL Wash Beams were chosen as an ideal fixture to balance the lighting levels for camera against the five columns of LED screen which were prominent onstage.

Tom comments that they were ideal for the role: "Shaping the beam was key to removing spill onto the screens and parts of the stage. It allowed performers to stand proud of the video screen and gave plenty of depth with lots of intensity to play with. Colour balancing the fixtures for cameras was also great, with lots of range."

Meanwhile, much further north, the seventh Ubud Village Jazz Festival (UVJF) was staged at the Arma Art Museum in the fertile and beautiful Bali Uplands, Indonesia, welcoming a host of fabulous local and international artists. They and an enthusiastic audience embraced the true spirit of jazz presenting a wide range of genres and styles, celebrating the art of improvisation in a peaceful and harmonious setting, tagged CERTAINLY! INDONESIA.

As the event has gained status in the jazz world, the production values have steadily increased. This year event curator Yuri Mahatma gave a clear brief about the ambience he wanted to see and achieve on all of the stages, which was interpreted by set designer and artistic director Klick Swantara who also co-ordinated the production lighting design for the main 'Giri' Stage.

This involved several Robe lighting fixtures, with 24 LEDWash 300+s, six Pointes and six PicklePATTs supplied as part of an equipment package from two local companies ETCetera Lighting and Lemmon.ID.



The general focus was on uniting the lighting and scenic elements in a seamless design that combines luminosity and colour with pixel mapping and projections onto the set which was inspired by Balinese temple architecture and constructed from traditional hand-crafted baskets flown from trusses and sculpted into a special formation.

The LEDWash 300+ was an ideal luminaire that ticked all the 'green' boxes and was bright, punchy, small, lightweight, and perfect for covering the stage area. The six Pointes were used to highlight and accent specific moments during some of the performances, a powerful 'special' for some of the more intense musical moments. The PicklePATTs boosted the general visual ambience, their large dish like reflectors looking interesting and contrasting with the baskets that had been sculpted into the set. This dynamic backdrop also became a 3D effect after dark with the addition of projections which were mapped to fit the curved and shaped surface.

"We were very happy to work with Anom (the event's founder) to bring all parties together for this festival. It was a local first in Bali to have this number of Robe fixtures on stage and the feedback has been absolutely spectacular. We are very much looking forward to the next edition of Ubud Village Jazz Festival!" stated Jens Poehlker, MD of Robe Lighting Asia Pacific. "Confirmed for 14th and 15th August 2020, we have 'certainly' marked our calendars already!"



Andy Bereza and Steve Batiste in the 70s

# AUSSIES RECOGNISED AT ALLEN & HEATH 50TH

**When two young engineering students established Allen & Heath in the corner of a London factory, they could hardly have imagined that 50 years later, people from all over the world would gather to celebrate 50 years of continuous mixing innovation!**

It was 1969, right around the time that Neil Armstrong first stepped onto the moon. Steve Batiste and Andy Bereza had established something of a reputation for their clever audio circuits, and were inundated by bands and companies asking them if they knew how to design and build various mixing devices. As a general rule they'd reply, "Of course," and then set about trying to do it! The quadrophonic analogue console used by Pink Floyd in Pompeii was one example.

Following firmly in Batiste and Bereza's footsteps, today's Allen & Heath products are used and loved by bands, rental companies, installers, places of worship, DJs, clubs, broadcasters and studios in virtually every country across the globe.

The secret of Allen & Heath's enduring success? "Excitement," says Managing Director, Rob Clark. "We're excited to be sharing in our customers' ambitions, and by the technologies that will help them to achieve those ambitions - that's what keeps us striving to innovate and improve."

"It's become a cliché to talk about listening to your customers, but that direct connection

with the people whose hands are on the faders is absolutely essential, and I think it shows in all that we do. It's inspiring to take stock of all we've achieved together in the past 50 years, but looking at the new developments in the pipeline, I can safely say that the best is yet to come."

Stephen Bray and Andrew Crawford from Australian distributor TAG made the trip to celebrate with Allen & Heath. "Believe it or not, we've represented Allen & Heath in Australia for exactly half their history," said Bray. "There's been plenty of ups and downs, tectonic technology shifts and many memorable characters and moments, but through it all we've stayed close, made great friendships and I'd have to say the relationship is more solid today than it's ever been."

During the celebrations, Allen & Heath invited Andrew Crawford to present a segment on the adventures of TAG's iconic Ampervan. "Who'd have thought a little Fiat van bumping around the Australian Outback with a big ampersand on its rear doors would attract global attention," said Andrew. "Everyone loves it and during the formalities we surprised MD Rob Clarke by presenting him with a scale model Ampervan complete in A&H livery!"

Giving one back, Rob Clarke presented a delighted Bray and Crawford with the 'Distributor of the Year' award. "This is a huge honour for us and it's a humbling experience to be here and receive this award among our

international peers," said Bray. "It's fair to say we'd drive the Ampervan to the moon and back if Allen & Heath asked us to," added Crawford.

## ALLEN & HEATH

Distributor of the Year  
TAG - Australia



Andrew Crawford, A&H's Global Sales Manager Debbie Maxted, and Stephen Bray

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**ALLEN & HEATH**

[allen-heath.com/avantis](http://allen-heath.com/avantis)

# NEW GEAR



## Allen & Heath Avantis

The third mixer based on Allen & Heath's 96kHz XCVI FPGA engine, Avantis is a 64 channel / 42 configurable bus console, with dual Full HD touchscreens, a super-flexible workflow with Continuity UI, extensive I/O options, add-on processing from their dLive mixing system, and a rugged full metal chassis.

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## VuePix Infiled Digital Wallpaper

Digital Wallpaper is VuePix Infiled's ultra-thin, ultra-high resolution digital LED display. The all-in-one design is for any installation requiring ultra-high definition. With a panel ratio of 16:9 and a pixel pitch ranging from 0.9mm to 3.1mm, configurations of 2K, 4K, and 8K resolution displays can be easily achieved with Digital Wallpaper.

**Australia and New Zealand: ULA Group**  
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## Elation Paladin series

Elation Professional introduces three new luminaires in its Paladin series of wash/blinder/strobe lights. The Paladin Cube, Paladin Brick and Paladin Panel – all with IP65 protection – are compact and powerful outdoor flood lights useful for a wide variety of applications. Using 15W RGBW cells – 9, 24, and 50 respectively, individual cell control and strobe make them flexible effect lights or audience blinders. RGBW colour mixing gives a full spectrum of colour options, including high-impact white light. For added dynamism, multiple pixel zone control can be incorporated for spectacular pixel mapped and eye candy looks.

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## Luxibel B P9Z

The B P9Z is a 36 x 15W LED RGBW quick zoom wash light with a zoom of 7° - 58°. Every line can be controlled individually for effects and equal colouring of buildings and walls. Thanks to its versatile bracket, you can suspend this fixture in every way possible: you can even make a line array of lights with them. They come with a magnetic honeycomb for unique applications, and are IP65 rated.

**Australia and New Zealand: ULA Group**  
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## Joan Room Booking

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[avt.tech](http://avt.tech) or +61 7 5531 3103 / +64 0800 768 558

## JBL EON ONE

The JBL EON ONE Compact packs a professional-grade loudspeaker, a full-featured 4-channel digital mixer and Bluetooth audio streaming and control into JBL's most compact battery-powered PA yet, weighing in at just 7.9 kg. It includes a 4-channel digital mixer with optional music ducking and treble, bass and effect control, two XLR combo jacks for mic/line sources; one 1/4" instrument input; one 1/8" aux input and a 1/4" pass thru output for system expansion. There are two powered USB 3.0 ports for hi-speed charging of compatible mobile and select DJ devices, and Bluetooth audio streaming and DSP control using the JBL EON Control app.

**Australia: CMI Audio** [www.cmi.com.au](http://www.cmi.com.au) or (03) 9315 2244  
**New Zealand: JPRO** [www.jpro.co.nz](http://www.jpro.co.nz) or (09) 275 8710



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# GUY SEBASTIAN >

by Cat Strom

Photo Credits: Troy Constable

**Guy Sebastian returned to the road with his *Ridin’ With You* tour which began in Adelaide and over a month later finished in Sydney.**

There’s no denying that Guy Sebastian is a very talented performer with an amazing vocal range and the ability to play a wide variety of instruments. The audience at Sydney’s Star Events Centre were pumped before he took to the stage and the vibe was electrifying from start to finish.

Creative director for the *Ridin’ With You* Tour was Mitchell Woodcock, with input from a handful of people including lighting designer Brad Alcock of BAAC Light. The stage design started with a large rear LED wall, then it was cut into three LED walls, and then multiple layers, before eventually settling with three

screens to allow some lighting elements to feature within the design.

The show is extremely content heavy with content created by Natasha Stewart and team, who have delivered stunning visuals for *The Voice*. Natasha and Mitchell spent several weeks with Guy shooting the required footage.

“All of the content is loaded onto both my Arkaos MediaMaster Pro touring servers and they listen to timecode direct from the Ableton session,” said Brad. “Everything is triggered by timecode to exact moments in the content.

All of BAAC Light’s servers are doing the show from a playback perspective, although obviously it all comes through me as the LD to balance all the light levels filters and overall impact.”

The stage design had a number of different levels, all in 300mm increments, with black Perspex fascia. Within the set were two DJ Power Low Foggers adding a dramatic, theatrical element. Located just above stage level in the riser skirting were Astera AX3 battery operated, puck wireless fixtures to light up the low fog and provide some texture to the floor.

“Today in Sydney we’re filming the show for a Channel 9 special,” Brad revealed. “So earlier today we did all of the TV close ups and tonight we’ll film the live show. I designed the show with the camera’s eye in mind, and



Brad Alcock



George Gorga

as such, I'm delivering a lot less horse power from above to ensure the pictures remain clean."

Whilst it was only the last show that was filmed, the design was the same for the entire tour with Brad pointing out that the design was specifically made with social media in mind. Guy has a camera crew with him on the road continuously making social media content, so he was very aware to keep Guy looking on the money the entire time.

"I'm actually shifting my design style to be more suitable for cameras and I spend my time trying to get 'moments'," Brad explained. "It's a different way of doing things, but it's to try and stay on top of all the phones in the audience. Obviously lighting designers have always created moments, and a lot of the time that's done with horsepower in quantity, but these days many LDs are bringing the lighting states back to allow the content or story to be more forward. This is common ground for me as I have a musical theatre background."

However the primary focus for Brad is Guy, as that's who everyone has paid to see and that's who is paying the bill, and everything he does is supportive to this end.

"That's a stickler for me and I struggle with designs where the artist disappears in an array of lighting bling," he said.

A key specification with the tour was that all the production gear, including screens, fitted into one truck. Around the stage were six towers of 2.44m pre-built truss housing two Fine Art BWS, one Robe Pointe and two Showline SL Nitro strobes. The BWS were chosen for a number of really big moments and air effects, although they spend a lot of time doing generic support lighting shots behind Guy. The vertical truss towers also featured effective use of LED pixel tape, as did the risers, which was sourced by BAAC Light and will be used on several of their upcoming projects.

"The Neon Pixel tape is flexible, tough and great for an LD as I can use it to light in many different ways," said Brad. "The six towers are really the core lighting rig with a bunch of lights under the stairs and on the stage itself to create shaping, form and interest for cameras."

Fine Art wash lights were located to the back of the stage on the rear deck with more hung over the stage. Also flown were eighteen Martin MAC Viper Profiles which supplied all

of the keylight and stage dressing.

Brad is known for not being precious when it comes to choosing the light fixtures for his shows and will simply specify a profile, a wash or a hybrid.

"I consider it to be the LD's job and your ego is not important," he stated. "It's my big criticism of the industry: it can't all be about the newest toy in town. I enjoy using fixtures that have been around for a long time and proving to myself that those fixtures can still do the job extremely well, sometimes better. We all know that LED is the way of the future and so the MAC Vipers may be ending their life cycle with me, but as an LD on a limited amount of time, I'm 100% confident in being able to balance them for TV. I know exactly where to go with the fixture, add a little bit of magenta to the CTO at 4000 K and straight away I've got a colour temp I love."

"It meant that all my key lights were already done and ready for TV, so today when we were doing the close ups I had to do very little in terms of adjustments after the white balance. As the show is timecoded I can basically watch what's happening on stage, call my follow spots rather than rushing around my console trying to balance things."

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Chris Skin, Matthew Silk, Takao Hashino



**“Guy owns his own Midas M32C Digital Rackmount Mixer with a DL32 32-input, 16-output stage box and he really wanted to use them to try get some consistency.”**

Brad ran the show with a High End Systems RoadHog 4 with the two ArKaos MediaMaster Pro servers, a primary and a backup, both fed timecode and everything triggered from the Ableton Live playback computer located within the audio setup.

“Basically they drive the show for me,” Brad remarked. “There are a number of songs in the set where I have removed the timecode .... primarily to keep me concentrating!”

The entire light show was designed around touring efficiently especially as there was only Brad and Matthew Silk, Brad’s system technician, as lighting crew who managed to have it all up and working in less than 2 ½ hours.

As the Perth show was the day after the

opening in Adelaide, the entire system was replicated in Perth perfectly by Frontier Lighting.

“I have nothing but fond words to say about Jared, Justin and the team,” added Brad. “They took the show in paperwork form for me and made it happen - including the staging - with an absolute minimum of communication. The Fine Art fixtures were substituted with Claypaky Super Sharpy and Claypaky B-EYE K10 with GLP JDC-1 strobes and Ayrton MagicBlade playing the role of blinders and LED strip.

FOH engineer George Gorga also looks after monitors which isn’t a mammoth task for him as the band control their own monitor mix on their phones via an app – a process George describes as fantastic.

“Guy owns his own Midas M32C Digital Rackmount Mixer with a DL32 32-input, 16-output stage box and he really wanted to use them to try get some consistency, mainly for the one-off corporate shows that we do,” explained George. “We decided to try it on this tour, so at the beginning of rehearsals I set all the gains, EQs and reverb effects which took about half an hour. After that, I let the musicians build their own in-ear mixes. I didn’t hear from the band for the entire four days of rehearsals as they happily controlled their own mixes on their phones. In fact, during the tour I’ve very rarely heard anything from them about monitors.”

George remarked that the band love this set up as they are in control of their own destiny, although all they can really control with the

app are the faders of their own mix with George doing anything else required. Each singer also has their own effects unit so they're not interfering with each other.

A Nowsonic 2.4Ghz /5Ghz Stage Router is used on stage which George says delivers excellent coverage.

"I run more than 32 input channels at FOH, but everything the band needs for monitors fits into the M32 channel count," explained George. "I also have an aux feed from the FOH console running back into the Midas Talkback input for any extra lines that may pop up. This set up may not work for every act but it really suits this one."

George has been mixing for Guy since the beginning of the year, mainly corporate and promo gigs, but this is the first concert tour he has done with him. He was running his weapon of choice at FOH - an Avid Profile - saying that although he occasionally uses an Avid S6L, the Profile is always reliable and does what he needs it to do. Plus he can get one pretty much anywhere in the world. He added that there are no great mysteries to mixing this show.

"It's a stock standard console with just a couple of Waves plugins; the C4 Multiband Compressor, the SSL Buss Compressor and the TrueVerb Reverb that I run on Guy's vocal," added George. "The rest is all standard plugins. I have a Smart Research C2 Compressor as an external unit inserted on the main stereo buss, something I take everywhere and find it hard to mix without it these days. There's also a MADI card in the FOH rack as we multitrack record every show."

The tour travelled an audio control package from JPJ Audio but utilised in-house PAs with George commenting that all of the venues they played had decent speaker systems. Extra gear was added locally when required, mainly subs and some extra front fills.

Guy, who has an endorsement with Sennheiser, used an EM 2050 two channel wireless receiver, two SKM 2000 handheld wireless transmitters, along with two KK 205 Neumann Condenser Microphone capsules.

"I'm a real Shure person and I hadn't really worked with this setup before," said George. "However, it just seems to suit his voice really well and sounds amazing". The backing singers are on Shure Beta 58s with UR radios and everyone is on Sennheiser SR2000 IEMs, of which we have eight sends." Guy also uses a Sennheiser EW500 G4 radio system for his acoustic guitar.

On stage are a pair of L-Acoustics 112P wedges for Guy, one 108P on Guy's piano riser when it is rolled in, plus a d&b Q-SUB for the drums - again all run off the Midas app. George can control them from his computer at FOH if needed, all on WiFi, but he runs a Cat5 cable as a backup.

#### GUY SEBASTIAN TOURING CREW

George Said - Tour Manager

George Gorga - FOH Audio / Production Manager

Brad Alcock - Lighting Designer

Brett Millican - Stage Manager/Backline Tech

Christopher Skin - PJ Audio Tech

Mathew Silk - BAAC Light Tech

Takao Hashino - Big Picture LED Tech

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LETTERS

# HAIR

by Cat Strom  
Photo Credits: Daniel Boud

## Hair, the show that revolutionised music theatre, is back, celebrating 50 years since its Australian debut.

Australian audiences were first introduced to the American musical *Hair* at the Metro Theatre, Sydney in June 1969. Billed as 'The American Tribal Love-Rock Musical' the production was ground-breaking in its modern performance style, as well as its themes of race, drugs, sexual freedom, and anti-Vietnam War protest. Staged here during Australia's involvement in the Vietnam War, *Hair* reflected the atmosphere of questioning and rebellion felt by many of the younger generation.

After playing for almost two years in Sydney, the musical transferred to Melbourne's Metro Theatre in 1971 and then toured other Australian capital cities from 1972 to 1973.

Fast forward 50 years and it still packs a disorientating punch with its loosely structured medley of rock songs, minimal dialogue, and subversive politics. And then there is the wild celebration of hippie culture with onstage nudity, profanity and substance abuse.

The David M. Hawkins' Australian revival of *Hair* is directed by Cameron Menzies with the production team given only a three week rehearsal period.

"I had preliminary discussions with Cam about the show and some of the looks, but ultimately there wasn't enough time to work through a

lot of ideas," said lighting designer Paul Lim. "There also wasn't much time for me to plot such a complex show for the initial season in Perth. The upside of a short rehearsal time is everyone is busy, so I'm kind of left to get on with it!"

Paul Lim is a director of Additive, the Melbourne-based lighting design and technical production house. They have a previs suite with L8 (formerly LightConverse) for 3D visualisation and grandMA2 onPC setup, so much of Paul's pre-programming work was done there prior to arriving in Perth. The previs was also invaluable for the Sydney Opera House run as the rig was markedly different from the rest of the tour.

"The Sydney show could not have happened without spending four days in the previs suite beforehand. Transferring the show to an almost entirely moving light rig in the previs made it possible to bump in in the limited time we had," added Paul.

Adam Gardnir's minimal set of scaffolding draped with colourful sheets is a constant throughout the show and whilst some may think it makes the lighting easier to do, the opposite can be true as sometimes the lighting designer is tasked with making the set look

different from scene to scene.

"It's the old adage of 'we'll fix it with lighting!'," commented Paul. "It seems to happen more and more these days as budgets shrink! Personally, I don't mind it being the same set all the way through, it's a good challenge. I have to ensure I build a number of possibilities into the rig. I felt that I got a good variety of looks out of the set."

One of Paul's main challenges was creating a design that would transfer well between venues, as well as allow him to create interest within the actual main performance area in front of the set piece which is quite small.

"It was challenging to create variety within that area without it looking too much the same," he said. "As the set structure doesn't change and because there is so much scaffolding in it, it was important to light the structure itself as it's the only backdrop I have. Consequently there's a lot of set electrics and lights that solely point at the scaffold. It was important to sculpt it as you would a backdrop so it created the mood and framed what was onstage."

Underneath the scaffold set are six Selecon HUI 1 Cell Cyc that do most of the work giving depth to the set, and around the outside are a bunch of ETC Source VI PARs that shoot through the scaffold, some in open white to do a backlight on the scaffold itself and some in colour to create a different shape and hue. Elation Six Bars are fixed to the structure for sidelight, with Paul commenting that they're not too bulky and have a lot of punch. A bunch



of LED PARs were used to light the band who were ensconced within the set structure.

Paul's homage to rock'n'roll were four flown bars of four PAR64Ss each fanning out to backlight the scaffold.

"The VNSPs were for the title track Hair, used as fingers of light for a classic rock'n'roll look," he added.

At the SOH, Paul used the in-house inventory of Martin MAC fixtures, and two Claypaky Scenius Unicos at the rear of the audience areas for flat full stage animation effects.

"What was predominantly a conventional rig turned into a mostly moving light rig with MAC Quantum Washes overhead, 12 MAC Viper Performances, seven MAC Viper Profiles, 16 MAC Quantum Profiles, and two Clay Paky Scenius Unicos," explained Paul. "The general rig had been conventionals FOH, plus a standard of nine washes and ten spots over the stage with a warm and cool top wash of conventionals .... so the challenge was to be able to do that with just movers."

Going into such a large venue, Paul was concerned with being able to achieve the

desired haze levels but the two Martin 365 and two Unique hazers sat really nicely in the room.

Two Robert Juliat Cyrano followspots came with the venue and control was an MA Lighting grandMA2 light at the SOH (although they had toured an MA2 onPC) run by Reinhardt Van der Walt.

Audio System Designer and Sonic Designer Russell Goldsmith has worked with director Cameron Menzies on a number of different projects. When Cameron expressed a desire

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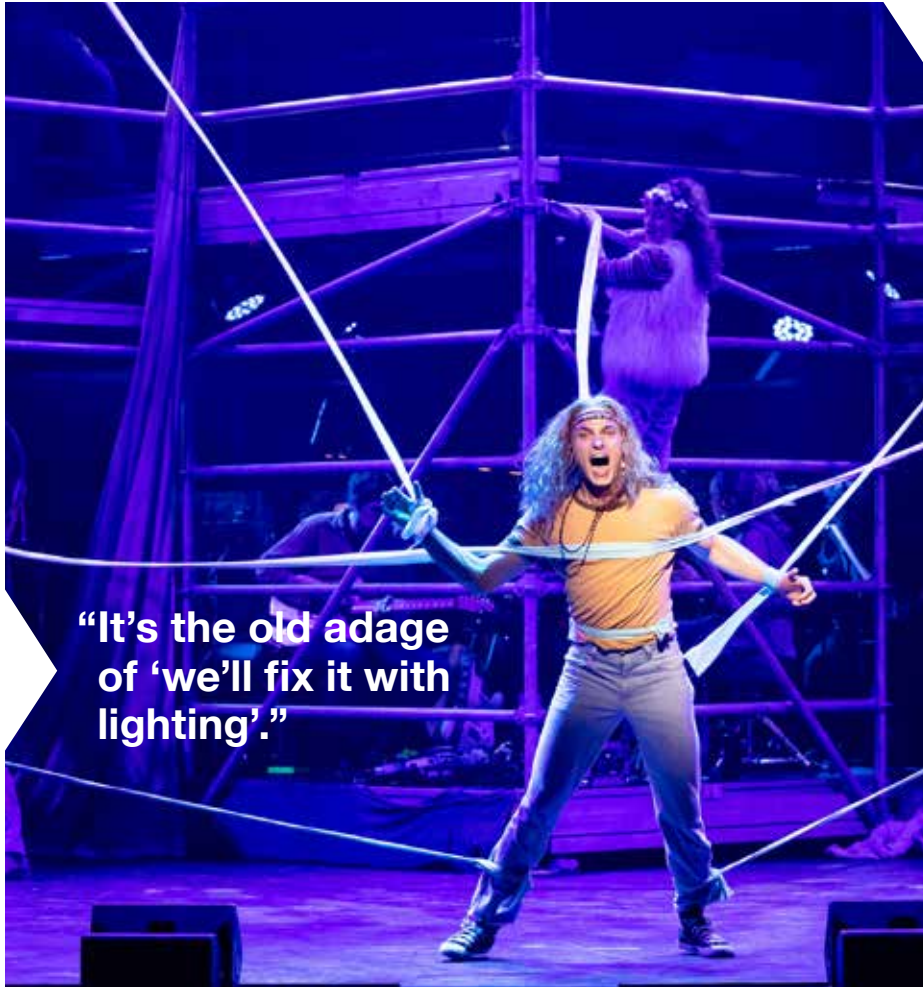
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**“It’s the old adage of ‘we’ll fix it with lighting’.”**

to do some creative and interesting things with the sound design for Hair, Russell was excited to take on the project. The decision was made to add soundscapes to the show in order to theatrically heighten some scenes, making the production more than just a rock show.

“We were trying to harken back to the Vietnam protest era of the Sixties, and at the same time give the audience a sense of the terror and magnitude of war, so we peppered the show with realistic war soundscapes,” explained Russell. “We combine that with protest soundscapes, particularly for the pre-show section where we bombard the entering audience with it as well as music of the era. It’s quite a cacophony of Sixties culture and war.”

The show utilised in-house PA systems on the tour, including L-Acoustics, d&b audiotechnik, and Meyer Sound systems, so Russell had to design a system that was uniform and also repeatable. The control and RF system for the tour was supplied by Eighth Day Sound.

“It was quite a challenge but we managed to make each show sound as good as possible,” commented Russell. “A lot of the time these venues have the PAs rigged and optimised for their room and they spend a lot of time in the years before I even turn up working with those systems. So really, the technical challenge is offset by the local knowledge.”

A QLab playback system manages the sound

playback and some venues required extra sound surround speakers for this playback only, particularly at the Sydney Opera House where the interior architecture of the Concert Hall does not facilitate the addition of speakers in the auditorium.

“We had to find a creative solution to install a rear surround position to make full use of the full acoustic architecture of the space,” explained Russell. “I like to envelop the audience in playback content with the performance happening on one plane in front of their eyes and the other 270° field used for playback where it doesn’t clash with the FOH mix. However it mustn’t be too distracting or pull the ear away from the main show onstage.”

Fortunately Paul Lim had positioned a box truss out front for some of his Martin MAC Vipers and Russell was able to add four Meyer Sound UPAs suspended from scaff pipe across the three metre LX box truss.

“Those rear positions for the back half of the house made use of the immense acoustic space that the Concert Hall presents and so I was actually bouncing sound off the ceiling, letting it propagate in the space rather than hit the audience directly,” clarified Russell.

The show is mixed on a Yamaha CL5 with a couple of their Rio racks distributed through the venue in order to do inputs and outputs in different places. Russell remarked that the



CL5 was attached to the project before he was!

“It’s not necessarily my first choice of console but it’s certainly doing the task we need it to do,” he added. “Anthony Lorenz operated at the Sydney Opera House, and he has come to grips with the console, really maximising its features. We are squeezing every last output from the console; it’s a large cast of sixteen plus a band of ten.”

Effects used were standard room reverbs tailored to whatever space they are in, with Russell remarking that they played in some pretty dry proscenium arch theatres to concert halls like the SOH.

“At the SOH we found the reverbs on the band and the vocals needed to allow for the natural reverb that occurs in the space and embrace it,” he said.

There is one scene in the show that is part of a drug-addled trip where five characters are inside a helicopter about to skydive, so Russell duplicated the input channel to the five performers and rather than routing it directly to the FOH through the normal FOH buss, it all ran through an amp simulation plugin on the console. The result successfully emulates the sound of a voice through an old fashioned headset in a helicopter.

Russell commented that it’s a busy mix with many open mics onstage as the ‘tribe’ are mostly all onstage at the same time. The impact of the show relies on having a rock band feel with the theatrical vocals over the top of it using radio mics. The mics were mostly DPA d:fine 4066 omnidirectional mics with some d:fine 4088 used on the performers who sounded better with that model. The band mics are a fairly standard rock set up of Sennheiser and Shure models.

All of the band use Sennheiser IEMs which they essentially mix themselves as they have their own foldback mixes which they control via a Yamaha mix app on their phone.

# VINTAGE HAIR

by Cat Strom

**The first Australian production of Hair was staged 50 years ago at the Metro Theatre, in Sydney's Kings Cross on 4 June 1969.**

Produced by Harry M Miller, it was well-reviewed despite a minor hitch at the premiere when the auditorium had to be evacuated because of a bomb scare!

Little can be found about the technical aspects of the 1969 production, and all that remains visually are fuzzy photos and blurry footage. Director Jim Sharman designed the

show which was essentially a disc surrounded by scaffolding and featured lights by renowned film and lightshow collective UBU. A short experimental film by Albie Thoms, a member of UBU, was created for projection over the stage during the 'Vietnam War' sequence.

Australian artist Roger Foley (AKA Ellis D Fogg), one of the country's most innovative lighting designers and lumino kinetic sculptor, was a contemporary of Albie and they were good friends.

"Many of the cast were my friends who came to my lightshows and some performed in them before Hair opened," said Roger. "Many of the original counter-culture folk were a bit pissed that Harry Miller was making a commercial version of our alternative history. The nude boys and girls on stage and all was old hat at hippy gatherings, but I have to say that Harry brought the alternative story to a straight audience, which was a good thing. My friend Albie Thoms and the UBU group did the lightshow for Hair utilising the contrasting colours that we all used in our Lightships since about 1966 ... green and amber/yellow rather than red and blue."

The show ran for nearly two years in Sydney before shifting to Melbourne, premiering on 8 June 1971 and then onto a national tour. Jim Sharman again directed but the show was re-



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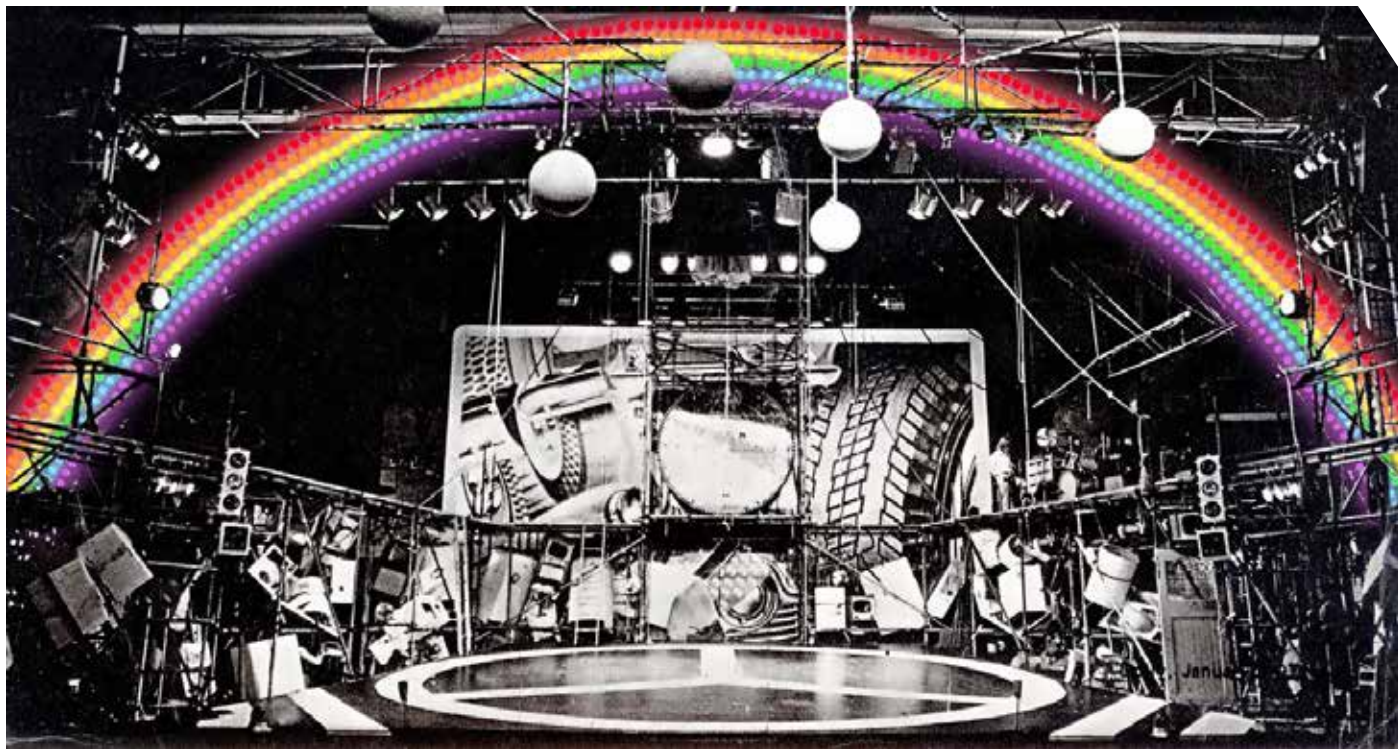
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Brian Thomson 1971

**“The billboard featured neon and all sorts of things that had never been used in theatre before.”**

designed by legendary Australian set designer Brian Thomson and his design included old washing machines, TV sets, radios and lawn mowers placed around the stage.

Brian designed his first theatre piece in 1971 and Harry Miller liked what he'd done and asked him to redesign *Hair* for Melbourne.

“At that point Jim wasn't going to direct so Harry brought in the director who had done the show in London,” commented Brian. “I showed him my design and he said he wanted it to be like the Broadway and West End versions. I told Harry to get a draftsman to draw this up and I thought I'd walked away but a couple of days later Jim called and asked me to come to his house. When I got there my set model was sitting on his coffee table - Jim was back and the UK director was sent home!”

Brian says that he ‘tidied’ the original design by dividing the disc into three segments so it related to the peace sign. He added the billboard to the back of the stage but most notable was the curved rainbow of lights

over the proscenium arch that featured 1500 lightbulbs that all lit up and chased.

“It came up at the beginning of *Let The Sunshine In* at the end of the show and was truly fabulous,” he noted.

Back in the Sixties, coloured globes were achieved by dipping ordinary globes into lamp dip. You warmed the globe first before dipping it and achieving a transparent colour. Initially a beautiful rich colour, over time the heat from the bulb would cause the colour to peel off.

The above photo, which has obviously been colourised, also shows suspended balls which were actually a light up mobile as well as the impressive billboard.

“The billboard featured neon and all sorts of things that had never been used in theatre before,” added Brian. “I had never done theatre before so I didn't know what should or shouldn't be used.”

Again Jim Sharman designed the lighting with Brian commenting that at that time there

was not the division of creative labour we see today.

“The show had to be done and whilst Jim may not have known all the technicalities of the lamps, he had a team of people who did,” said Brian. “Back then we all dreamed of lights that could change colour and move! But I think the biggest change has been in the sound, especially microphones. This production was the first to trial a radio mic and I believe Reg Livermore had it but you could hear taxis coming through. Jim ran down to the stage, grabbed the microphone, threw it on the stage and jumped on it! That was the end of that particular radio mic phase.”

As the chorus moved and danced around the stage, Brian reported that the sound would come and go depending on where they were in relation to the suspended microphones. In fact the choreography was based around mic cables more than anything else to avoid spaghetti tangles onstage.



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# So What is Event Communications?

by Chris Dodds, Managing Director, The P.A. People

**So who are The P.A. People and what is Event Communications? A common response from our crew is ‘Don’t be fooled by the name on the shirt’, particularly at some of the larger international events that we work on.**

Whilst domestically The P.A. People are reasonably well known for our audio system designs and installations in larger sporting venues around the country, what may be less well known is our role in providing production communications and audio systems on a rental basis to the world’s largest events.

The P.A. People is one of two contractors worldwide who provide wired production intercom, two-way radios, wireless full duplex comms, CCTV and stage surveillance systems, theatrical cue lights, video transport, and audio systems to support the production of major sporting events. We work on major events like the Ceremonies for Olympic and Paralympic Games and their many feeder events such as the Asian, Pan American, and European Games. The Event Comms team are also involved in the provision of audio and comms systems for many sporting, corporate and cultural events and ceremonies not only here in Australia but also many overseas.

So what is Event Communications? From our perspective it is the provision of communications systems in the broadest possible sense:

- We facilitate communications between a community-based sporting event organiser and their participants, no matter how far they are spread out.
- We facilitate communications between producers in multiple countries for a multi-venue annual general meeting.
- We facilitate communications within the production team, ensuring everyone gets their cue when and where they need it.
- We facilitate the audience being part of the experience for major sporting events, teams, and codes.

By its very nature, the provision of comms systems is being executed at its very best when no one even acknowledges that we exist. When the comms system has been designed effectively and is working optimally it should be transparent. People should be able to do their job without impediment. But when it is not done correctly, everyone is quick to complain.

The core of most communications systems is a wired intercom system. Dependent on

the scale of the event this could either be a digital networked HelixNet party line system, or possibly an Eclipse Matrix Intercom, both from Clear-Com.

After the wired intercom system, we would typically look at adding an integrated two way radio package. The P.A. People pride ourselves on the level of RF engineering that we apply to these larger projects which can typically involve more than eighty radio channels and well over a hundred radio frequencies to coordinate. Apart from the typical wired headset comms systems and fully integrated two way radio systems, The P.A. People also provide a number of other systems to facilitate Communications for the production team. One sub system that is growing in its popularity is the use of CCTV for both stage management and security.

“We used our CCTV panel in the light booth all the time,” said Travis Hagenbuch, Lighting Designer for lighting design group Full Flood at 2015’s Baku Asian Games. “We used it to help focus lights in places we couldn’t see, we used it to mimic some TV camera angles, and even to check smoke machines under the stage. Not having to send someone to do all those things helped save a lot of time. Everything supplied to us worked flawlessly, was flexible, and was intuitive to use, and I’ve never seen a comms system this large and complex. The integration of all three of Lighting’s radio channels into the headset panels was a life-saver when trying to talk to the crew and find someone quickly - that’s a feature I wish was on a lot more shows.



The P.A. People's staff made communication on this project effortless. There was always a quick reply on the comms channel, and help was always quick to come if we needed anything, even up to our 6th floor booth. The importance of good communication multiplies with the scale of a show this large, and we were very happy with the system and support we had."

Another common feature of a contemporary

event communications system is the use of an IP Network as the overarching backbone to the project. For example, the entire comms system in Baku was delivered over a large Ethernet network. The P.A. People deployed 20 fibre connected network nodes in and around the venue, including one at the Bulvar Cauldron in the city centre some 10km from the venue. "Our philosophy is to create a network centric environment and to deliver and connect all of our comms elements over

that backbone, including the matrix systems themselves, matrix keystations and partyline beltacks, CCTV cameras and viewers, timecode displays, cue lights, file and print services, and audio. Not only do we deploy our services across the network, but we also monitor almost all our sub systems using IP and SNMP technology, from the radio bases to the UPSs and everything in between" commented Paul Barrett, The P.A. People's Senior System Engineer for the project.

## Wireless Communications



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# Wi-Fi and Data Security on Events

by Simon Byrne

Wi-Fi is real handy at gigs. It means less cables need to be run, and it gives you the ability to easily transport media, control devices remotely such as mixing desks, lighting control and so on. However, it is a long way from perfect and needs to be deployed carefully.

There are three broad use cases on events for Wi-Fi. Real time media transport (video and audio wirelessly), control, and communications.

For real time media transport, there needs to be a compelling reason to do it wirelessly. Wi-Fi devices are literally radio transceivers which are prone to all the issues that come with radio devices. They operate in unlicensed spectrum so there is no legal protection from interference, and on a practical level, all the punters bring Wi-Fi devices in their phones so interference is going to be high.

We are all familiar with Ethernet cable, which has four twisted pairs of copper wires in one cable. This allows for bi-directional or full-duplex communication. Network devices on either end of the cable can talk at the same time, much like a two-lane highway.

Wi-Fi is half-duplex, which means that on any channel, only one device can talk at a time. If two devices try to talk at the same time, they interrupt each other. Wi-Fi is more like a single lane road; traffic can only flow in one direction at a time.

Since Wi-Fi is half-duplex, only a single Wi-Fi device can transmit on a channel at a time. The more Wi-Fi devices we add to that single channel, the more we restrict the available time for each device to talk. For example, if eight devices are trying to talk on a wireless network, it will take twice as long as one with only four devices. This is known as co-channel interference.

Since only one device can talk on a channel at a time, we need to limit the amount of devices on each channel. By ensuring our channel isn't too crowded, we reduce co-channel interference.

Half-duplex, combined with RF and co-channel interference makes the reliable transfer of real time media difficult because the stream is regularly interrupted by other network traffic. You can get around this by buffering the content but that adds time delay. Useless for live and time sensitive material.

A solution is to have multiple transmitters and receivers for a link and bond them into a single stream. The concept is that at least one of the

links is stable at any one time which should ensure reliable delivery. Brands like Teradek do this, but there is still some small latency which is usually acceptable, but they still sometimes fail due to interference.

I would never put a program stream on a Wi-Fi link unless I could afford to lose it, and there was no other option. The most reliable real time transport method for media is via a cable!

### 2.4 and 5 GHz Wi-Fi Comparison

| 2.4 GHz                           | 5 GHz                                    |
|-----------------------------------|--|
| 802.11b/g/n                       | 802.11a/n/ac                             |
| Greater Range (around 100 metres) | Lower Indoor Range (around 30 metres)    |
| Universal Compatibility           | Less Compatibility (a/n/ac devices only) |
| 3 non-overlapping channels        | 24 non-overlapping channels              |
| Congested with Wi-Fi              | Little Wi-Fi congestion                  |
| Plagued by non-Wi-Fi interference | Very little non-Wi-Fi interference       |

2.4GHz is the older and most dominant frequency range that emerged in 1999 upon which several standards are built (b/g/n). It has the advantage of a good range (about 100 metres line of sight), but the huge disadvantage in that lots of other devices operate in the 2.4GHz range, and therefore generate interference. For example, cordless phones and even microwave ovens operate in this range! In Australia there are eleven channels to select from in the 2.4GHz range.

5GHz is the other main range and it has much less congestion, but because of the higher frequency, is more prone to obstructions and suffers less range (about 30 metres). 5Ghz has close to two hundred channels.

However, unlike television channels, most Wi-Fi channels overlap with each other. More on this later.

802.11 a, b, g, n or ac? The letter refers to which version of the 802.11 standard. a and b being the oldest, dating back to 1999 and ac

| Year | Standard | Wireless Theoretical Speed | Band           | Comment           |
|------|----------|----------------------------|----------------|-------------------|
| 1999 | 802.11a  | 54Mbps                     | 5GHz           |                   |
| 1999 | 802.11b  | 11Mbps                     | 2.4GHz         | Old..turn it off! |
| 2003 | 802.11g  | 54Mbps                     | 2.4GHz         |                   |
| 2009 | 802.11n  | 300Mbps/900Mbps            | 2.4/5GHz       |                   |
| 2012 | 802.11ac | 500Mbps per channel        | 1Gbps possible | 2.4/5GHz          |

in 2012.

Allowing any device to talk at the slower, legacy versions means data rates can increase Wi-Fi overhead by as much as 40%. Therefore, on your wireless access point, turn off the legacy 802.11b data mode (11 mbps). Disabling the slower data rates will force all devices to either talk faster, or disassociate from the network, which will increase network performance.

A live venue is the equivalent of a crowded Wi-Fi battlefield. Literally hundreds of Wi-Fi radios arrive with the audience so strategies need to be put in place.

Height, people, height! Get your access point up high. You want line of sight from it to any of your clients. This is crucially important once the audience enters the room.

Antennas - Your antenna options are limited by law. That is, generally you are not allowed to change the antennas on a wireless access point for something more efficient or directional. It is for this reason that if they can be removed, they usually have non-standard connections.

Change channels on the access point - 2.4 GHz Wi-Fi equipment often ships with its default Wi-Fi channel set to 6. Change the channel up or down to avoid it. However, all Wi-Fi devices on a network must use the same channel.

Channel 1 uses the lowest frequency band and each subsequent channel increases the frequency slightly. Therefore, the further apart two channel numbers are, the less the degree of overlap and likelihood of interference. If you encounter interference from a nearby wireless LAN, change to a more distant channel. The three Wi-Fi channels 1, 6, and 11 have no frequency overlap with each other. Use one of these three channels for best results, but like I said earlier, channel 6 is usually a poor choice.

On 5GHz Wi-Fi, which channel is best? The newer 802.11n and 802.11ac Wi-Fi networks support 5 GHz wireless connections and you should go there if you can. These frequencies are much less likely to encounter wireless interference issues the way 2.4 GHz does. Also, the 5 GHz Wi-Fi channel choices available in most network equipment have been selected to choose only non-overlapping channels.

In Australia, the non-overlapping 5 GHz channels are most recommended: 36, 40, 44, 48, 149, 153, 157 and 161. How do you know which channels are unused ? Get yourself a Wi-Fi analyser. These are apps which can be

downloaded for your phone or PC and they give you a visual indication of what is already being used.

The 5GHz access points also feature Dynamic Frequency Selection (DFS) which is a Wi-Fi channel hopping function that enables WLANs to use 5 GHz frequencies that are generally reserved for radar.

The main benefit of using DFS channels is to use under-used frequencies to increase the number of available Wi-Fi channels, and potentially with more power! While this Dynamic Frequency Selection feature avoids interference issues, many network administrators avoid using this feature to minimise complications. The main reason being that the clients need to support DFS well and that often is not the case. I wouldn't use it.

**Channel Width** - The channel width option controls how wide the pipe is for transferring data. Think of it like a highway. The wider the road, the more traffic (data) can pass through. On the other hand, the more cars (routers) you have on the road, the more congested the traffic becomes.

By increasing the channel width, we can increase the speed and throughput of a wireless broadcast. By default, the 2.4 GHz range uses a 20 MHz channel width. A 40 MHz channel width effectively bonds two 20 MHz

channels together, forming the larger pipe; therefore, it allows for greater speed and faster transfer rates.

Obviously, two channels are better than one, right? Not if those channels are crowded with noise and interference. In crowded areas with a lot of frequency noise and interference, a single 20MHz channel will probably be more stable. 40MHz channel width allows for greater speed and faster transfer rates but it doesn't perform as well in crowded areas because there is twice as much chance of interference.

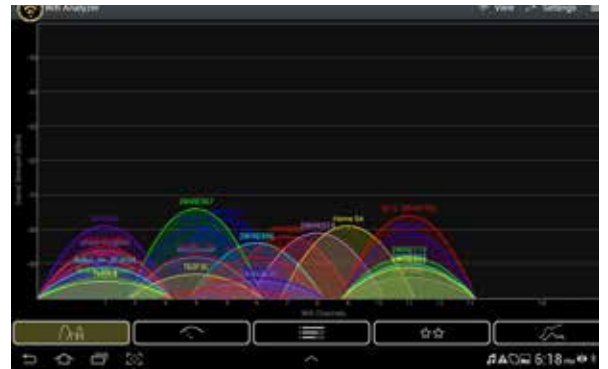
**VLANs** - Segmenting your networks into VLANs (Virtual Local Area Networks) makes a lot of sense. A VLAN uses the same network hardware, but is isolated by software. A different "virtual network". For example, you might have some wireless comms on one VLAN, and a mixing desk iPad controller on a separate VLAN. This way, the operation of the iPad cannot conflict with the wireless comms because they are isolated from each other.

**Hide the SSID** - A Wi-Fi network's SSID is the fancy term for its network name which is broadcast over the air. It is the way a user sees and connects to a Wi-Fi network. In wireless access points you

can hide the SSID from being broadcast which means the average users simply don't know that it exists. This single step of hiding the network dramatically reduces the likelihood of others trying to get into your network. To be clear, hiding the network SSID will not stop a dedicated hacker in the slightest. It is still dead easy to find, but it takes planned effort.

**Change your password!** The first thing a hacker is going to do is try the default password that came with the access point. Change it.

If it is a critical link, use a cable if possible! Copper is point to point with very low risk of interference. It is always going to be safer. Wi-Fi is great! But accept that it may not perform properly during the gig and plan accordingly.



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EXPERIENCE THE BEST

# The Next Generation of Full Duplex Wireless Comms

by Chris Dodds, Managing Director, The P.A. People



**Back in the early 2000s, a group of intercom engineers in the UK began experimenting with a technology called DECT to see if they could improve the current state of play in wireless intercom. DECT had its basis in the wireless telephone space and forms the basis of many domestic and commercial PABX wireless solutions. Back in the early days, DECT was limited to telephone quality and solutions had to be found to use multiple ‘time slots’ to achieve intercom quality, but the team succeeded and the first generation of FreeSpeak was born. It was expensive and far from perfect, but it showed that there was another way.**

Fast forward a few years. After Clear-Com joined the HME family back in 2010, there was a mood to reinvigorate the FreeSpeak concept.

In 2014, Clear-Com released the FreeSpeak II. A completely redesigned belt-pack, along with a new antenna transceiver, was released. The industry acceptance was significant and shortly after the product's release The P.A. People were awarded the communications contract for the Inaugural European Games in Baku, Azerbaijan in 2015. The production

crew did not include full duplex on the original specification, but as the artistic component of the event developed, and after we had been appointed as contractor, it was determined that a full duplex solution would constitute a significant advantage for the Ceremonies.

In 2018 FreeSpeak II received an upgrade which significantly improved its performance and flexibility yet again. In response to a growing requirement for networked solutions, Clear-Com released a new Codec and a fully networked antenna solution for FreeSpeak

II. The upgrade consisted of a new AES67 card for the Eclipse range of Matrix Intercom frames and a new IP antenna transceiver allowing the IP system to run up to 10 belt-packs per antenna. Extensively tested by DORNA, the organisation behind the MotoGP competition, the new IP solution has found wide acceptance in the twelve months since its release.

At September's IBC show in Amsterdam, Clear-Com changed the game again when they announced the release of FreeSpeak Edge, their latest addition to the FreeSpeak family.

Built from the ground up, FreeSpeak Edge is based on an all-new 5GHz chipset that features an exclusive radio stack development which has been optimised for intercom. FreeSpeak Edge leverages the same Audio-over-IP development previously released for the FreeSpeak II product, utilising AES67 connections between the transceivers and the host intercom frame for exceptional flexibility in deployment.

FreeSpeak Edge is the most advanced wireless intercom system in the Clear-Com range, delivering the best audio quality and enhanced performance in some of the most complex live performance environments.

“FreeSpeak Edge is the future of advanced wireless communication,” said Bob Boster, President, Clear-Com. “While some manufacturers are trying to improve incrementally on existing solutions, we have leapfrogged right to the edge of what is possible with wireless intercom technology today, in readiness for tomorrow's



increasingly demanding requirements. We often hear talk of so-called game-changers, but FreeSpeak Edge is the real deal.”

The 5GHz band is an ideal choice for large scale communications, as it can be managed with frequency coordination for reduced interference and offers the widest range of RF channels available for exceptional scalability. FreeSpeak Edge takes advantage of Clear-Com’s exclusive RF technology which uses OFDM to provide a robust transport layer that is immune to most forms of interference. Not only does FreeSpeak Edge provide a new band for full duplex intercom, it also allows for the use of a mixed system using both 5GHz and 1,9GHz simultaneously.

FreeSpeak Edge transceivers and belt packs offer more customisation and control than ever before to accommodate increasingly complex communication needs. The belt packs deliver the clearest 12kHz audio quality, with eight programmable buttons; rotary controls on both sides; and a master volume control and flashlight on the bottom. Clear-Com have also added a mic and speaker for headset-free or desktop operation. The transceiver supports 10 belt packs and includes attenuation and external antennas for custom RF zones.

FreeSpeak now provides the best of all worlds. You can opt for the original DECT based FreeSpeak II full duplex system which is still the market leader, or from early next

year you will be able to use the latest 5GHz based FreeSpeak Edge system. Both systems can be used either fully integrated with a matrix, or stand alone with a base. FreeSpeak II has traditional antennas and splitters (simple to use and no network required), or either system can be deployed using IP antennas with 10 devices per antenna and works on a network. They are scalable – you can use a few packs or a hundred. FreeSpeak in any flavour is the industry standard with literally thousands and thousands of systems deployed worldwide.

FreeSpeak just works. From the largest theatrical productions to sports presentation to corporate events, FreeSpeak II is currently available for hire from The P.A. People either as part of a full comms system package, as a standalone system to integrate with your kit, or simply some extra packs or antennas for your own system. Meanwhile we look forward to adding the features of FreeSpeak Edge to our inventory early in 2020.



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# Two Way Radios

by Jason Owen, Managing Director, D2N - Technology Solutions



**Since the early 20th century, two-way radio technology has been a key enabler in how we communicate over large distances. From local government, to police, the military, freight operations, marine, aviation and much more, two-way radios have not only evolved but also delivered us smarter ways of communicating.**

For us in the live events, production, theatre and broadcast sectors, two-way radios are part of our daily lives with just about every project requiring some sort of communications solution. From VHF, UHF, DECT, Satellite and now LTE, there is an ever-growing family of manufacturers all vying for our money in exchange for what we hope we will deliver reliability, coverage, and cost-effective communications for our business operations.

Products like the Motorola GP338, Kenwood NX-300, and now the Hytera PD-782 are by and large, the most popular radios used in our sectors. Used as either stand-alone handhelds, or as part of larger communications solutions with intercom and interfacing to third-party partners, these radios connect us to our Showcaller, our LD, Pyro or Staging teams, our Audio people, Floor Managers, Directors, Camera Ops, or

CCU teams. Now with the advent of products like Clear-Com's FreeSpeak II and Riedel's Bolero, businesses can integrate their teams even deeper with a more intimate wireless device capable of multiple talk/listen channels at the press of a button.

**So what's next?**

Current two-way radios use analogue and digital technologies (DMR and NXDN); however, the new breed of handheld communications devices is set to change yet again with the introduction of LTE-PoC devices. So what is PoC? Push to talk over Cellular, meaning we are communicating over the existing 4/5G networks on devices that are more like a mobile phone than a traditional two-way radio. Yes, for those of you shaking your head or showing a strain of doubt on your brow, you are right. These are not going to replace the hand-held radio

anytime soon. There are a number of issues to work through, some of which pigeonhole PoC to non-critical communications simply because of the contention issues with Telco timeslot availability at large events. Issues like latency, robustness of the devices, and cost compared to a radio all need to be worked through and evaluated on a case by case basis.

What we do see though is PoC replacing some of the wider area radio networks that will only grow in expense to maintain and with the PoC devices offering services like email, GPS tracking, phone calls, SMS, 4K Cameras and even work order management, two-way radios will struggle to keep their dominance in this space. Think about a large event where you have teams all over the Sydney and Melbourne metro areas. Currently you need a local comms solution for each end and then access to a wide area radio network if you have staff moving between sites in each city. PoC could be integrated with a traditional two-way radio solution so that your fixed staff still use a hand-held radio at each site, but those that are moving around those metro areas are on PoC. It's a brave new world and one to watch as the technology develops.

One last point, and that is about ACMA licensing. This is by far the least understood piece of business that we do with almost every radio customer asking us for advice on what type of licence to get and how it works. The short answer is do your homework, and talk to an approved ACMA licence planner (we

are one). Do not bring in radios from eBay, Alibaba or other online sites promising to supply compliant radios for use in Australia. The savings compared to buying locally from a reputable dealer are far outweighed by the fine (and potential confiscation of your kit) the ACMA will hand out if they catch you. Ask questions and be informed is our advice. Communications is often one of those things people think of last when it comes to spec'ing gigs, yet their role is absolutely critical in the delivery of those very same jobs.

Here at D2N - Technology Solutions we cover all of the major brands with Hytera, Kenwood,

Motorola and ICOM all offered with a range of both original and OEM accessories to suit just about any application. We are also one of the few communications companies to have our own ACMA approved licence planner on staff, so for those of you that do not understand the minefield of licensing, we can definitely help you navigate your way through!

In the communications space, D2N - Technology Solutions offers both a sales and rental service covering two-way radio, wireless and wired intercom, wireless audio, and RF over Fibre. We are unique in that we are not tied to any one brand, but instead

focused on delivering to our customers a 'fit for purpose' solution where the brand is just part of the overall decision.

With offices in North Western Sydney and the Gold Coast, D2N services customers across Australia, New Zealand, PNG, Fiji, Singapore, and Indonesia.

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# THE NBN

## Not to Blame, Necessarily

by Simon Byrne

**We constantly hear of poor internet delivered over the NBN, however the blame does not automatically sit with the NBN Co. There is a lot going on.**

NBN Co are in an invidious position. Under significant financial pressure from the government, they are the wholesaler of network connections in Australia, and that is all. They are not internet providers.

Yet they dance this dance where they promote their wholesale network product, to retail customers, where retail customers do not buy from NBN Co directly. Retail customers use the NBN Co network via a Retail Service Provider, or RSP. And this is where it gets complicated.

It is the RSP that delivers the access to the internet, and the content which you consume. From an RSP's perspective, delivering internet services via the NBN network is not a great business compared to the old model.

This is because the NBN Co charges the RSP a fixed monthly wholesale fee for every customer, and every RSP has access to the same NBN infrastructure as each other. Therefore with increased competition, their margin is the difference between what the retail customer pays, less the NBN monthly fees, and less the RSP's other costs in delivering the service.

However, it is the RSP that delivers the functionality, and the costs to do so are significant. It is the RSP that builds and configures their network, that connects to the outside world, and manages traffic and this is where network performance is built, and where costs savings have to be made. Therefore the temptation is strong to cut costs wherever possible, especially if customers blame the NBN Co instead of them!

And RSPs can really play some games...

**The Connectivity Virtual Circuit Charge, RSPs try to reduce it.**

The Connectivity Virtual Circuit (CVC) is a charge that NBN Co charges all internet RSPs. It is the charge levied against RSPs for the maximum amount of bandwidth they want to make available to ALL of the RSP's customers at once. In a plumbing analogy, it is basic width of the mains pipe that feeds *all* of the end users for an RSP.

The amount of CVC an RSP buys for each of their customers is the key factor in the quality of the NBN service that the end users actually get because the RSP decides how much of their overall Mbps purchase they want to

allocate to each customer.

If an RSP provider purchases 1Mbps for every customer it gets, it means that if every single customer were to use their internet at exactly the same time, they would all be able to achieve 1Mbps download speed. However, if an RSP provider only buys 0.5Mbps per customer and, all their customers are using the internet at the same time, the maximum speed they will get is 0.5Mbps.

As you can see, if the RSP chooses to spread their CVC load thinly, it will affect you as the end user at peak times. This is why speeds go down at night when more people are on the internet.

However, that's not the end of the story when it comes to charges your RSP has to pay to provide a service.

**The Point of Interconnects or POI.**

The Point of Interconnects (POI) are the physical connection points that RSPs use to connect to the NBN network. They are the modern day equivalent of telephone exchanges – the place where our old telephone and ADSL services connected using copper wiring. There are 126 POIs across Australia, of which most of them are placed within the old Telstra phone exchanges.

Each RSP has to pay for every POI they want to use to connect their service to the NBN. The bigger the RSP's coverage, the more POIs they use.



On top of a setup fee charged to RSPs to connect to each POI, they also incur a monthly fee payable to NBN Co to maintain their connection that can run in the tens of thousands per POI connection.

On top of the setup and monthly fees, RSPs also purchase and maintain their hardware (that can vary hugely in quality and reliability) that they install in each POI they provide a service from. This RSP supplied hardware is the actual connection to the internet.

There is an incentive for RSPs to maximise their return by using less POIs. This can be done by routing remote traffic using other

means to the existing POIs, which as you could imagine degrades the quality of service.

On the whole, NBN Co's engineering is sound. It is your RSP that provides your actual internet service, not NBN Co. If your RSP has sold you a product that does not live up to their promises, the blame lies squarely with them. If it is a fault in the NBN infrastructure, that is a matter between the RSP and NBN Co.

Don't get me wrong; there are absolutely some challenges with the NBN, but to blame NBN Co by default for poor internet service is not fair.

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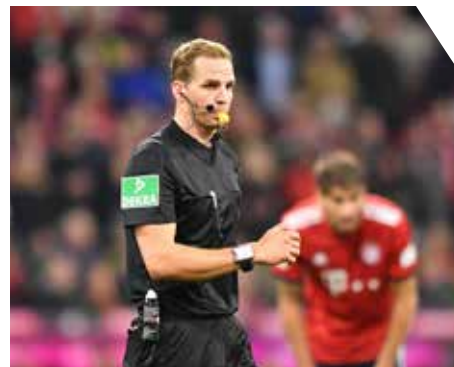
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# Riedel's Bolero & Bolero S:

## DECT-Based Comms In Stadia And Multi-Purpose Arenas

**Riedel's widely acclaimed Bolero wireless intercom system is being adopted by sports teams, leagues, and venues from New York to Tokyo. What drives the success of this DECT-based device?**

DECT is a highly versatile and common standard for wireless communications that operates within its own protected spectrum and has low power requirements. But, until recently, DECT-based intercom systems were impractical for use in large production environments such as stadia and multi-purpose arenas due to their susceptibility to RF reflections. No system could solve the RF issues and also provide the voice quality, low latency, and intelligence required for advanced wireless communications in demanding production environments.

As a manufacturer of pioneering real-time video, audio, data, and communications networks, Riedel Communications recognized the need for a DECT-based intercom system that could excel in the most demanding RF environments. An intense R&D effort

resulted in the Riedel-exclusive Advanced DECT Receiver (ADR) technology, a diversity receiver technology specifically designed to reduce sensitivity to multipath RF reflections.

Riedel's flagship product featuring this groundbreaking type of receiver is the Bolero Wireless Intercom. Bolero is an expandable, full-roaming, DECT-based intercom system in the license-free 1.9GHz frequency range, with a rich set of features and connectivity options.

Its high-clarity voice codec provides both higher speech intelligibility and more efficient use of RF spectrum, significantly increasing belpack to antenna density. Whether integrated with Riedel's Artist matrix intercom platform or operated in standalone mode, Bolero guarantees flexible and reliable communications. That's why some of the world's most prestigious stadia and arenas

have already chosen Bolero to take their communications to the next level.

Bolero's voice-operated counterpart, Bolero S, is taking the sports world by storm as more and more teams and leagues choose this compact Bolero system for referee and coach communications. Bolero S is a smaller, but equally powerful version of Bolero that includes a voice-operated switch for (VOX) for hands-free operation. Bolero S is offered exclusively as part of Riedel's Managed Sports Services that provide subscribers with a full-service solution including locally-installed communications hardware and remote management of the entire system by comms experts in Riedel's Remote Operations Center (ROC) in Wuppertal. In the ROC, experienced engineers monitor audio quality, RF performance, and battery life, while also constantly adjusting talk and listen levels and the VOX threshold in real time. In this way, Bolero S users can concentrate on their task at hand without having to worry about the quality and reliability of their communications. At the same time, this special remote support drastically reduces both personnel and logistics costs – while maintaining the highest standards of service quality.

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# JIMMY BARNES

by Cat Strom

Photo Credits: Troy Constable



**Jimmy Barnes embarked on his biggest headlining tour of this century – *Shutting Down Your Town* - playing all his classic hits plus highlights from his new album *My Criminal Record*.**

Tony Bryan has been mixing Jimmy's FOH for a couple of years and when CX caught up with him at Sydney's Hordern Pavilion, he was suffering from a nasty chest infection. The doctor had told him to take a week off work and not to fly – like that can happen in our industry!!

"I must admit my ears have been blocking a bit so I just kept looking at the spectrum analyzer to make sure I wasn't killing people and that worked fine!" said Tony. "I can't whinge though, as I'm just stoked to have a gig."

The tour lasts a couple of months due to the fact the shows are only on Thursday to Sunday, a trend for Australian bands that makes the crew weekend warriors. This scheduling keeps Tony happy as when he's not on the road, he works as an Account Manager at Perth's Audio Technik ..... plus he gets to see his family!

Tony toured a JPJ control package for the entire run as well as an audio truck full of d&b audiotechnik J-Series speakers. In fact the only shows where they used the in-house system were the Hordern Pavilion and Wollongong's WIN Entertainment Centre where L-Acoustics K2 systems were deployed.

"It was a bit of a transition for me to go from the black boxes to the brown boxes but I think I pulled a solid mix!" commented Tony.

The d&b set up varied slightly from gig to gig but a typical configuration comprised of ten J8 and two J12 for main hangs, out hangs were normally eight J8s plus eight Q10s across the front lip. Sixteen J-SUBs were used on the Queensland shows and for some of the other shows they changed to 16 B22s with 12 flown J-SUBs.

"Each room is different so we just have a truck full of gear and then per day, we bring



# Sometimes it all gets too much...



The *Support Act Wellbeing Helpline* is a free, confidential counselling service that is available to anyone working in Australian music who needs to talk to someone about any aspect of their wellbeing.

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**“I must admit my ears have been blocking a bit so I just kept looking at the spectrum analyzer to make sure I wasn’t killing people and that worked fine!” said Tony.**

in what we actually need depending on what ArrayCalc tells us to bring in,” added Tony. “Anything d&b is my preferred PA and it’s great for Jimmy as it’s a very solid rock box. It allows me to produce my rock sound for Jimmy at ease with lots of power and headroom. I can get a loud, but very controlled sound, with d&b which is essential with Jimmy. We still run lots of amplifiers onstage so it can get quite loud.”

Tony was mixing on an Avid S6L which is pretty much the only console he will mix on, saying the easy work flow of the channel strips is a big factor for him.

“It has a great layout for my work flow in a live situation,” he elaborated. “There aren’t too many button pushes to get where I need to go to operate. Also, it runs at 96K so the top end has a much better and sweeter sound to it. The console has a nice analogue warmth to it even though it’s digital.”

Tony describes a Jimmy Barnes show as very intense with a lot of instruments and six backup singers, so getting it to all fit into a space has been quite difficult. Fortunately, there was a full week of rehearsals in early

September where he was able to finalise his mix and get all of the instruments into the areas where they need to be heard.

“It can be tricky making Jimmy’s voice clear above everything else,” said Tony. “I use a multiband compressor on him as well as a single compressor plus I’m also using a Distressor – all of which help me to poke him out of the mix. I have a couple of Distressors as outboard gear and everything else is onboard.”

The microphone selection is quite varied from Neumanns for the overheads to Shure and Sennheiser for the toms. Jimmy uses a Shure Beta 58 with Tony saying it works best for his vocals. As it’s a Shure UR radio mic with a Beta 58 capsule, he has the freedom to run around the stage. Tony said that they had tried KSM8s and KSM9s but the Beta 58 still worked the best.

Everyone uses Shure PSM1000 IEMs with monitor engineer Phillip Kez Kesby dealing with 41 outputs from his DiGiCo D5 console plus there are wedges, side fills and drum subs.

*Crew photos by James Kilpatrick.*



Kez Kesby



Tony Bryan

# BLOOD, SWEAT & EARS

by Andy Stewart

In every respect, music is a form of communication: a human expression, a sonic art. As a science it's more about the transfer of energy across the medium of air (and occasionally water), or voltage through an electrical circuit. To others it's the conversion of ideas and feelings into vibrations (good ones hopefully) or a practised skill with a musical instrument. For the vast majority of people, however – and without wanting to sound patronising – music is a noise they hear in the background at the supermarket or the

footy. For engineers, music production is the understanding of all these things combined, balanced in a new (and sometimes unique) way.

Tom Waits once described the specific art of writing songs as: “just very interesting things to be doing with the air.” In his own inimitable, disarming, self-deprecating way, he was right, and in many respects this philosophy applies to audio in general. We're all doing something with the air...

But when it comes to communication across the divide between engineer and musician (often from behind glass via a talkback mic), at times there's a short circuit in that comms link. Though rarely discussed, this issue can be vastly more destructive to audio recordings than any overdriven preamp or poorly placed microphone. Whole albums can come a cropper in very short order if the engineer and musician(s) can't get on, communicate civilly or empathise with one another's perspective.



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So let's discuss this, shall we?

## Musician Vs Engineer – The Great Show Stopper

For me, it was the seminal moment where I crossed over between musician and engineer – though at the time I'm sure I didn't realise it: the day I came across an engineer in the studio who was rude, patronising, insensitive, obstinate, and arrogant.

There you go, I've set myself off again!

Seriously though, that infamous day really was the point at which I decided to engineer albums myself. At the time, learning these complicated ropes seemed preferable to ever going through the angst of dealing with the torment I was subjected to that day, even though I knew almost nothing about the technical side of the process back then. I s'pose I knew how to twiddle a few knobs, crudely read a VU meter, place a few mics and electrocute myself occasionally, but beyond that the big wide world of studio exploration was all ahead of me.

I was naïve and arrogant to think that an engineer did very little apart from unlock the studio door and let us in, press play or record once in a while and rewind the tape quietly while the band discussed its next revolutionary musical move. In my defence, I was three months shy of 16 at the time, so I was decidedly naïve about everything around me!

But if I learned anything from those early sessions it was that the process of recording music is both stressful and nerve-wracking, especially the first time around, and the last thing a musician needs in that context is to be treated insensitively, or condescended to. Musicians need all the help they can get to feel comfortable in the altogether unfamiliar surroundings of a recording studio.

Conversely, the studio is an engineer's comfort zone, his or her home turf. For a budding muso, it is not. It should therefore go without saying that an engineer or producer should never lord their technical prowess over more inexperienced musoes or engineers. It's a terrible look, a cheap shot and a form of passive bullying that only drags everyone down. Studios are supposed to be fun places to work, and experienced engineers and producers should know that better than anyone. So if you're making everyone feel bad you're not doing your job. Simple.

## Blood, Sweat & Ears

If you don't know what it's like to record a musical performance for the first time, think of it as an interrogation – like the ones you might have seen in movies. You're placed in a glass box where every microscopic detail of your performance is highlighted, scrutinised and recorded by people behind glass. Though you often can't see them, they occasionally talk to you as a disembodied voice over headphones, via a talkback switch

(that may or may not click horribly every time it's engaged, crackle in and out, or be left on accidentally while someone in the control room critiques your performance, insults you personally or makes a joke at your expense!)

While all this is happening you're experiencing myriad emotional upheavals as you try your damndest to record the best thing you've ever played, communicate with others in the room (and in other rooms) if you're recording as a group (or part thereof). If it's an overdub, you may be the first cab off the rank – I often was because I was the drummer, and in the '80s the drums tended to go first, often in a musically isolated way. (Drums would be overdubbed to a click track with almost nothing else playing. In hindsight, the whole approach was bonkers.)

So now you're isolated not only from the engineer, sunlight, a clock and fresh air, you're also separated from some, or all, of the music to which you're attempting to perform! This makes recording your best take all the more difficult, and that's why one of the most important aspects of any engineer or producer's skill-set is their ability to listen with sensitivity to everything around them, including most importantly, the needs and concerns of musicians, to whom the whole session – let's not forget – is dedicated.

## It's About The Musicians

Although the relationship between engineers and musicians is a two-way street, and people are doing their best on both sides of the glass, only one side is really under the scrutiny of the recording microphones – the musician's side. (Of course musos record in the control room too, but you get my point.)

In many respects, the highest priority of your job then as an engineer or producer is to communicate clearly and empathetically, whilst constantly reminding yourself that your task is the easier of the two, not the more difficult. I know it may not seem that way sometimes; and yes, occasionally people can drive you up the wall. But it's important to understand that the pressure of recording for the first time can be harrowing, and as the engineer you can choose to do only one of two things: make that experience worse, or better.

And the harder the musician's task becomes, the more sensitive and reassuring you need to be. Sometimes, when the chips are down, is when many an ill-conceived jibe can slip out of an engineer's mouth (even though it may have been well-intentioned) that can really destroy someone's confidence. When someone's having a musical crisis on the mic, that's when all the best engineers know to be on their guard, and mindful of how they navigate the drama.

## Going Under The Knife

To me, the role of the recording engineer or producer is a bit like being a surgeon. The more reassuring, knowledgeable, calm and

experienced you can seem towards everyone around you – be they fellow engineers, musos, record company staff, assistants or the media – the better you will be at getting the best out of everyone around you. Conversely, if you make tactless comments at inappropriate times down the talkback mic, or act defensively the moment someone disagrees with your perspective, you're bound to put everyone on edge. It also makes you a mediocre engineer.

If I'm being operated on, I want to be certain that the man or woman under the blue robes is supremely confident in their abilities, empathises fully with my plight and appreciates just how stressful it is to be asked to count backwards from 20, knowing that this task might be my last on earth!

No-one likes going under the studio's knife, especially when you're not sure what lies on the other side. As head surgeon, you the engineer must be the greatest communicator in the room, the most skilled and the most sensitive to the emotional turmoil you might discover when you open your patients up.

Blood, sweat and ears... might be the name of my autobiography.



**Andy Stewart owns and operates The Mill on Victoria's Bass Coast. He's a highly credentialed producer/engineer who's seen it all in studios for the last three decades. He's happy to respond to any pleas for recording or mixing help... contact him at: [andy@themill.net.au](mailto:andy@themill.net.au)**

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# New team appointed at Te Pae Christchurch Convention Centre

by Jenny Barrett

**Te Pae Christchurch Convention Centre is on schedule to host its first event in October 2020. Whilst the initial vision was firmly geared towards restoring Christchurch's business event market to its former glory, the AV industry has been cautiously watching developments over the last two years to see if the ASM Global (formally AEG Ogden) managed convention centre would remain as committed to seeking resources locally.**

## 'Te Pae Christchurch' – local meeting place or outsourced opportunity?

Ōtākaro, a crown company delivering the central city 'Anchor Projects' identified by the Government following the Canterbury earthquakes, is overseeing the design and construction of Te Pae Christchurch, pronounced 'te pie'. In February 2019, Ōtākaro appointed ASM Global (then AEG Ogden) to manage Te Pae Christchurch, keen to tap into ASM Global's international network. Whilst welcoming the progress, this appointment also sent shivers down the spine of local audio-visual businesses who had pulled together in the aftermath of the earthquake, forming new partnerships to survive in the venue deprived city. They feared that opportunities might be outsourced nationally, or even internationally, and valuable staff could be lost to whoever picked up the AV contracts. The recent merger of AEG Ogden with SMG into ASM Global renders Te Pae Christchurch part of an even larger international entity.

## GM: from Cairns to Christchurch

Ross Steele, appointed General Manager in March, is eager to reassure the local industry of his commitment to the economic regeneration of Christchurch. He brings an impressive record of regional economic development, latterly serving 12 years as General Manager of Cairns Convention Centre. Under his watch, Cairns was ranked number one in the world by the Association of International Congress Centres in 2004 and 2014 and is in Queensland Tourism's Hall of Fame for winning the Business Events

category three years running. He left on a high, responsible for securing \$176m for an extension and refurbishment of the venue which is due to start in May 2020.

Ross sees the new convention centre presenting Christchurch with a wealth of opportunity, "Purpose-built for the most modern city in New Zealand, Te Pae Christchurch is a key focal point of Christchurch's regeneration. Located at the heart of what is already becoming a thriving entertainment precinct, Te Pae Christchurch will provide a social hub for local residents, and position the region as a world-class conference destination, bringing with it opportunities for economic growth, innovation, knowledge sharing and social change for years to come."

He is very aware of the negative impact that the lack of a major convention centre has had on the city, "ChristchurchNZ estimates the Canterbury region is missing out on \$90 million annually in economic benefits from the business events market. Studies have shown that business event travellers typically spend twice that of leisure travellers, and often they will bring family and spend time touring locally or nationally, either before or after their event. That is thousands of dollars per person that could potentially benefit small business owners in and around the city."

## Reviving the regional AV sector

Ross is equally as attune to the negative impact the dearth of venues has had on the entertainment technology and audio-visual sectors, "We are committed to working with



Ross Steele

local suppliers and local education institutes to innovate and grow the sector here in Christchurch, and in the wider region. That may be through working with local businesses for specific events and theming opportunities or providing opportunities for training for those looking to start a career in the AV sector."

Tapping into the local scene will be a whole lot easier now that a new AV Production Manager has been appointed. Christchurch resident Jake Eastwood joins Te Pae Christchurch with several years' experience in the events production and technology industry. Previous to this role, he was the Events Manager for Spectrum Lighting and Sound – a local technical lighting and sound services firm. Jake was also an Event Technician at The Light Site, a Christchurch-based theatre and event lighting company.

Ross sees an important part of Jake's role to be liaison with local suppliers, "Jake will oversee Te Pae Christchurch's team of technicians, event coordinators and lighting and sound designers. He will be working alongside experts from across the local industry to ensure clients' technology requirements are met to the highest possible standard."

## Catalyst for skilled staff

In terms of recruitment, Ross's view is that rather than poaching from the current stretched pool of technical operators, Te Pae Christchurch will act as an incentive for skilled staff to return to Christchurch from elsewhere in New Zealand and overseas, "While Te Pae Christchurch has a focus on recruiting locally, it has also been the catalyst for several talented New Zealanders returning to the region from overseas, as well as from throughout New Zealand. They have seen the potential of Te Pae Christchurch and want to share the skills they have picked up to benefit the city and their community."

As AV Production Manager, Jake will also play an integral role in growing the local skills base by engaging with the city's IT suppliers and technology education providers – partnering with education institutes to provide opportunities for the next generation.



Artist impression - Auditorium



Artist impression - interior



Artist impression - Facade



Artist impression - Banquet hall



Artist impression - Victoria Square view



Artist impression - Colombo St view

Te Pae Christchurch, as part of an international network of venues, will also provide stronger career pathways, “The international reach and ‘global meets local’ approach of ASM Global provides a host of opportunities for career advancement across all our permanent and casual staff, through knowledge sharing and networking, which is a valuable tool for anyone looking to develop their career. This applies to staff currently working in other venues who may be able to assist in the short or long term or new team members looking to join Te Pae Christchurch.”

The merger of AEG Ogden and SMG into ASM Global means that Te Pae Christchurch will be able to draw from an even deeper pool of global experience and knowledge, but Ross is keen to reiterate that the Te Pae Christchurch team still has a tight hold of the reigns, “Te

Pae Christchurch is operated by a local team based here in Christchurch and the merger does not affect the day to day running of the business.”

**What’s On Te Pae Christchurch’s Radar?**

The first event on 15th-17th October 2020 will be the Christchurch-based New Zealand College of Midwives, significant for a local organisation being able to host their first national conference in the South Island for more than 10 years.

It will be followed by Te Pae Christchurch’s first major international event, the International Association of Ecology (INTECOL) 11th International Wetlands Conference, which will bring around 1000 delegates to the city.

And then the Grand Ford Mustang Show, a

feature event of the 2020 National Mustang Convention will take place over Labour weekend 2020.

Te Pae Christchurch’s new Business Development team are also currently working on over a hundred other events. They are supported by Te Pae Christchurch’s research team who, with assistance from ASM Global, are also working on sourcing events that support universities and ChristchurchNZ growth industries and super nodes. Many events have a long lead time, often booking 2-3 years in advance, so the team are working across a significant time span, with bookings for 2020, 2021 and 2022 being confirmed.

Hopefully all bringing a wealth of business to Christchurch’s entertainment technology and audio-visual sector.

**To see the progress of work, build to date and an artists animation of the centre, please check out these vimeo links.**

**Progress Video** <https://vimeo.com/366164515/209e63ec44>

**Timelapse of build to date:** <https://vimeo.com/366139889>

**Animation:** <https://vimeo.com/282583505>



# SCIENCEWORKS PLANETARIUM

by John O'Brien

**For over a generation, visitors to Melbourne and science buffs alike have been entertained by the imaginative facilities and exhibits at Scienceworks Museum in Spotswood. One of the most impressive features is the Planetarium and in March 2019, a \$1.2 million upgrade debuted new projection and lighting systems.**

Originally designed for 250k visitors per annum, the whole complex now sees 500k visitors a year. It is always looking ahead and constantly under improvement.



Warik Lawrance

I toured the facility with Warik Lawrance, Melbourne Planetarium Digital Production Designer, and got a good insight on the whole setup. Warik has been with the venue since 2005 and is obviously passionate about the cinematic aspects of projection, video and associated technologies. In that time, he has been 3D animator, designer, director, compositor and editor on eight full-dome films and presided over several major upgrades.

#### Key moments in Scienceworks history

- 1991 - Construction started
- 1992 - Scienceworks launched to the public
- 1999 - Melbourne Planetarium opens - E&S Digistar2 Vector Graphic system installed.
- 2005 - 6 x Barco 909 CRT projectors ended up with 22,000 hours on the lamps!
- 2013 - Audio and projector upgrade - 7.1 active JBL compact line array and BSS DSP. 2 x JVC 4K D-ILA projectors installed.
- 2019 - E&S Digistar6 platform and 6 x 4K projectors installed with new lighting system.

The 2019 re-opening of the planetarium also marked the launch of Moonbase ONE, a 28 minute in-house affair, starring self-identified geek culture enthusiast Stephanie "Hex" Bendixsen. I'd previewed some of the footage on the computer and it is slick and well produced but watching this in the dome was another thing altogether. It was hard not to be impressed by the production and the way it highlighted the unique experience of high end graphics in a hemispherical screen environment.

#### Planetarium general history

The early planetariums of the 17th Century were nothing more than the sky painted on a dome but technologies have evolved considerably since then. Optical - mechanical projection systems have been around for about 100 years now and are still used in many venues but more are either hybrids of analogue and digital projection or purely digital, like Scienceworks. There are now over 3,000 domes worldwide hosting many different projection systems.

Once just presenting a simulated display of the night sky, modern digital planetaria offer so much more scope for deeply engaging entertainment. Astronomy, STEAM (Science, Technology, Engineering, Arts, Maths) education, general entertainment and animation are excellent source material for an all-encompassing arena like this. Of the five in Australia, Scienceworks Planetarium is the second largest. Accommodating 155 people in layback seats, the immersive setting features an Astro-Tec dome stretching 16 metres from side to side.

#### 2019 Upgrade

At the core of the 2019 enhancements are six Sony VPL GTZ-280 4K Laser Projectors,



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**“Installations like this seem to go to another level, leaving me reaching through the grab bag of superlatives to try and convey just how intense it feels to be enveloped in these surroundings.”**



driven by two 1200 high racks filled by 12 custom Dell server PCs, each loaded with twin Xeon chips and Nvidia Geforce GTX 1080 Ti GPU cards. A PC gamer's idea of bliss, the stats are impressive here: 36 million pixels on the screen and 384GB RAM assisting 132GB of GPU power! DisplayPort extenders take outputs direct via fiber to the projectors, which are edge-blended to create a seamless image that covers the large hemispherical projection surface. My critical technician's eye tried hard and could barely pick anything amiss! Kudos to Evans and Sutherland (E&S) for building a quality package.

Founded in 1968 by University of Utah professors, David C. Evans and Ivan Sutherland, E&S luminaries moved on to some of the most important areas of computer graphics. E&S' own involvement in flight simulations led to analogue vector drawing systems in the 70s and 80s - cutting edge stuff back then. They started branching into dome video systems in that period and remain an industry leader since, evolving their Digistar suite through several major iterations.

The current Digistar6 operating platform is controlled via their Show Builder UI. While the projection system was being installed, the addition of 158 300mm long RGB LED strips augmented cove lighting throughout the dome room. Installer Bowen Technovation develop their own lighting control software, AstroFXAurora, which interfaces to the in-room Digistar Producer and Workstation UI.

Conveniently dimmed to not bleed on the dome, this workstation gives full operator control of all content and room features. The coolest part of the UI is an XBOX controller, used to navigate through 3D spaces in real time. I'm sure that the GPUs work hard but the end result is very smooth, if a little vertiginous.

### Content Development

The Digistar cloud library gives access to mountains of excellent footage, including plenty of STEAM related presentations - a core feature at Scienceworks. Warik is also in charge of a team producing content internally. With deep knowledge of the dome environment, they tailor their productions to get the best out of the very capable gear. They are now the largest maker of Fulldome Shows in the Southern Hemisphere, selling over 100 licenses into 20 countries and winning multiple awards along the way.

One recent collaboration with Red Dogs VR is the stunning Carriberrie - a beautifully composed study of indigenous dancers around the country. Shot in VR, the three dimensions fairly leap out of the screen, and the projectors keep it all very sharp.

These compositions take immense effort to realise. Every frame of video is sliced and warped into six output frames (one for each projector) then encoded into a stream to allow a full dome show. 3ds Max and Adobe Production Suite are the main tools

used with a typical animation pipeline of Script, Storyboard, Animate, Animation, Compositing, Editing, Sound Mix, Post Production. Some documentaries follow more dynamic scripting but whichever methodology, it can take up to 18 months to get the final product ready for screening.

### The Future - Where To Next?

In 2013, a BSS London BLU 800 DSP fed audio to the speakers via CobraNet. In 2019, the backbone moved to Dante, with a BLU-DA added. Network points all around the dome enable Dante inputs for performance events and the system is still very competent. Audio systems are a potential upgrade but that is dependent on budgeting and will happen only when it is feasible. With the projectors now on lease arrangement, who knows? Who also knows what other technologies will mature in the meantime? E&S LED domes are already available and look interesting.

We are all used to funky technology and its wow factor. Installations like this seem to go to another level, leaving me reaching through the grab bag of superlatives to try and convey just how intense it feels to be enveloped in these surroundings. Visceral, transcendental, mesmerising - and many more - there is so much sensory information for the brain to process that you have to take it all in on an instinctive gut level. I can't wait to go back to feel the next upgrade.

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Balooga Entertainment's Buddha puppet at Melbourne's White Night Reimagined '19



Custom LED control design and install for Stage Kings – Facebook AGM

# OPTO PROJECTS

by Jason Allen



Scott Opie and Simon Toomer

**OPTO Projects are a relatively young Melbourne company directed by Scott Opie and Simon Toomer that provide bespoke lighting solutions for unusual projects, with a specialisation in set electrics. CX spoke with Simon Toomer about where the company came from and where it's going...**

**Simon Toomer:**

I started my professional lighting career in Brisbane in the late 1990s, mostly working in theatre, which took me around Australia and on to England. Following this I wanted a new challenge, and an opportunity came up to work on the 2006 Melbourne Commonwealth Games within the Ceremonies Team. I met a lot of great contacts during the course of that job, which led to being Senior Production Manager in charge of costume and set electrics on the Vancouver Winter Olympics in 2010, employed by the ceremonies team put together by David Atkins Enterprises. Since then I've worked on multiple ceremonies all over the world.

**Trouble = Opportunity**

Scott's career path was quite similar to mine, our path first crossed working in the musical theatre scene and continued into the ceremonies world. During this time we both had observed that scenic and set lighting was often an afterthought; it was rarely considered how to make it reliable or tourable. When Scott and I were working together on the 2014 Sochi Winter Olympics, we found ourselves repairing set lighting problems caused by poorly done work. We also noticed the same thing touring with theatre shows; we'd get a lot of set electrics that wouldn't pack down, they were built to work for one season and weren't thought about again. We're talking

Christmas lights stapled across joins of a set, underrated wiring, subpar connectors – the kind of standard you wouldn't expect to see on a professional show. We would often have to fix or adjust set electrics as it just wasn't being built properly. We saw a gap in the market for someone who could do things effectively without compromising quality and decided to start OPTO.

**Custom Customers**

We now provide designs and products for musicals, events, and unique experiences. These are usually bespoke or one-off items. Creative directors and designers tell us what they want - an effect or concept - then we implement it. For example, we provided a lighting solution for SimpleMotion's swings made for the installation 'Freedom of Movement' at Sydney's Vivid 2017, and Balooga Entertainment's Buddha puppet at Melbourne's White Night Reimagined 2019. Our most recent major theatre work includes the venue refurbishment, house lighting, smoke and haze effects for *Harry Potter and the Cursed Child* and scenic electrics builds for *School of Rock* and *Come from Away*.



LED and control system for the 2018 Jakarta Asian Games Opening Ceremony



'Freedom of Movement' Vivid, Sydney, '17

**You Want What?**

Our most ambitious project was for the 2018 Commonwealth Games in the Gold Coast. The creative brief was to create a field of stars. As these also had to be struck within four minutes to allow for the athlete seating, it presented quite a challenge. This resulted in 7,000 individually programmable LEDs mounted onto a flexible pole with a base plate that could easily sleeve into each other. Originally the stars were all going to be wired together, but by modifying PixMob's wristband technology, OPTO designed and managed the build and deployment of the star field with each 'star' being battery powered. It was quite the logistical challenge as each star had to be laid out in a specific order and have all 14,000 batteries changed multiple times but the effect was quite spectacular.

**OPTO Product Pipeline**

For *Matilda the Musical*, the late, great Richard 'R2' Pacholski wanted some strobes around the proscenium and contracted us to design a solution. We made something practical and he was happy with the result. Richard then worked on *We Will Rock You*, and wanted something similar with more control and flexibility. We took our original concept and developed it further into our Pixel Strobe product, which is durable, tourable, and the first official product we sold.

In addition to our custom projects, we have been busy developing and sourcing a variety of products such as our optoLED line of LED strip designed for the entertainment industry. We have some new products on the horizon - all I can say is watch this space!

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# How to win a Cisco hackathon

by Landell Archer

Recently, Kim Burgess, an ACAEngine developer from Australia, was part of a team that won the ‘Smart Spaces’ category at the Cisco hackathon in Dallas.

## Here’s how you do it:

### Identify an interesting problem

Emergencies are an unfortunate reality. Think about it in terms of our skyscrapers; 30-40 floors, 10,000 people. If there is an emergency, the PA system goes berserk and fire wardens give instructions. The stairways gets jammed with people who are trying to walk down. The average evacuation takes two hours. It’s an interesting problem because it’s not business as usual, which means it’s usually at the bottom of the pile of technological enhancements. But it can also be life and death if things can go wrong.

The tech and sensing abilities baked into modern spaces can be used to help reduce anxiety, minimise risk, and give both the people evacuating and the teams of wardens and emergency responders the info they need when this happens.

### Nail your pitch

The team went with, “When people talk about smart buildings, intelligent spaces, and the people within them, the discussion is centered on utilisation and getting people into the right space. We want to focus on getting them out, particularly in less than ideal scenarios.”

### Take off your sales hat

For most sales people, it’s about selling more boxes to do “things.” If a client presents you with two unique problems, you get to sell double. Developers don’t usually think

like sales people. In this case, they were interested in solving the problem using the existing technology in the room and not introducing any new boxes. They used Cisco WebEx Room Devices for presence detection, face counting, displaying contextual signage and for notifications. They also used the Meraki scanning API and the Meraki MV Sense vision analytics API.

### Embrace your inner nerd

Technologists are nerds at heart. We love to see new technology and just play with it, tinker with it, figure out what it could be used for and figure out where its creators went wrong- what we would’ve done better. For me that’s functionality and aesthetic, for developers that’s the small details mashed with their big picture goals of how to differentiate one box from another. In this case, the introduction to the new Cisco WebEx and Meraki kit established the excitement for what could be possible.

By combining WiFi location analytics, face counting, acoustic signal presence, inputs from environmental sensing (PIR, CO2 etc) and conversational UI, search areas may be reduced, response times minimised, and safety of all involved maximised.

### Use ‘trendy’ tech

Kim (ACAEngine platform developer) was part of a team with developers from OneReach. ai (artificial intelligence and apparently “chat

awesomeness”) and World Wide Technologies (who provided a UX specialist as well as a dev).

The team scoped integrations with Joan booking panels (room booking panels that allowed for notifications and QR Code rendering) and Schneider Electric (base building services) to also layer with all the Cisco technology available.

These technologies are trending for a reason, they fill a gap that couldn’t be filled by the tech that came before it. On the surface, trendy tech can seem a little overwhelming. Is it a fad or does it add real value? How would that solve problems? How does that relate to the tidal wave of tech already in the market?

Developers who use trendy tech for solutions don’t see it that way. They see each bit of the tech as fundamental piece of the puzzle. Often we sell technology as individual “things” and we miss the point. In isolation, trendy tech presents us with as many hurdles as solutions. But technology is never used in a silo and nor should it be. Devs get this and when you throw them into a room to develop collaboratively using the latest and greatest, the result is what customers really want.

### Be thankful for flexible working practices... and day sleeps

Some people do their best work after 6 PM or 9 PM or even 2 AM. I’m learning that developers are like artists in that way - creating and perfecting something in flow until it gets to a point with which they’re happy. The team worked from 9 AM right through till 5 AM the next morning hacking together their solution. If you do your best work being “on” for 24 hours followed by being “off” for 2 days, you just might win your own hackathon category.

Congratulations to the developers for the win!

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# Undercutting. You aren't really helping yourself!

An open letter for those  
entering the industry

by Alex Hughes

**The Australian touring and events market is in a bit of a mess currently and, in my experience, it has been in steady decline over the last ten years.**

In a recent Facebook post/rant I expressed my frustrations with the overall touring market after being informed via email I had been unsuccessful in obtaining a new touring client. Now due to the small size of the market, combined with the sheer amount of good skill out there, this can be a regular occurrence and is just part of being a touring professional in general. However, this email got my feathers especially ruffled as not only did they have the audacity to suggest my rates were unreasonable they also laid out what the successful candidate had offered. The email reply from the artists management can be paraphrased as follows:

*"Hello Alex, thanks for your design proposal. Unfortunately, we don't see the value in spending that amount and have located someone who has been able to meet our ideal budget. They have stated they are more than happy to provide a design, program and operate the show for \$150 per day without any of these extra charges for travel or pre production."*

When I read that I simply couldn't believe my eyes.

Someone clearly doesn't value their work enough, or have many overheads, if they can afford to tour and design for that rate. The profession of technical and creative

operation and design has a serious and steep cost of entry and it isn't a smooth transition. I calculated that I have spent close to 15 grand in the past few years on design and visualisation software alone, not to mention insurance. If you choose to be in the industry for more than a few weeks you simply can't afford to undercut and undervalue yourself like this.

Artist managers will never tell you that you're charging too little, and no matter what you might think, you aren't securing yourself a gig for life by vastly undercutting. While things may be good for a while, artists and management can be a fickle bunch, and given the chance to work with someone with a certain profile, they will quickly jump at the chance to work with someone who can provide them a certain level of production and design.

The money they save on you can be used to pay for someone later when the artist gets large enough, and they need to up their production game. All it takes is a festival where you are back-to-back with another artist that amazes the crowd and people will start comparing your work to that of others.

It also seems to surprise people when I tell them that I have public liability insurance despite being mainly a programmer and designer.

The prime example I provide, and I could provide many, is what if a light that you refocused fell out of a rig? Or you decided

strobing a crowd a bit too hard was a good idea and someone in the audience had a bad reaction? You might end up being the first ever person to have a lawsuit levelled against you for causing an epileptic fit. Now the chances it would come back to you might be very small but why take the risk? Have you reviewed your liability and level of insurance recently?

I think what our industry is missing greatly is a freelance alliance and booking agency that looks out and manages technical creative staff properly. I would be very happy to give up a percentage of my rate to have someone that deals with bookings and manages me in a similar way to an artist. I would love to provide you all with a link to my new business that serves that purpose, but I am a creative that doesn't have time or the skill to create such an agency.

It also strikes me as a shame that there is no proper union that covers those who work outside of venue work properly. You certainly wouldn't see a plumber or electrician work for the rates that we are on regularly. Of course, I wouldn't let one that charged so much under market value anywhere near my house!

I am aware that sometimes work slows down and you have to take whatever work you are offered to pay your rent or mortgage, but there is a big difference between dropping your rate to pay some bills and totally undercutting everyone.

In conclusion, if you are charging a low-end rate, just remember that those who are pushing the cases can earn what you are asking for in a three hour call. I am not suggesting they aren't as important as the tasks you are undertaking, but they are carrying a lot less risk than you are and are still making more money.

# HAYDEN JAMES

by Cat Strom

Photo Credits: Brayden Smith & Jordan Munns

**With design and creatives by David Fairless, the staging for Hayden James' latest tour is quite remarkable.**

The June 2019 release of Hayden James' debut album *Between Us* provided a platform for David to produce an entirely new show

to tour around the world. Since David's last show design for the artist, he has capitalised on some of the latest in lighting technology,

using ROE Strip Lighting and Green Hippo Media Servers in his design.

"It's an amazing platform to be able to create a design around one singular artist on stage," he added.

The new show design uses simple depth perception that creates a sense of movement from the audience's perspective. From



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**“The show has been designed to be entirely scalable...”**



any angle of the room, the audience is experiencing a unique version of the show. The design doesn't rely on the entirety of the square shape throughout the performance, but rather a rich programming of fluid video content that uses portions of the ROE Strip Lighting at a time.

The Hippo Portamus controls the strips over Art-Net from the MA Lighting grandMA2 lighting console and is the war horse in this set up. The Hippo is then responsible for delivering video and colour blocking content to each of the squares. David is able to control each linear section, as well as the ROE Strip's double pixel line in the squares, as an RGB fixture but with the colour grading of an LED screen. This allows him to manipulate the squares in different ways, outside of a traditional fade and strobe, which produces multiple mind-bending looks.

In addition to the layered squares, David has incorporated a simple 1.5m squared ROE LED screen in the centre of the rig that gives the squares an infinite appearance with certain content. Having a ROE LED wall allows for blocks of bright coloured light unlike what any standard lighting fixture can provide. This effect is paired with the artist's live performance to demonstrate a live relationship between audio and visual technologies.

“The show has been designed to be entirely scalable to fill the Main Stage at Splendour In The Grass one week, to more intimate club performances the next,” explained David. “Regardless of the size of stage, no single effect or look is sacrificed when bumping into different venues around the world, delivering a consistent show at every date.”

David's vision for the show was really looking for solid corners, something that a lot of video products on the market don't provide. Novatech supplied Colourblind with the ROE Strip for the massive Australian run of shows to kick off the tour, as well as providing a flyable rig to take this design worldwide. There is an A Rig, which consists of the largest square being 4400mm and smallest 1500mm as well as a B Rig which is also flyable and consists of a 300mm and 3300mm square.

David's lighting rig complements the square design by framing them with lights as well as using four angled floor runs into Hayden thus leading the audience's attention back to the squares and Hayden on stage.

The rig consisted of 12 Claypaky Sharpy, eight Martin MAC Viper, 12 GLP X4, 12 Sunstrips, and 15 GLP JDC-1 68 channel mode.



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Matt Britten is Head of Lighting at Scene Change, "Australia's Most Awarded AV Company". Scene Change have offices in Adelaide, Brisbane, Hobart, Hunter Valley, Melbourne, and Sydney, providing video, audio, lighting, staging, IT, and other event technical services.

# ROBE T1 PROFILE

by Matt Britten

**It's tough for an AV company to find one lighting fixture that does everything, because no fixture can possibly do everything really well. At Scene Change, we concentrate on making sure what's in our lighting stock works for us. A lot of our events are run in venues with low ceilings, restricted headroom, and some tight weight limits. Where we might like to use a 45kg unit, we'd struggle in a lot of our cases.**

A lot of our work is corporate, and corporate is all about framing shutters. Our next two most important criteria are the quality of the colour rendering, and the amount of noise the fixture makes; we do lighting for orchestras and maestro doesn't want to hear whirring fans. We also do a lot of work with cameras for broadcast, recording, and IMAG, and we want to keep them happy, so features like minus green and colour correction are also important.

After defining what we'd like in an ideal all-round fixture, and researching the products on the market we thought might fit, we went into a testing phase. Tested against their competitors, the Robe T1 Profiles came out on top in almost every category. They suit our market perfectly; they're a high quality flexible light source that's small, lightweight, and quiet.

## Colours

Colour is important in everything we do. The T1 Profile's reds and blues are better than anything I've ever seen come out of a LED source; the rendering is just so rich. I like that there's an additive source so you don't have to use the CMY mix; it means you can get deep reds and blues which you can't always get out of CMY. The whites are perfect, and run at beautiful temperatures. The tungsten emulation mode does exactly what it says it does. It's not often you can say that there's no

negatives about a fixture's colour rendering.

We really appreciate the plus and minus green, which we've found the camera operators always require. Rosco and Lee have always made green filters for tungsten fixtures, so it's nice to see a LED source get true colour rendition right for camera.

## Gobos, Animation, and Prism

I try and restrict my use of gobos when I'm programming, but I can say that the T1's gobos are good, as is the prism and the animation wheel. I have no issues with any of them, and the T1 maintains a smooth, flat field, and a nice zoom when they're in use. As a moving light with effects in use, it does what it does well.

## Zoom

The zoom range runs 7 to 49 degrees, and we give our T1s a fair workout across the entire range. I might be using it as a lectern wash, then a super tight performer special, before going out to a lovely wide room wash. One of my only criticisms of the T1 is that it feels like it's slightly lacking in output when it's out super-wide.

## Framing

The framing system, one of the main reasons we invested in the T1 – is extremely fast and incredibly accurate. When we tested the T1s, I ran a 12 hour sequence on the framing system

which I let run overnight. When I came back in the following morning, the T1 was still hitting its marks.

## Control

We predominantly use MA Lighting grandMA2 or dot2s for control. The included wireless DMX on the T1 works perfectly, and we always get great range. With the T1s in their cases running on their internal battery, it's possible to change their DMX address, but not change their mode and most other settings. While I'd like to see that implemented, it's fair to say that if you're doing your preparation properly, you should be taking your fixtures out of the case and powering them up.

## Manual Handling, Construction, and Support

The T1s come in cases from Robe, which are well built with plenty of space for the fixture. At just 24kg, it's an extremely easy unit to work with physically. They're well built, and we've had no service issues with any of the units in our fleet. The support and service from Robe distributor Jands, from the initial loan of demonstration units, through the purchase process, to delivery, was impeccable, and I'm very impressed with them.

## Conclusion

Robe market the T1 Profile as 'The One', as in 'the only one you need', and they've done their very best to make that true. The T1 is rock solid. It ticks all of the boxes, and it does what it does really well. The T1 Profile is the perfect fixture for the mix of work Scene Change does, and they have performed beautifully since the day we got them. We're very happy with our decision.

**Brand:** Robe

**Model:** T1 Profile

**Product Info:** [www.robe.cz](http://www.robe.cz)

**Australia and New Zealand:** [www.jands.com.au](http://www.jands.com.au)



## The Specs

Light source type: MSL 550 W Multi-Spectral LED engine

LED life expectancy: min. 30,000 hours

Zoom range: 7° - 49°

Fixture total lumen output: up to 10,075 lm

Colour mixing: CMY/RGB or RGBAL

Variable CTO: 2.700K - 8.000K

+ - Green correction function

Adjustable CRI from 80 to 90+

Framing shutters, rotating gobo wheel, animation wheel, prism, iris, frost

Electronic strobe effect with variable speed up to 20 Hz

Protocols:

USITT DMX-512, RDM, ArtNet, MA Net, MA Net2, sACN

Pan movement: 540°, Tilt movement: 280°

H: 726 mm, W: 400 mm, D: 258 mm

Weight: 24.3 kg

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# SHOWPRO NEPTUNE 400 HYBRID IP65

by Tim Hall



**At Resolution X, we've spent the last two years looking for waterproof, IP rated lighting fixtures. In an ideal world, we wanted something versatile; not just a beam, but a hybrid. We thought that meant it would have to be a discharge source in order to get the output we need. We just didn't think any LED engine would cut it, and you need a bright fixture for outdoor work. Many IP rated fixtures simply don't zoom, and most are discharge fixtures. We wanted the lower cost of ownership of LED, while getting the output and versatility of zoom and beam.**

## Testing

When we first saw the output specs on the ShowPRO Neptune 400 Hybrid IP65, we were sceptical, because it's a LED source, but as we already own and run fixtures from ShowPRO's Pluto range, their performance and quality suggested we'd be happy. We sourced a demo unit from distributor Show Technology, set it up and tested it in our warehouse. We were happy to confirm it was exactly as bright as it said it would be, and with a very flat beam to boot. Even outside, the Neptune 400 is more than bright enough, and makes a nice profile fixture as well. We brought it into inventory, and it became an instant workhorse.

## In Use

The first job for the fixtures was at the MCG for the inaugural AFL Emergency Services game. We needed them to roll on and off the ground quickly without having to worry about waterproofing or the weather. Ironically, the weather was perfect! They then went out for a week on Melbourne's White Night Reimagined, and the weather was appalling! They certainly got wet, and there were no failures. After they came back into the

warehouse, they were filthy, so we gave them a quick hose down - there's some obvious advantages to an IP65 rating!

## Weatherproofing

The Neptune 400's panels are fitted with rubber seals. To change the gobos, you simply pop the seal and get inside. The optical path is 100% sealed, so if you take them out on a dusty festival, the optical path stays pristine. They're slightly heavier than a non-IP rated fixture with the same functionality, but at 34 kg, that's only five or six kg more than an indoor fixture with the same feature set, which is manageable.

## Flexibility

Surprisingly, a number of our corporate clients have started using them indoors, and really like them! It all started when we were a little short on options during a busy period, and offered them to a client to try. The client was sceptical, but took them, and has taken them out multiple times since because they like them so much. We really didn't expect that at all! The Neptune 400s have the quality of colour and output punch required for most events, and as a fixture, they look good,

so they can sit comfortably on a corporate stage. The only trade-off is that they're slightly heavier than a standard fixture might be, but that usually doesn't matter.

## Performance

The colour rendering from the CMY engine and the colour wheel is great. The dimming performance is on par with other similarly spec'ed fixtures. Gobo projection is sharp and even. The movement is a little slower than a standard fixture, as is with most IP rated fixtures because of the extra work involved in moving their rubber seals; but I still wouldn't describe it as 'slow' though!

## Neptune 200 Beam IP65 and Neptune 400 FX Wash IP65

We were so happy with the Neptune 400 Hybrid IP65, we decided to invest in other units from the series, specifically the Neptune 200 Beam IP65 and Neptune 400 FX Wash IP65.

The Neptune 200 Beam IP65 competed well in a shootout we ran, and with its deliberately limited feature set, does what it does really well. It produces a nice flat bright beam, and does it with a LED engine. The result is not at all peaky, and when you put its prism in, you get a wider beam. It's a fantastic price and represents great value for money.

The Neptune 400 FX Wash IP65 has the same output specs as a ShowPRO Pluto 2000 wash, and runs seven 40W LEDs in its outer ring, plus a 60W centre LED that you can defocus to create a break-up effect. There's individual pixel control, and you also have an outer LED effect ring providing another creative element. It's a great size, and sits well on smaller jobs. At only 22kg, you can use them indoors comfortably, and they're physically easy to handle.

## Service

The service and support from Show Technology has been extremely impressive. When we decided to purchase our Neptune 400 Hybrid IP65s, there was a very short lead time in order to be ready for the MCG gig. Show Technology worked with the



## The Specs

|  |  |
|--|--|
| Light Source: 300W RGBW LED  | Frost: 1 frost filter  |
| Beam Angle: 3°-30°   | Pan/tilt rotation: 540°/ 270°, 8-16 bit                                    |
| Rotating Gobo: 8 Gobos + White, Gobo flow effect, Gobo shake and bi-directional rotation | Dimmer: 0-100%, 16 bit   |
| Static Gobo: 12 Gobos + White, Gobo flow effect, Gobo shake                              | Control: DMX512, RDM, Art-Net sACN, W-DMX                                  |
| Colours: CMY engine + Colour wheel (8 dichroic filters + white, rainbow flow effect)     | Control Channels: Basic 20, Standard 24, Extended 28                       |
| Prism: One piece 5F prism with bi-directional rotation and indexing, speed adjustable.   | Pan/Tilt movement blackout, selectable pan/tilt ranges, gravitation sensor |
| Focus: Motorised linear focus  | Dimensions: 416 x 356 x 670mm  |
|  | Weight: 34 kg  |
|  | IP Rating: IP65  |

**Tim Hall is the Managing Director of Resolution X, one of Australia's leading lighting and production hire companies. Part of the Lightmoves Group, they have grown since their founding in 1998 to become one of the largest providers of rental lighting and rigging equipment in Australia.**

manufacturer and had the fixtures built from scratch in seven days, airfreighted to Australia, and cleared through customs within another seven. Our units were in stock three days early. I was concerned there might be manufacturing issues due to the speed of construction, but there was not a single issue. Out of 40 units we've had delivered, the only problem we've had has been one stuck gobo,

which was easily fixed.

While we purchased our Neptunes for festival and outdoor work, we're utilising them indoors too. Aesthetically, they are not only nice to look at, they look like a normal fixture, which certainly wasn't the case in the early days of IP rated luminaires with their 'architectural' designs. To us, they represent superior return

on investment, and we feel we're not paying a premium for the IP rating.

**Brand: ShowPRO Model: Neptune 400 Hybrid IP65**

**Product Info: [www.showtech.com.au](http://www.showtech.com.au)**

**Australia and New Zealand: [www.showtech.com.au](http://www.showtech.com.au)**

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<sup>1</sup>Passion, Pride, Pitfalls Dec 2014

Arosh Fernando is the managing director of Melbourne's WooHah Productions, a one-stop audio visual production company that provides content creation and talent management in addition to equipment hire and technical services. Recent high profile clients have included the Melbourne Esports Open 2019, Wizard of Oz Arena Spectacular, and Intel Extreme Masters 2019.

# CHAUVET DJ FREEDOM FLEX H4 IP X6

by Arosh Fernando

**It was those moments on gigs when our clients would suddenly ask for some uplighting on the walls, or a bit of wash outside. All we had in stock to do that were our standard Par cans on DMX. We had to run power cables and signal cables, and try and hide any slack under the fixtures. It was a painful and uneconomical amount of work just for a last-minute add-on. It didn't justify the dollars.**

We knew we didn't have the right products in stock for those requests, and knew some battery powered wireless fixtures was what we needed. The reason we waited so long to invest was output; powered fixtures have a certain brightness. There used to be a big discrepancy between the output of cabled versus battery powered fixtures. When the Freedom Flex H4 IP X6s came along, their output performance meant we could have an offer to our client that ticks all the boxes.

There are no cables involved, just a packer. Any of us can set up or pack down 12 lights in five to 10 minutes, which is a huge saving on labour. The entertainment branch of our business, which provides DJ and musician services, love them. At a wedding, one person can set up 24 lights for mood lighting within 30 minutes. The convenience is amazing – 24 Par cans would have taken two people two to three hours. The IP54 rating means we can leave them in the rain and wind outside without damage. At most events, entry lighting at the front of a building gets packed down as soon as the client goes in for the show, and one person just puts the Freedom Flex H4 IP X6s in their roll-on cases, and we're done.

## Battery System

Apart from output, the most important thing for us in a wireless fixture is battery life. Some

shows take three days to bump-in and run all weekend. We needed flexibility, and the fact that the Freedom Flex H4 IP X6s have replaceable batteries, instead of needing the fixture itself to go back on a charger, was a big 'tick' for us. We can leave the fixtures where they are, and different crew on different days just replace the batteries as they go.

Nothing else on the market that we found had the same removable battery capability. We have bought a stock of batteries, which are sold separately, to keep on charge, instead of being forced to take units out of hire.

The H4s reliably run 8-10 hours on a single colour, and though we haven't really tested their limits, they've never gone flat. The charge time is 12 hours, which we leave running overnight to get the batteries from dead to 100%.

## Colours

The inclusion of the white, amber, and UV chips mean we can provide any tone to clients; if they want Facebook Blue, we can get their corporate colours matched perfectly instead of approximated. The colour mixing is really accurate, and the results look great. Being able to use white and amber really helps you to get exactly the right tones. Wedding clients in particular love the pastels, and you need a nice white and amber to add to green or blue to get those tones.

## Control

We generally deploy the H4s with a little six fader controller, or run them off a grandMA for the bigger gigs. Most clients just want the H4s up or down, or a bit more colour, so that is more than enough for most applications. Their wireless DMX is awesome, and we use it wherever we can. While there are three DMX channel modes, with 6, 8 or 12 respectively, we mostly just run them at 6 to get the colours; we're not doing anything fancy. There is a standalone control app made for them, but we haven't used it.

## Improvements

The only improvement I'd like to see is more output. In environments where you're competing with LED screens and a lot of bright stage lighting, the client often wants lights like these to match that intensity. Now, we don't expect a light like this to ever be on par with the rest of the rig, but it would be good if there was a 'boost mode' or similar that halves battery life but doubles output, for example.

## Service and Support

The support from distributor AVE has been great. They've provided us with a dedicated account manager, and when we had one battery dead out of the box, it was immediately picked up and replaced. That's the only issue we've ever had.

## Conclusion

We're quite picky about our lighting inventory, particularly what we use for corporate AV. We invested in 24 units of the Freedom Flex H4 IP X6s, and they were a hit with both our clients and our crew straight away. In terms of reliability, they haven't skipped a beat, and AVE's pricing has meant we have enjoyed a very good return on our investment.

**Brand:** Chauvet DJ

**Model:** Freedom Flex H4 IP X6

**Product Info:** [www.chauvetdj.com](http://www.chauvetdj.com)

**Australia:** [www.avec corp.com.au](http://www.avec corp.com.au)

**New Zealand:** [www.mdr lighting.co.nz](http://www.mdr lighting.co.nz)



## The Specs

Light Source: 4 LEDs (hex-colour RGBAW + UV) 10 W, (2 A), 50,000 hours life expectancy.

Beam Angle: 23° Field Angle: 34°

Recharge Time: 6 hours

Illuminance: 2,163 lux @ 2 m

IP Rating: IP54

Run Time (all on): up to 8 hours

Ships with 6 Freedom Flex H4 IP pars, 6 Flex batteries and a charging road case

Swappable battery packs

Charging road case simultaneously charges and

holds 6 additional batteries (sold separately)

Temporary outdoor-rated robust housing repels water, snow, dirt, and sand for all-weather applications

Multiple wireless triggering and control options via the FlareCON Air and the FlareCON app

Works in master/slave with all Chauvet DJ Freedom Pars

Built-in adjustable kickstand

Wireless non-DMX control using the IRC-6 remote

DMX Channels: 6, 8, or 12

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# PFC Music Services. No, not Power Factor Correction!

by Duncan Fry

## I'm sure that sometimes we all like to remember how we got into this business. My first venture into the audio business was a rehearsal studio.

Back in the days of Dunk's Disks, the Smoothest Sounds in the South, the shop had way too much space for just selling records and cassettes to its small (and getting smaller) regular clientele.

In a moment of inspiration, I decided to halve the size of it and create a chill-out area at the rear of the shop. I was sorely tempted to halve my expenses and live in it, but the fact that the toilet was a short bike ride down the lane, and there was no shower or bathroom eventually made me change my mind and turn the back space into a rehearsal room.

Driving home that evening past some offices that were being remodelled, I saw piles and piles of old carpet and underfelt thrown out and waiting to go to the tip. "You little beauty," I thought, "just what I need." I made about twenty trips back and forth to the shop with great rolls of the stuff piled high on the roof of the Yellow Peril - my 1310 Mini Clubman GT. Not the ideal vehicle for transporting large amounts of anything, but it was all that I had.

The next day, in between being bothered by customers wanting to buy things, we set to work with a vengeance, covering everything in multiple layers of underfelt and burnt orange shag pile carpet - the floor, the walls, the doors, the ceiling.

When we were finished it looked like a carpet fetishist's private hideaway or, as one unkind soul commented, "more like a padded cell!" And boy did it smell! A heady combination of water damaged underfelt, cheap carpet, glue, dust and cat's wee! In actual fact - just like every other rehearsal room I'd been to! It didn't seem to bother any of the customers, though.

I put together a rudimentary system comprising various bits and pieces I'd collected - a pair of the late Gary Nessel's 4560 cabinets (the 80's go-to general purpose speakers), a power amp, a six channel mixer, and three Shure 585 microphones, probably left over from Sunbury!

In this original configuration I ran the 4560's full range - this was before the great piezo experiment of later years - they were a bit middly but loud enough, despite being left in the garage for a couple of years. The first "Check 1 - 2" after they were plugged up sent

a family of mice scuttling out of one of them, which ran across the carpet and disappeared out the back door, instantly pounced upon by Squeak, the shop cat!!

Everything worked, though, and I was eager to start recouping some of the massive expenditure (about \$50 all up!) I had outlaid, so I put an ad in Juke magazine (ah memories!) - "Rehearsal Room. Southern Suburbs. Cheap Rates", and the phone number.

I had no name for this state of the art pre-production facility, but that problem was soon solved for me by my clients. The phone rang hot as soon as the ad came out, and the first question all the customers asked was "How much, mate?"

When I told them it was \$10 for three hours, 7 till 10 PM (I figured that was all the neighbours would stand before storming the walls) their only comment was "Shit, that's Pretty F\*\*\*ing Cheap!"

So PFC it was!

Soon it became a whole lot more profitable than the shop, being booked solid every night, even after I jacked the price up 50% to \$15. I registered the business name (initials only; for some reason the complete name was knocked back!) and opened up a bank account.

As he worked his way through the paperwork, the bank manager asked me what the initials stood for. When I told him I thought he was going to have a heart attack there on the spot! Luckily he didn't, and lived long enough to sign the papers; PFC Music Services was born.

It wasn't long before business in the rehearsal studio and Honest Afghan Discount Records at the Sunday Market soon outstripped income from the shop, so in conjunction with my brother I rented a small factory so I could expand the studio business. Even I found it hard to be in two places at once, so the shop had to go.

Advertising the business as "Record Shop for sale, good lease, low price" I sold it to the first person who rang up - a mobile disco operator looking for a base to work from plus a continuous supply of cheap records and

young girls! My DJ guru Nat Prick had never heard of him, but he appeared to be a suitable buyer, so I said OK and the deal was done.

We did a stocktake, agreed on terms, he paid me half up front, moved in and took over, then promptly declared himself bankrupt before paying the rest! Further conversations, with lawyers at 10 paces, resulted in an offer to pay it back at \$30 per month! I think I got two or three payments out of him before he vanished off the face of the earth. Perhaps he had owed money to other people who were a little less conciliatory than me! Let's hope so anyway.

But I had enough to get PFC Mk 2 off the ground, and this time I incorporated a small control room so I could do demo recordings there. Looking at the prices that studios charge today for studios that are far better than mine ever was makes me realise what a ripsnorter of an earner it was back then. \$25 per hour for basic 8 track facilities. And I truly do mean basic! For \$25 an hour nowadays I could rent a studio with 48 tracks and available effects up the wazoo.

But it was a whole lot of fun, and a succession of local bands tramped through with their three song repertoires, happily going home with a cassette of their performance in exchange for a hundred bucks!

The good ol' 'Gigmaster Mk 1' 12 into 2 console finally decided to vapourise itself during one session, as the band played obliviously on. "Shit what's happened?" I asked Col. "It's stuffed," he replied. One of the benefits of having technical people on hand is that they can always come up with a pinpoint diagnosis of the problem! "Jeez I can't tell them that," I said, thinking of my dollars flying out the control room window. "Well, tell them it's...er..tell them it's substrate overload," he said.

"Sounds technical enough for me," I replied and went into the studio to give the boys the bad news.

I waved my hands for them to stop. "We'll have to stop now, guys - you'll have to come back tomorrow night." "What's wrong?" they all asked. I put on my most serious courtroom appearance voice. "I'm afraid we've got a bad case of...substrate overload in the control room. We'll work all night to try and correct it, but we should be OK for 6 o'clock tomorrow evening. Thanks for your understanding, guys," and I went back into the control room.

We listened to them on the talkback as they packed up. "Wow, sounds serious...What do you suppose it is...do you think we might have caused it?...jeez let's get out of here quick!"

Of course, the problem was simply a fried chip and was easily found and replaced the next day. But 'substrate overload' has always been our universal catchphrase for an electronics problem ever since.

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