digital edition

Lighting&Sound international

February 2011

entertainment, presentation, installation

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Behind The Wall

LSi reports from the first touring production of Roger Waters' iconic live show . . .

- Theatre industry mourns David Taylor
- Bruce Jackson, audio legend, 1948-2011
- Singapore: Nightlife Trendsetter
- Classic Gear: the 15A plug
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Technical Focus takes the mic

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LSi visits the final tour

Ice Road Trackers
LSi reports from France

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There can have been few, if any, sadder beginnings to a new year for our business than 2011. Before January was out, we lost two hugely respected figures. Both were among the highest achievers in their fields, both were prodigious contributors to their industry, both were universally popular men - and both died, before their time, in tragic circumstances.

The first news was of the death on 17 January of David Taylor (*see page 8*). Taylor was a leading theatre consultant and lighting designer, and an untiring contributor to the industry through his work with various industry organisations, most recently with ESTA during its transition into the merger with PLASA. As a theatre consultant with Theatre Projects Consultants and later with Arup, he had contributed to the development of many of the world's leading performing arts venues of the last quarter-century. His death at the age of 48 - an apparent but still unconfirmed suicide - seems inexplicable to those who knew him.

The second shock, shortly before we went to press, was the news that the veteran Australian sound engineer and technical innovator Bruce Jackson had been killed when his light aircraft crashed in California on 29 January (*see page 12*). During Jackson's remarkable sound engineering career, many major artists benefited from his skills and his passion for high quality live sound, but his accomplishments behind the console were mirrored by many further achievements in product development arising from his technical brilliance and insight. Both men made extraordinary contributions to the business of entertainment, and will be sorely missed.

Rebuilding The Wall: In our main feature this month, we bring you a fascinating in-depth look at Roger Waters' *The Wall* production, which is touring at last and will kick off its European leg in March. If you're interested in how the original, iconic 1980 production has been translated - not just to a 21st century stage, but to a major tour of dozens of 21st century stages across North America and Europe - then don't miss this treat beginning on page 34.

Education: And how better to follow a feature on the *The Wall* than with a focus on installations for Schools & Education? In the aftermath of the UK's Building Schools for the Future (BSF) programme being scrapped last year, we look at what the future holds for service providers targeting the schools market, the technical considerations involved with such projects, and at two different but equally successful case studies to give a flavour of what it takes to correctly service this unique market area. There's plenty more inside, too, including Simply Red's *Farewell* tour, the latest moves from innovative UK manufacturer GDS, two new venues on Singapore's trend-setting nightclub scene and an interesting new product on an ice show touring France . . .

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BORN UNDER A LUCKY STAR

More on the new **KARA** modular line source at www.l-acoustics.com

L-ACOUSTICS

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Theatre industry mourns tragic loss of David Taylor

USA - The sudden and tragic death of David Taylor, the well-known theatre consultant and lighting designer, left many in the theatre industry in a state of shock in January. Taylor, who was 48, fell from the 14th floor of the Howard Plaza Hotel in Taipei, Taiwan. While early local reports suggested the death was a suicide, later reports indicated that the police had refused to speculate. A full police report is said to be pending.

A popular, well-connected, and highly involved member of the industry, Taylor was born in London. After studying in the UK and USA, he spent 21 years at Theatre Projects Consultants where he was involved in a number of acclaimed and high-profile projects, including the Kodak Theatre in Hollywood, New Amsterdam Theatre in New York, Hyperion Theatre at Disneyland, Goodman Theatres in Chicago, Chicago Shakespeare Theatre, San Jose and Seattle Repertory Theatres as well as new homes for the Seattle Symphony, Philadelphia Orchestra and New World Symphony. His international experience includes projects in Southeast Asia, Japan, Europe and the UK, including the Dewan Filharmonik Petronas Hall in Kuala Lumpur for the Malaysian Philharmonic Orchestra and the Orange Tree and Tricycle Theatres in London.

In 2006, he joined the design/engineering/consulting firm Arup to lead the company's theatre consulting work in the Americas.


David Taylor - "irreplaceable".

Among his projects there was the Jerome Robbins Theatre at 37 Arts in Manhattan.

Taylor also worked as a lighting designer. For London's Tricycle Theatre, he lit *The Gamblers*, *Dreyfus*, *The Mai*, *Macbeth*, *Wine in the Wilderness*, and *Water*. In New York, he designed the musical *Shabbatai* and the New York premiere of *The Workroom* for American Jewish Theatre. Other credits included *Lucia di Lammermoor* for Lyric Opera of Kansas City, *The Lady's Not For Burning* at San Jose Repertory Theatre, and the Bollywood musical *I Believe* at the National Theatre in Mumbai. Most recently, he lit the American tour of *The Great Game: Afghanistan*, produced by the Tricycle Theatre and seen at theatres across the US.

Arup said Taylor had been in Taipei "starting a wonderful project that he had brought into Arup through his typical combination of skill, design flair, enthusiasm and commitment." The company described him as "a major and much-loved international name in the theatre business, both as an exceptional forward thinker and designer for the performing arts, theatre planner, technical systems consultant, and active stage lighting designer . . . David will be irreplaceable to Arup and to the theatre design industry, but most to his family, to whom we extend our deepest sympathy."

Taylor was also very involved in both ESTA and PLASA, serving as vice-president on the ESTA board for five years and becoming the vice-chair of the new PLASA North America regional board as well as a member of the new PLASA governing body.

Matthew Griffiths, CEO of PLASA, notes that Taylor was equally well-known in Europe, both for his design and consulting work and for his participation in the *Showlight* symposium. "David had a lot of friends and associates in the UK," adds Griffiths. "We will miss his wit and wisdom and his passion for the theatre industry. Our thoughts and prayers go to his family."

Eddie Raymond, chairman of the PLASA North American board, said: "PLASA North American staff and members were devastated to learn of the passing of our colleague and very good friend David Taylor . . . Not only was David a forward-thinking theatre professional . . . but he led the way with modesty, humour, and an open minded approach always considering the greater good of the industry."

David is survived by his wife Sara and two sons Sebastian and Oliver.

Tributes to David:

> rememberingdavidtaylor.wordpress.com

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voices in this issue

"GDS is already well down the road of providing a comparable solution to the problem of auditorium and house lighting: a dimmable, low voltage solution which can be installed with minimal disruption and cost . . ."

Lee Baldock discusses the next generation of developments from Bristol-based innovator GDS (*GDS: The Next Phase, 22-23*)

"I do have to concede that there is a kudos attached to this kind of job. Why else would Meyer Sound and Autograph so willingly designate it a loss leader . . . ?"

Phil Ward on the relationship 'twixt art and audio (*Audio File, 32*)

"Since there's a ten-percent attrition rate each night, we're still in the brick-building business."

Tait Towers' director of design, Tyler Kicera, discusses the touring production of Roger Waters' *The Wall* (*Behind the Wall, 34-43*)

"After Sean started working on the content, it became fairly obvious that we could save ourselves a couple of million dollars literally by going with rear projection instead of LEDs."

Screen technical director Richard Turner discusses projection for *The Wall* (*Behind the Wall, 34-43*)

"We are very happy with our new installation and are the envy of other schools. We are about to start an after-school Sound and Lighting Club."

Karen Hayward of the Winchcombe School praises the results of a well-executed installation (*Schools Focus, 54-55*)

"Hucknall is also careful on stage, he consistently shields his mic from the kit with his body, and doesn't point it at the brass section; while some reverb from the house is constant, instrument bleed-in is rare."

Steve Moles, On Tour (*Simply Red: Farewell, 58-65*)

"It's astonishing to think that only as far back as the 1950s frequencies higher than 600MHz or so were thought to be both unobtainable and useless."

James Eade discusses the latest advancements in antenna technology (*Technical Focus, 68*)

Light Emissions launches at ARC

Peter Ed.

UK - A new company, Light Emissions, made its debut at the ARC Show in London, promising to introduce "new standards in large-scale LED video-based graphics to architects and interior designers". With the technology already established in the entertainment sector, the new start-up, led by Peter Ed, has optimised its new low- and medium-resolution RGB tile system, known as Art, for wider commercial markets, including museums, casinos, retail and cruise ships. Ed is joined by former G-LEC colleague Sergej Mironov, who heads Light Emissions' R&D programme.

> **www.lightemissions.com**

Global Truss America files suit against GLP

USA - Global Truss America LLC has filed suit against GLP (German Light Products) and Mark Ravenhill, president of GLP, alleging "trademark infringement, misappropriation of trade secrets, unfair business practices and other violations of the Lanham Act".

Global Truss accuses GLP of falsely stating that it is "an authorized distributor of Global Truss products in the United States and falsely stating that Mr. George Lee is the CEO of Global Truss" and wrongfully "implying that Global Truss is the source of the products that GLP is advertising, distributing, offering for sale and/or selling."

> **www.globaltruss.com**
> **www.glp.de**

Stageco sued over tower collapse

USA - Stageco has been sued in Texas state court by Christie Lites for damages sustained when a 90ft lighting tower erected by Stageco collapsed prior to a motocross event at Fort Worth Stockyards in June, 2009. Christie Lites alleges that Stageco was negligent in the design and construction of the tower.

Christie Lites adds that Attempts to resolve this matter amicably have been frustrated, necessitating filing of the lawsuit. Christie Lites is seeking actual damages in excess of $500,000, and to ensure that this type of incident does not jeopardise public safety for future events, $1,000,000 in punitive damages.

Stageco told LSi: "Stageco takes its responsibilities very seriously, we are fully insured, so all parties will be appropriately protected and reimbursed. Following this unfortunate incident we initiated our own investigation; there are multiple parties and multiple factors under consideration such as unpredicted wind gusts, and most importantly, there were no injuries."

> **www.christielites.com** > **www.stageco.com**

Philips Vari-Lite expands in Middle East

UAE - Philips Vari-Lite has delivered 42 VL3500 Wash and 30 VL3000 Spot luminaires to Production Technology located in Dubai, for use on lighting productions throughout the Middle East. Since its founding by Steve Lakin in 1999, Production Technology has become one of the region's largest production companies with over 70 highly-trained staff members.

> **www.vari-lite.com**
> **www.productiontec.com**

Powersoft raises US presence

Italy / USA - Powersoft has formed a new US corporate structure, Powersoft Audio Technologies Corp, which has moved to an expanded 1,600sq.ft facility in California. The premises will serve as the national sales, service and support centre for the company's innovative amplifiers. Ken Blecher, who joined the Powersoft team in May 2010, will lead the new company, with Tom Bensen remaining in the east as key accounts manager and Steven Temmel as operations and service manager.

> **pro-audio.powersoft.it**

Juliat's Brazilian appointment

Brazil - Robert Juliat has appointed Lighting Bits Ltda of Sao Paulo, Brazil as its distributor. Headed by Daniel Ridano, Lighting Bits will be exclusively responsible for Robert Juliat products across Brazil, and non-exclusively across the wider Latin American market.

> **www.robertjuliat.fr**

HSL invests a further £2.5m

HSL MD Simon Stuart.

UK - Following one of their best ever years, lighting rental company HSL has invested another £2.5m in the last two months just to service its current work. Purchases include 300 of the latest Robe moving lights (100 Robe 600 Spots and 100 Robe 600 Washes, plus an additional 40 Robin Beam 300 and Beam 700 units); 12 Robert Juliat Lancelot 4K Arena followspots, supplied by Robert Juliat's UK distributor, White Light, and 60 LiteWare high output LED uplighters supplied by GDS. Adding to an existing stock of ColorWeb 250, 200 pieces of the ChromaQ ColorWeb 125 LED surface have been bought from A.C. Entertainment Technologies.

Over $1m has been invested in acquiring Vari*Lites this year, giving HSL a large stock of VL3500 and VL3000 Spots, VL3500 Washes, VL1000 Arc ERS and VL1000 Tungsten ERS fixtures. HSL has also purchased an assortment of different power distribution units from SES and also many kilometres of cable from A.C., as well as A-type trusses from James Thomas Engineering. In the automation department, a further 12 Kinesys master beam trolleys have been added to the inventory, along with 24 slave beam trolleys.

> **www.hslgroup.com**

Media Powerhouse Group expands

Michael Breen, Media Powerhouse's CEO.

UK - Media Powerhouse, a leading AV rental services companies, has announced that Special Project Solutions (Special Projects) has joined the Group. Special Projects' services span the entertainment and industrial sectors. Being a part of Media Powerhouse Group will strengthen the specialist technical management and system integration expertise in both companies, say Media Powerhouse.

> **www.media-powerhouse.com**
> **www.specialprojectsolutions.co.uk**

Yamaha & Equipson's WORKproCA

L-R: Nick Cook (European marketing director, Yamaha Commercial Audio Europe), José Vila (president, Equipson), Masato Oike (president, Yamaha Music Europe), Juan José Vila (director, Equipson) and Stevie Miyawaki (director, Yamaha Music Europe).

The Netherlands - Yamaha Commercial Audio Europe is to distribute a new line of audio products designed for the contractor installation markets, produced exclusively by Spanish manufacturer Equipson. The new WORKproCA series will include ceiling speakers, active and passive wall-mount loudspeakers, subwoofers, power amplifiers and mixer amplifiers.

Yamaha, which has worked with Equipson to design the exclusive series, will now promote it through its extensive European dealer network. Yamaha Commercial Audio can now offer an even wider spread of installation products as a one-stop solution, the company says.

> **www.yamahacommercialaudio.com**
> **www.equipson.es**

Matrix Reloaded . . .

UK - Matrix Amplification is a new company with a familiar name. Over the past 18 months, from its base in Wales, the company has developed, manufactured and field-tested a new range of lightweight switchmode power amplifiers.

Amplifier designer Andy Hunt, the man behind the original Matrix, has re-established the brand along with business partner Matt Button. Save for some metalwork which is sourced from a local supplier, the new manufacturing operation is remarkably self-sufficient, with the design and manufacture taking place in-house, including the switchmode power supplies and surface-mounting of the PCBs. The company now has 13 product lines in production, all of which are either Class AB or Class G topologies. Matrix is already providing amplifiers on an OEM basis for two sound system manufacturers - Shermann Sound Systems and A.S.S.

> **www.matrixamplification.com**

Clear-Com appoints Orbital for UK

USA / UK - Clear-Com, the voice communication systems specialist, has appointed Orbital Sound as its UK distributor in the Live Event/Live Performance market. Orbital, specialising in sound and communication systems for the theatre, event and broadcast markets, will offer Clear-Com's full range of professional intercom products. Orbital will also provide trained technical staff to assist with after-sales support and services, as well as designing and running a dedicated series of training workshops.

> **www.clearcom.com**
> **www.orbitalsound.co.uk**

Latest news from Flare Audio

UK - Flare Audio will shortly be opening a new R&D and demo facility in West Sussex, UK. Building work is currently underway and is on schedule to complete shortly. The 6,000sq.ft building will also house the company's new head office. In other news from Flare, the company welcomes D&E International as its official distributor in Hong Kong.

> **www.flareaudio.com**

Audinate extends ZP collaboration

USA / EMEA - Rome-based ZP Engineering has become the first Audinate authorised distributor and engineering partner in EMEA. "We're very excited that ZP Engineering has stepped up to become our first authorized distributor and engineering partner. ZP and Audinate have a long standing relationship. Audinate's respect and confidence in ZP's capabilities are second to none," stated John McMahon, Audinate's VP of worldwide sales and support. "Having ZP Engineering providing Dante products with their design and integration support will allow small to medium OEMs quicker access to our complete line of products and services."

> **www.audinate.com**
> **www.zpeng.com**

Optocore's Finnish appointment

Mikko Palomäki, Tero Hölttä and Optocore's support engineer, Maciej Janiszewski.

Finland - msonic, the Finnish entertainment technology company set up by Mikko Palomäki, has added to its roster of advanced audio tool solutions after winning the territorial distribution rights for Optocore. The Optocore range will receive support from msonic's sales engineer, Tero Hölttä, who had helped Palomäki establish new digital platforms while working together at their previous company.

> **www.optocore.com**
> **www.msonic.fi**

These stories were reported in full online at **www.lsionline.co.uk** prior to L&SI's publication.

Bruce Jackson, audio legend, 1948-2011

USA - Bruce Jackson, one of the world's most respected live sound engineers, died in late January when the light aircraft he was piloting crashed in southern California.

Bruce Jackson pictured at the PLASA Show, 2007. (photo: PLASA Media)

A true pioneer of the live sound reinforcement industry, Jackson was the 'J' of Jands, the company which he co-founded in Sydney in the late 60s (as 'J and S Research Electronics') and which remains today as one of the biggest names in Australia's professional entertainment technology industry. Jackson and co-founder Phil Storey began by building lighting and sound equipment, renting it out to the clubs of Sydney's Kings Cross area.

A meeting with US live sound pioneer Roy Clair in 1969, during an Australian tour with Blood, Sweat and Tears, led Jackson to a long and fruitful relationship with Clair Brothers Audio. He moved to the US to work for them, and in 1971 began mixing monitor sound for Elvis Presley, which he did until Presley's final performance, in June 1977. He later recalled the period as hard work, with hundreds of shows, but there was a notable innovation here too: Presley's flown Community/JBL PA system saw the first use of a CM chain hoist for this purpose.

The two other artists Jackson became most associated with were Bruce Springsteen and Barbra Streisand. In 1995, along with Ed Greene and Bob La Masney, Jackson won an Emmy Award for his work on a TV special for Streisand, who described him as "the best sound engineer in the world". His mixing credits also included many other major artists, including Stevie Wonder, Diana Ross, The Jackson Five, Barry White, Rod Stewart, Cat Stevens, Art Garfunkel and Lou Reed.

But Jackson's skills as a top-flight live sound engineer were complemented by an unceasing interest in electronics and how technology could be used to find new ways of improving live sound. Among his many achievements on this front, he built a series of mixing consoles for Clair Brothers - including the first fold-out console, and consoles with parametric EQ and plasma bar-graph meters; he was involved with the launch of Fairlight's ground-breaking audio sampler; he founded Apogee Electronics; he and later joined David McGrath at fledgling Lake Technology, where they developed, with Clair Brothers, the Clair iO controller and later its much-lauded commercial version, the Lake Contour DSP sound system controller. More recently he worked for Dolby as director of live sound.

His considerable talents were employed in the role of audio director for the Opening and Closing Ceremonies of the Sydney Olympic Games in 2000. He later filled the same role for the Asian Games in Doha in 2006 (see LSi February 2007) and at the Winter Olympics in Vancouver in 2010 (see LSi April 2010).

For those who knew Jackson, the words 'generous', 'patient', 'humble', 'unassuming' and 'friendly' are among the terms most commonly used to describe him. His link with Elvis Presley naturally made him a curiosity to Elvis fans worldwide, and he was patient and generous with his time in responding to them. His ego was never to the fore: he may have been a giant figure in the evolution of live sound, but you would not have heard it from him.

LSi contributor Steve Moles, who toured with Jackson on Springsteen's 1985 tour, recalled an occasion at Wembley Stadium when, as lighting crew chief, he had just rigged a number of bulky fixtures at the request of LD Jeff Ravitz, and protested when Jackson arrived and told him they would have to be moved. He recounts: "Calmly and slowly, Jackson unfolded before me a measured and concise discourse on the nature of loudspeakers and sound propagation. So gentle and compelling was his delivery that I understood immediately and without further ado I set about moving all the lights to an even higher position. It's what began my affair with understanding sound. I never forgot it, and funnily enough, nor did he."

Roy Clair recalls their first meeting, when he quickly noted that Jackson was "smart, knowledgeable and extremely interested in everything about the audio industry". He says: "Bruce and I became instant friends and had a lot of great times both professionally and personally. He had the ability to think through problems and always come to a resolution. Bruce brought us a fresh perspective and some cutting-edge ideas, while we were still a young company, which were, quite simply, integral in setting us, and our systems, apart from others in the business. We were fortunate to have had someone like him on our team."

The feelings of many people will be reflected in the statement issued by Jands: "Bruce will be sorely missed by his many friends around the world . . . Our heartfelt condolences to Bruce's family and to all who knew him, worked with him and appreciated his immense contribution to the audio industry."

Lee Baldock

A public memorial for family, friends and colleagues of Bruce Jackson will be held at the Concert Hall in Sydney Opera House on 25 February, beginning at 10.00am.

Events Diary

ISCEx 2011
1 March 2011
Watford, UK
www.isce.org.uk

CeBit
1-5 March 2011
Hanover, Germany
www.cebit.de

USITT
9-12 March 2011
North Carolina, USA
www.usitt.org/2011

IP & TV World Forum
22-24 March 2011
London, UK
www.iptv-forum.com

ProLight+Sound
6-9 April 2011
Frankfurt, Germany
www.prolight-sound.com

NAB
9-14 April 2011
Las Vegas, USA
www.nabshow.com

HK Electronics Fair
13-16 April 2011
Hong Kong, China
www.hkelectronicsfairse.com

PLASA Focus: Leeds 2011
19-20 April 2011
Leeds, UK
www.plasafocus.com/leeds

PALME Middle East
26-28 April 2011
Dubai, UAE
www.palme-middleeast.com

PAL
15-16 May 2011
Toronto, Canada
www.thepalshow.com

ShowWay
15-17 May 2011
Bergamo, Italy
www.showway.com

Lightfair
17-19 May 2011
Philadelphia, USA
www.lightfair.com

Caveat emptor, caveat venditor . . .

Thanks to Andy Graves at Pulsar Light of Cambridge for passing on to L&SI the weblink to a Chinese manufacturer of LED lighting devices, Shenzhen Aviso LED, which as you can see, has been rather making free with images from Pulsar's project portfolio . . .

Now although a lighting manufacturer offering "ingrond" or "Chirstmas" fixtures might not be the thinking person's first choice of supplier, the case of Aviso does highlight the dangers of misleading sales information. In this case, it's the clear suggestion that Aviso LED's products are in use in the lighting projects shown. We know they are not. Not the worst offence, you might think - unless it's your lighting design, or your fixtures' performance that they're ripping off. But if a company misleads you in this way, should you trust the rest of their claims?

Whether it's stealing a few pictures, inventing product performance data (light output, or lamp life, for example), making false statements of compliance (such as bogus CE marking) or even directly copying another manufacturer's recognisable product design and branding - it all means the same thing: the buyer can't be sure what they are buying. Perhaps worse, from an importer's viewpoint, the seller can't be sure what they are selling.

Back in the January 2010 edition of L&SI, PLASA's technical resources manager, Ron Bonner, highlighted where responsibility lay for those selling CE marked equipment into the European Economic Area (EEA). "The responsibility for examining, testing and CE marking a product is held by the manufacturer or their appointed representative within the EU (i.e. the importer or distributor)," said Bonner. In the UK, importers found to be making false claims of compliance can have their stock confiscated and face fines of up to £5,000 or three months imprisonment. Trade mark infringements (selling counterfeit goods etc) can incur significantly higher fines and longer custodial sentences.

In the USA, action has recently been taken against misleading LED performance data. The Federal Trade Commission (FTC) sued California-based Lights of America Inc for misrepresenting the light output and life expectancy of the LED bulbs it was selling, which are manufactured in China. The FTC found that the packaging of one product claimed the bulb could replace a 40W incandescent, but the lamp in question produced just 74lm instead of the expected 400lm. In another example, a product with a claimed lamp life of 30,000 hours was shown to lose 80 percent of its light output after only 1,000 hours.

We all know there are products on sale in the UK and Europe which fall into one or more of the above categories - fanciful performance data, uncertified compliance markings, or misleading associations with other people's projects. The advice to buyers is to go to a reputable supplier, and do not buy on price. For suppliers, be very sure about what you are putting on the market - and make sure you know where the buck stops.

Lee Baldock

ISCE seminars scheduled for March

UK - Visitors to ISCEx2011 at the Park Inn Hotel in Watford on Tuesday 1 March will once again have the opportunity to network with professionals from the sound industry and view the latest products during the ISCE's annual exhibition and seminar day. The seminars, which run alongside the exhibition, will provide the latest information on a wide range of topics. Of particular interest to those who work in the Voice Alarm industry will be *Voice sounders for evacuation - where are they now?*, by Tony Payn of Vimpex.

Technologies continue to converge and *Video for audio engineers*, by David Tyas of Ikon AVS will be of interest to many. Gordon Morris of Gordon Morris Ltd , who is himself deaf, will present *Why loop systems are failing*, and Peter Alberry-King of Penton UK who have recently been through the third-party certification process, will present *Loudspeakers and EN 54 part 24 - has Europe gone mad?*.

Exhibitors who have already signed up include Ampetronic, Baldwin Boxall Communications, Cloud Electronics, Communication Technology, Current Thinking, DNH Worldwide, Fuzion plc, Gordon Morris Ltd, Ikon AVS, Neutrik (UK), RCF Audio, Shuttlesound, SigNET (AC), TOA Corporation and Voiceperfect.

> www.isce.org.uk

SSE's date with KARA

Steve Moles visited SSE Audio Group's open day for L-Acoustics Kara line array . . .

UK - As Dave Brooks, Head of Training at L-Acoustics hosted the finer listening points of the KARA system I turned to my host, John Penn of SSE, and said: "I suppose this system will be more of a commodity for you?" implying that KARA would prove a popular item for SSE's sales division.

Top: L-Acoustics' Dave Brooks presents the KARA system.

Above: Ray Furze (left) and John Penn from SSE Audio Group.

"Yes, definitely," he replied, "but we've already purchased 24 boxes for our rental stock as well". In some ways, that tells you all you need to know about KARA - a nice system, it performs well, will be popular for installations and has a place in the rental inventory of any reputable touring company. But then so do a fair number of other manufacturers' products: it's a cliché that all the big names in PA system manufacturing make good sounding boxes these days.

This 'Public Listening Event' at SSE was well attended: at least 50 people crowded the demo room, including three who had come all the way from Hire Sound in Gothenburg. Stuart Down, who captains L-Acoustics' UK Office ran the morning session, giving a potted history of L-Acoustics - even old hands like Ray Furze and Huw Richards expressed surprise when Down pointed out that V-DOSC has been with us for 17 years now. I happily recall visiting The Ahoy and meeting Dr Heil all those years ago: 17 years is at least three lifetimes in terms of technology products.

KARA is a lightweight, mid-size (2x8" 1x3" compression), line array with 110° horizontal dispersion that can comfortably reach down as low as 55Hz: one to three thousand seaters would suit it quite nicely. Brooks demonstrated the system (and a few other products) using beautifully detailed recordings which were ideal for gauging dynamic range and sensitivity, but did not give a feel for what Kara will do when you turn up with the Nascent Gruntfuttocks in a 1000 capacity club one hour before doors and have to fling up the kit and sound-check during the opening number. (How about attendees turn up in the morning, plug up the kit themselves and turn it on for a quick listen from any source they care to bring with them, then get the chalk and talk while the system is tuned to its best?)

Down described how Dr Heil has embedded scientific practice at the heart of L-Acoustics, and that's certainly a virtue of the company, but it's also been a criticism in the past. Scenes of earnest system techs spending afternoons with their Tablets walking the room, fine-tuning, while the house engineer waits anxiously by the desk with the band's manager spring to mind.

On that score, Down and Brooks both indicated that KARA is a less fussy system, thanks to flat and smooth delivery, and will perform 'out of the box' as it were. This assertion was confirmed by two areas of significance and improvement; the KARA rigging system is, like its larger cousin K1, well engineered, easy to set and fast. And compared to dV-DOSC, the most comparable L-Acoustics product, the off-axis HF response from KARA is much improved. And that's what all these 50 people came to hear. Well worth the trip.

> www.l-acoustics.com > www.sseaudiogroup.com

ABTT Theatre Show 2011

UK - Building on the success of previous years, the 33rd ABTT Theatre Show promises to deliver a packed showcase, whilst celebrating The Association of British Theatre Technicians 50th anniversary, say organisers.

The ABTT Theatre Show is already well over 50% sold out for 2011 with an enviable list of key industry players including XL Video, ETC, Stage Technologies, Martin Professional, Yamaha and Philips Entertainment booked to appear from 15-16 June, at the Royal Horticultural Halls, Vincent Square, London SW1P 2PE.

The Show will feature a two-day programme of seminars and meetings, which will reflect the achievements of the ABTT as it reaches its 50th birthday and look forward to the challenges for technical theatre in the coming years. The Show will again offer a simple and free pre-registration facility through its enhanced website.

> www.abtttheatreshow.co.uk

ShowWay returns in 2011

Organisers of the Italian professional entertainment technology exhibition ShowWay have announced that the long-awaited second edition of the event will take place in Bergamo, Italy, from 15 to 17 May 2011.

Having put the show on ice last year, allowing its exhibitors to "concentrate their efforts on optimising their businesses during the peak of the world recession," organisers feel the time is right for a recovery-boosting show. The show will follow the same format as the successful 2008 debut event, which saw 65 exhibiting companies attend - 60% coming from outside Italy - and 6,783 visitors from 35 nations.

APIAS, the Italian association of manufacturers and importers of equipment for the entertainment industry, which represents the most important and distinguished firms in the trade in Italy, confirms its utmost commitment to working together with ENTE FIERA PROMOBERG towards a show with top ranking participants including designers and consultants; architects and interior designers; rental companies; theatres, museums and local authorities; TV and cinema production companies; concert, show and event organisers; specialist installers and retailers; and importers and international distributors.

> www.showway.com

ETC's iRFR app gives boost to Light Relief

UK / USA - In the year and a half since it became available, the iRFR app from ETC which turns any iPhone, iPad or iPod Touch into a remote controller for ETC lighting desks, has raised some £21,500 for Behind the Scenes and Light Relief. When buying the £30 app, users choose either the LR or BTS version, depending on which charity is closer to home. That money has gone directly to workers in the industry who are going through crises and has been used for much needed care and living expenses.

"This is a great way for ETC console users to support their fellow professionals," says ETC CEO Fred Foster. "Just by purchasing an app for devices they use each day, lighting professionals are making a big impact on someone else's life and supporting technicians in our industry who face dramatic personal challenges. The popularity of the iRFR app has made it possible for Behind the Scenes and Light Relief to continue the important work that they do."

> www.etcconnect.com

NSA Conference 2011

UK - The National Skills Academy for Creative & Cultural's biggest event of the year, the Annual Industry Conference, focusing on future of skills in the music and backstage theatre sectors, will take place on 1-2 March 2011 at the newly renovated Pavilion Dance, Bournemouth.

Attendees will have the opportunity to network with key industry figures, attend lively and practical seminars and celebrate achievements the Skills Academy has delivered in the last 12 months.

Pauline Tambling, MD of NSA for Creative & Cultural says: "The conference is intended to stimulate imaginative debate around the skills issues currently facing the industry . . . this will, I hope, lead to the generation of some tangible solutions that address a number of the challenges that lie ahead. This is a must-attend event for all those with a genuine interest in the skills and productivity agenda for the sector".

Key speakers include Paul Latham, COO, Live Nation, Melvin Benn, managing director, Festival Republic and Sarah Rushton-Reed, co-founder of WISE (Women in Stage Entertainment).

> www.nsa-ccskills.co.uk

More 2012 Switchover Open Days from A.C.

UK - Following "huge interest" in A.C. Entertainment Technologies' free dedicated 2012 digital switchover open days last year in partnership with Sennheiser and Shure, the company's Audio division has announced it will be holding more events in March 2011.

The upcoming open days will be held at AC-ET's UK offices in conjunction with the manufacturers as follows: South (High Wycombe) with Shure on 9 March and North (Leeds) with Sennheiser on 17 March. The format of the events will remain the same, with attendees receiving an in-depth 2012 digital switchover Q&A session by members of the BEIRG committee and demonstrations of the manufacturers' new Channel 38 compliant equipment, as well as showcasing other brand ranges distributed by Sennheiser and Shure.

A.C. Audio has also launched a new dedicated 2012 digital switchover microsite (see below) providing everything users need to know about the switchover, including frequently asked questions, the latest Sennheiser and Shure Channel 38 compliant wireless equipment product ranges available from the company and other useful industry web sites.

> www.ac-et.com/audio

ARC 2011

After two years somewhat in the doldrums, 2011 saw much better fortunes for UBM's annual architectural, retail and commercial lighting show, ARC. Sarah Rushton-Read reports for LSi. . .

From top:

The Artistic Licence team.

Architainment's Nic Tolkien (right) with Neil Gamble of EcoSense.

Peter Ed announces the launch of Light Emissions.

UK - Firstly, there was no sign of the snow that bought London Transport to a standstill on both show days in 2010 and secondly, the show dates didn't clash with ISE! However, the real icing on the cake for ARC is that the show is no longer hosted at the far-too-cavernous Earls Court 2, but has returned to its original home in Islington.

For two long years the rather unsuccessful coupling with EC2 has irritated and frustrated exhibitors and visitors. ARC's reunion with its original venue partner - The Business Design Centre, Islington - was therefore received with unanimous relief. The show floor, although not heaving, was consistently busy. Organisers reported slighty higher attendance this year, with 3,082 visitors, compared with 3,075 in 2010. Exhibitors on the whole seemed happy with the visitors they received, with many reporting a steady stream of UK lighting designers and specifiers.

Manufacturers are better harnessing LED technology in more attractive, user-friendly products designed specifically for real architectural needs. The difference this year is that the quality of light and consistency of colour temperature means that LED fixtures are finally getting much closer to achieving designer-preferred levels of intensity, colour and control - for both task and accent lighting. Thankfully, they now go way beyond the realms of colour changing, wall washing, eye candy.

No surprise then that a number of companies and individuals - perhaps more familiar to the live entertainment sector - continue to see the architectural market as a rich seam of business. New products, new companies and new collaborations have been announced and it feels as though exciting times are ahead.

So, where better to start than with George Muller, author of over 50 solid-state lighting technology patents and responsible for establishing LED lighting company Color Kinetics - later acquired by Philips.

In 2008 Muller embarked on his latest venture, **EcoSense Lighting**. The company manufactures a line of specification-grade white LED luminaires designed for a range of interior and exterior applications. Products utilise the latest high-brightness white LEDs and offer a non-flicker, full-range dimming curve. EcoSense's Neil Gamble, VP of sales and marketing - Europe & Middle East, announced that distribution of these products in the UK would be taken care of by **Architainment Lighting**, led by managing director Nic Tolkien.

Until recently the widespread adoption of white LED products has been prevented by the inability of manufacturers to consistently meet the target colour temperature specification, and by visible variations of colour temperature from unit to unit. This is what EcoSense has sought to rectify. Gamble explains: "EcoSense has developed a stringent LED binning criteria, which has resulted in at least a 4x tighter yield than the ANSI standard."

Carrying on the LED theme, **A.C. Special Projects** exhibited a range of hybrid architectural products based on its popular entertainment technology ranges. They included static and moving head LED units but also fixtures from manufacturers including: **Chroma-Q**, **Spotlight**, **GLP**, **Teclumen** and **Pufferfish**.

Launching his latest venture, **Light Emissions**, Peter Ed, formerly of G-Lec, introduced architects and interior designers to new standards in

large-scale LED video-based graphics. The company's 'Art' system comprises low-resolution RGB LED PCB 'tile' modules, either 37.5mm medium-to-low resolution and a wider 75mm pixel pitch for low-resolution displays. They can be positioned in a frame, which allows for a front diffuser to be attached while 'The Brain' provides a dedicated, fast and powerful video-processing unit.

Of course one of the biggest challenges for the fast evolving architectural market is the interface between various control systems and protocols. **Artistic Licence Engineering** is a company that has been addressing that problem for some years. Managing director Simon Hobday says: "Installations progressively require increased interaction and integration, often involving new technology. Customers want to understand what this means for them. We've responded by publishing *Technical Focus 2*, which explains the workings and detail of DMX to DALI and DMX to DSI conversion, Art-Net, DMX splitters, controllers and LED dimmers, as well as a range of testing products. Alongside, we've set up training days, sponsored by company founder Wayne Howell. These are already proving to be very popular."

Another company ensuring that the control of large numbers of fixtures is not treated as a dark art is **Pharos Architectural Controls**. Visitors to ARC 2011 were the first to see the revised LPC and preview the new RIO A. The award-winning LPC now has enhanced connectivity and improved performance. Eight inputs can now be configured as contact closures, digital or analogue inputs; the serial port has been updated to be a multi-protocol port supporting RS232, RS485 or DMX-in triggering, with an installation-friendly 3-pin connector and a number of other features.

The company's expanded range of Remote Devices feature more flexible design based around Ethernet and PoE. RIO A is a Remote Audio Device with stereo audio-in and support for up to 30-band spectrum analysis and enhanced timecode decoding, as well as MIDI in/out and RIO D - Remote DALI Device supporting both DALI Master and Slave modes.

Meanwhile, over at the **White Light Stand** the team were showing a range of architainment appropriate LED products to the ARC audience for the first time. They included the **Robert Juliat** Aledin, **FullSpectrum**'s Reflection and **Coemar**'s StageLite LED. The company also showed the new **I-Pix** Data over mains system aimed at architectural installations where fitting new cables is not achievable.

White Light MD Bryan Raven says: "The ARC Show allows us to showcase our architectural product range from our various exclusive manufacturers (Coemar, Robert Juliat, RevEAL, i-Pix and ELC Lighting). It's an ideal opportunity to meet people outside our usual customer base and develop our network within this market. We met a number of potential leads and footfall to the show was good."

Niclas Avidsson, Int. sales manager for **Wireless Solution Sweden AB**, concurs: "Our aim is to meet new clients in commercial lighting as well as the architainment market. It's quite a small show but it's a good investment. We did a Prototype release of wireless lighting control of DALI and PWM, although the major launch will be later this year."

For LED fixture manufacturer **Anolis**, the show saw the launch of a new control system - the Anolis ArcControl 1024 - a feature-rich, fully programmable DMX controller, designed to offer comprehensive and intuitive control of all Anolis fittings and third party DMX-controlled luminaires. A stand-alone, wall-mounted system, the Anolis ArcControl 1024 includes a comprehensive library of all Anolis luminaires and other effects for easy installation and programming. An LCD display and scroll-wheel combined with the realtime astronomical clock enable more complex sequences, timed events and colours to be added without using a computer.

Lee Filters were again in evidence, promoting their ranges of products aimed specifically at architectural lighting applications - including its fluorescent gel sleeves (which are available in over 200 colours), glass dichroic filters, diffusion filters and a whole range of other accessories.

This was the first architectural show for the new division of **Rosco Architectural** since it was officially formed. The company showed its new Warm White LitePads. Moving on from standard LitePad products, which have been available for sometime, Rosco now offers customised sizes and shapes, letters etc in warm and cool white configurations. Rosco's Steve Ramos reported: "We were constantly busy and our target markets of designers and specifiers from both architectural and interior design companies were plentiful."

So, a good show on a number of levels. However, one niggling irritation was the constant stream of companies, not exhibiting at the show, touting for business. A couple of exhibitors told me they would like to see a restriction on companies doing this. One exhibitor explained: "There's nothing worse than hurrying through a discussion with a potential client to get to someone you feel has been waiting on stand an uncomfortably long time, only to discover they want to sell you something!"

> **www.thearcshow.com**

People News







USA / UK - Loud Technologies Inc has appointed **Jeff Rocha** as vice-president and general manager of EAW and **Anthony Taylor** as vice-president and managing director of Martin Audio. Rocha and Taylor will assume P&L responsibility for their respective brands, as well as manage all engineering, product development, marketing, manufacturing and sales efforts. In addition, Rocha will lead the EAW design and manufacturing facility in Whitinsville, USA, while Taylor will lead the Martin Audio design and manufacturing facility in High Wycombe, UK.

USA - Harman Professional has named **Mark Posgay** as sales director for the United States. Posgay will be based out of Harman Professional's Elkhart, Indiana Sales & Support Centre and will report to **Scott Robbins**, vice-president of sales. Before joining Harman Professional, Posgay held senior sales positions at Mars Music and more recently at Monster Cable.

UK - Pearce Hire has appointed **Jim Brown** as a dedicated hire manager. After years of touring as an audio freelancer, Brown began working with Pearce Hire in 2010. Other advances see **Dan Shelton** promoted to head of operations, whilst **Daniel Stratton** has been promoted to company electrician, responsible for overseeing all installations and electrical testing.

UK - Rosco has expanded its UK Sales force with the appointment of **Laurie Giraudeau** as sales executive. Giraudeau has experience within the entertainment industry having previously worked as marketing manager for trussing and staging manufacturer Litestructures.

UK - Audio Light Systems Ltd has appointed **Dennis Martin** to head up its new office in Ireland. Martin has worked in performance technology since the early '80s. Prior to joining Audio Light Systems Ltd he was a Project Engineer at Northern Light and before that was chief engineer at Stage Services North, Belfast.

UK - Media Powerhouse has appointed **James Loveless** to head up its audio division. Loveless has worked in audio since the late '90s. The extensive list of projects he has managed range from Scrum on the Beach to a G4 Security Conference for the 2012 Olympics. Prior to joining Media Powerhouse, Loveless was a project manager at Dimension Audio and before that was head of engineering at Orbital Sound.

USA - Crown Audio has announced changes in its senior management team. **John Fitzgerald**, vice-president of programme management at Harman Professional, will take the additional position of general manager for Harman's Amplifier Business Unit and will be responsible for all aspects of Crown Audio's business. **John Batliner**, vice-president of sales for Harman's High Performance Audio Video group, will assume additional responsibilities as vice-president of sales for Crown Audio, and **Matt Bush**, previously director of sales for Crown Audio is appointed senior director of operations for Crown Audio.

USA - Liberty AV Solutions has appointed **Alan Richards** as the company's new Eastern director of sales. Richards comes to his new post with over 20 years of experience within the AV industry. Richards effectively replaces Liberty's former Eastern director of sales **Dan Reich**, who has taken on new responsibilities within the company as its sales operations manager.

USA - **Larry Eschelbacher**, J. R. Clancy manager of controls engineering, has been promoted to the position of director of engineering. Eschelbacher came to J. R. Clancy in 1994 to manage the company's controls department. Since his arrival, he has designed controls for more than 1,000 motorised rigging projects.

Italy - RCF has created a new PR & strategic marketing job function within the company and has appointed **Kenneth Bremer** to fulfil the role. Bremer has been working in the professional audio industry for more than 25 years, from retail, distribution and international work. He will be based at RCF's headquarters in Italy.

UK - At its recent AGM, **Ken Bennett-Hunter** was voted in as the new chair of Skillscene, which represents theatre managements, unions, trade associations and trainers. Bennett-Hunter has over 35 years' experience as a stage manager, production manager, general manager and producer. A vote of thanks was given to outgoing chair **Anamaria Wills** in recognition of her leadership for over eight years.

USA - Analog Way has promoted **Alexander Schöpff** to vice-president of American operations. Based in New York, Schöpff will head up Analog Way Inc. and oversee operations and sales activities for the US, Canadian, and South American markets. Schöpff joined Analog Way in 2003 as a sales manager for Germany and Eastern Europe.

From top: Anthony Taylor becomes vice-president and managing director of Martin Audio; Matt Bush is appointed as Crown Audio's senior director of operations; Harman Pro names Mark Posgay as sales director for the US; James Loveless heads up Media Powerhouse's audio division; J.R.Clancy promotes Larry Eschelbacher to director of engineering; Liberty AV Solutions appoints Alan Richards Eastern director of sales; Analog Way promotes Alexander Schöpff to vice-president of American operations.

The challenging thing about standards is there are so many of them. Which is why the Vista URS-1608 is so special - feed it almost any source in any format, and it routes it to any output display.
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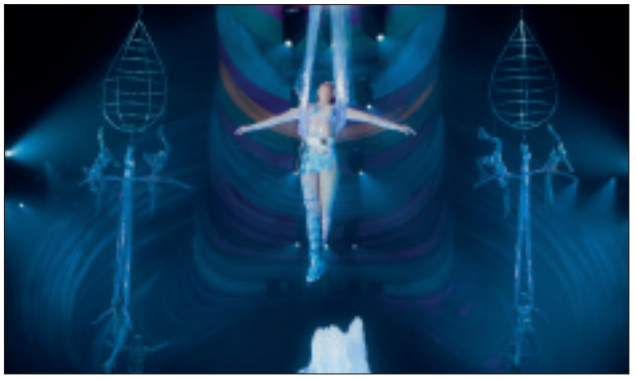
Ice Road Trackers

Currently touring France, *Festival*, the latest Holiday on Ice production, is the first ever touring show to employ Zactrack, a new tracking lighting system. LSi tries to keep up . . .



France - The latest production in the glittering portfolio of ice entertainment giant Holiday On Ice, is *Festival*. On the road in France until May, the show sports, among many impressive statistics, the first touring deployment of the Austrian Zactrack automated tracking system, and one of the largest inflatable set pieces this side of the Rolling Stones.

The success of Holiday On Ice is reflected in the statistics, the company visiting more than 110 cities in 20 countries each year. Each show tours for three or four years, mainly in Europe and South America, but also in markets including the USA, Asia, Middle East and Eastern Europe. Currently running alongside *Festival* in Europe is the company's production *Energia*, currently in the UK until March.

This all-new Stage Entertainment production, with Flashlight/APR - the Belgian rental arm of the Ampco Flashlight Group - supplying a full lighting and sound production package, also features a set design by Bart Clement; lighting, video and effects design by Luc Peumans of Painting With Light; sound design by Leo van den Boogaard and costumes by David Shields.

In charge are executive producer Hans Staal, associate producer Kiki Venhuizen, technical director Bogdan Lewko, supervision and technical support Stano Kusik, technical coordinator Jaap Bouma, casting director Jayne Hamelink, and lighting programmer Paco Mispelters. Maurice Luttikhuis is the new show's musical director.

The set itself comprises the aforementioned inflatable, made by Airworks of Amsterdam and labelled the 'Tornado'; this complex piece employs 7500 square metres of fabric, made up of 10,000 individual segments and inflated by 24 blowers.

Under and around it dance eight principal skaters of Olympic standard, six semi-principals and a 20-strong chorus, assisted by 12 skate crew, the skaters drawn from 12 different countries.

The show's audio and lighting cues are timecoded, with a Pro Tools rig driving an Avid Venue Profile console. Flashlight/APR, as the Belgium member of the Synco Europe Network, is supplying a Synco by Martin Audio line array system, using a combination of W8LC and W8LM cabinets, flown around the ice arena.

Lights that always find you

The Zactrack system, which is compatible with any DMX-controlled moving lights and effects units, consists of several fixed base stations - measuring stations - and movable transponders. Each transponder communicates with the base stations via radio signals and the base stations deliver their measurements to a central computer via a fibre optic network. The system operates within the licence-free ISM band in the range from 5,735 to 5,875GHz and a Zactrack transponder operates at 25mW - considerably less, the company points out, than a mobile phone or wireless LAN signal.

Early adopters, adds the company, were football clubs Bayern Münich, PSV Eindhoven and AC Milan, along with Speed Skating tracks in

Heerenveen, Berlin and Moscow, animal behavior research centres in Switzerland and Germany, and car and motorcycle racing and testing. *Festival*, however, really puts to the test the manufacturer's claim that Zactrack is the most productive and efficient lighting system worldwide.

Peumans chose it to automatically track no fewer than 34 skaters, utilising the system's one-centimetre tracking accuracy to follow them with 60 High End Systems Cyberlight 2 fixtures. "We use Zactrack for following the skaters with Cyberlight 2s," he notes. "After a lot of tests with different types of lighting fixtures we found that only the Cyberlight 2 was fast enough to follow these skaters at the incredibly high speeds they can reach. On previous shows we used the original Cyberlight, but in the Mark 2 version the electronics have improved, and the tracking is very fast."

Erwin Franck, production manager for *Festival* at Flashlight/APR, comments: "It's quite exciting to be first on the road with the Zactrack system. We've used things like Autopilot in the past but this system surpasses anything else for speed and accuracy."

Four corner lighting pods carry the majority of the lighting kit, in combination with followspots, which provide key lighting on the principal skaters in combination with side lighting from the auto-tracked Cyberlight 2s. The other key fixtures are Philips Vari*Lite VL3000s, used to create overall washes on the ice and for projections on the inflatable, and Clay Paky 1500 HPs and Alpha Spots. The Clay Paky fixtures, Peumans comments, "do a great job, they have a lot of power, and they're very reliable. They also provide very good projection possibilities, and the autofocus function means the gobos stay sharp all the time, which is a very nice feature because we do such a lot of projection."

Another Dutch product, this time manufactured by Showtec, is deployed along the edges of the ice, in the shape of a complete line of active sun strips with built-in dimmers. Says Peumans: "They look like an old-fashioned strip light, but you can control every single light to create lighting sequences and so on."

In command of the complete lighting rig - followspots excepted, naturally - and also running to timecode, is a GrandMA console, running 12 universes over MA Net with four network signal processors.

Referring to the programming phase, Peumans notes: "You don't programme the Zactrack moves, obviously, as they're automated. You simply programme in the lighting console to command which light follows which skater, and with each skater wearing a beltpack transponder you can decide to use any beam you like - and the size of the beam is automatically adjusted according to the distance of the skater from the light source via the iris. Something else we're doing which works very well is using Martin Atomic Strobes fitted with gel scrollers. They're mainly focused on the inflatable, to provide special dynamic effects - we planned at first to put them inside the inflatable, but that didn't work very well because that inflatable is a very complex thing!"

As for Flashlight/APR, *Festival* joins a substantial list of arena-scale musical productions currently on the road that includes Holiday On Ice's *Energia*; *Tropicana*'s six month European tour which ends in Kiel in late March; Aladdin On Ice in Greece and Turkey in February; and the recent *Snow Queen* show which ran over Christmas and New Year in Moscow.

> **www.afgroep.com**
> **www.zactrack.com**

From top:

The GDS team outside the new premises at Riverside Business Park, Bristol. Matt Lloyd is second left, Richard Cuthbert far right.

The newly expanded LiteWare production area.

Popular lines . . . LiteWare uplighters, CueSystem controller, BlueDome fixtures, Cue Lights and the MOBAL Socapex tester.

The Cue System software interface.

GDS: The Next Phase

With a reputation for innovation, a growing global sales network and a keen eye on diversification, GDS, always a company with a long-term view, is entering a new phase of growth. Lee Baldock visited the company's new headquarters in Bristol to find out more . . .

UK - With growth of 250% in 2008/09, followed by a further 74% in 2009/10, it's probably fair to say that for Bristol-based manufacturer GDS, memories of the great recession (or whatever posterity chooses to call it) will be relatively painless.

The company closed a busy 2010 with a move to new premises, tripling manufacturing capability and providing for further expansion in a number of directions. Just as importantly, the new, ergonomically maximised production space has, along with other wise investments, enabled a pricing restructure on its LiteWare range of portable wireless event uplighters, making an already popular product an even more attractive proposition to markets worldwide.

Innovation & Timing

Company founders and directors Matt Lloyd and Richard Cuthbert attribute their remarkable success in these troubled years to the timing of product introductions, but they also recognise that innovation is the real driver. Consequently, more than 20% of GDS's turnover is reinvested in R&D.

Products like the Stage Managers' Console and the complementary CueSystem - the TCP-IP networked programmable cue light system - have brought a new, modular flexibility and sophistication to this niche, not to mention a drastic reduction of installation costs. There are already more than 100 GDS SM Consoles in use worldwide, including five at the Hong Kong Academy for Performing Arts, supplied through Pacific Lighting and DinoTech - while the CueSystem is now being specified on some very high-profile theatrical productions around the world.

In fact, the modular SM Consoles and CueSystem are increasingly being specified together, as the system's benefits are becoming clear. "One of our ultimate goals," says Cuthbert, "is for stage management to be able to take their show from a GDS desk in one venue to the desk in the next - and just run it. And that's now becoming a reality."

Innovative Solutions

Behind GDS is a passion is for finding intelligent solutions to real challenges. "We're not here to make a quick buck," says Cuthbert. "We're here to develop the right products for the industry. CueSystem is our first real venture into software development, our first venture into a big product range which is networked together, and it's a mighty job, especially for a company that is not used to working on that scale. But then the result is worth it - it's modular, fast and intuitive."

However, Cuthbert observes: "Actually, you can't make a fast buck, because it's a narrow market - you're not going to selll 10,000 units. But it's a solution to a real problem and I think eventually it will become standard."

Among GDS's other products, the MOBAL Socapex tester also applies to a narrow market, but has been nevertheless a well-received solution to an industry need. While GDS's founders agree it won't make anyone rich, it has further enhanced the GDS brand's reputation for ingenuity and quality.

Plying the Blues

Of course, not all GDS products are so niche. BluesSystem, the low-voltage, LED worklight solution, won a PLASA Award on its launch in 2006, and also picked up the People's Choice Award from the Theatres Trust at PLASA 2010. Blues (the only GDS product line manufactured off-site, in Gosport), is now specified by the world's leading theatre consultancies including Arup, TPC, Charcoalblue, Theatretech, Theatreplan and Carr & Angier.

A new mains voltage version of Blues will soon be available (in the same housing), allowing venues to avoid the cost of low voltage rewiring. The next step, a fully dimmable version, will effectively make the original Blues obsolete - and open up a much wider market. Warm or cool white versions are also available for specific applications, and these, repackaged as the ArcSystem, are now being targeted at the architectural market. What's more, the control technology for a new, cost-effective RGB version is also being developed for ArcSystem.

Looking ahead, GDS is already well down the road of providing a comparable solution to the problem of auditorium and house lighting: a dimmable, low voltage solution which can be installed with minimal disruption and cost, and applied to a wide variety of applications. The first results will be unveiled at a test site soon.

Lighting Up

GDS was the first to market with "a proper solution of a wireless battery uplighter that was bright enough to compete with halogen," when it introduced its LiteWare system in 2009. The original UL uplighter was a 40W unit; the new HO or High Output version is 80W, but can run at 50% to offer the lower output; consequently it's the LiteWare best-seller. GDS has sold 2000 units in two years, and is now manufacturing at twice the rate of 2009. It's also worth noting that LiteWare has led several London venues to insist on wireless uplighters on their technical riders - an example of innovation changing technical practice.

LiteWare's success has inevitably led to other 'versions' which, shall we say, owe a debt to GDS thinking. As a consequence, pricing has become an issue. "We've taken that on board," says Lloyd, "and by moving here and increasing the volume we are able to bring the price right down and pass that saving on to our distributors and to end-users in the UK, where we sell direct."

The steady higher volume has also led to savings on component cost. Instead of buying light engines off the shelf for LiteWare, GDS has invested in developing its own heatsink and heat-transferring copper PCB, to which the (GDS-designed) LED chip - sourced from a new supplier, California-based LedEngin Inc - is mounted. "The result is twice the light output at 50% of the cost," says Cuthbert.

Lloyd continues: "So now the price is not an issue, as long as they're happy to commit to a certain amount. We've already had four distributors buy straight into that in January alone. So we feel LiteWare will maintain its position."

Special Plans

In 2011, further diversification for GDS will see the launch of a new custom project design and build service, called GDS Specials, which will be fronted by a well-known industry figure (watch out for announcements at www.lsionline.co.uk), with design and project management from design engineer Dave Harris, who joined the company in October.

Lloyd says: "GDS Specials applies to theatre, touring, film, corporate events. Using our specialist skills in mechanical, electronic, electrical and software engineering, we can provide any bespoke project - anything you can't buy off the shelf, we will be happy to do."

Global Thinking

Another string to GDS's bow is its global outlook. Lloyd reports strong sales in France, Germany and Italy (which is "phenomenal" for LiteWare, he says). The company is targeting Japan, Russia, Eastern Europe, North and South Africa through PRG Distribution, and the US through ACT Lighting. There is also established distribution in the UAE, Singapore, China, Hong Kong and Macau. "Selling globally is key to our aims," says Lloyd. "Everything we build here can be used all over the world."

This year will see further concentration on the US market, as well as development of the GDS presence in Asia, and particularly China. Lloyd concludes: "We feel we're here to stay now."

> **www.gds.uk.com**

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20 Years Ago . . . L&SI February 1991

Business news: Celco, manufacturer of lighting control systems, had joined the Electrosonic Group, creating 'Celco, the Live Entertainments Division of Electrosonic'. David Leggett, MD of A.C. Lighting, reported overall growth of 6.6% for A.C. in 1990, and was optimistic for 1991 due to new products secured for European distribution, such as the Event lighting console from Jands, the Vision range of stage luminaires and 'Scroller' colour changers from Wybron. A.C. also announced the appointment of Peter Searles as IT systems manager. Meanwhile, Le Maitre Lighting & Effects had become the exclusive UK importer of Luna Tech's Pyropak stage pyrotechnics system.

Overseas, Luciano Salvati, sales manager at Clay Paky, had taken up a similar position with rival manufacturer Coemar. Nexo had opened a new subsidiary, Nexo Far East Pty Ltd, based in Singapore: the company was to be headed by Laurence Tay and James Young of Nexo distributor Electro Systems.

An interview with John Lethbridge, MD of Cerebrum Lighting, covered the company's 20-year history and its recent move to new premises. Lethbridge discussed Cerebrum's early involvement with Celco and, following Celco's move to sales independence, the distribution agreement with MA Lighting of Germany. "We were looking for something that was as equal to or superior to Celco and that's why we've gone the MA route," said Lethbridge.

Lighting designer 'Andy' Watson (as L&SI recorded his name at the time) was interviewed about his work with The Mission. The article related how Watson, while studying for a degree at Sussex University, teamed up with Louise Stickland to build a lighting rig, with which they serviced local gigs for a couple of years. Later, Watson joined Vari-Lite, and went on to tour with Prince and later The Cure, both with LD Roy Bennet, before taking over lighting design duties for The Mission from LD Phil Wiffen. Today, Andi Watson is better known as the celebrated designer for rock royalty, Radiohead.

10 Years Ago . . . L&SI February 2001

This month, the process of decommissioning the Millennium Dome was underway, with 15,000 lots of surplus equipment due to go under the hammer. Pro audio supplier HHB Communications had celebrated 25 years in business, while New York City-based City Theatrical was, to the surprise of interviewer Rob Halliday, already 15 years old.

"It's the first time a show's sound has been all-digital on Broadway," sound designer Jonathan Deans told Rob Halliday, discussing the use of a CueConsole work surface for the LCS Matrix3 and SuperNova DSP systems on new show *Seussical: The Musical*. Why take the chance on new equipment? "The CueConsole takes up seven seats," said Deans, "rather than the 28 that a conventional set-up would have needed." With each seat in a sold-out show capable of bringing in $37,000 per year, the reasoning was clear.

In his *No Comment* column, Tony Gottelier lamented the award of US Patent 6150774 to Color Kinetics. "Whether anyone in the industry would see the use of pulse width modulation and an addressable controller as anything more than an obvious step is a moot point," he said. To illustrate the weakness of the system, he then cited the example, provided by ESTA's Karl Ruling, of a US patent, US 6004596, entitled 'Sealed Crustless Sandwich' . . .

A further concern was Vari-Lite's apparent ownership of Patents relevant to ESTA's development of the DMX-512 A standard, and also to the proposed ACN standard. Vari-Lite had responded that they were "committed to supporting development of the ACN and DMX-A communications standards. To that end, we will be willing to license any manufacturer for a reasonable royalty . . ."

Another L&SI Round Table session saw journalist Louise Stickland record a lunchtime conversation on the subject of 'Multi-Media, its role and its future in production and entertainment'. Discussing were multi-media designer Peter Wilms, visual artist and designer Chris Bird and Malcolm Lewis of Media Projects International.

Singapore: Southeast Asia's nightlife trendsetter

From top:

SOUL: Mezzanine.

SOUL: Nexo PS15-R2 with RS18-SUB positions on the dance floor.

Timbre now sports two clusters of DAS Audio Aero 8A active line array elements.

Singapore has often set the lead for Southeast Asia's nightlife hotspots. Clarence Anthony reports for LSi on two of the island's latest late night developments . . .

Singapore - With its cosmopolitan mix of residents and a strong expatriate community - not to mention a unique geographical position that sits smack dab in the middle of the ASEAN region - Singapore is often seen as the trendsetter for the region's clubbing scene, with its business formulas often being reproduced in Malaysia, Indonesia, Thailand and Vietnam.

SOUL is the newest trance club in Singapore and is the latest venture from the Black & White Lifestyle Group. SOUL offers a variety of experiences for clubbers, whether it is in the Dance Club, where the music is a fusion of solid trance and house beat, in the Vodka Bar, the VIP Club, or in the VIP Room - a large private room complete with karaoke facility and a 7ft pool table.

In phase with the company's moniker, the décor is set in a symbiotic black and white theme with a minimalist and contemporary style for creating a voguish clubbing environment. In the lower level of the Dance Club is a large rectangular dance floor. Standing tables, alcove seating, and a full service bar completes the indulgence on the lower level. Up in the mezzanine, the experience continues with more private tables and an ethereal setting in the Vodka Bar which boasts wide windows and a high ceiling to allow patrons a great view of iconic city landmarks at night; they can also enjoy watching the club's resident or guest DJs performing in the booth.

Singapore-based interior design firm IBA International was the main contractor, and they in turn brought in the services of OTTO Technology to

design and install the audio and visual systems for the main areas. In the Dance Club, the main PA consists of six Nexo PS15-R2 speakers with four Nexo RS18-SUB cabinets stacked underneath to provide low frequency support. Completing the system are Nexo NXAMP 4x4 amplifiers, and a Yamaha SP2060 processor. Providing coverage for the lower service bar are Nexo PS10-R2 speakers driven by a Yamaha XP7000 amplifier.

The lighting system comprises DTS XR5 250W moving heads, DMX strobes, DTS FX5 foggers, an Antari ICE-101 low fogger, and a DMXCreator 512 lighting controller. Laser effects are from a 2W multicolour laser, together with multiple small laser projectors to create a "laser ceiling" between the levels.

To reinforce the mezzanine's upper balcony areas, the system comprises PS10-R2 speakers driven by an NXAMP 4x4 and a PS10-TD V3 controller. The sound in the adjoining Vodka Bar uses PS10-R2 and LS600 cabinets, XP7000 amplifiers and PS10-TD V3 and SP2060 processors. Inside the DJ booth is the favoured Pioneer CDJ-2000MK3 and DJM-2000 set-up with monitoring from Yamaha DSR112 speakers and a Yamaha Q2031B EQ.

SOUL aims to take the clubbing experience to a whole new level with panoramic 3D video imagery which has been specially designed by Oracle Projects International. InFocus projectors and customised content transform the mezzanine walls into a dynamic 3D visual spectacular. Oracle also designed the creative visual feature for the Entrance Foyer using video mapping effects and InFocus projectors. To illuminate the Vodka Bar, OTTO Technology came up with a unique design using LED Pendant Light rings of 1200mm, 1000mm, and 800mm diameters, which would be able to change the ambient mood settings through a series of colour changes from an RGB controller.

Away from the high energy activity at the main club, the sound in the VIP Club is kept at an unpretentious level but the system, using PS10-R2 and LS600 cabinets, can just as easily deliver the high-power, thumping performance when needed. Completing the speakers are XP7000 amplifiers, PS10-TD V3 controller, CDJ-350 players, DJM-350 mixer and a Yamaha MSP5 speaker for DJ monitoring. The lighting system consists of MSD250 scanners, DMX Strobes, and a DMXCreator 512 controller.

Although the dance platform may seem to be the coolest slice of the club pie, it is in fact the live music venues that still own the nightlife in Asia. Timbre @ The Substation, the flagship establishment for Timbre Group, is such an outdoor music bar which offers a selection of great food and live music. The venue has become a target destination for local indie music fans, with some of the best original bands in Singapore having performed there.

Having set precedence by introducing many new bands into the limelight, the venue can now add another first to its record, in having the first D.A.S. Audio Aero 8A active line array system installed in the region. The installation is part of the collaboration agreement between D.A.S. Audio Asia and the client, Timbre Group. The venue's new FOH now sports a newly installed truss system with two clusters of Aero 8A active line array elements which are flown six per side, and three units of the powered LX-215A subwoofer, which are ground-stacked in a centre-mono subwoofer configuration. Other D.A.S. Audio speakers installed at Timbre are the powered Avant 12A as stage wedges, with an Avant 12A hung at each end of the front truss and facing out as side-fills.

To complete the system, only one DSP-4080 audio processor is needed for speaker management. Since its commissioning just over a month ago, the Aero 8A line array system has proven just perfect for the characteristics of the venue and the high energy performances that occur every night there - especially if one is judging by the patrons who stayed to enjoy the new sound, thus making the install another milestone for the team at D.A.S. Audio Asia.

What's new out there . . .

Product News updates online:
www.lsionline.co.uk

Audio

Mackie extends the Thump series

USA - Mackie has announced an ultra-compact addition to its Thump Series of portable, powered loudspeakers - the Thump TH-12A. The new 400W, two-way 12" Thump Series loudspeaker is designed for any application that demands high-output, professional sound without breaking the budget.

www.mackie.com

Audinate debuts Dante Brooklyn II

Australia - Audinate has launched its new Dante Brooklyn II audio networking module, a low-height, small mini-PCI form factor module that provides a complete, ready-to-use Dante interface for a networked audio product, with the addition of a range of new features and interfaces for even more flexibility of design. Brooklyn II is also designed to be upgradeable to AVB networking standards, says Audinate.

www.audinate.com

Adam Hall releases power amplifier series

UK - Adam Hall has launched the LD Systems Deep2 amp series, featuring four class-H power amplifiers with toroidal cores offering amplifying levels from 2×350W to 2×800W at 4 Ohms. The Deep2 series features include a clip limiter as well as all the standard protection circuit. While in continuous operation the amps are 2 Ohm and 4 Ohm (bridge) stable. All common in- and outputs can be found on the rear panel. All models feature robust steel plate housing while maintaining a lightweight, compact and user friendly design.

www.adamhall.com

Increased safety & flexibility for JoeCo's Blackbox Recorder

UK - Blackbox Recorder manufacturer JoeCo has released the latest software update (V2.1) for its 24-track live recorder. A major implementation is the new Safe 'n' Sound record recovery feature that enables recorded audio files to be recovered after a sudden accidental loss of power. All recorded data can be recovered including song splits, song names and track names. The recorded files will also still be split up into smaller bite-sized pieces that some workstations rely on when importing. Further features include a new background disk scan feature, which automatically scans a drive when first connected to the BBR to ensure that free space and first available cluster fields in the File Allocation Table (FAT) are correctly calculated, or recalculated and repaired as necessary.

www.joeco.co.uk

Dynacord debuts Compact Mixing Systems

Germany - Dynacord's new, three-model CMS series includes the CMS 1000 (10 input channels), CMS 1600 (16 input channels) and CMS 2200 (22 input channels). All feature low-noise, microphone preamps; six AUX busses; two 24-bit stereo effects units; an 11-band graphic eq; vocal voicing filters; and a low-cut filter.

Newly integrated is a 4in/4out USB interface (for PC and Mac) to support 4-channel recording and playback.

www.dynacord.com

Audio-Technica recharging station released

USA - Audio-Technica has introduced the ATW-CHG2 Two-Bay Recharging Station for its new 2000 Series wireless transmitters. This unit charges ATW-T220a handheld transmitters and/or ATW-T210a UniPak transmitters (in any combination). Batteries are charged within the transmitters.

A built-in safety feature monitors cell voltage and automatically turns off the unit if problems are detected. The unit will also automatically shut off if damaged or alkaline (non-rechargeable) batteries are installed. Maintenance charging prevents battery self-discharge until the transmitter is removed from the charger. Two AA 2000 mAh Ni-MH rechargeable batteries are included.

www.audio-technica.com

Optocore upgrades MADI network devices

Germany - Optocore has announced the release of the DD4MR-FX and DD2FR-FX dual MADI, video and data network devices. These two 1U products have been designed for compatibility with Optocore's new Cat 5-based SANE platform, allowing up to 256 channels over Cat 5. The existing DD4ME and DD2FE MADI devices have thus been re-engineered to function within this environment, and include RJ45 SANE network connectivity, while the optical port upgrade (to 2Gbit LC SPFs) allows for simple user exchangeable single or multimode fibre transceivers.

www.optocore.com

XTA debuts 'DP448 on steroids'

UK - XTA has introduced the DP548 Dynamic Audio Processor, described as the "DP448 on steroids." XTA sales & marketing director, Bill Woods comments: "Think of a standard DP448 - fully loaded with a 28-band EQ, eight parametric EQs and delay on every input; high pass, low pass, nine parametric EQs and delay, plus a combination of two limiters, including the look-ahead "D-Max" limiter on each output.

"Then add three bands of Dynamic EQ on every input, a variable knee compressor on every output with full control over ratio, threshold, attack and release times. On top of all that, include full matrix mixing of any input to any output or mix of outputs and provide memory recallable dynamic EQ for the first time via AudioCore, and that is the power and potential of the DP548," says Woods.

www.audiocore.co.uk

Audio-Visual

D-Tools SP3 upgrade available

USA - D-Tools has released SI5.5 Service Pack 3, available to all customers via automatic updates. D-Tools System Integrator is currently used by over 3,000 companies to streamline the design, estimation, and documentation processes associated with the installation and integration of low voltage systems. In addition to enhancements and bug fixes, SP3 includes expanded support for the tools that customers rely on to manage their business, says the company. This includes new support for QuickBooks 2011, Outlook 2010 and Visio 2010.

www.d-tools.com

Screen Monkey version 3.5 released

UK - "With more layers and more clips, the latest version of Screen Monkey media playback and control software is sure to have something you are looking for", the company claims. Highlights of the new version include: New audio layer and video layers; new Scribble Clip to allow freehand drawing on a layer; test card clip to display test

images; SVG (Scalable Vector Graphics) support; extra effects generator shapes; improvements to display profile editor; layer size and position control through DMX.

www.screenmonkey.co.uk

Lighting

Chauvet releases SlimPAR Pro family

USA / UK - Chauvet has launched the SlimPAR Pro family of products, available in three styles: variable white (VW), red/ green/blue/amber (RGBA) and tri-coloured (Tri) LEDs. All three are high-power LED wash lights, flicker-free - making them a video-friendly choice - and housed in rugged cases.

Chauvet has also added two members to the COLORado line of products, COLORado Range IP and COLORado Ridge IP. COLORado Range IP has 180 5W, RGBWA LEDs, two independently adjustable panels, and 15° and 30° lenses installed. COLORado Ridge IP consists of a single panel with 90 5W, RGBWA LEDs with 30° lenses with an option for 15° lenses.

www.chauvetlighting.com

City Theatrical launches latest power/data supply

USA - City Theatrical is now shipping its PDS-375 TRX power/data supply for Philips Color Kinetics CKDMX LED lighting fixtures.

The PDS-375 TRX combines advanced new LED fixture control and configuration features with multi-control protocol interoperability and powerful new data management resources in a single lighting control unit, and along with the larger PDS-750 TRX, represents the first practical implementation of all of these features in a single unit. The unit can be controlled with all popular Ethernet protocols including Streaming ACN, Art-Net, or KI-Net, as well as wired and wireless DMX512, and is fully RDM enabled. Every unit includes a built-in SHoW DMX receiver.

www.citytheatrical.com

Elation's Antari fog machine on the case

USA - Elation Professional has introduced the Antari F-3 Fazer. This new DMX-compatible 800W water-based dry fog machine comes integrated in its own steel flight case. The F-3 Fazer's case design also makes it easily stackable, so it can be packed up and transported with no fuss and hassle - and ready to roll anytime the show goes on the road, says the company. Featuring Antari's pump system, it produces "a fine, dry fog with minimal fluid consumption".

www.elationlighting.com

ETC announces Eos software update

USA - ETC has released an update to its Eos family of lighting control desks, providing improved and additional functionality for Eos, Ion and Element users. The major change for Eos and Ion is a new Virtual Media Server which allows the creation of grids of fixtures, to which static and animated images can be applied, with a variety of manipulation tools. Similar to a media server, images can be created or imported by the user. A second download - Eos Family Pixel Mapping Installer - allows users to add media content to the console for use with the Virtual Media Server.

www.etcconnect.com/downloads.aspx

Martin's LightJockey 2 repackaged

Denmark - Martin Professional's PC-based lighting software, LightJockey 2, is now shipping with the new Martin One-Key protection device, one Martin USB DUO DMX and the MSD5 MC Edition 3D Visualizer. Martin also announces a LightJockey hardware replacement programme. Through the programme, old LightJockey hardware from an ISA PC card to a Universal USB device can be returned for exchange. The replacement kit includes the Martin One-Key, either one or two Martin USB DUO DMXs, and an MSD5 MC Edition 3D Visualizer.

www.martin.com

Rycote rebrands Lightwave line

UK - Rycote has added three telescopic carbon-fibre boom poles to its range of accessories for broadcast and location sound recordists: the 1.63m long G3, with three sections, and the 2.49m long G5, with five sections. The G5 is itself available in two versions, a standard version and one with an internal coiled cable and built-in Neutrik XLR connector in the hilt.

For several years, following their takeover of US boom pole manufacturer Lightwave Audio, Rycote has been selling telescopic boom poles under the Lightwave name. However, with the launch of the Rycote-branded G-series carbon-fibre poles, the entire range, including the A3 and A5 aluminium poles, will now be rebranded as Rycote products.

www.rycote.com

Traxon debuts long distance LEDs

China - Traxon Technologies has introduced the Shield AC XB lighting system, designed for wall washing and grazing applications where fixtures are located far from the control area, or where the structural construction is complicated and extensive cabling or mounting is limited.

Powered by line voltage, the Shield AC XB system can run up to 300m away from the nearest power source. It eliminates the need for separate driver units and is suited for large scale architectural installations, such as bridges and high-rise buildings, as it allows more flexible placement of fixtures in outdoor applications, says the company.

www.mood-light.com

Staging

LTM adds more blocks and clamps

UK - Lift Turn Move has announced two additions to its product range - The C-Force Manual Chain Block and C-Force Beam Clamp. These new products are all black in colour which makes them suitable for venue and touring rigging applications. These professional duty blocks come complete with swivelling load and suspension hooks, lightweight, low headroom, safe and easy operation. LTM has also supplemented its existing product range with the C-Force Beam Clamps. They are available in 1,000Kg - 5,000Kg capacities and again, these are available from stock and come in an all black finish, making them suitable for the entertainment industry. For those who need it, these clamps can also be offered to the German BGV-C1 standard.

www.liftturnmove.co.uk

Send your new product information to:
news@lsionline.co.uk

Classic Gear: The 15A Plug . . .

Rob Halliday takes a nostalgic but instructive look back at the tools that have shaped the industry . . .

Some classics revolutionise. Some improve. A few are just quietly indispensable. This is one such: the 15A plug (and its companion socket) which have fusslessly been serving British entertainment lighting for more than half a century now.

In some ways the 15A plug is actually a historical artifact, a dinosaur that has survived in the shelter of our specialist world. It was created as part of British Standard BS546 in the 1930s, a response to the 10th edition of the IEE's electrical regulations' call for all sockets to have an earth contact. It is one of six related connectors designed to replace the myriad of plugs (and adaptors designed to feed appliances from light fittings, since power for lighting was often charged at a lower rate than power for other uses) that had proliferated since the dawn of domestic electricity supply. All had round pins. Two were two-pin connectors, the 5A variant still familiar as the standard UK shaver plug. The other four were all triangular three-pin, scaled up or down variants designed for 2A, 5A, 15A and 30A, live and neutral at the bottom, a longer earth pin at the top.

The 5A and 15A versions became common in domestic wiring, the smaller one intended for lighting and small appliances, the larger for heaters. But then came BS1363. This introduced the 'ring main' to British domestic wiring in an attempt to reduce the amount of copper required in the austerity of post-war Britain. But this new technique demanded that each plug be fused to protect its appliance and the cable feeding it. A new, rectangular-pin 'type G' plug that became the British standard (plus alternative designs from Wylex and Dorman & Smith) were fused. The old, round-pin plugs weren't.

Theatre lighting doubtless adopted the round-pin 'type D' connectors because of their ready availability. 15A became the de facto standard because it coped with lamps of up to 2000W, though some smaller installations used the 5A connector instead. We just kept using them, partly because we had no need to change, partly because we didn't want a fuse in the plug, which would make troubleshooting a rig a nightmare: the fuse at the dimmer protected the circuit.

And so they keep going today. The original Bakelite has given way to plastic and now most commonly to rubber. The pins have acquired sheathing, the sockets internal shutters. Everyone has at some point wired the plug without first feeding the cable through the plugtop; it's a sort of rite-of-passage. Many users prefer them to the CEE-form connectors now often proposed as alternatives: they take up less space, particularly at plug boards in tight spaces such as fly floors, there is no spring-loaded protective cover to snap on your fingers, and black tends to be less obtrusive in the rig than bright blue - though a truce is often reached where CEE-forms feed non-dim power to moving lights.

Elsewhere in the world, the 15A plug has a life beyond theatre: electrical connectors are often a reminder of a country's colonial past, and the 15A plug is still the standard domestic connector in South Africa and commonly found - rated at 16A - in India.

In theatre it has served everything from the classic-classic Patt 23 to the modern-classic Source Four (both, ironically, requiring just a fraction of the connector's 15A capacity). It's a classic, but a humble, working one.

More than you ever wanted to know about plugs and sockets:
> www.fam-oud.nl/~plugsocket/

Or for the less technically-minded:
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"A piece of sound art won the Turner Prize last year, the UK's most prestigious gallery gong. Maybe this signals a new relationship between genres."

Phil Ward's audio musings . . .

This month: The art of noise

SOUND, ENGINE, EAR

I've never been one for trying to separate entertainment and art. As far as I'm concerned, Mozart was the Jimi Hendrix of his day and Tex Avery has the same right to be in an art gallery as Rubens. I tend to deliberately confuse the contexts, a bit like Tommy Cooper did in the routine about finding a Rembrandt and a Stradivarius in the attic. You know the one: the only trouble was, Stradivarius was a rotten painter and Rembrandt made terrible violins.

The only differences between art and entertainment are socio-political. Middle class people use classical music as a weapon in just the same way as rastafarians use reggae. Music is tribal, and will accordingly be assigned value-added labels like 'cheap', 'serious', 'trash' and 'culture' by self-appointed tribal elders. Those without any artistic sensibility at all turn to neutral data for signposts, such as sales figures and chart positions, leading nowhere except towards what French thinker Alexis de Tocqueville called the 'tyranny of the majority'. Just because an opinion is the majority doesn't make it right. It just makes it louder.

I digress. All of this is prompted by the appearance of a very significant number of Meyer Sound loudspeakers in an art gallery. Not as exhibits, you understand, although I'm sure some of the defining models will end up in a science museum one day. The church of culture in question is The Serpentine Gallery in London's Kensington Gardens, where French artist Philippe Parreno has ordained a fascinating audio-visual installation.

It's actually four works spread across four galleries, each an evocative film with brooding soundtracks. The narrative is highly abstract, and therefore depends enormously on the quality of the audio to deliver subtle hints and moods. Aware of this, Helen Meyer engaged in probing negotiations with Parreno and his team and made sure that Meyer Sound got the gig. Word passed to Roger Harpum, Meyer's indefatigable representative in the UK, who duly enlisted theatre mainstay Autograph Sound to deliver and install an impressive inventory: three Acheron speakers - pivotal to Meyer's new EXP cinema range - for a sequence called *Invisibleboy*; five MM4-XP powered speakers for *No More Reality*; eight UPM-1Ps and one USW-1P for *Boy From Mars*; and no fewer than 28 MM4-XPs, five UPA-1Ps and three USW-1P subs for *June 8, 1968*, a depiction of assassinated senator Robert Kennedy's posthumous journey by train from New York to Washington DC.

The latter was the most interesting: the MM4-XPs are positioned behind a giant screen exactly where the sound source corresponds to the visual cue, making the entire canvas a pinpoint-accurate audio-visual field. It would work just as well in conventional cinema. To achieve it, something like 64 channels of playback audio, delivered via QLab on Mac minis, are processed through a Yamaha DME64N with MADI cards, routing each sound to the right output at the right moment throughout the entire automated programme. Cool.

According to Autograph's Scott Arnold, who spent several days on site making sure that the audio, shall we say, ticked all the right boxes, this is new territory even for The Serpentine. Suddenly, all these wires and boxes turned up, and Scott was wise enough to enlist the support of production sound engineer Ken Hampton. Rather pleasingly, just as Scott, Ken and the others were puzzling over how to hide all the cable runs, Parreno's team arrived on the scene to insist that they remain visible as an integral part of the work. So much for Health & Safety.

Showing the wires is a very modernist concept, and chimes with our old friend Marshall McLuhan and his medium-is-the-message stuff. Ever since rock music went all grown-up, apart from heavy metal, bands have relished the images of cable-infested rehearsal rooms, grainy pointers to the means of production and repeated celebrations of instruments, technology and studios that represent the antithesis of the old showbiz creed of keeping backstage well and truly, well, backstage. Behind the curtain. Away from the audience. They get the silver screen, the old razzle-dazzle. It's an artifice, but any promoter will tell you it's what the crowd wants. Smoke and mirrors, bright lights and botox-rigid smiling faces. Anything else is for geeks.

And maybe that's a distinguishing factor of art, after all: its honesty. I do have to concede that there is a kudos attached to this kind of job. Why else would Meyer Sound and Autograph so willingly designate it a loss leader, with most of the transactions taking place at a highly discounted rate in order to oil the wheels of commerce onto the rails of culture? At least Autograph can re-purpose the stock at the end of the installation and sell it on, and Meyer will win the plaudits. I just wish it didn't have to be so.

A piece of sound art won the Turner Prize last year, the UK's most prestigious gallery gong. Maybe this signals a new relationship between genres. If so, I sincerely hope we can look forward to an era of pro audio commissions that are no longer required to take a financial hit merely to hitch them to something that's considered to be somehow more worthy. Entertainment or art, who cares? You should pay for quality.

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Behind The Wall

A seminal concert production returns - for the first time in a touring format . . .

words by Sharon Stancavage
photography by Todd Kaplan

So ya, thought ya, might like to go to the show - (In the Flesh?)

A unique cross of rock concert, spectacle and performance art, *The Wall* has until now only been exhibited in five separate cities. In 1980/81, it was presented in Los Angeles, New York, London, and Dortmund, Germany. In 1990, it was performed in Berlin to celebrate the demise of the Berlin Wall. Now it is on tour for the first time.

Although *The Wall* was officially a Pink Floyd project, it is largely the work of Roger Waters, sole author of all but four songs on the album. It is a concept album - a rock opera about a young man named Pink, whose lifetime of suffering - a father lost to war, an overprotective mother, abusive schoolmates and a broken marriage - culminate in his separation from the world, symbolised by the giant wall.

The live show was also an expression of Waters' vision, resulting in an event that was unlike anything previously seen on the concert-touring circuit. As *The New York Times* noted in 1980: "The *Wall* show remains a milestone in rock history . . . Never again will one be able to accept the technical clumsiness, distorted sound and meager visuals of most arena rock concerts as inevitable." It added: "The *Wall* show will be the touchstone against which all future rock spectacles must be measured."

This was no mere PAR can light show: *The Wall* set a new standard for concert spectacle. Audiences saw a giant wall built and torn down onstage, along with several inflatables, a plane crash, pyro and large-scale 35mm projections.

Popular wisdom has long concluded that *The Wall* could not be toured, but production designer Mark Fisher, of London-based Stufish, who has worked on all of the show's live incarnations, disagrees. "In 1980, you would have had to load it in the day before the show. So it could have been toured," he says. The issue, according to Fisher, was not the size of the show, but the economics of the era. "Ticket sales today generate proportionally more revenue than they did in 1980 - this allows artists to pay for the stage sets of a size that they could not previously afford," he explains.

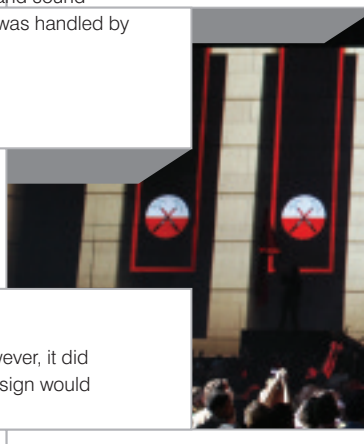
In 1980, the average ticket price was $12.50 (£7.80 - using today's exchange rates), which is $35 (£22) in 2011 prices. Today, the average ticket price for the tour is $117 (£73); the potential gross ticket sales are $257 million dollars (£161 million pounds); the cost of the production is rumored near $60 million (£40 million pounds).

Although credited as production designer, Fisher admits that his role in this project is somewhat different. "Roger is the author of the show. My role has been much more that of being a realiser of Roger's vision and a creator of new ideas that Roger then approves of," he say. "It's at the very least collaborating, at the very most, following strict instructions," he concludes with a chuckle.

From a design standpoint, the past is indeed analogous to the present, Fisher notes: "The 2010 show is mechanically a facsimile of the original 1980 show - everything has been rebuilt, but there is nothing significantly different in the way that the thing is done - from the small print of the engineering to the fact that some of the components are sourced from the same company that we sourced them from back in 1979 when we were building it for the first time."

In 1980, the primary vendor was Britannia Row [at that time, Pink Floyd's wholly-owned staging, lighting and sound company]; this time out, scenic fabrication was handled by Tait Towers of Lititz, Pennsylvania.

Working with Fisher to complete the vision was technical director Jeremy Lloyd, who typically handles all the stadium and larger arena shows at Stufish. "Basically, we had to take paper drawings, things on transparencies and tracing paper that had been drawn by hand, and go over every single piece," he explains. It was, he adds, "a very boring, slow process." However, it did guarantee that the integrity of the original design would indeed survive.



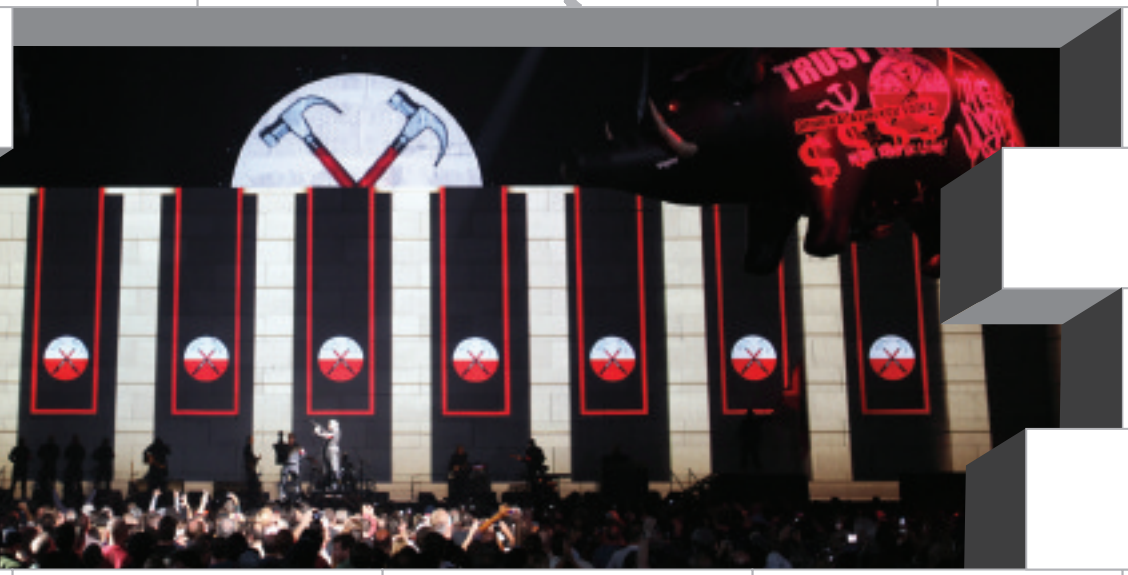
MOTHER SHOULD I BUILD A WALL?

- (Mother)

The nexus of the 240ft (73m) wide by 35.5ft (10.8m) high wall are the ramparts - the two wall sections that are in place at the start of the show. Lloyd says: “In 1980, the ramparts were built with some big plywood boxes and scaffolding - they would cut the plywood around the seating, remove loads of seats. It was a major operation, and it took a long time to complete.” Today, the ramparts enable the wall to be erected in virtually any venue. They’re constructed using a multi-part rolling scaffold system, lightweight decking, and a universal hardware kit that includes, according to production manager Chris Kansy, “feet, legs, shims and lots of extra bits.”

Tait Towers also developed a new leg for the ramparts. Tait’s director of design, Tyler Kicera, says: “No matter where the bottom point of the structure is . . . we have a leg we can drop to accept that distance - that’s what allows the structure to adapt to the different inclines of the different venues.”

The scenic design itself also allows for adjustments of the ramparts. “They can shift the entire rampart fascias, the brick fascias, onstage/offstage by 6” (15cm). It’s quite a large amount, but it means they can guarantee that the bricks line up with the stage when it’s in place,” Lloyd remarks. Perfect alignment is critical, since, if the middle didn’t line up, “it would look absolutely terrible, particularly with the projection on the wall - you need to have as flat a surface as possible.”



ALL IN ALL IT WAS ALL JUST BRICKS IN THE WALL - (Another Brick in the Wall, Part 3)

The bricks - physical, as well as metaphorical - have always been an integral part of the show. In 1980, they were constructed of corrugated cardboard painted white; for storage, they simply folded and stored flat. In 2009, when Tait Towers took on the project, Kicera says: "We went through a bunch of rounds using different materials, different thickness, plastic versions, double wall, triple wall - and, at the end of the day, we arrived at a similar solution that Mark had."

That solution was a brick constructed of die-cut tri-wall corrugated cardboard. The finish of the brick "had to be fireproof, it had to be something that dried quickly, and it had to be something that they could get hold of anywhere, so they can touch-up the bricks when they get scuffed and damaged," Lloyd notes. Store-bought white latex paint was the answer for the finish. Tait contracted a firm in Connecticut, and, according to Kicera: "Since there's a ten-percent attrition rate each night, we're still in the brick-building business."

There are a total of 245 bricks - 60" (1.5m) wide by 30" (.76m) high by 18" (45cm) deep - placed during the show. 346 bricks are used in total.

In 1980, Fisher realised that Britannia Row needed a technical partner to build the *Wall*'s machinery, since the set-fabrication industry was extremely limited. "In a way, the biggest challenge back then was who we were going to get to build it," says Fisher. Research led him and Jonathan Park, his engineering partner at the time, to Genie Industries. After explaining their needs, the owner "turned over part of his factory to Jonathan," Fisher recalls. Genie built the vertical stabiliser masts used to keep the wall in place in 1980; for this tour, Tait repackaged masts produced directly from Genie.

The masts are located inside the 8ft (2.4m) high by 100ft (30m) long main stage. Lloyd says: "You place a brick, they push a button on the controller and the stabiliser will rise by the height of one brick." McLaren Engineering was also involved in engineering certain aspects of the show, including the brick stabilisers, technicians' lifts, followspot rigs, puppets, band lifts, round projection screen, and the portion of the lighting rig that handles the Barco/High End Systems Cyberlights.

In 1980, Genie also offered the solution to physically building the wall night after night. Fisher says: "Jonathan Park went to work at Genie Industries and developed what subsequently became the double Genie - which they did not make up until then."

Tait recreated the double Genie man-lifts used by the carpenters to create the wall during the show. Five personnel lifts, with two carpenters on each, create a 100ft-wide moving platform. During *In the Flesh, Part 1*, the carpenters appear on the man-lifts, acting as flag-bearers. Fisher remarks: "That is the new scene that was added. We were struggling to find something to do at that point of the opening, and came up with that in rehearsal, and it works very well."

The personnel lifts are also used for the band in the second half of the show, most notably during *Is There Anybody Out There?* and *Comfortably Numb*. "Robbie, the lead singer, is taken up on a lift so he's singing from above the top of the wall, and Kenner, the guitarist, is on another lift, up on top of the wall, and they are run remotely at that point," notes Lloyd. The personnel lifts are either controlled locally or remotely via a Navigator system from Las Vegas-based Fisher Technical Services Inc.

IN PERFECT ISOLATION HERE BEHIND MY WALL - (Waiting for the Worms)

During the first act, Waters and the band are upstage of the wall, and, brick by brick, they become separated from the audience. When the wall is complete, *Hey You* and *Is There Anybody Out There?* are played entirely behind the wall - a surreal experience. "The separation that you might feel from things that might be important to you are symbolically represented by this wall, which is separating you from the band who are playing the music," is how Waters describes it.

The wall also features a hotel room, which is constructed using a drawbridge. In what Waters has said is one of his favourite parts of the show, the drawbridge is bolted down, Waters walks in, sits down and sings *Nobody Home*.

The production also features two stages. The main stage, located upstage, is 100ft (30m) long and 8ft (2.4m) high. The forestage, which is on the downstage side of the wall, is 80ft (24.4m) long and 5.5ft (1.7m) high. For this production, the forestage is covered during the first half of the show with a slip-stage unit. Lloyd says: "Tait came up with a really nice system for the decks that roll open - these little tambour covers. It's a very nice system, very compact."

TEAR DOWN THE WALL! - (The Trial)

At the end of the penultimate number, *The Trial*, the wall collapses. "In 1980, it was Mark Fisher with a toggle switch - he'd hit go, and he'd have to toggle the hammers back and forth manually, sort of shaking the wall almost by hand," explains Kicera. In fact, the first time Fisher ever saw the wall collapse from the front was during rehearsals for this tour.

In 2010, Fisher is left to his design duties, replaced by another type of Fisher - the Fisher Technical Navigator system which controls the stabilisers. "On the top of each stabiliser there is an arm, which is a pneumatic hammer. The arm is about 2.5ft (.75m) in length, from the pivot point to the tip of the arm," notes Lloyd. During the build phase of the wall, the arm is vertical. To operate it, "you can either rotate the arm forwards by about 30° and you can bring it back up to the centre, and then you can rotate it backwards by about 30°." The arm moves both upstage and downstage, which allows the bricks to fall in two different directions. "Otherwise, you'd end up with a very big pile on one side. This way, it looks quite nice falling," adds Lloyd.

Although the set design is modular and has been created by the very best in the business, it doesn't mean that it isn't a challenge to tour. "No one has done this before," Kansy says, "and it's a long day."

IS THIS NOT WHAT YOU EXPECTED TO SEE? - (In the Flesh?)

Creative director Sean Evans, editor Andy Jennison from Breathe Editing of New York, who both worked on the *Dark Side of the Moon* tour, and Waters himself, headed content creation. The initial plan was to divide the work up and send it to a number of graphic houses - a typical approach for a concert tour.

However, *The Wall* is anything but typical. "Roger is very specific, so he wants to be able to walk into the room, look at a frame, and say 'yes' or 'no.' There are also subtleties that he needs to see - it's not something that we could be sent renders of and say, 'OK, that's fine'," Evans reports.

Instead, a small group of talented individuals was assembled to work out of Breathe, side-by-side with Waters, beginning in January 2010. "He [Waters] put in a lot of hours working on this," Evans asserts.

The original footage from the film shown during *The Trial*, which featured animation by Gerald Scarfe, was located in Waters' personal AV vault, and became part of the production. "We had that source film, and we used some of that in the new show - we restored it and painted out the sides in the format we invented for this," Evans explains.

The format was dependent on several factors, including the wall dimensions and the brightness of the visuals. Evans explains: "In order to get acceptable brightness and a good image, we wound up with a resolution that is 8K wide - an IMAX screen is about 4K."

On paper, a double IMAX screen of that width appears reasonable. The reality is somewhat different, as Evans explains: "Every single frame that we have is 8,560 pixels wide - for some of the 3D sources, one frame would take half an hour to render." Rendering the images became an issue; render farms were contacted but turned down the work once they heard the output resolution and amount of work, so the team did it in-house. "We had 10 16-core desktop Mac Pros as dedicated render machines that immediately started working round clock," says Evans.

Thematically, in 1980, *The Wall* was about alienation of an artist from his fans. In 2010, the

theme has evolved. One iconic image from 1980 featured the marching hammers. Evans notes: "We had done some versions that were very modern-looking and very photographic, and very photo-real with lots of lighting and lens flare - very dramatic. They looked great as stills and as animation but didn't look right in context with the other animation."

The hammers weren't the only images that were originally too photo-realistic. "There's a bit in *Mother* where there's this sort of blood liquid that goes across from stage right to stage left, and I had rendered that out so that it had all kinds of reflection and refraction and it looked like very realistic blood - but it just didn't make any sense in the context of the rest of the show," Evans says. The bombers seen in *Goodbye Blue Sky* were also originally very photo-realistic, and then adapted to remain cohesive with Scarfe's original style of animation.

"For *Run Like Hell*, we started doing the destroy and bend tests very early on to see if it would fly in a live environment," says Evans. This song is one of the most visually complex of the show: "It's a long process; the strobing lights are rendered out and then looped in After Effects. Then that's rendered out, and that is placed into a 3D file where the bricks are flying out. Then it's brought back into After Effects, colour-corrected and grain is added."

Waiting for the Worms also features dimensional imagery courtesy of Cinema 4D. "*Waiting for the Worms* is where you see a lot of what can be achieved," says Richard Turner, the show's screen technical director. "It's one of Sean's pieces that is just architectural - it's an Albert Speer-type building with columns, when the worms start coming in and out, and they track through the columns, and suddenly you're in a Scarfe world with a cityscape."

That cityscape is from the world of 1980. "In *Waiting for the Worms*, when we come into the hammer sequence, we're coming out of the old animation. We reformatted Gerry Scarfe's animation from the original show to fit our new format, and it's literally a cut between one scene and the next, so they had to work well together," says Evans.

HOW SHALL I COMPLETE THE WALL? - (Empty Spaces)

Turner, of UK-based Lucky Frog Limited, was the specialist Evans consulted to ascertain if a seamless HD projection across the 240ft by 35ft wall was possible. "What's technically possible is whatever you can afford and whatever you have the time for. Then you're into what is pragmatically possible," Turner says.

The video system requirements included the ability to do seamless projection across the wall; to mask individual bricks, and to mask around the seats in each venue. When asked if those parameters could be met, Turner's answer was 'yes' but with a caveat: "The design will require an unprecedented level of cooperation between departments."

In 1980, three 35mm projectors were used to project three separate 4x3 frames across an 80ft (24m) central section of the wall. Since then, technology has changed radically and, with the advent of media servers, complex video productions are now commonplace on tour. DLP projectors came into the concert world in the late '90s, but the Barco projectors used here, provided by XL Video's Nashville base, were not developed until 2006.

Turner determined that the wall would be divided into five overlapping sections. However, due to the expanse of space, multiple projectors would be required. Considering rigging concerns, sightline issues and alignment times, the ideal number of Barco FLM HD20s was determined. "One has to overlay three projectors on top of one another to get what I would call the minimum acceptable brightness for this situation," he says.

The projectors, which are placed next to each other, must be rigged as quickly and as precisely as possible, giving Turner the maximum amount of time to align the system during the afternoon. "We made it easy for ourselves on the rigging front by coming up with a custom frame, so we're carrying three projectors going across on a yoke that can be twisted, turned, panned and tilted to the angle that we need." SGPS Show Rig, of Las Vegas, fabricated the frames, which were jointly designed by Turner, XL Video and Eric Pearce of SGPS. The latter company also handled all the show rigging outside of the sound rig.

The next technical challenge involved creating a seamless projected image on the wall where the surfaces intersect. Typically, this is achieved in one of two ways: by using the morph function of the projectors to blend the image, or by physically creating shutters on the projectors using gaffer tape or other physical barndoor mechanisms. Both solutions were problematic, because they result in a visual grey barrier on the overlay area. Turner says: "The normal corporate way out is to ignore it and flood the screen with a bit of light, or to make the content in such a way that you never see that. We couldn't really say that to Roger."

Turner was well aware that projection shutters were on the market. Unfortunately, those products weren't functional on the Barco FLM HD20s. Consequently, he turned to Tait Technologies in Waardamme, Belgium to create shutter plates with adjustable blades for each projector cradle. "Each blade is on two actuators, and each axis of the shutter is DMX-controlled, so we can just dial the shutter in; it's as simple as that," he says.

The alignment of the projectors proved to be the issue that kept Turner awake at night. He explains: "It had been said that the process was so laborious that it would not be possible to

build the wall to focus the projectors." As a result of that initial assessment, he was forced to envision multiple ways of doing the focus without the wall in place. These scenarios were all investigated during the first week of rehearsals in Wilkes Barre, Pennsylvania. "Eventually, the glorious Denny [Rich], our head carpenter, got it down to getting the wall up in 20 minutes to a state where we can start focusing on it."

Of course, the projections aren't limited to the wall; they can also be found on the 30ft (9m) circular screen located upstage centre. At one point, there was talk of using LEDs for the circle screen. "After Sean started working on the content, it became fairly obvious that we could save ourselves a couple of million dollars by going with rear projection instead of LEDs," says Turner. The circle screen utilises three Barco FLM R22 rear projectors that, unlike LEDs, match the front projections perfectly.

The content playback system is, as expected, complex. Six sources - five for the wall and one for the circle screen - had to be frame-accurate between all six screens, and be 100% reliable, which can be an issue with media servers. "All of the Catalysts, mBoxes, and so on, rely on computer graphic cards as the output device, and that's always been my problem with them. It's not the most synchronous of signals, shall we say, and doing multiple devices to be exactly the same timing is difficult," explains Turner.

The turning point came when Turner discovered that the alignment could indeed be done on the wall. Once he realised he would have time to align the system every day, that led him to a frame-accurate system based on six Xserves Mac computers (one per screen), a Barco Folsom Encore, VVTR software (by Gallery) and a Catalyst media server, which is used primarily for the masking key source. Image stability and synchronisation is achieved through the use of each Mac's installed Aja HDSD IO (input/output card). "It gives us a referenced video signal so that on all six screens, the start of frame is exactly the same time," he says.

To achieve the brick-by-brick projection, Turner relies on a key signal from the Catalyst which works in tandem with the keying abilities of Encore. "There is content there for every brick, all the way across, so we can cut into it and shape seats, right up to the squared ends, because there are some European stadiums they're playing next year that will have square ends."

And while it might appear that when a brick is added to the wall, the content is added, the exact opposite is true. "Catalyst provides the mask signal, which is built a brick at a time - as a brick gets put in, we take out the mask," he says. "The Catalyst mask and VVTR playback channels are routed through the Encore - the Encore sets up a key, and uses Catalyst signal to key internal black over the VVTR signal."

The Encore black as well as the whole of the video system is referenced to the house black signal provided by the video system SyncPulseGenerator (SPG), which is also sent to audio playback engineer Mike McKnight, so that his system is timed to video. "We provide the timing, but Mike then provides the time-code back to us, so that time-code is referenced to our master synchronisation signal," Turner explains.

Synchronisation between the visuals, the musicians and the audio playback is critical to the production, he adds: "Between Mike McKnight and myself, I guess we've taken extreme care that would not usually be taken, because normally you're dealing with pop songs, and a couple of frames over a three-minute pop song isn't an issue. But . . . we're into 40-minute runs, so it can turn into a couple of seconds by the end, and that's significant,"

Call the schoolmaster - (The Trial)

Another iconic element of this production is its inflatables of the Teacher, the Wife, and the Mother, all of whom torment Pink. "This time, Roger wanted them to be far more animated," notes Lloyd. Fisher, who began his career working on inflatables for Pink Floyd's *Animals* tour, redesigned them based on sketches from Gerald Scarfe. The fabrication was done by Rob Harries of UK-based Air Artists, who was also involved in the 1980 production.


Far left: An early Fisher/Park drafting for 'The Teacher'. Middle: On tour with the original show. Right: The new and improved model.

The domineering Teacher, who unfolds to a height of 30ft (9m) is, according to Fisher: "A complicated chap." Lloyd adds: "The Teacher has something like 12 or 14 axes of motion - arms, legs - his legs have points on his knees - his feet, his hips, his shoulders, and his head. He can rotate, and you can make it look like he's walking." Today's Teacher is a far cry from what could be technically achieved 30 years ago. "He did some really, really basic stuff in '80," adds Lloyd. "I think they literally had two motors that yo-yoed up and down to make him do that funny, gangly kind of walking thing."

The green, mantis-like Wife is configured much like the Teacher, and unfolds from above. An imposing 40ft (12.2m), Mother inflates and turns her head to follow the gaze of a surveillance camera projected onto the circular screen.

Both Teacher and Wife feature a complex winch system and state-of-the-art control. "We used a Kinesys K2 control system and had Brilliant Stages make the puppet control system," Lloyd adds. Kinesys and Brilliant, both of whom work frequently with Stufish, are located in the UK, which was a necessity for the extensive pre-production testing.

The final inflatable, the Pig, provided by Mobile Air Ships of Canada, appears over the audience during *Run Like Hell.* Lloyd says: "It's a helium-filled blimp that they can fly around the arena. That's a whole different construction method."

Another favourite moment in the show is when a plane flies in from the back of the arena and slams into the wall. Back in '80, it was rigged with steel ropes in a fairly labour intensive manner. "Today, modern technology allows us to use a high-performance synthetic static line; instead of a steel wire rope, it's made out of this material called Technora. It's exceptionally strong rope, and it's very easy to handle," says Lloyd.

THE FLAMES ARE ALL GONE
- (Goodbye Blue Sky)

As in the original show, the pyro appears during *In the Flesh, Part 1*, but has increased exponentially. "Roger wanted something truly and profoundly impressive to start the show - something no-one has ever done before," says special effects designer/partner Mark Grega, from Strictly FX, of Elk Grove Village, Illinois. This impressive start of the show was called 'the opening finale'. "It's a visual exclamation point," adds Grega, who created the effect using 3D Studio Max. "With it, we could tweak the chase for timing, and the visual impact, without actually shooting it," he notes.

Waters liked what Grega created, but wanted a bit more impact. "The chase was originally designed to be 550 pieces in 12.8 seconds but Roger asked for the chase to be extended to 16 seconds once we were in rehearsals in New Jersey. Now the chase lasts all the way until the plane explodes into the wall." The result is a wall of pyro that, according to Kansy, "chases like the Bellagio fountain" in Las Vegas.

The opening song contains an astounding 730 pieces of pyro; most shows use less than 300 for a whole show. Specifically, Grega uses 100 40ft ultra-fast comets, eight 40ft ultra-fast comets with tails, 25 medium direct shorts, and 600 1/45ft silver gerbs for the chase at the end of *In the Flesh*. When the plane crashes into the wall, two Lyco cannons provide the dramatic fireballs.

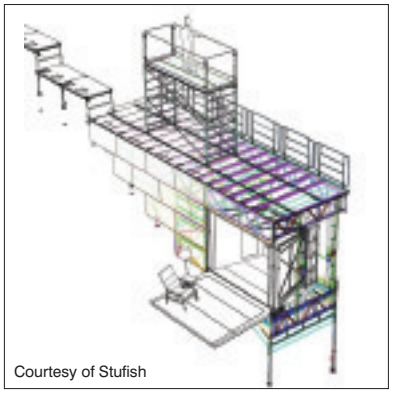
For the finale, Strictly F/X also provides custom-shaped confetti, eight truss-mount AC confetti blowers and two Le Maitre LSG foggers.

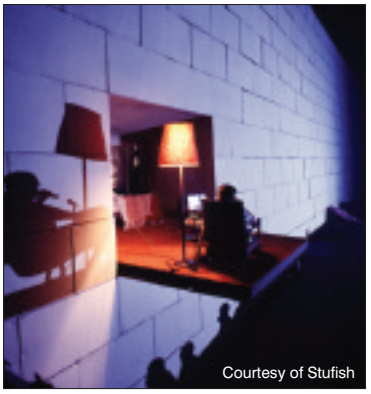
I'VE GOT ELECTRIC LIGHT
- (Nobody Home)

The basic design of *The Wall* is the same as it was in the original incarnation. The same goes for the centre circle screen, but with some differences. "In '80, it had a few PAR cans around the rim, and then rear projection which was a 35mm film projector," explains Lloyd. Today, the circle screen is there, as well as rear projection. But from a lighting standpoint, technology has indeed changed.

Marc Brickman, the original lighting designer, returned for the 2010 show. Actually, 'original' is probably the wrong term. "They hired me in 1980, the night before they opened," Brickman recalls, "I got a phone call saying, 'I'm Steve O'Rourke. I'm Pink Floyd's manager, and we're having a problem here.' I thought it was Colin Waters [of equipment supplier TMB] winding me up, so I replied, 'That's great. I need 25 tickets if you want me to come.' There was silence, and the voice said, 'I am Steve O'Rourke, and I am Pink Floyd's manager, and we are having a problem, and I want to know if you can come down here.' Oops. I had less than 24 hours to recue the lighting."

What with the enormous scenic installation of the wall and the extensive use of projection, the challenge has always involved finding decent lighting positions with which to integrate lighting into the rest of the production design. Brickman is a big fan of side-light and, in 1980, he used the Genie towers at stage left and right to provide it. This time, he says, he has a set of torms on which are placed 18 Philips Vari*Lite VL3500s; these provide general band coverage. He also takes advantage of the upstage circle, which features a set of 24 VL3000s around its perimeter, and the overhead circular truss, which contains 32 Barco/High End Systems Cyberlight 2.0s - 24 units placed on eight moving pods.





Left to right: The original CAD drawing for the Ramparts & Motel; The 'Motel' on the 1980 tour; and on the 2010/2011 tour.

In order to pick out the musicians from the oversized production design, Brickman chose a pair of Lycian M2 medium-throw truss spots placed on stage right and left tracks. Speaking of the latter, Mark 'Sparky' Risk, the show's programmer and lighting director, says: "The spots move downstage, as well as vertically, enabling us to position them perfectly, depending on the state of the wall build and the shots we're looking for. They also provide an exciting visual effect during appropriate moments in the show. The flexibility of their positioning allows us to light band members without creating nasty shadows on the wall." An additional four front-of-house spots are employed at each venue for additional coverage.

The rest of the lighting rig includes eight more Cyberlights on the front trusses, 12 Philips Vari*Lite VLX LED wash units distributed across the stage floor; 48 medium flood snub nose PAR cans, placed on the rear low hanging truss for backlighting the lifts, the wall, and the flags; 10 PRG Bad Boys placed on a downstage truss for forestage coverage; two Syncrolite XL10 units placed on top of the upstage chicken run, where they create searchlight effects in the opening number; 33 Martin Professional Atomic 3000 strobes - 28 with colour scrollers - distributed across the stage floor; six Gekko Kicklites, attached to the mic stands for front light on the musicians, four MDG Atmosphere hazers and four MDG Max 5000 heavy foggers.

The lighting is controlled by a grandMA 1 console which Risk says has become his "desk of choice." The lighting equipment was supplied by PRG.

Just nod if you can hear me - (Comfortably Numb)

For the original iteration of the project, the sound system was vastly different. "Obviously, line arrays didn't exist, and you can't even describe the speaker setup back then. Basically, you just saw horns from inside the cabinets that were sort of loose; it was a very different system," explains Lloyd.

To handle front-of-house audio duties, Waters tapped James 'Trip' Khalaf, who also serves as the show's tour manager. Khalaf's FOH system consists of three consoles - two analogue and one digital - all provided by Clair Global, of Lititz, Pennsylvania. System engineer and crew chief Bob Weibel explains: "The console setup is two Midas XL4s. One does the primary main stage band, and the second does the smaller stage in front of the wall that they use towards the end of the show. The third console is the Yamaha PM 5D used for playback of our pre-recorded surround effects, and also used for effects returns."

Speaking of dedicated effects, Weibel says: "Roger Waters is the only artist that I've ever personally toured with where this would even make the remotest sort of sense - for most musical acts, this is completely superfluous, since their songs don't have German fighter planes, explosions or Jeeps driving left to right, or helicopters."

The surround clusters consist of: "Three separate clusters, each made up of 16 of our three-way R4 cabinets; the clusters are positioned left and right, hung midway down the arena floor and the third cluster is hung all the way back at the arena floor," notes Weibel. There are also 12 BT218 subs out in the rear arena that are used sparingly as part of the surround system. The standard R4 cabinets are powered by Crown amps, while the subs use Powersoft K10s.

For the main PA, the tour is using the prototype of a new system, the Clair I5 D. According to Weibel: "It incorporates the components from the current I5 system, in a newly designed cabinet. The primary difference is that it has two 18" drivers in the cabinet instead of one."

The cabinets all have a 90° horizontal dispersion pattern; however, there are three

From top: A custom-designed projector cradle.

The FTSI automation control station.

A Lycian medium-throw followspot and operator's chair with a Syncrolite XL10 searchlight beneath.

different vertical dispersion patterns available. “In this system, the top six cabinets are long-throw cabinets, 2.5° verticals; the next four cabinets down are the 5° vertical cabinets, and then the bottom four are the 10° vertical cabinets.” Using the associated hardware, the cabinets can be positioned to make the system flatter, if necessary.

The main PA also uses eight i5 cabinets as the side PA. 12 Clair BT218 subs are located under the front of the stage, along with eight FF2 front-fill cabinets. Again, amplification is Crown, except for the subs, which use Powersoft.

Waters and his band are exceptional musicians, making the job at FOH somewhat easier. “When the band sounds good, our primary job is to make it louder, you don’t have to perform a lot of magic,” confides Weibel. That doesn’t mean there is no outboard gear: the list includes TLA 100 tube limiters, a Crane Song STC 8 Class A tube limiter, and dbx 903 limiters. Weibel admits: “We like the way the dbx limiters sound a lot.” There’s also an Eventide 3000 harmonizer, a Lexicon 480 reverb, two Lexicon PCM 91s and a TC Helicon Voice Doubler.

The microphone package contains many rock‘n’roll touring staples: Shure SM58s on the vocals, Shure Beta52s and SM91s on the kick drums and Shure SM57s on the snare. In addition, there are Milab DC96s on all the overheads, Audex D2s on the rack toms, while on the electric guitars there are Audio-Technica 4050s. “It’s a very striking production, and I look forward to hearing the show every night,” Weibel concludes.

Turn on the sound effects! Action!

- (In the Flesh?)

The unseen glue that holds together the entire production is provided by audio playback engineer Mike McKnight, who sits in a technology-filled cubbyhole upstage left. “Basically, when I start my computers, I’m sending time code to video, pyro, lighting, and even to the little apartment scene in *Nobody Home*, so that video plays right in his little hotel room,” he reports.

Although McKnight technically does playback, it doesn’t mean that the show isn’t completely live. “I’ve been on a lot of tours where people aren’t singing or playing as much - on this one, everybody is playing and it has to be to a click so the imagery happens exactly at the right time,” he explains. Even in a song like *The Trial*, which includes many special effects elements, the band is still there. “There’s a lot of orchestra there, but the band is playing along - there’s so much going on with the orchestra, but if you pulled the band out of it, it would be very, very obvious they weren’t playing,” adds McKnight.

Waters is also insistent in regards to the live aspect of the show. “Basically, everybody is playing everything on stage - there are never guitars coming out of my rig, there are never drums or anything like that, and all the background vocal parts . . . are absolutely, totally live.”

Keeping the band in sync with the video is McKnight’s primary role, and when the band slides off the click-track, life for McKnight suddenly becomes more challenging. “If the band make a mistake and come in four bars early, or Roger sings something in a different place and the band adjusts to him, they can’t say it’s the wrong place, they follow him - and once they go sideways, I have to make the computer go right with them.” In that sense the computer is an unseen member of the band.

While many playback operators rely on Pro Tools, McKnight prefers a different piece of software - Mark of The Unicorn Digital Performer. He notes: “ProTools is great for one song at a time but, with Digital Performer, you can have multiple versions of each song on its own. To do that with Pro Tools you have to line them up one after another, so your bar numbers and your locations would not be correct; Pro Tools is not something you would want to use for a show like this.”

Digital Performer also provides the all-important time code signal, and is running on a series of Macs. “I use two G5s, one for the A system, one for the B system, I also have some laptops - I prefer to have at least three or four systems. I have three systems running in sync together, so if any of them go down I can switch between any of the three.”

McKnight uses Digital Performer to generate timecode that is then sent to a Brainstorm Electronics de-strippalyzer SR15 Plus. “The de-strippalyzer will take the timecode and reshape it if needed. I can then send it to five different destinations all from one box, all at different volumes, either grounded or ungrounded,” he says. The ability to send the signal grounded and ungrounded is important. “Some of these other boxes that I connect to don’t want ground from me - if you have a ground loop on a timecode line, it can mess up the timecode, so nothing runs in sync.”

Digital Performer also provides McKnight with a virtual mixer to submix the audio elements coming from the computer to multiple outputs. “There are

five lines of surround music; five surround effects; a subwoofer channel for the wall coming down; another stereo pair of sound effects so Trip has more flexibility mixing at front-of-house; and a stereo pair of the choir," McKnight explains. All are sent to Khalaf, who then integrates them into his mix.

In McKnight's world, nothing is left to chance. "Every single day before I do anything, I duplicate the current show file, so that at the very most, I will lose a few hours of work, not the entire show," he says. McKnight does manual backups, and indeed, keeps the show on six separate hard drives. "I always travel with at least one or two of the drives with me, the other four are with production. This way, if the truck flips over, we still have a show."

Timing is also critical even in what seem to be the inconsequential moments of the show. Towards the end of *In the Flesh, Part 2*, Waters pulls out a gun and fires - a moment that seems simple, yet is not. "We spent one or two days adding machine gun sounds where he pulls out a prop machine gun and shoots it - I'm in his ears, saying 'gun two three fire' or 'stop'," McKnight reveals.

In fact, there are only three moments within the entire production that McKnight's computers are halted. "I stop the computer just before *Mother* when he talks, between Act One and Act Two. At the end of *In the Flesh 2*, when he does the shooting - once that ends, then I stop, and he talks as long as he wants in those two places," he says. Outside of those three instances, McKnight's timeline in each half is continuous.

In the end, McKnight has come to the same conclusion as Turner. "I think that me and Richard Turner are definitely the two that could do the most damage to the show, and it's not fun having a job like that, but it's the nature of the job!"

THE SHOW MUST GO ON...

- (The Show Must Go On)

Roger Waters concluded the North American portion of *The Wall* in December. The tour resumes in Lisbon in the latter half of March.

Sharon Stancavage

The Shend interrogates sound engineer Jeremy Dubois

Turn someone in for questioning . . . E-mail: crewcuts@lsionline.co.uk

Crewperson: Jeremy Dubois

Age: 36

Job: Sound engineer, TM/PM.

Location: Currently Los Angeles, CA, USA

Recent Activity? Production manager and monitor engineer for Robin Thicke. Just finished a US tour with a great new artist on Interscope Records named Alyssa Bernal. She's a YouTube sensation with over 85,000,000 page views; she's a real natural talent.

Worthy Past Glories? I always have fun on the job but my first tours in Austria and Asia were real eye-openers. Those were with the Elvis Live tour, featuring the TCB Band and European tours with Ravi and Anoushka Shankar. I have also worked with Jenifer Hudson, Jon Secada and Roberta Flack.

Why are you what you are? I was a guitar player till I broke my wrist in three places during a show. I had a cast on my wrist for over nine months and during that time I took up recording and just fell in love with being an active part of the music on the other side of the console.

Three best things about your job? The people I work with day-to-day and what I learn from them; How no two shows or days are ever the same; Getting paid to travel and see the world.

Three worst things about your job? Airport security; Shrinking budgets; Never getting enough sleep.

Detail the equipment you use in an ideal world? d&b audiotechnik and L-Acoustics loudspeakers; Avid and Yamaha digital consoles; Shure PSM 900s; Ultimate Ears UE-7s and UE-18s.

Most crucial invention since you started, that has improved your job? Most definitely digital consoles, line arrays and prediction software.

What do you never leave home without when working? My passport, laptop, IEMs - oh, and a working Debit Card.

Proudest moment? Pulling off eight shows in a 48-hour period in New York City without a hitch, during the album release week for Robin Thicke's *Sex Therapy*.

Best gig while working? Atlantis Resort, in the Bahamas for a week (the show was 30 minutes).

Best gig as a punter? The Cult, around 1992 in a small club in Fort Lauderdale, Florida.

Biggest nightmare on the job? Just after doors at a Grammy's event in Miami. The FOH A1 (that was me) made a gross file management error on a PM1D. Spent the next 30 minutes restoring the console from backups and eye/memory in front of a room full of Grammy winners and record producers. I pulled if off by the skin of my teeth and the crowd and organisers were none the wiser.

Most irritating request from a member of the public, artist or promoter? Promoter: 'Can't we just put those speakers in the back of the room somewhere?' The stupidest thing I have ever been asked, has to be 'Do you know what all these knobs do?'

Artist from the past you'd most like to have worked for? I would have loved to work with Bob Marley.

What phrase sends a chill down your spine while working? Chain!

What invention would make your job easier or better? An auto budget booster!

What other member of the crew would you least like to be? The poor folks who have to run all the feeder at the big festivals. I feel for you.

Which other member of the crew do you take your hat off to? The stage manager, for keeping the show running as planned, or better.

Name three best sounds and three best videos on the crew bus? Sounds would have to be Swervedriver, Floyd and any standup comedy. As for video - *This is Spinal Tap*, *Idiocracy* and *Eastbound and Down* on HBO.

Most irritating thing on the crew bus and why? Shoes and personal items left all over the place! Usually, I'm kind of the bus maid.

Best hotel you've stayed at while working? Schoss Elmau, Elmau, Germany.

Like all music journalists, are you really just a frustrated musician? I'm happy in my current role.

Any artist you'd happily swap places with if you had the talent? Um - nope!

Members of the audience you loathe the most? The drunk guy asking me if I can play X or Y song. Dude, I am not the DJ!

Any artists you'd happily spend time with socially? I've been lucky to work with some very fun people.

Best passing through customs anecdote? Arriving in Kazakhstan was interesting. I'd never seen customs with a bartender involved. Nice touch!

Most bizarre sight you've seen at work? Our PM had a camel brought out to an arena show for someone's birthday when we were in Dallas; 30 minutes into the show and we all hear on the radio 'the camel is loose, the camel is loose in the parking lot!' Not the norm, not even for Texas.

Favourite artist to work for? That's easy - the current one.

Favourite food and drink on tour? Sushi and cold beer after a show or day off.

Favourite / Most hated venue? Favourite: The Gusman Centre in Miami has a special place for me since I was a house guy there for five years. Hated: None really, you just have to deal with the hand dealt and do the best job you can.

Open air or under a roof? Definitely, under a roof.

Best festival? Bumpershoot in Seattle is fun.

Best item of clothing when working? All weather jacket.

Closest you've come to death whilst touring? Amsterdam + Halloween + day off!

Most outrageous thing you ever did on tour? I've had a few fun nights in hotels - nothing to a level Led Zeppelin would be proud of, but . . .

Most sensible thing I ever did on tour? Started working out more often. OK, that one didn't last long, but I'm working on it.

Email: killnoise@hotmail.com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Building School Theatres: What's the future?

Actress Imelda Staunton gave her support to the Theatres Trust 'Designing School Theatres' conference in 2009.

It's been nearly a year since the Theatres Trust held its conference on Designing School Theatres, which looked at the issues surrounding the poor delivery of a number of new school theatres built under the then labour government's Building Schools for the Future (BSF) programme.

Sarah Rushton-Read assesses the post-BSF situation . . .

By examining a number good, bad and downright ugly UK school theatre builds in detail, the Building School Theatres conference highlighted successes and failures and asked theatre industry experts how the BSF process might be improved.

By the end of the conference various industry bodies had made a number of recommendations and commitments to improving the situation. However, hot on heels of the conference, a UK general election saw a coalition Government oust the architects of the BSF scheme and take their seats in parliament. Publicly funded programmes began to shake in their leaky boots. In a bid to cut the UK's soaring national debt the new Government made some severe and very deep public spending cuts. BSF soon became water under Westminster Bridge.

BSF's aim, although in many ways wasteful in its ececution, was commendable. It aimed to ensure that secondary school pupils learned in 21st-century facilities.

Issues with BSF

Central to the BSF programme's philosophy was that the client specifying the job was often the local authority and/or a representative from the school. In the case of those schools that included a theatre, the only person in charge of the design and specification would be a head teacher or head of drama. I think it would be fair to say that neither are likely experts in designing or building schools, never mind specifying the complex specialist rooms such as a theatre or performance space.

Unfortunately, unless the specification is tight and well thought through then the school was likely to get a building that did not live up to anyone's expectation. This naturally filtered down to specialist areas such as theatres and the results, in some cases, were disastrous.

Part of the reason this could happen was that the BSF procurement approach differed to the more traditional routes likely to be seen in private schools, where a design team is employed from early on to develop a design in conjunction with the school staff and other experts. Nothing would be built until everyone was happy. If a lesson is to be learned, this is one of them.

Sadly, in too many cases, those attempting to make the theatre specification under BSF were working without employing expert advice such as theatre consultants or theatre professionals. When they did eventually call the experts in, it was often too late. To compound it all they used outdated publications as reference.

In fact, one of the key recommended actions that came out of the Theatres Trust conference was that the Association of British Theatre Technicians (ABTT) would review the area schedule guidance in BB98 to reflect present day technology as opposed to circa 1950-70!

Another important thing to learn from BSF is that the design concept of the building was but a small proportion of what went to decide who was awarded the contract to provide that school. Considerations such as facilities management could literally dwarf building design. Of course, the theatre design would be an even smaller percentage of the whole, so you can see how it might be overlooked in some cases.

Nevertheless, every now and again, when a client flagged a particular discipline - such as building a theatre - as high priority, a clever contractor would see it as a chance to grab the ticket that would win the job. In these cases, contractors were more willing to appoint the necessary experts and often the client had consulted with its own specialist. The result was always a better thought out, more successful building.

Of course, there is no 'one size fits all' for any school. Each has different resources and capabilities. Some schools might want a sophisticated technical space and others might want something simple and low tech.

Even though BSF has been scrapped, many of the issues remain relevant today and the lessons learned can still be valuable in future projects such as the development of the Academy schools.

The Government has announced that rather than concentrate on wholesale renewable schools (a lot of the BSF projects involved knocking three schools down and building one new one) they will focus on refurbishment and regeneration of existing stock where possible.

Whilst there is certainly less money available, this could mean that each project is treated in a more traditional manner, considering individual merit and need. That has the potential to be much better for the theatre design aspect of a project and for the industry as a whole.

One of the main reasons the coalition scrapped BSF was to reduce the investment in the bidding process because it was so wasteful. Two or three teams would bid against each other, at their own risk, for several schools at once. It would be better to concentrate on appointing contractors early in the process and allowing them to have a dialogue with the end user from an early stage, something the BSF procurement process prevented.

Because bidding was done at risk, the amount of time across the whole of those three teams has to be limited. The focus of the bidding team is not always on producing a great design but creating a design sufficient to win the bid.

What screamed out of the Theatres Trust conference was the desperate need for more considered thought, better communication, more expert help and opinion at the early stages of the process and a realisation that one size certainly doesn't fit all.

It seems that, although common sense has not always prevailed, where it has the successes are testament to it. What I mean by this is that building school theatres (or indeed any project) works best when there is a proactive collaboration between a passionate, well informed and enthusiastic client or end user and a contractor that is willing to appoint appropriate expert consultants early enough to make a difference.

Today there is a rich seem of experienced architects, consultants and specialist contractors who have learned from the mistakes of BSF. That should not be wasted. Going forward, what should come out of the Theatres Trust conference is a schedule of best practice. The industry, the design teams and the schools sector would benefit hugely from seeing exemplars of what has worked well in school theatres and why. It would allow the people procuring these projects in future to better understand what kind of facility they can demand or realistically service.

Sarah Rushton-Read

Our thanks in particular to the team at Arup for their contribution to this article.

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Providing for Schools: Technical Considerations

The advent of specialist schools - i.e. those with some particular excellence in a discipline such as performing arts - provides a potential growth sector for installation companies with the experience and skills to cater for the requirements of performing arts facilities. James Eade looks at the technical considerations for companies targeting this market . . .

No-one would disagree that it is important to educate and promote technical theatre to the potential technicians and engineers of tomorrow. So why is it that generally we do such a poor job of giving them appropriate tools to learn? By way of an example, a recent meeting about a new performing arts academy which included representatives from the building contractor, architect, the M&E contractor and others - but notably, no-one from the school itself.

One of the 'others' included a lighting company purporting to be a stage lighting company who was hoping to get the contract for the stage infrastructure. They had already been extolling the virtues of LEDs and how the whole lighting system should be LED-based. The panacea was sold to the builders, until it was gently pointed out that LEDs aren't always the best tool, are seldom used in professional theatre (save for effects type lighting), and things like the lack of LED profile lights available is a big hindrance and that they are very expensive. The lighting company representative then began bleating on about the latest PAR36 LED fittings from Acme company and how good they are, and added "it is only a school" . . .

In these days of CAD and 3D simulation, why give the engineers of tomorrow a piece of paper, pencil and protractor to learn with? It seems there are two main ways in which school installations can fail. One is the rental company who specify a good, modern system with appropriate equipment but install it in a fashion suitable for a long-running temporary event, using TRS and multicores clipped to the wall and lighting bars lashed to the roof joists. The other is the electrical contractor who will do a perfect job of the install, using proper cable and containment . . . but who also has an employee who once did a bit of am-dram and 'knows a bit' about lighting and sound.

Sadly, there are too few companies with experience of current theatre technology *and* experience of commercial electrical contracting. This is exampled by a recent enquiry to the PLASA Technical Resources Office, in which a company asked for guidance on the merits of running a single earth in a bit of 18-way multicore cable (i.e. traditional 'Socapex' style cable) to get more circuits. The concepts of cable loss, heating and fault/shock protection hadn't appeared on the installer's radar - let alone the fact that they were using the wrong cable. Using current technology and equipment is good: using current temporary installation practice is not.

In many respects, a good rental company could successfully enter this market, with the right guidance - the advantage for the client being that they will be familiar with the latest tools and techniques. It is an achievable transition, providing the temporary installation practices are left firmly behind - and that's where the external guidance comes in. You must remember that, unlike a show, the installation may be around for decades, with varying levels and types of use. The required design of bespoke interface panels, the electrical design, audio and data network design, documentation and testing are not the usual jobs of a rental house - hence the need for guidance. And that's before you've even got onto the modern building site, which has a culture far removed from that found on shows.

So where to start? With the obvious really - assemble a system on paper that will fulfil (or exceed) the client brief, bearing in mind that it will be used by small/young people under instruction. Next, design it, producing schematics of how it will all fit together. Then it's time to make recourse to standards. These documents are best practice guides and following them at this stage will reap rewards later on - the system is more likely to work first-time and the building contractor will have even less cause to bother you. Ultimately, of course, if the unthinkable happens and something does go wrong, by following appropriate standards you will have shown due diligence.

The standards will tell you everything you need to know in order to make sure your system is safe to operate, won't start a fire or electrocute anyone, and will work as designed (which may be different from working as intended!). The first and most obvious is *BS 7671 - Requirements for electrical installations*, otherwise known as the IET wiring regulations. This covers all electrical installation work and practices - it isn't just aimed at power wiring and is relevant to the installation of data and control systems (such as DMX) and audio too.

A new section coming in Amendment 1 (expected late 2011) covers in considerable detail the subject of electromagnetic compatibility (EMC). This studies in detail wiring practices such as earthing (did you know a separate 'technical' earth is potentially dangerous?) as well as the correct routing of data and power cables in relation to each other.

Installations actually now fall under the scope of the EMC Directive and it is incumbent on the designer of such systems to perform a risk analysis of what other equipment may interfere with yours and how yours may interfere with others - dimmers and analogue audio are two sensitive subjects that spring immediately to mind. In addition to the assessment, conforming to this new section of BS 7671 will be appropriate in most cases, so recourse to the EMC directive isn't really needed.

There is a veritable range of other standards and codes of practice that should be considered when carrying out installations, some loosely relevant and others more so. Here is a summary of the most important ones . . .

• From an audio point of view, BS 6259:1997 is the *Code of Practice for the design, planning, installation, testing and maintenance of sound systems*; it is quite dated, with little relevance to modern


Stewarts Melville School, Edinburgh.
Installation by Northern Light, 2007.

"The standards will tell you everything you need to know in order to make sure your system is safe to operate, won't start a fire or electrocute anyone, and will work as designed . . ."

installation practices and technology, and is actually being re-written currently. Also of relevance (despite the title) is BS EN 60728:2005, Cable networks for television signals, sound signals and interactive services. While this is aimed primarily at distributed TV services there is some good guidance to be had on distribution of analogue audio and associated RF (e.g. radio mic antenna) cabling.

• For both lighting and audio, guidance on the installation of Ethernet and other network cabling can be found in BS EN 50173-5:2007, *Information technology. Generic cabling systems*. This suite of standards covers everything from data centres to installation standards. In the same vein is BS EN 50174-1:2009, *Information technology - Cabling installation*. Particular reference should also be made to the ESTA ANSI standards for DMX. E1.27-1-2006 is a Standard for portable control cables for use DMX and E1.27-2 is a recommended practice for permanently installed control cables. System designers should also have a copy of the *Recommended Practice for DMX512: A guide for users and installers*, available through PLASA/ESTA.

• When it comes to power and rack/panel building, BS EN 61439:2009 Low-voltage switchgear and controlgear assemblies is the standard to use. This suite is applicable when constructing bespoke control panels (such as stage machinery controllers or lighting power distribution) and also technically applies to ordinary 19" equipment racks. If stage machinery is involved then BS EN 60204-1:2006+A1:2009 *Safety of machinery. Electrical equipment of machines* is another suite of standards you should look at.

Obviously the list is not exhaustive, but taking these on board as a minimum will be adequate for most school-sized installations. Following these three rough ground rules is the answer to many questions posed about how to install infrastructure:

1. Make sure it won't catch fire or start one.
2. Make sure it won't electrocute anyone.
3. Make sure it will work reliably for ever more, electrically and mechanically.

From these, all the other elements - such as neat wiring practices and good workmanship - will flow naturally.

Once the system is installed, the building contractor is likely to want copies of all the documentation which will include schematics, cable schedules, design notes, test certificates and schedules for installed cabling (low voltage and power) and of course the operating and maintenance ('O&M') manual. This will probably be a fairly chunky document (even for a small installation) as it should detail all the manuals for the equipment installed plus your own guidance on what maintenance the actual installation may need - such as how often to grease hand-winch spindles, or how often the electrical inspection should be carried out. Somewhere you should also document what needs to be done when it comes to demolishing the building - are there any particular hazards? Should it be done in a specific order?

There is quite a lot to do, but none of it is difficult if you take a methodical approach and once the method and your systems are in place, it becomes less arduous!

James Eade

Directory, cont'd . . .

SSE Audio Group have been supplying audio packages and equipment to schools, colleges and theatres for 35 years. More recently, we have added a range of our own staging products which have proved popular. With the addition of our recently opened London warehouse we can now offer our full range of services to London and the South of England.
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Stage Electrics supplies and installs technical theatre and performance equipment to the education sector from primary and secondary schools to universities. Projects range from new builds to complete technical refurbishments. Services include lighting, sound, audio visual, rigging, staging, curtains, training, testing and maintenance. Advice, specification and detailed drawings services are also available.
www.stage-electrics.co.uk

Stage Services Ltd is involved in designing and installing sound, stage lighting, draperies and rigging systems. With about half of its work in the education sector, Stage Services covers most of mainland UK for everything from a new school or theatre, to refurbishing an existing drama studio.
www.stage-services.co.uk

Upstage has carried out many installations in drama studios and school theatres. Involved from the early stage of planning, the company contributes to discussions about layout, acoustics and lighting positions. Upstage will supply drapes and tracking systems, IWBs, dimmers and control systems, sound and lighting equipment.
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Case Study: Bideford College

When Bideford College opened the doors to its brand new Science and Sustainability facilities this September, its 1,800 students set foot in one of the country's most advanced new-build schools, a £45 million state-of-the-art facility for theatre, media and other performing arts genres.

Above: Chris Brant (left) and Saul Eagles (right) of Stage Electrics with clients Paul Williamson and Mike Newby of Bideford College.

Stage Electrics, with a team headed by Chris Brant and Saul Eagles, won the Audio Video and Lighting (AVL) contract in early 2007 when the college was awarded a BSF (Building Schools for the Future) Pathfinder project, with the objective of developing new production facilities. The buildings, with an existing theatre, widely used by the local public as well as by the college itself, were to be radically extended and fitted with highly flexible audio-visual and production lighting systems.

In conjunction with a college team led by coordinator Mike Newby - aided in no small part by Paul Williamson, Bideford College's ICT Project Coordinator - and architects, consulting engineers and project managers NPS Southwest, Stage Electrics began an 18-month design process focused on the college's needs and how to meet them. These included a requirement to integrate existing 'legacy' equipment into the new setup.

The spaces that emerged from this were a theatre that doubles up as a main hall and, separated from it by an acoustic door, a dance studio which can also act as a stage for the main hall. A pair of drama studios can be combined by opening another acoustic door, with an additional acoustic door leading to an external amphitheatre. Other spaces include a media suite, music department, a separate sports hall and the Winter Gardens atrium area. The college also boasts a demo theatre which forms part of Bideford College's 'Project Faraday' Department and is used for Education Science project demonstrations and experiments.

Connecting spaces

With flexibility a keyword in this multi-faceted project, Stage Electrics examined how best to link the college's proposed new facilities, to help the college exploit the variety of spaces to the full.

Saul Eagles comments: "They wanted to network digital multicore audio throughout the building. We considered several technology options, and settled on an RSS by Roland S-0816 and S-1608 digital multicore system, working over both copper Cat-5 and piggybacked on the college's fibre system, allowing the digital multicore system to be plugged in at any point via an IT patch cabinet."

The digital multicore system is designed to work alongside a Planet DV eStream video streaming system, allowing media to be distributed throughout the building to various network clients in tandem with optical audio. "It provides the ability to run media presentation and production at any location within the building," says Eagles.

Routing is a combination of standard gigabit switches for the Cat-5 network, while using redundancy in the fibre system to provide the building-wide routing between the main ICT hub room and consolidation racks located throughout the building.

Controlling this is a combination of physical routing for the digital multicore via hard patching of either fibre or copper, while user-friendly AMX touch-screen master routing controls the production and AV

presentation facilities in the Winter Gardens, the main hall/dance studio and demo theatre.

AVL systems

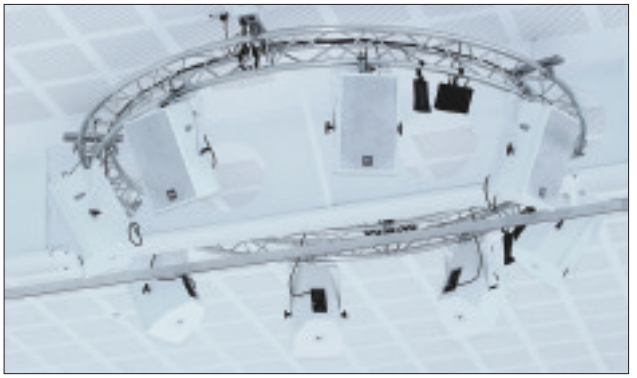
Production lighting for the theatre/main hall includes 96 channels of 2kW Zero 88 Chilli dimming, controlled by a Leap Frog 96 console, with additional AMX control for presentations. This allows intelligent operation when the two rooms are combined or separated, for ease of use, with the substantial DMX distribution and merging system well hidden behind the AMX interfaces.

A production grid over the stage area / dance studio comprises cyclorama bars and four of Stage Electrics' proprietary internally-wired LX bars. A similar arrangement over the main hall's auditorium allows shows to be staged in any configuration. Philips Selecon Rama Fresnels and PCs, and ETC Source Four and Source Four Junior Zooms, populate the rig.

The dance studio lighting can be controlled independently via a Zero 88 Juggler console, and has a full complement of tabs and tab tracks, providing full blackout facilities and a motorised FOH curtain track, operable from either the stage management position or the AMX system.

The drama studios, each with 24 channels of Zero 88 Chilli dimming, are combinable, and their audio and lighting services are fully selectable dependant on the room mode - again specified for ease of use by lecturers.

On the audio side both main hall and dance hall/theatre systems employ Sennheiser G3 radio mics and RSS by Roland M-400 consoles, patching into the building-wide digital multicore system, with audio distributed to Yamaha amplification and RCF Acustica loudspeakers.



Facing page: The Main Hall.

Top: RCF loudspeakers in the sports hall.

Above: Theatre control and audio racks.

Left: The Dance Studio's lighting rig; Right: The Winter Walkway at Bideford.

AV here comprises a Sanyo 6000 lumen data projector with an electrically operated projection screen and a full-scale cinema screen, while twisted-pair cable infrastructure features Kramer switching for degradation-free distribution. Denon DVD playback and surround processing allows DVD playback through the loudspeaker system, and an Omnex cinema system integrates 35mm projection with the sound facilities. A full Altair communications package is also included, as well as a Sennheiser infra red assistive hearing system for DDA compliance.

In the media department, Stage Electrics' principal task was to provide infrastructure to integrate the AVL routing and lighting facilities with the college's legacy equipment. It comprises two edit suites, an adjacent TV studio and two further media rooms, all interconnected. Enabling the integration are eStream encoder/decoders and RSS by Roland digital multicore systems, similarly patched into the building-wide network, allowing audio and video created in other rooms to be patched back to the media rooms for editing.

The music department centres on a Pro Tools rig, with add mixdown from a Soundcraft Ghost LE console and JBL nearfield monitors, while extensive patching connects the main music rooms and eight practice rooms.

Q&A with Stage Electrics' head of operations, Dan Aldridge

L&Si: Can you briefly outline your duties/responsibilities?
As the Audio Video Lighting integrator for this project, Stage Electrics' primary responsibility was to bring in the project on time, to budget and against specification.

Stage Electrics was involved in the technical part of the project from a very early stage and was able to contribute fully to the design process. Once the project was underway, we were responsible for supply and integration of production electrical and data cabling; mechanical installation of lighting grids and bars, curtain tracks and curtains; facilities panels and termination; equipment rack supply population and termination; loose equipment; project management; AMX programming; audio system configuration; testing and commissioning.

The client had some exciting plans and a very good idea of what they wanted to achieve, they just needed our help in realising their goals.

L&Si: What are your priorities when planning a new school install?
We always aim to discuss the requirements with the end user as well as the architect and builder. This results in greater consideration being given to the use of the space(s) and often delivers improvements in how the teaching staff are able to integrate the facilities into the syllabus. This ensures that the facilities we provide will support the technology in use today, as well as providing an infrastructure that supports expansion and adoption of developing technologies, where possible, in the future.

Accommodating the current Health & Safety considerations in schools is a challenge as certain technical tasks are considered as potentially high risk activities for children. We strive to ensure that safety is not compromised whilst ensuring that facilities are not unnecessarily "dumbed down".

L&Si: What are the unique challenges of school installations?
We have touched on one of them already, the perception and mindset towards potential Health & Safety risks. The risks are less present in the actual acting, singing, dance or spoken word activities. The more obvious risks become apparent when you consider teaching children the technical aspects of Theatrical and Performance Systems. Some obvious examples are; working at height to rig lanterns, working in the vicinity of electrical systems, working in the vicinity of equipment with very high surface temperatures, working with equipment suspended overhead etc.

These challenges are not unique to schools; they are common to all environments where systems are installed. The unique challenge of the school environment is to safely allow students to carry out these tasks and learn the skills of technical theatre. The temptation is to only allow qualified adult staff to carry out these tasks whilst the students observe. This may seem like a safer approach but it denies the student the opportunity of first-hand experience.

L&Si: What are the biggest restrictions when working in/with a school?
The current trend for multi-use spaces often results in facilities having to be compromised to fit into the multi-use space. This can be a very significant restriction and on occasions can actually prevent the delivery of a truly suitable space for the performing arts.

L&Si: What are your thoughts on the end of the Building Schools for the Future (BSF) programme?

The four-storey-high Winter Gardens extension, running the length of the main building, is designed for commercial rental use - small productions, product launches and presentations. It is fitted out with lighting bars, digital audio multicore and lighting facilities all controlled from the theatre's AMX system and features a similar mix of Sennheiser, Yamaha, RCF and Kramer.

The Faraday demo theatre, intended for presentation of experiments, includes LED architectural lighting, an AV system comprising three Sanyo data projectors and an AMX control platform, all built into a bespoke demo bench with integral AV equipment to enhance the user experience.

Finally, the sports hall boasts a large RCF / Yamaha / Soundweb PA system to provide intelligibility and power for sports and music events.

"It's a fantastic facility," says Mike Newby. "A considerable amount of consultation with the myriad of users, from students through to staff and the community, was carried out to ensure we delivered, as far as practicable, a College-wide provision which is not only current but also future-proofed as much as is possible. We are tremendously proud of what has been achieved in collaboration with Stage Electrics."

> **www.stage-electrics.co.uk**

Every government programme has its up sides and down sides. Whilst the BSF programme provided substantial funding for schools, there have been a number of disadvantages with its approach to our aspects of the work in schools.

The end to the programme is likely to result in a number of schools cancelling or substantially downgrading their plans for replacement or upgrade of their facilities. This will, of course, have an affect on the market for the technical installation companies who don't have a broader customer base to gain work from.

L&Si: What do you think will happen to the market post-BSF?
It is unlikely that the market will collapse, although it is very likely it will come under pressure for a period. The need to provide educational facilities for our young people has not ended with the end of BSF. The format that the upgrading or building of new facilities will take is uncertain, but we believe it will still remain a viable marketplace for many companies to operate in.

L&Si: What advice would you give to a school considering a new installation?
Be sure to seek out a company who have an established reputation and have been trading successfully for a long time. Your finances need to be spent wisely and picking a supplier who has considerable experience over a number of years can help ensure you get added value during the process. They can assist you with design decisions, funding options, phased projects, technology advice and CDM considerations which may affect your planned works.

Case Study: Winchcombe School, Newbury

The Winchcombe School for Primary Education in Newbury received a full installation of sound, lighting and AV equipment from dedicated school installation specialists, School Stage, in November 2010. L&SI visited the school with School Stage's founder and MD Chris Newton . . .

The Winchcombe School's Finance Officer, Karen Hayward, approached School Stage after discovering them on the internet. "We visited other schools to see their set-ups and been in touch with several installation companies," she explains, "but no-one seemed able to meet all our requirements satisfactorily until we came across School Stage.

"We liked the fact that they specialise exclusively in school installations rather than being part of a cross-market production company. School performance spaces are unique environments which demand specialist technical knowledge and an understanding of how schools operate.

"In addition to this, we had the significant consideration of an asbestos roof and had yet to be excited by any of the solutions put forward. School Stage came up with the innovative idea of using a truss which could span a considerable distance in such a way as to simultaneously solve the asbestos problem whilst concealing any unsightly cabling into the bargain. We were very impressed with the detail and quality of their solution."

"The Winchcombe School needed a set-up that would meet the multi-functional requirements of school assemblies, music lessons, after-school clubs, evening classes, discos and school performances," says Chris Newton, MD of School Stage. "Our design needed to be not only versatile, but robust enough to take the abuse of up to 15 or 16 hours of daily use!

"It is not unusual for schools to be so diverse and wide ranging in their requirements yet we must also keep it simple enough for children and time-pressed teachers to be able to get to grips with."

The final solution was based on School Stage's suggestion of a 12m long box truss from Litestructures, which was Chemfix'ed into the wall for stability, with a lighting bar suspended beneath. Several pillars obstructed the route of cable runs so these were re-routed through the wall and into galvanised trunking on the roof to circumnavigate the asbestos.

The equipment specification was tailor-made for the school's requirements. "Chris fitted the spec to our budget and took time to explain the consequences of any changes we made to the original plans," continues Karen. "This gave us confidence that we were not being sold anything that we didn't need, and we were able to take advantage of his considerable knowledge and experience to make the right choices."

"To maximise Winchcombe's limited budget we addressed their immediate needs first whilst factoring in the potential for future expansion as funds become available," says Chris. "At this point in time, the lighting is fairly basic, consisting of four LED PAR cans, six zoom profiles and an 8-way dimmer.

"We have also given them the capability of switching between two kinds of lighting control, with a choice of instant presets for everyday use, or full creative control for school productions from a Zero 88 Juggler lighting desk."

The sound system needed to be diverse enough to cater for assembly music, speech, presentations, and discos and to transmit at a consistant level through the whole of the hall.

This was achieved by a combination of Shure handheld and headset microphones, and Tannoy and QSC loudspeakers managed by a dbx processor.

School Stage MD Chris Newton.

Left: Training on the Zero 88 Jester (L-R: Chris Newton and pupils Hannah, Sophie, Justine & Nolu). Right: The 12m box-truss.

A lockable flightcase on wheels contains storage for microphones, a laptop, a rack-mounted 6-channel mixer, CD player with USB ports, amps and a processor, enabling the students to mix between microphones, CDs and iPods. The sound system was acoustically analysed and programmed to ensure an audible clarity.

Finally, an EKIE 5500-lumen projector is mounted centrally on the truss, with a remotely retractable projection screen ("which the kids love!") located on the wall at the front of the hall, giving great sightlines.

As an approved NICEIC contractor, School Stage was also able to provide the additional power supply required to run the new equipment in the hall, with the whole installation completed in only three days.

Four pupils - 10-year old Nolu, Sophie, Justine and Hannah - had been trained on the equipment following installation and were effusive in their response: "Our new equipment makes assemblies look better, more children can sing because they can see the words on the drop-down screen, and it's more interesting because we are not just looking at the Head and plain walls!" says Nolu.

Justine - a natural technician if ever there was one, with her understanding of the technical set-up and operation already firmly set in her mind - says: "This new equipment is much easier to set up and use than the stuff we had before. There's no overhead projector, the projection screen is central and we don't need cables all over the place - it makes the school look more professional. It has been easier to learn and we are now helping to teach the other pupils - we have even been able to show the teachers when they get stuck!"

Training is an important part of the School Stage package, as is the aftercare and support following installation. As Chris points out: "We consider training as paramount, giving children access to professional quality equipment chosen for its ease of use, simplicity, robustness and suitability for the job. Training the children really opened my eyes as I hadn't realised the impact it has on them, especially the less academic ones. It provides them with a vital grounding in the technology used in the professional world and opens up the possibility of a technical career within our industry. We often pop back to see how they are getting on and they know they can call on us if they need to."

"It is important to have high-tech, contemporary equipment in schools - and just as important that we know how to use it," says Karen. "Chris is adamant that children should be trained in how to use it, rather than leaving it to the sole responsibility of the teachers. He also believes the children should be encouraged to train the other children and that the equipment is not ring-fenced away from them.

"The children benefit from being given the responsibility of looking after it - it raises standards and gives them a sense of pride in it and in their own abilities. We are very happy with our new installation and are the envy of other schools. We are about to start an after-school Sound and Lighting Club."

"The equipment School Stage has specified is high tech, yet easy to use - even the teachers are able to use it without feeling intimidated!" adds Head Teacher, Felix Rayner, "plus it makes me look good in assembly!"

> **www.schoolstage.co.uk**

For more on Chris Newton and School Stage, see this month's *In Profile*, page 82.

"provided the show goes up on time without anyone or anything getting damaged in the process, technicians are often left to their own devices in carrying out work rather than in accordance with any procedures."

A look at things (impartially, of course) from a rigging point of view . . .

This month: Safety and responsibility

EMPHASISING SAFETY

Sometimes it is all too easy to forget our responsibilities with regard to safety. We are busy, heads down getting a show rigged and not thinking about the consequences of things going wrong.

If you are employed by someone as an employee, you are engaged to carry out work on their behalf. Therefore, your employer is responsible for you and your responsibilities are defined by the terms of your contract and/or by legislation. Outside of direct employment, the responsibility for carrying out work more or less 'follows the invoice'. If you are an employee you are entirely 'owned'; as a contractor you are hired subject to a contract which is negotiated to identify responsibilities as well as scope of work and any commercial considerations.

So to cut a long story short, as an employee, you do what you are told to do. The method of work, planning, the equipment, workplace and supervision are provided by the employer. The employer takes overall responsibility for the work and if employing more than five people, should have written procedures or policy for what they employ people to do. Managers plan and organise supervision and answer to the employer or board of directors, for example. Supervisors implement the procedures drawn up by management on behalf of the employer. Employees carry the work out in line with instructions derived from the policies or procedures in place. Simples!

Very often it is only when something goes wrong that a situation is examined closely - following an accident, for example. This is when written documents may be scrutinised and compared with what has taken place. For example, risk assessments may have been ignored, method statements not followed correctly and defined systems of work circumnavigated because they take 'too long'.

An employee's responsibility is limited by their position in the organisational hierarchy and job description. So, if you are responsible for doing a job in a particular way it is your responsibility to work the way you have been trained; the way the employer has decided it should be done. A supervisor ensures that you are doing so. An employee's role with regard to health and safety is essentially to look after themselves and anyone affected by their actions, in other words to maintain the safe conditions of work provided. These safe conditions are required of employers by law but will also contribute to the effective execution of the work at hand.

So how best to ensure that employees take safety seriously and help themselves and the employer discharge their legal duties? It has long been the case that employers have had to provide 'adequate information and training' to employees to allow them to work safely and to reduce to an acceptable level the risk to themselves and anyone else affected by their actions.

Employees need to know how to do their work, the hazards that may exist and how the employer has decided to adequately control those hazards. In fact, what often happens is that employees make up methods of work as they go along: the employer's procedure may be perceived as too complicated, slow or onerous and a short-cut is found. In the entertainment industry this is a common problem; there are usually two parallel operations, the creative team and the technical team. The technical team is usually highly skilled and has a great deal of experience but they are not often consulted by management - especially with regard to scheduling work. Clearly the need to sell shows drives the enterprise, but provided the show goes up on time without anyone or anything getting damaged in the process, technicians are often left to their own devices in carrying out work rather than in accordance with any procedures.

This isn't to say technicians aren't being careful, but their activities very often won't square with an employer's written procedure. This could well land the management in hot water, should something go wrong. (This being the same management that scheduled the work in the first place.)

So the issue is how to work safely, without sacrificing disproportionate amounts of time serving a well-meant but burdensome health and safety policy.

To have a middle line between stringently prescriptive methods and 'making it up as we go along' is the key to this. If there are real hazards then simple and robust measures need to be put in place. Importantly, these need to be implemented by supervisors and not written up and forgotten.

Making sure the employee understands the employer's responsibilities to the employee and *vice versa* is a good place to start. Sessions to cover more specific tasks or techniques can be developed in this context, building on the understanding of the basics. To let the crew plough on, uninformed, unprepared and ill-equipped seems to be condoned by some managements. A small investment in people at the start of their employment and at regular intervals will reap benefits far in excess of the cost of their training.

If everyone understands how the organisation is supposed to work, the hierarchy and lines of communication, the organisation will be more efficient and safer as a workplace. Making this happen will always pose a problem to businesses - how to balance the time and cost required to provide adequate training. Training in-house makes it a living part of the business, keeps the information relevant, makes it cheaper, more effective and often of shorter duration, meaning it's far more attractive to the workforce.

Having more than the absolute minimum of information is almost always a good thing, but taking it too far is counterproductive. The 'What's in it for me?' principle is generally the way we all learn the dull stuff and using this principle certainly helps instil an understanding of our responsibilities at work both as technicians and as management.

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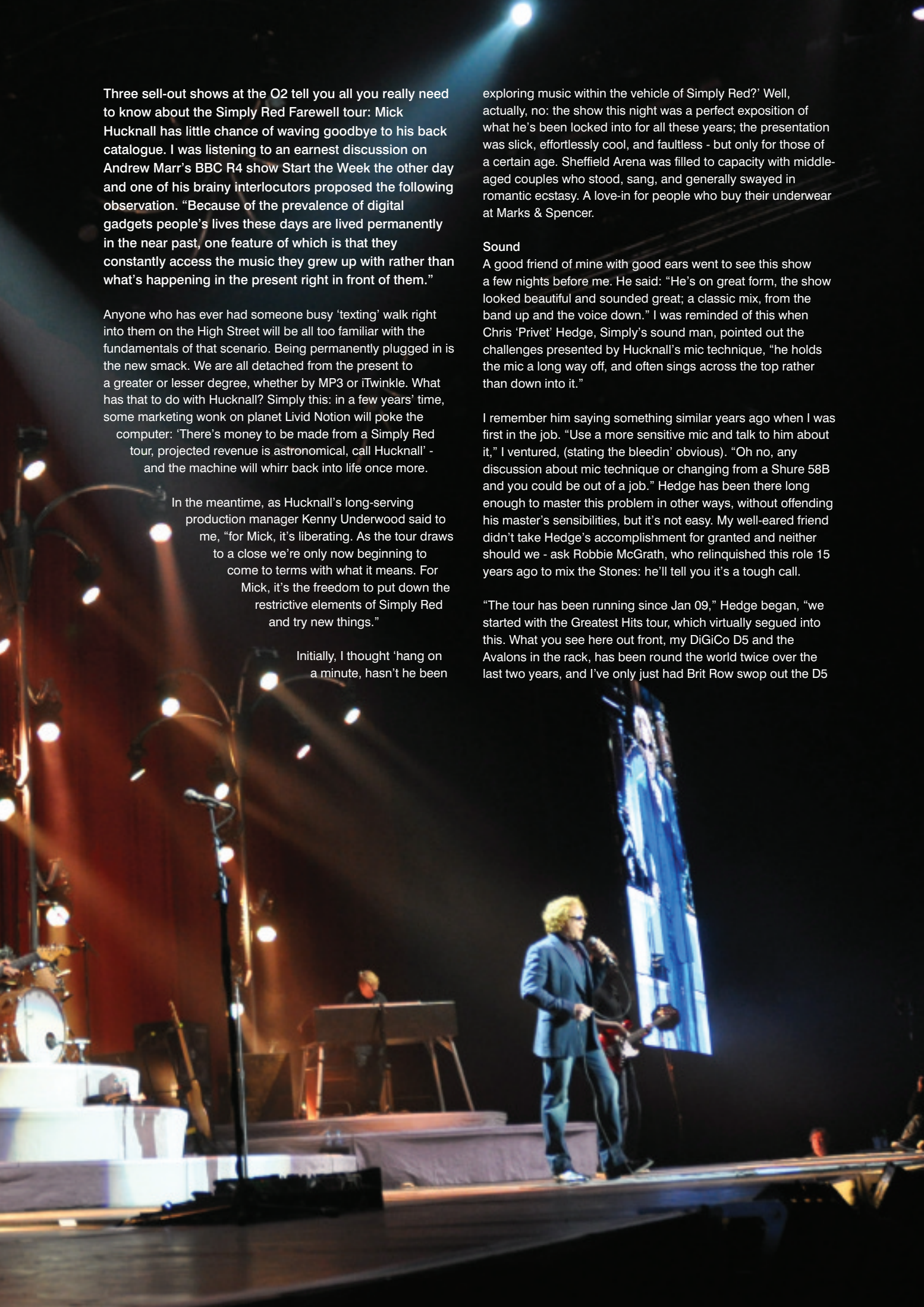
Simply Red: Farewell

Steve Moles catches up with Simly Red's final Farewell . . .



Three sell-out shows at the O2 tell you all you really need to know about the Simply Red Farewell tour: Mick Hucknall has little chance of waving goodbye to his back catalogue. I was listening to an earnest discussion on Andrew Marr's BBC R4 show Start the Week the other day and one of his brainy interlocutors proposed the following observation. "Because of the prevalence of digital gadgets people's lives these days are lived permanently in the near past, one feature of which is that they constantly access the music they grew up with rather than what's happening in the present right in front of them."

Anyone who has ever had someone busy 'texting' walk right into them on the High Street will be all too familiar with the fundamentals of that scenario. Being permanently plugged in is the new smack. We are all detached from the present to a greater or lesser degree, whether by MP3 or iTwinkle. What has that to do with Hucknall? Simply this: in a few years' time, some marketing wonk on planet Livid Notion will poke the computer: 'There's money to be made from a Simply Red tour, projected revenue is astronomical, call Hucknall' - and the machine will whirr back into life once more.

In the meantime, as Hucknall's long-serving production manager Kenny Underwood said to me, "for Mick, it's liberating. As the tour draws to a close we're only now beginning to come to terms with what it means. For Mick, it's the freedom to put down the restrictive elements of Simply Red and try new things."

Initially, I thought 'hang on a minute, hasn't he been exploring music within the vehicle of Simply Red?' Well, actually, no: the show this night was a perfect exposition of what he's been locked into for all these years; the presentation was slick, effortlessly cool, and faultless - but only for those of a certain age. Sheffield Arena was filled to capacity with middle-aged couples who stood, sang, and generally swayed in romantic ecstasy. A love-in for people who buy their underwear at Marks & Spencer.

Sound

A good friend of mine with good ears went to see this show a few nights before me. He said: "He's on great form, the show looked beautiful and sounded great; a classic mix, from the band up and the voice down." I was reminded of this when Chris 'Privet' Hedge, Simply's sound man, pointed out the challenges presented by Hucknall's mic technique, "he holds the mic a long way off, and often sings across the top rather than down into it."

I remember him saying something similar years ago when I was first in the job. "Use a more sensitive mic and talk to him about it," I ventured, (stating the bleedin' obvious). "Oh no, any discussion about mic technique or changing from a Shure 58B and you could be out of a job." Hedge has been there long enough to master this problem in other ways, without offending his master's sensibilities, but it's not easy. My well-eared friend didn't take Hedge's accomplishment for granted and neither should we - ask Robbie McGrath, who relinquished this role 15 years ago to mix the Stones: he'll tell you it's a tough call.

"The tour has been running since Jan 09," Hedge began, "we started with the Greatest Hits tour, which virtually segued into this. What you see here out front, my DiGiCo D5 and the Avalons in the rack, has been round the world twice over the last two years, and I've only just had Brit Row swop out the D5

From top: Monitor engineer Graham 'Blakey' Blake with the Midas XL8.

Sound crew chief Pawel 'Pav' Zakrzewski (left) with Brit Row's Gerry Fradley.

FOH engineer Chris 'Privet' Hedge.

Above, left: Lighting operator Pryderi Baskerville.

Above, right: Screens director Tom Robinson - still suffering from the dreaded 'lurgie'.

last week because it was starting to need a bit of attention." (Britannia Row service the tour here, and provide control, monitors and support worldwide). "It has been a very reliable package," says Hedge.

As with any such lengthy and well-travelled tour, Hedge chose a PA he can pick-up anywhere, its ubiquity a by-product of its lasting success. "I just love V-DOSC, it's perfect for this band. Also in long rooms like this I can fly long enough hangs to get the HF to the back and get rid of delays."

Hedge, it transpires, is not principally concerned with saving labour. "It's about coherence. With a wide room we hang mains and sides of V-DOSC with dVs for the near down-fill; we'll even have Arcs hung as a line array to cover the back on those 270° shows. Because it's all L-Acoustics, all the different boxes sound the same and in the absence of delays you can more easily time align everything so the transition between the zones is imperceptible. The thing is, it's an open and musical system, the highs are breathy, the mids natural. It's not a bass-heavy show - I've got nine 218 subs a side, which my system tech Pawel 'Pav' Zakrzewski times in an arc, which helps me keep the lows tidy. For me, there's no colouration in this system, even on the violin. Pav and Gerry Fradley from Brit Row have this system singing for me every day."

Zakrzewski told me: "We have a routine with Privet: we have a recording of Kick and Snare from rehearsals, and a track by Seal which is Privet's favourite for use as a benchmark. After we time-align the system we check with those sounds to make sure kick and snare sound natural and nice. Then we listen to Seal to check the room and make the usual adjusts, like here in Sheffield, some gain adjustment to counter slap-back from the rear wall. For the low-end I created a sub arc - three tiny time differences between them to smooth out the humps. I usually find at worst when we walk the room three or four numbers into the show we might have to notch out one or two nasty frequencies; but generally with this system if you set the room well enough in the afternoon it's good for the show that night."

Just one live 'grab' on the system EQ for Hedge; he has an XTA 448 on separate sends to the master rack, "so if Mick stops to sing under the side down-fills, I can quickly cut 10kHz to keep it safe."

As mentioned, Hucknall sings off mic, "and quite quietly too, particularly early in the show. In arenas I use no reverb at all because you hear enough of the room down the mic." And you handle this high input gain scenario how? "Like a monitor man would. I have to ring him out and use some fine notches on the 448 to remove the ugly stuff without compromising the character of his voice. The Avalon 737 is not there to compress, rather it's for the EQ, so as he moves off mic it keeps it warm, rather than his voice turning to paper. Fortunately, by the end of the show he does belt it out, so vocal gain improves as the show progresses. You're riding his fader and EQ all night."

Hucknall is also careful on stage, he consistently shields his mic from the kit with his body, and doesn't point it at the brass section; while some reverb from the house is constant, instrument bleed-in is rare.

"As with PA, I've chosen mics for robust touring. Nothing unexpected - 57A for guitars, 91/52 combo for kick, Beta 57 top and bottom for snare. I use dDrum triggers for the gates, which allows me to shape the envelope for the Toms, to shorten the back-end ring." It's this sort of work that keeps the low end tight. "On the desk all reverb return levels are out of the automation so I can alter them globally, depending on the venue; the only automation I'm using is Aux sends, cuts and fader settings for each song. In two years the only thing that's started to break down is one screen, which is why we swapped out the desk last week; the Avalons have been very hard wearing, just needing the occasional re-boot."

Has Hedge lined up anything to replace the steady stream of work Hucknall has given him? "I'm pitching for a few things in the Spring; but I will miss this; Brit Row put together a really good team with Gerry and Pav . . . This will be hard to follow."

Underwood's production assistant Debbie Bray forewarned me this was not the best day to visit as a nasty bug was doing the rounds. Monitor man Graham 'Blakey' Blake took himself to bed immediately after sound-check and a quick dinner, though he was kind enough to pose for a snap just before the show. He runs monitors from a Midas XL8: "I just love the desk," he volunteered in the few moments available, "just ideal for monitors."

I got the impression there would be no going back for Blake - and an interview he did with Midas certainly seemed to bear this out. He said: "The XL8 is a pleasure to use and so consistent. The band have real confidence in it so that the sound check has become something that's more 'nice to do' rather than 'essential to do'.

All the band use in in-ear monitoring - Sennheiser G2 systems - for which Blake provides nine stereo mixes, plus a separate mix for the drummer's bass cab. He also provides mixes for some of the backline techs.

In the Midas interview, Blake praised the XL8's POP(ulation) groups: "They make it so quick and easy to access a group of inputs for mixes." He added: "The onboard graphics are great and the onboard compression is really handy. There's so much choice of compression, each has its own applications and it's all right in front of you. I am also using all the onboard gates and comps, which are good enough for me not to need any outboard, and the reverbs perform really well."

Of the desk's performance on the road, he said: "It's been freighted in and out of planes all over South America already and has been more than robust."

Lights

Dave Maxwell - who I haven't seen since Eric Clapton, which must be at least three years ago now - was absent this night. That doesn't stop me saying what a lovely job he's done for this farewell tour. Those slender, elegant chandelier lamp stands define the show, setting an immediate stylish imprimatur entirely in keeping with the romantic flavour of the show and underlining the band's musical speciality. As sports arenas go, this is as close as you're going to get to a posh club: intimacy for 11,000 is not to be sniffed at.

In Maxwell's absence, Pryderi Baskerville runs the light show from a Road Hog Full Boar. A man with extensive theatre background and a few years at Vari-Lite in the mid-90s after graduating the Welsh College of Music &

Tour Suppliers

Audio: Britannia Row
www.britanniarow.com

Lighting:
Production Resource Group
uk.prg.com

Video: XL Video UK
www.xlvideo.com

Set: Brilliant Stages
www.brilliantstages.com

Backdrop & Drapes: J&C Joel
www.jcjoel.com

Rigging: Summit Steel (PRG)
uk.prg.com

Communications: Radio Tek
www.radiotek.co.uk

Catering: Eat to the Beat
www.eattothebeat.com

Trucking: Redburn Transfer
www.redburn.co.uk

Busses: Phoenix Bussing
www.phoenix-bussing.co.uk

Freight: Rock-It Cargo
www.rock-itcargo.com

Rehearsal Facility:
LH2, London
www.lh2studios.co.uk

Tour Personnel

Production Director:
Nick Levitt
Production Manager:
Kenny Underwood
Tour Manager:
Alan Morris
Production Coordinator:
Debbie Bray
Stage Manager:
Nik Rea
Keyboard Tech:
Vince Barker
Drum Tech:
Howard Barrett
Guitar Tech:
Morton Thobro

LIGHTS

Set & Lighting Design:
Dave Maxwell
Lighting Operator:
Pryderi Baskerville
Crew Chief:
Lars Kristiansen
Crew (FOH, System):
Philip Sharp
Dimmers:
Andrew Brown
Crew (Movers):
Matthew Bull,
Luke Pritchard
Rigger:
Richard Wythes

SOUND

FOH Engineer:
Chris Hedge
Monitor Engineer:
Graham Blake
Sound Crew Chief:
Pawel Zakrzewski
Sound Crew:
Gerry Fradley,
Steve Donovan

VIDEO

Screens Director:
Tom Robinson
Racks Engineer:
Bjorn Parry
LED Techs:
Alaistair Wright,
Oliver Derynck
Cameraman:
James Cronley

Wardrobe:
Sara Batini

Carpenters:
Mark Berryman,
Stuart Simms

Chef:
Heather Crewdson
Caterers:
Bridget Jenkins,
Holly McHugh,
Patrick Quilligan

Drama, Baskerville was approached by Yvonne Donnelly-Smith, the account manager at PRG, who provide the lighting for this tour, to fill the role for Maxwell. "I'd never worked with him before when Yvonne called; I programmed the original Greatest Hits show with Dave and we've worked together on this together as it's evolved," he said.

If you look online you'll find several plot designs. In short order, the *Hits* tour started as a small B-size world touring package; that then grew to Arena status - bigger, but largely derivative and run from modified original show files. The plot for *Farewell* is a different rig altogether, but look closely and you'll recognise certain themed elements that validate Baskerville's 'evolutionary' claim. For an act as musically defined as Simply Red, this makes good sense. Like the music, all three rigs are soft edged; there's barely a straight element in there.

"After the arena tour with *Hits*, we did some summer festivals followed by trips to Asia, Australia and New Zealand, then we went into LH2, Dave Ridgeway's place on the A40 outside London [readers may recall reading about LH2, Neg Earth's new rehearsal facility, in our November 2010 issue] and started from scratch, but drew upon ideas that had worked so well - the lamp post structure being an obvious one. In terms of lighting instruments the main choices have remained - VL3000 Spots and MAC 2000 Washes. With this show rigged very high - the highest truss 16m above stage - the comparative output strengths of the two sources are well matched: the spots might be brighter, but there's lots of gubbins in the gate, whereas the Washes are open, so on the output side it is balanced. We also have some VL5s on this rig but the big change is the MAC 301s."

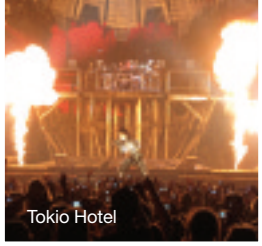
There are over a hundred of the 301s and Maxwell's decision in choosing them has ended up defining the whole look of the show. "Brilliant Stages built the chandeliers with built-in power and data. Originally we looked at the 301s to light the voiles between the onstage LED screens, but then we looked to the chandeliers and we realised we needed something light and simple. They've proved ideal - they're really fast, zoom between 8° and 32° - but the real impact is their physical nature. They're small; visually it doesn't look like a moving head stuck at the end of a curved arm; and they don't have great mass, so when they all move simultaneously they don't start the chandelier swaying."

Those two simple facts exert an enormous impact on the stage; look at the photos and you see multiple lights with roughly similar sized apertures - MAC 2k, VL3k, VL5 and MAC 301 all from a distance look, for want of better comparison, like the orifice of a PAR64. While the spots and washes do the expected work, washing and spotting, the 301s set the texture and tone. They are so impactful because the ones mounted on the lamp-post style floor-standing chandeliers (as opposed to those chandeliers suspended from the grid above) are clearly in line of sight of the audience, ergo all the other lights must be the same. From the punter perspective, the whole rig is cohesive. This was entirely intended: Baskerville revealed the flown chandeliers had originally sported MAC 700 Wash, "but were changed for 301s for a more unified look." Well worth the change.

Maxwell worked with J&C Joel to produce bespoke reefer curtains made from the flame retardant seer-suckered Polyester Trevira fabric. There were 22 reefer curtains, each 1.6m wide, produced in all - seven with a drop of 7.2m, and 15 with a drop of 16.65m. To stabilise the curtains, bespoke hanging brackets were designed, consisting of slightly curved aluminium tubes, two lightweight clamps and a 500kg shackle. Two standard black unlined Polyester Trevira drapes and a further two unlined silver Polyester Trevira drapes were also supplied, the latter with eyelets in the curtain headers to facilitate the kabuki reveal (see below).

The Video element falls upon three surfaces, two flanking the stage (IMAG) and one set on stage, spilt into columns. "This is largely for content from my Catalyst, though occasionally I take live feed from Tom [Robinson, video director]. Dave got hold of every bit of band footage and edited down specific parts he felt appropriate to the various songs. So what we run each night depends very much on the set list."

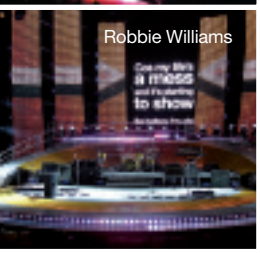

Pink

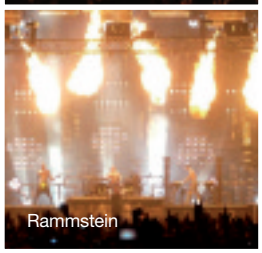

Tokio Hotel

BRILLIANT STAGES


AC/DC

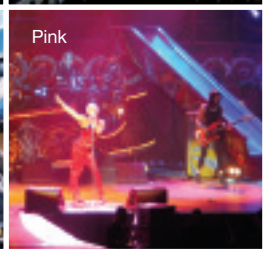

U2 Photo credit: Ralph Larmann


Robbie Williams


Rammstein


Tokio Hotel


Rolling Stones


Pink


Take That


Simply Red – Photo Credit: XL Video Holland


Photo Credit: Mark Fisher.

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The screens and the deeply scalloped drape plumes between them (voiles) don't appear until the 12th song; the kabuki reveal performed in darkness is, at this late juncture, quite unexpected. "The split between the screen surfaces is comparable to what's done with the Imag screens at the sides, but the separation is greater so the surface is less intrusive - more effect than screen," says Baskerville.

I watched over Baskerville's shoulder for two numbers after the kabuki drop and was delighted; the parts Maxwell has edited have been carefully chosen and crafted to fit; what appears on Baskerville's monitor pales in comparison to the way it works on the LED surface. Subliminal and ephemeral, the effect on the performance area is seductive rather than demanding of attention.

"This show builds and builds," concluded Baskerville - and this just three venues short of the tour's end. Dogged lot, these Welshmen.

The aforementioned Tom Robinson also appeared to have suffered the ravages of the tour lurgie, but was willing and able to talk through his role. A freelance director, Robinson is hoping to be working on the Aussie Pink Floyd documentary next year. I asked him first about the side screens being portrait and split into distinct columns. "It came from Dave the LD," he said. "It was also his concept to trim them low."

The screens sit at stage deck height, a position which relegates them to a snack view for the closer punters, rather than something the audience will find difficult to keep their eyes off during the show. Further away, they easily fulfil the Imag role. "Stylistically this format gives more of a 'look' to the live experience. As it's portrait I'm only using approximately 30% of what's captured on camera for the screens, but I am cutting two shows at once."

Audiences are offered the chance to 'buy the show' - a USB stick is available for collection immediately after (order in advance at the concessions stands). Purchasers have the choice of audio only, or sound and video combined. Thus Robinson has to have his brain in two windows at once, which is possibly why he looks so baggy-eyed, rather than the lurgie.

"As Pryd' said, the show builds, and once the stage screen is revealed there are a couple of numbers where he takes my feed to the back screen, and very effective it is. We discussed where to mix and match and it's proved a very easy collaboration. The F LED screen system and PPU comes from XL (Germany), switcher is Kayak, and we have four cameras (Sony F50s, standard def'). Originally we had some pencil cameras, not bad items in a fixed position and they will accommodate some strong change in light gain, but they didn't look good enough in comparison to the main four - the contrast between image quality was distracting." There are two hand-helds on stage, a dolly cam in the pit, and one rostrum out front.

Underwood's observation of Hucknall's imminent freedom was well made; on the evidence of this night I suspect that as with his dalliance with the Faces last year, Hucknall is going to pop up in all kinds of unexpected places. Some will probably be rubbish, some great, and most of them interesting. He has the talent, he has the talismanic voice. Sit back and enjoy.

MORE ONLINE . . .

See Dave Maxwell's lighting plot: **www.lsionline.co.uk/feb11**

Audio consultant Roland Hemming focuses on the business of installations . . .

This month: Client Communication

"You can explain build quality and maintenance costs relatively easily, ease of control too, if they are prepared to listen, but if you just say that it performs better you are on much stickier ground, even though we all know you are probably right."

MY CLIENT DOESN'T UNDERSTAND ME

I frequently talk to companies about the nature of installation projects and the problems and pitfalls associated with this sort of work. Whilst some project knowledge will help regardless of what you are installing, there are some specific issues that particularly apply to sound and lighting.

IT'S OFF OR ON

The first thing is that many people don't understand the qualitative differences when buying our systems. To some, sound and lighting is 'off or on'.

Quality itself has become more difficult to judge. For audio it is fair to say that quality has plateaued over the past few years.

Those who think that because our equipment is now commoditised things have become easier have forgotten something. Whilst we have easy access to high quality raw technology, we don't all have the knowledge of acoustics or the understanding of how to use lighting within the architecture of a building. A skilled lighting or sound designer will know how to make something look or sound good and use the equipment at his disposal to achieve the best results under the circumstances.

In lighting, anyone can buy colour changing LED fixtures and connect them to a control system without giving thought to what is sympathetic to the building.

So given that all our technology is 'quite good' how do you communicate your offering to the client and get them to understand the challenges you have to overcome?

This has been made more of a problem now that we have standards for defining quality. For example, in the audio world there is a British standard that sets out the requirements for intelligibility of speech and there are several 'bands' of quality varying from London Underground to high quality theatre.

All the specifier now needs to do is to say that the system has to perform to a given level of quality according to that standard. However, that doesn't actually mean that the system will sound any good, or that more creative use of equipment wouldn't give a more engaging experience.

In the lighting world you can specify some minimum light levels but that doesn't necessarily mean the colour temperature and deployment will make the place a pleasant environment.

HE'LL TELL YOU WHAT HE THINKS

Even once you have put your preferred equipment in, another problem is that the result of our work is based on a subjective judgement. Most people don't know about plumbing or IT networks but they do think they have a valid opinion about what things look like and sound like and they will take great pleasure in telling you. They have a hi-fi at home and a musical and aesthetic taste. This makes it a personal and not just a professional judgement, so we still have to listen to what they have to say on the matter.

The problem arises in that the commercial installation of audio and lighting has almost nothing to do with sound in the home or with personal taste about what looks good. Commercial installation involves filling large spaces with sound and lighting, often in the most economic way, whilst being given a countless number of hoops to go through.

Whilst a Hi-Fi may have two loudspeakers (or perhaps five for surround sound), these are laid out in a particular way in a relatively small room. They only ever deal with recorded sound, as you will never have a live microphone at home.

Commercially we have to deal with a variety of simultaneous audio sources. There are microphones of various types and people with different microphone technique. There are aesthetic concerns from the designer or architect. All this results in the need to use many more loudspeakers in imaginative ways.

The challenges with lighting in buildings are perhaps more difficult: you have to deal with all manner of weight, power, budget and location constraints that go far beyond something just 'looking nice'. It takes time and care to explain to someone why this makes things so different and why their performance expectations should also be so.

I CAN BUY THE SAME THING CHEAPER

This democratisation of technology also makes it difficult to explain the cost differentials between professional and other equipment.

Why does one 20W LED fitting or one 300W amplifier cost three times as much as another when it 'does the same thing'? You can explain build quality and maintenance costs relatively easily, ease of control too, if they are prepared to listen, but if you just say that it performs better you are on much stickier ground, even though we all know you are probably right. This leaves the buyer not really understanding how much they should spend on our systems.

THE GRUDGE BUY

Most large public buildings require you to have a voice alarm system or lighting for emergency purposes. It's the law. You have a client who wants to spend as little as possible because they have to comply - not because they actually want it. You can do a number of things to ease this pain and you can persuade some venue owners to have better quality, more sophisticated systems which they can also use for entertainment and promotions.

These days our lives are surrounded by a lot more audio. Whilst this is sometimes cause for complaint, it can also be used sensitively and effectively to keep people in buildings for longer and to inform them of special offers, so they spend more money. Of course if you make them happier and entertain them they are more likely to come back.

In many ways, this article should go into magazines read by our clients, because what we really need to help with all this is more enlightened clients, with a better understanding of what we are trying to achieve and an installation and the challenges we have to overcome.

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This month's news . . .

by James Eade

Welcome to this month's Technical Focus, in which we bring you news of new wireless and LED technologies with the potential to bring significant new possibilities to audio and visual technologies for entertainment, presentation and installation. There's also a warning from the lighting industry's own WEEE compliance scheme, Recolight, about the obligations affecting LED and OLED importers. Our main feature this month looks at microphones, their types and applications, as well as looking at some of the latest models on the market . . .

PLASMA Wireless?

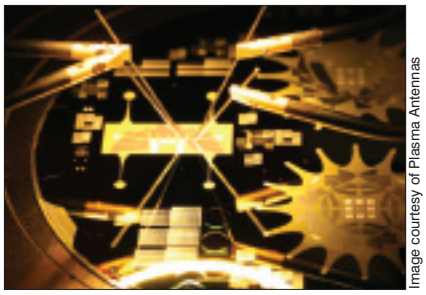


Image courtesy of Plasma Antennas

An article in a recent issue of *New Scientist* by David Hambling describes a potential new wireless technology which concerns the replacement of the traditional antenna with a plasma consisting solely of electrons. Typical antennas consist of metal radiators, reflectors and other physical directional elements to increase the gain of the antenna in a particular direction - unless they are omnidirectional, in which case it is usually a vertical rod or whip type. The manufacturing is quite specific as the elements need to be cut to precise lengths for the frequency of operation; assembly can also take some time.

The new Plasma Silicon Antenna, or PSiAN, relies on existing low-cost manufacturing techniques used for silicon chips. Developed by Plasma Antennas of Winchester, UK it consists of thousands of diodes on a chip which, when activated, generate clouds of electrons (hence 'plasma') about 0.1 millimetre across. At certain electron densities, the clouds reflect high-frequency radio waves: selective activation of the diodes can shape the reflecting area to 'steer' a focused beam of radio waves. This capability makes the antennas very useful to ultrafast wireless applications, because such streams of high-frequency radio waves would quickly dissipate using existing antennas.

Solid state plasma antennas are attractive for use in a new generation of ultrafast wi-fi, known as Wi-Gig. Existing wi-fi has a maximum data rate of around 54 megabits per second, whereas the Wi-Gig standard is expected to go up to between 1 and 7 gigabits per second - fast enough to download a television programme in seconds. However, getting through that volume of data in such a short timescale does require a higher bandwidth, something currently unavailable in existing licence-free wi-fi bands and hence the relatively unregulated band of 60GHz is being trialled. It's astonishing to think that only as far back as the 1950s frequencies higher than 600MHz or so were thought to be both unobtainable and useless.

Signals at these frequencies disperse rapidly unless they are tightly focused, which is where the directionality of PSiAN comes in. The benefits for the entertainment industry could be immense, particularly for audio as it would be easy to stream high channel counts at high resolution, while lighting fixtures could have all their data sent wirelessly, including graphics for the virtual gobos. We will have to be careful how we use them though: the US military is also interested in solid-state plasma antennas for use in a more advanced version of their so-called "pain beam", a weapon, called the Active Denial System. The ADS heats a person's skin painfully with a beam of 64GHz radio waves.

www.plasmaantennas.com

OLEDs usurped

OLEDs have been much vaunted as the replacement for the LED, particularly in display and architectural lighting applications. Now, however, quantum dot LED technology is set to knock OLEDs off their pedestal, following the recent partnership between LG Displays and QD Vision - a company which has carried out a lot of development work in this area.

The quantum dot light emitting diode (QLED) is a new breed of electroluminescent technology currently in the development stage that will (its developers claim) "lead to the next generation of electronic displays and solid-state lighting applications".

The heart of a QLED consists of electroluminescent colloidal (or evenly dispersed) quantum dots which combine the customisable, saturated, stable colour and low-voltage performance found in a typical inorganic LED with the cheap, flexible manufacturing processing methods of a polymer. The result is a tuneable colour technology that can employ ultra-thin, transparent or flexible substrates. The benefits of QLEDs over OLEDs include a 30-40% colour efficiency; as much as twice the power efficiency; lower manufacturing costs with the ability to print large-area QLEDs on ultra-thin flexible substrates and transparent, flexible form factors. Backlights or glass are not required, which makes the end product cheaper and more flexible in terms of applications. It seems that the prospect of a roll-up video wall is taking a step closer to reality.

www.qdvision.com/qleds-the-future

Highest output LED yet?

Despite the development of QLEDs, work on the humble old LED (which surprisingly is now around 49 years old) continues apace. US-based LedEngin Inc has launched what it believes to be a record device for a 12mm square package which can output 5500 lumens at a somewhat stark 5500°K colour temperature or 3000 lumens at a more comfortable 3100°K. The LZP series of devices is, its manufacturers claim, capable of replacing 35W metal halide (MH) bulbs or 50W high pressure sodium (HID) bulbs while still achieving the high flux required in applications such as high bay, architectural, street/area and stage lighting.

There are a range of proprietary TIR high-efficiency optics available to enhance the beam, which it is claimed can exceed the luminance of competing LED solutions by 6-10 times while overcoming the challenges of flood and spot lighting applications. Other features include (at 5500°K) a maximum power rating of 90W (95lm/W), an L70 lifetime of greater than 50,000 hours, various colour temperatures from 2700-5500K and a CRI of 85. Products are sold directly and through select distributors . . .

www.ledengin.com

Variable Drums

New software - called B-Keeper (short for Beat-Keeper) - has been developed at Queen Mary University of London's Centre for Digital Music, giving drummers the freedom to speed up or slow down the pace of any pre-programmed music, making the recorded material follow their lead. It means that drummers will no longer have to keep time with a click-track to set the beat of pre-recorded tracks often used during live performances and studio sessions.

Many bands, when integrating pre-programmed music into their songs, use click-tracks, with metronome-like clicks fed

to the drummer via earphones. Unless the drummer keeps a precise rhythm, the pre-programmed material will not synchronise properly with the rest of the music. B-Keeper allows the drummer to speed up or slow down the recorded material by around 5% and still keep pre-programmed parts of the music in line with the beat. The drums are linked to the software via microphones, primarily on the kick and snare. The software adjusts the tempo of pre-programmed music by using a sequencer that incorporates a pitch-tracking algorithm which changes the tempo without affecting its pitch.

Dr Andrew Robertson, who wrote the software from scratch, says: "The software follows the beat of the kick and snare drum and uses that information to make sure everything stays synchronised by changing the replay speed of the pre-programmed parts." Robertson is a keen guitarist and B-Keeper has now been successfully trialled by his own 'space rock' band, Higamos Hogamos.

"We've used B-Keeper at gigs in the UK, Belgium and Luxembourg, and it makes a noticeable difference in terms of helping to create a better atmosphere and letting the band feed off and bond with the crowd", says Dr Robertson. "Our studio work is also benefiting from the flexibility B-Keeper gives us when we're recording our material."

A new MaxForLive version of the software is available at www.B-Keeper.org. Dr Robertson now aims to simplify the software with a view to making it commercially available within the next 12 months. Future plans include using B-Keeper to synchronise not only all the musical elements of a song but the lighting too . . .

www.elec.qmul.ac.uk/digitalmusic/index.html

JFMG Win band manager award

The contract for the licensing of spectrum to the Programme Making and Special Events (PMSE) sector has been awarded by Ofcom to JFMG's parent company Arqiva. The decision was made following a tender process which included a tender from PLASA, and is subject to terms and conditions. The result is that JFMG will continue to issue licenses for PMSE use.

www.jfmg.co.uk

Health, Safety & Standards news

Recolight LED warning

Recolight, the specialist WEEE compliance scheme for the lighting industry is calling on LED and OLED importers and manufacturers to check if they meet their obligations under the WEEE Regulations.

The WEEE Directive is currently undergoing a review and LEDs will be specifically named in the scope of the recast Directive which is due to be finalised in 2010/11. In the meantime, the Environment Agency has already classed LEDs as in-scope for the WEEE Regulations, so companies importing or producing LED and OLED lamps need to comply with the WEEE Regulations *now*.

As most readers will be aware by now, under the WEEE Regulations a producer, importer or anyone who puts electronic or electrical equipment on the UK market for the first time must take responsibility for their products when they reach end-of-life. This includes companies importing from other EU member states, or those who simply re-brand a product.

Frank Craven of Recolight notes: "For many UK companies who only import a small quantity of LEDs, complying with the WEEE Regulations may seem like an unnecessary burden. However, good compliance schemes can work with you to ensure this isn't the case by making compliance as simple as possible."

Most manufacturers register their products with one of the Environment Agency approved compliance schemes which manage the process on their behalf. The lighting industry, however, established its own scheme, Recolight, to manage the recycling of all in-scope Gas Discharge Lamps, including fluorescent tubes, metal halide and sodium SON and SOX lamps. According to Recolight, the lighting industry has funded the recycling of more items of WEEE than any other industry, demonstrating its commitment to meeting the requirements of the Regulations and keeping this potentially hazardous waste stream out of landfill.

www.recolight.co.uk

Apology: Technical Focus Q&A, January 2011

Following on from last month's discussion on frequency changes caused by temperature, TF owes readers an apology. Quite a number of you wrote in to discuss the merits of the logic presented, and I do agree that it is flawed in respect of a 'real' sound wave. The frequency shift does hold true though for a theoretical space tuned to a standing wave at one frequency, which is then subject to a change in temperature - hence the confusion. For a fixed temperature gradient there will of course be a fixed delay time, hence all wavefronts will experience the same delay and there will be no change. Sometimes it pays to go back to basics rather than diving off at the deep end! My thanks to all those who've written in.

Send your technical questions to: **technical@plasa.org**

LSi's Guide to Mics

Technologies, types, applications and model updates . . .

by James Eade

Microphones are, of course, a primary element of any live sound system and will continue to be so forever - the human voice and many instruments will always have an analogue output which has to be converted to an electrical signal somehow . . .

That electrical signal will always be analogue to start with, but conversion to digital, either at a DSP in the rack or digital converter in a snake, is commonplace. We may see it happen at the mic more frequently in professional applications in the near future (AES have standard AES 42 for that purpose), although it's surprising to see the number of USB mics that can be purchased for home studio use. Either way, for the foreseeable future, analogue is here to stay.

There are several different types of mic available, each with their own characteristics. In the old days, carbon granules were the mainstay of microphone technology, although the first mic designs patented by Bell in 1876 actually used a moving armature type of design, later refined by Berliner and which became something of a standard in Bell systems for years to come. Carbon granule designs, though, were quite straightforward to manufacture and relied on acoustic pressure waves hitting a diaphragm to compress the carbon, thereby changing its resistance. Simple, but not always reliable - our more senior readers may remember banging telephone handsets on the table to try and loosen granules that may have become stuck together.

Carbon mics dominated telephony until quite recently but in the 1920s the need for higher quality audio for broadcasting meant that new designs were required as the limited frequency response of carbon mics (somewhere in the region of 400-2000Hz) was insufficient, as was the dynamic range. It was around this time that the first capacitor and dynamic mics appeared.

Dynamic

This microphone construction shares a lot in common with the ordinary loudspeaker and also goes by the names of electrodynamic, electromagnetic and moving coil microphone. In this design [*see Figure 1*], a coil of wire is attached to a diaphragm and as pressure waves move the diaphragm, the coil moves in and out of a magnetic field thereby inducing a voltage in the coil - exactly the opposite in operation to a moving coil loudspeaker, just a lot more sensitive. The actual design, however, is quite involved, in order to achieve a flat frequency response.

As the microphone consists of a mechanical coil and diaphragm assembly it cannot achieve a flat frequency response on its own, as the mechanical mass will resonate at a particular frequency, and thus the response will have a peak, typically designed to be at the geometric mean of its desired response [*see Fig.2*]. Curve 1 shows the raw response of the coil assembly with a distinct resonance at about 800Hz. This is damped - commonly using silk layers behind the coil - which reduces the resonant peak, but at the expense of the lower and upper frequency response (curve 2). To counteract this at the LF end it is common to insert a tube from the chamber to the outside air. The dimensions of the tube are chosen to provide a Helmholz resonance in the LF range which increases the overall sensitivity at LF. Conversely, for HF, a small resonant chamber is designed within the diaphragm which provides a resonant boost at these frequencies. Depending on the intended application of the mic, it is common to see these resonances accentuated - vocal mics often have peaks at a couple of kilohertz to make them sound a bit brighter and to increase intelligibility.

The advantages of dynamic mics include their robustness and durability, as well as their relatively lower prices. They don't need phantom power and they are fairly insensitive to changes in humidity. However, they are not the most sensitive and frequency responses aren't generally as good as other designs. They are not often damaged by the odd application of phantom power, but applying it causes the diaphragm to be biased (more than likely against the extremities of movement) which reduces the sensitivity markedly, as well as the response. Prolonged connection of phantom power is likely to damage the coil.

Condenser

The condenser - the old word for capacitor - microphone uses two plates that are electrostatically charged. One is fixed and

the other is free to move as pressure waves arrive. This causes the charge on the plates to vary [*see Figure 3*], which gives rise to a tiny voltage swing which is then amplified - almost always by electronics within the mic itself, hence the need for phantom power. The charge on the plates is caused by applying a polarising voltage which never changes. As the plates move apart the charge decreases, which causes the voltage to rise, and as they get closer together the voltage decreases in line with the increase in charge. The actual movement of the plates is microscopic - the difference between a pressure of 54 and 134 dB Lp is around 0.1mm, a tiny amount for such a large pressure swing.

Condensers are, in their natural state, broadly omnidirectional in their pick-up pattern (see later) and in order to achieve some directionality, the back plate has holes drilled in it. This allows the sound arriving at the back of the plates to be delayed to coincide with that arriving at the front, which then cancels the sound out - the size and position of the holes determine which frequencies will be affected. An advantage of this design is the ability to have varying pick-up patterns, specifically on larger diaphragm types (such as studio vocal-style mics) in which there are two diaphragms placed either side of a static plate. By varying the amount of signal from each diaphragm to the amplifier, the polarisation can be altered from a tight cardioid, figure of eight or to a full omnidirectional - normally selected by a switch on the unit.

A common form of condenser in the last 40 years or so is the electret, essentially the same as a capacitor except that the plates are permanently charged by placing them in a strong electromagnetic field while under heat. The result is a good quality response for considerably less money - hence they are now very common. Early models did have a tendency to lose charge over time but this is seldom an issue these days. The advantages of capacitor mics include excellent frequency responses (which may not always be entirely flat, often having a little lift at HF) and dynamic range. They are, however, sensitive to humidity and temperature and given manufacturing tolerances, two mics of the same model may not always sound exactly the same. They also need external power, typically in the form of phantom power from a mixing desk. They need a little more care too - the charged plates act as a magnet for dust and airborne rubbish and this causes the HF response to degrade over time, so they do benefit from a little maintenance occasionally.

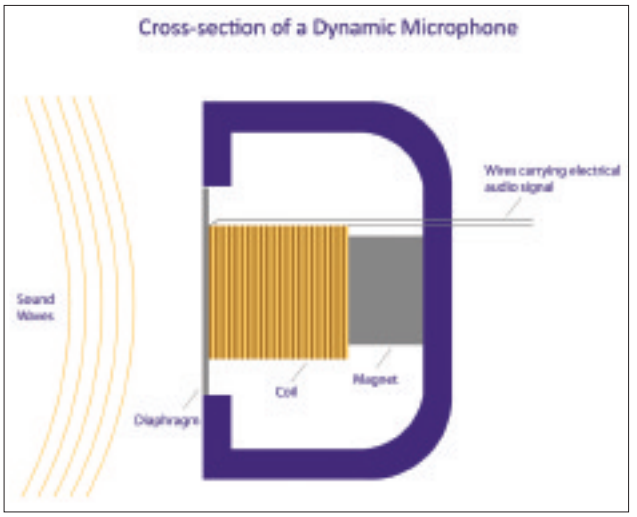


Figure 1: Dynamic microphone

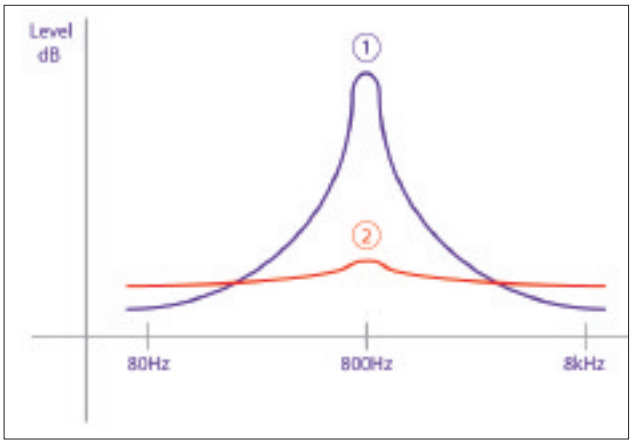


Figure 2: Dynamic mic damping

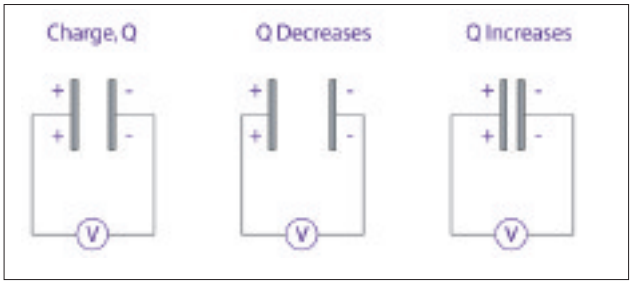


Figure 3: Capacitor microphone

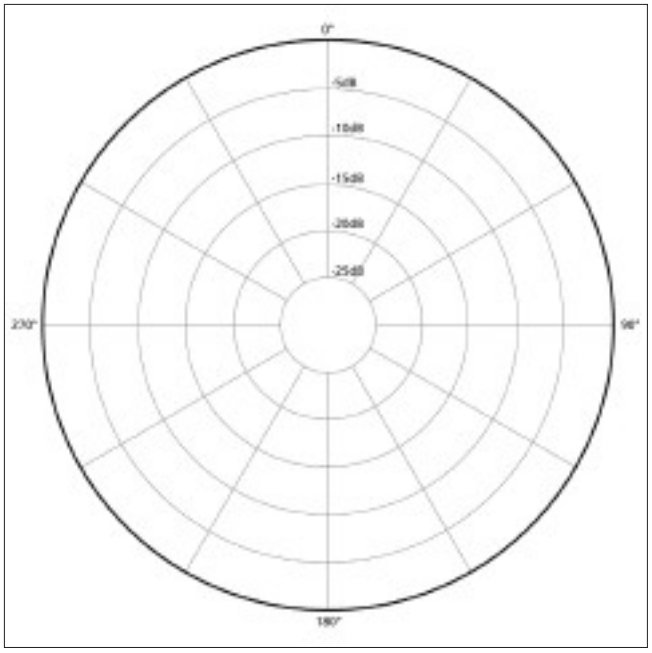


Figure 4: Polar pattern omnidirectional.

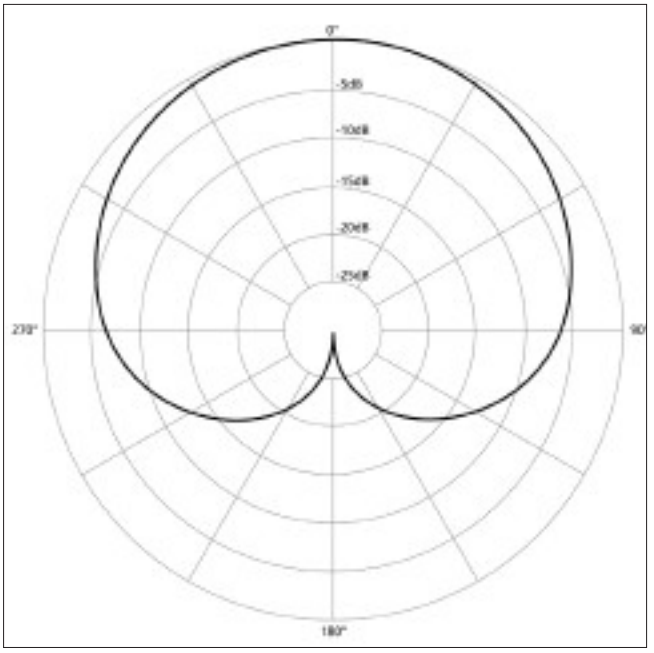


Figure 5: Polar pattern cardioid.

[Images by Galak76, available under a Creative Commons Attribution-Noncommercial license: //commons.wikimedia.org/wiki/User:Galak76]

Ribbon

The ribbon mic is the most common form of pressure gradient or velocity microphone. Such devices sense the difference in pressure between the front and rear of the diaphragm at closely spaced points. It was a technique pioneered by Harry Olson of RCA during the 1930s and was the most common of broadcasting microphone. In operation it shares characteristics with the dynamic mic in that the ribbon is typically a light foil strip (*see below*) which forms the diaphragm and this moves within a magnetic field - the result being that an electrical current flows through the foil which varies in accordance with the movement. This current is so small that in order to generate a useable voltage a transformer is usually deployed to boost the output.

As this design senses the pressure on both sides of the diaphragm it has a characteristic 'figure of eight' response pattern. The foil diaphragm is a lot lighter than the dynamic mic equivalent and as a result the resonant peak of the mechanical assembly is usually well down in the LF range (around 25Hz or below) and the lighter mass also allows it to vibrate more freely, giving rise to a higher HF response. Advantages include a relatively flat and high frequency response and they don't need power. They are, however, quite fragile and relatively expensive. Older ones used to suffer with sagging ribbons caused by age and when used outside a heavy breeze could actually destroy them!

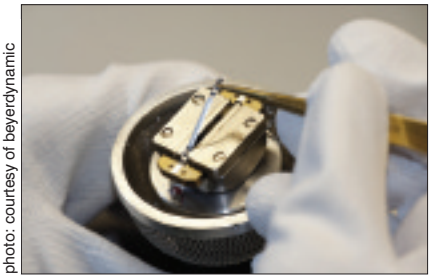


photo: courtesy of beyerdynamic

beyerdynamic RM510 ribbon mounting

After the introduction of the transistor and better dynamic and condenser technology, ribbons fell out of favour, especially in broadcasting, as the early chunky designs (to incorporate all the electromagnetics and transformer) did not look good on camera. However, they have undergone something of a renaissance recently with many manufacturers revisiting and improving old designs.

Other types

A variant of the condenser mic is the shotgun type - essentially an ordinary condenser mic with a long, perforated tube attached at the front. It works on the principle that sounds arriving at the slots in the side of the tube interfere with the sounds arriving from the front and cancel out - thereby reducing the level of nearby sounds at the mic element and giving it a high gain in the direction the tube is pointing.

The Lavalier mic is very common for body-worn applications owing to its small size. These are usually electret condenser designs and often made to seemingly impossibly small dimensions, with modern designs being in the order of a couple of millimetres diameter. The advantage, of course, is that they can blend in well with clothing or in hair and accordingly are used in situations where the visual intrusion is a problem, such as on camera or in theatre. Being close to the body and clothing means that they are sensitive to handling noise caused usually by fabric rubbing against them, so particular care is required in placement.

Common in the AV market is the PZM, or pressure zone mic, otherwise known as a boundary mic. This is again a condenser design, but placed on a flat plate which forms the boundary itself, hence the name. Getting the capsule close to the boundary reduces the amount of reflections hitting it from all over a room and only the strong wavefronts bouncing off the boundary get picked up. The result is greater sensitivity and it makes the signal sound less reverberant as it is picking up fewer of the weaker room reflections. The same principle can be achieved using ordinary condenser mics; for example, to pick up a theatrical cast mics may be positioned along the stage apron on small stands pointing down at the stage itself rather than at the 'action'. In this manner they pick up direct strong reflected sounds and not weaker reflections from elsewhere.

Another type is the vacuum tube condenser variety, often used for vocals in recording and broadcasting. These do not use a valve construction for the transducer - which is usually a condenser type - but for amplifying the signal from the transducer itself. As any exponent of valve amplifiers will note, the audio has a 'richer', 'warmer' or 'fuller' sound, primarily caused by the non-linearity of the valve operation and harmonic components.

Proximity effect

This phenomenon affects directional mics. If a mic is operated close to a sound source (such as drum or amp mic) there is a tendency for an increase in the LF response. The reason for this is that when working at close distances, there can be a substantial difference in the length of the audio path from the source to the front

compared to the back of the mic, the net result being that the LF frequencies are enhanced when the distance is small. This can be used to good effect as it increases the warmth of a sound, but equally, if not expected it can make the response seem out of balance.

Mic directivity

The sensitivity of a mic depends on the angle to which it is placed in relation to the sound source. As noted previously, a ribbon mic is equally sensitive to sounds coming from the rear as to those coming from the front, whereas dynamic or condenser types usually are most sensitive to sounds directly in front of the diaphragm. This pattern of sensitivity is illustrated by what is known as a 'polar plot'.

Looking at *Figure 4*, imagine an ordinary handheld microphone on a stand placed at the centre of the plot with the windshield pointing towards 0° and the connector to 180°. If you were to walk around the mic in a circle talking, the signal level would be the same at all frequencies wherever you stand, whether in front, at the sides or behind it. Looking at the other patterns it becomes clear that the gain of the mic varies with position - the cardioid (*Figure 5*), for example, has a very poor sensitivity (0dB) directly behind itself, and around 6dB down at the sides. Such a pattern lends itself to use as a vocal mic on stage as the mic is less likely to pick up sound from foldback monitors on the floor situated behind it. The polar pattern is not the same at all frequencies and the plot will normally show several lines, indicating the pattern at different spot frequencies.

Placement & Choice

Where to actually place a mic in relation to the sound source - whether a singer, an instrument or the environment - depends on many factors, not least the artistic element of what sound is actually required. The polar patterns are a guiding factor in terms of general choice of mic, but the rest is down to the desired response and somewhat less so, the sensitivity. Mics are often chosen for their particular frequency response and from reading event reports in the pages of LSi, it is not uncommon for a sound engineer to be reported as saying something like "we went for XX mic because it really brings out the characteristics of the singer's voice".

Response is a guiding factor, but not exclusively so - for example, a shotgun mic might have a similar frequency response to a handheld but you wouldn't use it as one for fear of getting the drum kit at the back of the stage down the vocal channel. Plus it would look odd! In short, placement depends less on the actual brand of mic than on what sound is required: is the style to emulate the sound of a particular band or era, for example, or are some of the

room acoustics required in a recording? How good the musician or vocalist is can also be taken into account.

It is difficult to 'pigeon-hole' mics into specific applications, although a few are just made for the purpose - like the Coles commentator mic, the 4104, which has a long pedigree and is specifically aimed at excitable sports commentators. However, most mics aimed at a particular use may also be deployed in another manner. It's not unheard of for a singer to use a mic primarily designed as an instrument mic, and vice versa. Equally, a lavalier mic designed for vocal use may be deployed on an instrument because of its discreet size. Generally, the flatter the frequency response, the more universal the possible uses.

What's out there?

TF has trawled the market to pick out a few new, classic and other notable products and attempted to classify them as follows - but don't be surprised to see a studio mic on a live stage or an instrument mic in a singer's hand . . .

Vocal mics

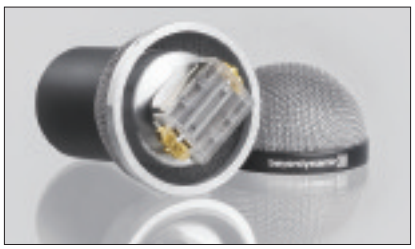
Surely the most ubiquitous of these is the famous **Shure** SM58 (*above*), much imitated and something of a design icon - it is pretty much what anyone would sketch if asked to draw a picture of a mic. It is actually a vocal variant of the instrument mic the SM57, the first 'heavy-duty' mic intended for stage use launched back in 1965 and still going strong. Characteristics include the trademark spherical mesh filter that minimizes wind and breath pop noise and a cardioid pickup pattern, as well as a high degree of shock

protection. A more modern version is found in the Beta 58A, which is a high-output super-cardioid dynamic vocal mic.

There are many similar mics from an array of manufacturers. For example, **Behringer** produces the XM8500 which has a frequency response of 50Hz to 15kHz and includes a two-stage pop filter. **Studiospares**' S580 vocal mic is, by its own admission, 'clearly inspired by the SM58' - and clearly looks like one too. It differs though in having a hypercardioid pattern and a narrower frequency response which is reflected in the cheaper price.

Audio-Technica, another well-known brand and for live applications, offers its flagship Artist Elite and Artist series of dynamic and condenser mics for vocals and instruments. The AE5400 handheld condenser has detailed anti-shock mechanics to improve handling noise and it features the same element as the AT4050 studio mic. It has a large-diaphragm capsule which gives a better response (20Hz to 20kHz) and enables better handling of high SPLs with protection against plosives/sibilance without affecting the HF end.

Beyerdynamic's TG-X 58 (*right*) is a supercardioid mic utilising a Neodymium magnet structure and having a similar performance to the SM58. A new release from the company is the RM 510 interchangeable ribbon capsule (*below*) for its Opus 9XX series and Opus 600 wireless systems. The company claims this to be the first wireless ribbon mic and the capsule takes its heritage from the M500 ribbon mic. The capsule design features an ultra-light, barely 3 micrometre thick aluminium ribbon that delivers a very impressive frequency response over its cardioid pattern. It has an HF resonator designed to achieve good HF reproduction; it also serves to protect against plosives, while a subtle attenuation in the 6kHz range suppresses sibilant sounds.

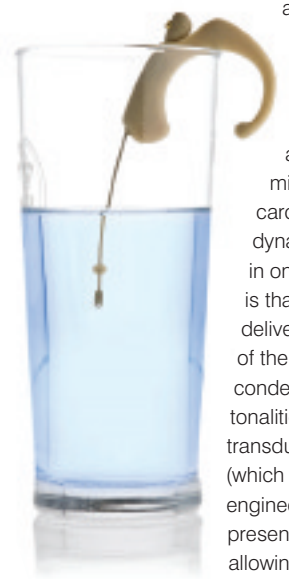


Lavalier Mics

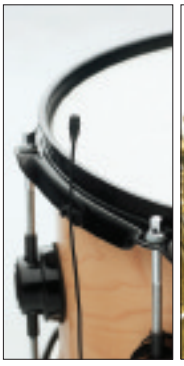
A name that springs readily to mind in this application is the **Sennheiser** MKE range, particularly the MKE2 Gold (*top*). It has been around for some time, has a wide response from 20-20kHz and features a permanently polarised capsule and an umbrella diaphragm, which helps against sweat build-up. It also has a robust cable - lavalier mics tend to suffer cable damage from being wrapped around beltpacks and also from the continual flexing at the connector caused by movement of the wearer. The MKE Platinum has an enhanced HF response and the MKE1 is the smallest in the range.

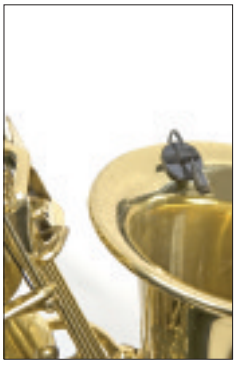
DPA is another name synonymous with lavalier and headworn mics. Its 4060 range comes in three variants with differing levels of sensitivity/SPL handling to enable them to be better matched to different types of beltpack transmitter. They also come with different grids to match them to specific placements on the body, such as the chest or head. The soft boost grid has a response of 20Hz-20kHz and a 3dB soft boost at 8-20kHz. The high boost grid has the same overall response but with a 10dB boost at 12kHz. There are also a wide range of accessories for body and instrument mounting for near enough every conceivable application as well as a range of adaptors to allow connection to different manufacturers' beltpacks.

A relatively new name on the scene is **Da Cappo**, now sold in the UK by Orbital. Currently, there are two omnidirectional capsules and one cardioid capsule used in the range of headworn and lavalier mics. The omnidirectional capsule specifications are identical except that one has a 10dB lower sensitivity, ideal for situations where a bit more headroom is required. The cardioid capsule is aimed at live stage use, particularly where onstage (as opposed to in-ear) monitors are used and has a sensitivity of -51dB. All feature a flat frequency response as well as good protection against electromagnetic interference. The capsules have been incorporated into the housings in a manner to make them water resistant: seeing one used to stir a glass of water before being taken out and talked into - with no discernable change in audio quality - is quite something to witness (*right*).



Sony is a name that doesn't always top the list, particularly since the demise of their studio mics such as the C-37A, but given the range of wireless mics it sells it is reasonable that it has a range of lavalier mics to complement. The electret ECM-88FPT is the smallest in the range (there are several ECM-88 models) measuring around 3.5mm and has a flat response up to 20kHz. The ECM-77 range feature a capsule optimised for speech,





whereas for the budget conscious (and, given the size, the less image conscious) the ECM-166 range provides a suitable alternative for less demanding applications.

Instrument mics

Shure has recently released a number of new mics, including the Beta 181 series, which are compact, small-diaphragm condenser mics designed for discreet placement and control in live and studio environments. A range of interchangeable heads offers cardioid, supercardioid, omnidirectional and bidirectional capsule options. Also new from Shure is the SM137, which has a very thin diaphragm for a frequency response that combines a smooth HF with a tight, controlled LF response.

Of note from **Audio-Technica** is the AE2500, a dual element kick drum mic consisting of both cardioid condenser and dynamic capsules combined in one housing. The principle is that the dynamic element delivers the aggressive attack of the beater and the condenser captures the round tonalities of the shell. Both transducers are phase-aligned (which is no mean feat of engineering) and the signals are present on a five-pin XLR, allowing either or both signals to be used. It's more affordable brother is the ATM250DE from the Artist range.

Putting mics on instruments is always an interesting task. **DPA** has used its expertise in small mic technology to develop the 4099 series (*pictured top right*), specifically targeted at different instruments. The 4099B,

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for example, is for picking up the warm sound of a double bass, with a mounting optimised to sit between the bridge and the fingerboard, thereby placing the mic in the 'sweetspot'. Others in the range are aimed at drums, brass, saxes, violins, guitars and pianos.

For kick drums and bass guitars, few would argue that the **AKG** D12 set the standard with its ability to withstand high SPLs and notable proximity effect. It is now superseded by the D 112, which shares the low frequency resonance and has a tailored HF response (a peak around 4kHz) to ensure the bass instruments are defined in a recording.

The AKG CK 451 was a stalwart of many rental companies and studios with its interchangeable capsules. It was discontinued some years ago but demand has led to the company coming up with the C 451 B (*above, right*), aimed at percussive instruments and guitars. It has identical acoustics to the original CK 1 capsule and the polar pattern is a near frequency independent cardioid. Also of note is the C 411 Ultra-light vibration pickup, a condenser transducer in a sealed enclosure aimed at acoustic guitars, mandolins and similar stringed instruments. It is designed to give a clear, uncoloured sound without changing the balance of the instrument and is designed to be stuck on or near the bridge using a reusable adhesive.

Another classic in the armoury of many studios is the **beyerdynamic** M 160, a dynamic double ribbon microphone. It features a hypercardioid pattern with a noise attenuation of 25dB at 110° and is very effective for voice reproduction. In the studio, it finds favour for capturing audio from string instruments, as well as for hi-hats and toms.

Studio Mics

A name synonymous with studios is **Neumann** - distributed in the UK by Sennheiser. Old favourites include the U47, U67 and M49/50. A new addition to the stable is the KMS 104 Plus (*right*) handheld microphone, launched last year. This has been especially optimised for the requirements of female voices in the rock and pop genres and features high acoustic resolution and smooth frequency response.

Audio-Technica has its top end 40 series of ribbon mics and the more affordable 20 series. The AT 40 Series includes the relatively new, handmade AT4080 (*left*) and AT4081 ribbon mics, which are remarkably robust for ribbons, and there are also the popular AT4033 large diaphragm condenser, AT4050ST stereo condenser and warm, vintage-sounding AT4047MP. Of note with the Artist and 40 series mics is that they all come with a lifetime warranty, which is quite unusual.

CAD is a less common name in Europe, but better known over the pond (readers with involvement in radio communications may recognise their other brand - Astatic). A recent addition to the CAD stable is the Equitek E100S, a large-diaphragm supercardioid condenser mic. It has what it claims to be the lowest noise floor in its class of 3.7dB(A). The electronic amplifier is based around a full differential FET front-end to help give a high sensitivity, coupled with low distortion.

Right: The Electro-Voice RE20.

The **Sennheiser** MD 421 (*below*) is frequently found on guitar amps or tom toms. It is a cardioid pattern and also features a roll-off switch to tailor the response from flat to one more optimised for speech. Its sibling, the MD 441, which is designed to have more response in the upper mid-range and less LF response than the 421. It is has a high degree of directionality (actually supercardioid) giving impressive gain before feedback and is often used on snare drums. Also worth mentioning is the new MK4, a large-diaphragm cardioid condenser microphone. It features an elastic mounting for the capsule which increases suppression of handling noise and an open front to the suspension mount enables it to be positioned close to the sound source. It also has a maximum SPL of 140 dB, and its self-noise of 10 dB(A) is extremely low.

The **Electro-Voice** RE series has both stage and studio variants. The RE20 is a common studio mic which features a proprietary innovation known as 'variable-D'. This utilises the ports along the side of the mic to reduce the proximity effect, giving a flatter LF response. It is tailored for speech use and is widely used in broadcasting as a vocal mic as well as in recording studios.

Rode's NT1-A.

A name more associated with budget mics is **Rode**, originally Swedish but now resident in Australia. A mic found in many studios is the NT1-A. It comprises a large 25mm capsule with gold-plated diaphragm and has a cardioid pattern and a noise floor of only 5dB(A). It doesn't use transformers for the output stage, instead favouring solid state electronics to give a uniform response over a wide dynamic range. It is also available as a matched pair for studio work.

Others

PZM mics are commonplace and **Bruce Bartlett** (ex-Crown) has developed the TM-125 range - based on their design for the Crown PCC-160, which is no longer available. They are supercardioid devices optimised for stage use and have good rejection of pit orchestras as well as the thumps and knocks of feet on the stage. A wide frequency response and low noise floor are characteristic of these units.

US-based **Audix** is another prolific manufacturer of microphones, with products for every conceivable application. The TM1 (*right*) is its pretty well-known test mic which consists of a 6mm pre-polarised condenser microphone used for test and measurement applications. It has good linearity, an accurate response and an extremely flat frequency range of 20Hz-25kHz.

MANUFACTURERS

AKG: www.akg.com
Audio-Technica: www.audio-technica.com
Audix: www.scvlondon.co.uk (UK)
Bartlett: www.bartlettmics.com
Behringer: www.behringer.com
Beyerdynamic: www.beyerdynamic.com
CAD: //cadaudio.com
Da Cappo: www.da-cappo.com
DPA: www.dpamicrophones.com
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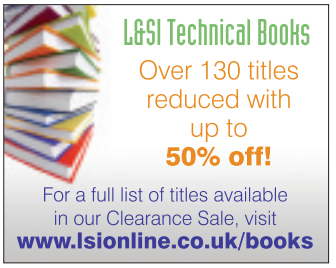

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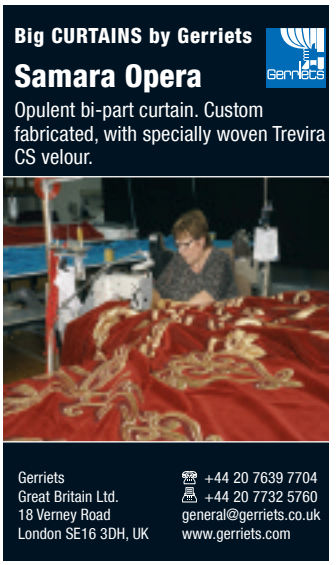

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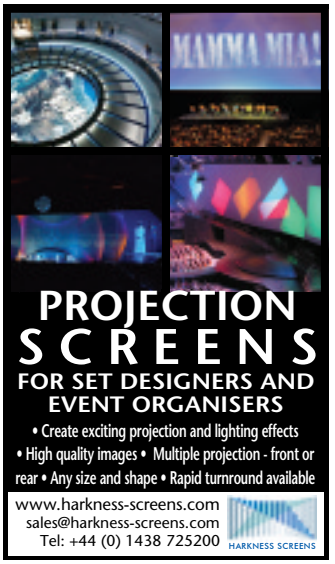

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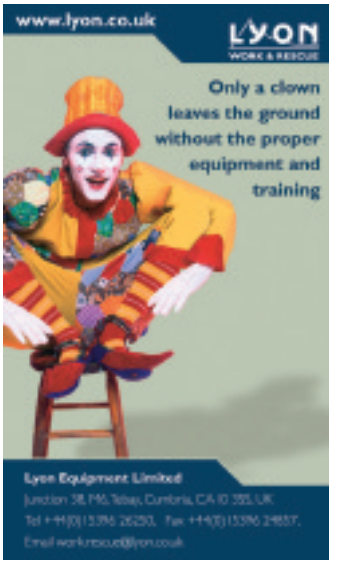

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In Profile . . .

LSi talks to Chris Newton, managing director of School Stage

"In the entertainment industry you can rely on a certain amount of technical knowledge, but in schools there can be next to none. You can't expect a teacher to have an in-depth knowledge of lighting or sound . . ."

School Stage is a dedicated performing arts installer, providing an all-in-one solution, at a professional level, exclusively to primary and secondary schools, colleges and universities. "We deal only with the schools and education market," specifies MD, Chris Newton. "We live and breathe schools and nothing else. It's not just 'lighting for schools', we see it as education for the future."

Having been involved in lighting and sound at school and amateur level through his early years, Chris had already built his own toy theatre, complete with lighting rig, when, aged 7, he contacted lighting designer Ian Scott. Ian had just re-lit Sadler's Wells' 1987 production of *Charlie and the Chocolate Factory*. "Ian presented me with my first copy of *Lighting&Sound International* and a Theatre Projects lighting stencil," says Chris, "and the seeds were sown!"

In 1998, aged 17, Chris started CWN, a lighting and sound hire company. The company immediately took off in both the production events and electrical contracting industry but, perhaps a victim of his own success, Chris found himself torn in several directions and in danger of losing focus. "Luckily at this point I was given two valuable pieces of advice," he says. John Montier of Pandora Productions identified Chris's skill at understanding the school market; when this view was reiterated by Steve Joynes MBE (owner of Hoar Cross Hall spa resort in Staffordshire), Chris began to take notice. "I wanted some impartial feedback from a businessman not in our industry," says Chris. "Mr Joynes advised me to focus on what I did best, the schools market, and make it my core market."

The result was the formation of a new registered brand within CW Newton Ltd, School Stage, in 2006. The company prides itself on being dedicated, efficient and professional with a young outlook and a fresh approach.

"No-one else was willing to commit exclusively to this market," says Chris. "Too often you see the same lighting and sound package rolled out to schools, regardless of individual needs. But it takes time and effort to really understand what is needed in each job to deliver the best possible solutions. What works in one school won't necessarily work in another.

"The systems we design are not driven by money or any standard 'formula'. We are not tied to any particular manufacturers. We create bespoke systems that suit the application and budget to provide what is right for that school."

School Stage's first and most important move is to build a relationship with the client. "If we can't make a connection, we don't do the job! I always insist on speaking directly to the person who will be using the equipment on an everyday basis. Only by understanding the exact, and often wide-ranging, usage can you build a scenario and design a system to suit the purpose. You also gain the trust of the client and generate a healthy interaction which means we build the best system and they have a better understanding of it after we have left."

A significant part of School Stage's role is advisory: "It's not uncommon for systems to be designed by a teacher. In the entertainment industry you can rely on a certain amount of technical knowledge, but in schools there can be next to none. You can't expect a teacher to have an in-depth knowledge of lighting or sound, or to understand how to use equipment. What they ask for can sometimes, therefore, be impossible and it is part of our job to help guide them to what they really need."

Schools expect their systems to be semi-professional and highly adaptive, able to provide lighting, sound and visual connection, relay to other rooms and be operated by children and non-technical adults. The cheapest route is not necessarily able to provide a system of sufficient quality and flexibility.

"We encourage schools to think of their system as an investment on two levels. Firstly, the systems must also deliver outside of school hours: parents' evenings, productions, after-school clubs and adult education classes. Schools now recognise that their facilities can be beneficial to the wider community and that, by investing in a good quality system, they can generate income from this.

"Secondly, it is an investment in the future: pupils are introduced to professional level equipment similar to that which they would encounter in the outside world . . . it gives them a head-start should they choose to move on to a career in the industry."

School Stage includes training, of pupils and staff, as a standard part of an installation package. "We feel the education side of our industry is still lacking which is worrying when you consider how technical it has become. The issue is starting to be addressed by organisations like PLASA and by companies such as ours who consider this such an important part of our future."

Logistical considerations include working around timetables, the flow of children, security rules, access hours and the risk of theft or personal injury. School Stage staff are chosen for their skills and their suitability to conduct themselves properly in front of children and teaching staff.

"Our team spends one day a month visiting primary and secondary schools at class level. They observe lessons in all subjects, assist children of all abilities with their work and mentor those who have lost ambition. Investing in this type of training enables our staff to gain a better understanding whilst at the same time finding it really rewarding."

School Stage has successfully developed a brand recognised for providing systems with professional standard capabilities. They are committed to listening to the needs of their clients, engaging with students and children and promoting the industry and PLASA in secondary schools and colleges. "What better stage is there to introduce youngsters to entertainment technology and to familiarise them with it before going out into the professional world?" says Chris. "A lot of children don't consider themselves as X-Factor, but they might just have the Tech Factor!"

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