

The magazine of the
Institute of Sound and
Communications Engineers

March 2013

ISCE

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Introduction from our President

Terry Baldwin *HonComplnstSCE*



If you came to ISCEx2013 at Jury's Inn, Milton Keynes earlier in March, you will know it was a great success. In fact I heard so many times, "best ever!" Very appropriate for our tenth ISCEx and for the very hard work done by our first lady, Ros and Phil

Price. Not only did we witness more stands than ever before, but the bookings for the seminars were oversubscribed. Thanks to the brilliant speakers and to Helen Goddard for keeping everyone in order!

During the day, I was delighted to present supporting member certificates to Phill Coe from d&b audiotechnik GB Ltd and Brian Latham of Electronic Audio Systems Ltd. Thanks for your support.

I also had the pleasure of presenting an Honorary Fellowship award to Eric Sawkins, who unfortunately, was not able to attend the exhibition this year, but Phil Price kindly accepted the certificate on his behalf and has since presented it in person to Eric.

Some of you will have noticed that the magazine is a little later than usual. Council decided that the magazine is an ideal method of sharing the thoughts and decisions with members. Therefore we intend in future to publish said magazine a week or so after relevant Council meetings. I hope you agree with us.

Some key news is that Anthony Smith has accepted the role of President from October 2013, when it is my turn to step down. Thank you Anthony, we all wish you much success.

A good example of some comments directed at Council for their consideration is Harold Smart's very valid point in observing that using a search engine and enquiring after 'sound systems' and the like, ISCE doesn't show up. This is now being rectified... unless, of course, you know otherwise.

Enormous strides are being made to modernise our Institute, always remembering we are a learned society and not a trade association. We have been given the go ahead to amend our Articles of Association. Rather than amend the original, Andy Scott together with his colleagues, Doug Edworthy, Bryan Robinson, John Woodgate and David Tyas, took the Companies House model and amended it to suit. Our thanks must go to them and hope that the new articles will be sanctioned by members when we meet for the AGM October 2013. At that time, we will also be seeking your approval to appoint Phil Price as an ISCE Director.

Regrettably, none of us will survive forever. A very morbid subject, but might I delicately ask you to consider a legacy in favour of one of our two charities? The Alex J Walker Memorial Fund – helping those members in various types of trouble. The other is The Public Address Engineers Benevolent Fund, providing training and education, particularly to the younger generation. Please help.

A number of you will remember our trip many years ago to The DNH factory in Norway. We have once again been invited on a date to be agreed. Please let me know if you are interested and I will cost accordingly. Flights are not kind and I think we may have to stay overnight... oh dear!

An omni-present request: do please help us promote ISCE by using our logo whenever possible and referring to our Institute in quotations and specifications.

Finally, at ISCEx2013, I am so proud to have received the highest accolade I can ever achieve. That of Honorary Companion of ISCE. I am humbled and take this opportunity to say thank you all.

Terry ♦

Comments and/or opinions expressed by contributors and in letters are personal, and may not necessarily reflect the opinions and policy of the Council of the Institute of Sound and Communications Engineers.

Comments on articles and letters are invited.

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International Hearing Loop Conference 2013

Hearing Loops For All

Saturday 5 – Monday 7 October 2013

The 3rd International Hearing Loop Conference, called Hearing Loops for All, will be hosted in the autumn of 2013 by UK hearing loss organisation, Hearing Link.

The Conference will be held in the beautiful coastal town of Eastbourne in the south east of England. Eastbourne is easy to access by air, rail and road, and is around 80 km from London. The Conference will begin with an evening reception on Saturday 5th October, with the main events taking place on Sunday 6th and Monday 7th October.

Hearing Loops for All will provide an exceptional opportunity for hard of hearing people to learn about the benefits offered by hearing loops and related technology, and to find out how they can encourage this technology to become more widely available where they live. It will also provide a rare chance for suppliers, service providers and relevant professionals from all over the world to share views, knowledge and information about current and emerging hearing loop technology.

The overall aim of Hearing Loops for All is to identify opportunities and options for encouraging hearing loop technology to become more widely available and accessible to hard of hearing people. The Conference, which is held every two years, previously took place in Zurich in Switzerland and Washington in the USA.

An evening reception on Saturday, 5th October, with light food and refreshments will be served as Conference guests are warmly welcomed to Eastbourne and the UK. It will take place in the

fabulous Ocean Suite, a venue offering dramatic and beautiful views over the English Channel.

The main Conference will be held in the Eastbourne Wintergardens on Sunday, 6th and Monday 7th October. The programme of events will feature workshops, presentations, exhibition stands, and networking opportunities:

- internationally recognised speakers
- experiences from around the world
- state of the art hearing loop technology
- stakeholder perspectives (user, audiologist, service provider, hearing aid manufacturer, loop manufacturer, architect, installers and maintainers, advocates)
- the hearing loop benefits cycle and the role that each stakeholder plays
- 'Lets Loop' campaigns in the United States and the United Kingdom
- technical workshops
- the impact of legislation
- installations and understanding complex hearing loop systems ♦

If you wish to support the conference with a technical presentation, please send a brief synopsis of your talk to Doug Edworthy HonFInstSCE, doug@edworthyaudio.com or call on 01435 830195.

www.hearinglink.org/loopconference

AMS Acoustics Exporter of the year 2012



At the Enfield Enterprise Annual Awards a hush descended before AMS Acoustics was declared the winner of the prestigious award for exports.

A black tie dinner was held at the Royal Chase Hotel Enfield on Thursday 22 November and the picture shows a delighted Helen Goddard FlinstSCE, the company CEO, receiving the award.

In a year when London hosted the Olympic Games, AMS Acoustics' designs were interlaced throughout the rail transport network. The company was also responsible for activities at designated Olympic sites including Heathrow Terminals and St. Pancras International Station.

Closer to the Games itself, AMS Acoustics was also engaged for the ExCel Arena which in effect was the only permanent sports venue. The Stratford visitor experience culminated in the PA/VA design for the entire Westfield Shopping Mall.

The export award is in recognition for its Middle East activities, particularly expansion of Jeddah Airport and the new King Abdulaziz Terminal and most significantly, the extension of the holy site in Mecca.

As well as activities within the region, AMS Acoustics is keenly pursuing other overseas markets further afield within Asia and South America. ♦

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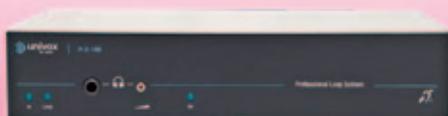
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Yaxley Museum: a legacy for future generations

Ken Yaxley *HonMInstSCE*

It was some 12 years since David Clayton of BBC Radio Norfolk, together with eight of their staff opened the Yaxley Museum. I will not say where has the time gone, because I have been actively involved with it every day since.

As an Honorary Member of the ISCE, I have quietly carried this out to the best of my capability, promoting the industry as I remember it and of course, the ISCE.

The Museum in its time capsule looks great and remains in mint condition.

Most of the remaining APAE engineers [before the change of name to ISCE], have visited the museum over the years, together with manufacturer Carl Heinlein of CTH and other manufacturers and distributors at a later date. Of course, we preserve the late Frank Poperwell collection, together with reconditioned APAE equipment. Hanging proudly in the porch is the APAE oil portrait of 1948 Founder and past President, Cecil Clarabot.



The Museum in 2013. A peaceful scene with old speaker tripods and covers protecting the young 6 ft palms growing from the roots of the original 13 ft palms killed by the frost of 2010. Snow clearing at 86 is not a good occupation, but keeps you fit.

Ken Yaxley in the Museum with Eric Sawkins, 1972 President of the Association of Public Address Engineers, on his visit in August 2012 when he donated much audio test equipment. It was great to see him as it was 42 years ago when he last visited Jo and myself.



No public address engineer has ever made big money from it, but what a wonderful life I have had. It gave me a passport to climb all over those fantastic millionaire yachts including Richard Branson's Virgin Atlantic, and on the many RAF sites we looked after for the PSA, not to mention the gas platforms in the North Sea.

This just confirms why I did not sell the business, despite being bombarded by agents over the years. The risk was too great as the Museum and sites are a legacy for future generations and who knows what would have happened to Yaxley's, had I done so.

As it was, in 2010 we settled all the accounts and closed the door, as simple as that. My last engineer takes care of any work required for now or the future.

So it really has a successful ending for the safety of the Museum and our sites.

But it is not quite the end of the story, as I have two reliable Trustees to take my place when Jo and myself are no longer in this world. Peter Henderson of Henderson PA, whose father was at one time a Member of APAE and Peter's engineer, Stephen Alderson, are ready to step in when that time comes.

Our websites

www.historyofpa.co.uk History of PA is a huge success, with no other site like it; educational and advert free, with all the information regarding the history, so we have been told by American people viewing it. Click on the APAE badge on its home page and you will be taken to the APAE section.

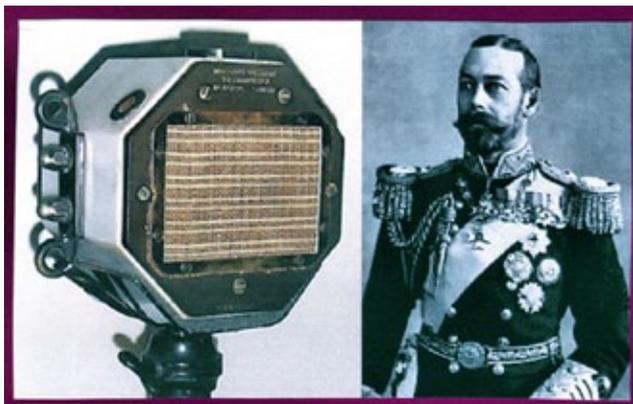
At the bottom of the page is a link to the ISCE website. In the 10 years the site has been on-line worldwide, we have never had a single person mailing to say "such and such" is not correct. There is no other official start of recognised PA, other than what is on our site. Our non-technical radio section is complete in every respect, even the programmes heard on 2LO shown on moving flash pictures.

Anyone who thinks the History of PA website would benefit from their knowledge, we would be pleased to consider it.

www.storyofa-radiodealer.co.uk I am most proud of this site which covers my father's completion of his electrical apprenticeship at Mann and Egerton and the start of Yaxley's in a workshop, through to myself and the closure in 2010. If anyone is entitled to call themselves professionals, Yaxley's are. My father had his first Marconi amplifier in 1929, and the first Royal event was King George V at Stody Estate Norfolk in 1932. The Marconi Reisz carbon microphone was loaned by Marconi who used to loan them to the BBC. They said later that he could have it for a nominal sum, but as he was friends with all the Marconi men, and they never billed him for it and it is now in our Museum complete with bronze stand.

I have tried on more than one occasion to locate a pre-1939 picture of a UK radio dealer working on a PA job. Other than ourselves, who have a number starting in 1933, there does not seem to be any. If you have one, please do send it on to me. ♦

Ken Yaxley marconi1926@btinternet.com



Our first Royal event was in 1932 at Stody Estate Norfolk – King George V. This Marconi Reisz microphone was the one used and is now in the Museum together with its bronze stand.

ISCEEx2013

TENTH ANNIVERSARY

The 10th annual ISCEEx exhibition and seminar day attracted more people than ever on 5 March 2013, at Jury's Inn in Milton Keynes.

Several new products were being shown off by some of the exhibitors, including those from Shure, Rackz, Sound Directions and A K Barns.

"What's nice is everybody at the exhibition is interested. You could have an event with 46,000 people but it won't be any good unless they are engaged" said ISCE President, Terry Baldwin.

Seminars included talks from Kevin Madeja of Extron Electronics on integrated solutions for digital switching and distribution, Mark Coles from the IET on operation of low voltage generators, Davies Roberts from Flare Audio on their white paper on the creation of pure sound and rounding off the day was Stephen Patterson of Bi-Amp Systems on AVB for professional AV.

So many of the exhibitors have returned every year, since the event first opened its doors 10 years ago. It's intimate and informal set up has proved a winning formula for creating excellent opportunities for networking and the seminars give the visitors a chance to learn something new.

ISCE would like to thank everyone involved in making ISCEEx2013 a great success.



Exhibition and Seminar Day

Tuesday 5 March 2013 · 9.30am–5pm



The smart way to use your mobile devices

Joules Newell *MInstSCE*



Over recent years a quiet yet devastating revolution has occurred in the terms of what kind of analysis equipment is available to the field audio engineer. Equipment that would have well exceeded £20,000 only 10 years ago is now available for under £1,000, and in basic format for under £500.

The explosion of iOS and Android devices into the world has put computing power previously only available in the office or lab into the pockets of virtually every field engineer. Dual and quad core processors, seriously powerful graphics processors, high quality A–D and D–A conversion, and high resolution screens unheard of on laptop computers six years ago now rest in the palms of our hands. If we take a moment to realise that the telephone function of these devices is simply an app installed by the manufacturer we begin to get away from the general idea that we may be trying to do serious analysis with a telephone, and the stigma that that concept involves.

While there are various applications available for Android-based devices, there are numerous issues on that platform that do not arise on the iOS platform. Issues such as non-standard I/O hardware, and non-standard hardware interface code that comes with various proprietary chipsets. Where iOS has the advantage in this market is with consistent and relatively small hardware sets that allow the application developer to be assured that signal I/O to the application will be as expected. On Android devices we may well see various manufacturers implement completely different digital converters with differing filters on the input circuits that any application developer may well have no idea about, yet such things would seriously damage the ability of the

application to produce a reliable result. It is not to be said that a quality application running on a premium Android based device will not work 100% as the developer expected, but the same application on a more obscure device could give very inaccurate readings.

Bearing in mind the problems with the open format platforms we will concentrate here on the abilities of a handful of useful applications available for the field audio engineer on iOS devices.

We should look at the number one criticism that will be thrown at the devices and address the issues raised.

First will be the “how can that be as accurate as a \$10,000 machine?” question. There are hardware development costs and economies of scale, the application developer has no hardware to develop, and the economies of scale have enabled global giants to throw thousands more in development funds at their devices than a bespoke device manufacturer ever could. The economies of scale have enabled high quality I/O interface devices (usually from Cirrus Logic) similar to many used in more discerning fields to be implemented within these devices. Most measurement devices made in the last 15 or 20 years have simply been a capture device such as a microphone or probe, coupled through an IC preamp directly to an A to D circuit. The stability and accuracy of these circuits is way beyond what could have been hoped for 30 years ago, and the most common cause of calibration drift on modern units is actually the calibration potentiometer itself. There is not much else there to drift. Modern on-chip

amplifier stages are far more stable than discrete devices ever were. In essence all our portable device is doing is simple conversion to and from analogue into the software domain. As our capture device is of adequate quality and the signal remains unmolested through these stages, we are not far from the hardware stages of these \$10,000 devices. The need for complex calibration is highly debatable. What is there to calibrate on a modern device? How tight is calibration required for field work (anything outside the laboratory) when it is nigh on impossible to get within a dB of agreement between many so-called calibrated devices even in laboratory conditions. As long as a specified flat capture device is used and amplitude calibration has been performed to within the required tolerance, then iOS-based devices have been proven to closely track just as well as any other device from some of the most respected systems manufacturers on the market.

As we are relatively confident about the hardware we are using, the issues regarding accuracy are purely down to the abilities and experience of the writers of the applications and the algorithms they choose to use. Many of the market leading applications are from people who have been involved in the industry for years, and have produced complete measurement systems of their own.

We should look at all the little apps that prove so useful out in the field, some of which often get forgotten. Some may seem silly to suggest until you realise the full potential.

Let's start with **Camera**, probably one of the most useful apps on any device. Take the low-res front surface face camera. A very good use for this camera is as a mirror, when you can't see behind a piece of equipment properly it can be a great little device for seeing which hole you are trying to plug something into. Next use, and a use that many fail to realise is as the low res front face camera does not have an IR filter on the lens, it can be used to check the functionality of infra-red emitters of all types. Simply point it at the emitter and you will see a white/purple glow. The same can be done for IR network ports or even TV remote controls. This can save you time messing about with diagnostic procedures. The hi-res front camera is just a great tool on any job. Be creative. Taping the device to a pole and using video recording has been used for checking switch settings on

inaccessible devices, reducing the need for expensive access equipment. Simply using it to take a still picture in a place where you cannot see (under a floor, in a duct, or above a ceiling) can save hours of work.

Four more useful applications are **Angle**, **Compass**, **Level**, and **Protractor**. These are great for getting accurate loudspeaker positioning correct, although it has to be said that Compass can be limited in usefulness when the loudspeaker is present.

Angle by Smudge Apps is a simple and effective inclinometer. For getting a constant inclination across many loudspeakers, simply place the iOS device on a flat surface of the loudspeaker, note the reading and copy this to other units.

Level by Stanley is a simple spirit level with good effective calibration, useful for checking what you are doing is straight.

Compass by Apple is of limited use when near loudspeakers due to their magnetic field, but can be great on large projects for referencing positions at early installation stages against the plans.

Protractor 1st by SkyPaw is a simple way to get the angles right when installing, probably a bit more useful on iPad where the display is bigger, but to quickly set a unit at a certain angle, or take a measurement at a required angle it is exceptionally useful.

Now on to audio applications

Generator by Studio Six Digital is a simple single channel audio signal generator with basic functionality. It also features wireless control over wi-fi from Studio Six's Audio Tools suite and a mono-balanced output feature.

Sig Gen by Audio Artillery is a dual independent waveform generator with total independent basic control of the left and right oscillators. It also incorporates a variable phase control.

ISTI Signal by Embedded Acoustics is a STIPA test signal generator compliant to IEC 60268-16 (4th edition) for simply generating a STIPA test signal. Useful for placing on a remote device to be left in an equipment room with a second measurement device being used in the public areas. This app features balanced output option and remote control ability. ▶

ISTI by Embedded Acoustics is a fully featured intelligibility meter available in three formats Lite, Standard, and Professional. Made by a team of experts in the field it provides a solid and reliable STIPA measurement tool. The basic version is not much more than a field verification tool, which is an excellent device for engineers to use so they are no longer working in the dark prior to the certification process. Now installation engineers will be able to spot and correct potentially costly problems when they can be resolved cheaply and efficiently. The Standard and Professional models, both very reasonably priced, enable fully featured intelligibility analysis. For professional use they would require a suitable capture device, such as the Studio Six iAudiointerface, or microphone, but with such a device they provide a fully featured professional STIPA analysis tool. The Pro version differs from the Standard by being able to GPS tag, email, and export measurement data, features that previous hardware only devices of much greater cost had no hope of being able to do.

AudioTools by Studio Six Digital is the big guns in town. Made by one of the developers of the TerraSonde Audio Toolbox this is a truly incredible analysis suite. What Audiotools doesn't have, you probably don't need in the realms of audio analysis. Produced as a core package with a whole host of ridiculously reasonably priced in-app purchasable modules the overall value of the entire suite only ten years ago would be well into the tens of thousands of pounds, yet for under £1000 all hardware costs included you can have an ultra-portable package of analysis tools of very high quality. Many of these modules have been tested with heavyweight professional analysis tools and have all proven to be within the general variation between systems, such as B&K Pulse, AFMG EASRA, Rational SMAART, Dolby AT-5 and Morset WinMLS. Never has the system fallen out of the general range of disagreement between those mentioned.

AudioTools includes:

SPL. SPL metering in A, C, Flat, and octave band. SPL logging. SPL threshold display (Traffic light) Recording of audio relative to logged SPL. Geo-tagging and photo-tagging of results. Emailing of SPL log results at pre-set intervals.

RTA. Octave and 1/3 octave RTA display. Storage and comparison of results. Geo-tagging and photo-tagging of results. Various threshold measurements including NC, NCB, RC, PNC, X-Curve, and NR in octave mode. RTA also features transmission loss figures to STC, Rw. And OITC standards.

FFT is a single channel FFT analysis tool, featuring a very useful Low Frequency range allowing measurement to 5 Hz. Again the usual ability to store, compare and tag the results exists along with a comprehensive set of weightings, decays, and comparison modes.

ETC is a basic energy time curve analyser able to record from internal or external stimulus. Results again can be stored, exported and tagged.

IR is a comprehensive set of impulse response analysis algorithms. Allowing an internally generated signal or an external impulse source to be used as the reference signal. IR features the following indices. ETC, Impulse, Schroder, Reverb EDT, ER, T30(RT60), Clarity C50, Clarity C80, CT, Definition, and a display of the Signal to noise and frequency content of the recorded impulse. Stimulus generated is a frequency sweep of selectable length depending upon the space being analysed. Results again can be stored, compared, tagged, or exported.

Smart tools is an iOS implementation of the single channel functions of Rational Acoustic's Smaart software. This includes RTA up to 1/48 octave and the very useful rolling spectrograph.

Transfer function, which must use the external interface, is a dual channel comparative FFT analyser. Able to display Magnitude, Phase, and Coherence plots, with various weightings and responses.

Level is a simple display of line level input and frequency on the line input connector.

Audioscope is a dual trace audio frequency oscilloscope with X-Y and M-S functions.

VU meter is, well, a VU meter. Or it can be a peak meter just to confuse matters.

THD+n displays total harmonic distortion + noise from the selected input channel and generates its own test signal.

Amplitude sweep gives a level-frequency plot of whatever is connected between the output and input of the device

Phase meter displays the phase relation between the two input channels.

Polarity is the good old fashioned speaker pop polarity tester. Connect the test signal to the stem input and point the measurement device at the loudspeaker under test and it will display positive or negative results.

Speaker THD+n is similar to the line level module except it is designed to use the mic input and has a range of pre-set test frequencies for the drivers under test.

Impedance test requires the iAudiointerface. This then using the knowledge of the iAudiointerface output and the units output monitoring ability will use a test signal to measure the impedance of the load connected across the output.

Impedance plot works in the same way with the iAudiointerface, but uses a sweep frequency test signal to plot the results on a graphic scale giving an accurate representation of the load a loudspeaker will present to the drive device. Results can be stored, compared, tagged and exported.

Delay finder puts out an impulse and will measure the difference between this and the device microphone to tell you how far a loudspeaker is from the microphone.

STIPA basic and **STIPA PRO** are STIPA measurement and signal generation modules. Somewhat less featured, and more expensive than the iSTI app, they are still very useful and reliable STIPA analysis tools.

Generator is a simple single channel audio signal generator with basic functionality. It also features wireless control over Wi-Fi from Studio six's Standalone generator app.

Surround generator will generate a selection of Dolby and DTS test signals for 5.1 system alignment.

Microphone monitor is an odd application as despite its name its best features are a range of audio effects such as reverb, compression delay, and EQ by iZotope that can be used between any signal passing through the iOS device.

Recorder is an audio recorder.

AudioTools then features a host of input and output trim. Preset, and calibration controls which are memorised depending on which interface may or may not be connected.

Generally the functionality of AudioTools alone is enormous. It would have taken a small van to carry this lot about six years ago. Now it will fit into your pocket. The biggest problem is forgetting that you have it with you. For quick on-the-spot measurement, the internal mic in the iOS device is adequate and since a recent iOS release has finally allowed developers to bypass Apple's mic high pass filters the low frequency response has become far more accurate. Often the external interfaces and microphones are only required for final commissioning and certification uses. ♦



ISCE presentations



During ISCEx2013, presentations were made to our new supporting members, Phill Coe of d&b audiotechnik GB Ltd (top left) and Brian Latham of Electronic Audio Systems Ltd (top right).

We were also delighted to present an Honorary Fellowship award to Eric Sawkins (right) and Bryan Robinson FlntSCE presented an Honorary Companion award to our President, Terry Baldwin (far right). ♦



Space Technology demonstration at Flare Audio

Following on from the seminar at ISCEx2013, Davies Roberts and his team at Flare Audio, would like to invite you to their research and development offices in West Sussex to see first hand, their patent pending Space technology that they have been developing using the principles of Waveform Integrity.

A range of products will also be demonstrated to show how the coloration between loudspeaker models has been removed and how the technology can be licensed into every sector involved in sound transmission.

The demonstration is scheduled to take place on 25 April at 10.30am. Places are strictly limited, please make sure you book your place by emailing Davies at davies@flareaudio.com, refreshments will be included. ♦

This demonstration is independent of ISCE and as such we are not specifically endorsing the products or technical white paper.



Park Live London 2012

Sponsored by British Airways

At the heart of the Olympic Park for the London 2012 Olympic Games stood Park Live, an area within the Olympic Park in East London dedicated for up to 10,000 fans with giant TV screens and picnic lawns in acres of newly created parklands. In fact, it was the only place in the Olympic Park where audiences could watch live sports action on giant screens during the course of the Games. Park Live proved to be the 'Henman Hill' for the duration of the Olympic Games.

At the heart of Park Live stood an enormous stage area, raised on columns in the River Lea, with two giant Panasonic video screens, broadcasting live images from BBC and Channel 4 to the large numbers of watching fans.

The stage area, sponsored by British Airways, was where athletes were interviewed after competing in events, allowing fans to get up really close to the real winners and other visiting stars.

Audio

A key factor in the delivery of the audience experience at Park Live was the distributed audio system providing the audio to match the images on the two giant Panasonic screens and the audio for the live presentations on the stage area at Park Live.

A critical element of the sound system design was to provide clear, intelligible sound throughout the acres of parkland of Park Live for 10,000+ fans but the sound also had to be contained within the area of Park Live so that the audio specifically did not interfere with other areas of the Olympic Park and in particular, didn't interfere with the nearby Arena, hosting events for the blind (using audible signals to recognise the passage of the ball) during sporting events for the Paralympics 2012.

Designed by Sound Directions UK for M-IS working on behalf of British Airways and LOCOG to create Park Live, the distributed sound system covered acres of newly created parklands, on both sides of the River Lea.

Stanislas Boivin-Champeaux for Sound Directions UK produced a system design incorporating in-ground loudspeakers placed strategically across the Park Live parklands in addition to using custom-designed high-frequency ribbon-arrays located strategically on the central stage, hidden from audience view.

Blending in perfectly with the surrounding parklands, a critical factor in choosing SoundTube XT850i-GN in-ground loudspeakers was as much for the aesthetics as well as its audio performance and



characteristics. Approximately 90 SoundTube in-ground loudspeakers were installed to provide a multi-zoned and distributed sound system.

Boivin-Champeaux for Sound Directions UK commented, 'The performance of the SoundTube XT850i-GN is excellent, however the custom ribbon arrays were added to supplement the in-ground loudspeakers and add some atmosphere to the sound in both park areas, enhancing the listening experience'.

The sound system design used a Yamaha DME-64 to control the audio feeds, allowing the division of the audio signal from the video feeds/live stage into a number of zones, providing complete flexibility in terms of audio control and alignment.

Andy Huffer for HD Pro Audio, appointed by Sound Directions UK for the programming and commissioning of the distributed sound system for Park Live, commented 'The Yamaha DME-64 incorporated into the sound system design allowed us to make really fine adjustments to the audio levels in each zone of the parklands and to the timing of the delays to ensure the audience experience was maximised wherever in the parks the audiences chose to sit. It also allowed us to operate the system remotely and make any fine tuning changes during the course of events without always needing to be on site'.

The sound system design incorporated an Auvitran AVY16-ES100 Card and two Auvitran AVBx3-EX100's for each rack of equipment, in addition to an ethernet switch with fibre optic converter, which allowed audio to be sent easily via fibre optic links to the audio racks on both sides of the River Lea from the centralised rack mounted in the control room on the stage area.

Cloud Electronics VTX-4400 and VTX-4240 4-channel amplifiers were used to drive the SoundTube loudspeakers and custom HF ribbon arrays. More than 40 channels of amplification were required to cater for the large number of zones across the parklands. The Cloud Electronics VTX4-channel amplifiers were chosen for their performance, reliability and cost effectiveness.

Boivin-Champeaux from Sound Directions commented 'I really like Cloud Electronics amplifiers, our system design coupled the VTX-4400 and VTX-4240 with a series of Cloud CXL-400T 100V transformers and they provided a really clean and strong audio signal. The VTX-WM1 web cards fitted to the amplifiers turned out to be a really cool and essential feature as they allowed remote monitoring and load testing of the amplifiers throughout the course of the Olympic and the Paralympic Games. There was also a lot of synergy between a British amplifier manufacturer and these very British events'. ♦

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Events diary

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Coverage angle and coverage area of a ceiling loudspeaker

John Woodgate HonFInstSCE

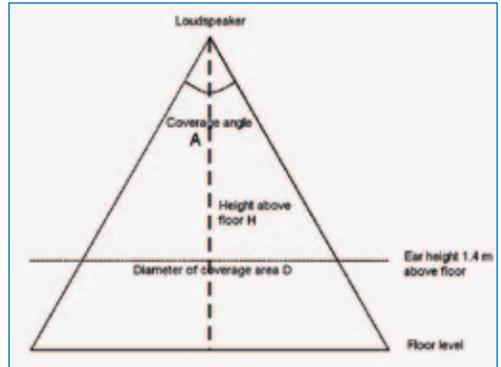
It is important that the coverage area provided by a given ceiling loudspeaker is calculated, because it determines how far apart the loudspeakers can be in order to get uniform coverage of an area, without 'weak spots'. The diagram opposite shows the geometry of the situation.

The diameter of the coverage area (a circle if the loudspeaker does not have a non-coaxial tweeter) can be calculated either by Pythagoras or trigonometry (two sides of the same coin). Using trig, we get:

$$D = 2(H-1.4)\tan(A/2)$$

This Excel spreadsheet calculates some typical values:

If the loudspeaker has one or more non-coaxial tweeters, the coverage angle is different in different directions, and the specification should give details. ♦



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Coverage angle and coverage area														
Ceiling height m	3	4	5	6	7	8	9	10	12	14	16	18	20	25
Coverage angle °	Diameter of the coverage area at 1.4 m above floor level m													
20	0.6	0.9	1.3	1.6	2.0	2.3	2.7	3.0	3.7	4.4	5.1	5.9	6.6	8.3
25	0.7	1.2	1.6	2.0	2.5	2.9	3.4	3.8	4.7	5.6	6.5	7.4	8.2	10.5
30	0.9	1.4	1.9	2.5	3.0	3.5	4.1	4.6	5.7	6.8	7.8	8.9	10.0	12.6
35	1.0	1.6	2.3	2.9	3.5	4.2	4.8	5.4	6.7	7.9	9.2	10.5	11.7	14.9
40	1.2	1.9	2.6	3.3	4.1	4.8	5.5	6.3	7.7	9.2	10.6	12.1	13.5	17.2
45	1.3	2.2	3.0	3.8	4.6	5.5	6.3	7.1	8.8	10.4	12.1	13.8	15.4	19.6
50	1.5	2.4	3.4	4.3	5.2	6.2	7.1	8.0	9.9	11.8	13.6	15.5	17.3	22.0
55	1.7	2.7	3.7	4.8	5.8	6.9	7.9	9.0	11.0	13.1	15.2	17.3	19.4	24.6
60	1.8	3.0	4.2	5.3	6.5	7.6	8.8	9.9	12.2	14.5	16.9	19.2	21.5	27.3
65	2.0	3.3	4.6	5.9	7.1	8.4	9.7	11.0	13.5	16.1	18.6	21.2	23.7	30.1
70	2.2	3.6	5.0	6.4	7.8	9.2	10.6	12.0	14.8	17.6	20.4	23.2	26.0	33.0
75	2.5	4.0	5.5	7.1	8.6	10.1	11.7	13.2	16.3	19.3	22.4	25.5	28.5	36.2
80	2.7	4.4	6.0	7.7	9.4	11.1	12.8	14.4	17.8	21.1	24.5	27.9	31.2	39.6
85	2.9	4.8	6.6	8.4	10.3	12.1	13.9	15.8	19.4	23.1	26.8	30.4	34.1	43.3
90	3.2	5.2	7.2	9.2	11.2	13.2	15.2	17.2	21.2	25.2	29.2	33.2	37.2	47.2

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