

# ISCE

The magazine of the  
Institute of Sound and  
Communications Engineers  
**December 2010**

We're off to  
ISE, Amsterdam  
1–3 February  
Visit us on  
stand no 9A114  
in hall 9

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# Introduction from our President

Terry Baldwin ComInstSCE



**W**OOW!! Were you there? I am talking about Institute day in Cardiff. If you weren't, it was, as they say, 'absolutely fabulous!'

A few of us gathered in a local hostelry, namely 'The Eli Jenkins', the evening prior. I asked

who Eli was, but nobody knew. On returning to the hotel I asked after Eli once more. No one knew.

We kicked off our day with a session on 'hot topics'. These ranged from PRS/PPL licensing, latency – delay due to digital processing, radio microphone licensing changes and EN 54.

An excellent hour when all members had the chance to vent their grievances.

Next was the Warren-Barnett memorial lecture given this year, by Peter Mapp. His topic was *Thinking outside the box*. Peter gave a very light-hearted talk, which appealed to our more technical elite as well as those, like me, who needed a bit of a brush up.

In the evening, we gathered for a drinks reception and it was a good opportunity to catch up with long lost friends and get to know our new faces.

We were seated for dinner and the St. David's Hotel did us proud, albeit at the instigation of our loyal secretariat, Ros Wigmore. Thank you all those involved.

We welcome your contribution to the magazine with editorial and advertising. Please send news or articles to Ros

After dinner, I gave a short speech at which point we announced that Leon Pieters had been awarded an Honorary Fellowship of the Institute. There is no higher award. Unfortunately, Leon, who attended the talks in the afternoon, didn't feel too well and decided to rest in his hotel. On hearing this, a dozen or so of us rushed to the sofa on which he sat in the middle of the hotel foyer and presented the award personally. Congratulations, Leon Pieters HonFInstSCE.

You can't cross that bridge into Wales and not meet up with the voice of them all, Dai Vaughan! Dai gave a speech, a talk, stand up comedy, a song and a lecture all within the hour! I've known Dai for a great number of years and his indelicate touch hasn't changed. Thank you so much, Dai. Oh, yes, and Dai then explained who Eli was. He told us he was the fictitious pastor in the play *Under milk wood* by Dylan Thomas and set in a village called Llareggub. All this to be true, especially when you work out the village's name backwards!!

Well if that hasn't tempted you into coming to next year's Institute Day, then I've wasted my time using two fingers on this QWERTY keyboard! Do come, I know you'll enjoy it. ♦

## Events Diary

**1–3 February 2011**

ISE, Amsterdam

**1 March 2011**

ISCEX2011, Watford, UK

**9–14 April 2011**

NAB Show, Las Vegas

**6–9 April 2011**

Prolight & Sound, Frankfurt

**19–20 April 2011**

PLASA Focus, Leeds, UK

**26–28 April 2011**

PALME, Dubai

**16–19 May 2011**

IFSEC, Birmingham, UK

**8–13 September 2011**

IBC, Amsterdam

**15–17 June 2011**

InfoComm 2011, Orlando

**12–15 September 2011**

PLASA 2011, London, UK

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# Fireworks and music

## an interesting change from the day job

Peter Roe MInstSCE



Terry Baldwin and I share the privilege of living in the village of Fletching in the beautiful Sussex countryside. One of our contributions to the local community has been to help maintain the local 'bonfire society' tradition of a torch-lit procession and fireworks, with Terry raising money for me to spend on fireworks. Ten years ago, we added music to the firework displays, starting a tradition of our own, and since then the displays have become larger and more complex.

Synchronisation of fireworks to music requires control over ignition, so each firework is fitted with an igniter; a tiny PCB with a fuse wire bridging two pads and encapsulated in a pyrogen. Igniters are guaranteed not to fire if a small current is passed (<100mA), but a current of >1A will result in a sharp 'crack' and enough sparks to light conventional black powder (gunpowder) fuse within 2ms or so.

Our first shows were fired using a manual push-button controller, with scripts based on the timer readout on the CD player. As Sussex shows are traditionally noisy, our first show had some particularly large 'ground bombs' and when one caused the CD to jump about 20 seconds we learnt one of our many lessons – we then went onto minidisk and solid state playback.

Display design has moved on since then, and we now fire cues as close as 40ms and this year's finale used over 200 cues in the last 10 seconds. The whole show lasted 17 minutes, had 1,400 cues and nearly 2,000 fireworks.

ProTools is used to edit music into a single WAV track, which is imported into the scripting software which allows fireworks to be inserted onto a timeline and assigned cue numbers. Normally a firework's

visual effect is synchronised to the music, but tolerances in fusing delay times and variation of loudspeaker distance to individuals in a large audience mean that the choreography has to rely more on interpreting mood and flow rather than necessarily hitting particular notes. A 'chase' sequence using single-shot roman candles or mines which leave the ground virtually instantly can be note-perfect for the front row of the crowd, but if carefully planned will create a pattern which still looks good at the back where the audio has been delayed by several beats or even a whole bar.

Cue and timing data is loaded into the firing control panel which communicates with field modules via a 2-wire bus carrying power and bi-directional data. Each field module contains 32 switch circuits delivering 24V to fire the igniters. A test mode passes just a few millamps, and missing connections are shown on the panel, or for large setups a laptop connected to it.

The show is synchronised by a SMPTE timecode track recorded with the audio, to which the controller locks, or in the case of larger shows the timecode is fed to several controllers. As we put on the Fletching show for fun, we have also experimented with triggering solenoid-controlled gas flames and coloured liquid fuel flame projectors, in addition to our now trademark 'wall of fire' which uses conventional explosives and various fuel mixes, fired using igniters in the same way as the fireworks.

The design and technology is only part of the work – setting up and fusing so many devices takes a large crew and many long hours, but to hear the crowd cheer and see the happy faces makes it worth the effort. ♦

# Exhibition and Seminar Day

Tuesday 1 March 2011 · 9.30am–5pm

Park Inn Hotel, 30–40 St Albans Road, Watford, Hertfordshire WD17 1RN  
 t: +44 (0)1923 429988 f: +44 (0)1923 254638 w: [www.parkinn.co.uk](http://www.parkinn.co.uk)

10.00am

## Voice sounders for evacuation – where are they now?

**Tony Payn, Vimpex Ltd**

Voice sounders for alarm purposes are essentially alarm sounders that are also capable of playing a recorded voice message. This type of product is now firmly established as an alternative to simple coded alarm sounders and to more complex PA/VA systems. This presentation will discuss how voice sounders meet the requirements of alarm systems and looks at some of the technologies used within voice sounders.

11.00am

## Video for audio engineers

**David Tyas MInstSCE, Ikon AVS Ltd**

Incorporating video into a project can be a good additional source of revenue for audio professionals. It may be simply adding a projector in a theatre, or digital signage to augment a VA system. But, with multiple analogue video formats and the transition to an equally confusing array of incompatible digital formats, what connects together and works, how do you convert between the formats and how do you cable and connect them? This seminar will cover the basics of video with the emphasis on the newer formats, how to interface these and how to incorporate legacy products into systems.

2.30pm

## Why loop systems are failing

**Gordon Morris MInstSCE,  
Gordon Morris Ltd**

We have the technical know-how. We have the enthusiasm. So why are loop systems failing? As a hearing aid user for over fifty years, Gordon Morris is better placed than most to understand these issues. He will explore why loop systems fail and the technical and human complexity involved in making them work. This is not a blame game and is purely highlighting what the hearing aid user hears or does not hear. What more can the Institute do to influence and bring about a more satisfactory solution for the purchaser and above all, for the hearing aid user?

3.50pm

## Loudspeakers & EN 54 part 24 – has Europe gone mad?

**Peter Alberry-King MInstSCE,  
Penton UK Ltd**

The enforcement of EN 54 part 24 is just around the corner. April 2011 is when we all take a deep breath as loudspeakers for use in voice alarm systems used for fire evacuation will have to be certified to EN 54 part 24. Peter Alberry-King will explain what the certification process is, the reasons for its introduction and explore the implications that EN 54 has for both manufacturers and installers. He will attempt to address the long list of questions that have been raised to date regarding the introduction of third-party certified loudspeakers.



# Urban myths about valves

Jez Arkless MInstSCE, Arkless Electronics



Whilst the majority of ISCE members will rarely (if ever) come across the use of our old friend the thermionic valve, there is an ever increasing demand for them in the live music, recording and hi-fi industries and it's always wise to be prepared for anything...

With this in mind, I would like to lay to rest some of the more common 'urban myths' about valves currently doing the rounds on internet forums etc.

## You can always spot a dud valve because the filament will not be glowing

90% of the time the heater will still glow when a valve is dud. If it isn't glowing then yes it could very well be a dud but it's just as likely that you will find a problem with the heater supply to that valve.

Equally, the heaters of some of the recently-made double-triodes don't glow very much in daylight, because all the hot part is inside the cathode tube.

## If you tap all the valves with a pencil then the dud one can be picked out by the different sound it makes

You can't test for a dud valve in a powered down amplifier merely by tapping the glass with a pencil and listening for if it tings or pings differently from the rest. With the amplifier switched on it can be a good way for checking for microphonics in earlier stages and can sometimes provoke an output valve to go altogether (often in a 'flash over'), thereby revealing itself as the culprit, but that can have other knock-on consequences....

## I've just had Acme Repairs fit a new set of output valves and check the biasing on my amp and it failed halfway through the second number of our set! They are obviously cowboys' etc etc blah blah...

Just because a set of output valves is brand new does not, unfortunately, guarantee that they will be reliable. Valves, like all electronic components, follow a 'bath tub' curve when failure rate is plotted against time. The first few minutes to hours of use are the time when they are most likely to go (yes, really). These early failures are known as the 'infant mortality'

part of the curve. If they are fine after say 6 hours and a couple of gigs then they will probably go on to have a normal life span. However, valves are more prone to this early failure problem than any other electronic component with around 10% of (modern....) output valves failing shortly after being fitted!

## I can see a blue glow inside my output valves so they must be duds/about to go

It is normal for output valves to have a pretty blue glow around the screen grid (the spiral of thin wire nearest the anode) or the beam forming plates in the case of Beam Tetrodes. This is caused by all valves having a less than perfect vacuum and the molecules of gas being ionised by the high voltage. They then glow in the same way that a neon sign does. The intensity can vary, depending on the quality of the vacuum and how high the voltage is, BUT if it starts turning pinkish and brighter (and especially if it is tending to leave the confines of the screen) that is bad. It means the valve is going what's called 'soft' and losing too much of its vacuum. Failure can then be expected.

## I CAN'T see a blue glow inside my output valves so they must be duds/about to go

If this glow is not there it does not always mean that the valve is a dud (but yes, it can mean this). There are a variety of other things that can cause it to stop glowing blue such as a failed H.T. or screen grid supply, open circuit screen resistor etc just for a start.

## The heaters of some of my valves glow brighter than others so they must be duds

The heaters (filaments) of the valves may well not all glow with equal brightness. This is quite normal and can be especially apparent if the valves are not all of the same make.

## I can see a red glow that's not the filament but it's still playing OK

Nothing but the heater filament and the cathode (the tube up the middle that the heater warms up) should glow red. If any other part glows red (screen grid and/or anode) you have a problem. Switch it off now before it causes more damage!

A recent case in point was an amplifier emitting bursts of thunderous noise. The screen grid of one output valve was seen to glow during the bursts of noise. The fault was a bad soldered joint at the anode contact of the valveholder, and further investigation showed fourteen more suspect joints! The heat from valves can cause joints on the printed board to fail due to repeated expansion and contraction.

### **An output valve has failed in my amp but it still seems to work. Can I continue to use it?**

An amp can sometimes still work with one dud output valve, especially if it has four output valves,(they function as two push-pull pairs) but this will only happen in those cases where the valve fails harmlessly (open circuit) and behaves as if it just isn't plugged into its socket. There will be less power and more distortion under these conditions. It will not be good for the remaining valve on that side that's trying to do all the work though....

Even when an amp uses only two output valves there can be a surprising amount of volume from the Watt or so of class A output from the solitary working valve!

### **You can usually tell a dud valve from its appearance**

It is quite normal for a dud valve to look perfectly normal. If the heater fails open circuit and doesn't light up then that's obvious enough. Also if the valve has even the slightest crack/leak in the glass then the silvery black part of the glass (called the 'gettering') will turn white. In either case the valve won't work... obviously, but only maybe two out of ten times will there be anything this visible.

### **I've heard that if a fuse goes during a gig you can wrap it in foil as a temporary measure**

NEVER, EVEN IF THE A&R MAN FROM SONY MUSIC HAS COME TO YOUR GIG, WRAP FOIL AROUND A DUD FUSE AND PUT IT BACK IN!!

Fuses are there to prevent an equipment failure from turning into tomorrow's headlines about a venue burning down. At very least the repair bill will be vastly higher if you need a new mains transformer and/or output transformer. You have been warned.

And on to a few more generalised points arising mainly from internet-based misnomers...

Regarding all the talk one hears/reads about different makes of valve. There are only a few companies actually making valves in this day and age... Sovtek, Svetlana, JJ (formally Tesla), Ei and a few Chinese makes (mainly Shuguang) manufacture 95% of the valves you will come across (Sorry to any brand I've missed out). Virtually all other brands such as Electro Harmonix, Groove Tubes, Tube Amp Doctor (TAD) and Marshall, Fender, Boogie own brands etc, are re-badged versions of the above makes.

Sometimes you are paying more for these 'posh brands' because they have been better 'burnt-in' and tested so you are less likely to get a dud.....mostly, though you are just paying more because they have rubbed 'Sovtek' off the glass and printed something else instead. Yes you can get them colour coded into sets by Groove Tubes etc but you can buy standard Sovtek in matched sets from many suppliers anyway.

It is true that 'new old stock' (NOS) valves from yesteryear and manufactured by once famous names such as Mullard, Brimar, GEC and Mazda etc are of much better quality, reliability and longevity than modern brands. In the authors opinion however, they are not worth the 10–20 times as much as a modern valve that they sell for... and can even be fakes! Caveat emptor.

The following may be rather a pedantic point but it is usual to hear most non-technical types refer to all the smaller valves in an amp as being in the pre-amp ('pre-amp valves'). This is not the case. There will always (unless it's a single-ended class A amp and probably about 5 watts) be a phase splitter valve, sometimes a driver valve/s after this and often a valve driving the reverb line. Some models such as the VOX AC30 have valves in the tremolo etc. All the above mentioned functions will most usually be carried out by ECC83 (12AX7) or ECC81 (12AT7) or ECC82 (12AU7)....all so called 'pre-amp valves' but not only found in the pre-amp section.



Apologies to our more technical readership that will be all too aware of those areas which I have simplified or glossed over, but I hope that this article will be found useful by many readers who are less familiar with the warm glow of the valve. ♦

[www.arklesselectronics.com](http://www.arklesselectronics.com)

# PLASA 2010

12–15 September, Earls Court

PLASA 2010 was a great success for the companies exhibiting within the ISCE Pavilion which included; Baldwin Boxall Communications, DNH Worldwide, Current Thinking, Ikon AVS, CIE Group, Clever Little Box, Inter-M, Bosch Security Systems, Ateis UK, Penton UK, RCF Commercial Audio, Institute of Acoustics, Interlek and of course, the ISCE.

We enjoyed an even larger space, with better branding and publicity at this year's exhibition and the seating area for informal meetings provided a welcome resting place and was conducive to talking business.

Of course, the Plug & Socket, courtesy of Baldwin Boxall Communications, certainly pulled in the punters and created a certain ambience within the Pavilion.



We have received confirmation that PLASA will offer a further 5% discount for PLASA 2011 ISCE Pavilion bookings, as well as the 25% discount for PLASA members and 5% discount for early bookings. We have already received enquiries from new companies who would like to be included next year, so early provisional bookings are recommended.

It has been suggested that the ISCE offer our own award scheme for Pavilion exhibitors, for categories such as outstanding product, development or service, and we would be pleased to receive your feedback on whether you think this is a good idea. ♦

## ISCE Pavilion



# INSTITUTE DAY 2010

17 November, Watford

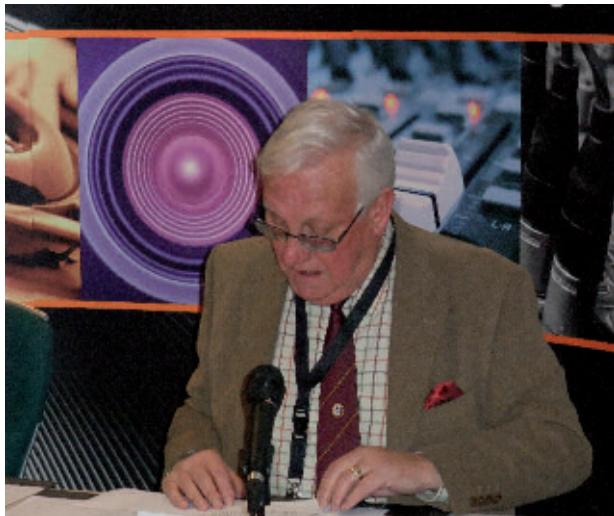
"My congratulations on this year's Institute Day in Cardiff. I think the planning and execution were most successful, and can assure you that as a member I thoroughly enjoyed every aspect of the proceedings and dinner."

Michael Leaver ComplnstSCE



"It was good to see some of the old faces again, and I enjoyed Peter's take on thinking outside the box, it made understanding stuff a lot easier for us mere mortals."

Jim Hooks AMInstSCE, DJ Kilpatrick



"I thought the day was very well organised, well attended and, for me, very informative. It was also a good opportunity to meet and network with others in the industry. The lecture was very interesting and I learned a lot from it."

James Candler MInstSCE,  
Superior Sound Systems



"I thought it was an excellent event and the hot topics and Peter's presentation were very informative."

Jim Smith MInstSCE,  
Arup Acoustics



# What makes the perfect voice announcement?

Nicky Spiers MInstSCE, Voice Perfect Limited

How often have you been hanging on the phone, irritated by a flat, synthetic voice you can't quite understand and desperate to hear a human? Well, passengers feel just the same.

Most people would agree that the main requirements of any announcement system are clarity and comprehension, whether it is for information, routine safety or emergency management. After all, if the passenger can't hear an announcement or can't understand it, they can't act on it. This is where real, professional voice announcements come in.

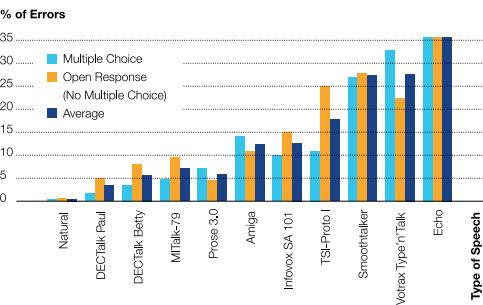
Researchers at Edinburgh University performed a series of experiments which compared methods of generating spoken output in an information service. The research scenario was a simple telephone dialogue in which 100 subjects were required to confirm the times and routes of pre-booked flights, via concatenated recordings of real, natural speech, text-to-speech synthesis or a combination of both.



Each participant experienced 10 versions of the flight time information service, differing only in the method used to generate the spoken message.

The researchers found:

- a strong preference for versions of the service using natural speech throughout, over versions making any use of synthetic speech
- a preference for versions making minimal use of synthesis over those where it was used more extensively
- a significant preference for professional-standard recordings over amateur ones
- a preference for a single speaker rather than a combination of two speakers, particularly in natural speech messages
- a preference for female voices over male ones, at least where information is being imparted.



The test and the results are also summarised in Santen et al (1997).

For the airport or railway operators, though, the most important finding was that natural speech enabled the research subjects to identify the required information more accurately and with fewer repetitions than synthetically produced messages. The implication is clear: passengers hearing a real voice are more likely to go to the right gate or platform

in good time; not leave their bags unattended or even, should the need arise, evacuate the building without panicking.

After 20 years' experience in the metro industries, and in conjunction with a number of customer information display suppliers and integrators, Voice Perfect has created the Scheduled Customer Announcement System (SCAS®) for airports and mainline rail. The first of the air systems have recently been installed at Britain's East Midlands Airport (EMA) and Lleida in Spain.

SCAS® is a simple to use, touch-screen system which creates professional, real voice scheduled and customised passenger announcements and is linked

directly to customer information and public address systems. Messages are assembled from a repertoire of segments but through a sophisticated set of algorithms, they sound to the listener exactly like one seamless sentence. The system can provide any language requirement, always using native speakers for maximum passenger comprehension.

Just think how much more professional a smooth, real voice announcement sounds than a tinny, broken automaton. ♦

**Voice Perfect is exhibiting at ISCEx2011 and SCAS®-Air at Passenger Terminal Expo in March 2010. Visit them there or at [www.voiceperfect.co.uk](http://www.voiceperfect.co.uk)**

## New range for Communication Technology

**A**t a time when many companies in our industry are feeling the pinch, Communication Technology remains buoyant. It manufactures a range of high quality professional audio products for the commercial sound industry including: speciality goose-neck microphones, multi PA overrides, zone paging microphones and portable public address systems. A recent addition to the range is Silent Witness, a ceiling mounted microphone with a 360 degree pick-up fully encased in a smoke detector housing. This allows for discrete installation in, for example, interview rooms for surveillance purposes.

The company has also re-launched the VM100 – a superb hand-held microphone that's suitable for a number of applications. Finished in matt black, the VM100 is used on stage, in PA situations and for live broadcasts.

Communication Technology also designs bespoke audio products for its customers. All their standard products appear on the company website with full technical data. ♦

**[www.communication-technology.co.uk](http://www.communication-technology.co.uk)**



# ISCE honours pioneer of industry

## Leon Pieters HonFInstSCE

ISCE President, Terry Baldwin and Council, were delighted to honour Leon Pieters, with the most prestigious award, an Honorary Fellowship, at the recent Institute Day in Cardiff.

Leon Pieters spent his life in the audio industry, specialising in audio loops. Born in Belgium in 1933, he grew up during the Second World War among the most horrific conditions.

Pieters is a remarkable engineer, who was involved in televising the 1953 Queen's Coronation. He is the founder of Ampetronic, having pioneered many new technologies and applications for induction loop systems and made a major impact on the adoption of high quality assistive listening solutions in the UK and around the world.

His passion, drive and commitment is second to none, and he has always been at the cutting edge of technology and never faulted in his quest to keep standards to the highest.

This award recognises his considerable contribution to the industry. ♦



## RCF establishes new UK Service Centre

RCF has established a new UK service centre on the premises of Ampman Audio's HQ in Potters Bar, UK.

RCF has confirmed that Ampman will take on full service and repair responsibilities with immediate effect.

The announcement follows the passing of Mick Williams, RCF's technical manager for numerous years.

Phil Price MInstSCE, who heads up RCF's operation, praised the high level of technical back-up carried out by Williams' company Audio Workshop, over a long period.

"The support provided by RCF products by Williams and his team was exemplary – and his untimely death last in August left us with some extremely big shoes to fill, which we have now managed to do."

"This appointment will offer a seamless transition and Ampman will undertake the same duties and responsibilities as Audio Workshop", stated Price. "This includes warranty and out-of-warranty repairs as well as sales of spare parts for RCF products."

Customers who require equipment servicing or replacement, either under warranty or out of warranty, should first log onto the Ampman website ([www.ampman.co.uk](http://www.ampman.co.uk)) in order to fill in an online returns authorisation form. ♦

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# Acoustics – fact and fiction

## A new approach to concert hall and theatre acoustics

**Arthur van Maurik AMInstSCE**

Acoustics play an essential role in the world of music and many of today's industry experts have questioned how can we best explain variable acoustics to musicians and concert hall management.

Thanks to new advances in technology, such as complex computer systems and improved measurement techniques, acoustics has become a highly-developed science. We know that specific kinds of performances need dedicated acoustics to make it sound right – different kinds of music, speech, and other performances all require specifically tailored acoustics.

All the technology in the world still isn't enough to produce the perfect acoustical experience and the ability to interpret what is required for each space remain paramount to accommodate each venue. Throw in the fact that many composers tailor their creations for specific kinds of concert halls, and the matter can become even more complicated. In light of this, most acousticians and architects create compromises. After all, even the world's top venues have their own limitations.

The great Pinchas Zuckerman, who leads the Canadian National Symphony, has said that every performance space should have additional acoustical enhancement system – one that approaches acoustics from a musical point of view. Such a system would not only change the reverberation times but also compensate for naturally occurring barriers in the architectural acoustics. There is, in the end, no way around the fact that putting four walls and a ceiling around a performance area will influence and colour of sound.



One of the professionals at the forefront of this new combination of disciplines is Malcolm Morton, who works in the acoustics industry, but has travelled the world as a professional trumpet player working with orchestras such as the Hague Residential Orchestra. He has performed

in many different concert halls, experiencing first-hand the different effects venues can have on sound. He has built up a wealth of knowledge and experience in judging the acoustics of these halls, and he has worked closely with the designers behind the enhancement system which has been developed by Acoustic Control System, a company based in the Netherlands.

"There are definitely challenges between the methods of technicians and musicians. My experience enables me to work better with acoustical consultants and architects who work on the creation or improvement of the hall acoustics," Morton said. "As a trumpet player I can combine my experience in closely analysing the directivity of the sound waves produced in certain acoustics and provide advice on how to get closer to the best possible acoustics. My background as a musician makes it easier for me to speak to other musicians in their own language."

Morton explained: "By combining the musical and acoustical disciplines with technology, many acoustic faults at venues can be rectified. This provides better tools for technicians, acousticians and musicians to work with, as it gives a more balanced approach to acoustics. Electronic Enhancement has also come a long way since its inception. Especially in these times of economic hardships, getting it right the first time can save a lot of money."

He has created a service to bridge these worlds using the creative management, orchestras, hall management and the acoustic consultants in combination with architects.

"I often ask hall management, do you want to increase your revenues and have five different optimal sounding halls in the same physical space – this all at the press of a button, and be at the cutting edge of theatre design? All this is possible now." ♦

**[www.acs.eu](http://www.acs.eu)**

**[mortonacousticconsultancy@scarlet.be](mailto:mortonacousticconsultancy@scarlet.be)**

# Sound system test, alignment and certification part 3

## Quality and certification

**Steve Jones FInstSCE**

### Quality

After all the test signals, the time comes to listen. The ears are a sensitive measurement tool which will be the final arbiter. No meter can tell whether the human race will like what they hear. This is the time to listen firstly to messages and then to music. Preferably listen at relatively low sound pressure levels when checking the whole site, but lastly definitely at full power in selected areas, if not the whole site.

Provided that care has been taken not to upset the neighbours and the rest of the trades on site, this final test should come as a pleasant surprise to everyone, both on and off site.

### Certification

Sound systems used for emergency purposes (be that fire, civil order, bomb alert etc) usually require certification that they meet certain standards, and that measurements have been taken to prove that this is the case.

No system should be measured until it has been properly and fully aligned as given above. There is no point. If a system is required to be intelligible and the delays have not been set properly, it will not be intelligible.

Care should be taken to ensure that where a system is used as the voice alarm part of a fire detection and alarm system, any commissioning of the fire system which triggers the voice alarm is not carried out until the sound system has been fully aligned. Even so, when the voice alarm is finally connected to the fire system, the latter will, of its very essence, cause sounds to be made at maximum sound pressure level and this will surely upset neighbours and fellow workers if it is allowed to continue unabated. Unfortunately not all people are quite so considerate as sound contractors, so it may be necessary to only allow the fire contractors a connected state for restricted periods until they have certified that their systems are fully de-bugged.

Since most of the validation/certification is that the system produces sound pressure levels which meet the design parameters, or that there is a certain consequence for a certain cause, these parts of the validation /certification will have already been carried out as part of the test and alignment procedures above. The one set of measurements which will not have been done is intelligibility.

Intelligibility measurements are quite a lengthy and rigorous exercise which requires knowledge and experience and are not suited to being described in this document. However, suffice it to say that, like maximum level alignments, they have to be done zone by zone at full power. It is therefore of great importance that due consideration is given to the neighbours and fellow workers.

The standards to which one is certifying usually have a template for the certificate, but if not, or if it is inappropriate, the contractor should produce their own template. This should contain the relevant clause numbers and headings against which the measurements or ratification of cause and consequence can be entered. There may need to be many sheets of the data section of the certificate in order to fit in all of the measurements when dealing with a project having several zones. It is advisable that this is not merely a bureaucratic exercise, but forms part of the maintenance manual whereby the system can be re-tested on an annual basis. Another use would occur when the system is re-aligned following modification or expansion, and that in turn would lead to re-certification. ♦

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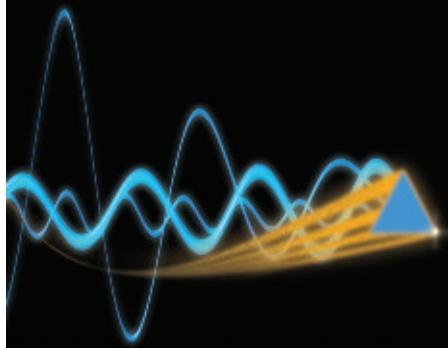
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