

Vol 39 No 3 May/June 2014

ACOUSTICS

BULLETIN



in this issue... Back to the Future – part 2
Building Regulations: what benefits have they brought?



1974 - 2014

plus... Annual report of Council for 2013
Converting HHSRS into decibels
Further consideration on floating room systems

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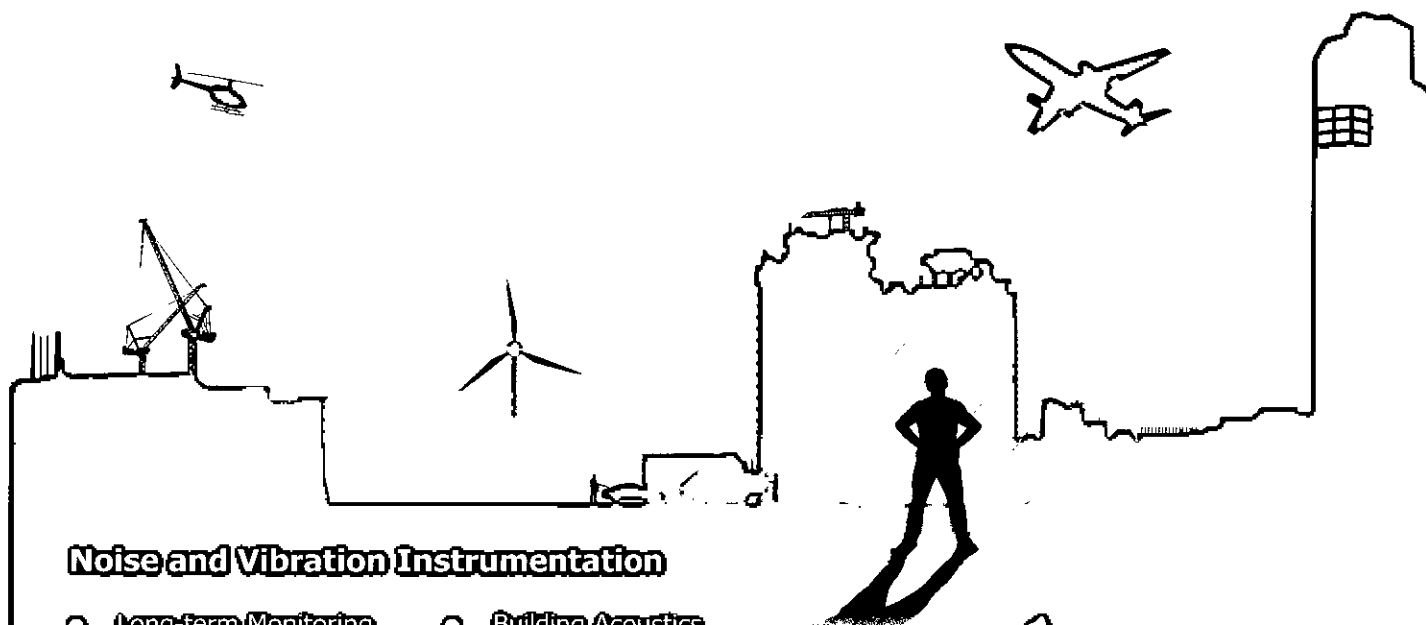
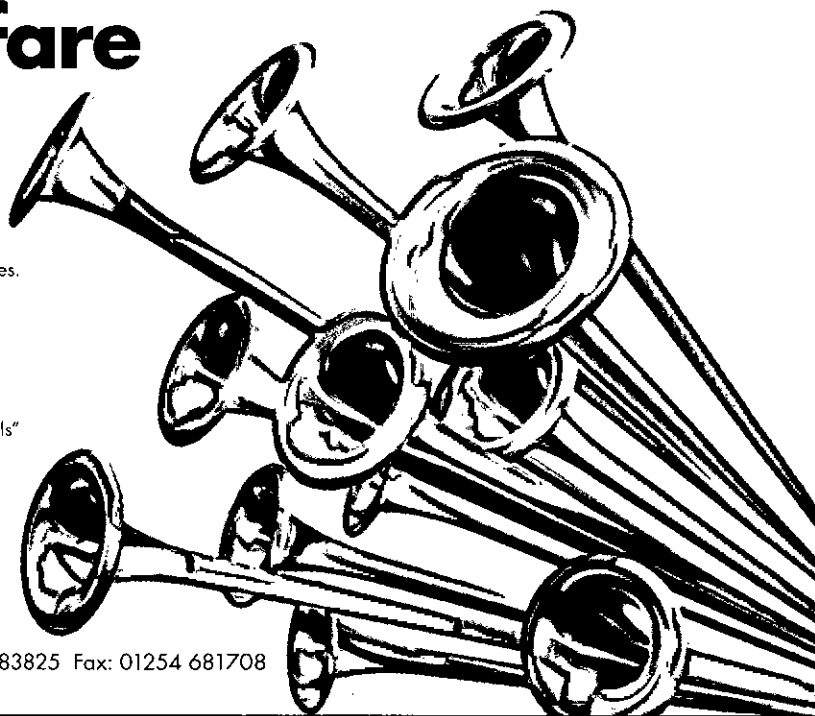
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ACOUSTICS

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Front cover photograph:

Back to the future: what benefits have changes to Building Regulations brought?

The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society. The Institute of Acoustics is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.

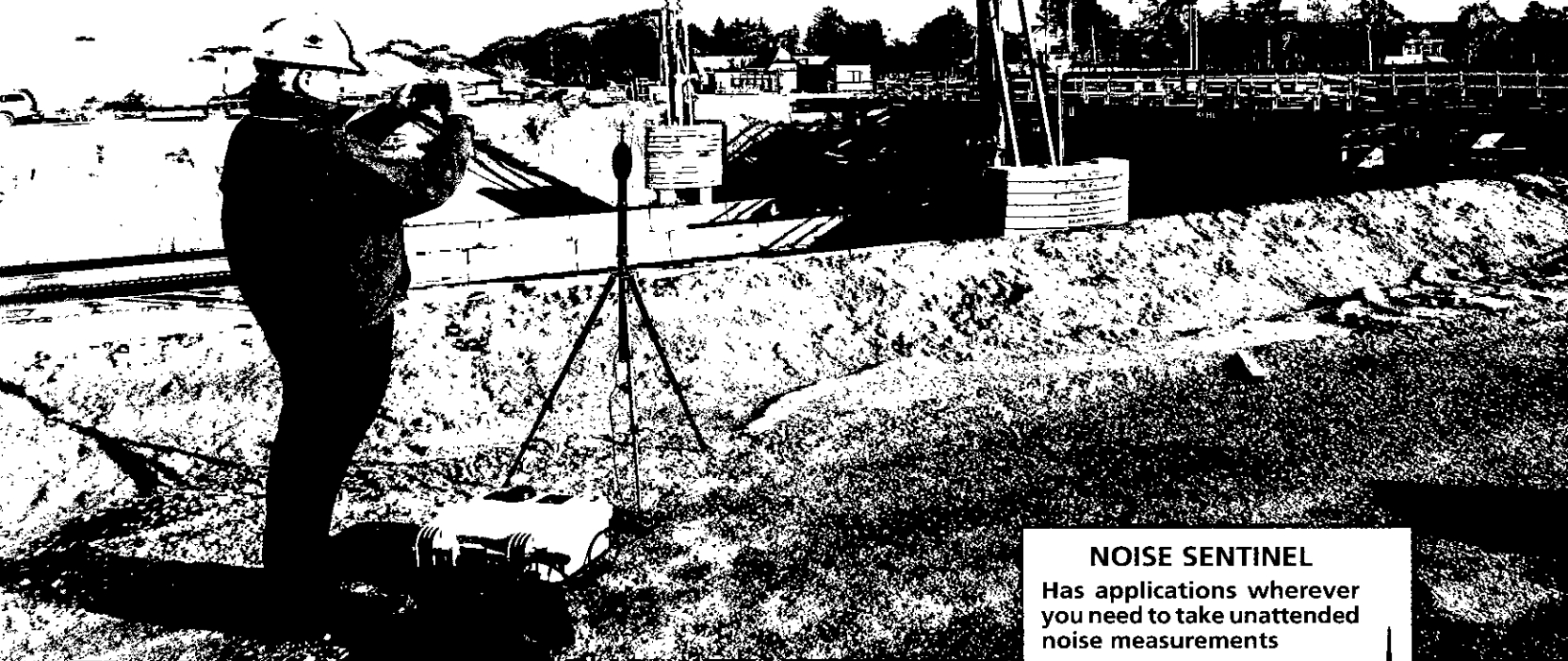
The Institute has over 3000 members working in a diverse range of research, educational, governmental and industrial organisations. This multidisciplinary culture provides a productive environment for cross-fertilisation of ideas and initiatives. The range of interests of members within the world of acoustics is equally wide, embracing such aspects as aerodynamics, architectural acoustics, building acoustics, electroacoustics, engineering dynamics, noise and vibration, hearing, speech, physical acoustics, underwater acoustics, together with a variety of environmental aspects. The Institute is a Registered Charity no. 267026.



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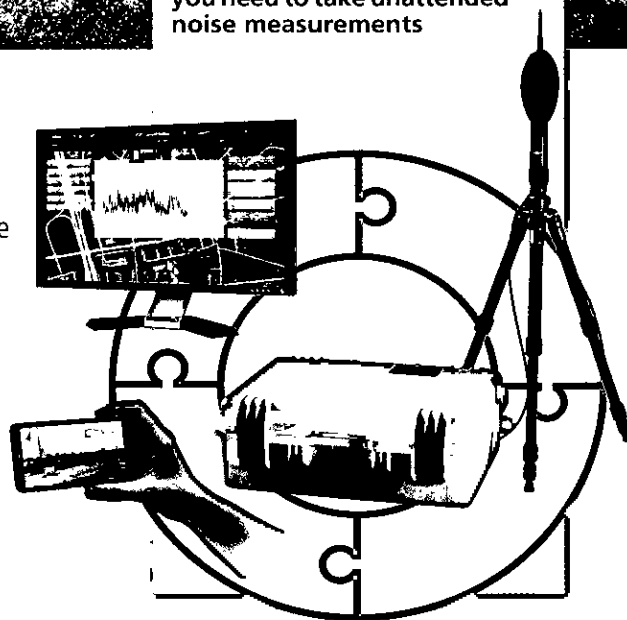
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Conference programme 2014

15 May

Organised by the
Scottish Branch and the
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Wind turbine noise
Glasgow

17 June

Organised by the
Young Members' Group and the
Society of Light and Sound
Casting light on sound
London

25 June

Organised by the Measurement
and Instrumentation Group
How noisy is that machine?
London

4 July

Organised by the
Musical Acoustics Group
**The acoustics of organs and the
buildings in which they are housed**
London

8 July

Organised by the Noise and
Vibration Engineering Group
**New technology for
engineering noise control**
London

17-19 September

Organised by the
Underwater Acoustics Group
**Third international conference on
synthetic aperture sonar and
synthetic aperture radar**
Lerici, Italy

14-15 October

Organised by the
Electro-Acoustics Group
Reproduced Sound 2014
Birmingham

15-16 October

**Institute 40th
Anniversary Conference**
Birmingham

Please refer to
www.ioa.org.uk
for up-to-date information.

Dear Members

This year is becoming a significant one for acoustics in the UK with the revision of several important standards, particularly in the areas of building and environmental acoustics. Individual members have always played a key role on committees drafting standards, legislation and guidance, and it is important that the wider membership is involved in responding to consultations as and when they appear. As well as contributing to the official IOA consultation responses, any member may of course also respond as an individual, and, if you feel strongly about a particular issue, I urge you to do so.

As many of you will know, and as reported elsewhere in this Bulletin, the long awaited revision of BS 4142 was released for consultation earlier this year, and a very successful and informative meeting was held in London in April to gauge members' views in order to provide the Institute's response, which is included in this issue.

When you receive this Bulletin there should still be time to respond to the consultation on the draft revision of the acoustic performance standards for schools under Part E of the Building Regulations; the closing date is 16 May. A report on the April meeting being held to help inform the Institute's response will be included in the next Bulletin. As with BS 4142, this revision has been many years in the drafting, and it is excellent news that it has finally been agreed by the Department for Education and the Government that it can go out to consultation. In addition to the standards themselves, the IOA and the Association of Noise Consultants are working together to revise the guidance that previously formed sections 2 to 7 of Building Bulletin 93, and this should be available later in the year.

Other guidance being provided by the Institute includes the Supplementary Guidance Notes to the Good Practice Guide for the assessment of wind turbine noise, published last year. Thanks are due to all our members who have been working hard in drafting these various documents, organising meetings to discuss them, and preparing the IOA consultation responses. In addition, it is always good to see new initiatives taking shape, and a very worthwhile new development for the Institute is the Sustainable Design Task Force, also covered in this edition of the Bulletin.



Preparations for this year's 40th anniversary celebrations are progressing well. There was an excellent response to the call for papers for the conference, to be held on 15-16 October at the NEC, Birmingham, so it looks as though it will be a very interesting and enjoyable event. Thanks go to all of you who have submitted abstracts. We are also publishing a "souvenir" publicity brochure as part of our marketing strategy. The booklet contains words and pictures relating to each of our specialist groups, the aim being to describe what the Institute is, and to give a flavour of the wide and varied interests of our members. It will be distributed to politicians and other decision makers and people in related professions, as well as to the general public as appropriate, and will hopefully raise the profile of both acoustics in general and the Institute in particular.

This year's AGM will be held on 8 July at WSP's offices in London. There will be three vacancies on Council and, although, as is the custom, Council will put forward a "slate" of three names for election, this does not preclude other members from standing for election if they wish. So, if you would like to be on Council, please put yourself forward for nomination. New faces are always welcome. ■

Bridget

Bridget Shield, President

Institute membership remains steady at just under 3,000

Annual report of Council for 2013

The Institute has continued to serve the interests of its members through its established programmes in the areas of education, professional development, meetings and publications, and by providing representation in areas such as the Engineering Council, Standardisation and International affairs.

The Trustees confirm that in the exercise of their powers as charity trustees, they have had due regard to the published guidance from the Charities Commission on the operation of the public benefit requirements and the aims of the charity are carried out for the public benefit.

During the year:

- A new Chief Executive was appointed in December 2012 and took up the post in January 2013.
- An ambitious programme of well attended conferences and technical meetings was undertaken at national and regional level.
- Eleven candidates presented themselves for Professional Review Interview. Seven were successful.
- The Diploma in Acoustics and Noise Control is now in its sixth year since extensive revision in 2008. During the year 91 students were awarded the Diploma, with 134 new students registering for the course, of whom 56 have enrolled for distance learning, including six from overseas.
- *Acoustics Bulletin* continues to provide a high standard of technical content and remains popular with members.
- Despite the financial climate, membership has been retained at just under 3,000.
- The Institute is represented internationally through the following members: Colin English (Vice President, EAA), Barry Gibbs (Director, IIAV), Prof Yui Wei Lam (ICA Board), and Rupert Thornely-Taylor (Director, IIAV).
- The Institute has purchased demonstration equipment to support the "You've Been Banned" acoustic workshop for presentation to schools. A number of volunteers have been trained and 12 workshops were delivered in schools during the year.
- The Institute continues to engage with a number of government departments (DfE, DCLG, Defra and DECC) to influence future policies affecting acoustics.

Standing Committees

Education Committee

The Diploma and Certificate courses have continued to recruit and to provide education and training for both members and non-members of the IOA. The education programmes and courses introduce many working in acoustics and associated professions

to the Institute and help in the recruitment of new members.

The Diploma in Acoustics and Noise Control is now in its sixth year since extensive revision in 2008. As a result of grades obtained in 2012/13, the Diploma was awarded to 91 students. NESCOL reversed its decision not to operate as a centre, and London South Bank University is offering the course. The committee is continuing to monitor the effects of the changes in funding for higher education on students and centres, and investigating options for electronic delivery of learning materials.

In 2013, the Certificate of Competence Courses recruited as follows: Management of Hand-Arm Vibration nine students (six passes), Environmental Noise 184 students (170 passes), Building Acoustics Measurement 19 students (17 passes) and Workplace Noise Risk Assessment 42 students (35 passes). The Certificate of Proficiency programme in Anti-Social Behaviour (Noise) continues to be run in Scotland by Bel Education and Strathclyde University and recruited 32 students (28 passes).

Since 2011, Diploma members have been able, for CPD or other reasons, to register for additional specialist modules. So far four people have taken advantage of this opportunity. Additional "formal" CPD courses (with a syllabus and assessment) are being considered in conjunction with groups and branches. Options for alternative delivery of courses, including e-learning continue to be considered. The committee is also keen to work with groups and branches to support "formal" CPD, where there is a defined syllabus and assessment of learning outcomes. This may include online learning and topics for consideration include "sustainable acoustics" and new acoustic guidance currently in preparation.

In 2012 Council approved the purchase of sets of demonstration equipment to support the "You've Been Banned" acoustic workshop for presentation to schools. Twelve "You've Been Banned" presentations were given during 2013.

The committee continues to be indebted to the support of its members, course tutors and examiners, the work of the Education Manager and for the assistance provided by the Education Administrator and other members of office staff.

Engineering Division Committee

The committee met twice during the year, confirmation of approval of registration for some candidates being given by email correspondence with committee members. Two internal audits were carried out, with no non-compliances identified. The Policy and Procedures Manual is to be revised in early 2014, to incorporate several minor amendments. The number of enquiries for registration from Institute members remained strong, but many



potential candidates still deferred or failed to complete their applications, despite the personal support provided.

The number of formal applications for Chartered Engineer and Incorporated Engineer registration was higher in 2013 than in recent years. Eleven candidates presented themselves for Professional Review Interview, of whom four were "Standard Route" CEng candidates, holding accredited degrees, and six were "Individual Route" CEng candidates with diverse backgrounds, including physics degrees. One candidate, holding the University of Salford Acoustics degree, was elected IEng. Seven candidates were registered with the Engineering Council. Four candidates were invited to submit further written evidence for consideration before confirmation of their registration. Their areas of employment were mostly in architectural and building acoustics.

The Institute's EC licence is due for renewal in January 2015.

Medals and Awards Committee

The recipient of the 2013 Rayleigh Medal was Professor Jacques Guigne of PanGeo Subsea based in Newfoundland, Canada; he is also a visiting professor at the University of Bath. The medal was presented at the International Conference on Underwater Acoustics in Corfu in June 2013. Two A B Wood Medals for underwater acoustics (for 2012 and 2013) were also presented, to Dr John Smith (2012) and Dr Brian Hefner (2013).

The R W B Stephens Medal was awarded to Dr Bob Peters, for his long and valuable contribution to acoustics education. He was presented with the award at the Spring Conference in Nottingham, where he entertained the delegates with his medal lecture.

Several awards were made at the Reproduced Sound conference in Salford in November. Luis Gomez Agustina received the Peter Barnett Memorial Student Award for his work on speech intelligibility on the London Underground, while Marcos Felipe Simón received the IAC Young Persons' Award for Innovation in Acoustical Engineering. Roy Bratby, a former Chief Executive of the Institute, was given an Honorary Fellowship in appreciation of his work for the IOA in the past and his continued interest and contributions. Three awards were made for Distinguished Services to the Institute, to Allen Mornington-West, David Sproston and Jon Lee. Allen's award was in recognition of his many years' service to the Institute, including on the Electro-Acoustics Group and the Publications Committee, and for all the time and effort he put into redeveloping the IOA website, ably assisted by David and Jon.

The recipient of the 2013 award for Promoting Acoustics to the Public, presented at the Musical Acoustics Group meeting in London in June, was Gianluca Memoli of NPL for his very extensive range of activities in this area.

A new award is to be established in memory of Peter Lord, a founder member of the IOA and past President, who died in December 2012. The proposal is for an award to be given for a general project (e.g. a building or product); the details of the operation of the award are to be decided but it is hoped to make the award for the first time in 2014.

Meetings Committee

The committee met four times in 2013. Its membership remained unchanged from last year's report, although the Secretary changed. At the end of 2013 the committee constituted a Chair (Jeremy Newton), Secretary and Young Members Representative (Chris Turner) and three other members – Hilary Notley, Ken Dibble and Paul Lepper.

The committee presided over the organisation of 11 events covering a wide variety of topics. There were nine one-day meetings, the Reproduced Sound conference and Acoustics 2013. The feedback from the events' questionnaires in general continues to be very favourable and many of the proposals for future meeting topics are passed to the relevant specialist group.

Acoustics 2013 trialled the proposed format for the Institute's 40th Anniversary Conference in 2014, and specialist groups organised sessions that were run in parallel. Many members commented that they enjoyed this format and would have appreciated more time to network and meet with colleagues. As a result,

the 40th anniversary event will again involve as many groups as possible and this time will be held over two days to maximise the networking opportunities. In a break from tradition, Reproduced Sound will be held at the same venue and timed to overlap to give members the chance to attend this popular event as well.

Given the global recession, the financial performance of meetings has been under some scrutiny and we continue to review performances and learn from our experiences so that deficits may be minimised in the future and events continue to generate a moderate surplus. Specifically, the committee aims to meet a target of an average surplus of £1,000 per event. During 2013, this target was exceeded by more than 100%.

Membership Committee

The committee met four times during 2013. Chris Stopford was welcomed to the committee as a representative of our local authority members. During the year Rob Hill retired from the committee due to a house move, after many years of service to the committee and to the Institute generally. The vacancy is to be filled by Ellen Harrison representing our Young Members.

A CPD review team was formed and has now commenced the task of reviewing samples of members' CPD records. This will be an ongoing exercise in the future.

The committee considered 10 cases under the Institute's Code of Conduct, four of which have been classed as dormant due to lack of response from the complainant. Of the remainder, one was not within our remit, a second had no case to answer, a third is in abeyance due to impending legal action and three are ongoing. Unfortunately, this represents an increase in the number of cases brought to the committee compared with last year. In addition, action was taken against an individual falsely claiming to be a TechIOA.

Discussions were held with officers of the CSCS site safety card system over appropriate grades of membership. In response to a request by Council, the committee developed a policy on the use of the IOA logo on company websites. Several trials of webinars were carried out during the year to assist members with their CPD. These seemed to meet with general approval. A new grade of free membership has been proposed for all students studying in fields associated with acoustics.

During the year 316 applications were assessed by the committee, of which 310 were elected to membership of various grades, representing an encouraging increase on the previous year's figure.

	2013	FIOA	MIOA	AMIOA	Tech	Affil	Student Sponsor	Total
Applicants	5	111	133	21	11	30	5	316
Elected	5	107	131	21	11	30	5	310
New Members	0	41	120	21	11	30	4	227
Resigned	3	35	14	1	1	1	2	57
Deceased	0	2	0	0	1	0	0	3

Publications Committee

2013 has been a relatively quiet year for the committee. During 2014 several changes are due to come on line for publications topics. The new website is expected to come on line early in 2014, and as part of this the publicly accessible search facility changes from being the *Register of Members* style search to the *Buyers' Guide* style search, allowing companies to provide better information about their services to the public using this facility. The decision was also taken in 2013 to stop production of the paper *Register of Members*, making the 2013 edition the last one. Electronic availability of *Acoustics Bulletin* is also being trialled through 2014.

Acoustics Bulletin and *Acoustics Update* continue to provide a high standard of technical content, reporting news and details of the Institute's meetings and affairs. One change to the

117 Bulletin will happen in 2014, where a level of technical editorship will be introduced to assist Charles Ellis with his editorial duties.

During 2013 the committee welcomed three new members, Rebecca Hutt, Mark Lawson and James Hill, whose contributions are most welcome. On a related thread, the historic activities of the committee have come under examination in preparation for the Institute's 40th anniversary celebrations, and determining who has been on the committee at various times seems to be a challenge. Opportunity is therefore taken to thank all of the committee and sub-committee members for volunteering their time and enthusiasm to the committee since 1 (Adam Lawrence) became Publications Chairman in 2008: Peter Bird, Bob Walker, Matthew Ling, Michael Morrow, David Sproston, Seth Roberts, Gary Timmins, Alice Hubley, Gwyn Mapp, Briony Williams, Allen Mornington-West, Jon Lee, Chris Chittock, Daniel Goodhand, and Dan Pope. Thanks are also due to the editors, Ian Bennett and Charles Ellis, the advertising manager Dennis Baylis, and all the staff at the IOA office, particularly those in the publicity role: Judy Edrich, Kevin Hyatt, Debbie White and Charles Ellis. Lastly, thanks are due to everyone who contributes to the Bulletin with meeting reports, technical contributions, letters, book reviews and everything else.

Research Co-ordination Committee

During 2013, the committee (RCC) met in May and October at the Defra offices in London. The committee reviewed their performance in the light of the committee's responsibilities listed in the Committee Terms of Reference document. It was noted that a very important responsibility of the RCC is to improve the national status of acoustics as an academic discipline. The committee noted that a considerable proportion of RCUK funding for acoustics related research does not go to members of the IOA, but to members of IoP, IMechE and other professional bodies. This makes the IOA a relatively small player in defining the UK's horizon for acoustics related research. Therefore, the ability of the RCC to fulfil this responsibility may be limited because of the above situation. The RCC noted that this responsibility can be fulfilled much more efficiently if the IOA, IoP and IMechE agree to work together in a coordinated manner. Representatives from IoP (Dr Eleanor Stride) and IMechE (Professor Steven Daley) were

approached and persuaded to attend the committee meeting in October 2013. An important outcome of this meeting was the agreement between members of these three institutes to work together in a concerted manner to promote acoustics as a research discipline. It was agreed to apply together for RCUK funding to facilitate a series of workshops/showcases to help to address the current state of fragmentation in funding for acoustics related research. It was also agreed to set up a framework which enables the challenges in acoustics to be communicated to the RCUK directly by the industry rather than by the academics. The latter can be achieved by engaging the industry better and in a more concerted manner in future RCC meetings to which members of IoP and IMechE will also be invited. The committee has spent a considerable amount of time discussing ways for better interaction between the PHE, Defra and RCUK. Until December 2013 this issue has been impeded by the lack of noise specialists at PHE with whom the committee, Defra and RCUK could communicate efficiently. This issue has been rectified recently and the committee Chairman, Professor Horoshenkov, will be meeting the newly appointed Principal Noise and Health Specialist, Dr Benjamin Fenech, at the end of February 2014 at Public Health England offices in Birmingham. Dr Fenech has also been invited to attend the forthcoming RCC meeting in May 2014. The committee held a teleconference with Daniel Smith, the new EPSRC Portfolio Manager for Engineering at the EPSRC, during which the Challenges in Acoustics document was discussed. The committee communicated via email with Katie Clark at the RCUK with regard to funding for the acoustics related research, making her aware of the existence of the RCC. The committee discussed funding programmes under Horizon 2020 which might be relevant to acoustics as a research discipline. These and other actions are detailed in the meeting notes which have been submitted to the IOA.

Specialist groups Building Acoustics Group

With the continued economic recovery, the group gained new enthusiasm and verve for the future. The first major event of the year was the Spring Conference in Nottingham in May. This was a return to multiple simultaneous sessions, with all of the **P10**



John Willet tests equipment at Reproduced Sound



Matthew Cand at the Good Practice Guide launch



Bob Walker at Reproduced Sound



Lorenzo Morales at Reproduced Sound



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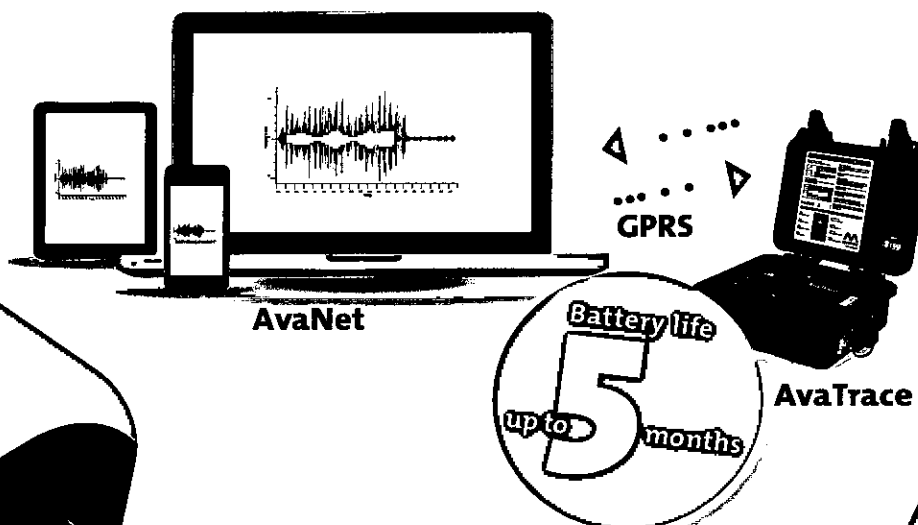
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CPB Institute groups taking part. BAG organised a whole day of talks in one of the sessions and the feedback was excellent. Definitely a model to repeat!

The success of this meeting has inspired us to deliver two days of talks for this year's two-day 40th Anniversary Conference which will follow the successful model of multiple simultaneous sessions. There really will be something for everyone! On one day the BAG session will focus on green buildings and sustainability, with a session on the second day on building acoustics hot topics.

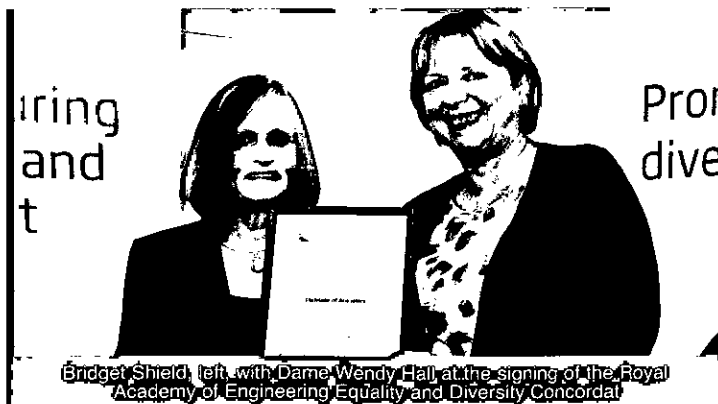
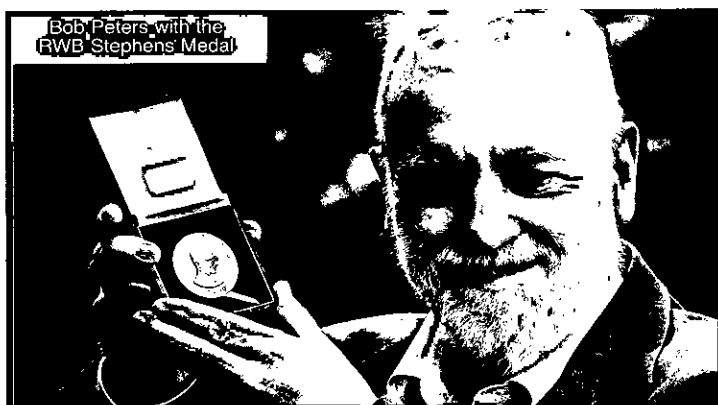
Bridget Shield, our President, has helped to re-invigorate our relationship with the RIBA and we look forward to developing this relationship this year. Our members have also been busy with writing and consulting on several acoustic documents, including the Acoustic Design of Schools, CIBSE guides, sound and impact isolation field testing and many more. I would like to personally thank all of my committee members and everyone else who gives their valuable time for free for the betterment of our noble profession.

Here's to a successful and celebratory 2014!

Electro-Acoustics Group

During 2013, the group committee organised and put on Reproduced Sound 2013, the annual two-day conference that has run every year since 1984. This was held at the Renaissance Hotel, Manchester, with opportunities pre-conference to visit the facilities at the BBC in MediaCityUK and the University of Salford. RS was once again well attended by both regulars and new faces, including the pre-conference tours. Feedback (questionnaire forms) was sought from attendees and these have been scrutinised to inform future events. RS continues to attract a large contingent of student delegates, a number of whom are already forming a positive part of RS looking to the future. Two new members were welcomed to the group committee, James Allen, a student, and Emma Bigg, director of an international sound hire company based in London.

It was announced at RS 2013 that Reproduced Sound 2014 would be alongside and part of the IOA 40th Anniversary Conference. RS 2014 will also be the 30th RS event in as many years.



At the EAG AGM held at RS 2013 the 2014 committee was agreed. Paul Malpas remains as Chairman and Helen Goddard as Secretary. Other offices had been developed within the committee, and this being a definite team effort, the contributions of all members were acknowledged and appreciated.

Environmental Noise Group

The group held a session of eight papers at the IOA Spring Conference in Nottingham in May, which was attended by about 60 delegates and reported in *Acoustics Bulletin*. The AGM was also held to elect the committee, which has nine members following the earlier retirement of Nigel Cogger and Tim Clarke. During the year the committee held three further meetings, and considered four public consultations, preparing responses to two; the Department for Communities and Local Government consultation on review of the planning practice guidance, and the Defra consultation on draft Noise Action Plans. In October 2013 the IOA hosted an evening meeting in London to discuss Defra's Draft Noise Action Plans. Twenty members heard Defra describe their proposals and gave direct feedback to inform the consultation. During 2013 informal discussions began on the need for national guidance to fill the gap left by the repealing of Planning Policy Guidance 24. This work will continue in 2014 when the committee will keep members informed of progress, seeking views as appropriate.

Measurement and Instrumentation Group

During the past year the group has organised two one-day meetings and a session during the Spring Conference. In March, a one-day meeting entitled *Making smooth the rough – the latest in human vibration measuring* was held at the Health & Safety Laboratory in Buxton, Derbyshire. A wide variety of presentations ranged from information on how to measure whole-body vibrations on high speed boats to a practical demonstration of how easy it is to get huge variations in measuring what appears to be the same source of vibration, and indeed whether it is worth measuring it at all! Thirty delegates enjoyed the nine presentations and there were plenty of questions and discussion after each one. The group provided a session at the Spring Conference, held in May in Nottingham, on optical methodologies, covering **P12**



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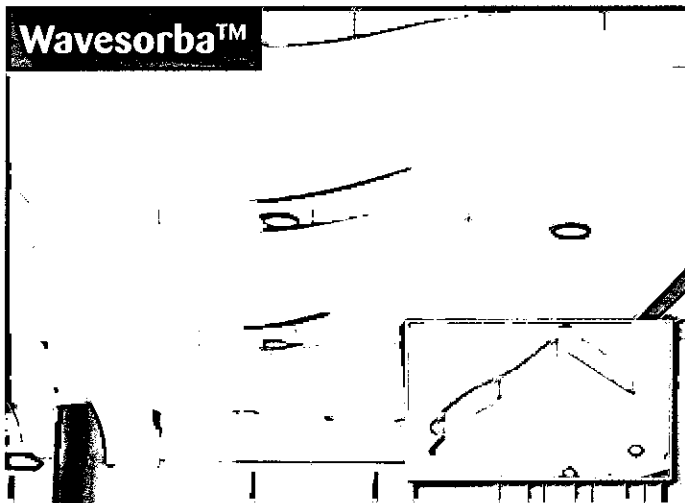
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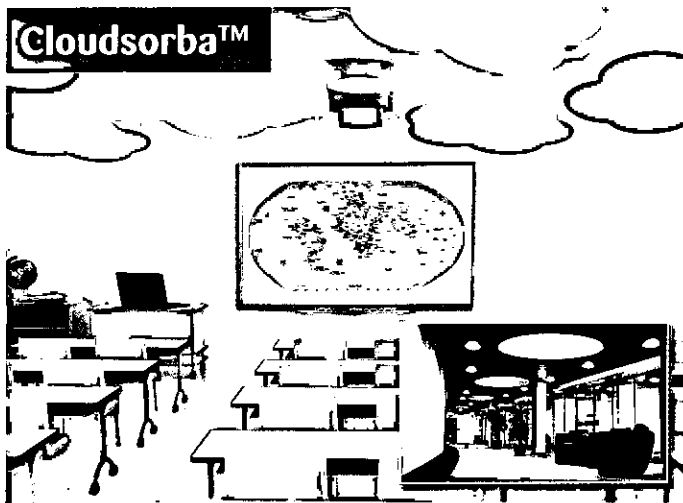
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Presentations covered new optical primary standards, the acousto-optic effect, 3D imaging and characterisation and use of an intelligent distributed acoustic sensor. With many parallel sessions of presentations from different IOA groups operating, numbers attending each presentation were quite small. The group returned to the Royal Society in London in June to hear about *The trials and tribulations of overcoming acoustic challenges*, which covered a wide variety of difficulties ranging from comparing predictions and actual results of transport noise systems via the unpredictability of moveable room partitions to trying to measure jet engines at just 2.6 m in 44°C ambient. Twenty-eight delegates enjoyed the presentations and used the informal day to network and discuss many different issues. Over the past year, the group's committee members have continued contributing to the regular *Instrumentation Corner* article in *Acoustics Bulletin*, which has produced some interesting discussion and articles, and this is scheduled to continue for the forthcoming year. A programme of two one-day meetings plus contributions for the 40th Anniversary Conference has been planned for 2014, with the first of these scheduled for 12 March 2014 in Birmingham asking *Railway noise – on the right track*. My thanks go to all members of the committee for the active roles they take in all aspects of the group's activities and to Martin Armstrong for his secretarial skills on behalf of the group.

Musical Acoustics Group

Following the considerable recent efforts to revitalise the group, 2013 was certainly an encouraging year. Despite the group's apparent dormancy in recent years, with activity confined to well-attended sessions at the IOA Spring Conference, records show that the membership of the group has actually been increasing since 2002. By 2012, it was approaching 300, showing that the interest was there and the group was long overdue for a proper relaunch. To this end, the focus during 2013 was on widening the appeal of the group, in particular, bringing in acousticians from consultancy, manufacture and development, as well as those from academic institutions and research organisations.

The IOA Spring Conference held a full session of musical acoustics papers. The session was chaired by David Sharp and covered a broad range of topics. The acoustics of musical instruments included research on the gamelan gong, guitars, the clarinet and the violin family. The way players can influence the sound of a mechanical action pipe organ was also discussed. Digital signal processing technology aspects included a novel approach for separating sounds produced by different percussion instruments. A novel system was demonstrated that processes the raw electrical output signal from an electric violin to sound like an acoustic instrument. The session even included a discussion of measurements designed to investigate whether a medieval bronze lion statue may once have made a roaring sound.

In July the group held its first one-day meeting for over five years – *Acoustic challenges in quires and places where they sing* – in London. The session chaired by Mike Wright opened with a paper presented by Bridget Shield based upon work done by London South Bank University and the Royal Academy of Music to educate musicians on acoustical issues, taking account of such matters as noise awareness in health and safety, cultural sensitivity, theatre design etc. This was followed by a discussion on the interaction between music, acoustics, and architecture in renaissance churches in Venice by Raf Orlowski. Shane Sugrue presented a study of choral singers and perceptions of auditorium acoustics. Jude Brereton gave an interesting talk on her investigations into singing performance in different acoustic environments in the "virtual singing studio", taking account of perceptions, predictions and analysis of acoustic measurements in three types of auditorium. The effect of pitch drift in a capella singing groups resulting from the natural use of non-equal temperament was highlighted by David Howard and solutions for the well-known problems associated with concerts of unamplified music in cathedral-type spaces were discussed by Mike Barron. Finally, there was an investigation by Chris Stanbury into the use of 21st Century organ tech-

nology including the increasing popularity of 'hybrid' instruments and the cost and sonic benefits that are possible.

The group also held its first AGM since 2008 and a formally elected management committee is now in place. Keeping branch members informed is most important and the launch of *MAG MAG*, an e-newsletter, commenced in June. This follows in the footsteps of its paper-based predecessor, *Notes*, which circulated in the 1990s. Owen Woods edits this informative quarterly publication.

In order to really understand the interests and aspirations of the group, a survey was carried out among members, the first for more than 20 years. Those who responded made it very clear that they wanted to be in *MAG* to "gain knowledge". They would like to visit concert/recital buildings, instrument makers, musical equipment manufacturers and TV, radio and recording studios. They do not like the high costs of one-day meetings which have tended to put off many members from attending, and the survey suggested that lower cost options could prove much more attractive to members. Many simply do not have the time or resources to travel long distances.

The group has an ambitious target for the coming year with a one-day meeting at Salford in March, another at the Royal Academy of Music in July and the IOA 40th Anniversary Conference in October. To extend the interest of the *MAG* to local level, presentations are being held at evening and other branch meetings. The first was held in Exeter at the October South West Branch meeting, with more planned in 2014 and beyond. Of note will be a half-day meeting in conjunction with the Southern Branch on 28 February.

We still have a lot of work ahead but with a strong committee in place there is real hope that the *MAG* will become a group that will attract a very much wider audience and promote the musical side of acoustics as a mainstream component of the subject and not just a sideline interest.

Noise and Vibration Engineering Group

Five committee meetings were held during the year, mainly by teleconference but including several sub-group meetings in the Southampton area. As always, the focus was on planning events of interest to the membership.

In March a meeting entitled *Buy quiet/design quiet* was organised jointly with HSE in Nottingham; this was a well-attended meeting which produced a good level of discussion among delegates. The group also organised a session at Acoustics 2013, which was chaired by Stephen Walsh and comprised a number of presentations on automotive NVH, including a talk about the design of the Jaguar F-type sports car and several talks about challenges posed by hybrid and electric cars; a brief AGM was also held.

A meeting on *Recent advances in engineering noise control* aimed particularly at the process industries was planned for the autumn, but work commitments of the organising sub-committee prevented this happening; it is now planned for May 2014.

Other changes and contributions to the IOA include: Reuben Peckham now acts as an examiner for the Noise and Vibration Control section of the Diploma; Simon Stephenson replaced Mike Hewett as Secretary; David Lewis retired from the committee after many years of service – his contribution will certainly be missed.

Physical Acoustics Group

No activities to report.

Senior Members' Group

The group and its members are one year older! It has been a successful year. All communications have been by email, particularly with the committee, and this seems to have worked. Two meetings were held during the year. The first was our AGM which was kindly hosted at the IOA offices in St Albans in March. The meeting concluded with a fascinating paper by Mike Wright, Chairman of the Musical Acoustics Group, entitled *What is the* 

■ *right note, pitch or temperament in music?* in which he discussed how "classical" composers in Africa had written piano and other fixed pitch instrumental music tuned to the European convention. This is generally the equally tempered 12-note scale which is in conflict to musical traditions still prevalent throughout the continent. Mike's well-received presentation was also enjoyed by more than 20 people not able to be present at the meeting, thanks to a webinar organised by David Trew. An autumn meeting in conjunction with the Young Members' Group was held at the Health and Safety Laboratory, Buxton, and concentrated on the noise and vibration work of the laboratory. It included a presentation on the development of a hearing test based on otoacoustic emissions; this test can detect the effect of noise on the ear before it becomes evident by conventional audiometry, and is not dependent on a conscious response by the patient. All those attending the meeting thought it was worthwhile, and it was also appreciated as a contribution to professional development. Holding the meeting jointly with the senior and young members worked well.

The group is co-operating with the CPD committee, and the chair and secretary attended the last meeting at St Albans where procedures for implementing the CPD scheme were examined in detail. It is anticipated that senior members, some of whom have previously shown an interest in helping out, will assist with the monitoring process. So far we have had three offers from committee members who are willing to review CPD submissions. Senior members will be approached when more details of how the scheme will work are published. The History Project is progressing under the guidance of Geoff Kerry with assistance from group members. Submissions covering the activities undertaken over the years by various committees and several groups and branches have already been received and more are expected before the task of editing begins.

The 2014 AGM will take place on 20 March at the IOA offices, St Albans.

Speech and Hearing Group

The group co-organised events including a talk on *Protecting the professional ear* by Andy Shiach (Advanced Communications Solutions) and another on *Voices, vices and visors: some applications of forensic speech analysis research* by Dominic Watt (University of York). It also organised two sessions of papers on topics related to speech and hearing at the Institute's Spring Conference in Nottingham in May.

The group committee met three times during the year, and discussed planning the above events and wider issues of acoustics relating to speech and hearing. Future activities planned include evening talks on *Looking after your voice*, *Recent advances in hearing aid technology* and a visit to the Sound and Vision Unit at the British Library. In addition, sessions on speech and hearing-related topics will be held at the Institute's 40th Anniversary Conference in October.

The AGM was held in London in March 2013, immediately after the talk by Dominic Watt. Approximately 20 corporate members of the Institute were present. Emma Greenland (WSP Group) was re-elected to the committee, and Allen Hirson (City University, London) was co-opted on to the committee.

Underwater Acoustics Group

The group's main endeavour for 2013 has continued to concentrate on the dissemination of knowledge via its conferences and other activities. A marine renewable session was organised at the IOA Spring Conference, and this attracted eight presentations. Many of the committee were involved with organising sessions and presenting papers at the Underwater Acoustics Conference (UAC) in Corfu in June. This conference provided the ideal opportunity to present the 2013 Rayleigh Medal to Jacques Guigne and the 2012 A B Wood Medal to John Smith. Some members of the committee are on the ISO TC43 SC3 Working Groups 1, 2 and 3. These are working on measuring ship noise, measuring piling noise and acoustical terminology. WG 2 and 3 plan to produce

their ISO standards in 2015. The group is now dedicating its efforts to future meetings, including a synthetic aperture sonar conference at Lerici in Italy and sessions at the IOA 40th Anniversary Conference.

Young Members' Group

The Young Members' Group (YMG) committee meets quarterly with one round-the-table meeting a year and three telecom catch-ups. This year's face-to-face meeting was at the IOA office and was held in September.

The YMG has seen a significant change of committee members which can be summarised as:

- Louise Beamish stepped down as Chair to be replaced by Angela Lamacraft
- Ben Piper became the Young Members' Representative (YMR) for the Measurement and Instrumentation Group
- Chris Bradley became the YMR for the Midlands Branch
- Ellen Harrison became the YMR for the Membership Committee
- Lisa Greenhalgh became the YMR for the Musical Acoustics Group
- James Allen became the YMR for the Electro-Acoustics Group.

The year saw a number of activities organised by the YMG:

- Successful webinar trials at one day and evening branch meetings by one of our members means this function is likely to be used for some meetings within the IOA
- Nearly all of the YMR positions have been filled, although Underwater Acoustics Group and Eastern and Yorkshire & North East Branches remain vacant
- We held an informal meet after the wind turbine Good Practice Guide launch in Bristol
- We held an informal meet during Reproduced Sound in November which was attended by eight young members
- We participated in the Sky's the Limit, an inter-professional networking event in Manchester, for the first time in November. This was a brilliant opportunity to meet young members from other institutes such as RTPI, CIBSE and ICE, to name a few.
- The group has also developed ties with the Sustainable Design Task Force, with a few of our members becoming directly involved. We are helping to arrange a joint meeting with the CIBSE Society of Light and Lighting on 17 June 2014.

A full copy of the report, which includes branch reports, is available on the website. **P14 ▶**

Grade	MEMBERSHIP	
	2012	2013
Hon Fellow	35	35
Fellow	173	174
Member	1722	1751
Associate Member	733	731
Affiliate	65	69
Technician Member	81	88
Student	67	72
Totals	2930	2975
Key Sponsor	3	2
Sponsor	51	50

•P13

GROUP MEMBERSHIP

Group	2012	2013
Building Acoustics	1226	1234
Electro-Acoustics	322	340
Environmental Noise	1540	1563
Measurement & Instrumentation	499	546
Musical Acoustics	280	299
Noise and Vibration Engineering	984	998
Physical Acoustics	199	206
Senior Members	104	96
Speech & Hearing	186	183
Underwater Acoustics	172	190
Young Members	145	172

BRANCH MEMBERSHIP

Branch	2012	2013
Central	172	194
Eastern	260	261
Irish	127	125
London	767	789
Midlands	387	380
North West	386	385
Overseas	326	345
Scottish	160	168
South West	265	271
Southern	454	472
Welsh	71	77
Yorkshire & North East	224	220

DETAILS OF EMPLOYMENT

Employment Category	2012	2013
Architectural Practice	43	56
Consultancy	1420	1455
Education	221	221
Industry/Commerce	365	366
Public Authority	370	390
Research & Development	219	219
Retired	149	146
Other	91	88

MEETINGS ATTENDANCE IN 2013

Topic	Date	Venue	Attendance
Hosanna Project	28 January	London	65
Buy Quiet – Quiet by Design	5 March	Nottingham	34
Making smooth the rough	21 March	Buxton	30
Acoustics 2013	13 May	Nottingham	168
Wind Turbine Noise	21 May	Bristol	110
It shouldn't happen to an acoustician	5 June	London	28
Acoustic challenges in quires	2 July	London	30
Are you sure?	25 September	London	45
Wilson Report – 50 years on	29 October	London	44
Wind Farm Noise – update	7 November	Edinburgh	69
RS 2013	12-14 November	Manchester	115

INSTITUTE PERSONNEL AT 31 DECEMBER 2013

COUNCIL	Officers	Ordinary Members
President	Prof B M Shield HonFIOA	Mrs A L Budd MIOA
President Elect	Mr W Egan MIOA	Mr K Dibble FIOA
Immediate Past President	Prof T J Cox MIOA	Dr E E Greenland MIOA
Honorary Secretary	Mr R Richardson MIOA	Dr P A Lepper MIOA
Honorary Treasurer	Dr M R Lester FIOA	Mr R Mackenzie MIOA
Vice President: Engineering	Mr R A Perkins MIOA	Ms H Notley MIOA
Vice President: Groups & Branches	Mr G Kerry HonFIOA	Mr G A Parry MIOA
Vice President: International	Dr W J Davies MIOA	Mr A W M Somerville MIOA
		Mr D L Watts FIOA

Committees & Sub Committees

Chairman

Education	Mr S W Kahn MIOA
Diploma in Acoustics and Noise Control, Board of Examiners	Mr S J C Dyne FIOA
Certificate of Competence in Environmental Noise Measurement	Dr M E Fillery FIOA
Certificate of Competence in Workplace Noise Assessment	Mr D Lewis MIOA
Certificate of Proficiency in Anti-Social Behaviour (Scotland) Act 2004 (IOA/REHIS)	Mr S Williamson MIOA
Certificate in the Management of Occupational Exposure to Hand Arm Vibration	Mr T M South MIOA
Certificate of Competence in Building Acoustics Measurement	Mr C Steel MIOA
Engineering Division	Mr R A Perkins MIOA
Medals & Awards	Prof B M Shield HonFIOA
Meetings	Ms H Notley MIOA
Membership	Mr P T Freeborn FIOA
Publications	Mr A Lawrence MIOA
Research Co-ordination	Prof K Horoshenkov FIOA

Specialist Groups

Chairman

Secretary

Building Acoustics	Mr R O Kelly MIOA	Mrs A L Budd MIOA
Electro-Acoustics	Mr P R Malpas MIOA	Ms H M Goddard FIOA
Environmental Noise	Mr S C Mitchell MIOA	Ms N D Porter MIOA
Measurement & Instrumentation	Mr R G Tyler FIOA	Mr M J Armstrong MIOA
Musical Acoustics	Mr M Wright MIOA	Mr D Sharp MIOA
Noise and Vibration Engineering	Dr M G Smith MIOA	Mr M D Hewett MIOA
Physical Acoustics (Joint with the Institute of Physics)	Prof V F Humphrey FIOA	Prof M Lowe
Senior Members' Group	Mr R J Weston MIOA	Mr M R Forrest MIOA
Speech & Hearing	Dr G J Hunter MIOA	Mr D Nash MIOA
Underwater Acoustics	Dr P F Dobbins FIOA	Mr A P Holden MIOA
Young Members' Group	Ms A Lamacraft MIOA	Ms E Keon MIOA

Regional Branches

Chairman

Secretary

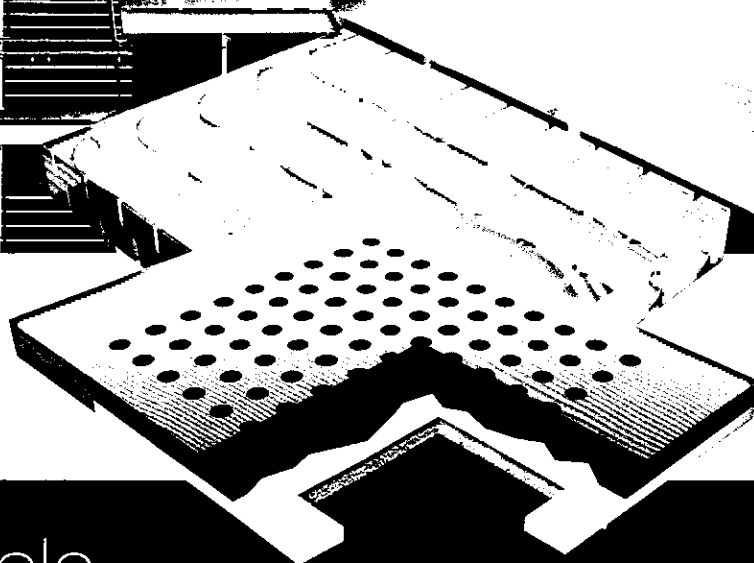
Central	Mr R A Collman MIOA	Mr M Breslin MIOA
Eastern	Mr M Jones MIOA	Mr C M Pink AMIOA
Irish	Dr M R Lester FIOA	Mr S Bell MIOA
London	Mr J E T Griffiths FIOA	Mrs N Stedman-Jones MIOA
Midlands	Mr P J Shields MIOA	Mr K Howell MIOA
North West	Mr M Hewett MIOA	Mr P Stringer MIOA
Scottish	Mr A W M Somerville MIOA	Ms L Lauder MIOA
Southern	M P Rogers FIOA	Mr D Saunders MIOA
South West	Mr D C Pope MIOA	Mr D O'Neil MIOA
Welsh	Mr G O Mapp MIOA	Mr J M Keen AMIOA
Yorkshire & North East	Dr D Chesmore FIOA	vacant

Chief Executive:

Mr A Chesney



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AM, and where to next for ETSU-R-97?

By Richard Perkins, Chairman of the IOA wind farm working group

The ninth IOA one-day meeting on wind farm noise took place at the impressive Celtic Manor Resort in Newport, Wales in March, with delegates enjoying a packed programme, interesting, thought-provoking and sometimes heated debates, and good hospitality.

The full capacity meeting was opened by Gwyn Mapp, Chairman of the Welsh Branch. Richard Perkins, Chairman of the IOA wind farm working group, then introduced the theme for the morning sessions on the topic of amplitude modulation.

The first talk was given by Matthew Cand, who gave an overview of the RenewableUK (RUK) wind turbine amplitude modulation research that he was involved with, and how the results of that research could be applied to the ongoing problem of quantifying and assessing AM. Matthew outlined the known causes of AM, the acoustic characteristics of AM from a wind farm, and whether it could be reliably predicted. He then went on to describe how the known causes could be mitigated, and how a penalty system to regulate AM could work.

The second paper was given by Sabine von Hünnerbein who was responsible for the laboratory experiments undertaken as part of the RUK research. Sabine described how the stimuli were defined for a series of listening tests undertaken to test whether a relationship between modulation depth and annoyance existed. She then explained the results of the research which showed that a relationship existed, that there was a strong effect of sound pressure level on annoyance, and that average annoyance from AM signals was higher than that for unmodulated noise. The results also showed that there were no clear effects with increasing modulation depth, type of modulation or the addition of garden noise. Sabine confirmed that these results were in agreement with other recent studies.

The third paper was titled *Review of recent research into AM from wind turbines*. Dani Fiumicelli gave a run through of all the latest research being undertaken around the world on AM, and his view as to the direction that it was heading. He concluded that the problem stemmed from a lack of a globally recognised definition of AM, and therefore attempts to quantify and determine a dose response relationship remained difficult. His parting thought to delegates was a suggestion as to whether the UK should join the rest of the world and adopt the LAeq parameter rather than LA90.

Jeremy Bass provided the fourth paper of the day on *The development of the RenewableUK AM tool*. He described how the results of the RUK research had been developed into a method for rating an audio signal of wind farm noise for potential AM, and how a penalty rating system could work to control AM with a precise planning condition. He explained how the proposed condition was written to reflect the IOA Good Practice Guide (GPG) sample condition, and why the software to run the analysis was made freely available. Jeremy also reflected on how the sample condition was only the start of the process, and more work was needed to complete the method, and more importantly to decide on the appropriate level at which the penalty would be triggered.

The fifth paper, from Sarah Large, looked at the issue of AM from a different angle. Her paper, *Investigating amplitude modulation noise: what about character?* was supplemented by a number of audio recordings, and set about describing one possible explanation for why the character of AM can be more annoying. Sarah explained through demonstration how certain AM signals recorded on actual wind farms exhibited rhythmic properties, and at times it can be the removal of a repeating rhythmic signal that is almost as annoying as the sudden presence of it. This orientating reflex was suggested to be one possible reason for heightened annoyance responses.

After an excellent lunch, the afternoon session, chaired by Dick Bowdler, opened with Mike Stigwood talking about the Cotton Farm Research Project. Mike said the RUK approach was incorrectly dealing with the wrong aspect of AM, and that the proposed metric was too complicated. He explained how his company was undertaking long-



term monitoring at the Cotton Farm site, which had already collected a year's worth of data. Mike went on to explain how he believed AM could be predicted, along with "heightened EAM noise zones" where a given wind direction and the right conditions could lead to increased AM. He concluded that 100ms LAeq was a better descriptor of AM annoyance.

The next paper, *Case studies of amplitude modulation assessments using the RUK AM method*, was presented by Tom Levet. Using the RUK analysis tool, Tom has analysed data from a number of sites where excess AM is either known or claimed to exist. Tom found problems in the methodology, and looked at solutions such as overlapping analysis windows, band limiting the data to frequencies specific to dynamic stall noise, and including the 2nd harmonic information in the analysis. He concluded that the RUK method as currently proposed would underestimate a constant modulation signal, and that there was room for improvement in de-trending steps, dealing with the variability of modulation, and addressing non sinusoidal modulation.

A different perspective on the whole assessment method was then given by Richard Cox, a retired electrical engineer, titled *Critique of the RUK report on wind turbine amplitude modulation*. Richard was highly critical of the entire IOA GPG process, and highlighted the RUK method as continuing the flaws in the original ETSU-R-97 assessment process, and the IOA GPG. He used Mike Stigwood's research to explain his views and urged all present to question whether the current approach was appropriate, and whether more harm was being done.

The final session began with a talk from Dick Bowdler on *The planning system, acousticians and ETSU-R-97*. Dick set out the role of an acoustician in the assessment process. He explained how it is our job to investigate the baseline noise, the development noise, and to describe the impact of the scheme. It is not our role to be planners, or to set the limits. He then went on to look at the EIA Directive, and compare how noise assessment for wind farms was currently undertaken to a landscape and visual assessment. He concluded that noise assessment needed to move away from a "tick box" to an assessment process focussed on the impact on people.

The final talk was given by Richard Perkins on *IOA NWG update including Supplementary Guidance Notes final drafting*. The process of producing the notes (SGNs) was explained, and he thanked those delegates who had responded to the consultation. It was hoped to publish the notes by the end of May. He also explained how the feedback received from the meeting would be used to produce an options paper (to be published in *Acoustics Bulletin* at a later date) for IOA Council approval.

The agenda for the meeting allowed for plenty of discussion after each session, covering points too numerous to mention here. However, some of these will be picked up in the options paper. Discussions on the "RUK" vs "Denbrook" methods for assessing and rating AM became heated at times, illustrating how the two opposing views remain some distance apart. Whilst the acceptability of AM is

■ still hotly contested, it was interesting to hear one speaker conceding that its acceptability would change considerably if residents were financially compensated for the level of impact experienced. This only goes to show how difficult it is in determining how affected people actually are when their responses are highly influenced by their take on the acceptability of a scheme (for whatever reason), or whether they will receive compensation.

Overall the day was highly informative and both sides were given ample chance to air their views and justify their positions on AM, and for the time being at least the debate will continue. In particular, the debate pointed to ways in which the RUK condition scheme could be improved. Thanks go to all the speakers who gave their time to prepare presentations, and to all the delegates who attended a fascinating day. ■

Industrial noise rating revisions: draft BS4142 workshop

By Steve Mitchell, Chairman of the Environmental Noise Group

British Standards Institute has published a draft revision to BS4142; methods of rating and assessing industrial and commercial noise. The draft is to replace the 1997 version that is widely used to assess industrial and other noise in the UK. The proposed changes relate to the scope and purpose of the standard, the rating method, instrumentation and measurement methods. These changes have added a great deal more detail to the standard and could significantly affect how industrial and commercial noise is assessed, so the Institute is preparing a considered response. To help bring together members' views, and to seek common comments that should be made in response to the consultation, the Institute held a workshop at London South Bank University in April, which was attended by 70 people.

It began with an overview of the changes and the reasons behind the changes from Ken Collins, a BSI committee member. He explained that some of the changes were necessary updates, and some were to add clarity. He confessed it had not been easy, but the general aim was to improve the standard and in a way that would ensure it was used more consistently.

Tony Clayton and Jon Tofts from the Environment Agency outlined the areas that the agency thought had been improved and those that remained unclear. They illustrated their views with examples of trialling the draft standard in real situations. The effect of the larger cumulative tonal/impulsive correction was shown to increase the rating level in one case. The proposed facility within the standard to consider context in arriving at an assessment was shown to give a sensible outcome for a site with intermittent sources of both specific and residual noise.

Dani Fiumicelli from Temple Group gave his view on some of the strengths and weaknesses of the draft standard. This set the scene nicely for a series of lively discussions which were held in four break-out groups who debated the scope, fit with policy, rating method, and measurements processes.

The discussions were facilitated by Colin Grimwood, Dani Fiumicelli, Rupert Taylor and Tony Clayton before Steve Mitchell chaired a healthy discussion on the feedback from the four groups. The standard has been updated and revised adding considerable detail, particularly around measurement procedures, and whilst this should help ensure practitioners carry out thorough noise investigations that yield sensible results, there was also concern that it would add to costs. Nonetheless, the committee had clearly worked hard to improve a standard that was very important to those IOA members working in industrial noise assessment and permitting. ■

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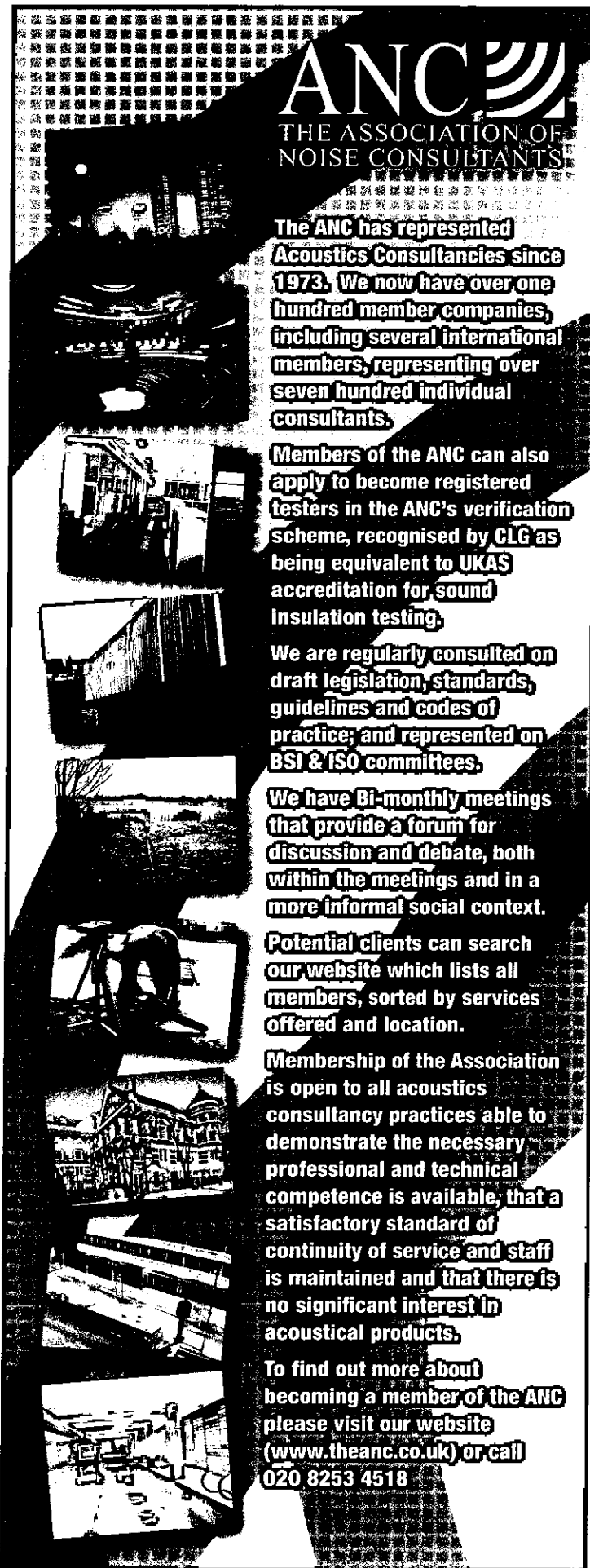
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IOA members demonstrate their achievements in sustainable practice

By Richard Cowell and Peter Rogers of the Sustainable Design Task Force

The development of support for sustainable design practice in the Institute, through the Sustainable Design Task Force (SDTF), has begun with a look at our current strengths. So before introducing something new, we decided to look at the examples of projects that members have been working on, given that clients have been driving at more sustainable project outcomes for some time.

Sustainable practice covers such a wide field that there is a danger that it will be thought of within too narrow a perspective. The following first examples illustrate the breadth of valuable contribution by members, and are also real value for the profile of the Institute.

We thank those who have offered us these case study summaries. Several possible examples we have evaluated fall well short of good sustainable practice (these examples excluded!). There is plenty of scope to strengthen our performance in this area as we begin to share and articulate what is good practice over the next year. We hope that the following examples encourage more attention to the valuable contribution we can make as professionals through our acoustic practice.

Renovate and re-use a piece of cultural heritage: St Andrew's Church, Steyning, Sussex

This is an electro-acoustic solution to pipe organ expansion (efficient re-use of resource combined with new technology)

For renovation and updating of its pipe organ, the church had problems of cost and available space. The solution was to install a "virtual" organ running on a Windows-compatible PC installed in the existing console. To conserve appearance, new electronics were mostly hidden from view and loudspeakers concealed behind the extant pipe work. Existing keyboards and stops were 'retrofitted' with MIDI controllers connected to the console computer.

Using Hauptwerk, specialised software containing several thousand samples of organ pipes, the console now controls both sound from the original organ pipes and the "virtual" organ simultaneously. The instrument now has an enhanced tonal palette with virtually no disturbance to the church building or facilities.

Contact: Christopher Stanbury (University of West London)
Email: christopher.stanbury@btopenworld.com

Social cohesion and connection: TalkMaths and speech recognition

The TalkMaths project at Kingston University has been running for approximately seven years. Its aims are to design, develop, test and evaluate a system which should assist people with disabilities (notably those with visual impairments and/or limited use of their hands or arms) writing and editing mathematical text. These groups are often disadvantaged in their educational and career opportunities partly due to the difficulties they have with mathematically-based subjects. TalkMaths uses Automatic Speech Recognition (ASR) plus additional software to enable people to dictate mathematical equations and formulae into documents, displaying the results on the computer screen and saving them in a variety of electronic formats. A demonstration version is available for free trial use at

www.talkmaths.org However, this does require users to already have a speech recognition system installed on their computers.

Contact: Dr Gordon Hunter (Kingston University) Email: G.Hunter@kingston.ac.uk

Community connections and economic benefit: City Academy Norwich

This is a BREEAM Excellent school constructed from CO₂ sequestered composite laminate timber, achieving major CO₂ savings. Use of exposed timber for floor and wall constructions required a bespoke acoustic prediction assessment and careful detailing. The building is carbon neutral for use over 10 years and its airtightness maximises thermal efficiency. The main atrium has an excellent reputation for multipurpose use thanks to its good acoustics, which has also attracted external users, generating an external annual revenue stream of £35,000 and covering the cost of acoustic treatment within a year. The facility has improved links between the school and community, and helped to bring together disparate communities on each side of the school site.

Contact: Emma Greenland (WSP Acoustics) Email: emma.greenland@wspgroup.com

Assessment of renewable materials: acoustic performance of straw bale construction

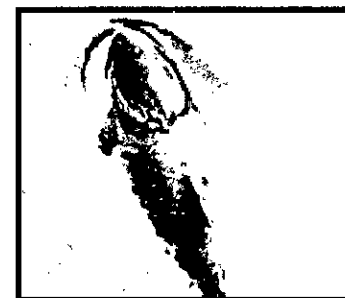
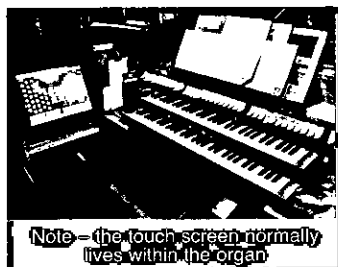
Multi-unit houses built from straw bales have recently become a reality. Apocryphal consensus was that straw bale walls offered superb sound insulation. A literature review and analysis of existing sound insulation test data from laboratory and field showed that straw bale walls, whilst very good at mid and high frequencies, perform poorly at low frequencies. The tests offering the best results revealed poor instrumentation and test methodology. Newly commissioned tests confirmed poor compliance with European sound insulation criteria. A plasterboard partition added to one side resulted in outstanding sound insulation with minimal environmental impact when viewed as part of a complete build.

Houses at North Kesteven were the first straw bale semi-detached houses in the UK – and the first straw bale council houses, too. They failed the pre-completion test at low frequency and needed an extra partition built to pass. The $D_{nTw} + C_{tr}$ was 58dB.

Contact: Paul Herwin (Herwin Acoustics) Email: info@herwin.co.uk

Protection of marine life from noise pollution: Anthropogenic noise measurements and impacts for assessment of the marine environment-Loughborough University

This research explores the characterization of underwater noise and its potential impacts. ▀



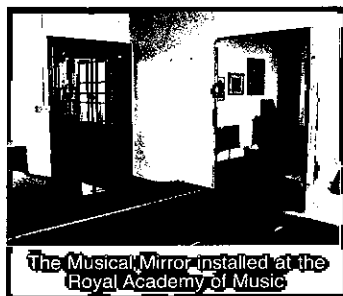
■ The context of these measurements is highly complicated. Development of monitoring and assessment tools, understanding of physiological and behavioural effects on marine species and how a understanding of current limitations are central to obtaining a better understanding of the marine acoustic environment and how best to operate sustainably within it. This study included measurements for assessment of impact on coastal fish farms and the hearing of the harbour porpoise in relation to offshore windmills and oil and gas exploration, drilling, marine construction and offshore renewables developments.

Contact: Paul Lepper (Loughborough University) Email: PA.Lepper@lboro.ac.uk

Sustaining music and human health: the Musical Mirror

With the advent of the Control of Noise at Work Regulations the Acoustic Group of London South Bank University was approached by the management of the Royal Academy of Music. A noise team was formed which formulated a strategy to address the issues of classical music and the risk of hearing damage. A baseline was established for individual practice, section rehearsals and fully orchestral performances both on stage and in the theatre pit. Education was prioritised, as were audiometric assessments for all students. Management practices were changed and innovative solutions offered in the form of the new Musical Mirror.

Contact: Dr Stephen Dance (London South Bank University) Email: dances@lsbu.ac.uk



Cross disciplinary collaboration and holistic design: detailing for acoustic and air tightness performance at Racecourse Estate, Sunderland

Racecourse Estate, completed in 2011, was the largest residential Passivhaus certified development in the UK, and it also achieved Code for Sustainable Homes Level 4. The terraced bungalows achieved maximum credits for sound insulation. The design and detailing of the party walls and external wall junctions required integration of the design for acoustic performance – controlling direct and flanking sound paths – while also avoiding thermal bridges and maintaining continuity of both the air tightness and wind tightness envelopes. This was carried out in collaboration with Mark Siddall of LEAP Architecture.

The design was successfully tested to achieve an air tightness of $< 0.6 \text{ m}^3/\text{m}^2\cdot\text{hr}$, and an average sound insulation of $62 \text{ dB } D_{nT,w} + C_{tr}$ over 6 tests, testament to the successful implementation of integrated design. We continue to develop details, particularly for the junction between the foundations and structure above, to achieve both sound insulation and air tightness requirements.

This scheme is also an exemplar design for the MVHR system; noise levels have been measured to be below 22 dB(A) , in both normal and boost mode. The design appropriately controls duct borne noise, MVHR unit casing noise break out, structure borne vibration, and cross-talk between rooms.

Contact: Jack Harvie-Clark (Apex Acoustics) Email: jack.harvie-clark@apexacoustics.co.uk

We would welcome more examples of sustainable acoustic practice carried out by IOA members. Contacts: Peter Rogers (progers@sustainableacoustics.co.uk) and Richard Cowell (richard.cowell@arup.com) ■



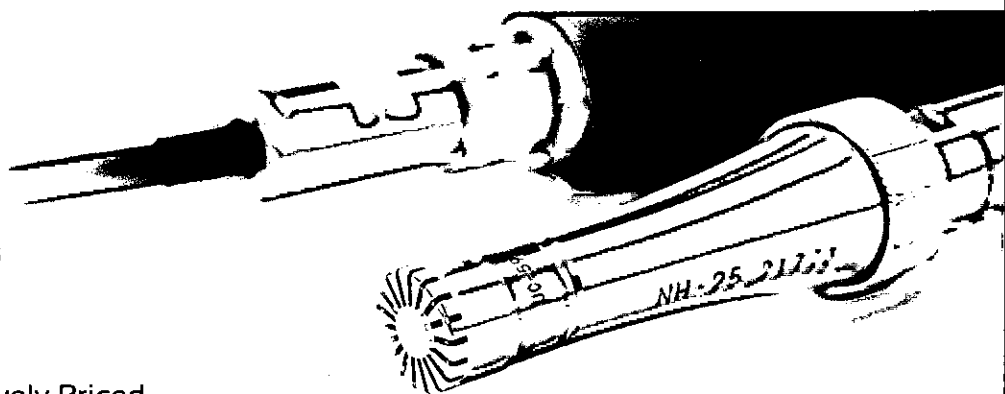
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Acoustic design of schools: towards a new standard

By Andy Parkin

In March the Education Funding Agency (EFA) finally issued a consultation document on schools acoustic design that has been promised for more than 12 months. This document heralds the intended replacement of BB93 which is a means of compliance with Part E4 of Building Regulations. The consultation ends on 16 May, after which the agency and its advisors will assess the consultation response, resulting in BB93 being revoked and a new document set up in its place.

But the consultation document is not new. It is currently being used as the Facilities Output Specification (FOS) for the Priority Schools Building Programme (PSBP). This document started out life as the light touch BB93 amendment in early 2009, which has evolved over time into a full-blown re-vamp. The document has been written by IOA members who have given up a lot of their – and their companies' – time to produce a well-needed updated to BB93.

The consultation raises a number of questions that EFA would like those involved in school design to answer. These questions are:

1. Do you agree that the new standards adequately cover the requirements for refurbishment and change of use?
2. Do you think these changes relating to indoor ambient noise levels are reasonable? If not please suggest changes/amendments with reasons.
 - a) Changes to indoor ambient noise level room types
 - b) Change of unit of measurement of airborne sound insulation between spaces
 - c) Change of design conditions for calculation of sound insulation of building envelope
 - d) Dropping of 55 dB L_{A1}
 - e) Change in standard for rain noise
3. Do you think these changes relating to sound insulation between rooms are reasonable?
 - a) Changes to Table 2 of airborne sound insulation values
 - b) Adoption of lower standard for refurbishment for sound insulation between rooms
 - c) Change of unit of measurement of impact sound insulation between spaces
4. Do you think these changes relating to sound insulation between rooms and corridors are reasonable?
 - a) Changes to composite R_w values instead of specification of individual elements of wall
 - b) Reduction of standard for ventilation ducts between classrooms and corridors
5. Do you think the change to the reverberation time in teaching spaces designed for students with special hearing or communication needs is reasonable?
6. Do you think these changes relating to reverberation time in sports halls are reasonable?
 - a) Increase in reverberation time for sports halls from 1.5 to 2 seconds
 - b) Testing not recommended for sports halls with deemed to satisfy constructions
7. Do you think the changes relating to Alternative Performance Standards (APS) are reasonable?
 - a) Lower limit for APS set at refurbishment standard
 - b) Commonly applied APS that have proved successful included as permitted exceptions
8. a) Do you agree that STI calculations of the speech intelligibility in open plan spaces should be excluded from Building Regulations requirements but standards should be included in "Acoustic Design of Schools" in support of the School Premises Regulations and the Independent School Standards? **P221**

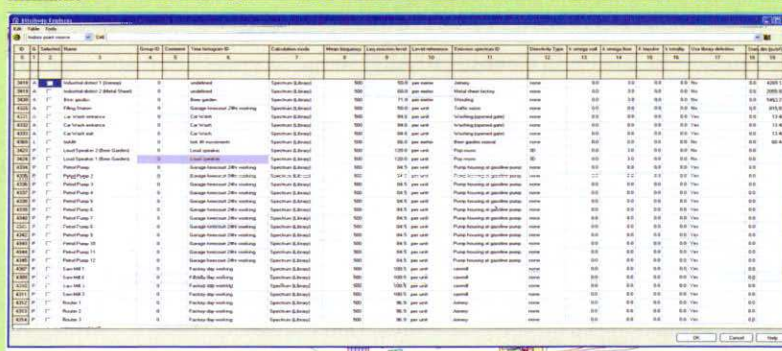
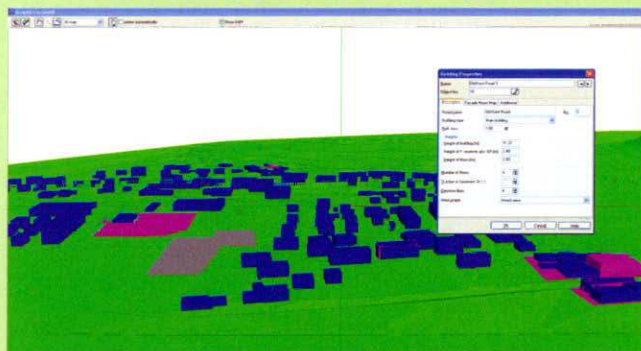




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Gruppen

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Filtern:

System: **Projekt**

- Emissionsquellen (Treffer: 1)
- Raddler, Arbeitskreis
- Planenraupe, Arbeitskreis
- Bockdräher
- Desinfizierler mittlere Arbeit
- Desinfizierler Fahrt
- Desinfizierler Lauftrieb
- Elektrischer mittlere Arbeit
- Elektrischer Fahrt
- Elektrischer Lauftrieb
- Gestapler, mittlere Arbeit
- Gestapler Fahrt
- Gestapler Lauftrieb
- Hallenregler
- Planenraupe ca. 150 kW
- Prallbrecher

Raddler ca. 140 kW

Raddler ca. 140 kW, Fahrlängeweg

Raddler, Poligenstein-entgraben Lmas

Raddler-schraube auf Asphalt Lmas

Raddler, Runderen-entgraben Lmas

Raddler ca. 100 kW

Tiefenbohrgerät

Tiefenbohrgerät, mittlere Arbeit

Waldschneidung für Drosch

Größtkörbiger Kett

Größtkörbiger Kett

Raddler

Presch/Planer

Holzspaltenreiser

Saatschneidemaschine

Gruppen

☐ Aktiv ☒ Deaktivieren

Filtern:

System: **Projekt**

Algemein

Werte Gruppen Kennwerte QUL DNF

Gruppen: 147,8 (dB(A) Meter)

Freiquant [Hz]

Gesamtbericht / Zusammenfassung

0,00 - 0,00

Raddler ca. 140 kW

A-Spektrale Schallleistungspegel, bezogen auf einen durchgehenden Betrieb

Schwingbereich der Referenzfrequenz: 504 - 1102 Hz

Quelleart: Punktquelle

Erreichteart: 1 m

Referenzspektrum: 1/3 Okt

Besonders wird darauf hingewiesen, dass die Emissionsangaben keine Anpassungen für besondere Gerätscharakteristika gemäß DIN EN 504-5 sind (insbesondere) und Tonhöhen aufweisen.



Reference Library now included.

- ◀ P20 b) Do you agree with the inclusion of a second criterion in Table 7 relating to the STI between groups of pupils?
9. Have you have any comments on the proposed revision of the performance standards for schools?
10. Is the guidance as short and concise as possible whilst being fit for purpose?

By the time this article is published the IOA will have held a consultation event, on 15 April in London. It will include presentations from some of the key authors of the document and the output from the day will be an IOA response to the questions set out above. In addition to the general IOA response, all members are encouraged to send in their own response.

Throughout the consultation document, reference is made to a second document, *Acoustics of Schools – A Design Guide*. This document is being prepared jointly by the IOA and ANC and should be published in 2014. The content is complete in draft and

at the time of writing has had an initial edit. It requires further minor input from authors then a final edit before publication. This second document gives guidance on how to apply the BB93 replacement, following the format of the original BB93 which had a large volume of supporting information in its Section 2 onwards.

As with any new regulations document, there will inevitably be split opinions, between those who think it does not go far enough and others who think it goes too far. Whilst in an ideal world the acoustic conditions within schools would be perfect, acoustics is just one design consideration and at a time where all regulation is being scrutinised and costs savings are being demanded, it forms a good basic standard. It is the writer's opinion that the document will form a welcome replacement to BB93, being a more practical and contemporary tool for designing school buildings, at least until education design moves on once more and the revision process begins all over again. ■

Railway noise – on the right track

By Steve Cawser

Railway noise was the subject of a meeting organised by the Measurement and Instrumentation Group in Birmingham in March. With the debate on HS2 hitting the media almost daily, it seemed appropriate to organise an event to discuss the current state of understanding the topic.

The day began with a paper discussing the assessments carried out for the environmental statement that has formed part of the HS2 Hybrid Bill. Tom Marshall of HS2 Ltd gave a brief introduction to the project before Colin Cobbing of ARM Acoustics presented an overview of the assessment methods used in the HS2 Environmental Statement (ES) on behalf of himself and Richard Greer of Arup Acoustics. Colin discussed the process used in determining the significance criteria, including Standards, government policy and guidance documents as well as research on sleep disturbance. He also covered consideration of quiet areas in the impact criteria, the definition of the effect criteria and the process of consultation and engagement which HS2 carried out throughout the assessment process. He concluded with an overview of the mitigation which has been included in the design of the proposed railway.

The next paper on the noise considerations went into the appraisal of sustainability for HS2 Phase 2 route option selection process and was presented by John Fisk of Temple Group. The presentation covered the process that went into the option selection of the 170 route options considered between the West Midlands and Manchester and the 190 route options considered between the West Midlands and Leeds. The project used noise modelling and Geographical Information Systems (GIS) to provide outputs that allowed consideration of the potential need for mitigation and comparison between different route options. The final output provided a series of maps showing the expected impact of the selected final route.

The morning session ended with a joint presentation on the work the Crossrail project has carried out for construction noise and vibration caused by the tunnelling works. Andrew Bird of Crossrail provided an overview of the project and the methods of construction used for tunnelling. Steve Summers of Anderson Acoustics who was representing one of the tunnelling contractors then ran through the methods used for the measurement and prediction of noise and vibration from the tunnel boring machines and also discussed the temporary construction railway. The presentation covered the methods used to control groundborne noise from the operation of the temporary railway and the validation process used for the modelling techniques. Steve handed over to Dave Clark of SRL who was representing the other group of Crossrail's tunnelling contractors. Dave ran through the methods that SRL had used to predict the

groundborne noise and vibration from the temporary railway so delegates had the chance to see the contrast between how two consultants carried out the same process. Dave also covered some of the processes that they went through when complaints had been received regarding the operation of the temporary railway and how these had been resolved.

Ben Cox of Arup Acoustics started the afternoon session by presenting a paper on the modelling processes used in the preparation of the airborne noise predictions for the HS2 Environmental Statement. He covered a process called parametric modelling which enabled him to provide results in quicker time than on previous projects. The project required the noise modelling to include flexibility for variables, such as service patterns and speed profiles and the parametric modelling allowed these to be separated from the propagation calculations, which is the part of noise modelling that requires the most computation time. The paper also covered how GIS was used to provide a post processed output of the models in any format that was required.

Chris Skinner of URS then discussed considerations required when carrying out baseline surveys for large infrastructure projects. He covered all aspects of monitoring, from selection of the most appropriate equipment, site selection and what to do when the required site is not available. He also discussed other factors, such as health and safety, equipment security and the quality assurance procedures used to ensure that different survey teams reported all the necessary information for every site in the correct format so that all data were consistent and comparable.

The final session was started by Jo Webb of Arup Acoustics who provided the details of the sound demonstrations prepared for HS2. The demos started life as a demonstration tool for the Secretary of State, who was so impressed that he asked for them to be available for all the public consultation events carried out by HS2. Jo covered the basis behind the audio and video demonstrations and how recordings of German trains in France had been used to give people in the UK a better understanding of how modern high speed trains were expected to look and sound if running close to their homes. She also showed an example of one of the demonstrations that has been used on the recent route consultations so everyone in the room could experience the final demonstration.

Steve Cawser of URS closed the event with a case study on some recent groundborne noise measurements carried out in properties above the London Underground Jubilee Line. He ran through the process and difficulties with finding suitable sites to carry out such measurements and the considerations that were needed to obtain good quality data when ideal sites are not available. ■

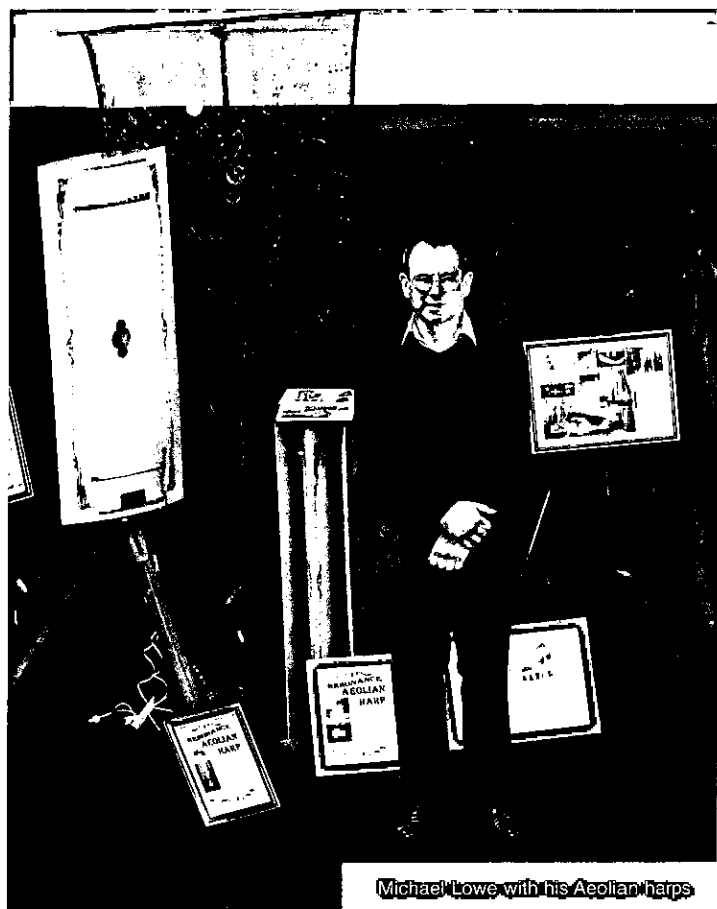
Brighton plays host to creative soundscapes

By Reena Mahtani

Southern Branch, along with the Musical Acoustics Group and Brighton's Science Festival, put together a free half-day meeting in February about (creative) soundscapes as part of its commitment of expanding its activities to all members of the region.

Brighton was deemed to be the perfect spot due to the soundscape research that has taken place in the city in the past few years, led by Brighton and Hove City Council and the Noise Abatement Society among others. The choice of subject was influenced by recent legislative initiatives, such as the Noise Policy Statement for England, the Noise Planning Policy Framework and the draft of British Standard 4142, which have stated the importance of the quality of the sound over the number of decibels and have dropped the use of the term "noise" for the rather more positive "sound".

Creative Soundscapes 2014 had a panel of four speakers covering different aspects of soundscapes design – not just the engineering side of things. Peter Rogers, as chairman of the Sustainable Design Task Force, gave an introduction to the concept and how the task force is working towards sustainable design in acoustics: identify and enhance the positives, reduce and mask the negatives. **P24**



Michael Lowe with his Aeolian Harps

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P23 Jian Kang gave practical examples on how natural sounds like water can improve quality of life and the perceptions of an area, albeit demographics, main use of the space, activities and behaviours must be taken into account as part of the user's interaction with the environment. The practical example was Sheffield's Gold Route, in the city centre, which was regenerated using an array of fountains with different designs – and hence different acoustic qualities. It was seen as a way of reconnecting the city to its past, close to the Don and Sheaf rivers once again.

Trevor Cox then presented his new book, *Sonic Wonderland: a Scientific Odyssey of Sound*, and expanded on some of the sound locations mentioned within it. The main topic of conversation was (of course) the Guinness world record he recently achieved at Invergordon's fuel depot for the longest echo, seasoned with anecdotes from his sound walks in Manchester and the "musical road" in California created for an advertisement which did not work quite as expected.

Finally Dan Pope from Atkins gave a presentation about the future sounds of cities. This highlighted points in which acousti-

cians should work to achieve a balanced soundscape without compromising growth and development. Some views from architects and designers such as Le Corbusier were discussed.

A display of Aeolian harps by artist Michael Lowe was also on show during the event. Weather conditions were not ideal for a demonstration, but he explained to the audience how they are constructed, tuned and played some examples on how they sound. Not apt if you want to be a good neighbour, but definitely a good idea for making dull areas more interesting.

The meeting was attended by around 50 people, acousticians and others interested in the subject. This led to interesting discussions and we hope it helped increase awareness on the importance of qualitative acoustic design as a means for sustainable development.

Southern Branch would like to thank all the presenters. If you would like to keep up to date with our activities, forthcoming events are posted under latest events on the website. If you are not already a member, you can join by logging into the members' section. ■

Roving STEM ambassador Michael gets into top gear with Lab in a Lorry

IOA member and STEM ambassador Michael Lotinga answered the call to take part in an innovative outreach activity organised by the Institute of Physics.

Called Lab in a Lorry, it takes the form of a touring HGV converted to haul a roving laboratory around the country's schools. Students are given the opportunity to take part in hands-on physics experiments, which currently include forensics, optics and, of course, acoustics

"The acoustics experiment looks at the idea of resonance in everyday objects, such as tuning forks and glasses," said Michael. "The best bit, of course, is attempting to smash a wine glass using just the power of sound! The pupils cram around the special chamber hoping for any sign of a crack."

The lab rolled into Bolton School for the day and caused a bit of a stir for the students. "It's a great idea and gets the students and teachers excited about doing science. It shows that STEM subjects are not all about reading books."

STEM ambassadors are volunteers aiming to encourage and inspire young people in science, technology, engineering and mathematics. For more information on taking part in acoustics outreach work, please contact the IOA at education@ioa.org.uk; or to enquire about becoming an ambassador with STEMnet visit <http://www.stemnet.org.uk/>

To check when the Lab in a Lorry is coming to your town or to register interest in volunteering please visit <http://www.labi-nalorry.org.uk/> ■



Michael Lotinga discussing resonance with Year 9 students



Lab in a Lorry coordinator James Bamford (far left) with Bolton School pupils and teachers

Lost and Sound: the rediscovery of music after deafness

WSP, in association with the IOA Young Members and Speech and Hearing Groups, hosted a complimentary screening of the award-winning film *Lost and Sound*.

The film – the director/producer is partially deaf – is a fascinating documentary that follows music critic Nick Coleman, dancer Emily Thornton and pianist Holly Loach over two years, as they journey deep into sound and silence to rediscover music after deafness.

More than 40 people watched the film and enjoyed a drinks reception afterwards, which provided a great opportunity for networking and discussion in an informal atmosphere.

Among the attendees was IOA President Bridget Shield who said: "As well as being informative, the film is very moving in parts and is beautifully made. I hope it will be shown more widely in future at Institute meetings to give an opportunity for all our members to see it.

"Congratulations and thanks to the Speech and Hearing Group and the Young Members' Group for putting on such an interesting event, and to WSP for providing the venue and the refreshments before and after the screening." ■



Nick Coleman in a scene from the film

Otoacoustic emission testing in relation to hearing conservation

Senior Members' Group meeting and AGM

By Ralph Weston

Alison Codling of the Centre for Workplace Health at the Health and Safety Laboratory, Buxton, attended a meeting of the Senior Members' Group at which she described her work with otoacoustic emission (OAE) testing in relation to hearing conservation.

This was of special interest to many members and others who have used conventional pure-tone audiometry, which requires a conscious response from the subject and a very quiet (not always available) environment for the test, as an indication of noise-induced hearing loss.

OAEs are given off by the inner ear when stimulated by a sound; when sound stimulates the cochlea, the outer hair cells vibrate. The vibration produces a nearly inaudible sound that echoes back into the middle ear. The sound can be measured with a small probe inserted into the ear canal, and is an indication of a normally functioning cochlea; it is used in a new-born hearing

screening programme. People with hearing loss greater than 25–30 decibels (dB) do not produce OAEs. This test is combined with tympanometry which can detect blockage in the outer ear canal, as well as problems in the middle ear.

The use of this technique in hearing conservation is intended to complement, not replace, conventional audiometry; the main difference is that standard audiometry is dependent on the subject responding to a pure tone signal applied to the ear, whereas OAE is objective and does not depend on the cooperation of the patient. Use of an in-ear probe also avoids variation due to headphone placement. However, a standard for this technique has not yet been completed and there are a number of issues (mentioned by Martin Armstrong during the meeting) outstanding, such as determining a baseline. While standard audiometry would be carried out every three years and takes about 30 minutes, OAE testing would be carried out **P26▶**

CP25 annually in the workplace and would take only a few minutes. With more frequent repeat testing small trends in hearing loss can more easily be detected.

Alison told us about the research going on in South Africa, where it is used in their mining industry. Her work raised many questions from members, many of whom have experience with audiometry testing in the past; and I think that she went home with several ideas for her programme.

The meeting, at the IOA offices in St Albans, was combined with the group's AGM. It was attended by 14 senior members, who agreed that Ralph Weston and Mike Forrest should continue as Chairman and Secretary respectively.

Chief Executive Alan Chesney explained how the Institute was going to operate in future, which was based as much as possible on the website. A key aim was to raise its profile among the government, MPs, industry and the general public, which necessitated having information on the website and making it easily accessible. It was planned to have information for children and schools for both education and for persuading young people to

join the profession. As one member pointed out, developing your career in acoustics does not mean that you have to stay in it until retirement; many managers have a background in acoustics.

President Bridget Shield outlined details of the 40th Anniversary Conference at the NEC, Birmingham on 15-16 October, which will see all specialist groups organising parallel sessions and a "combined session". Guest speakers will include Leo Beranek and Herman Steeneken. The conference will be preceded by Reproduced Sound, with the sessions overlapping with the anniversary conference on the second day. As currently arranged, it is not suitable for the senior members to put on a formal meeting, but the opportunity to meet in a bar informally at Hilton Hotel prior to the formal reception and conference dinner is being explored.

Geoff Kerry gave a brief update on the state of the history project. This is progressing very slowly and he is looking to older members to provide him with as much information about the early days of the Institute and to help research the old documents which have now been digitised. ■

Midlands Branch reports

By Kevin Howell

Noise Action Plans and other developments: an update from Defra

Stephen Turner, Head of Noise & Nuisance Technical & Evidence Team at Defra, provided an update at Derby University of current issues and progress made since his last presentation to the branch more than three years ago.

He began by outlining Defra's Noise and Nuisance Policy, the main drivers for their work and their links to many other government departments and external bodies. He described the current review of the noise action plans following Round 2 of END noise mapping, carried out in 2012. He went on to discuss the draft National Planning Practice Guidance on Noise, its purpose and how it needs to meet the aims of the National Planning Policy Framework and the relevant recommendations from the Taylor Review. He then discussed some of the data resulting from Round 2 of noise mapping, including interesting comparisons with data from Round 1. Stephen described the web-based Noise Action Plan Support Tool and demonstrated live how the appropriate authorities can access it and input information. Stephen finished by restating the Government Noise Policy Vision and asking the question "how should we define meeting this vision", possibly the next big question to be answered.

HS2 sound, noise and vibration

This meeting was held at the Roundhouse, Derby, which was the first railway roundhouse, dating from 1839. A fitting venue then for Tom Marshall of HS2 Ltd to present *HS2 sound, noise and vibration: using Government policy and guidance to develop best practice*.

He began by highlighting the many relevant policy and guidance documents, ranging from the Noise Policy Statement for England to the requirements for EIA. He then picked out some key facts and figures about HS2, including that the total network will be around 530 km with up to 18 trains/hour in each direction, with trains up to 400m long and seating up to 1,100 people.

Phase one of the project (230km, London-Birmingham) has seen more than 100 acoustic consultants working on the design, assessment and communication of operational and construction noise and vibration. More than 57,000 properties were identified in the study area, leading to 4,200 assessment locations with 67,000 hours of baseline sound monitoring carried out at 1,100 baseline monitoring locations. Tom explained the approach

regarding mitigation of noise and vibration effects, ranging from the design of the track alignment, the control of noise at source and the use of barriers and insulation. More than half of this phase will be in cutting or tunnel.

Finally Tom described the reports that have been issued, containing a huge amount of information and data, and the consultation process, including the community forums established along the route. Details can be found on the HS2 website.

Fifty years of change in noise and the future sound of cities

Adam Lawrence of Atkins began the meeting at Atkins Birmingham with a talk on *50 years of changes in noise*, in which he used the 1963 Wilson Report as a starting point to consider what changes there have been to the understanding of noise sources and effects and the subsequent changes in noise policy that have evolved between 1963 and the present day. He highlighted some of the major steps along the way as noise became an increasingly important issue for the general population.

His colleague Dan Pope then spoke on *The future sound of cities*, moving the story on to consider the impact of noise in the future, particularly in the light of increasing concern for effects on health. He noted that more than half of the world's population already live in cities and this is projected to reach 75% by 2050. He considered future development scenarios and discussed how health impacts could be reduced and quality of life improved in evolving cities in the developed world, and how to get good design right from the start for new cities.

The final part of the evening was given over to a review and discussion of the new public consultation draft of BS4142. The discussion was led by Richard Collman, a member of the drafting committee. Richard highlighted some of the main changes in the new draft and a very lively discussion ensued on most of the topics raised.

Sound asleep: acoustic contributions to insomnia disorders

Kevin Morgan, Professor of Psychology and Director of the Clinical Sleep Research Unit at Loughborough University, gave a fascinating talk on the role of noise in sleep disorders.

Sleep is essential for maintaining health, efficiency and wellbeing. However, increasing urbanisation suggests that sleep ■

is now vulnerable to noise disturbance. But is modern living associated with an epidemic of noise-related insomnia? Kevin explained that we are designed to be awoken by noise. It is an in-built defence mechanism and important for other functions, for example hearing a crying baby. He described how we cycle between different depths of sleep from the lightest to the deepest, typically going through three or four cycles per night, and the concept of auditory awakening threshold at different depths of sleep. Most people after awakening fall easily back to sleep once the disturbance has abated. However, repeated disturbances can result in sleep deprivation. Insomnia is very different from sleep

deprivation and Kevin explained the models that describe each. Insomnia is something to which certain people are pre-disposed, characterised by an ongoing constitutional (trait) anxiety and lack of attention control. This means that any disturbance results in extended awakening. Kevin cited two studies from Finland and the Netherlands which examined reported sleep disturbance and noise levels. This brief report cannot possibly do justice to Kevin's excellent and interesting presentation which even included an amusing clip from *Father Ted*.

Many thanks go to all presenters and to our hosts. ■

Cochlear implants: the world's second most successful implant – how much better can they get?

London Branch report

By Bob Peters

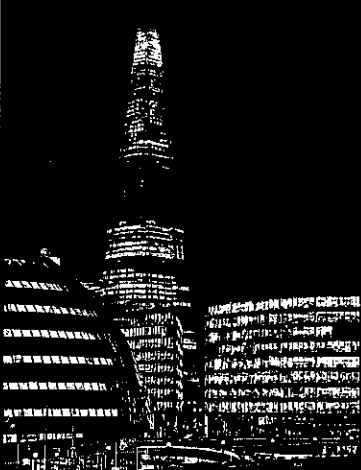
Dr Brad Backus (Audio3 / Oticon Medical) started his presentation by explaining that around 30,000 cochlear implants are fitted per annum worldwide with around 500-1,000 in the UK, making the cochlear implant (CI) second only to the pacemaker in the number of human body implants in use.

He then showed us a physical sample of the outer electronic device for a cochlear implant, but not the inner ear device.

He reminded us briefly of the structure of the human inner ear hearing mechanism in which about 20,000 hair cells are distributed along the cochlea arranged in a linear array with those most sensitive to the base frequencies at one end and treble sensitive cells at the other end. Although the cochlea is a coiled snail shape, this essentially linear arrangement of different frequency sensitive hair cells is the key to the cochlear implant, in which between 16 to 20 electrodes are **P28▶**

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►P27 arranged at regular intervals along the length of the cochlear, each electrode connected to a group or bundle of hair cells. Each bundle of hair cells is then stimulated by digitally controlled pulse signals emitted by the cochlear implant device along a very thin wire.

At present the limitation on the number of electrodes is both by the physical size of the smallest connecting wires needed to connect into the cochlea, and by capacitive interactions between them. Developments in printing electrodes directly on to nano-PCBs may lead to improvement in the future.

For a relatively small number of subjects it is not possible to insert electrodes into the cochlear and an alternative brain stem implant technology is available. Although this is not as effective, research is continuing to develop improvements.

Brad then explained the relationships between the magnitude of the stimulation pulse applied to the hair cells, the firing rate they induced in the cochlear and the resulting audible response in the brain. He went on to explain the limitations of the sound heard by cochlear implant users in terms of frequency selectivity and loudness response.

He demonstrated these limitations and the effect of the number of channels (i.e. number of electrodes) with audio

simulations of both speech and music signals for increasing numbers of channels: 1,2,4,8,16 and finally 32 channels, so that we could hear the increasing intelligibility of speech as the number of channels increased and that the speech signal were very much easier to identify than the music.

Brad next explained the advantages of binaural implants i.e. one for each ear, and illustrated a simple mathematical model, based on psychoacoustic principles, for predicting the improvement in speech intelligibility, first for the current technology in which the signals to the two channels are uncorrelated, and then finally, he gave us a glimpse into the future when advanced signal processing might enable phase correlated binaural implants to become available.

The enthusiasm of both speaker and audience for this subject was apparent from the number of questions asked, both during the presentation and afterwards. These ranged from questions about the signal processing involved in CI to developments in materials compatible with insertion into the human body, and future improvements in battery life, and the way in which CI users are able to respond to music.

The presentation was attended by some 30 people. The branch would like to thank Brad for his talk and WSP for providing the venue. ■

Hundred more membership applications approved by Council

One hundred and one applications for membership were approved by Council in March following the recommendations of the Membership Committee.

Fellow

Wolfgang Ahnert
John Darren Smith

Member

Rachel Bennett
John Flynn
Tomas Gabor
Paul Gunter
Chris Hu
Rob Kirkaldy
Anton Krynkina
Philip Lu
Reena Mahtani
James Mangan
Jonathan Mart
Jordan Mayes
Paul McDonald
Ben Munday
Christos Nestoras
Austin Lee Nichols
Edward Oxborough
James Patterson
Michael Pimlott
Ben Piper
Francesca Remigi
Brendon Shanks
Anne Thompson
Michael Thorne

Associate Member

Jose Carlos Alonso Garcia
Kirsten Archibald
Adam Bamford
Allan Barbour
Francesca Bell
Nicholas Bush
John Byrne
Carme Cortada Catala
Moise Coulon
Matthew Crimp
Michael Cunningham
Gareth Davies
Graham Davis
Jordi De Haro Prat
Nicholas Dennon
Jose Maria Gonzalez Diaz
Rebecca Grady
Muhammad Shahid Gul
Christopher Harlow
Gareth Hughes
Christopher Humphreys
Catherine Ingram
Alex Jefferis
George Kourtis
Gordon Lauder
Alexander Lees
Michael Lilley
Janec Lillis-James

Martin Loft
Jordan Moran
Andrew Moseley
Teck Sing Ng
Adam Page
Krishnan Patel
Sam Peckham
Jerry Rees
Mark Robertson
Eugenie Sainte Cluque
Thomas Sanderson
Nobert Skopinski
Anna Starbuck
Daniel Taylor
Robin Taylor
Paul Thomson
Mark Tideswell
Mark Underhill
Anna von Borzyszkowska
David Whitmarsh
Alun Williams
John-Paul Williams
Gemma Wilson

Technician

Lyn Farmer
Nora Hoeltzenbein
Daniel Newbery

Jay Reilly
Jake Willcocks

Affiliate

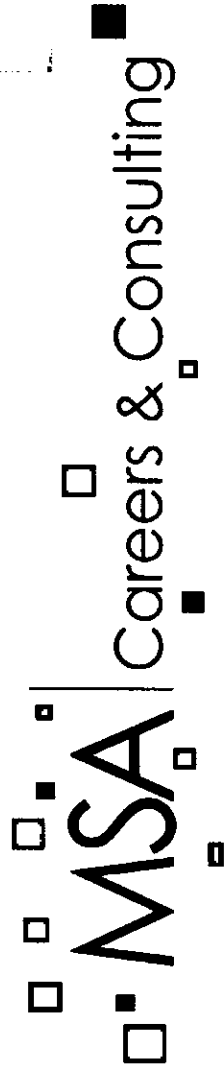
Angela Goodhand
Raymond McGurk

Student

Harry Bartley
Sarah Dennison
Francis Goodall
Karem Hanafy
Ben Holcombe
Charles House
François Lallemand
Thomas Lock
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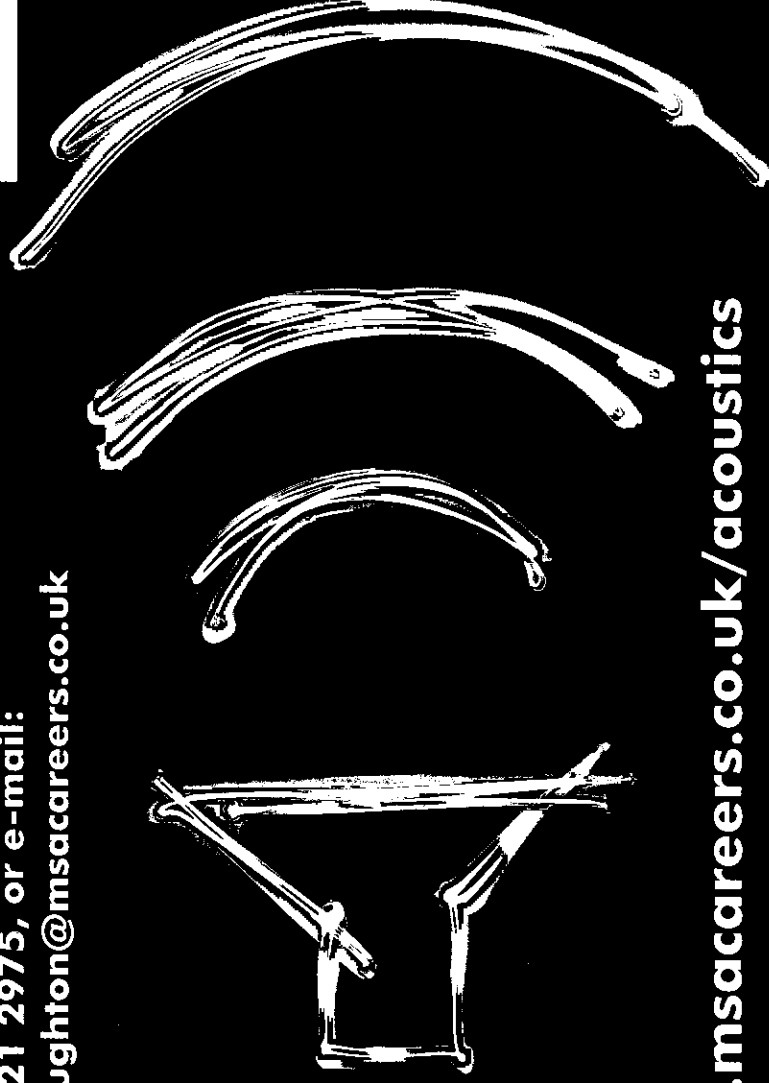
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The revised IEC Standard for frequency analysis in sound and vibration measuring instruments

By Richard Tyler AVI

On 14 February the revised standard for octave and fractional band filters, IEC 61260-1 Ed. 1 was published. Publication of this Part 1 alone was not the original intention of IEC TC29/MT19, the committee responsible for its update, and this article aims to explain the current situation as well as trying to avoid some confusion with the previous version.

The original IEC 61260:1995 Ed. 1 has been under review for many years, with a view to producing a three-part document: Part 1 with revised specifications and the latest approach to uncertainty of measurement; Part 2 with tests for pattern evaluation; and Part 3 with tests for periodic testing, following the approach used by the latest sound level meter standard IEC 61672. The initial aim was to publish all three parts at the same time so that design and verification of any new filters could take place in the full knowledge of all the requirements from the outset. It was also expected that the revised version would be IEC 61260 Ed. 2.

Progress of the revised Standard

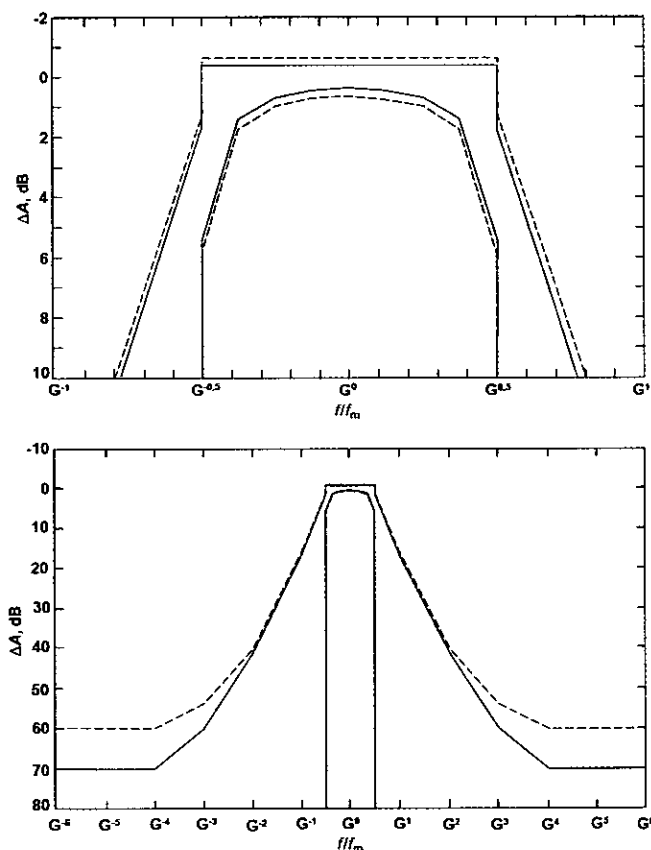
The Committee produced the full text for Part 1, and then started to draw up text for Parts 2 and 3. In order to gain worldwide views and judge the acceptability of Part 1, it was circulated to National Committees for comments, as is the case with all IEC Standards, and proceeded with some comments received through the various stages to a CDV (Committee Draft for Vote) stage. Although a number of significant comments were received, including a No vote from the UK for reasons to be explained later in this article, IEC Central Office at first agreed to a second CDV stage, during which the Drafts of Part 2 and 3 would also be available to National Committees for comment, but several months later reversed its earlier decision (deciding it was now outside IEC "rules") and instead the document was circulated as a Final Draft International Standard (FDIS) with no Part 2 or 3 available at the same time.

Although there were some adverse comments and with the UK still voting against the document, sufficient positive votes were received for it to proceed to publication with no further alterations. However, prior to publication, this document was altered to become IEC 61260-1:2014 Ed.1 as IEC Central Office decided that, now the Standard was in three parts, its Edition number was reset to 1 because the previous edition did not have 3 parts, which to this author's mind is extremely confusing for the Standard user. At present, both editions are available from the IEC store for purchase, so anyone interested in purchasing a copy of the new Standard should ensure that it is the 2014 version they are purchasing if they require the new edition. Parts 2 and 3 have now been circulated once for comment to National Committees, with significant numbers of comments received. These parts will follow the IEC path for revision, and it is hoped that fast progress can be made, such that publication in about a year's time may be possible.

Requirements in the revised Standard

The new Standard is based on the assumption that stand-alone filter sets are unlikely to exist, and that the filters will be part of an instrument measuring sound or vibration. The basic filter shape requirements have not changed from the previous edition, but Class 0 filters have been removed from the Standard and no longer exist. The requirements for an octave band filter are as shown in the following figure.

Acceptance limits on minimum and maximum relative attenuation as a function of f/f_m for class 1 and class 2 octave-band filters



x-axis: Normalized frequency f/f_m – logarithmic scale.
 y-axis: Relative attenuation ΔA in decibels.
 Solid lines apply to Class 1 filters, dotted lines to Class 2 filters.

The other changes to the main specifications are not too significant: only filters with centre frequencies to Base 10 are permitted, all filters in a filter set must meet the same Class, and if the filters are to be used for measuring reverberation time, the filter decay time in each band must be specified. However, one additional feature is now specified that is very significant in the design of instruments that read more than one filter band simultaneously. Filters are now required to be time-invariant, so that all data processed by a filter is analysed sufficiently frequently that no relevant data is omitted. An elegant test to prove this was devised, which is quick and easy to carry out, but presents severe problems in the verification of the signal being applied. This signal is a sine wave that is swept at an exponential rate from well below the centre frequency of the lowest filter centre frequency in the filter set, to well above the centre frequency of the highest filter centre frequency. The rate can be quite rapid, so a sweep lasting only 30 seconds can be sufficient to test every filter in a filter set 20 Hz – 20 kHz for the time-invariant parameter. **P32**

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IP30 Commercial generators that produce frequency sweeps are available, but these do not always produce an exponential rate of change, which is essential for the correct operation of this test. *Proving that a sweep generator maintains a constant amplitude output during the sweep, that the sweep is truly exponential and that the frequencies supplied are accurate is proving quite a challenge, and with no solution currently proven that would satisfy an external assessment, such as that required for independent accreditation (UKAS in the UK).* In Part 1 of the revised Standard, a maximum permitted expanded uncertainty of measurement of just 0.20 dB is currently the limit for any laboratory attempting this test. (If they have larger uncertainties, they are not allowed to verify the filter set). Tests are planned to try to quantify an approach to testing and derive a meaningful associated uncertainty budget for a sweep generator, but with nothing proven at the time of voting, the UK considered it appropriate to vote No to the FDIS for Part 1 until this figure was shown to be achievable, as mentioned above. Now the Standard is published, what will happen if the subsequent testing shows this figure to be unrealistic will be interesting, as it is mandatory for all Pattern Evaluation laboratories to undertake this test, and they can only issue Pattern Approval if they can show their uncertainties for all tests are less than or equal to the maximum permitted figures given in Part 1 of the Standard. Testing sweep generators in an appropriate fashion to establish the uncertainties is now planned by a few committee members for late March 2014 onwards, so it is hoped that early indications of an approach that appears to

conform to the required uncertainty budget can be proven.

It is recognised that proving the performance of a sweep generator may be beyond some periodic verification laboratories to achieve, (due to lack of sophisticated test equipment for example), so the IEC Committee members are now considering making this test optional for Periodic testing. However, this may only be possible for filter sets that have been successfully pattern evaluated, as this will verify the design of the filters and the design will not change during the lifetime of the filter. It is a pity that such a quick and elegant test is so difficult to verify with a known uncertainty, but until this issue is resolved, it is quite difficult to see the way forward for completing the text of Parts 2 and 3 of the Standard.

Conclusion

The aim of the revision of IEC 61260 was to produce requirements and tests that would define filter performance for many years to come. At present, there are no tests specified, and until Parts 2 and 3 are published, it will be a while before these are defined. Until then, work will continue to try and provide a reliable, achievable set of tests that prove a filter is fit for purpose without taking many hours to perform, so ensuring the tests can be performed at a realistic cost.

Richard Tyler FIOA is Chairman of the IOA Measurement and Instrumentation Group and UK Member of IEC TC29/MT19 ■

New vibration-damping material 'could change mechanics forever'

Researchers in Switzerland have produced a prototype of a vibration-damping material which they believe "could change the world of mechanics forever".

The material of the future is not only able to damp vibrations completely, it can also specifically conduct certain frequencies further.

Although the "programmable material" still only works in a one-dimensional model construction, it has already demonstrated its unusual capabilities: The research project entitled Phononic Crystal with Adaptive Connectivity has been published in *Advanced Materials*. The first step towards mechanical components with freely programmable properties has thus been achieved.

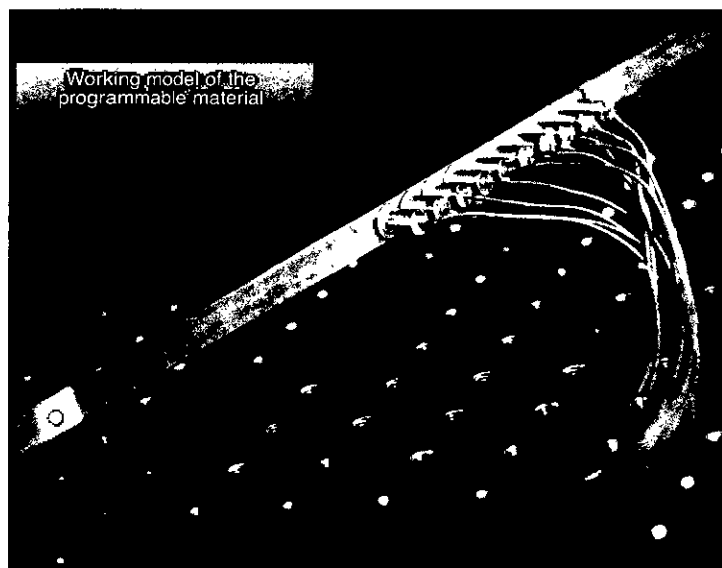
The working model used by the researchers from Empa and ETH Zurich consists of a one-metre by one-centimetre aluminium plate that is one millimetre thick. This sheet-metal strip can vibrate at different frequencies. In order to control the wave propagation, 10 small aluminium cylinders (7 mm thick, 1 cm high) are attached to the metal. Between the sheet and the cylinders sit piezo discs, which can be stimulated electronically and change their thickness in a flash. This ultimately enables the team to control exactly whether and how waves are allowed to propagate in the sheet-metal strip. The aluminium strip thus turns into a so-called adaptive phononic crystal – a material with adaptable properties.

The piezo controls can now be set in such a way that waves are able to propagate through the sheet-metal strip "perfectly normally," i.e. as though no aluminium cylinders were attached to it. Another configuration enables a certain frequency spectrum of the waves to be absorbed. And this muffling is variable as the piezo elements can alter their elastic properties electronically in fractions of a second – from low to high stiffness.

Project supervisor Andrea Bergamini explained what could develop from the research results: "Imagine you produce a sheet of metal, imprinted with an electronic circuit and small piezo elements at regular intervals. This sheet metal could be

programmed electronically to block a certain vibration frequency. The interesting thing is that even if you cut off part of the sheet, the waves in the cropped section would largely spread in the same way as in the initial piece." This method could be used on three-dimensional components.

Such a "metamaterial" could fundamentally revolutionize mechanical engineering and plant construction. Until now, the vibration properties were already determined in the selection of material and the geometry of the part. In future, the material could react to current vibration readings and adapt its vibration properties at lightning speed. ■





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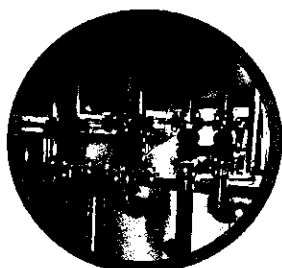
House of Music - Denmark

A recent project that used Mason products

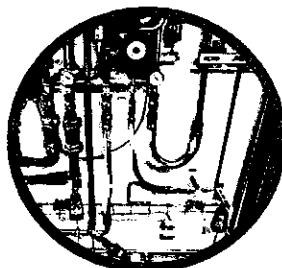


The Musikkenhus, designed as the largest classic music venue in Northern Europe and the home of the Aalborg Philharmonic Orchestra demanded the highest standards of acoustic performance. Mason UK provided design services and isolation components liaising closely with the acoustician, architect, structural engineer and site contractors.

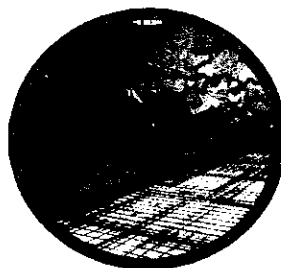
Mason products used on this project:



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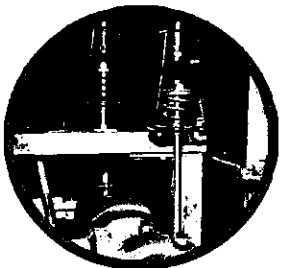
Stainless Flex



Acoustic Floating Floors



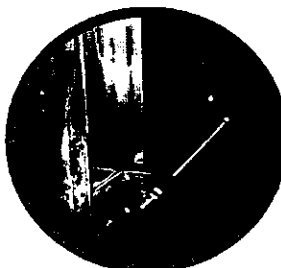
Floating Floor Jack



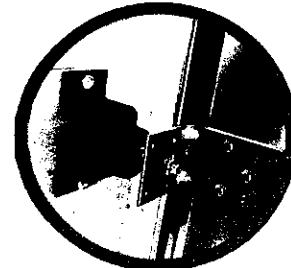
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World's first 3D acoustics cloak makes its debut

Engineers at Duke University in the US have demonstrated the world's first 3D acoustic cloak.

The device reroutes sound waves to create the impression that both the cloak and anything beneath it are not there.

It works in all three dimensions, no matter which direction the sound is coming from or where the observer is located, and holds potential for future applications such as sonar avoidance and architectural acoustics.

Steven Cummer, Professor of electrical and computer engineering, said: "The particular trick we're performing is hiding an object from sound waves. By placing this cloak around an object, the sound waves behave like there is nothing more than a flat surface in their path."

To achieve it, Cummer and his colleagues turned to the developing field of metamaterials – the combination of natural materials in repeating patterns to achieve unnatural properties.

In the case of the new acoustic cloak, the materials manipulating the behaviour of sound waves are simply plastic and air. Once constructed, the device looks like several plastic plates with a repeating pattern of holes poked through them stacked on top of one another to form a sort of pyramid.

To give the illusion that it isn't there, the cloak must alter the

waves' trajectory to match what they would look like had they had reflected off a flat surface. Because the sound is not reaching the surface beneath, it is travelling a shorter distance and its speed must be slowed to compensate.

"The structure that we built might look really simple," said Cummer. "But I promise you that it's a lot more difficult and interesting than it looks. We put a lot of energy into calculating how sound waves would interact with it. We didn't come up with this overnight."

To test the cloaking device, researchers covered a small sphere with the cloak and "pinged" it with short bursts of sound from various angles. Using a microphone, they mapped how the waves responded and produced videos of them traveling through the air.

Cummer and his team then compared the videos with those created with both an unobstructed flat surface and an uncloaked sphere blocking the way. The results clearly show that the cloaking device makes it appear as though the sound waves reflected off an empty surface.

He believes that the technique has several potential commercial applications, such as sonar avoidance and in the design of concert halls or "any space where you need to control the acoustics". ■



Bogdan Popa, a research student at Duke University, shows off the 3D acoustics cloak he helped design.

Electric cars must make noise under new EU rules

Electric and hybrid cars will have to generate noise to make them safer for pedestrians, especially the visually impaired, the European Parliament says.

MEPs have voted to introduce mandatory “acoustic vehicle alerting systems” (AVAS) – sounding like a conventional engine – to all new electric and hybrid cars to protect vulnerable road users.

The new law is expected to be rubber-stamped by the European Council.

The move follows lobbying from British MEPs and campaign groups including Guide Dogs for the Blind.

Electric cars and plug-in hybrid cars such as the all-electric BMWi3 or the Toyota Prius currently emit very little sound when

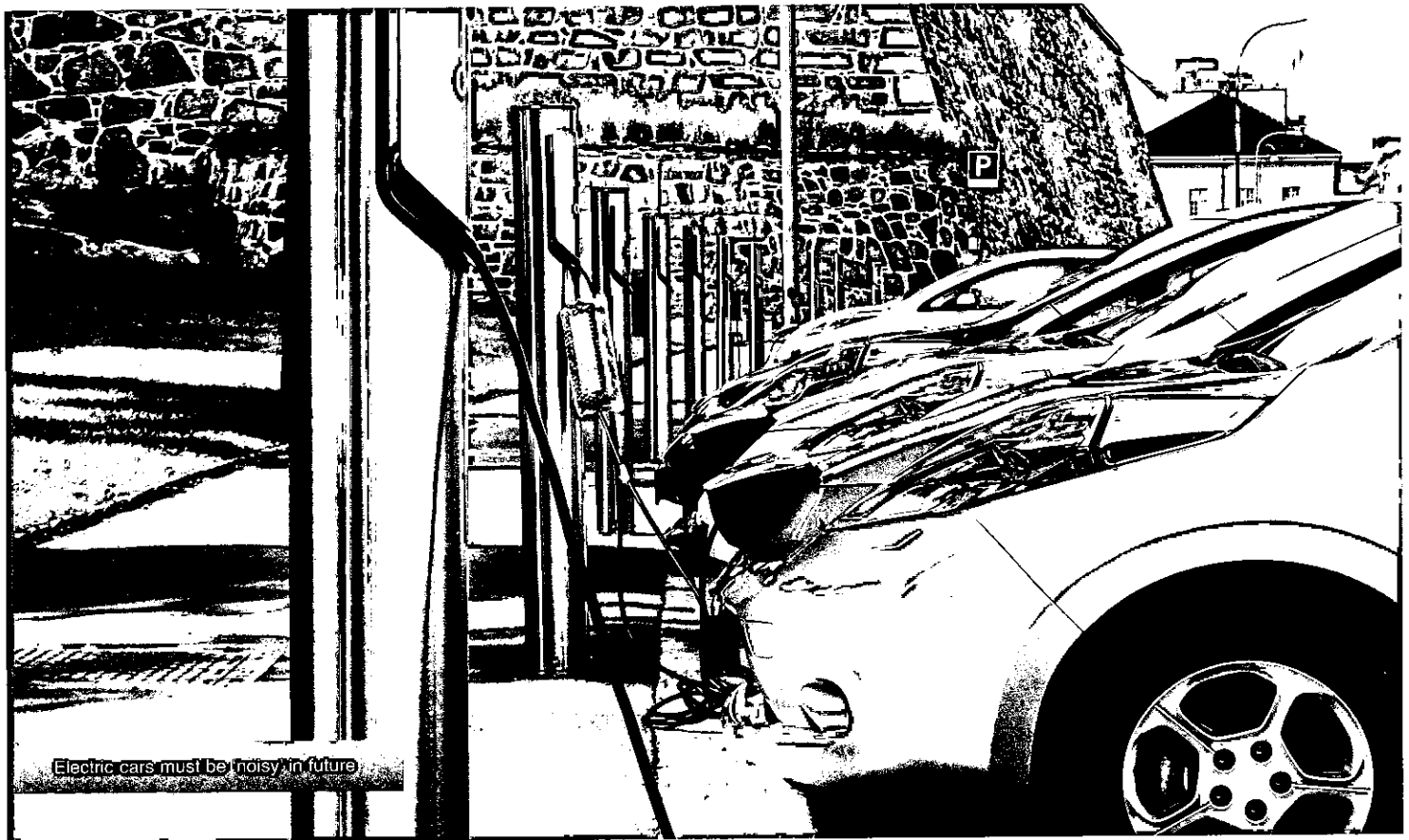
running on electric power only.

Campaigners say this is particularly dangerous for partially-sighted and blind pedestrians.

Earlier proposals from the European Commission called for the installation of an artificial sound system to be done on a voluntary basis only.

But Liberal Democrat MEPs successfully introduced an amendment making this a mandatory requirement for all electric and hybrid vehicles.

It is part of new EU legislation which will also require conventional cars and lorries with petrol and diesel engines to make 25 per cent less noise. ■





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Amendments to BS5228 – a summary

By David Hiller and Alan Wills

BS 5228:2009 *Code of Practice for Noise and Vibration Control on Construction and Open Sites* has been amended to address a number of comments that had come to light through its use. The panel that drafted the 2009 document was reconvened to respond to these comments, the majority of which were in relation to Part 1 (noise). The decision was taken to address some lesser comments received in relation to Part 2 (vibration) while the process was taking place. In addition to technical amendments, the standard has been brought into line with current normative references, policy and guidance documents, such as National Planning Policy Framework and its associated Technical Guidance.

Part 1 (noise) was issued at the end of February as BS5228-1:2009+A1:2014. Part 2 (vibration) was expected to be issued in April. Text introduced or modified is identified in the amended standards by tags. The following sets out the main changes from the 2009 documents.

Part 1 – Noise

1 Scope

The scope has been clarified from “relating to construction and open sites” to now be “relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites”.

3 Terms and definitions

The definition of ambient noise has been amended to “noise in a given situation at a given time, usually composed of sound from many sources near and far, but excluding site noise” and includes a note that “ambient noise plus site noise gives total noise”.

Site noise is defined as “noise in the neighbourhood of a site that originates from the site”, with a note that “ambient noise plus site noise gives total noise”.

6 Neighbourhood nuisance

Section 6.3 describes a number of factors likely to affect the acceptability of noise arising from construction and open sites (previously this only said construction sites) and the degree of control necessary. Item g from the 2009 document, which described provision of noise insulation and temporary rehousing, has been removed from the list and guidance is now provided in Annex E.4.

Annex E Significance of noise effects

Annex E is the most revised section of the document. It has been clarified where necessary that the approaches provided are to establish *potential significant* effects, not necessarily a *significant* effect arising upon reaching particular criteria; this is reflected in the subheading titles. Section E.1 contains a new introductory paragraph stating that:

This annex gives examples only. It does not comprise an exhaustive set of provisions regarding noise effects.

The examples cited in this annex offer guidance that might be useful in the implementation of discretionary powers for the provision of off-site mitigation of construction noise arising from major highways and railway developments [see Note to item a)]. ... Off-site noise mitigation might not be applicable in all circumstances or to other categories of construction project.

Part of the text from item a) listed under E.1 has been removed and re-cast as a note.

Section E.3.2 describes the ABC method for identifying potential significant effect. This section was one of the main reasons for the standard to be amended, as the method was erroneously based on the *total* noise level (i.e. the site noise and the existing ambient) whereas it should assess the impacts on the site noise level to determine potential significant effects. This is corrected in the 2014 amendment.

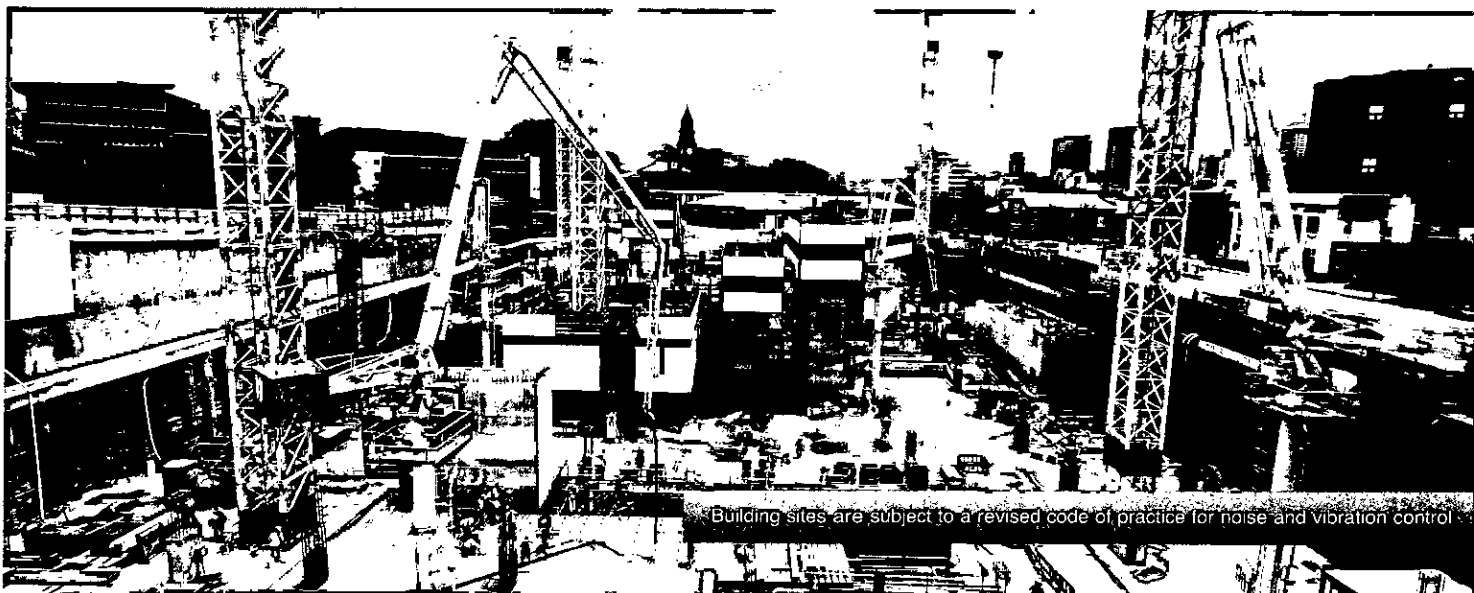
The heading to Section E.4 is now “example of thresholds used to determine the eligibility for noise insulation and temporary rehousing” and the (modified) text from what was previously item g) in Section 6.3 is now included here. Clarifications about eligibility for noise insulation or temporary rehousing are also added to the fifth paragraph of this section.

The temporary rehousing criteria, defined with reference to Table E.2, are also clarified.

Section 3.5 “construction works involving long-term substantial earth moving” has been revised in line with the withdrawal of MPS2 and the replacement by NPPF and associated Technical Guidance.

Annex G Noise monitoring

This has been expanded to include notes relating to standards for sound level meters, in particular acknowledging that some meters, designed to earlier standards, remain in use. **P38**



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CP36 Bibliography

The bibliography has been updated to be consistent with the amendments made to the document.

Part 2 – Vibration

Changes to Part 2 are much less than to Part 1. The references to other standards and guidelines have been updated as necessary. The main changes are outlined below.

9.2 Methods of measurement

A new section 9.2.4 is introduced on calibration of measurement equipment. It recommends that the whole instrumentation chain should be checked immediately before and after measurements, but recognises that this is not always practicable. The use of transducer sensitivities, determined by the manufacturer or an accredited laboratory, are an acceptable alternative.

Annex B.2 Human response to vibration

The second sentence of the clause has been softened slightly, now beginning with “As vibrations increase above these values they can...”, rather than the previous statement “Vibrations above these values can...”

Footnotes have been added to Table B.1, which describes

human response to vibration quantified as peak particle velocity (PPV), to clarify the guidance and put it into the context of BS6472. The footnotes address the following:

- The magnitudes apply to a measurement position that is representative of the point of entry into the recipient.
- A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.
- Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate.

Annex B.3.2 Response limits of buildings

An addition paragraph is inserted before the final paragraph of this sections noting that criteria may be reduced where there exist significant defects of a structural nature, the amount of reduction being judged on the severity of such defects.

Annex E Prediction of vibration levels

Two of the footnotes to the prediction equations have been clarified. ■

Back to the Future – part 2

By Stuart Dryden FIOA of Rupert Taylor

This technical contribution is the second in a series expanded from presentations given at the Royal Society in October 2013 as part of the conference ‘The Wilson Report – 50 years on’

Background

This paper reports on two of the topics covered in a Defra research project commissioned in January 2012 to carry out “An investigation into the effect of historic noise policy interventions” to cover the period from about 1960. The background to and an overview of the study were included in a technical contribution in the March-April 2014 issue of *Acoustics Bulletin*. That contribution also described the process and findings for two of the five topics studied for the project. This paper describes the work undertaken in respect of Building Regulations and Noise Control Legislation; it also includes a brief section on ‘lessons learned’ from the project as a whole. A further paper covering aircraft noise will be the subject of a subsequent technical contribution.

Building Regulations

Evaluation – Building Regulations

Question to be answered: What benefits have the relevant changes to the Building Regulations brought about?

The Building Regulations as a national code were introduced in 1965 and included the regulation of sound (Part G) but only in newly-built or extended properties. Amendments to the sound insulation requirements in the Regulations were made when new Regulations were introduced in 1972, 1985, 1992, and 2003/4. Two key changes occurred in 1992 and 2003/4.

In 1992 the Regulations applied sound insulation requirements to dwellings formed from an existing building including sub-division of a single dwelling to form one or more separate dwellings (so-called ‘conversions’). However, there was still no routine testing of the performance of party walls and floors as built.

The 2003/4 Regulations continued to use specified constructions (as had earlier versions) but introduced two new

schemes that were underpinned by on-site acoustic testing of built units and were intended to raise the rate of compliance. One of these schemes – pre-completion testing (PCT) – required mandatory testing of 10% of the units on a site and remediation work for any construction that failed to meet the standard (until it did so). Two bodies operate registration schemes for accrediting testers: the United Kingdom Accreditation Service (UKAS) and the Association of Noise Consultants (ANC) which devised a scheme specifically for this legislation.

The second scheme (Robust Standard Details – RD) was based on specified constructions but its implementation includes some important features which distinguish it from the use of similar approaches in previous versions of the regulations. First, the constructions were described to a much greater level of detail than before and it was known from a large number of field tests that the design on which they were based would typically achieve a higher standard than required. This provided a ‘safety margin’ to take account of some variation in workmanship. Furthermore, the on site performance both of individual examples of a construction type and the continuing level of performance of a construction type across many sites is subject to monitoring by an independent RD inspectorate staffed by specialist acousticians rather than building inspectors. Each plot is assigned a unique reference number and a check list of construction details that must be confirmed by the site agent on completion. In addition, the RD inspectors examine a random sample of each type of construction (including both visual and acoustic tests) to ensure compliance.

The Defra study focused on the effects of the extension of the 1992 Regulations to cover conversions and of the new measures in the 2003 Regulations to increase compliance by the use of on-site testing.

The first stage was to use data from the Department for Communities and Local Government (DCLG) and a study on conversions by the National Society for Clean Air (NSCA) to estimate for each of the periods the number of newly built or newly formed dwelling units in two periods 1992 to 2002 ■

■ (i.e. before the 2003 Regulations were brought in) for which the interest was on the number of conversions created, and from 2003 to 2010 (after the introduction of on-site testing) for which dwellings counts were estimated separately for houses (excluding detached properties) purpose built flats, and conversions. The overall changes in the numbers of conversions and dwellings over this period are shown in Figure 1.

The next stage was to estimate for these periods the compliance rates with the standard then in place in for the relevant kinds of property. Before the 2003 Regulations were introduced the DCLG consulted on the proposals and the consultation package included estimates by BRE of the rates of failure to meet the Buildings Regulations standard. After the introduction of the 2003 Regulations databases using the results from on-site testing undertaken under the ANC and RD schemes enabled the overall rates of compliance with the Building Regulations' standard by post-2003 dwellings to be derived.

The post-2003 compliance rates and BRE's earlier estimates of the pre-2003 compliance rates were then applied to the figures derived for the number of completed units of each kind of dwelling to estimate the number of failures that would have occurred first in the absence of the regulations and secondly with the regulations in place. The figures derived from this analysis are the estimated number of purpose-built flats, attached houses, and conversions completed in the period 2003 – 2010, and of conversions in the period 1992 to 2002, that might have passed or failed the standard with and without the relevant policies in place. The results are shown in following section dealing with phase three of the project.

Analysis – Building Regulations

It was estimated that 138,000 conversions (in 65,000 properties) were formed in the period 1992 – 2003 which were therefore subject to the 1992 extension of the regulations to include conversions. That total was then used to estimate the number that failed to meet the standard over the period

1992 to 2002 with the policy in place in order to determine how many conversions might have directly benefited from the policy.

Before the 2003 Regulations were introduced BRE had estimated that for new-build properties as many as 40% of separating floors and 25% of separating walls might fail to meet the standard then current¹. Because many conversions have timber floors it is considered likely that the failure rate for floors in conversions would have been higher than the rate for purpose-built flats but the 40% factor was also used as an estimate of the failure rate for conversions in the period 1992 – 2003 (when the policy that that extended sound transmission requirements to conversions was first in force). The failure rate for the 'no policy' case was assumed to be 100%.

Applying those percentages to the total number of 138,000 conversions gives values of 82,800 meeting the standard with the policy in place and none doing so in the absence of the policy.

The numbers of units estimated to have benefited from the introduction of mandatory pre completion testing in the period 2003 – 2010 is 551,000 flats, 482,000 attached houses, and 101,000 conversions (the latter in 48,000 properties). To estimate the number of failures in the absence of the policy the BRE estimates of pre-2003 failure rates, referred to above, were used.

By 2009 the overall compliance rates (for all property types) from the ANC's PCT database and the RDL database were over 95% and values from those databases were used to estimate the numbers of properties that would have failed to meet the standards (separate rates were available for non-attached houses, purpose-built flats, and conversions). The standard for airborne noise in the 2003 Regulations included a stricter control of low frequency performance than that in the 1992 Regulations and these compliance rates relate to that new enhanced standard.

The estimated numbers of dwellings in each **P40**

Condition	Purpose-built flats (000s)	Attached houses (000s)	Conversions (000s)
No Policy			
BRE Estimated failure rate (%)	40	25	[assumed to be 40%]
Total completed	551	482	101
Estimated number of failures	220	120	40
With Policy			
Pass rate (%) ¹	96	98	89
Total completed	551	482	101
Estimated number of failures	22	10	11
Net effect of policy			
Failures without policy	198	111	29
Failures with policy			

Table 1 Estimates of properties failing 2003 standard in the period 2003 – 2010 (000s)

P39 category that might have passed or failed the standard with and without the 2003 policy are shown in Table 1. It can be seen that the net effect of the policy over the period 2003–2010, assessed in terms of preventing ‘failures’, was therefore about 198,000 houses (semis and terraces), 111,000 purpose-built flats, and 29,000 conversions (in 14,000 properties).

Note that even though failure rates post-2009 are only small in percentage terms, the absolute number of constructions being completed each year means that there may still be significant numbers of dissatisfied occupiers. The effect of a small change in the failure rate is illustrated by comparing the estimated numbers of failures for attached houses with the figure for conversions in Table 1. Although it was estimated that there were more than four times as many attached houses than conversions completed in the relevant period, because the compliance rate for conversions was 89% compared with instead of 98% for attached houses, the total number of ‘failed units’ is about the same (11,000 conversions and 10,000 attached houses).

Conclusions – Building Regulations

The pre-2003 compliance rates determined by BRE are described as estimates. The compliance rates provided by the ANC and RDL are accurate values for their respective databases and are considered representative of the post 2003 construc-

tion types tested. The numbers of units of each kind for different years have been estimated from DCLG data that have been gathered from a range of sources including returns from local authorities (LAs) and from house-building-related bodies. Some data have been derived from the English Housing Condition Survey (EHCS), an annual DCLG survey of the physical characteristics of a representative sample of homes. Further factors were taken from a 1986 study on conversions undertaken by the then National Society for Clean and Environment (NSCA) involving LA surveys.

Overall the results should therefore only be regarded as indicative of the number of properties of each kind affected by and benefiting from the policy. This does not detract from the underlying conclusion that the rapid improvement in compliance rates has led to the vast majority of dwellings being compliant.

It has also been pointed out that, though small in percentage terms, the absolute number of non-compliant dwellings post 2003 still represents a substantial number of homes. However, it was not the intention that the policy would achieve 100% compliance. The stated objective of the 2003 policy of increasing the compliance rate to more than 95% within 10 years² has in fact been exceeded both in magnitude and timescale.

Noise control legislation

Evaluation – noise control legislation

Question to be answered: Has the implementation of noise control legislation been effective?

Before the passing of the Noise Abatement Act 1960 (NAA)³ the only means of abating a private nuisance from noise was a civil action through the courts⁴. The NAA extended the concept of statutory nuisance that had been developed in the 19th-century, and at that time was within the Public Health Act 1936, to include noise and thereby subject it to the controls in that Act. Subsequently, noise as a nuisance was controlled first by the Control of Pollution Act 1974 (CoPA) and now by the Environmental Protection Act 1990 (EPA)⁵. The principal benefit of these laws is that they provide powers for (and latterly place a duty on) the LA to investigate complaints of noise and, where the LA establishes that a statutory nuisance exists it has a duty to serve an abatement notice under the powers conferred by the legislation⁶. The LA also has power to prosecute breaches of an abatement notice and to apply to the High Court when the remedies available in the magistrates’ court are considered inadequate.

Subsequently provisions have been introduced in relation to particular noise sources and/or to provide specific powers (e.g. the playing of music at night and fixed penalty notices under the Noise Act 1996; audible intruder alarms and the seizure of equipment for playing music under the Clean 



Figure 1. Net Gains to Housing stock each year (000s)
New build = Purpose built Houses and Flats (Left hand Scale)
Conversions = Flats from existing dwellings (Right Hand Scale)
(No data for conversions for 2003 – 2005)

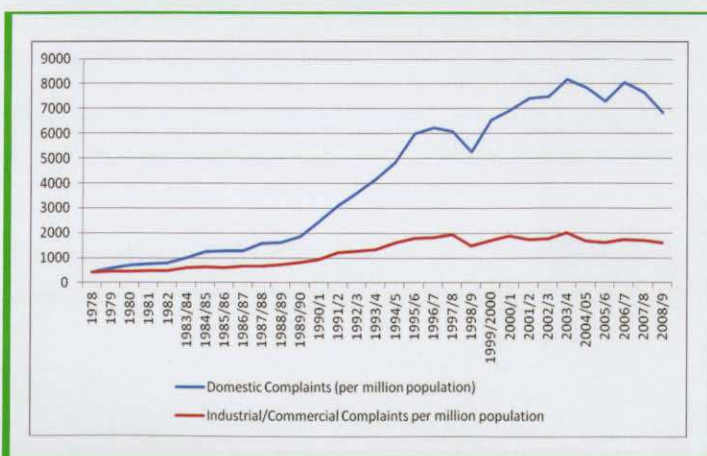


Figure 2. Divergence of domestic and industrial/commercial complaints

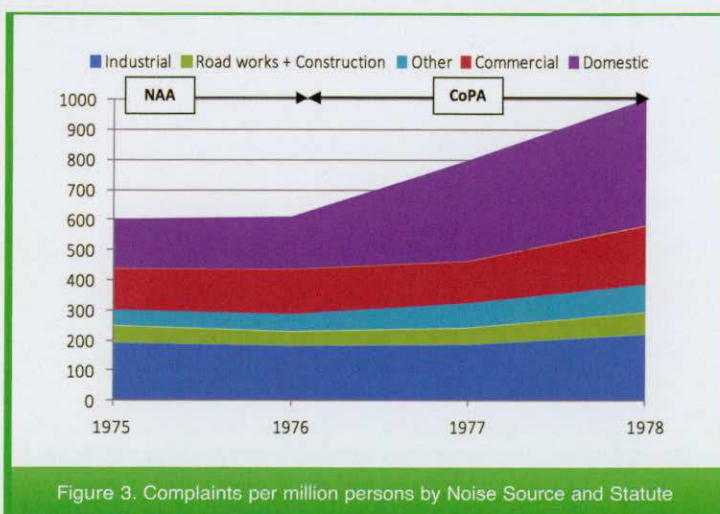


Figure 3. Complaints per million persons by Noise Source and Statute

Neighbourhoods and Environment Act 2005).

During the study period many surveys have been conducted by such bodies as BRE, the National Society for Clean Air (NSCA, which was later renamed EPUK), the Noise Abatement Society (NAS), and the Chartered Institute of Environmental Health (CIEH). These surveys collected social and/or acoustic data on noise and its effects. An example from the early part of the study period is the London Survey of 1961 – 62⁷ in which 1,400 people in central London were interviewed about the sources of noise that disturbed them at home, when outdoors, and when at work. That approach is typical of many surveys⁸.

Other surveys have been concerned with the effects or operation of particular acts or legal provisions relating to the control of noise; in fact the Wilson Committee sent a questionnaire about the operation of the Noise Abatement Act to LAs. The NSCA carried out regular noise surveys of local authority officers in the period 1994 – 2005 and public opinion surveys in 2007 – 2009 to gauge attitudes to noise. They were adapted each year to gather information on contemporary noise issues/gauge the impact of any legislative changes year on year. Perhaps the best known dataset is that resulting from the annual survey of LAs by the CIEH which collects information on complaints, abatement notices, and other details of LAs' activity in relation to noise control legislation and which has been undertaken since the mid-1960s.

The information collected from the NSCA surveys can be characterised as assessing subjective aspects rather than collecting quantitative data, and so complements rather than duplicates the annual CIEH surveys of LAs. The CIEH surveys include quantitative data on the numbers of complaints received (by LAs), nuisances confirmed, abatement notices served, and prosecutions undertaken⁹ and so that seemed to be the most appropriate dataset on which to undertake quantitative analysis.

Analysis – noise control legislation

Information from CIEH surveys collected since the late 1970s shows an increasing trend in the annual number of complaints received by LAs about noise, mainly as a result of the large increase in complaints about domestic sources (see Figure 2). Analysis of the CIEH data was undertaken to determine whether effects of specific items of legislation could be identified. Thus Figure 3 shows the number of complaints in terms of the annual number per million persons¹⁰ in the period shortly before and shortly after the Noise Abatement Act 1960 was replaced by the Control of Pollution Act 1974. In addition to complaints about industrial, commercial and domestic sources of noise, the normalised complaint totals are shown for noise from road works and construction (and demolition) and about other sources not covered by any of those four categories.

Figure 3 shows that in most categories the complaint rate

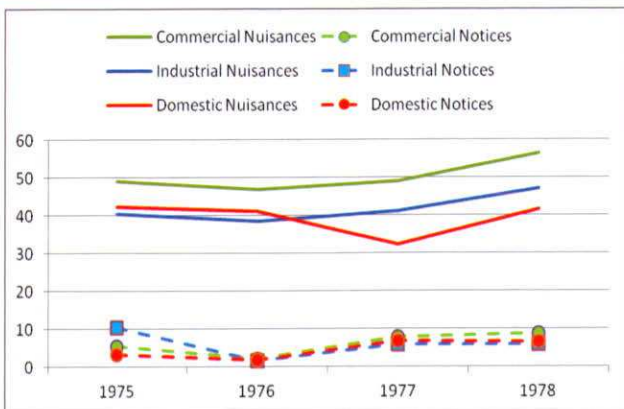


Figure 4. Percentages of Confirmed Nuisances and of Notices Served

appears to be virtually unchanged but that there was a large increase in the complaint rate for domestic noise source in the two years after the first year of CoPA operation. There are many possible causes of this increase, for example, increased awareness of the legislation or where to direct complaints, higher expectations and lower tolerance, continued rise in use of noisy equipment or activities in the home. However, it is not possible to determine whether the provisions of CoPA contributed directly¹¹.

Analysis of the percentage of confirmed nuisances (as a percentage of complaints for each source type) and notices served (as a percentage of confirmed nuisances) reveals two interesting points as can be seen in Figure 4. The first point is that, broadly speaking, the percentage of complaints that were confirmed as statutory nuisances was of the same order across both the four year period shown and across the three categories of noise source (industrial, commercial domestic) (i.e. around 40%). The second point is that the number of notices served, as a percentage of the nuisances confirmed, was also, very broadly of the same order across years and sources types (around 5%). Thus the use of informal methods to resolve a statutory nuisance continued to be the preferred approach in the vast majority of cases¹².

In practice, analysis of relevant CIEH data found in almost all cases that the observed changes in data before and after the introduction of a specific measure were not statistically significant. This is attributed to the presence of other factors that influence the data collected in the surveys even with the use of selected sub-sets designed to eliminate some of those factors¹³.

Whereas the mean annual total number of complaints per responding authority grew markedly (from 10 to 1,124) since 1966 that is not true of the use of formal action. Figure 5, which shows notices per 100 complaints, reveals that although the long-term trend has been upwards, the use of notices has been in decline for the latter part of the period. In fact, the proportion of incidents found to be a nuisance in CIEH surveys dropped from 48% (1966) to 19% (2009/10). It is not clear whether that is a result of public expectations exceeding the legal benchmark, of the practical difficulties in undertaking investigations, or the result of resourcing pressures. It is clear, however, that non-statutory, informal, methods continue to be widely applied. Although incidents dealt with by that means are included in the 19% figure above, it might also be that some justified complaints are dealt with informally without ever being classified.

Conclusions – noise control legislation

Reported public dissatisfaction with noise as expressed by complaints has risen rapidly since the introduction of the legislation in the 1960s and, in contrast to the findings of the 1960-1 London Noise Survey, complaints of domestic origin **P42 ▶**

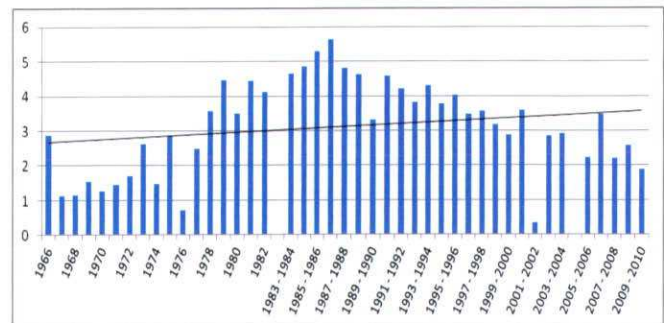


Figure 5. All statutory notices reported served in respect of noise per 100 complaints throughout study period

P41 now predominate. The effects of the individual items of legislation enacted in 1960, 1974¹⁴, 1990¹⁵ and 1996¹⁶ are not easy to judge but it is difficult to say from the data that any piece has checked the growth in complaints.

Whereas complaints and notices grew in roughly equal proportion during the early years, as the numbers of complaints grew, a tipping point seems to have been reached around 1986, following which the proportion of complaints resulting in a statutory notice has declined (see Figure 5).

The main provision of the policy has been to provide a means for occupiers subjected to noise nuisance to obtain relief without the need to take legal action themselves by legislating that LAs should have powers to take action on their behalf – i.e. the extension of statutory nuisance to include noise. Although the quantitative effect of an individual measure cannot in most cases be reliably determined, it is clear that over the study period numerous noise nuisances have been confirmed. It is considered unlikely that civil actions would have been undertaken in respect of so many nuisances (ie, by individuals in the absence of the statutory nuisance powers afforded to LAs). However, the majority of these confirmed nuisances are reported as being resolved. The fact that most nuisances are resolved using informal methods does not detract from the benefit provided by the policy as a whole since it imposes a duty on the LA to investigate; without it those experiencing the nuisance would not be able to obtain relief by the LA's intervention.

Lessons learned from the project

The lessons learned fall into two groups: lessons about the implementation of policy, and lessons about providing evidence to evaluate the effects of policy.

An example of successful policy implementation is the PCT/RD regime of the 2003/4 Building Regulations which has exceeded expectations in terms of the level of compliance achieved and the timescale required to do so. The important ingredients in this case included a clear policy objective, a well-resourced means of delivery, and sanctions for non-compliance. This policy also demonstrated the benefit of appropriate data collection in enabling the progress/success of the policy's implementation to be monitored and because the database is available and 'live', it continues to build the evidence base.

The availability of and access to data was a critical factor for all the topics investigated. Not only was a wide range of organisations consulted for data but, because of the period covered by the study, the data format and means of access also varied. Some information could be downloaded from the websites of Government departments; in some cases not only current but historic data were included where the data collection was from an annual survey that had been running for many years. A lot of data was also collected from hard copies and locating and accessing them was an important part of the study. One particular survey accessed in hard copy was started in the late 1970s by the DoE and compiled environmental data from various sources including the CAA, individual airports, the CIEH, and Government studies. Since that covered the pre-Internet period it was a particularly useful source of information. Unfortunately, responsibility for the survey appears to have been moved to another department (i.e. not just successors to the DoE) and over time the content changed so that although it eventually became available online it was less relevant to noise.

It was fortunate that many of the hard copy sources used for this study had been consulted by team members when they were originally published and so we did at least know that they might be found. Although access to data ought to be easier with the advent of the internet it has been found that even relatively recent information is archived (presumably because of storage issues) and it can then be difficult to find even if its existence is known. Thus, more recent reports, which perhaps were mainly distributed electronically before being archived,

might be harder to access subsequently because there will be fewer locations holding them and so their content might effectively be 'lost' even if they can, in principle, be retrieved from archive.

Thus to provide an evidence base to evaluate the effect of a policy, the policy implementation should include the design of a means of collecting appropriate data, ensuring that it purpose is understood and 'protected', and maintaining access to the data in the future.

Acknowledgements

I would like to thank Howard Price and Kim Willis at the CIEH for their detailed acquisition and analysis of the data used in the project and include in this article. ■

References

1. Regulatory Impact Assessment in the Consultation Package on the proposed regulations. DETR, January 2001 (paragraph 56).
2. Paragraph 56 of the Regulatory Impact Assessment for the Consultation on the proposals. Op. cit.
3. This was as the result of a Private Members Bill and a campaign by the late John Connell, founder of the Noise Abatement Society.
4. Before it was enacted there were approximately 400 local acts in force which contained similar (though discretionary) provisions. However, the 1960 Act brought noise within the same statutory framework as was already available in respect of other causes of nuisance and for the first time, nuisance caused by noise (or vibration) became a statutory nuisance on a national level.
5. As amended.
6. A delay of up to 7 days in serving a notice is permissible in certain circumstances (Clean Neighbourhoods and Environment Act 2005).
7. The survey was undertaken by the Building Research Station (BRS), London County Council (LCC), and the Central Office of Information (COI).
8. The conclusion of the study was that road traffic was the predominant source of disturbance, with no other single noise source of comparable importance.
9. Details have changed from year to year to reflect changes in legislation, for example.
10. The number of complaints was normalised in this way to take account of the changes in population covered by the LA responses from year to year.
11. Note that the incidence of complaints about loudspeakers declined between 1975 (NAA) and 1976 (CoPA).
12. Indeed, the 1978 annual Environmental Health Report of the CIEH (then the EHOA) said, for example, 'Normally, the firm persuasion of the environmental health officer and the general wish of the individual not to offend makes the service of a [CoPA] Notice unnecessary.'
13. There are several confounding factors which complicate the interpretation of the data from the CIEH surveys. For example, the same LAs do not respond to the same questions, or necessarily at all, every year and so the responses in successive years might not relate to the same LAs. Consequently trends in responses from year to year might be affected by differences between the LAs that responded to the surveys rather than by changes in the underlying responses.
14. Control of Pollution Act 1974.
15. Environmental Protection Act 1990
16. Noise Act 1996
17. One set of reports, produced originally by the DoE was accessed by Mary Stevens just before the EPUK library was dismantled. Another report, which had been discarded by a library, was obtained from a specialist seller of such books after an internet search for a copy!

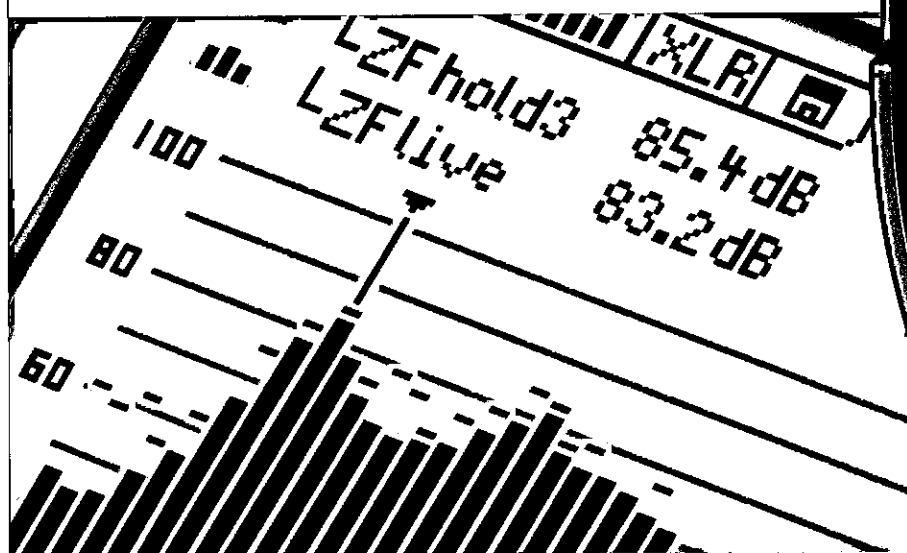
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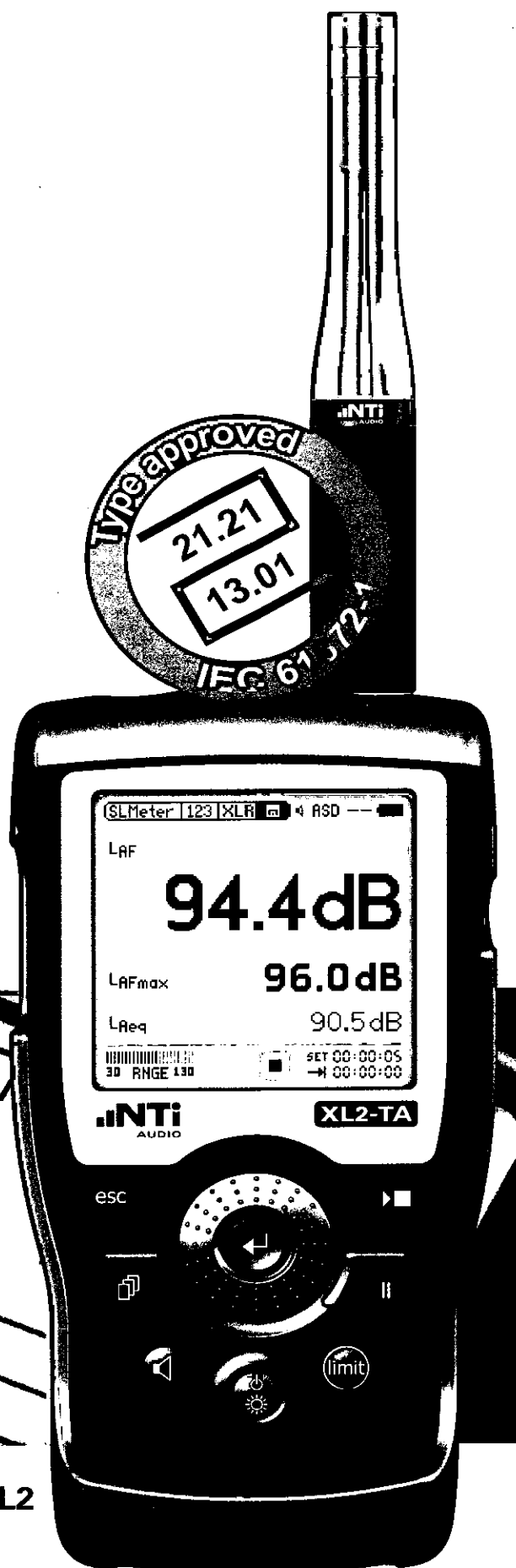
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Converting HHSRS into decibels

By John Miller, Partner at Bickerdike Allen Partners

In their article in the September-October 2013 edition of *Acoustics Bulletin*, David Trew and Tomasz Galikowski of Bickerdike Allen Partners briefly described and commented on the provisions of the Housing Health and Safety Rating System Regulations (HHSRS), 2005.

This is the Government's approach to the evaluation of the potential risks to health and safety from any deficiencies identified in dwellings. It covers 29 matters and circumstances, ranging from damp and mould growth to structural collapse and falling elements, all of which give rise to a range of possible health outcomes (physical and mental) in dwellings. Noise is one such hazard. Each hazard is rated by considering both the likelihood of a health outcome occurring and its potential seriousness. There are four classes of health outcome, ranging from Class I, "severe" (e.g. death), to Class IV "moderate" (e.g. occasional discomfort).

Noise and health outcomes

The spread of health outcomes currently associated with noise is given in Table 1 below. These apply to dwellings of all types and eras and for occupants in all age groups. For evaluation purposes, these are adjusted to the nearest representative scale points, given in the Regulations (which must add up to 100%). A standard set of multipliers is given, which are proportional to the seriousness of any particular health outcome (e.g. a Class I hazard, such as death, is one-thousand times more serious than a Class IV hazard, such as "occasional discomfort").

Likelihood

An HHSRS inspector is required to use his or her judgement to assess the likelihood of a health outcome occurring, by reference to a standard set of likelihood scale points (see Table 3). For example, if it is judged by the inspector that the chance of a health outcome occurring lies between 1 in 240 and 1 in 130, then the likelihood scale point, L, used in the assessment would be 180.

Total hazard score

A total hazard score is calculated by multiplying each representative scale point by its respective multiplier and dividing by the likelihood value. An example, using L=180 is given in the final column of Table 1.

Hazard Band and Category

The Hazard Band and the Hazard Category are derived using the values in Table 2. A rating of A-C constitutes a Category 1 hazard and this places a duty on the local authority to take enforcement action. Hazards scoring D-J are Category 2 hazards and local authorities have the discretion to take

enforcement action.

Using the example where L = 180, the total hazard score of 27.17 corresponds to Band H and it is a Category 2 hazard.

Converting the scale to decibels

The complete hazard scale is set out in Table 3. The likelihood scale points are shown with the computed total hazard score, using the above procedures. The corresponding rating bands (A-J) and hazard categories (1 or 2) are shown in the third and fourth columns, respectively. As the scale is more or less a geometric progression, it is valid to ascribe decibel values to each scale point. The fifth column is left blank for the entry of decibel values in equal steps.

In order to enter appropriate values it is necessary first to decide on the following levels:

- **A** - The decibel value above which a Category 2 hazard may be declared; in other words, the highest acceptable noise level, taking into consideration the type of noise under investigation, room types, time of day and any relevant noise characteristics (such as tonality or impulsivity). Table 3 ascribes value A to the highest hazard score corresponding to rating band J (though there is still a 1 in 560 chance of a negative health outcome and, strictly speaking, the Regulations do not define a threshold value for Hazard Category 2).
- **B** - The threshold value for a Category 1 hazard to be declared. That is, the level at which the health hazard is sufficient to require the local authority to act. This corresponds to a scale point of 1 in 3 (likelihood of a negative health outcome between 1 in 4 and 1 in 2.5).

The selection of suitable values for A and B are matters for the judgement of an inspector operating under the Regulations, taking into consideration "relevant matters affecting likelihood and harm outcome" (see HHSRS operating guidance).

The decibel value corresponding to a likelihood scale point, L, may be computed using:

$$\begin{aligned} \text{dB} &= x \log_{10}(1/L) + y, \text{ where} \\ x &= 4(B-A)/9 \\ y &= A + 2.75x \end{aligned}$$

The above formulae only hold good as long as the spread of health outcomes currently attributed to noise remains as indicated in the current system, given in Table 1.

If these were to change (for example, as a result of further research in the effects of noise on health and safety), then it would be necessary to re-compute the total hazard score, **P46**

Health Outcome Class	Spread of health outcomes, noise	Representative scale points % noise	HHSRS Multiplier, all hazards	Example L=180
I Extreme	0.0	0.0	10,000	0
II Severe	1.0	1.0	1000	5.56
III Serious	9.0	10.0	300	16.67
IV Moderate	90.0	89.0	10	4.94
Total Hazard Score:				27.17

Table 1

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Numerical Score Range	Band	Hazard Category
5,000 or more	A	1
2,000 to 4,999	B	1
1000 to 1999	C	1
500 to 999	D	2
200 to 499	E	2
100 to 199	F	2
50 to 99	G	2
20 to 49	H	2
10 to 19	I	2
9 or less	J	2

Table 2

▶P44. H, for each likelihood scale point, using the HHSRS method, and to compute the decibel value using the following formula.

$$dB = x \log_{10}(H) + y2, \text{ where}$$

$$y2 = A - x(\log_{10}(L.H) - 2.75)$$

A re-computation would also be necessary if an inspector were to consider that there were circumstances in a particular inspection which justify a change to the spread of harm outcomes.

For an acoustician, the first steps in evaluating a noise are to determine its sound level and its spectral and temporal characteristics. For some sources it will be possible to relate these directly to the results of research on noise and health. In other cases may only be possible to relate the figures to generally accepted criteria for the source in question. In either event, it will be possible using the steps above to relate decibels to the HHSRS likelihood scale points and to compare different sources of noise in these terms.

I am grateful to Ian Cole, Environmental Health Practitioner and senior EHO at Bristol City Council's Neighbourhoods Directorate, for his assistance in the interpretation of the HHSRS scoring system. ◻

Likelihood scale point, L (1/in)	Total hazard score, H (noise)	Rating Band	Hazard Category	Level dB
5600	0.87	J	2	
3200	1.53	J	2	
1800	2.72	J	2	
1000	4.89	J	2	
560	8.73	J	2	A
320	15.28	I	2	
180	27.17	H	2	
100	48.90	H	2	
56	87.32	G	2	
32	152.81	F	2	
18	271.67	E	2	
10	489.00	E	2	
6	815.00	D	2	
3	1630.0	C	1	B
2	2445.0	B	1	
1	4890.0	B	1	

Table 3



YOUR FUTURE



US



CLEAR NOW?

Further consideration on floating room systems

By Ryan Arbabi and Dan Emery of Farrat Isolevel

Due to our affinity with this subject, we read with great interest the article in the November-December 2013 *Acoustics Bulletin* entitled *Floating room systems for noise reduction in mechanical spaces* and also the follow-up letter in the January-February 2014 issue entitled *Errors and inconsistencies in floating room systems*.

The purpose of this technical contribution is to offer what we believe is the basis of a correct theoretical analysis, including the underlying assumptions governing when these theories are valid, and how these considerations apply to real-world performance.

The article raised some interesting points, in particular, emphasising the importance of the acoustic air gap, rather than the mechanical isolators as the primary element providing the isolation. It pointed out that the design of the mechanical isolation element of the system becomes a case of damage limitation, whereby the aim is to minimise transmitted mechanical vibrations, as a room cannot truly "float".

The letter was mainly concerned with the effect of the air cavity (air gap) stiffness on the natural frequency of the isolation system as a whole. It pointed out some numerical errors in the application of the equations given in the original article, and commented on the validity of the air gap stiffening equations for vented floors. However, whilst the letter made some valid corrections to the equations in the article, there were still inconsistencies in both the equations given and in the theoretical consideration of air gap stiffness.

Both contributions model their floors as simple single degree of freedom (SDOF) oscillators where the air gap stiffness acts in mechanical parallel to the isolator stiffness, so the total stiffness of the supported slab is the sum of these two values. Where this theory falls down is that it assumes that the air gap is perfectly sealed, however with even the highest standard of workmanship, a perfectly sealed air gap is unachievable in a real-world scenario.

The equation for air gap stiffness given in both articles is based on a low frequency assumption, where the air gap can be considered as a lumped volume compliance. Low frequency is defined as frequencies where the acoustic wavelength is much longer than any dimension of the air cavity, therefore, as frequency increases and the wavelength gets shorter, this low frequency assumption becomes less reliable. There will be some "long wavelength limit" above which acoustic waves begin to propagate. If we choose the frequency whose wavelength $\lambda = 2L$ (where L is the longest dimension of the air gap), to define the long wavelength limit (since when $\lambda = 2L$ standing

waves will start to occur), then using an example of a 5m x 5m floor, we have a frequency limitation of

$$f_{lim} = \frac{c}{2L} = \frac{340}{10} \approx 34\text{Hz} \quad (\text{A})$$

(where c = speed of sound in air)

For frequencies $f < f_{lim}$, the acoustic variables (pressure and volume velocity) are assumed to be constant throughout the air gap, so no acoustic waves propagate. With this as a basis for understanding the conditions under which the model is valid, the equation for the mechanical stiffness of the air gap can now be derived. However, both prior authors seem to have published equations with inconsistencies in the units, and have confused stiffness (N/m) with specific stiffness (N/m/m² = Pa/m), when deriving their respective equation (2). That is, the units of K_a as given by equation (2) in both the article and the letter, should have units of Pa/m not N/m. The simplest remedy is to correct equation (2) by multiplying by the area of the floating slab, S_1 , giving:

$$K_a = \frac{\rho_0 c^2 S_1}{t_A} \text{ (N/m)} \quad (\text{B})$$

(Where ρ_0 is the density of air, and t_A is the air gap height)

Alternatively, using equation (2) as given by both authors, the terms in equation (1) for the natural frequency of the mechanical system and (3) for the natural frequency of the air gap must be modified to use specific mass, $M' = M/S_1$ with units Kg/m² and specific isolator stiffness $K_{rm}' = K_{rm}/S_1$ with units Pa/m (where M is the total mass of the floating slab and K_{rm} is the total stiffness of the isolators supporting the floating slab).

Namely, it is incorrect to swap between a "per-unit area" approach and a "whole-floor" approach mid-analysis. However, sticking to one or the other is equally valid, so with the above modifications applied, the natural frequency for the perfectly sealed SDOF model of a floating floor is given by:

$$f_n = \frac{1}{2\pi} \sqrt{\frac{K_a + K_{rm}}{M}} \quad \text{or} \quad f_n = \frac{1}{2\pi} \sqrt{\frac{K_a' + K_{rm}'}{M'}} \quad (\text{C})$$

P48

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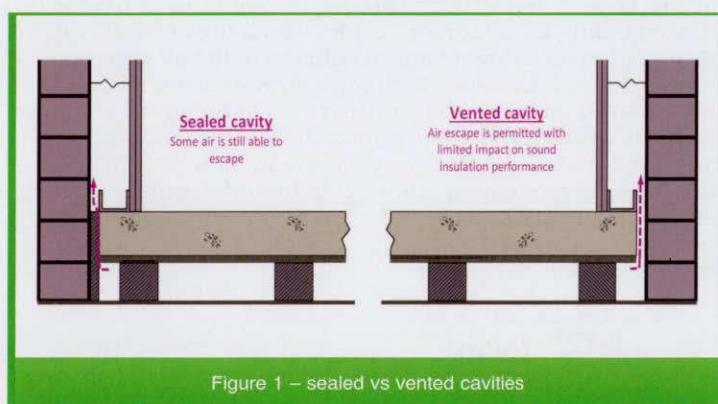
#brainstopick



P47 Taking this further, and allowing for an air gap that is not perfectly sealed, this adds another degree of freedom to the low frequency model. There will be a body of air in a 'vent' (an unsealed gap from whatever source) that is in mechanical series with the air gap. The result is that the total mechanical impedance of the air gap and vent combination becomes strongly dependent on the mechanical impedance of the vent. Whilst the impedance of the vent is low, the impedance of the air gap and vent combination is low in comparison to the case of a perfectly sealed floor, so the air gap stiffening effect becomes much weaker. In other words, the displaced air has somewhere to escape, so there is less pressure increase in the air gap resulting in a lower air gap specific stiffness.

This holds even for very small vent sizes, (i.e. the incidental air gap of just a few millimetres between perimeter isolation strips) the combined impedance of the air gap and the vent is still much lower than that of the air gap of a perfectly sealed floor, so the effect of the stiffening of the air gap is far lower.

With regards to the incorporation of vents, the author of the



letter stated that "even for a floor as small as 5m x 5m, the trapped air at the middle of the floor still has to travel more than 2.5m to get out and as such is still considered slightly 'trapped'". We have previously discussed the fact that the acoustic variables are constant *throughout the entire air gap* at low frequencies. Therefore, the air does not need to "travel" to the edge of the floor to "escape", the coincident volume of air is simply displaced by the deflecting slab which causes an equal pressure increase throughout the entire air gap.

There is a dimensional dependency, so for a larger room, it is more important to consider the potential adverse effect of air gap stiffening. The increased stiffening is dependent on the ratio of the area of the floating slab to the area of the available vent. So in order to maintain an equal specific air gap stiffness as the room dimensions are increased, the vent width must be increased by the same factor as the room dimension, such that the incidental air gap quickly becomes insufficient and it becomes necessary to incorporate a full vent into the design. A secondary effect which also must be considered for larger floors is demonstrated in equation (A). By the time the room has reached 15 x 15m in size, the "long wavelength limit" has dropped to around 11Hz, so the SDOF model becomes unreliable as there is further performance degradation due to the presence of standing waves.

Considering theory is one matter, however almost all papers written on this topic lack practical experimental confirmation, or real-world application. For most uses of high-performance acoustic floating floors, it is our experience that air gap stiffening actually has a very limited negative impact. In cinemas, the air gap is usually vented entirely to the underside of the raked seating, and in plant rooms, venting the cavity back into the plant room itself is often considered as having no degrading effect on overall performance of the space. It is also important to consider the application of the room in question, if performance is only going to be measured in terms of Part E

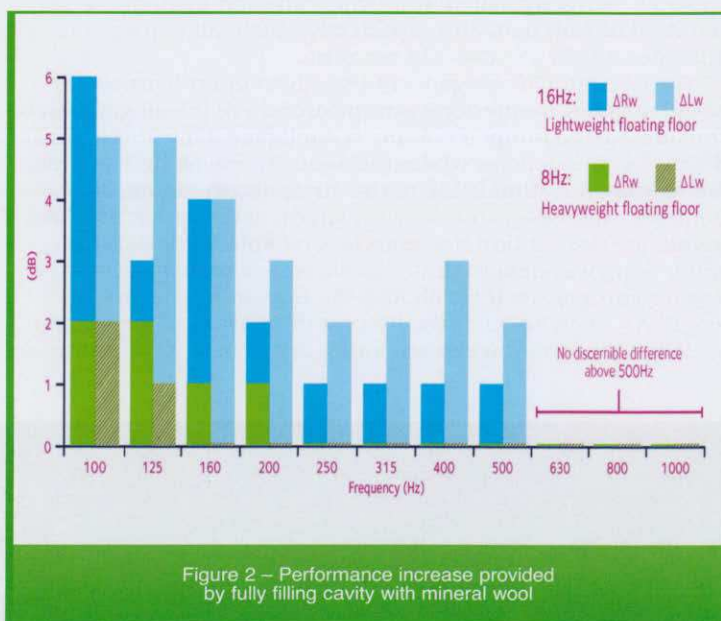
of the Building Regulations, then even if air gap stiffening is playing a part at low frequencies, by 100Hz, its effects would be similarly limited. We have provided a number of 37mm air-gap height floating floor solutions into residential environments with very positive feedback (both analytical and subjective).

For rooms the size of typical plant rooms (or cinemas/recording studios), and an air exchange of just a few cm^3/s (of course, nothing large enough to degrade the high frequency airborne sound insulation) then the effects of air gap stiffening are generally negligible. This is borne out by both our research and from similar research done by Bickerdike Allen Partners at the BBC's Broadcasting House Studios in London in 2007¹.

Both sets of research demonstrate that for low air gap heights, nearfield slab-to-slab radiation is the dominant transmission route, and that for air gaps above 50mm the beneficial effects of increasing the air gap height drop off much faster than standard models would indicate.

Finally, on the subject of the effect of adding mineral wool to the air gap, the author of the letter claimed that this would "reduce the air cavity stiffness... on the principle of trying to avoid the presence of standing waves". We have already discussed the fact that the model in question is based on a low frequency assumption whereby there is a pre-requisite that standing waves must not occur in order for the model to be valid. This does not mean that the author's statement is entirely incorrect, just that the statement should only hold true above the "long wavelength limit" discussed earlier in order to be valid.

Our research based on real-world testing shows that the addition of mineral wool has a significant impact on the mid frequency (50-200Hz) performance of lightweight floors, but a negligible impact on heavyweight floors (which already provide significant 50Hz+ isolation), as shown in Figure 2. It seems likely that the significant increase in performance when mineral wool is used in the air gap of lightweight floors is due to the dampening of standing waves, but only above the "long wavelength limit" where standing waves are able to occur and have an adverse effect on performance. ■



References

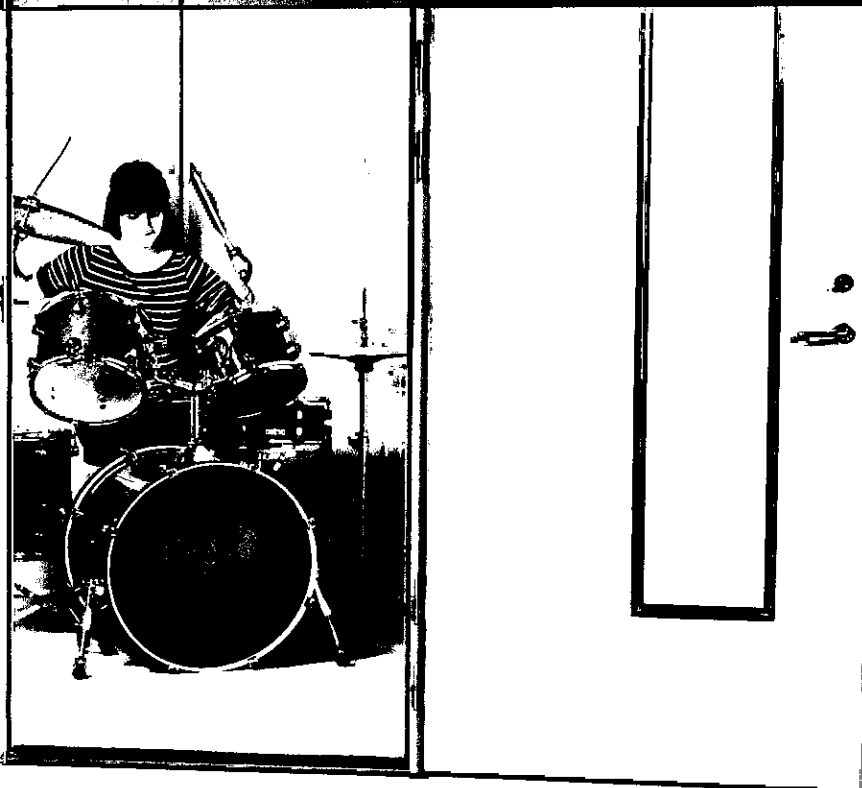
1. Bickerdike Allen Partners, Case Study: BBC Broadcasting House Studios, London – Vibration and structure-borne noise from trains in buildings, 24 January 2007

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Pete French - Head of Music,
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Top motor sport award for Andy Watson

IOA member Andy Watson has received a lifetime achievement award from the Motor Sports Association "in recognition of his unrivalled and unique contribution of British motor sport". It was presented to him by Prince Michael of Kent.

Andy has presided over seminars, chaired consultative groups and contributed to legislative documents, in the UK and world-wide. He is the UK representative on the

were when measurement and noise control started in the late 1970s, and there is no doubt that Andy has contributed hugely to this.

As a younger man he was an active rally driver, competing in all Scottish championship rallies for many years. He was also a director of the Scottish Sporting Car Club, carrying out official duties for the club as a steward and clerk of the course.



Andy Watson receives his award from Prince Michael

International Standard Committee on Vehicle Noise. As well as the IOA, he is also a member of the Royal Environmental Health Institute of Scotland, the British Standards Committee on Transportation Noise, representing the MSA and the International Working Group on Outdoor Leisure Noise.

Recognised as a knowledgeable expert witness, Andy has appeared at many court cases and investigations. He was an integral part of the team that brought racing back to Goodwood, and has since assisted in updating the restrictions imposed there. He facilitated the opening of Anglesey Circuit, successfully defended a case brought against Pembrey and helped many other venues.

There are now more race circuits and motor sport venues in the UK than there

Andy introduced and ran a mobile results service on the Scottish Rally for two years. He first measured noise on the 1982 Scottish Rally. He is currently involved with noise issues at many venues. In 1996 he was responsible for the production of the "Guidance Notes for Noise Control at Motor Sport Circuits", a joint venture research project conducted by the MSA with the AMRCO. Many venues in the UK and Europe now manage noise issues by use of such techniques.

Andy has been a consultant to the MSA in respect of noise measurement and control for more than 30 years and been instrumental in developing the systems and regulations now in place. ■

Paul Kelly joins expanding Environoise

Paul Kelly has joined Environoise Consulting as a Senior Consultant. His arrival coincides with the relocation of the company to new state-of-the-art offices in Ellesmere Port.



Paul Kelly

Ray Woolley, Managing Director, said: "Paul is a valuable addition to our expanding team. Our workload, including hotel and school design, waste recovery plants and noise and vibration risk assessments for shipping, keeps us all very busy."

Miles Woolley, Principal Consultant, who is also a board member of the Association of Noise Consultants (ANC), added: "We hope that our new convenient location (off junction seven of the M53) and varied growing workload will encourage other consultants to apply to us for career opportunities." ■

Ramboll acousticians share expertise in Finland

Thirty acousticians from four countries – 12 of them IOA members – travelled to Helsinki to share their expertise at the third Ramboll international acoustics conference.

The event included a visit to the new Helsinki Music Centre, with acoustics

designed by Yasuhisa Toyota of Nagata Acoustics, and a keynote speech from Tapio Lokki, Professor of Acoustics at Aalto University, entitled *Concert hall acoustics: novel, objective and subjective evaluation methods*.

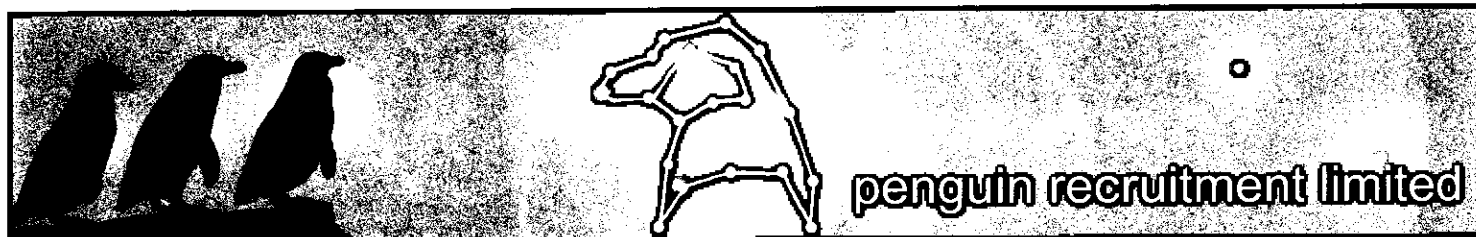
Presentations given by acousticians from

the different countries included: shooting range noise, the acoustic challenges of high speed trains, concert and rehearsal hall design and refurbishment, underwater noise and groundborne vibrations measurement, prediction and implications.

The success of collaboration between the different countries to achieve technical excellence and the potential for future collaborations was discussed. Travel opportunities within the team to strengthen collaborations were recognised as an exciting possibility for the future. ■



The Ramboll delegates



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Acoustic Engineer – North London

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Graduate Acoustic Consultant – Hampshire

£17-20k

Our client, a multinational consultancy is seeking a talented Graduate Acoustic Consultant to join their team in the Hampshire area. You need to have a minimum of a BSc or BEng in Acoustics, ideally from Southampton ISVR or Salford University, excellent communication skills both written and verbal, and also some knowledge of UK regulations surrounding building acoustics. This role will provide the successful candidate the chance to work on large scale property development, across both commercial and residential builds. Duties will include; undertaking noise measurements, data collation and writing reports. If selected you will be on competitive starting salary and flexible benefits package.

Principal Acoustician – Bristol

£30-40k

Due to incremental growth, a highly experienced Principal Acoustician is required to join a reputable global organization in their HQ in the Bristol area. A proven track record in project management, associate membership of the Institute of Acoustics and a minimum of 5 years commercial experience is required for this role. You will also need to be proficient with noise modelling software such as Odeon, Catt Acoustic or Ease, and have extensive knowledge of UK guidelines and regulations. Your responsibilities will include; leading and coordinating team members, liaising with clients and junior staff for design work, project management of all acoustic input in major developments. On offer is a fantastic remuneration package including pension, healthcare and dental cover.

Senior Building Acoustic Consultant - London

£30-40k

A renowned multidisciplinary consultancy, providing specialist services to the built environment for 100 years, is currently looking to hire a Senior Building Acoustic Consultant to their London branch. Applicants are expected to have an architectural or buildings focus with at least five years experience, a BSc/MSc, an IoA Diploma, and Full IoA Membership. You will also have a proven ability to manage a variety of large scale projects, and a team of specialists. This role presents an impressive client base and project portfolio, along with an impressive starting salary, room for promotion, a variety of benefits, and the support of a friendly and dynamic team.

Sales Engineer (Acoustics) – Yorkshire

£18-23k

We are urgently seeking a technical candidate with business acumen to join a market leader in noise control products across various markets. Operating as a Technical Sales Engineer you will be in a client facing role, providing technical guidance whilst upselling bespoke acoustic solutions. You need to have a minimum of a BSc in an acoustics related subject, have a technical understanding of noise control products and commercial awareness of issues surrounding noise and vibration. This is fantastic opportunity to excel your career with a reputable firm that is renowned for investing time and money into their staff. Our client is offering a competitive starting salary, flexible benefits package and fast career progression.

Interested in our current Acoustic job opportunities? Please do not hesitate contact either Jon Davies or Amir Gharaati on 01792 361 770 or alternatively email jon.davies@penguinrecruitment.co.uk or amir.gharaati@penguinrecruitment.co.uk

We have many more vacancies available on our website. Please refer to www.penguinrecruitment.co.uk.

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Selectaglaze quietly on track for rail clients

Selectaglaze is working with Crossrail and Network Rail to provide sound insulation at station buildings in line with statutory requirements.

Thanks to the use of secondary glazing systems set 100mm or more from existing windows and high performance frame seals, noise reduction in the range 40-45dB is achievable using standard glazing materials and up to 50dB with heavier acoustic laminates, it says.

"Many station buildings are listed or have special architectural merit and the windows need to be retained," it said. "Purpose-designed secondary glazing can be sympathetic to the character of a building and as a reversible adaptation will generally receive listed building consent."

Among other projects where its products have been installed is a development of 67 apartments created above St Pancras station in London.

For more information ring 01727 837271, e-mail enquiries@selectaglaze.co.uk or visit www.selectaglaze.co.uk □



More products in pipeline for Pulsar as it celebrates 45th anniversary

Pulsar Instruments, which is celebrating its 45th anniversary this year, is planning to increase its product portfolio.

The company began in Silicon Valley, California in 1969 before switching to the UK 30 years ago in order to serve better its largest markets – Europe and Asia.

Today it sells products to more than 45 countries, having established relationships with some of the biggest brands in the industrial, entertainment, transport and construction industries.

Achievements include being the first company to display the sound exposure on the scale of a sound level meter as well as the sound level, pioneering the use of integrated circuitry in place of discrete transistors and being one of the first companies to include a quasi-rms circuit to meet the then standard IEC 123.

Sarah Brack, Managing Director, said: "Our innovative technology and strong desire to expand our business globally have certainly been key factors, but the real foundation of our success lies in the long-term relationships we have established with health and safety professionals, safety consultants and company owners."

The company says it expects to increase its portfolio of noise measurement products in coming years in order to meet its growth objectives.

For more details go to www.pulsarinstruments.com □

Brüel and Kjær signs sensor licensing agreement with Smart Fibres

Brüel and Kjær has entered into an exclusive licensing agreement with UK company Smart Fibres to produce and sell fibre-optic acceleration sensors worldwide.

SmartAccel-HF is a single-axis Fibre Bragg Grating (FBG) sensor suitable for high frequency measurement of small vibrations, for example the monitoring of rotating machines such as pumps, turbines, motors and wheeled vehicles. It can be used as part of an integrated fibre-optic system to monitor subsea pumps for the oil and gas industry.

Benefits include increased tolerance against extreme harsh environments,

allowing long-term, sustainable monitoring solutions for a wider range of applications.

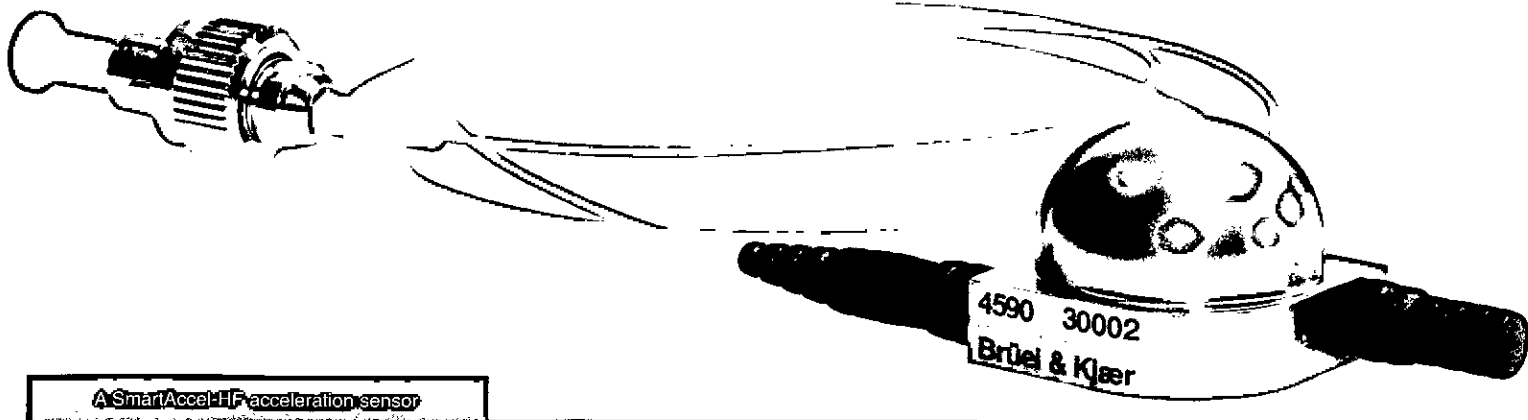
Chris Staveley, CEO of Smart Fibres, said: "We have already proven the product in oil and gas applications and we are now looking to apply it to our other industry sectors."

"One of the key advantages of FBG technology is the ability to multiplex numerous sensors of different measure and types on a few optical fibres. Acceleration is one of the most interesting measures for machine health monitoring."

Under the terms of the agreement, Smart Fibres will manufacture and sell the product to its customers in the oil and gas business

and other harsh environment industries.

More information about Smart Fibres is available at <http://smartfibres.com/> □



A SmartAccel-HF acceleration sensor

TMAT unveils new acoustic testing facility

TMAT, the multi-national manufacturer of acoustic components for tractors and excavators, whose customers include Case, New Holland Tractors, JCB, and Volvo, has invested £25,000 in a new acoustic testing facility at its Chesterfield site.

The new soundproof chamber is an upgrade to the existing acoustics laboratory.

It will allow TMAT to compare the different materials it develops to reduce noise and vibrations in its customers' tractor and excavator cabins more scientifically.

TMAT Managing Director Jason Lippitt said: "We want to remain at the cutting-edge

and ahead of the game in terms of developing soundproofing and vibration reduction solutions for our customers.

"This new lab will allow us to better monitor and further increase the quality of the unique acoustic products we engineer and manufacture with our customers."

TMAT designs and engineers innovative solutions to reduce noise, vibration and harshness for ACE (agricultural, construction, earthmoving) markets that it knows are the best in the industry.

For more details go to www.tmatuk.com ■

US patent awarded for speech recognition system

NovoSpeech's application to the United States Patent and Trademark Office for its "virtual microphone array" speech recognition technology has been granted.

This innovation is a proprietary algorithm that creates a number of independent channels — producing an array effect — from a single speech signal from one microphone.

Just as an array of microphones allows for signal enhancement in a noisy environment, NovoSpeech's virtual microphone array enhances the speech signal against background noise, all without de-noising the speech signal, which often results in losing important data.

Thus NovoSpeech improves the robustness of speech recognition in real-life environments such as busy public places and moving vehicles and addresses one of the key challenges still facing speech recognition as it tries to penetrate mass markets.

The Israel-based company aims to develop a cutting-edge speech recognition engine that provides highly robust, large vocabulary speech recognition entirely on-device without the need to connect to the cloud, as required by current leading speech recognition solutions for mobile devices.

For more details go to <http://www.novospeech.com/news.asp> ■



SLR acquires North American acoustics business

SLR Consulting has acquired North American acoustics firm HFP Acoustical Consultants, which has offices in Houston, Texas, and Calgary in Canada.

HFP provides acoustics and noise control consulting services to clients in the energy, industry, planning and development, infrastructure, mining and minerals and waste management sectors. The company, which was founded in 1979, has completed more than 5,800 acoustical engineering projects in 19 countries on six continents.

HFP's expertise encompasses industrial noise control at oil and gas facilities, pipelines, and power plants; and architectural acoustics for architects and building developers, including engineered audio-

visual system designs.

Projects range from acoustic design, to noise impact assessments as well as conceptual and detailed compressor station design and, commissioning and operation noise emission studies. Clients include Conoco Phillips, BP, Chevron, Esso Resources Canada, ExxonMobil and Lefarge Canada.

Neil Penhall, CEO SLR Consulting, said: "We have seen a strong increase in client demand for acoustics and vibration related work and HFP's services complement those we already offer. This move provides a platform for us to enhance the range of acoustics and noise control services to new and existing clients in North America and elsewhere internationally." ■



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English Cogger Partnership becomes Sustainable Acoustics

The English Cogger Partnership (TECP) has been rebranded as Sustainable Acoustics following the retirement as partner of Colin English who has handed over the reins to Peter Rogers. Colin, a former IOA President, is continuing to work for the company as a consultant.

Announcing the developments, Peter said the name change had been made "to better respond to the challenges of the times".

"After 13 years TECP has a solid reputation within the industry, and my intention is to build upon that whilst also developing the thinking and practice of sustainable design within acoustics," he said.

"Our vision is to continue to deliver excellent acoustic design advice which inte-

grates sustainable design principles. We want to inspire change and apply these principles to deliver transformational acoustics for a 'soundworld'.

"Our services include acoustic engineering and innovation, environmental acoustics (sound and noise), building acoustics, infrastructure, vibration control, soundscaping design, planning, licensing and expert witness.

"We work directly with clients but also look to work with other like-minded organisations where we can bring our expertise to connect with the bigger picture. We have our home office in Winchester, and now have an office in London. We're looking to expand again, so if people feel they have got what it takes I would invite them to get in touch."



Peter Rogers

For more details go to www.sustainableacoustics.co.uk or email progers@sustainableacoustics.co.uk □

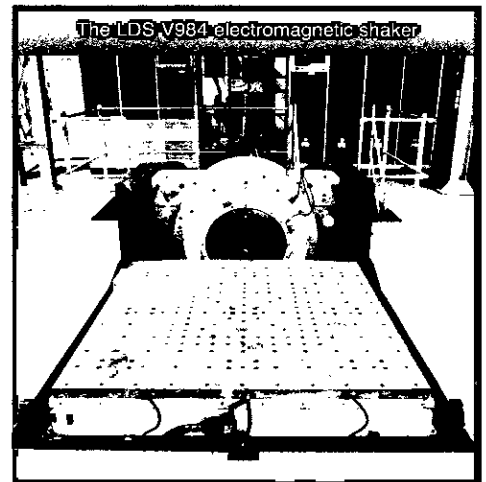
On TRaC to expand testing services

Test and certification group TRaC Global is expanding its testing service offering for the aerospace, defence and rail industries following the unveiling of a new LDS V984 electromagnetic shaker at its Warwick testing facility.

The company is one of only two independent testing houses in the UK to offer this large vibration system for shock and vibration testing to replicate the more harsh environmental conditions that products might encounter in their respective fields of operation.

Supplied by Brüel & Kjær, the LDS V984 is designed for larger products that are exposed to more severe vibration levels typically seen in aerospace, defence and rail vibration specifications. The LDS V984 has 160kN thrust and is capable of testing up to 2000kg payload.

Mark Heaven, CEO at TRaC Global, said: "This new investment means the UK aerospace, defence and rail industries will be able to experience greater availability, improved test capability and lead times for testing larger pieces of equipment and vital parts." □



The LDS V984 electromagnetic shaker

SATRA expands acoustic test facilities

SATRA has increased its acoustic testing facilities to include sound power, emission sound pressure level and peak emission level testing, while also vastly increasing the company's hearing protection testing capability.

Recent work includes the simulation of jet engine noise to test intercom clarity in aircrew helmets during supersonic flight conditions.

In addition to the testing of hearing protection devices to European standards (BS EN 352 parts 1 to 8), SATRA can now provide assessment for Australian, New Zealand and American markets using a combination of hemi-anechoic and semi-reverberant test chambers.

The laboratory can also provide equipment manufacturers with a source of sound power assessment for a wide range of devices, covering many European standards and directives. The most common uses are compliance with the machinery directive (required for all mechanical devices), the outdoor noise

directive (specified for many devices intended to be used outdoors, including lawnmowers, chainsaws and generators), the toy directive (for noise emitting children's toys) and the energy labelling directive (required for household white goods).

Emission sound pressure and peak emission level assessment can also be performed.

For more details go to http://www.satraco.uk/portal/media_item_view.php?id=388 □



SATRA tests intercom clarity

Invictus Portable Noise Monitor



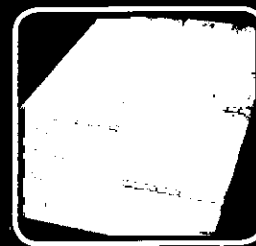
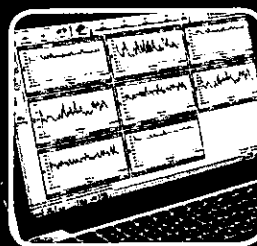
Hear • There • Everywhere

Introducing the Invictus...

Cirrus Environmental's purpose designed portable noise monitor for outdoor noise measurement.

- **Reliable:** Simultaneous measurement of all parameters.
- **Informed:** Audio recording, SMS, email and twitter alerts.
- **Control:** Communicate remotely via 3G, GPRS, Wi-Fi, Ethernet (LAN) or Radio Modems.
- **Flexible:** Set different measurement periods and alerts for different times of the day and days of the week.
- **Manage:** Noise-Hub² Software allows data to be downloaded, reports created and data analysed.
- **Integrate:** Includes additional inputs and outputs for integration of weather data and video recording systems.

Accurate • Flexible • Reliable



Email: sales@cirrus-environmental.com

Call: **01723 891722**

Visit: www.cirrus-environmental.com

Caice launches free attenuation selection software

Environmental building products manufacturer Caice has launched new attenuator product selection and scheduling software, a first for the heating, ventilation and air conditioning (HVAC) industry.

The attenuator selector, available free for use by mechanical and electrical services specifiers, enables users to quickly produce comprehensive and precise product schedules which allow like-for-like competitive tendering.

HVAC attenuator products can be selected based on a wide range of project requirements including noise criteria, air volume, pressure loss, unit size and construction options.

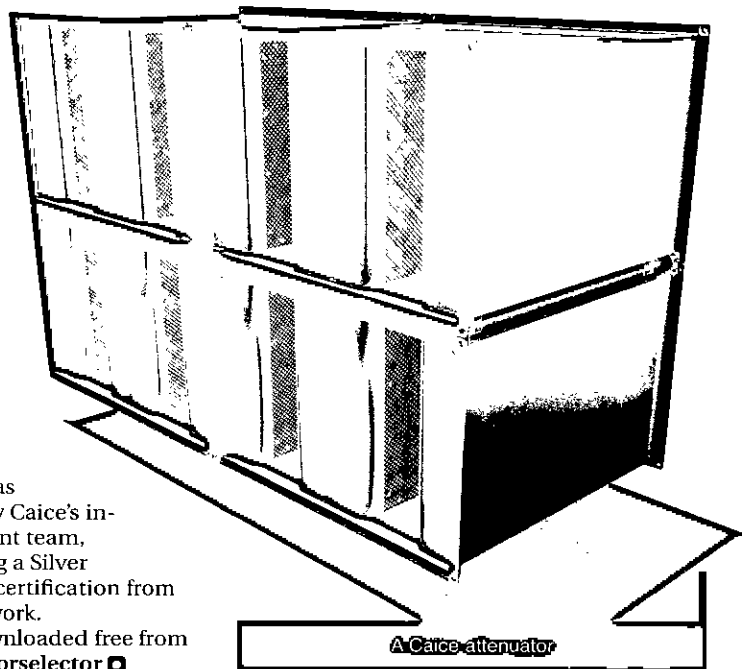
Product selections can be scheduled, stored, shared with colleagues and exported into Microsoft Excel or Adobe PDF format to support the creation of project specification documents.

Ken Amott, Caice Managing Director, said: "This is a significant development in our software strategy.

"We have worked closely with our peers to understand the needs of busy project teams in today's challenging market conditions."

The software package was designed and developed by Caice's in-house software development team, resulting in Caice achieving a Silver Application Development certification from the Microsoft Partner Network.

The software can be downloaded free from www.caice.co.uk/attenuatorselector ■



A Caice attenuator

Tight spot? No problem for PCB's new probe microphone

PCB Piezotronics has launched a new probe microphone for research and development engineers who need to measure sound pressure in confined areas.

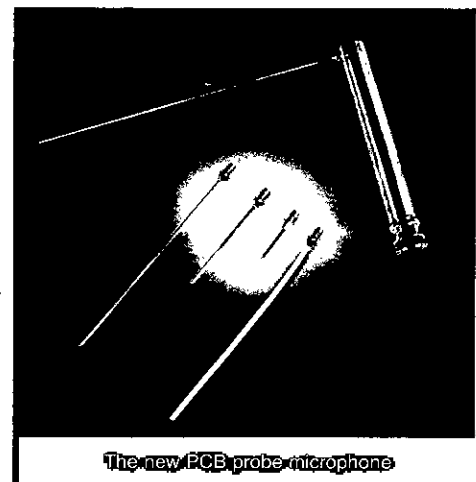
The probe tip diameter measures 0.050" (1.3mm) which enables white goods, telephone, headphone, loudspeaker and musical instrument manufacturers to make measurements in small, confined and difficult-to-access areas that cannot be reached using traditional microphones, which are typically larger. The small size of the probe tip also allows near field measurements with minimal disturbance of the sound field. This enables more accurate test results.

The probe microphone (Model 377B26) comprises four components: microphone,

preamplifier, housing and several probe tips of different lengths. The components work together to provide a maximum operating temperature of 800°C, much greater than traditional test and measurement microphones.

Mark Valentino, Product Marketing Manager for PCB's acoustics division, said: "The combination of the elevated temperature range and small form factor of the probe tip allows it to be used in a plethora of applications where traditional microphones would not be feasible."

The prepolarised design is powered by ICP® or any 2-20mA constant current supply. This allows engineers to use existing 2-20mA low-cost power supplies and coaxial cables



The new PCB probe microphone

which are less costly than 200V power supplies required for externally polarised microphones. An additional benefit is interchangeability with existing ICP® accelerometers, load, force, torque and pressure sensor set-ups.

For more information go to www.pcb.com/probemictest ■

Noise Sentinel is now On Demand

Brüel & Kjær has launched a new subscription-based service called Noise Sentinel On Demand for noise consultants "who have to choose between buying expensive equipment or turning down work".

Noise Sentinel is a web-based system that displays real time noise, alerts the operator to any threshold exceedances and delivers regular noise compliance reports.

Consultants can order the service online

and everything needed for the job is delivered, so they can start measuring immediately.

The cloud-based service makes the data accessible from anywhere over the Internet. When the monitoring project is complete, the equipment is returned, but the user can still access the measurement data.

"Investing in brand new equipment for one project is not viable, especially as it may not be used on a regular basis and can quickly

become outdated," said the company.

"To overcome this, we've designed Noise Sentinel On Demand, which is ideal for short term noise monitoring projects, including spot surveys or compliance monitoring for short construction projects."

More information is available at: www.noisesentinel.bksv.com ■

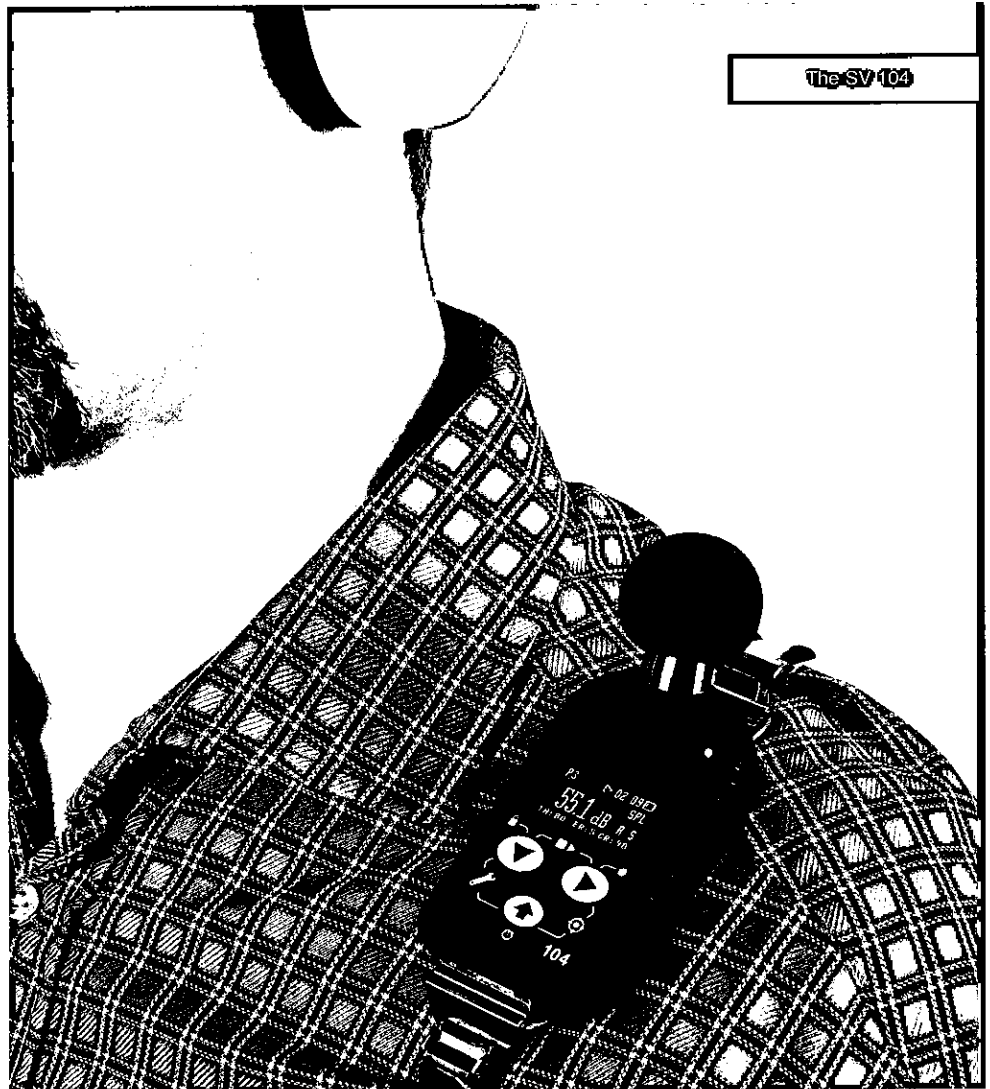
Svantek's noise dosimeter wins US new product award

Svantek's SV 104 noise dosimeter won the industrial hygiene category of US magazine *Occupational Health and Safety* New Product of the Year Awards.

The SV 104 was entered by Svantek's North American distributor Sensidyne. Its features include:

- Real-time octave band analysis that provides the data required for selection of personal hearing protection
- Three independent dosimeter profiles that allow the performance of multiple surveys at the same time
- Audio recording for peak or threshold noise source identification
- A MEMS tri-axial vibration sensor that detects possible impacts
- A durable MEMS microphone for greater shock resistance
- A colour OLED display for ease of reading in dim light or direct sunlight
- Supervisor software included for easy management.

For more information, email paulrubens@svantek.co.uk or visit: www.svantek.co.uk □



The SV 104

New laser vibrometer from SKF

SKF has launched a digital, integrated, single-box laser vibrometer, the MSL-7000, which has been developed specifically for non-contact vibration measurements.

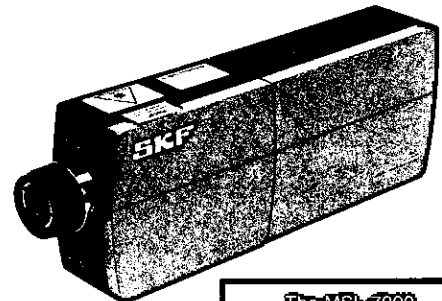
It is aimed at customers who wish to conduct end-of-line noise testing for their products, especially for "noise critical" applications such as fans, electric motors, pumps and household appliances.

SKF says the design is easy to integrate into test set-ups and existing control systems and covers acoustic measurements from 0.2 Hz (for slow rotations) up to 22 kHz.

The MSL-7000 can also be used for mobile condition monitoring, together with the SKF Microlog series, where it enables non-contact measurements that could not be taken before, such as measurements on hot surfaces and through glass.

The MSL-7000 was developed to be used on its own for end-of-line inspection or together with SKF condition monitoring products, such as the SKF Microlog family of portable vibration monitoring and data collection instruments.

In addition, a package, MSL 7000C, for



The MSL-7000

laptop use with the SKF FPM Software and a mobile data acquisition card is available.

For more information visit www.skf.com/lasersensor □

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Committee meetings 2014

DAY	DATE	TIME	MEETING
Thursday	1 May	10.30	Membership
Thursday	15 May	11.00	Publications
Tuesday	20 May	10.30	Engineering Division
Wednesday	21 May	10.30	CMOHAV Examiners
Wednesday	21 May	1.30	CMOHAV Committee
Thursday	22 May	11.00	Executive
Tuesday	27 May	10.30	ASBA Examiners
Tuesday	27 May	1.30	ASBA Committee
Monday	9 June	11.00	Council
Wednesday	18 June	1.30	CCENM Committee
Wednesday	25 June	9.00	CCBAM Examiners
Wednesday	25 June	10.30	CCENM Examiners
Thursday	26 June	10.30	Distance Learning Tutors WG
Thursday	26 June	1.30	Education
Thursday	17 July	11.30	Meetings
Tuesday	5 August	10.30	Diploma Moderators Meeting
Thursday	14 August	10.30	Membership
Thursday	4 September	11.00	Executive
Thursday	11 September	11.00	Council
Thursday	25 September	10.30	Engineering Division
Monday	29 September	11.00	Research Co-ordination
Thursday	16 October	10.30	Diploma Tutors and Examiners
Thursday	16 October	1.30	Education
Thursday	23 October	11.00	Publications
Thursday	30 October	10.30	Membership
Tuesday	4 November	10.30	ASBA Examiners
Tuesday	4 November	1.30	ASBA Committee
Thursday	6 November	11.30	Meetings
Thursday	13 November	11.00	Executive
Wednesday	19 November	10.30	CCENM Examiners
Wednesday	19 November	1.30	CCENM Committee
Thursday	20 November	11.00	Publications
Tuesday	2 December	10.30	CCWPNA Examiners
Tuesday	2 December	1.30	CCWPNA Committee
Thursday	4 December	11.00	Council

Refreshments will be served after or before all meetings. In order to facilitate the catering arrangements it would be appreciated if those members unable to attend meetings would send apologies at least 24 hours before the meeting.

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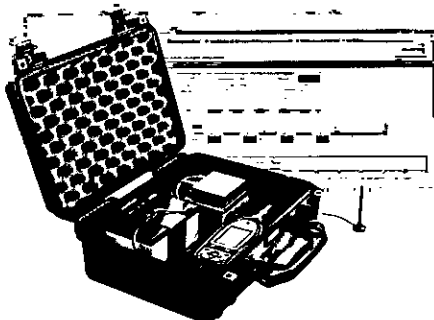
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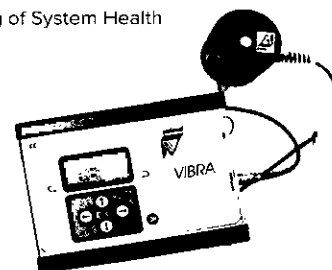
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RION WS-15

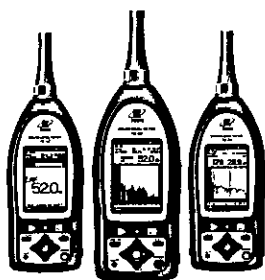
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 - Continuous
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