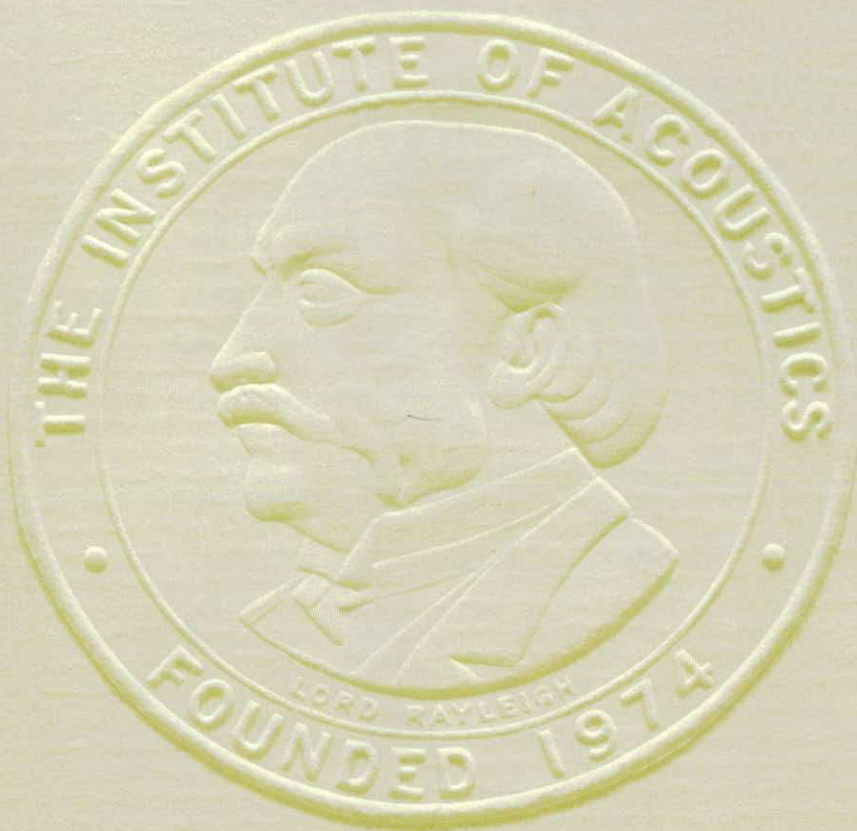




Acoustics Bulletin

April 1976

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NAGRA KUDELSKI

HAYDEN

President's Letter

Dear Member,

The Institute of Acoustics is now in its third year of existence but it is built upon two previous generations. At a time when the Institute is entering a period of intensive development, in which the present and future must command full attention, it is appropriate to slip a brief reminder of the past into the record.

The first move was initiated by A T Pickles and myself. He had directed underwater defence research during the war and had come to Building Research Station as Head of Architectural Physics whilst I was his deputy, justifying the "architectural" part of the Division's title. Together we convened a group which included radio technology, musical acoustics, audiology and other major subject areas and in 1947 the Acoustics Group of the Physical Society was born. Alexander Wood from Cambridge gave the inaugural address and Per Bruel, (then just beginning his famous instrument firm) was an early speaker, as was Erwin Meyer. In due course the Physical Society merged with the Institute of Physics and the Acoustics Group went with it. During the 1960's the social and technological importance of acoustics rapidly expanded and the British Acoustical Society was formed. For a number of years the Acoustics Group and the BAS coexisted but it became apparent that the division was hampering the growth of acoustics in the United Kingdom; eventually a marriage was arranged and in 1974 our Institute was formed. And here we stand, approaching now one thousand members, not as large as our American counterpart but comparable perhaps with the Japanese, and growing steadily in size and influence.

William Allen

Membership of The Institute of Acoustics

Membership of the Institute is open to all those individuals and organisations concerned with the study or application of acoustics. There are two main categories of membership, Corporate and Non-corporate. Corporate Membership, open only to individuals, gives the right to attend and vote at all Institute general meetings, and to stand for election for the Council, in addition to such other rights and privileges as the Council shall from time to time determine.

Corporate Membership

Honorary Member. Honorary Membership of the Institute is limited to ten and will be conferred by the Council on those whom it considers to have made an outstanding contribution to the study of application of acoustics. **Full Membership.** These will normally be persons with a university degree or its equivalent, in a subject concerning or related to acoustics. However, Council may also elect to membership persons whom, though not holding a recognised qualification, it considers are making a valuable contribution to acoustics. Applicants for Full Membership must be proposed by two Honorary or Full members and be approved by the Council.

Student Membership. A Student Member will usually be attending a course of full time education in acoustics, or a course in which acoustics is an integral part. He must also

be between the ages of 18 and 25. (The Council may, however, in exceptional cases vary these requirements.) Applicants for Student Membership must be proposed by an Honorary or a Full Member of the Institute, and approved by the Council. One Member of the Council is a Student, elected each year by the other Student Members.

Non-Corporate Membership

Subscriber. A person who is not eligible for Corporate Membership as above, but who has an interest in acoustics, or a related subject. Subscriber members do not need to be proposed formally, but their applications must be approved by the Council.

Sponsor Member. A professional, industrial or public body which is engaged in, or has an interest in acoustics. Membership entitles a specified number of the organization's staff to receive the Institute's literature, and to attend the Institute's Technical Meetings at the members' rate.

Membership application forms and copies of the Memorandum and Articles of Association of the Institute are available from: The Secretary,
Institute of Acoustics,
47 Belgrave Square,
London SW1X 8QX.

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1975-76 Awards

The President and Council are pleased to announce the following awards to members of the Institute:

Honorary Membership

Hope Bagenal

In conferring Honorary Membership of the Institute of Acoustics on Mr Hope Bagenal, our Institute honours itself, for Mr Bagenal is the most distinguished practitioner of the art and science of architectural acoustics of our age. Trained as an architect he was one of the first users in England of the results of Sabine's investigations of the acoustics of the lecture hall of the Fogg Art Museum at Harvard University, and one of the first to use the famous formula $T = 0.05 V/A$

Mr Bagenal made early contact with the works of physics under somewhat unusual circumstances, for he met Alex Wood in hospital in 1917 when both had been wounded in the war, and the meeting of minds and the contact of skills was responsible for the classic book by Bagenal and Wood "Planning for Good Acoustics" published in 1931, which to this day can be read with pleasure and profit by all concerned with the design or correction of the acoustics of auditoria. Alex Wood will himself be remembered for his distinguished theoretical publications on acoustics.

Between the wars Bagenal was a great personality of the Architectural Association, both as a writer and a lecturer, and all who came into contact with him during that period can recall his wit and wisdom. In the late 20's and early 30's he was a member of the Architectural Acoustics Committee of the Building Research Board (chaired for a number of years during this period by the Nobel prize winner, Sir William Bragg). In this inter-war period he was the most eminent acoustical consultant in this country, and was involved in the design of many auditoria, notably the Philharmonic Hall in Liverpool, and the Watford and Walthamstow Town Halls, both of which became very popular in later years with recording engineers.

During the last war Mr Bagenal worked at the Building Research Station. A year or two after the end of the war, he worked on several jobs, particularly the Royal Festival Hall, and all the major decisions affecting the acoustical design, e.g. the basically rectangular shape and the reverberation time, were made by him. Other major auditoria of this period with which he was concerned were the rebuilt Free Trade Hall in Manchester, the rebuilt Colston Hall in Bristol, and the new Fairfield Hall in Croydon. But it is not merely his consulting work which merits the honour we now do him; it is above all the concern for the beauty of sounds with which he invested the attitude to architectural acoustic among practitioners in Britain.

Unfortunately "Planning for Good Acoustics" went out of print before the war. In 1942 he published "Practical Acoustics and Planning against Noise", which was as he says in the introduction "a short handbook, useful during an interim period when libraries and works of reference were fewer and less accessible than formerly". This aim it certainly fulfilled at the time, and continued to fulfil for many years. This book was prefaced with one of his own poems, for he has published three books of poetry. He also has written two plays, performed but not published. In the '20s he, with R Atkinson, published Part I of "Theory and Elements of Architecture". Part II was never published, reputedly because he was never satisfied with its drafts. He is still writing: within the last year or two he contributed a chapter entitled "The Rationale of Traditional Buildings" to the book "Rural Change and Urban Growth 1500-1800" (edited by Chalklin and Havinden), exhibiting once again his wide range of interests.

Many of us have learned a great deal from him and we have an enormous respect for his judgement, for the quality of his written and spoken English, itself a lesson in acoustics, and for his wide knowledge. But above all it has been his character and personality which have been so impressive.

Honorary Membership

Raymond W.B. Stephens

Raymond William Barrow Stephens was born at Tunbridge Wells on 13th October 1902, and was educated at both Southfields and Emanuel Schools in London.

In 1921 he commenced his academic career in the Physics Department of Imperial College of Science and Technology as a student, and remained there until 1970 working as demonstrator, lecturer, senior lecturer, senior tutor and reader in acoustics.

His dedication to his research students at Imperial College is reflected in their achievements; one became President of the Acoustical Society of America, two gained the biennial Award of the Society, and another was awarded the Silver Medal of the British Acoustical Society. The Institute of Physics awarded the A B Wood Medal to another of his students, and many others have held distinguished posts as Officers of The British Acoustical Society, The Institute of Physics, The British Society of Audiology, and in our own Institute. It is indeed most difficult to find a country in which at least one of his past students does not reside. Dr. Stephens' interest in his students did not end in the laboratory; he took an active part in their recreational and vocational development as a member of the College Vocational Training and Employment Committee, as Chairmen of the Sports Ground Committee and as President of Imperial College Association Football Club, and has been honoured as a Life Vice-President of the latter. He also served as President of the Royal College of Science Old Students Association. During this period he also acted in the following capacities:

Chief Examiner in Practical Physics Examinations for London University. (A post held for 18 years).

Chief Examiner in Physics (A level), University of London.

Physics Examiner, The Institute of Plastics.

Physics Examiner, Royal Aeronautical Society.

Physics Examiner, British Optical Association.

Asst. Examiner in Theoretical and Practical Physics, University of London.

External Examiner, Universities of Ibadan (Nigeria), Malawi, Kumasi and Khartoum (Sudan).

Dr. Stephens has held many part-time evening lectureships in a number of Polytechnics and Colleges in the London area, and was for fifteen years Special Lecturer in Acoustics at the Chelsea College Part-time MSc Course.

His Honorary Service on Councils and Committees of Societies includes:

First President of The Institute of Acoustics.

Chairman and Secretary of the Acoustics Group of The Institute of Physics.

Vice-Chairman of The British Acoustical Society.

The Council of The Physical Society.

Committee of Applied Physics of the London Regional Advisory Board for Higher Technological Education.

The Education Committee of the Physical Society.

The Non-Destructive Testing Group of the Physical Society.

The Technical Papers Committee of the Physical Society.

The Library Committee of the Physical Society.

Internationally, he is most certainly the most respected and best known British Acoustician, and has attained the following personal distinctions:

Doctor Honoris Causa of Corboda University (Argentina).

Senior Research Fellowship of the National Science Foundation of America.

First British Award of the Rayleigh Gold Medal of The British Acoustical Society.

Fellow of The Institute of Physics.

Fellow of The Acoustical Society of America.

Honorary Member of the Spanish Acoustical Society.

Honorary Member of the Latin-American Acoustical Society.

Honorary Member of the Society of Rheology.

He has been invited on many occasions to lecture at local and international meetings throughout the world, in such places as France, Poland, USA, Russia, Argentina, Venezuela, Mexico, Denmark, Germany, Hungary, Sweden, Japan, etc., and only recently in his 72nd year he has been invited to speak at yet another meeting in the USA, as a guest of The Acoustical Society of America. He was responsible, along with others, for the setting up of the Federation of Acoustical Societies of Europe and has represented Britain at Council meetings.

Dr. Stephens is a man of both British and international eminence in the art and science of acoustics, a subject to which he has devoted a great deal of his life.

To Raymond, and his dear wife Ellie, without whose encouragement and support such an outstanding record of service could not have been so consistently maintained over so many years, the Council pays tribute in awarding him the distinction of Honorary Member.

Rayleigh Gold Medal

Peter H. Parkin, Building Research Station, Garston, Hertfordshire.

P H Parkin took his first degree as an electrical engineer at Queen Mary College in 1938. The beginning of the war interrupted work on a doctorate and he joined the Admiralty underwater defence team, directed first by Bullard and later by A T Pickles. There he was on the tail end of the magnetic mine work and later was totally involved in the acoustic mine work and the highly successful defence against the pressure mine.

He moved with Pickles to the Building Research Station at the end of the war where the most immediate problem was that of sound insulation in houses and flats. In this work his seemingly effortless skill in management and his fine sense of scale blossomed. He put his laboratory on wheels with the first large mobile acoustics facility in the world, and proceeded to wear it out, making innumerable useful measurements all over Britain and on the continent, and organising alongside them the social surveys necessary to give meaning to the data. It was a model operation, and eventually provided the background for codes and standards that have proved to need little change as time has passed.

In 1949 he had a taste of musical auditorium acoustics when Hope Bagenal was appointed consultant for the Royal Festival Hall, and Parkin and Allen from Building Research Station were drawn in as advisers. This was an intensive team operation, with meetings twice a week for much of the period of design and construction. Typically several 'firsts' were made to happen, - the involvement of conductors, musicians and music critics; the use of test audiences; the idea of a tuning period; the prototype structure on site to check insulation from train noise; the big extemporary reverberation chamber under the approach to Westminster Bridge for low frequency work on panel absorbents, then too new to have been documented. All this sort of work has been instinctive with him.

It is a unique tribute to his work that he was able to develop his system of assisted resonance in the Hall a dozen years later, and that he is still involved there.

During the war, Erwin Meyer had been a scientific opponent of the underwater team, but in the post-war period he and Parkin did some collaborative work on sound insulation, and Parkin and Pickles organised DSIR contracts at Gottingen to get Meyer's civilian researchers going again. Haas was one of Meyer's students, and his work on the value of delays for sound systems in buildings was promptly given its first major application by Parkin in a speech reinforcement system for St. Paul's, which also was one of the first major uses of column speakers. It was an absolute first for the now customary use of the two together. The system has been brilliantly successful, and is now being updated, nearly 25 years later. Installations for other cathedrals have been modelled on the St. Paul's scheme, often with his help. Westminster Abbey is an example, and for this he has helped to develop a new type of column speaker.

Between 1955 and 1965 he did classic work on the propagation of noise from aircraft, and it was typical of his approach that he had a fast military plane purchased for his work, stabled conveniently at Radlett and Hatfield. The published researches from this programme are still standard references.

The London Noise Survey was done in 1960 and '61, the first such comprehensive survey in Britain, and perhaps the first of such quality anywhere, largely because of the excellent mobile facilities available. The LCC (as it then was) collaborated, and it was largely out of this experience that the GLC's present strong team developed. At this time he was also organising the new static research facilities at BRS, combining the largest acoustic chamber in Europe with a large reverberation chamber.

Another practical matter of much importance then was the organisation of the studies on which the Government has based its scheme for the sound insulation of dwellings around airports, and once again the right sense of scale was evident in an extensive use of helicopters to provide convenient sources for overall insulation measurements.

In the 1960's he collaborated with the late Henry Humphreys on a book on architectural acoustics which has become a standard text and reference here and abroad.

His most recent work has been on the further development of assisted resonance, which is being marketed with increasing success here and abroad, and on acoustic modelling of auditoria. A related paper on the acoustics of concert and multi-purpose halls has been published in the Proceedings of the Royal Society.

It is part of Parkin's unusual quality that he combines exceptionally successfully the abilities of a researcher, developer and consultant, and although he is not in independent practice as such, his advice is constantly sought by architects and by other acoustical consultants. His imagination attracts, and his insights are valued. He is a model of an applied scientist and his fruitful career stands as the testimony of an effective and concerned person, a fitting recipient of our Rayleigh Gold Medal.

John Tyndall Medal

Michael E. Delany, National Physical Laboratory, Teddington, Middlesex.

Michael Edward Delany was born on 30th June, 1934 at Chelsea and received his secondary education at Emanuel School Wandsworth Common. He graduated from Battersea Polytechnic in 1955 with an Honours Degree in Physics.

On joining the Acoustics Group at Imperial College he developed, from scratch, the instrumentation to measure the optic-acoustic effect in gases. It is a singular coincidence that Tyndall himself, with a less sophisticated system, used this effect to detect the presence of CO₂ in air. On being awarded his Ph.D., he took up a Canadian National Research Council Fellowship for one year at Dalhousie University, where he worked on the effect of a magnetic field on the propagation of sound in liquid mercury. From 1959-61 he held a Leverhulme Research Fellowship in the Department of Audiology and Education of the Deaf at Manchester University, where he investigated the performance of hearing aids and speech training aids for children.

In 1961, Dr Delany joined the Applied Physics Division at the National Physical Laboratory and is at present a Principal Scientific Officer. During this period his versatility in the experimental field has been most pronounced, covering such diverse problems as the design and performance of an artificial ear (since adopted as an International Standard), complex techniques for absolute pressure calibration of laboratory standard microphones using the reciprocity technique, acoustic properties of fibrous absorbent materials, propagation of sound in the atmosphere including ground-absorption effects, prediction of traffic noise, and was a major contributor to the recently published Department of the Environment prediction procedure 'Calculation of Road Traffic Noise', etc. In all he has been the principal author of 22 papers, 20 technical reports, and a number of other publications. The clarity of his lecture presentations have made demands on his time in recent years for public lectures.

Dr Delany is also currently the British representative on three working groups of Sub-Committee 29C of the International Electro-technical Commission. He was a member of the Committee of the Acoustics Group of The Institute of Physics and served for a time as its Honorary Secretary; he is currently a member of the Council of The Institute of Acoustics and a member of both the Publication and Meeting Committees.

John Tyndall was an outstanding experimenter, and as a public scientific lecturer he has been quoted as being the greatest in history, and appropriately the Tyndall Medal is concerned with acoustical education and experimentation. From this Citation it is evident that Dr Delany is truly in the image of the great Victorian Scientist himself, and the Council had no hesitation in selecting Dr Michael Edward Delany as the first recipient of the Institute's Tyndall Medal Award.

Publications Policy

Council has approved the following Institute publications, as recommended by the Publications Committee, but will further review the publications policy in a years time.

Acoustics Bulletin

This replaces the existing Newsletter and will appear three times per year (January, April, and October). It is hoped that production costs can be largely defrayed by income from advertising. Initially this will be edited by M E Delany assisted by J G Charles, R F Higginson, A J Pretlove, and G A Saunders.

Acoustics Yearbook

This will appear in A5 size in September and will include reviews of the past year; Presidential address; Medal lectures (Rayleigh, Tyndall, Wood); invited review articles; Committee, Branch and Group reports. This publication will also carry advertisements. R W B Stephens will act as Editor, assisted by M E Delany and H G Leventhall.

Proceedings

A system of four-page lecture summaries (four pages of A4 photographically reduced to one folded sheet of A4 and produced by photo-offset) covering all scheduled Institute meetings will be introduced as soon as possible. These will be circulated as preprints to conference participants and subsequently all members of the Institute will receive loose-leaf copies to retain as proceedings (these mailings will only be made three or four times a year in order to reduce postal charges). Conference organisers will be responsible for collecting and collating the material for reproduction according to a strict schedule.

Special Volumes

From time to time the Publications Committee may decide that a meeting justifies the production of a special volume containing fuller papers together with the relevant discussion, although this will only be possible when projected sales are likely to fully cover all production costs. This will be in addition to the distribution of corresponding summaries for the Proceedings.

International Acoustics

There has been much discussion in Council regarding the Institute's relations with other national and international institutes and societies. An account by Prof. B L Clarkson portrayed the scene so well that we thought members would also find it interesting. We are grateful to Prof. Clarkson for allowing us to reproduce an edited version of his contribution, to stimulate discussion. Correspondence on this or related matters for publication in a future edition of the Bulletin would be welcomed.

Many issues have recently been raised related to the development of acoustics nationally, regionally and internationally. Some seem unsure of the present position and therefore a debate within IOA on its identity and future would be a good thing.

In the first place we should accept that acoustics is more inter-disciplinary than perhaps any other professional activity. This very wide range of interests in acoustics means that the majority of acousticians have other complementary professional allegiances such as RIBA, RAeS, IOP, IMechE, etc. It is therefore very difficult (and in my view not required) to turn IOA into a unified professional body. By its very nature it will always be a loose association of workers in a broad range of disciplines. This is what we should encourage and we should beware of alienating any particular group by taking controversial stands on issues which are only relevant to a part of the membership.

If we accept such a broad definition of acoustics we then have two major scientific functions. The first is to encourage the development of the specialist fields themselves. The second is to promote cross-fertilization of the specialist fields. This second one is done best perhaps by the promotion of activities which are interdisciplinary in themselves. Such topics as community noise, signal processing, non-destructive testing etc., perhaps fall into this category. These functions should be the main activities of the national (IOA), regional (FASE, ASA), and international bodies (ICA).

The question of professional status is rather more of a national issue. For example there are significant differences between Eastern and Western European approaches on this question. At this stage it does not seem appropriate for the international bodies to take up this matter.

To return to the scientific functions, I believe that the 'explosive' growth of the Institute of Noise Control Engineers (INCE) was not due primarily to a lack of activities in the Acoustical Society of America, but rather to a kind of scientific elitism which de-emphasised applied work on noise as being inappropriate to the ASA. The applied scientists (of which we have several on Council) have made a major contribution to the work of the BAS and the Acoustics Group of the IOP. The marriage of BAS and the Acoustics Group gives us the opportunity to go ahead with noise as a major theme in parallel with other major subject areas. We have therefore no need of an INCE in this country. The majority of the activities of INCE could be, and indeed should

be incorporated into IOA's activities. On the other hand, it seems to me that the Association of Noise Consultants (ANC) has a perfectly valid, useful and separate role to play - rather more in the style of a trade association. Relevant scientific activities can be included in the IOA's programme but it would be wrong to try to make the Institute play all the roles required of the ANC.

I think that International-INCE is something else again. In spite of its obvious relationship to its parent it seems to exist solely for the purpose of organising biennially the International Inter-Noise meeting. IOA should cooperate with International-INCE as it should with any other body organising a meeting on a topic in the general field of acoustics (Ultrasonics International for example). This cooperation could be in the dissemination of information about the meetings, suggestions for speakers etc. But IOA does not have to join International-INCE in order to do this.

It seems to me that the Federation of Acoustical Societies of Europe (FASE) is nothing more than its title suggests, i.e. a loose federation of national scientific societies whose broad individual aim is to further acoustics in their own country. FASE offers the possibility of developing acoustics at the regional level by the promotion of joint scientific meetings on an annual basis in between the ICA congresses. It provides a forum where European acousticians can meet together and as such must surely fulfil a useful function. In this form it becomes of similar size to the Acoustical Society of America. The fact that it does bridge the 'Iron Curtain' so effectively is in my view a strength not a weakness. I do not believe that it overlaps with the International Commission on Acoustics. FASE from the start has been very careful to keep the Commission informed of its activities and the President and Secretary of the International Commission are always invited to attend the FASE Council meetings. This is surely sufficient cross-representation to ensure coordination and to avoid duplication of activities.

The International Commission on Acoustics, as a specialist commission of the International Union of Pure and Applied Physics (IUPAP), exists to advance the science of acoustics throughout the world. It does this in several ways. The most obvious activity is the Congress on Acoustics which takes place every three years and acts as an International meeting place for all acousticians. The large number of papers and their variable quality result from two deliberate policy decisions. The first is that the boundaries of acoustics are set very wide and secondly that there is no review procedure for papers. The breadth results from the interdisciplinary nature of the subject and surely cannot be a point of issue. The question of no review procedure is a point which can be criticised. The reasons against review are that the Congress is essentially a meeting together of acousticians and to many it is essential that they be allowed to present a paper if they are to get travel approval. A review procedure would tend to discriminate against the young unknown acousticians, who find the Congresses of great benefit to their own studies. Thirdly it would be potentially divisive as there would certainly be feelings in some cases that a rejection decision

had been made on national or racial lines. Fourthly it would be very difficult to gather together in the host country a panel of reviewers who were competent to judge all the offerings. Set against these disadvantages is the obvious advantage of a smaller number of presentations, fewer parallel sessions, more time for important contributions etc. which would result if an effective procedure could be developed. On balance the present position of no review seems to be best for the Congresses. Thus we have a viable pattern emerging. Specialist meetings arranged by the national societies (albeit with international participation in many cases) and a triennial get together sponsored by ICA. I think these activities are complementary.

The next way in which the ICA seeks to carry out its mission is through the information and coordination service. This is

a most successful activity. A third area has arisen recently out of the ICA participation in the Scientific Committee on Problems of the Environment (SCOPE) programme. Working groups on four aspects of environmental noise have been set up. Information on them will be circulated to the Acoustical societies and journals in the near future. This represents a new type of activity for the ICA and if successful it is our intention to continue the scheme by choosing three or four emerging topics to highlight in each three-year cycle. The Commission considers other matters from time to time but the above three activities are likely to be the major topics over the next few years.

B L Clarkson

Pioneers of British Acoustics

We continue below with the series on Pioneers of British Acoustics with short biographies on two further workers who have made notable contributions to the prominent position held today by British Acoustics. These have been compiled by R W B Stephens.

E G Richardson

Edward Gick Richardson was born at Watford in 1896 and after graduating from London University with a BSc in physics he served in the RAF during World War I. Following a short period in teaching he became a lecturer in physics at University College, London, where he started his career in acoustics research under Prof. C A Andrade. In 1931 he took up a physics lectureship at Kings College, Newcastle, where he initiated a successful research school in acoustics which led to his appointment as Reader in Physics in 1943 and in 1956 he became the first professor in acoustics (albeit a personal chair) at a British University. During World War II Richardson was an adviser to the Admiralty. He was a founder member of the Acoustics Group of the Physical Society and was the first English editor of the journal *Acustica*. Richardson was also a founder member of the British Society of Rheology of which he was later the President and this versatility was evident in the wide field of his research interests. He published 90 scientific papers including topics such as phonetics, speech analysis, sound propagation in liquids, relaxation phenomena, edge tones etc. He wrote or edited twelve books and his physical text book on Sound first published in 1927 had reached its fifth edition by 1953.

Professor Richardson was a good ambassador for acoustics and lectured in many countries. Students from many parts of the world worked in his laboratory. He had a keen sense of humour and was a very sociable person. The organ and church choir were his main outside interests and he was fond of folk dancing. It can be truly said that Prof. Richardson laid the foundations of academic ultrasonic research in Britain.

A B Wood

Albert Beaumont Wood was born at Uppermill in the West Riding of Yorkshire in 1890 and was educated at Huddersfield Technical College and Manchester University, from where he graduated with first class honours in physics in 1912 followed by the award one year later of the MSc for physics research. He then worked with Marsden on the determination of the range of recoil atoms from radioactive substances at a time when Rutherford's laboratory at Manchester contained many workers whose names are famous as pioneers in atomic physics such as Andrade, Bohr, Geiger, Hevesy, Makeover, Mosely, Nuttall and Paneth. In 1914 Wood was appointed Oliver Lodge Research Fellow at the University of Liverpool and later lecturer in physics but in 1915 at Rutherford's suggestion he became one of the first two research scientists to work for the Admiralty on anti-submarine problems. He was concerned with ASDIC from its beginning in World War I but initially the use of piezo-electric quartz transducers was not practical owing to the absence of means of amplifying the signals. However, about a year later H J Round of Marconi produced the first valve amplifier which had a large asbestos filled pip at the top of the envelope and this was heated by a coil to control the vacuum. Later, under the directorship of Prof W H Bragg, Wood designed the first directional hydrophone for use in submarine detection. He was awarded the DSc of Manchester University in 1919. In World War II Wood was designing acoustic mines and counter-measures and he received the OBE in 1940 for his part in dismantling the first German magnetic mine.

Albert Wood was a member of the Physical Society and served on its Council and he was a founder Fellow of The Institute of Physics. In 1952 he was awarded the Duddell Medal of the Physical Society for his work on instrument design and his many contributions to underwater acoustics were recognised after his retirement by the bestowal in 1961 of the 'Pioneer of Underwater Acoustics Award' of the Acoustical Society of America. A B Wood was a modest man who took particular delight in helping his younger colleagues. His book 'Sound' was a standard text for many years. On his death his many friends on both sides of the Atlantic contributed to a fund for the institution of the A B Wood medal and prize, which appropriately, is aimed at the younger research worker.

Construction and Demolition Sites

Noise is one of the commonest environmental pollutants - and one of the most difficult to control. Part 3 of the Control of Pollution Act puts new emphasis on measures to achieve reasonable noise levels on construction sites and gives local authorities stronger powers to enforce them. Hand in hand with the drafting of the Act went work on BSI's new code of practice BS 5228 "Noise control on construction and demolition sites" which offers valuable practical guidance to local authorities and to the building industry on the best ways of meeting the Act's requirements. In this article, reproduced by kind permission from BSI News, June 1975, it is described by Mr R C Simpson of the Noise Policy and Clean Air Division of the Department of the Environment.

BSI's new code of practice, BS 5228 *Noise Control on Construction and Demolition sites*, reflects and is in response to a radical change in the law governing noise from construction sites. It will be an important and integral part of the mechanism of control.

The form of the code is largely dictated by two recent pieces of government legislation - the Control of Pollution Act 1974, which has yet to be implemented, and the Health and Safety at Work etc Act 1974. Though it is primarily designed to help those responsible for carrying out work on construction and demolition sites, the code's application is not restricted to this.

Behind the code and the legislation which backs it lies a growing realization of the harmful effects of noise on workers in noisy occupations and on others who are incidentally subjected to it. Noise from construction sites is high on many people's list of pet noise hates. There are a number of reasons for this. Construction sites (especially when the term is shorthand for construction, repair or maintenance of buildings or roads, major civil engineering works, demolition or dredging - as it is in the Control of Pollution Act) impose themselves on everyone's attention from time to time. They bring in their train problems of mud and dust as well as of noise. The noise problem frequently causes resentment in urban areas, despite high noise levels, but the disturbance is even less welcome in quiet residential or rural areas where the noise from the site is a very noticeable intrusion on the privacy of those who are forced to listen to it. Such intrusion is particularly resented when the noise continues late into the night or starts early in the morning.

Solutions

The analysis of the problem is relatively easy, but finding solutions is altogether more difficult. Since 1960 there has existed a law giving local authorities powers to deal with noise nuisance. However, these powers cannot be brought into operation until the nuisance has first been caused and even then the process of remedying it tends to be relatively long drawn-out. This means that by the time local authorities are in a position to take action against a noise-maker he has finished the job and has moved on to a new site to begin the process all over again.

In practice, the situation is probably not quite as bad as it is painted here, but there is no doubt that the present law (enshrined in the Noise Abatement Act 1960) leaves a great deal to be desired. This was the verdict of a working party of the Noise Advisory Council which, under the chairmanship of Sir Hilary Scott, produced the report *Neighbourhood noise*. The report recommended that control over noise from construction should start before the work commenced.

This idea has now been embodied in the Control of Pollution Act which, inter alia, provides local authorities with powers to specify noise requirements which the person proposing to carry out the works will be required to meet. The Act also provides procedures to enable the person who is going to carry out the works to take the initiative in ascertaining the local authority's requirements. The advantage of this is that the applicant can do this at a time convenient to him and any delays in ascertaining those requirements will not then lead to expensive delay on site. It is worth noting that the Act also provides for various appeal procedures against any requirements imposed by local authorities, but once the requirements have been settled it becomes an offence to contravene them.

Code of practice required

The Act goes further and requires the Secretary of State for the Environment to approve a code of practice for the carrying out of works on construction sites (which is where BS 5228 comes in). In making this provision, Parliament was tacitly recognizing that noise control on construction sites is by no means a simple business - a view which any contractor would readily, and with emphasis, confirm. On the contrary, it is a very complex matter and will be affected by any number of factors - for instance the kind of site, the type and number of machines operating on the site, the part of the site on which they are operating, the stage of the works, the activities of the workers, the ease of access and the immediate environment of the site.

In such a situation there is every chance of a difference of view between the local authority and the person carrying out the works on what constitutes suitable noise control requirements. What is more worrying, particularly to the large contractors whose operations take them to all four corners of the kingdom, is that different local authorities in different places may have different ideas about what can be done to control noise. This could have serious implications for contractors who have invested many thousands of pounds in machinery in the expectation that they could use it anywhere in the country and then find that what is acceptable in Winchester is not acceptable in Wapping.

There is, of course, no way of ensuring that different local authorities will approach problems in an absolutely identical way, and it might well be undesirable that they should, since their job is to decide their noise requirements in the light of the local position. But having said this, there are obvious advantages in doing everything one can to ensure that local authorities, wherever they might be situated, take the same factors into account in reaching their decisions. One of the main objectives of the new code, BS 5228, is to give local authorities guidance on what can and what cannot be done to deal with noise from construction sites. Thus it will provide local authorities with a manual on which they can base their requirements.

Not rigid

It is not intended that this should be a manual to be rigidly followed. First of all it would be virtually impossible to produce a rigid code and, even if it were possible, it would be undesirable. The intention is that local authorities shall be able to adapt the code to their particular local needs.

It is worth noting that the Act is drafted in such a way that if a local authority ignored or disregarded any relevant provisions of the code in serving a notice or giving a consent under the Act, their failure to have regard for the code would make their decision liable to challenge by the recipient of the notice or consent. Thus any substantial or significant departure from the code would have to be justified by the local authority. This should do a great deal to promote general uniformity of approach to the problems of construction noise by local authorities. The code will also help local authorities by giving valuable information about the noise levels of machinery typically used on construction sites and will assist them in other ways with the prediction of noise levels and with information on how to combat noise.

Helping the industry

However, the code is not intended only for local authorities. It is designed to help the industry to meet the requirements which are likely to be imposed on it under the new legislation. It should do a great deal to promote useful discussion between building contractors and local authorities on what is, and what is not possible in particular circumstances. Of particular value to the industry is the fact that the code

brings together, for the first time, much useful information about the best present noise control practice. This is worth emphasizing because it shows that the guidance and suggestions made in the code are essentially practical ideas produced within the construction business rather than the idle and idealized imaginings of academics or administrators. It means that, by taking care, and by paying due attention to noise problems from the planning stage onwards, small contractors as well as large ones can meet any reasonable requirements placed on them by local authorities.

Legislation

The new legislation mentioned in this article is an indication that there has to be a new approach to the control of noise on construction sites. No longer will it be sufficient to worry about noise only when pressed to do so by a local authority. In fact the onus will be on those responsible for carrying out construction works (and the other works to which the Act relates) to consider designs, work methods etc in the light of the effects of noise both on their workers and on the surrounding neighbourhood. BS 5228 is designed to assist local authorities and the industry to reach agreement on ways of protecting workers and the environment from unnecessary noise. The fact that both local authorities and the construction industry will be referring to the code should unify their efforts to meet the Act's requirements.

Unfortunately it is not possible, and probably never will be, to have silent construction works but, with the help of the code, they should at least be quieter in the future than they have been in the past.

Control of Pollution Act

Part III of the Control of Pollution Act 1974 came into force in England and Wales on 1 January 1976 following a Commencement Order made by the Secretaries of State. On the same date the Control of Noise (Appeals)

Regulations came into force and so did the Control of Noise (Code of Practice for Construction Sites) Order which gave authorisation to BS 5228, Code of Practice for the Control of Noise from Construction and Demolition Sites. The Control of Noise (Measurement and Registers) Regulations dealing with noise abatement zones are expected to come into force on 13 February 1976, subject to Parliamentary approval. A Department of the Environment circular covering all this is being prepared for issue at the end of February.

Federation of Acoustical Societies of Europe

Council Meeting

The 4th Council meeting of FASE met in Paris on 3rd October 1975 and the Institute was represented by its President, Mr W A Allen. At this meeting Prof H G Diestel (PTB) was elected President of FASE and Dr von Wolfden Palthe (Delft) was elected Secretary. The Hungarian Acoustical Society was accepted into membership of the Federation (this is in addition to the existing representation by the

Hungarian Society for Optics, Acoustics and Filmtechnology). The UK representation is shared between the IOA and the British Society of Audiology. It was reported that the first FASE congress had been a great success with 140 registrants from 23 countries at the first colloquium and 350 registrants from 26 countries at the second colloquium. The next FASE symposium will be held in 1977 in the United Kingdom (during November at the new Wembley Conference Centre) with the theme "European Noise Legislation". It was further announced that Poland will host the FASE congress in Warsaw in September 1978 which (provisionally) will cover ultrasound including ultrasonic medical diagnosis, non-destructive testing, underwater acoustics, environmental acoustics and wave propagation.

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Conference Reports

Railway Noise

held at Potters Heron Motor Hotel, Ampfield, on 25th November 1975

Nearly 40 people attended this meeting which was intended for research workers, engineers, and planners. Papers by H H Stanworth and B Hemsworth described some of the work being carried out at the British Rail Technical Centre at Derby on the noise problems created by railways. Of particular interest was evidence which indicates that new generation trains are quieter by some 10 dB(A) than earlier models, even though they run at higher speeds. Preliminary results were presented on the effectiveness of noise barriers alongside a railway line.

Results of a study on the propagation of railway noise were presented by J A Tubby and were shown to be in close agreement with the theory put forward by Rathé. Experimental determinations of the attenuation of railway noise produced by cuttings, embankments and houses were reported by J G Walker. He concluded that a single row of detached or semi-detached houses produces an insertion loss of about 8 dB(A), terraced houses a reduction in noise

level of between 12 and 17 dB(A), and a cutting a reduction of 6-8 dB(A).

T K Williams and I D Griffiths reported their consideration of ways in which the effect of railway noise on a community can be assessed. They concluded that, pending further data, A-weighted Leq is the most satisfactory way of rating railway noise when assessment of its disturbing effect is required and this was in close agreement with J Simpson's conclusions.

During the discussion session it was concluded that it is essential to conduct a comprehensive study of the effects of railway noise on the community which would allow a method for rating railway noise with respect to community reaction to be formulated. It was reported that ISVR are at present engaged on such a study and that preliminary results could be expected in about a years time.

Other conclusions reached were that track maintenance activities will present a difficult assessment problem, that low-frequency diesel engine noise could have particular importance, that vibration problems may be considerable, and that changes in noise environment may affect reactions considerably.

J G Walker

Digital Techniques

held at Chelsea College, London, on 16th December 1975

Over 70 people, about half of them non-members of the Institute, attended this Meeting. The delegates came from a range of backgrounds including communications, electroacoustics, manufacturing industry, aeronautics, research establishments, consultancy and education.

N G Kingsbury of Marconi Space and Defence Systems described "A Cepstrum Processor for Speech Analysis". The processor calculates cepstra for real time analysis of speech by Fast Fourier Transform methods, and gives the spectra and larynx period. The processor also provides as outputs the log spectra and cepstra in both analogue and digital forms for display on an oscilloscope or for further processing by an external computer.

A paper on "Application of Digital Measurements to Speech" was given jointly by H J Prangnell (Cossor Electronics Ltd.) and M W Judd (Joint Speech Research Unit) who described "The Development of a Digital Spectrograph". The analogue spectrograph has limitations for some detailed research requirements, but these are overcome in the new instrument which will contain a digital store holding up to 64,000 samples and a digital scanning filter. A micro-processor controls the general characteristics of the analysis and display.

S J Flockton from Chelsea College in a paper entitled "An Alternative to the Standing Wave Tube Using Digitally Generated and Processed Transients" showed the advantages of digital methods over standard analogue techniques. A digitally generated frequency modulated tone burst is reflected from the sample at the end of a long tube and the reflected signal detected and digitised. Fourier transformation of the reflected signal enables the complex reflection coefficient of the tube termination to be determined.

R C Driscoll (North London Polytechnic) read a paper on the "Application of a Programmed Read Only Memory (PROM) to produce a narrow band spectral test function". The function consists of a $\sin\beta/\beta$ envelope which may be varied in time by the control clock and used as the modulation envelope of an audiofrequency, thus producing a narrow band signal which has wide applications in acoustic and vibration test work.

The application of digital techniques to loud speakers was discussed by L R Fincham and J M Berman of KEF Electronics Ltd. in papers on "Loudspeaker evaluation using digital techniques" and "The development of an engineering computer for acoustical work". Difficulties in analogue recording of loudspeaker impulse response are overcome by digital signal averaging of many impulses whilst transformation of the impulse enables the amplitude and phase response of the loudspeaker and cumulative decay spectra to be obtained. The impulse response also gives the response of the loudspeaker to any other input and permits the simulation of loudspeaker modifications

to be assessed. More general applications of the digital computer were also considered by Dr Berman who showed how the use of a mini-computer as the heart of a multi-purpose test facility greatly improves on the majority of analogue measurements and has immense versatility. The papers produced an active discussion. Some of the delegates still had doubts about the economics of digital

equipment in relation to analogue systems, but these doubts will probably disappear as the cost differentials reduce and it was generally accepted that, in due course, most acoustical laboratories will be equipped with a mini-computer, programmed to carry out a wide range of functions.

H G Leventhall.

IEEE Group on Sonics and Ultrasonics

This three-day meeting was held in Los Angeles during September 1975 with plenary sessions on biophysical and biological effects of ultrasound, underwater acoustics, and consumer product application of ultrasound. Each day

started with a plenary session in the form of a tutorial paper which was followed by a break-up into three parallel sessions containing both invited and contributed papers. As is becoming common in scientific meetings in the USA, poster sessions were given a trial. Of the 27 sessions eight dealt with some aspect of surface acoustic waves, three with medical applications and four with various aspects of physical acoustics.

R W B Stephens

Symposium on Acoustics and Spectroscopy — Gdansk University

It is interesting to report on Gdansk University as one of the few University physics departments in Poland with strongly developed acoustics research. This department is under the direction of Anton Sliwinski who has a total academic and technical staff of over one hundred. A new building for Physics was officially opened last October and in commemoration a Symposium was held on Acoustics

and Spectroscopy, the two main research fields which interlace most effectively with present trends in physical acoustics and optics. The speakers invited from the UK were R V Jones of Aberdeen who in the course of his talk on "The Momentum of Electromagnetic Radiation in a Refracting Medium" dealt with radiation pressure, John Lamb of Glasgow University whose lecture title was "Shear Waves of Variable Frequency for Studying Viscoelastic Relaxation Processes and Molten Polymers" and Raymond Stephens of Chelsea College whose talk was on "Acoustics as an Interdisciplinary Subject in the Education of a Scientist". The latter also gave a contributed paper on "Ultrasonic propagation in liquid metals".

Acoustics at C A Parsons

C A Parsons & Co Ltd manufacture turbogenerators and their associated equipment. The firm was founded by Sir Charles Parsons, who developed the first successful steam turbine.

Although the steam turbine has found applications in a number of fields, C.A. Parsons is now solely concerned with the very largest machines—those used to generate electricity.

A turbogenerator consists of a steam turbine driving an electrical generator. A modern one is a truly massive machine, being as much as 50 metres long, 5 metres in diameter, spinning at 3000 rpm, and generating over 500 MW of electricity. With this enormous amount of power passing through the machine it is not surprising that some of it turns up as noise. In fact the noise levels close to the machine are quite modest, ranging from 80 to over 95 dB(A) in the worst cases. Further, it is frequently the associated machinery which is the main source of noise.

The Company is carrying out work on the noise problems of turbogenerators. This is done by the Applied Physics Department of the R & D Laboratories. The department

also does acoustic consultancy work through the associated contract research organisation, International Research & Development Co Ltd. The two companies occupy neighbouring sites at Newcastle-upon-Tyne.

Turning first to the noise problems of turbogenerators, the aim here is to control noise within the turbine halls of power stations. A number of noise sources are involved. Continuous sources include the turbine, the generator, the steam valves which control the flow of steam to the turbine, fan noise from air-cooled generators, and the exciter, which is a small generator which powers the electromagnets of the generator. There are also a number of intermittent sources, such as air ejectors and steam dump systems, which are involved in the starting and stopping of the turbogenerator.

It is no easy task to separate these noise sources. Generally, the acoustic measurements must be done in the turbine hall of a working power station, containing a number of turbogenerators side by side, and many other noise sources as well. The measurements must therefore be made very close to the turbine. To avoid the large number of measurements that would be required if separate measurements were made all along the length of the machine, a 'walk-round' technique is used. This technique consists of simply walking right round the machine, carrying a sound level meter and a portable tape recorder. If the tape is then replayed onto a graphic recorder, the resulting trace is a graph of the variation of noise along the turbogenerator.

Some other techniques are also being tried, such as using directional microphones, and a stethoscope-like system.

At present, noise control is largely by silencing and enclosing machinery, although Parsons are also undertaking fundamental research on the problems. An enclosure for one of the turbogenerators at Ferrybridge 'B' power station has been designed and built by C A Parsons, in collaboration and with financial support from the CEGB. This, together with some other acoustic treatment, has reduced the noise substantially. The experience gained on this project is being used to further develop the system, which could have applications for other firms.

As a large engineering company, C A Parsons experiences some noise problems within its own works. These do not usually arise from the very large machines used to make turbogenerator components; in fact these are remarkably quiet. Problems occur from the typical engineering processes such as chipping and grinding, and occasional tool resonances on lathes; some problems have also come from special test rigs. The Applied Physics Department deals with these problems as part of the Company's Health and Safety policy.

An example of this was the new high speed balancing pit, used for dynamically balancing generator rotors. This was an interesting example of the dividend paid by having an acoustician as a member of the design team for a large project. The noise within this pit can exceed 130 dB(A). However, the pit must be covered by a 4000 ton concrete lid, to protect personnel should the rotor burst. This cover was therefore also made to serve as an excellent acoustic cover. Further acoustic work went into designing the cooling system for the drive system to minimise the noise. The resulting pit can be operated without any problems from noise.

The consultancy work undertaken by the department covers many kinds of problems, ranging well outside the area of turbogenerators. The work includes measurement and analysis of noise, the design and manufacture of noise control measures, noise planning, and R & D work.

The department's equipment includes the normal range of sound level meters and tape recorders. Analysis equipment includes real-time $\frac{1}{3}$ octave analysis and real time narrow band analysis. There is also a small anechoic chamber, a special duct for absorption measurements down to low frequencies, and a transmission loss pit.

Currently, many small measurement jobs are being done for firms lacking the equipment or expertise. These include noise surveys for factories wishing to check whether their noise levels are in line with the 90 dB(A) Leq recommended in the DE Code of Practice, measurements for equipment suppliers wishing to provide noise data to their customers, measurements of the acoustic properties of materials, and investigations of community noise problems.

A project is in progress for a company which is the main contractor for a blowing and generating station. The customer has specified maximum noise levels both within and outside the station. Work on this project includes checking the many subcontractors noise data and calculations, and recommending additional acoustic treatment where necessary.

A recent R & D project concerned the noise of hydraulic pumps. These are small machines, but can be quite noisy, as they pump fluid under very high pressures. The project was concerned with measuring the noise from the pumps, and developing a means of predicting the noise of the pumps by indirect means, as a method of production testing.

The work of the Applied Physics Department, then, covers most of the aspects of industrial noise. For its own company, it is engaged in noise measurement and analysis, fundamental research into the problems of the company's products, designing noise suppression equipment, and helping to provide a good working environment. To outside organisations it is providing a noise measurement and analysis service, helping companies to meet their customers noise requirements and undertaking R & D work.

M.P. Jenkins.

Euronews

The International System of Units (SI for short) is revised at regular intervals: full use must be made of the resources offered by modern science and technology to define even the most basic units, such as the metre (re-defined in 1960) and the second (re-defined in 1967), as accurately as possible. It is also in the interests of the European Community to use units recognized by the rest of the world. Can a British engineer using the term "horse power" (which in Britain corresponds to 745.7 watts) be quite sure of being correctly understood on the continent (where it corresponds to 735.498 75 watts)? The European Commission has therefore proposed that Member States' legislation on units of measurement be gradually aligned. It will indeed be sad to see the stère (a cubic metre of wood) disappearing completely and the degree Celsius or Fahrenheit being

replaced by the Kelvin. But the nostalgic amongst us should not despair. Harmonization admittedly makes for greater accuracy but there is no reason why we should not continue to use the delightfully archaic and poetic calorie (now 4.186 8 joules) or furlong (now 201.2 metres) in everyday speech. And the essential has been preserved: the pint, kingpin of the British Imperial system, has been granted a reprieve.

A Research and Development meeting of the Community's Council of Ministers on 15 December will examine the priorities selected by the European Commission for the next five years. The Commission's communication recommends that the Community's research effort should concentrate on resources (energy, agriculture, raw materials), the environment (criteria for pollutants, prevention of pollution, nature conservation), economic and industrial development (data processing, the aircraft industry, iron and steel, textiles etc.) and the life of society (biomedical research, urban development, transport and telecommunication system, social research etc.).

Council 1976

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Co-opted Members	Dr L Mackinnon (Chmn Education Committee) Mr B Oakes (Chmn North-Eastern Branch) Dr F Fahy (Chmn Southern Branch)

Council has met twice in recent months and a brief report on some of the topics discussed at these meetings is given below. Other aspects, such as Committee, Branch and Group reports, appear elsewhere in the Bulletin.

The Institute of Acoustics has declined an invitation to join International INCE, at least for the present. However, IOA will cooperate with INCE whenever appropriate.

Council is continuing to examine proposals to restructure the Institute as a professional qualifying body and has charged the Membership Committee, in cooperation with the Education Committee, with producing detailed recommendations at their next meeting.

Council has provisionally agreed to a recommendation by the Education Committee that the Institute should establish a Diploma in Noise Control. A working party has been established to draw up a proposed syllabus and make recommendations regarding the organisation and administration of such a Diploma.

Council has decided to seek membership of the Parliamentary and Scientific Committee. This is a non-Party body formed in 1939 with the object of providing a permanent liaison between Scientific bodies and Parliament so that the latter shall have proper regard for the importance of scientific methods in relation to public affairs.

Acoustics News

International Commission - President

Friends throughout the world will wish to join with us in congratulating Edgar Shaw (ex-Imperial College) on his appointment as President of the International Commission on Acoustics.

International Commission - Secretary General

Acousticians throughout the country are pleased to congratulate Professor Brian Clarkson on his election to Secretary-General of the International Commission on Acoustics. We wish him the same success in his new task as he achieved as Chairman of the Organising Committee for the 8th ICA held in London in 1974.

Council for National Academic Awards - Doctor of Technology

W E Scholes, Head of Environmental Design Division at BRE Garston, has been awarded the degree of Doctor of Technology by the Council for National Academic Awards on the basis of his published research into noise. The research included work on sound insulation between dwellings, outdoor noise propagation, the insulation of dwellings against external noise, and more recently, road traffic noise.

Atkins Research & Development - Appointment

Roy Waller has been appointed a Director of Atkins Research and Development. As Head of the Environmental Consultancy he continues to be responsible for noise (Chief Noise Consultant Mr T K Willson) and for dynamics (Chief Dynamicist Dr L R Wootton) as well as for ecology, social

response, and the assessment of environmental impact in general. Projects relate to transportation noise, industrial and construction noise, building acoustics, dynamic loads resulting from mechanical sources, earthquakes, wind and waves. Recent major work has included studies related to the Noise Insulation Regulations, the full-scale investigation of loads induced in off-shore oil rigs, the wind tunnel testing of suspension bridges, the isolation of buildings from ground-borne vibrations, the drafting of the Code of Practice on construction noise, the design of open plan offices etc. Roy Waller is a Vice-President of the Institute and is Chairman of our Meetings Committee. He is also Chairman of the Association of Noise Consultants.

British Standards Institution - Chairman

Mr W A Allen has accepted Chairmanship of the British Standards Code Drafting Committee BLC/10 - Sound Insulation.

Chelsea College - Appointment

We congratulate Dr H G Leventhall on his appointment as Reader in Acoustics at Chelsea College.

Acoustical Society of America - Memorial Session

On the occasion of the Acoustical Society of America Memorial Session to Vern O Knudsen, Dr R W B Stephens was invited to repeat the memorial address he originally delivered at the Edinburgh Meeting an Architectural Acoustics which was held immediately following the 8th ICA.

Appreciation

Vernon M Albers

Acousticians concerned with Underwater Sound will lament the passing of Dr V M Albers who was Emeritus Professor of Engineering Research at the Pennsylvania State University. He passed away on 15th May, nine days after celebrating his 73rd birthday.

He graduated from Carleton College, Minnesota in 1923 with a BA degree in Physics and subsequently obtained the MA and PhD degrees in Physics from the University of Illinois. From 1930 until 1943 he taught first at Antioch College and later at Ohio State University and his field of research was primarily in the study of absorption and fluorescence spectra of plant and animal pigments. During the period 1943-5 he worked at Harvard under 'Ted' Hunt in the production of the first acoustic homing torpedo and afterwards joined the Applied Research Laboratory within the Engineering Faculty of Pennsylvania State University where he became in turn Professor, Assistant Director and Chief Scientist. He was continually active in publication

from 1956 onwards and was the author or editor of three books on underwater acoustics and a general acoustics book and as recently as 1972 he edited the Benchmark Acoustics Papers on Underwater Sound. The Acoustical Society of America also received his attention during these years and particularly in education and in the editing of manuscripts on underwater acoustics, and he played an active part in the acoustics graduate degree programme at Penn State University when it was inaugurated.

It would surprise many to learn that under his serene and friendly attitude Albers could be so industrious and versatile. In evidence of the latter quality may be mentioned his best-sellers on the art of furniture making. The writer was privileged to assist him in the 1961 NATO Conference on Underwater Acoustics held at Imperial College as a joint effort with Penn State University and I was able to appreciate at close hand the unassuming but efficient way he carried out his duties. The friendly atmosphere and technical success of this meeting are still a live memory and a tribute to the man whose passing we mourn.

Raymond Stephens

Branches and Groups

Southern Branch

There have been five Southern Branch meetings this Autumn, including a skittles evening held on 11th December at Romsey, and membership now stands at 93. The four technical meetings have been as follows. "Instrumentation for Noise Measurement" by Tony Miles of the Wolfson Unit, University of Southampton, held at Highbury Technical College, Cosham; a panel meeting on "The Work of the Noise Advisory Council" held at the Guildhall, Southampton, at which Mr Batho, Prof Richards and Prof. Clarkson explained the work of the Council and answered questions - this meeting was open to the public; "Recent Advances in Auditorium Acoustics" by Dr M Baron and "Noise Control in Air Conditioning Systems" by Ivan King, both held at Southampton University. Meetings for Spring 1976 are listed below and all Institute members will be welcome.

20th January

Talk by Dr P House of the Department of Biology, Southampton University, on the ways in which insects use noise to communicate. 8pm, Arts Lecture Theatre C, Southampton University.

18th February

Hearing Hazards from Impulsive Noise, Dr A Martin, ISVR, 8pm Arts Lecture Theatre C, Southampton University.

10th March

½-day meeting to be held at Basingstoke in conjunction with the Southern Centre of the Environmental Health Officers Association. Speakers include Rupert Taylor, and Ewan Roberts (Environmental Health Officer, Bristol) Meeting starts at 2pm.

27th April

On-line Condition Monitoring, by Robert Monk. Arts Lecture Theatre C, Southampton University, 8pm.

For further information contact Peter D Wheeler, Wolfson Unit, Telephone Southampton 559122, Extension 2162

North Eastern Branch

The NE Branch has already held one meeting this session and is paying particular attention to ways of catering for a widely-scattered membership. A joint meeting with the IEE "Noise from industrial plant" addressed by Mr J Moir, is planned for March. A meeting on "Aspects of Pollution" which will include noise, air pollution, and radioactivity is planned for April, and a joint meeting with the British Occupational Hygiene Society during May. For further details contact the NE Branch Meetings Secretary, Mr M Jenkins, R & D Laboratories, C A Parsons & Co Ltd, Newcastle-upon-Tyne.

Aerodynamic Noise Group

The AGM was held on 6th January following a successful meeting "The Prediction of Jet and Fan Noise" held at Rolls Royce, Derby. The Group is also cooperating in organising the Institute's meeting on Aerodynamic Noise to be held at Loughborough University on 24th March. For further details of activities consult Dr Mike J Fisher, ISVR, Southampton.

Musical Acoustics Group

Council has approved the formation of a Musical Acoustics Group and it is hoped to hold its first meeting at the Department of Musical Instrument Technology, London College of Furniture, Commercial Road, London E1 1LA. The provisional date for this is the afternoon of Friday 9th April. It is hoped that members attending this meeting will report on their progress (not necessarily a paper on completed work). There will also be opportunity to see College workshops and, although the students will be on vacation, some instruments should also be on view. Prospective participants please contact Mr John Lincoln at the above address as soon as possible.

Speech Group

Council has approved the constitution of the newly-established Speech Group. For further information contact Dr Adrian Fourcin, Department of Phonetics, and Linguistics, University College, London.

Underwater Acoustics Group

A main Institute meeting organised by the Underwater Acoustics Group will be held at AUWE, Portland, on 31st March - 1st April. The Secretary of this group is Dr Brian V Smith, Department of Electronic and Electrical Engineering, University of Birmingham.

Industrial Noise Group

A Steering Committee of six members has been formed to aid the running of the Group until a postal ballot can be held in March 1976. Three meetings have been held so far. The second meeting was held in the Department of Electrical Engineering, University of Salford, on 10th September and dealt with the Control of Pollution Act: 1974. The third meeting, held on 10th December at Nottingham University, dealt with the Draft Code of Practice on Machinery Noise and the design of machinery to comply with the Control of Pollution Act. For further details of activities please contact Dr Paul L Wilcox, Department of Aeronautical & Mechanical Engineering, Salford University.

Education Committee

The sixth-form lectures held at Canterbury in October and at Bath in November were most successful with attendances of 200 and 300 respectively. It is hoped that the next session will include sixth-form lectures at Bradford, Liverpool, Norwich, and York. Following the previously successful meeting held at Southampton, the sixth-form lectures there have become an annual venture with an attendance this year of over 400. In addition Dr R W B Stephens recently addressed the Science Masters Association at their Annual Meeting.

Within the next few months it is planned to produce a single-page hand-out to be given to all attenders at such meetings. It is also hoped to find a convenient method for updating the existing booklets on "Education and Careers in Acoustics" with the intention of producing a completely new edition for next year.

Approval has been given for the project competition to be held again this year.

Acoustics in Parliament

Aerospace - Aircraft Noise

On 28th July 1975 Mr Pattie asked the Secretary of State for Trade whether he has seen a copy of the policy document by the Local Authorities Aircraft Noise Council entitled "Relief from aircraft noise"; and if he will make a statement on his policy towards its recommendations.

Mr Clinton Davies: Yes. I have seen a copy of the document. My Department is already taking action in a variety of ways to provide relief from aircraft noise, but we are always prepared to consider new measures and study their practicability. The council's document embraces many wide-ranging measures and I cannot at this stage comment on them in detail. They will need careful consideration and my officials have arranged a meeting with the council to discuss the document.

Mr Pattie: May I press the Minister further, despite his answer, and ask him to comment on two facets of the report which are particularly important: first, the desirability of encouraging research into the production of quieter aircraft engines and, secondly, the two operational methods mentioned in the report for reducing aircraft noise on landing?

Mr Davis: The hon. Gentleman will no doubt recall that on two previous occasions I have indicated to the House that it is important to continue research into the production of quieter engines. The question of landing techniques continues to concern my Department and those engaged in the aviation industry. I hope that the hon. Gentleman will accept my assurance on those matters.

On 1st August 1975 Mr Corbett asked the Secretary of State for Trade whether he will publish details of the terms of reference, the research methods to be employed, the estimated cost and expected duration of the project financed by the Department into the effects of aircraft noise upon health to be carried out by the Medical Research Council.

Mr Clinton Davis: The study is being carried out by the Institute of Psychiatry, London, on the effects of aircraft noise on the health of communities near airports. It was commenced in October 1973 and may take up to five years to complete at a total cost of £200,000 at 1973 prices. The institute is responsible for the design of the research and the methods to be used in carrying it out, and I am not in a position to provide details on these matters in advance of its report.

Mr Corbett asked the Secretary of State for Trade whether he will advise the Medical Research Council to receive evidence from interested members of the public in the course of its research into the effects of aircraft noise upon health.

Mr Clinton Davis: The Medical Research Council considered the problem of this research in considerable depth before it decided to ask the Institute of Psychiatry to undertake it. That body must now be left free to carry it out in the manner which it considers most likely to enable valid conclusions to be drawn, and it would be improper for me to give it advice on this.

Concorde

On 23rd June 1975 Mr Hayhoe asked the Secretary of State for Trade if he will arrange a series of Concorde landings and take-offs at Heathrow so that those living near the airport may assess the noise nuisance this aircraft will cause under normal airline service conditions.

Mr Clinton Davis: No. A substantial number of Concorde flights to and from Heathrow are, however, planned to take place between July and September as part of the endurance flying programme. These flights will be monitored for noise purposes.

Mr Hayhoe asked the Secretary of State for Trade what are the latest figures for the landing and take-off noise of Concorde; and how these compare with the current generation of large jets in airline service.

Mr Kaufman: I have been asked to reply.

The manufacturers' latest estimate remains as quoted in the reply which my hon. Friend gave to the hon. Member on 17th December last. This is that Concorde's noise levels on certification at the increased weight of 400,00lb. will be 118 EPNdB on take-off and 115 EPNdB on landing. These compare with large jets currently in airline service as follows:

	Take-off	Landing
VC10	110	112
Boeing 707-320C ...	114	120
DC8-61	115	116
Boeing 747-200 B/F ...	108	107
Lockheed 10-11	97	103
DC 10-30	104	107

Education - Postgraduate Education

On 10th July Mr James Boyden moved: "That this House takes note of the Third Report from the Expenditure Committee in Session 1973-74 (House of Commons Paper No. 96) on Postgraduate Education, and the Third Report from the Expenditure Committee in the last Parliament (House of Commons Paper (1974) No. 306) on Educational Maintenance Allowance".

Referring particularly to the report on Postgraduate Education, Mr Boyden mentioned the Committee's reference to higher education policy. 60% of postgraduate students who obtain higher degrees go immediately, without any work experience, into universities, schools or research. In other words, practically two-thirds of postgraduate students with higher degrees return to the areas of activity from which they came.

The Committee makes a strong case for the argument that, instead of allowing students to decide the subjects in postgraduate education, there should be a much greater national effort in the universities and polytechnics to have some influence on the decisions which the nation requires in its employment of postgraduates.

Mr Geoff Edge regretted that the report does not make a clear distinction between people being trained to do research and those being trained for university teaching. There are people who are excellent researchers who would be quite incapable of communicating to any group of people. The skills need not necessarily go together and quite often they do not go together at all.

The people whom we need to train to do research are those who deserve training which is more than slapdash. Many of those who entered into research were given no training in research techniques. By and large he understood that the science departments are better than the social sciences and the arts departments.

We needed to look far more seriously at the whole question of research policy. There has been no effective debate about what research policy should be between different disciplines. There is no major attempt to identify the key areas into which research should be directed. There needs to be far greater debate about the relative volume of expenditure to be shared between the different research councils.

Research returns which we can obtain from a given input of money will vary. Science research and research in engineering is inevitably more expensive, but we need to discover what we are getting in terms of reports, research and trained manpower, of which we can make use.

The Under-Secretary of State for Education and Science (Miss Joan Lestor), speaking for the Government, said that the Expenditure Committee's Report had been carefully considered by the research councils, both individually and in the advisory board for the research councils. They have provided their detailed observations and the Department will be taking them into account when in due course it replies to the Report. The Science Research Council had responded by establishing its own separate review of policy in the fields for which it is responsible. The report of its working party would be published in August.

The Report of the Expenditure Committee is being taken very seriously. It is right, in a matter of this kind, where responsibility is widely diffused, for the Government to collect and consider the views of all interested bodies before giving their final pronouncement.

Health - Hearing Impairment

On 16th June 1975 Mr Sydney Irving asked the Secretary of State for Social Services what matters she has referred to the two new advisory committees on hearing impairment.

Mr Alfred Morris: In the case of the Advisory Committee on Services, gaps in the existing health and personal social services, including, in particular, rehabilitation of the adult hearing impaired, the organisation and staffing structure required for an audiological service including the place of the graduate scientist, the future priority groups for the behind-the-ear hearing aid and the needs of hearing impaired children.

In the case of the Advisory Committee on Audiological Equipment, equipment for audiology units at district general hospitals, environmental aids, monitoring of equipment research and development projects sponsored by the Department, reports of defects and hazards in audiological equipment, monitoring of progress of the issue of behind-the-ear hearing aids, editing of the Medical Research Council's electro-acoustic committee report and the standards for speech audiometry equipment.

On 19th June 1975 Mr Normanton asked the Secretary of State for Education and Science whether he has read the Screening Survey report of 2,060 hearing-impaired children in the Midlands and North of England which has been distributed by the Royal Schools for the Deaf; and whether he has any proposals in mind to deal with the inadequacies in teacher training facilities and educational provision for such mentally handicapped children.

Miss Joan Lestor: The report has been read by the Department's specialist advisers and officials concerned. Before its circulation they had discussed with representatives of the schools which cater for hearing-impaired children who are also educationally subnormal or maladjusted, including the Royal Schools for the Deaf, Manchester, what further provision was needed for such children. Various proposals are now being considered.

Motor Vehicles - Electrically-Propelled Vehicles

On 14th July Mr Gwilym Roberts asked the Secretary of State for Industry if, in view of the recent trials of electrically-driven cars, he will now provide additional resources to stimulate the development of electrically-driven cars and commercial vehicles.

Mr Kaufman: Electric propulsion is used most commonly in light commercial vehicles. Progress in its wider application could be assisted by the development of improved batteries, and my Department, together with the Department of the Environment, is supporting a substantial programme of research on the sodium sulphur battery.

Tractors (Noise Levels)

On 23rd June 1975 Mr Moate asked the Minister of Agriculture, Fisheries and Food if he is satisfied that adequate resources are available to the National Institute of Agri-

cultural Engineering at Silsoe for the purposes of carrying out research into the reduction of noise levels on tractors, without loss of power; what support the Government are providing; and if he will make a statement.

Mr Strang: I am satisfied with the adequacy of resources available to the National Institute of Agricultural Engineering for carrying out research into the reduction of noise levels on tractors. This study includes noise reduction at source in relation to engine design and rating. Also receiving consideration is the acoustic absorption of cabs, tractor and cab structural resonance, optimum mounting arrangements for cabs and investigation of acoustic materials. My Department supports the work under the arrangements for commissioning research and development with the Agricultural Research Council and in the current year expenditure is expected to be about £15,000.

Book Reviews

The editor welcomes the submission of books for review to be included in the Bulletin, which should be sent to the Secretary. It is hoped that reviewers will agree to donate the review copies to the Institute so that they can be held for referral by members.

Noise and Noise Control Vol. 1

M J Crocker and A J Price

CRC Press, Cleveland, Ohio

This is part 1 of a two-volume set which is devoted to principles of noise control and is intended "more for the practitioner than the casual reader and for students in mechanical, environmental, civil, electrical and aeronautical engineering, architecture and architectural science". Successful chapters deal with fundamentals of sound and vibration, human hearing and subjective response to sound, instrumentation for sound and vibration measurement, acoustics of enclosures, and architectural acoustics. For much of the material a high level of mathematics is not required although some engineering knowledge would certainly be necessary. In the preface the authors assert that the book should bring to a wide audience an up-to-date, very badly needed, reference work in the field of noise control. This is a bold assertion and would require an outstanding text to achieve it. This text does achieve a reasonably high standard of presentation and attempts have been made to achieve up-to-date coverage with, for example, foot-note coverage of the ASA No. 1;1975 standard method for the real-ear evaluation of hearing protectors. In other places, however, it leaves something to be desired. For example, in the case of calibration of microphones reference is made only to the ANSI S1. 10-1966 American standard rather than the more recent IEC Recommendations on precision and simplified methods for pressure and free-field calibration of microphones. Again, referring to A-weighting specification, no reference appears to be made to the revised tolerances specified by IEC for precision-grade sound level meters. Throughout the text examples are given of summing band levels "two-by-two" which may have been necessary in pre-electronic calculator days but is hardly necessary now. Most of the text is in terms of MKS units with occasional convenient conversions but towards the end it seems to veer towards a

random mixture of SI, cgs, and "practical units". It is liable to confuse the reader when in the space of a single sentence referring to absorbing materials the density is given in lb/ft³, dimensions in inches, and the specific flow resistance in rayls/cm. In this respect I also feel that the authors' use of "English Units" to describe units based on feet and inches is a little outmoded; since Britain has adopted the SI system whilst USA has not, I would suggest that such units be termed "American Units" but if the latter is objected to then at least refer to them as "Olde English Units". There are lapses too in one or two places. In explaining the operation of polarised capacitor microphones under constant-charge conditions, premature binomial expansion of the capacitance variation in terms of the electrode/diaphragm separation will surely lead the reader to conclude that the relation between output voltage and displacement is inherently non-linear. Again, in referring to the effects of wind and temperature on outdoor sound propagation, we read "The shadowing or reinforcement effects can cause differences of as much as 20 or 30 dB from the expected attenuation of a sound source"..... "but instead an enhancement of sound would be heard (compared with the normal inverse square law attenuation)". Thus no indication is given that any "enhancement" compared with inverse square law is generally very small indeed and that such meteorological factors merely overcome excess attenuation due to screening or ground effects. However, these comments should not be taken too much to heart. The style adopted is quite attractive, there are numerous clear diagrams, and generous lists of references for further reading. Although I would advise noise-control practitioners that it would be premature to cast away their well-thumbed copies of Harris's Handbook of Noise Control, or Beranek's Noise Reduction and Vibration Control (if only because the present volume makes a number of references to them), here is a volume which many will find useful and which can be generally recommended.

M E Delany

Wave Electronics

A new International journal Wave Electronics was launched during 1974/75. This journal publishes papers on the general field of wave interactions used for communications purposes. This includes the fields of bulk acoustic wave propagation in solids and liquids; surface acoustic waves;

guided surface waves, both electromagnetic and acoustic; guided optical waves; optical signal processing and holography. The unifying theme of the use of wave propagation and wave interactions to perform signal transmission and signal processing functions in electronics runs through all these fields. This list is not exhaustive but indicates the range of uses of wave interactions in electronics at the present time. British members of the editorial board include E A Ash, J H Collins, E R Dobbs, E G S Paige, F N H Robinson, J S Palfreeman, and C W Turner. Details available from Elsevier Scientific Publishing Company, PO Box 211, Jan Van Galenstraat 335, Amsterdam, Netherlands.

Archives of Acoustics

The Polish language quarterly "Archiwum Akustyki" is now in its tenth year of publication. Starting in 1976 an English language edition with the title "Archives of Acoustics" will be published which will contain original papers from all fields of acoustics as well as news of activities of acoustical centres in Poland and in other countries. There will be no page charge to authors. Further information can be obtained from the Editor-in-Chief, Prof S Czarnecki, IPPT PAN, Swietokrzyska 21, 00-049 Warszawa, Poland.

Noise Second Edition

by Rupert Taylor

Published by Penguin Books

The book is intended for the educated layman, engineers and architects and those who have ambitions to become architects. It certainly does not pretend to be a thorough treatise on acoustics; a point which has to be made in the light of some of the misguided reviews which appeared after the first edition.

Here is a book which can be read in order to gain knowledge of a subject in which one is already involved, or at leisure, or on a tedious train journey. It is the easy literary style which encourages reading for reasons other than the mere pursuit of knowledge, and for this the author deserves congratulations since it is a rare achievement amongst contemporary scientists and engineers.

The fundamentals of acoustics required for appreciating what follows are covered in the first four chapters, then follows a chapter on hearing and damage to hearing. There is then a chapter devoted to the meaning of noise and the

rest of the book covers the principles of noise control. Quite a useful glossary of acoustical terms is included together with suggestions for further reading.

At 80p this book is extremely good value for money.

P Lord

Construction Industry Europe

Published by House Information Services Limited. 1974
£12.00

This bilingual guide (English and French only), sets out to provide basic information on the construction industry throughout Europe. It will be of considerable interest to anyone facing the prospect of extending their business activities into the EEC. Although the Guide has been designed with the construction industry in mind, it will be of considerable assistance to anyone working in the broader field of environmental engineering and who requires basic information on national products and services, market prospects and client organisations, building regulations and town planning controls, standards, testing, research and information, professional practices and a wealth of carefully organised and annotated key facts.

Building Regulations (1972) Checklists and Index

Published by House Information Services Limited.
£1.95

House's Checklist and Index will be of secondary interest to the acoustician, but to the architect and building designer it will give invaluable assistance in interpreting the Building Regulations (1972) and subsequent amendments. As the introduction to this publication states, 'anyone who is constantly to check work against the regulations faces two problems: how do I find out which ones apply to this job? and when I find them how do I know what they signify in practice?' The Checklist obviously cannot cover all possible interpretations of the finer points of the Regulations, but should be of considerable assistance to any building designer in making sure that no major matters are overlooked or given insufficient attention.

T J B Smith

Recent International Standards

(Available through BSI)

ISO 2041: 1975

Vibration and Shock - Vocabulary.

(Substantially agrees with BS 3851)

ISO 3095: 1975

Measurement of Noise Emitted by Railbound Vehicles
(No BS equivalent)

ISO 532: 1975

Method for Calculating Loudness Level

ISO 2922: 1975

Measurement of Noise Emitted by Vessels on Inland
Waterways and Harbours
(No BS equivalent)

ISO 2923: 1975

Measurement of Noise on Board Vessels
(No BS equivalent)

ISO 1999: 1975

Assessment of Occupational Noise Exposure for Hearing
Conservation Purposes

Recent Publications

Stress, Vibration and Noise Analysis in Vehicles.
Edited by H G Gibbs & T H Richards.
Applied Science Publishers Ltd, UK £16.00

Auditorium Acoustics.
Edited by R Mackenzie.
Applied Science Publishers Ltd, UK £10.00

Road Traffic Noise
A Alexandre, J Ph Barde, C Lamure, & F J Langdon.
Applied Science Publishers Ltd, UK £8.00

Models and Systems in Architecture and Building.
Edited by D Hawkes.
The Construction Press Ltd, 1975

Acoustics and Vibration Progress, Vol 1.
Edited by R W B Stephens & H G Leventhall.
Chapman & Hall, London, 1974. £6.00

Physical Acoustics.
W P Mason & R N Thurston.
Academic Press, 1973. £20.65

Ultrasonic Communication by Animals
P Sales and D Pye
Chapman & Hall 1974 £5.95

Disorders of Auditory Function.
Editor W Taylor.
Academic Press, 1973. £6.70

Modern Developments in Audiology (2nd Edition)
Editor J Jerger.
Academic Press 1973, £8.65

Basic Mechanisms in Hearing
Editors A Möller & P Boston.
Academic Press, 1973. £14.40

Sound Reception in Mammals
Edited by R J Bench, A Pye, & J D Pye
Academic Press 1975. £9.80

Introduction to Noise Analysis.
R W Harris & T J Ledwidge.
Pion Ltd 1974 (distributed by Academic Press) £2.50

The Auditory Periphery: Biophysics and Physiology.
P Dallos.
Academic Press, 1973. £16.80

Dictionary of Sound: International Dictionaries of Science
& Technology.
Edited by R W B Stephens.
Blackwell Ltd. £15.60

The Protection Handbook of Industrial Noise Control
P Sutton.
Second Edition. Alan Osborne & Associates Ltd, London
London. £1.00

Human Performance Reports.
List 20, Autumn 1975. Edited by P Barnard.
Available from MRC Applied Psychology Unit, 15 Chaucer
Road, Cambridge, CB2 2EF.

Auditory Analysis and Perception of Speech.
Editors G Fant & M A A Tatham.
Academic Press 1976. £12.00

Physiological Measures of the Audio-vestibular System.
L J Bradford.
Academic Press, 1975. £11.25

Foundations of Modern Auditory Theory.
Editor J V Tobias.
Academic Press Vol 1, 1970 £15.35
Vol 2, 1972 £12.95

Visual & Technical Aids

Sound Research Laboratories have produced a catalogue of slides, films and handbooks, available for purchase and loan from the company. The catalogue is free on application to SRL., Holbrook Hall, Little Walsingham, Sudbury, Suffolk.

Recent British Standards

BS 4009: 1975
An Artificial Mastoid For the Calibration of Bone Vibrators used in Hearing Aids and Audiometers.

Basic Features of an Artificial Mastoid for Objective Calibration of Bone Vibrators used in Hearing Aids and Audiometers. Agrees with IEC 373.

BS 5261: Part 1: 1975
Guide to Copy Preparation and Proof Correction.
Part 1. Recommendations for Preparation of Typescript Copy for Printing. Gives guidance to authors on the preparation of typescript to make their work easier to edit and to print. 24pp, £4.00

Other Recent BSI Publications

DD 47: 1975 (Draft for Development)
Vibration Isolation of Structures by Elastomeric Mountings.
This tentative code of practice deals with isolation of structures from ground-borne vibrations and noises. It is hoped that users comments will enable a definite code to be prepared within a few years.
75/54156 DC
Measurement of Airborne Noise Emitted by Compressor Units including Prime-movers - Engineering Method for Determination of Sound Power Level.
(ISO/DIS 3989)
Specifies an engineering method for determining the airborne noise emitted by portable (movable) and stationary compressors and gives precise instructions for conducting the test and reporting the results.

Institute of Hearing Research

The Secretary of State for Social Services announced recently that HM Government is to establish an Institute for Hearing Research in the UK.

In announcing this decision the Secretary was quoted to have said that 3.5% of the total population (of Great Britain) suffer from hearing disabilities, and that a situation such as this calls for a much more intensive effort of research.

It was also pointed out that, in determining research priorities, one cannot slavishly follow the rule of thumb of putting common things first, but common things should have a very high priority.

Further information on the final form the Institute will take, will be published when announced.

International Meetings

15th International Conference on Acoustics ULTRASOUND
5th to 9th July 1976.

Secretariat: Dum techniky CMTS Praha
O. Michalcova
Gorkeho nam. 23
112 82 Praha 1
Czechoslovakia

INTERNOISE 76

The 1976 International Conference on Noise Control Engineering organised by International INCE in cooperation with the Acoustical Society of America will be held at the Shoreham-Americana Hotel in Washington DC on 5-7th April 1976 concurrent with the Spring meeting of the ASA being held at the Statler Hilton Hotel, Washington DC on 5-9th April. The technical programme will highlight noise control engineering in the areas of environmental noise, industrial noise, and transportation noise, along with related national and international developments in standards,

legislation, materials, products and measurements. For additional information write to: Inter-Noise 76, ARL-PSU, PO Box 30, State College, PA 16801, USA.

76 Noise Control Conference in Poland

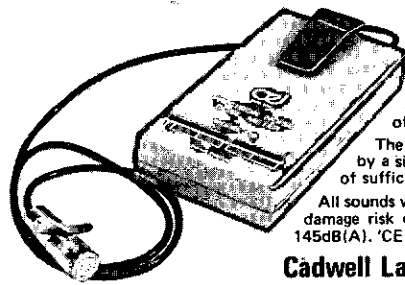
The Committee on Acoustics of the Polish Academy of Sciences has announced that the 1976 International Noise Control Conference will be held in Warsaw from 13th to 15th October 1976. Assistance in organising the technical programme is being provided by the Institute of Noise Control Engineering (INCE/USA). The conference will address current problems on noise control with particular emphasis on technical, physical, psycho-acoustical, and environmental problems. Three forms of paper presentation will be used: poster form, invited papers and contributed papers. Time will be allowed for panel discussion. For further information please write to Prof S Czarnecki, President of the Committee of Acoustics, IPPT PAN, Swietokrzyska 21, 00-049 Warsaw, Poland.

Forthcoming Meetings and Conferences

Date 1976	Subject	Location	Date 1976	Subject	Location
12/14 Apr	Spring Conference Noise in Buildings Loudness Evaluation Industrial Noise Non-linear Propagation in Solids	Liverpool	Oct	Psychoacoustics & Hearing	University of Surrey
19 May	Construction Noise	Coventry	Nov	Ultrasonics	To be decided
16 Jun	Wave-induced dynamic loads in structures	London	Dec	Cybernetics & Acoustics	Chelsea College
June	Room Acoustics and Audiometry (joint with BSA)	To be decided	1977		
2 Sep	Autumn Conference Integrated Design Speech Musical Acoustics Hi-Fi	Heriot-Watt University Edinburgh	Jan	Instrumentation	Southampton
Late Sep	Colloquium on Case Studies of Noise and Vibration Control	Newcastle	Feb	I Mech E conference on Industrial Noise	London
			Apr	Spring Meeting	University of Bath
			Late Apr	Correlation Techniques in Acoustics	London
			May	Air Sounding	To be decided
			July	9th ICA	Madrid
			Nov	FASE Symposium on European Noise Legislation	Wembley

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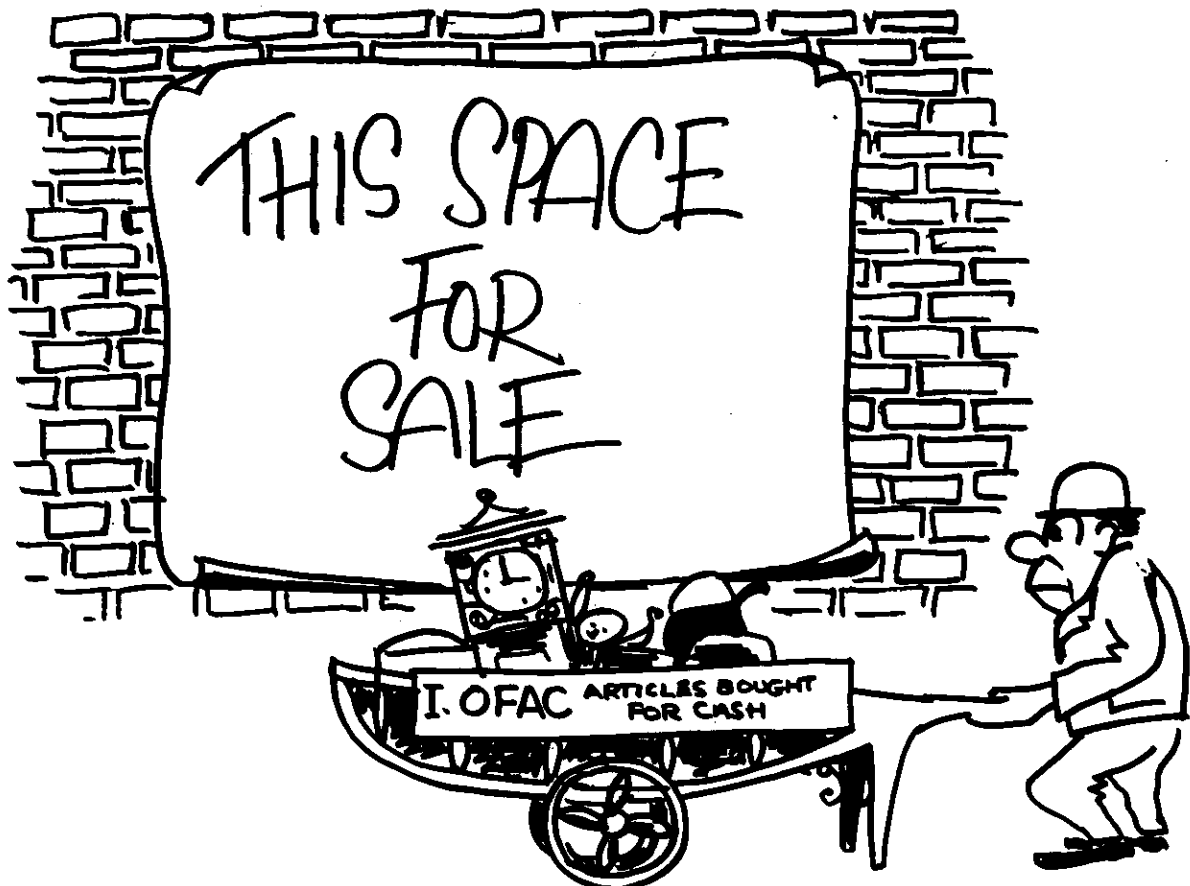
Now monitoring and control of excess noise needn't be a headache. The pocket size 'CEL 139 Noise Dose Meter' weighs only 80gms. Designed to fit an employee's top pocket to register noise exposure throughout the working day and express the results as a percentage of the maximum recommended daily exposure as in the D. of E. 'Code of Practice'.

The Unit is completely self contained having its own integral read out system, powered by a single PP3 battery, monitored by a battery condition indicator to give an assurance of sufficient capacity, and operates for at least five 8 hour measurement periods.

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**'WO' A BARGIN — AND I CAN'T EVEN
GET IT ON ME BARRER !!'**

UNIVERSITY OF SALFORD COURSE IN INDUSTRIAL ACOUSTICS

The University of Salford is to introduce in October 1976, a part-time two year course leading to the degree of MSc in Industrial Acoustics. It has been designed to provide specialised knowledge in acoustics for persons already in industry and consultancy. Students on the course will be expected to attend the University for one half-day every fortnight to discuss their progress, but the study for the course will be of a private individual nature. The course is being organised by the Department of Applied Acoustics, which was established in the University on 1 August 1975.

The course content has been organised into seven different modules. They are:

Fundamentals of Acoustics I
Fundamentals of Vibration
Human Response to Noise and Vibration
Fundamentals of Acoustics II
Random Signal Theory
Instrumentation and Measurement
Noise and Vibration Control

These seven modules will be studied during the first eighteen months of the course and

each will be examined by a written paper. Students will spend the final six months preparing a dissertation.

Candidates for the course should have an honours degree (or equivalent) in Engineering, Mathematics or Physics. It is expected that there will be places for up to 10 students.

Further information is available from Dr R D Ford, Department of Applied Acoustics, University of Salford, Salford M5 4WT.

NEWCASTLE UPON TYNE POLYTECHNIC

Department of Physics and
Physical Electronics

**HNC/HND Supplementary
Studies in Applied Acoustics**

3rd - 21st MAY 1976.

This is a three-week course of intensive study of the instrumentation, measurement techniques, principles and procedures for noise abatement, and recent legislation.

The course is intended for technologists, engineers, environmental health officers and others, having little or no formal training in acoustics, who are becoming increasingly involved with noise problems. Participants will be given an up-to-date appreciation of the subject and a unique opportunity to study for a certificate of Supplementary Study in Applied Acoustics.

Suitable applicants would normally hold an HNC, HND (any relevant discipline) or EHOEB Diploma. Candidates with equivalent qualifications or experience will be considered.

Course fee—£14.25 (exclusive of accommodation or meals).

Application forms, a hotel list and further details can be obtained from the Course Organiser, Mr B Oakes, Department of Physics and Physical Electronics, Newcastle upon Tyne Polytechnic, Ellison Place, Newcastle upon Tyne, NE1 8ST.
(Telephone: 0632-26002, ext. 344 or 319.)

ASSOCIATION OF NOISE CONSULTANTS Part-time Chief of Staff.

The Association is considering the appointment of a Part-time Chief of Staff to look after the affairs of the Association and to promote its interests.

The Association is formed of the majority of the professional noise consultants in the United Kingdom and has been in existence now for nearly three years. The Association has a strict Code of Ethics governing the behaviour of its Members but as an Association is anxious to play a fuller part in the public debate of noise issues and in formulation of policy. It is also anxious that the Members shall jointly develop the reputation of providing a

high quality service at a reasonable cost thus enhancing both their own prospects and benefiting their clients in general.

One possibility is for a person who has been working in the field of Noise and who is about to retire. It would be particularly appropriate if there had been experience of Government and Local Authority Organisations because quite clearly one significant area of interest for the Association is in its relationships with such organisations.

Remuneration would be negotiated but we are thinking of somewhere in the region of £2,000 per annum plus expenses. The location

of the individual is not particularly important provided that he/she can travel to London relatively easily. We are looking for a person with considerable initiative and ability to work on behalf of the Association both politically and technically with the minimum of guidance from Council.

Enquiries should be made in writing and be accompanied by a brief career description, addressed to:

The Chairman
Association of Noise Consultants
6 Long Lane
London EC1A 9DP.

UNIVERSITY OF SOUTHAMPTON



Institute of Sound and Vibration Research

Research Assistant required for experimental research in higher order mode acoustic energy propagation in flow ducts with area changes. A graduate with some experience in Acoustics is required. Salary in the range £2,800 to £3,800 approx.

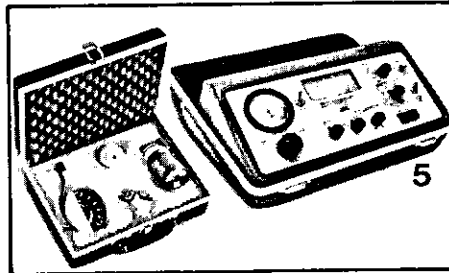
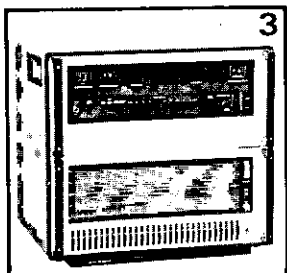
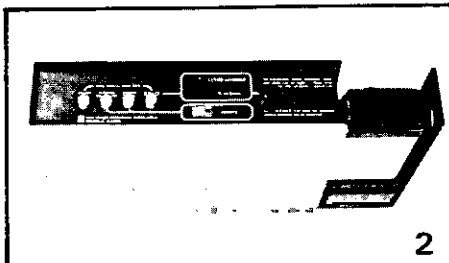
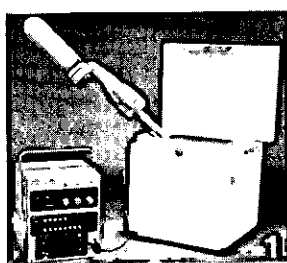
To commence as soon as possible.

Applications to: Professor P.O.A.L. Davies,
I.S.V.R. University of
Southampton, SO9 5NH.

Total capability in Acoustic measurement

1. GenRad 1945 Community Noise Analyser. A stand-alone, easy-to-use instrument giving on-site readout of L exceedance levels, including L_{max} and L_{min}, L_{eq}, and L₁₀. Does not require tape recorders or calculators, and battery power eliminates ac line requirements. Low-cost, optional weatherproof microphone system and waterproof security enclosure available.

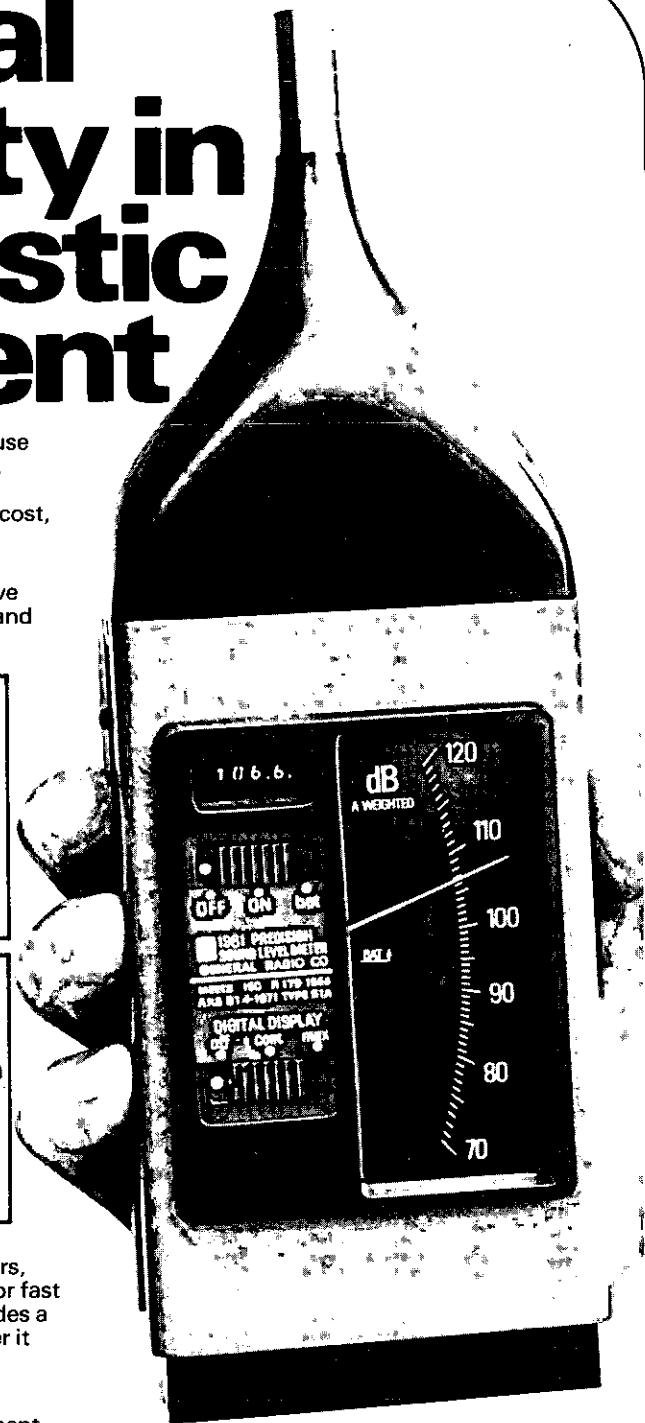
2. GenRad 1944 Noise Dosimeter. The practical solution to cumulative noise-exposure measurements in areas where noise levels fluctuate and where workers may move from one work station to another.



3. GenRad 1921 Real-Time Analyser. It has adjustable filter attenuators, which can be adjusted to equalise the outline measurement system for fast or specially shaped response. Filter section of the analyser also provides a summed output, which is the weighted, recombined input signal after it has passed through the adjustable attenuators and filters. Selectable integration time from 1/8th sec. to 32 sec.

4. GenRad 1983 Sound-Level Meter. A low-cost, easy-to-use instrument with one range, 70 to 120 dBA, no range switching, easy-to-read scale calibrated in 1-dB increments.

5. GS. 1721 Otoadmittance Meter. Portable, built-in audiometer, 5 frequencies which can also be used for screening audiometry. HTL, low pass, high pass and band pass noises are included. Requires no preliminary ear canal measurements. Linear scale.



**The GR 1981
precision sound
level meter**

GenRad Ltd.,
Bourne End, Buckinghamshire SL8 5AT.
Telephone: Bourne End 26611
Telex: 848321.

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