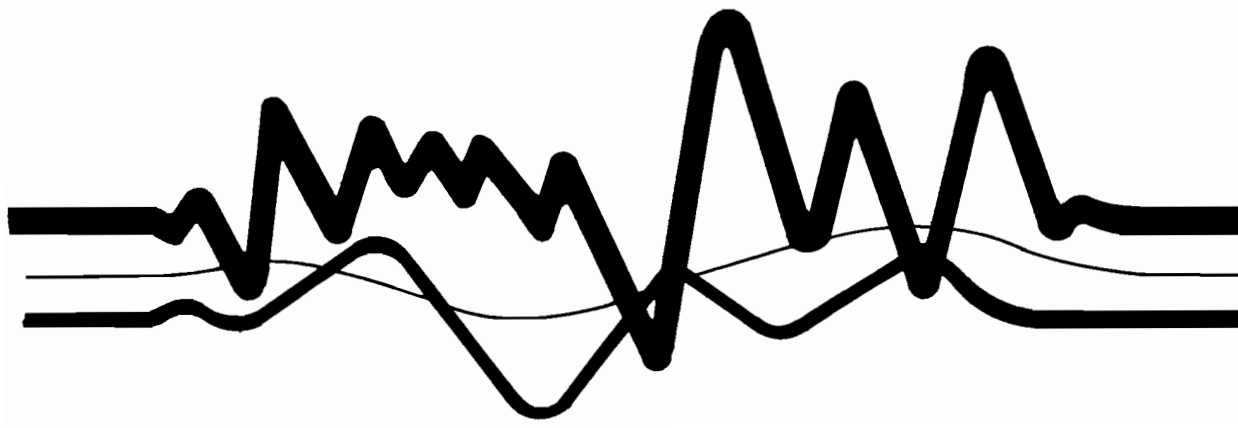
The Bulletin

OF THE AUSTRALIAN ACOUSTICAL SOCIETY

Volume 7, Number 2, August 1979



Addresses for Correspondence

Correspondence to the Society on National matters should be addressed to:

The General Secretary, Australian Acoustical Society, Science Centre, 35 Clarence Street, Sydney, N.S.W., 2000.

Correspondence to the Society on regional matters should be addressed to the appropriate Division Secretary as set out below:

N.S.W. Division (includes Queensland & A.C.T.): Mr. G. Patterson, C/ Science Centre, 35-43 Clarence Street, Sydney, 2000.
S.A. Division (includes N.T.): Mr. D.H. Woolford, 38 Lockwood Road, Erindale, 5066.
Vic. Division (includes Tasmania): Mr. W.J. Kirkhope, P.O. Box 130, Kew, 3101.
W.A. Division: Dr. I.H. Bailey, Department of Physics, W.A.I.T., Hayman Road, Bentley, 6102.

Address for Correspondence to The Bulletin

Dr. R.J. Alfredson, Department of Mechanical Engineering, Monash University, Clayton, Vic., 3168.

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THE BULLETIN OF THE AUSTRALIAN ACOUSTICAL SOCIETY

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- The Bulletin is published by the Australian Acoustical Society, Science House, 157 Gloucester Street, Sydney, NSW, 2000.

GUEST EDITORIAL

Concern about noise in Australia has now reached the stage where each state has noise laws, and agencies to administer those laws. Also, the public has become much more aware of problems caused by noise and expects much more of noise laws. Some laws have not been going long enough for them to be assessed and, of those that have, some have been found to be far more successful than others. Further, many of Australia's noise laws are remedial rather than preventative and, while remedy is necessary, a far greater emphasis should be placed on prevention. It is the failure to introduce certain preventative laws, and to properly implement others, that is of concern to me here.

Firstly, motor vehicle noise. We are all aware that motor vehicles are the most widespread cause of noise problems. The Commonwealth has a law limiting the noise emissions from new vehicles and some of the states have laws limiting the noise emissions from vehicles in use. These measures certainly have helped to reduce noise from individual vehicles but have not had a major effect on the overall noise from motor vehicles. This is partly because there is no comprehensive approach to the problem, not even comprehensive requirements limiting the noise from roadways. In Sweden, for example, there are both staged emission limits for new and in-use vehicles (similar, in principal, to Australia's), and immission limits from roadways to various land uses - the latter is for new developments and gives standard values and five exceptions, such as for a new roadway in an existing area. This approach has much to commend it, but unfortunately it will probably be sometime before Australia looks at introducing something similar.

Secondly, hearing conservation. Many Australians are aware that noise can damage their hearing but still choose to ignore this, or do nothing about it. This results in unnecessary hearing loss in the community, which could be significantly reduced if people were better informed. I believe there is a real need for many more comprehensive education programs on hearing conservation, and its implications. This could have a significant effect on the problem, including an eventual reduction in the number of employees awarded worker's compensation for hearing loss. Persuasion alone, of course, is not enough and most of the states now have, or will soon have, hearing conservation laws (hopefully uniform in approach). However, none yet have the resources necessary for overall enforcement. Further, some of the laws may not have sufficient scope. Once again in Sweden, for example, the proposed legislation covering hearing conservation is generally more wide-reaching than here. For instance:

students in training institutions, prison inmates and conscripts, as well as employees generally, are covered by its provisions;

administration authorities may intervene, and employees may participate in the planning processes of plant, equipment and buildings to ensure a good working environment; and

the central administration authority is empowered to completely ban a non-conforming process or item of equipment.

Far greater powers to prevent noise problems from occuring would make a significant contribution towards achieving what should be the goal of any noise law - the elimination of harmful and annoying noise from the community.

Carolyn Mather
Chief Noise Control Officer,
Environment Protection Authority

FROM THE PRESIDENT

The first fifteen years of the Society is now behind us so it would seem appropriate to review our progress since the formative meetings held separately in Sydney and Melbourne during 1964.

While the Melbourne and Sydney groups were persuing their separate activities there were members of both looking forward to amalgamation with a view to forming an Australia wide Society. After much painstaking work by a relative few, Memoranda and Articles acceptable to each group were completed and the Australian Society was formally incorporated in 1971. As interested people in West Australia had just established a group they were pleased to form a Division there and more recently a healthy Division has been established in South Australia. We hope that before long there will be sufficient interest in the remaining States to complete our establishment. Since incorporation our numbers have increased from 181 to the present 368 and although we may take pride in this growth it is clear that a broader base is required for discharge of the Society's national and international responsibilities.

The 10th International Congress on Acoustics, Sydney, 1980 and the satellite conferences in Perth and Adelaide will place us on the acoustic map of the world but it will also make great demands on our human resources. There is no doubt that the 10th I.C.A. will stimulate a growth in membership at that time but it is my belief that instead of waiting until then we should make every effort to bring new members in before hand. They would get to know those of longer standing and become acclimatised to the Society and its activities prior to the I.C.A. Not only would this enhance their own enjoyment of the Congress but as Australian hosts they would help to give many hundreds of overseas visitors the royal welcome we are planning for them.

Don't leave the search for new members to others, please do what you can yourself.

Gerald Riley
President

MEMBERSHIP CHANGES

Member

Bridge, P.	N.S.W.	Pollution Control Comission, Sydney, N.S.W.
Burton, R.S.	Vic.	H. Vivian Taylor, South Yarra, Vic.
Cheah, B.K.	N.S.W.	Cheah, Carr & Wilkinson Pte. Ltd., Singapore
Chiveralls, K.	S.A.	Sturt C.A.E., Bedford Park, S.A.
Colgan, P.J.	N.S.W.	Health Commission of N.S.W., Lidcombe, N.S.W.
Hield, P.R.	N.S.W.	Pollution Control Commission, Sydney, N.S.W.
Hollingworth, G.H.	N.S.W.	Main Roads Dept., Brisbane, Qld.,
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Lee, K.H.	N.S.W.	Pollution Control Commission, Sydney, N.S.W.
Nemec, D.	N.S.W.	N.A.L., Millers Point, N.S.W.
Steele, C.M.	N.S.W.	C.M. Steele & Assoc., North Sydney, N.S.W.
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Smith, T.J.	N.S.W.	N.A.L., Millers Point, N.S.W.
Spickett, J.T.	W.A.	W.A.I.T., South Bentley, W.A.
Tonisson, W.	N.S.W.	N.A.L., Brisbane, Qld.

Affiliate

Manson, J. McA	S.A.	Vibration Analysers Pty. Ltd., S.A.

Subscriber

Blake, F.P.	N.S.W.	F. Perot & Co., Kings Cross, N.S.W.
Heintjes, F.W.	Vic.	Deakin University, Belmont, Vic.
Lamb, P.R.	Vic.	CSIRO, Textile Industry, Belmont, Vic.
Lawry, P.S.	S.A.	Thermofoam Pty. Ltd., Beverley, S.A.
Wyner, I.	N.S.W.	

Student

Axford, S.J.	W.A.	Public Works Dept., West Perth, W.A.
Daly, C.	N.S.W.	School of Mining, University of N.S.W.
Paige, C.	N.S.W.	Health Commission of N.S.W., Lidcombe, N.S.W.

SUSTAINING MEMBERS

The Society values greatly the support given by the Sustaining Members listed below and invites enquiries regarding Sustaining Membership from other individuals or corporations who are interested in the welfare of the Society. Any person or corporation contributing $200.00 or more annually may be elected a Sustaining Member of the Society. Enquiries regarding membership may be made to The Secretary, Australian Acoustical Society, Science House, 35-43 Clarence Street, Sydney, N.S.W., 2000.

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NEWS & NOTES

SOCIETY ANNUAL GENERAL MEETING AND DINNER

Date: Friday, 21 September, 1979 at 7.15 p.m.

Venue: Parkroyal Motor Inn, 441 Royal Parade, Parkville (Victoria).

Functions: The Annual General Meeting of the Society will be followed by a dinner at the same location, commencing at 8.00 p.m. and the cost for this dinner will be $17.

CONFERENCE "BUILDING ACOUSTICS DESIGN CRITERIA"

Date: Saturday, 22 September, 1979

Venue: National Science Centre, 191 Royal Parade, Parkville.

* The information sheet and Registration Form were prepared and distributed late in July. The Registration Form should be completed and forwarded no later than 24th August. Eight papers will be presented at the conference. All attendees should check in for registration between 8.30 and 9.15 a.m. The cost of attending the conference will be $28, which includes lunch, morning tea, afternoon tea and a copy of the conference proceedings.

* Due to mail delays in July this could be your first notice. If so, please contact K. Cook at RMIT, Melbourne (03) 341 2600, or R. McLeod at the SEC Melbourne (03) 615 3090 for last minute registration.

AAS REPRESENTATION ON NATIONAL COMMITTEE FOR PHYSICS

As mentioned in the article on the International Union of Pure and Applied Physics in the April 1979 issue of the Bulletin, Mr. R.A. Piesse had been nominated by the Society as its representative on the National Committee for Physics, of the Australian Academy of Science.

We are pleased to report that at the last meeting of the Council of the Academy, the following membership of the recently reconstituted National Committee for Physics was approved:

Prof. C.A. Hurst (Chairman)
Prof. M.H. Brennan
Dr. L.W. Davies
Dr. A.K. Head
Prof. L.R. Segall
Prof. B.M. Spicer

Representing the Australian Institute of Physics:

Prof. H.C. Bolton
Dr. J.L. Black

Representing the Australian Acoustical Society:

Mr. R.A. Piesse

1978 ANNUAL CONFERENCE PROCEEDINGS AVAILABLE

The Society's 1978 Annual Conference was held at the University of Sydney last September and was attended by about 170 people, a third of whom came from interstate.

The theme of the conference was "Occupational Hearing Loss - Conservation and Compensation" and the titles of the 15 invited papers were: Noise-Induced Hearing Loss and the Definition of Hearing Disability, Hearing Impairment and Hearing Handicap; Occupational Noise and the Law; Surveying and Assessing Occupational Noise - Dollars and Sense; Managing an Engineering Noise Reduction Programme; Management of a Hearing Protection Programme in a Mining Company; Requirements for Valid and Reliable Industrial Audiometry; The Interpretation of Industrial Audiograms; A Hearing Conservation Programme - Success or Failure; Fifteen Years Experience with Hearing Conservation Programmes; Monitoring Audiometry - Protection for Whom?; Industrial Deafness - A Trade Union Viewpoint; Workers' Compensation Legislation - Provisions Relating to Occupational Hearing Loss; Fundamental Issues in the Audiological Assessment of Compensation Claimants; Workers' Compensation and Industrial Deafness - An Insurer's Viewpoint; Noise in the Workplace - Educational Programmes to reach Small Industry.

The published Proceedings of the Conference are now available. They include the texts of the fifteen invited papers, the opening and closing addresses, and edited transcripts of the discussion periods which followed each paper. There were two half-hour panel discussions during the conference, one on Industrial Audiometry and one on Noise Exposure Reduction, and edited transcripts of these are also included. Copies of the 270-page Proceedings are available at $8.50 each, postage included, by writing to The Secretary, Australian Acoustical Society (NSW Division), Science House, 35 Clarence Street, Sydney, N.S.W., 2000. Cheques should be made payable to the Society.

The RION state of the art range of sound level meters offers a welcome alternative for convenient and effective sound level measurement. The range comprises four new instruments, the NA-21 and 61 offering the additional facility of impulse measurement. Utilising highly stable ½" condenser microphones on the precision NA-60/61 sound level meters, and 1" units on the NA-20/21, acoustic calibration is simply accomplished using companion pistonphones NC71,72. In conjunction with their 1/3 or 1/1 octave filter units, these instruments combine measurement versatility with simplicity of operation to give you a practical, economical solution to a variety of noise measurement problems

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- AC output facility for level recorder, etc.
- NA 60/61 conforms to IEC draft type I, IEC Pub,-179 and 179 S. NA 20/21 conforms to IEC draft type II IEC Pub.-123.

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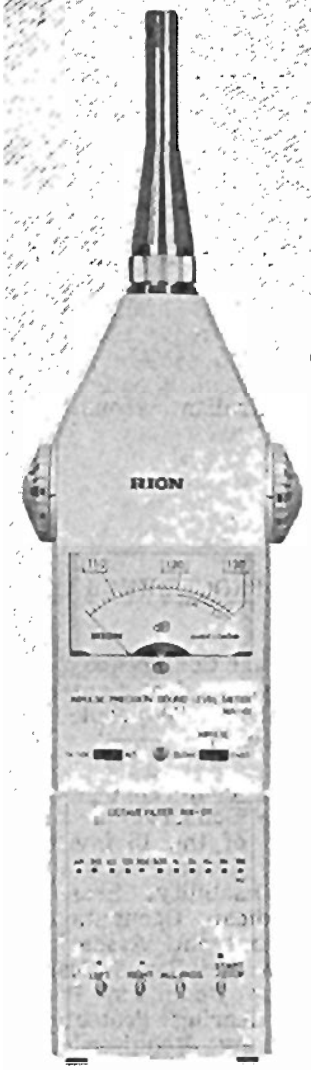

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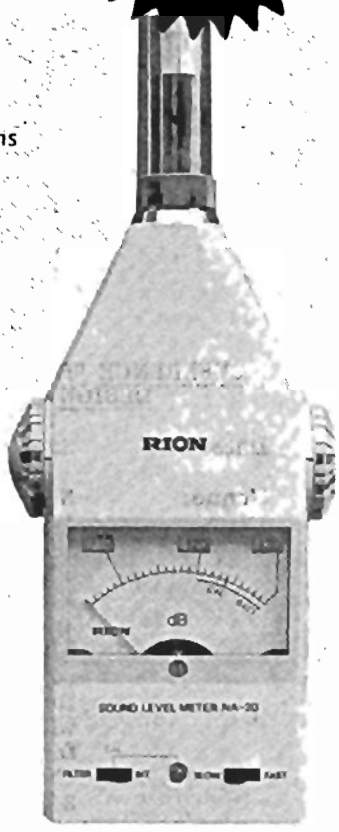

Sound Level Meter Model NA-20 Impulse Precision

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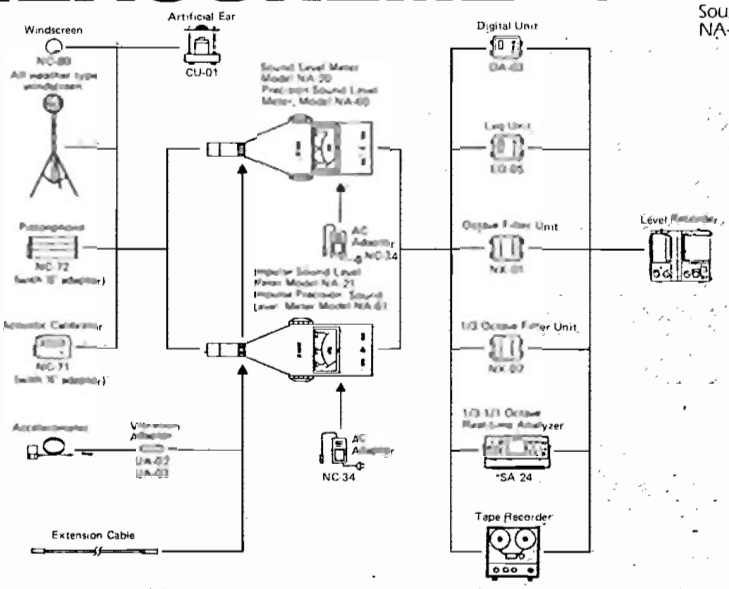
- **PRECISION SOUND LEVEL METER MODEL NA-60**
- **IMPULSE PRECISION SOUND LEVEL METER MODEL NA-61**



BLOCK DIAGRAM SHOWING POSSIBLE SYSTEM VARIATIONS USING ASSOCIATED RION INSTRUMENTS.

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WF621/78

PANEL DISCUSSION ON SOUND TRANSMISSION LOSS/SOUND INSERTION LOSS METHOD OF LABORATORY AND FIELD MEASUREMENT

Held on 21st June, 1979 at National Science Centre, Melbourne.

Chairman: Ken Cook

Panel Members: Paul Dubout, Gerald Riley Jim Watson

Jim Watson opened the discussion by proposing the following motions: That this meeting:

1. Agrees that the Sound Insertion Loss method of test is in a great many cases the most appropriate method of field test for building components such as doors, openable windows, operable walls and air relief vents.

2. Further agrees that in many cases of such components transmission loss testing cannot readily be carried out and that in such cases sound insertion loss testing can be performed more simply and at less cost while being equally, if not more, meaningful.

3. Requests Committee AK/4 of the Standards Association of Australia either to:

   (a) Revise the forthcoming Standard AS 2253 to include Sound Insertion Loss test methods for the components as described, or

   (b) Prepare and issue a separate standard for test methods for such components, this standard to include Sound Insertion Loss testing.

4. Instructs the Divisional Secretary to write to the Society's representative on SAA Committee AK/4 requiring that he (she) bring to the notice of that Committee the views and requests of this meeting as stated.

These motions were seconded by John Moffatt.

In supporting these motions Jim introduced as examples of difficulties:

(a) A door opening from a room to a long corridor - the problem is how to determine 10 log S/A of corridor.

(b) A small operable wall between a room and another where A >> S, so 10 log S/A is very large.

(c) Air relief silencer in wall - what is the value of S. Possibly term 10 log S/A is very large.

Jim showed examples of measurements on doors, showing noise reduction NR and SIL -in all cases NR exceeded SIL but in a random fashion between samples and for different frequencies.

Gerald Riley quoted from some of his experiences with doors that STL and SIL were the same quantity. For some doors and windows, both techniques had been used and showed no great differences between STL and SIL, when arithmetically averaged, though greater discrepancies had occurred in particular octave bands.

When put to the vote, the above motions were carried.

Ken Cook

ICA - 1980 ASSOCIATED ACOUSTICS CONFERENCE AUCKLAND, NEW ZEALAND JULY 19th and 20th 1980

ANNOUNCEMENT AND CALL FOR PAPERS

A Conference associated with the 10th International Congress on Acoustics is to be held in Auckland, New Zealand, in the weekend following the ICA in Sydney.

TWO CONFERENCE TOPICS

The conference is planned to attract participants from two major Acoustics subject-areas, Architectural Acoustics and Underwater Acoustics. The first of these is ACOUSTICS OF EDUCATIONAL BUILDINGS and will include noise criteria and control, design of teaching spaces for speech and music, integration of audiovisual facilities, acoustical design for the handicapped, open planned teaching spaces, and noise control in manual skills education.

The other topic AMBIENT NOISE IN THE SEA is particularly appropriate to the South Pacific due to the low shipping density there. Topics will include: Wind and wave contribution to deep ocean noise at frequencies below 1 kHz, Shallow water ambient noise, Bioacoustics and ambient noise, and the propagation, directivity and statistics of ambient noise in the sea.

Papers on these and related topics are invited.

FURTHER INFORMATION

If you wish to receive further information on the ICA - 1980 Associated Conference in New Zealand, contact:

ICA - 1980 Associated Conference,
P.O. Box 1181,
AUCKLAND,
NEW ZEALAND

ABSORPTION

SOUNDFOAM

Urethane foam developed specifically to absorb maximum sound energy with minimum weight and thickness. Used to absorb airborne noise in industrial and EDP equipment, machinery enclosures, over-the-road and off-highway vehicles and marine and airborne equipment. Meets UL 94, HF-1 flame resistance test procedure.

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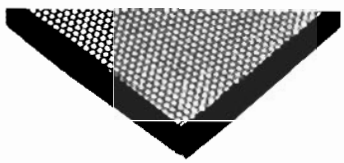
The surface pattern increases sound absorption performance 25 to 35 percent in the most critical low and mid-frequency bands when compared to other foams of the same thickness and density. Ideal solution for low frequency absorption problem. Meets UL 95, HF-1 flame resistance test procedure.



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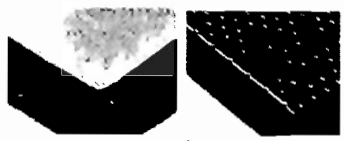

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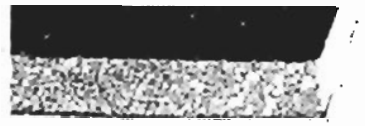
SOUNDFOAM
(With Perforated Vinyl)

Provides a tough, handsome finish for use in vehicles and other places where appearance is important. Leather-looking surface is bonded to highly efficient acoustic foam.

DAMPING

GP-2 DAMPING SHEET

A thin (0.050") sheet of pre-cured damping compound with pressure sensitive adhesive backing. Easily and inexpensively die cut and shaped to fit and form to flat areas and simple curves.



FOAM DAMPING SHEET

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A polymer specifically developed to provide effective constrained layer damping on thick, heavy, metal plates. Applied by cementing the polymer sheet to both the structure being treated and a metal constraining layer.

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A quick curing resin based damping paste which can be applied by trowel or spray. Completely resistant to severe environmental conditions, including water, acid and alkalis. Popular for marine and outdor applications.

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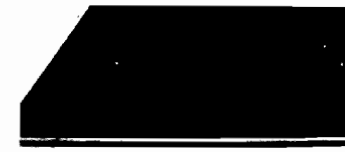

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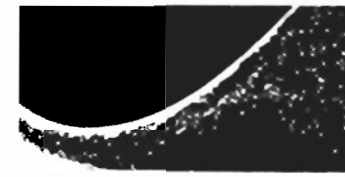
Soundmat LF is made up of a vibration isolation layer of foam, a lead septum sound barrier, and a layer of embossed foam to provide maximum absorption, together with noise attenuation.



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Soundmat FV has 1# limp mass barrier layer bonded to a 1/4 inch layer of acoustic foam. A heavy, scuff-resistant black vinyl skin is optional. Particularly for vehicle cab floors and bulkheads. Also used as pipe lagging.

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(With perforated vinyl)

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TECHNICAL NOTES

ACOUSTIC SHIELDING OF A TELETYPE

Teletypewriters are renowned noise-makers, the one under study producing around 79 dB (A) at the position of the operator. Furthermore, the noise produced is especially annoying as a result of the impactive nature of individual keystrokes, line feeds and carriage returns.

Initial observations were made of the near field sound levels over the outer surface of the teletype. These showed that large contributions to the external noise levels were arising as a result of poor acoustic sealing and the vibration of light panels. However, since the teletype under study is used as a hard-copy printer only, requiring only minimal access to the device, enclosure was preferred over acoustic treatment of the teletype itself.

A simple all-round enclosure was designed and constructed. For ease of operation as well as periodic maintenance, the design features a hinged perspex access to the keyboard and paper feed, and a front panel which can be easily removed allowing the rest of the enclosure to be slid away from the teletype. For ease of construction, the enclosure was fabricated using 13 mm chipboard glued and nailed to a pine frame. The transparent, sloping front is made from 8 mm perspex and held down using wooden swivel clips. The interior surface of the chipboard is lined with 25 mm foam plastic as absorbent. The design is shown in Figure 1.

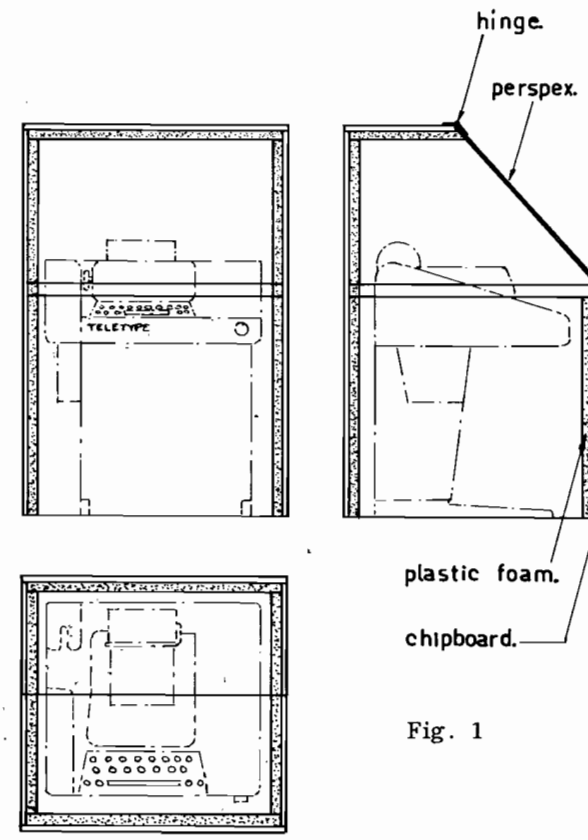


Fig. 1

Sound pressure levels at the position of the operator have been determined using a Bruel and Kjaer portable sound level meter and attached third-octave filter. In typical operation, the sound pressure level produced by the teletype decreased from 79 dB (A) to 58 dB (A) when the enclosure is fitted around the teletype. The third-octave band pressure levels are shown in Figure 2; the reduction is in excess of 20 dB for the bands above 800Hz with significant reductions down to 200Hz. The operation of the teletype is now barely audible whilst other devices are running, whereas previously it had been the most annoying of the devices in the computer suite.

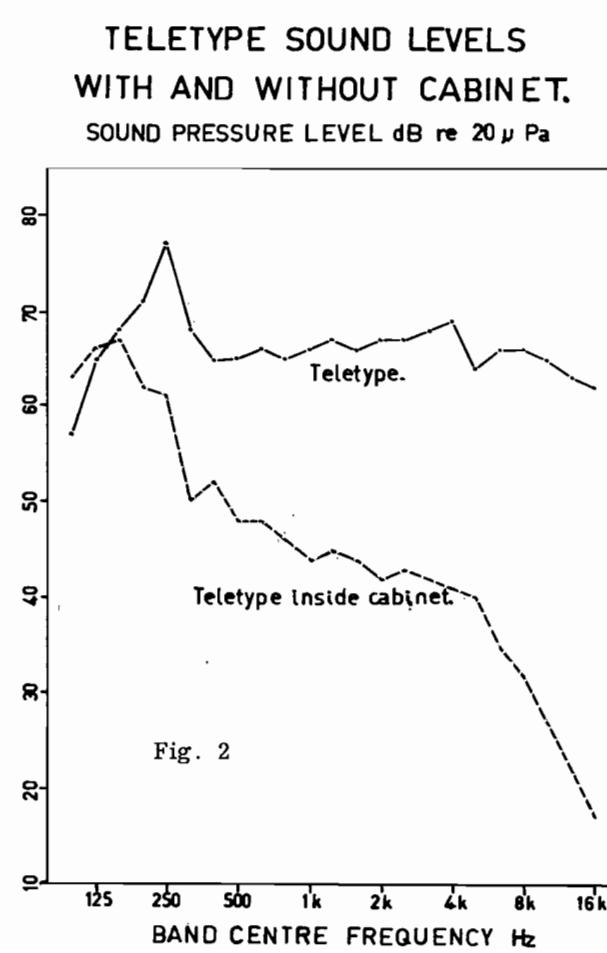
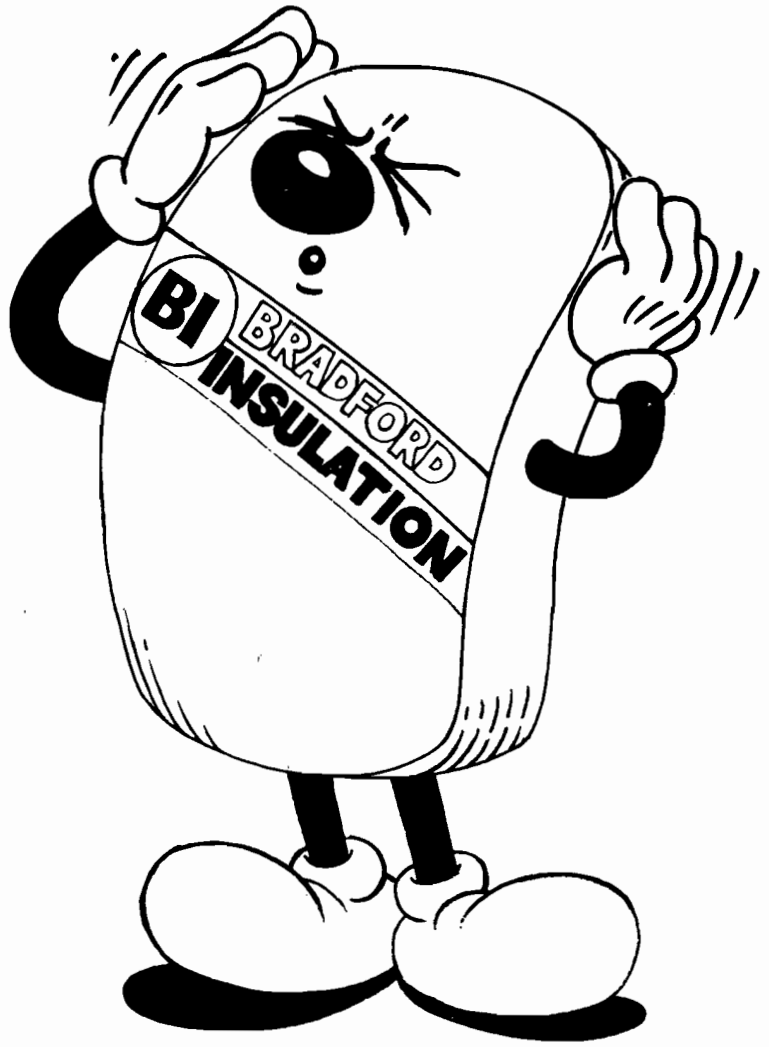


Fig. 2

* Work undertaken in partial fulfillment of the requirements of the Bachelor of Applied Science (Applied Physics) Course.

S. Federico*, E. Gold and K.G. Rossiter*,
Department of Applied Physics, Royal Melbourne Institute of Technology,
Melbourne, Australia.

RINGING EARS?



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PAINTED ACOUSTIC TILES

Sound absorptive ceiling tiles and panels made from compressed fibres (mineral, wood or cane) have traditionally been supplied with a factory applied paint like finish to their front or active surface usually in a white or near-white colour. Users of such products have traditionally been warned by the suppliers that further painting in situ with conventional paints is likely to be detrimental to the sound absorptive properties.

To the best of the Writer's knowledge such advice has usually been heeded by architects and acoustic consultants dealing with new projects although it has often been ignored by the renovators of hotel bars in Melbourne and presumably elsewhere. This consultant acknowledges having often wondered over a glass or two of ale whether the bar acoustics were indeed downgraded by a coat or two of brown paint on the ceiling.

On one large project recently the architects were very keen to have their dark brown ceilings in the bar and elsewhere right from the outset and proceeded to specify that the mineral fibre ceiling tiles as normally supplied would be further painted with brown paint. The tile suppliers gave vent to the usual ominous warnings so the architects decided to put the matter to test.

A specimen was selected of each of four tile types then under consideration and half the surface of each tile was spray painted with two coats of paint.

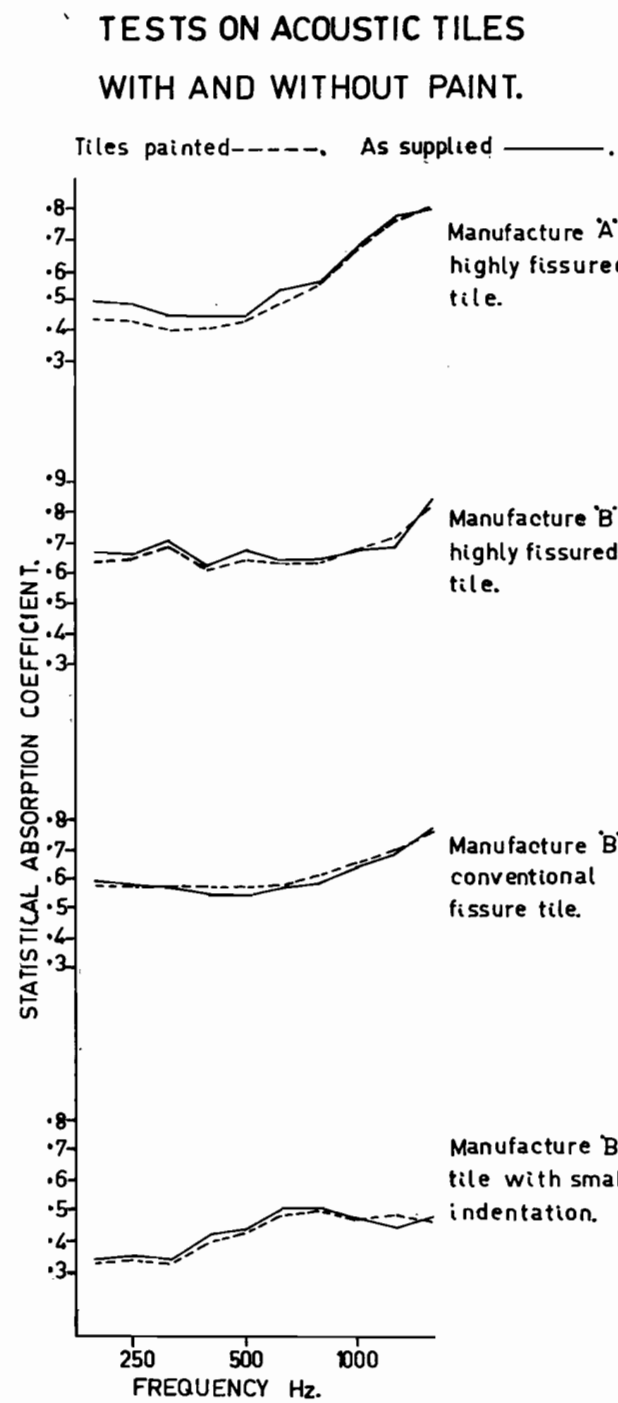
All the tiles were of overseas manufacture (from two manufacturers) and ranged in thickness from 14 to 20 mm. The surface patterns included one with a basically flat surface pierced by small circular holes, one with conventional "fissured" surface and two samples with very irregular and deeply indented surfaces.

The nominated paints were of two types, one a locally made "flat acrylic" the other an imported "colloidal acrylic". Having no knowledge of paint chemistry the writer is unable to elaborate on paint properties beyond these lay descriptions. A substantial coverage was achieved in the painting and by eye the brown paint appeared to have pentrated to the bottom of all but the very deepest of the surface fissures and crevices. The paint coat certainly increased substantially the surface toughness and abrasion resistance of the two irregularly surfaced tiles.

Two 100 mm samples were cut from each tile, one from the white half as supplied by the manufacturer and one from the brown painted half. Each sample was mounted in a B & K Impedance Tube Type 4002 with 120 mm air space between rear of sample and solid backing. The statistical absorption coefficient was determined in the frequency range 200 to 1600 Hz inclusive. Results of tests on the four tile types are shown on the attached chart.

Allowing for expected variations in sampling and for experimental errors the results are seen to be remarkably similar, to all intents and purposes identical. There seems no doubt that these four tiles differing quite markedly in surface type are not detrimentally affected by the application of these acrylic paints.

James H. Watson
Carr Acoustic Group Pty. Ltd.



AIR DUCT TESTING AND ANALYSIS

INTRODUCTION

The static acoustic attenuation of three cylindrical air ducts has been measured in the RMIT Acoustics Laboratory. Both insertion loss and noise breakout for each duct have been determined relative to a plain steel duct of the same length and diameter. An important objective has been to determine how a relatively minor modification, perforating the inner metal foil lining, to one duct, alters its acoustic performance.

METHOD OF TEST

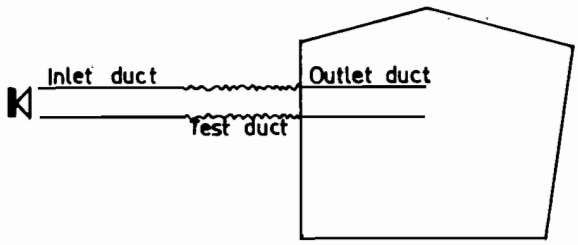
The duct testing has been carried out in accordance with British Standard BS 4718:1971 "Methods of Test of Silencers for Air Distribution Systems", Section 2.3 The Diffuse Field Method (for measurement of static insertion loss). The measurements were made using RMIT's 200 m^3 reverberation room and standard Bruel & Kjaer instrumentation. The following departures from the Standard have occurred:

(i) Two microphone positions only have been used; the agreement between their readings however has been within 1 dB.

(ii) Some problems have been encountered with background noise apparently associated with a loss of efficiency of the loudspeaker used. Previous measurements using an identical setup have achieved sound pressure levels some 10 dB higher in the chamber (private communication from L. Williams). As a result it has not proved possible to exceed background by 6 dB at the lower frequencies for the ducts with greatest attenuation, implying that the corresponding insertion losses have been underestimated.

(iii) We have utilized a loudspeaker mounted in a lined box and attached to the entry duct with a soft rubber separator after confirming that this gave equivalent results to the standard method where the loudspeaker is mechanically decoupled from the duct. The method was adopted to minimize ingress of extraneous noise into the chamber and aggravating the background noise difficulties.

In addition to the insertion loss measurements, further measurements have been undertaken to clarify the mechanisms by which these ducts achieve their attenuation. The same total length of ducting has been used but with the test duct now inside the chamber so that noise breakout from the duct walls contributes to the sound pressure level in the chamber. The two setups used are shown in Figure 1.



Setup for insertion loss measurements.

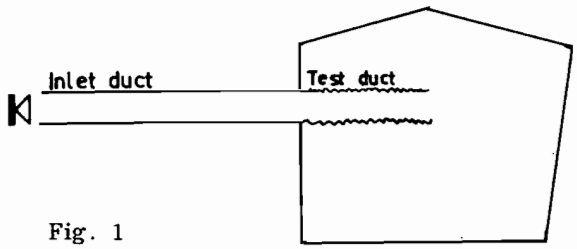


Fig. 1

Setup for total attenuation (noise transmitted through end and wall of duct) measurements.

The ducts used for testing were;

A: Reference duct made of unlined galvanized steel.

B: Commercial ducting made of corrugated aluminium having perforations 2 mm in diameter at 8 mm centres. The aluminium is surrounded by 2 cm fibreglass insulation and finally sheathed in polythene.

C: Commercial ducting made of metal foil liner wrapped around a steel wire helix. 2 cm of fibreglass insulation and a polythene sheath again complete the duct.

D: Duct C but with the metal foil liner perforated at 12 mm centres with holes approximately square in shape and 2 mm across.

All ducts are of 200 mm nominal internal diameter and 3 m in length.

RESULTS AND DISCUSSION

The results obtained for both the insertion loss and noise breakout measurements are presented in the tables. The results have been presented graphically as follows:

(i) In Figure 2 we plot insertion loss versus octave band centre frequency for the test ducts B, C and D. The insertion loss has been calculated by subtracting the sound pressure levels obtained in the chamber for the test ducts, from those for the reference duct A. It is apparent that ducts B and D are substantially superior to C when considering down-duct attenuation of noise; the clear difference in the performance of ducts C and D, differing only with respect to the perforated metal liner, are especially noteworthy.

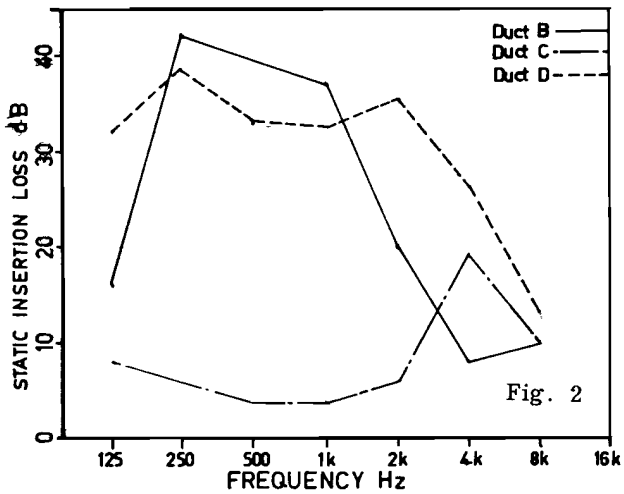


Fig. 2

(ii) In Figure 3 we plot total attenuation for each of the ducts when noise transmitted through the duct walls can also enter the conditioned space and must be included in the assessment of acoustic performance. The sound pressure levels obtained with the test ducts in the chamber have been subtracted from the sound pressure levels obtained with the reference duct in the chamber to obtain the total attenuation. All three ducts achieve substantially similar total attenuation as opposed to the large differences in their down-duct attenuation; ducts B and D have higher transmission of noise through the duct walls to compensate for their lower transmission of noise down the duct.

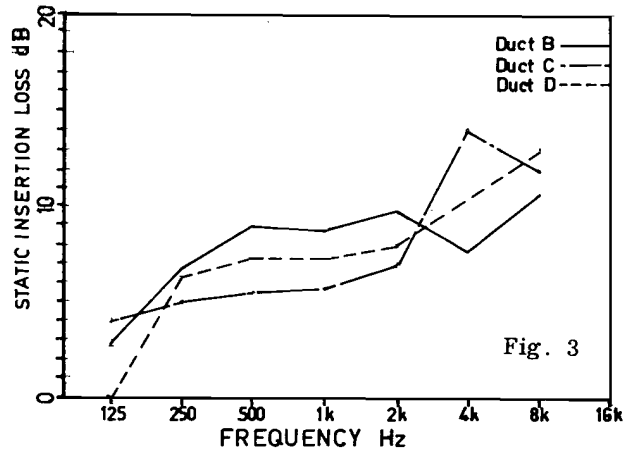


Fig. 3

Sound energy incident into the ducts has been apportioned to the following three categories,

(i) energy absorbed within the duct,

(ii) energy transmitted through the walls of the duct,

(iii) energy transmitted through the open end of the duct,

This analysis reveals that absorption is substantially similar for the three tests ducts and is approximately 70-80% of incident energy at mid frequencies. Wall transmission for ducts B and D constitutes approximately 20-30% at mid frequencies, and thus much less than 1% of incident energy is finally transmitted through the far open end of these ducts, producing their good insertion loss characteristics at mid frequencies. In comparing ducts C and D at mid frequencies, we observe that perforating the metal foil liner slightly improves the absorption, but allows wall transmission to increase from negligible amounts to 20-30% of the incident energy. In the absence, for duct C of substantial energy loss by wall transmission, the energy not absorbed within the duct is transmitted through the far open end, resulting in the poor insertion loss of duct C. The main effect of perforating the metal foil liner is thus revealed to be a substantial increase in the transmission loss of the duct walls.

TABLE

Sound Pressure Level dB	Octave Band Centre Frequency (Hz)				
	250	500	1000	2000	4000
DUCT A					
SPL (E)	71	75	75	73	67
SPL (WE)	70	77	76	72	67
DUCT B					
SPL (E)	30#	36	38	53	60
SPL (WE)	63	68	67	63	59
IL	41	41	39	20	7
TA	7	9	9	9	8
DUCT C					
SPL (E)	65	71	71	67	48
SPL (WE)	65	71	70	65	53
IL	6	4	4	6	19
TA	5	6	6	7	14
DUCT D					
SPL (E)	32#	42	42	37	41
SPL (WE)	64	70	69	65	56
IL	39	33	33	36	26

SPL (E) denotes sound pressure level in the chamber for noise transmitted through end of duct only.

SPL (WE) denotes sound pressure level in the chamber for noise transmitted through both walls and end of duct.

IL denotes insertion loss.

TA denotes total attenuation of the duct relative to the reference duct when transmission through both the duct walls and open end are considered.

\# denotes less than 6 dB above background or does not decrease by more than 10 dB in flanking test.

* Work carried out in partial fulfillment of the requirements of the Bachelor of Applied Science (Applied Physics) course.

E. Gold and N. Kacavenda*
Department of Applied Physics,
Royal Melbourne Institute of Technology,
Melbourne, Australia.

LETTERS

DEAFNESS AWARENESS WEEK 1-7TH OCTOBER, 1979

As the field of acoustics is very much related to the sense of hearing, I assume that all members of A.A.S. are interested in all forms of deafness.

I wish to draw attention to a national Deafness Awareness Week, from 1st to 7th October, which is being organised by the Australian Deafness Council.

In each State the activities will be governed by bodies in that State. Approaches have been made to involve churches with divine services related to deaf people and to the media for appropriate programmes on radio and T.V. and articles in the press. A variety of activities will be conducted by various associations, competitions are being arranged for deaf children and it is hoped that a commemorative postage stamp will be issued.

We might remember that man is a gregarious animal whose well-being is related to his ability to communicate with others. Interference with this has far reaching effects causing complications, misunderstanding irritation and, above all, loneliness. As this is the Year of the Child, there should be special thought for the deaf child who cannot hear a car horn, the birds, or the usual daily sounds, who suffers serious psychological effects of a "dead world" and a severe handicap in learning, and whose world is not only confusing, but often hostile.

Mention should be made of a serious problem of discrimination against the deaf, which is occurring and which, unfortunately, appears to be increasing. Deaf persons are being refused employment for the sole reason that they might be a compensation liability to an employer.

It is hoped that Deafness Awareness Week will lead to more patience and sympathy towards the deaf, a better understanding of their problems, better alternative methods of communication and perhaps greater efforts to communicate with the partially deaf by the use of sight, touch, gestures, and expressions. Community support for the deaf will be appreciated.

Horrie Weston
On behalf of the Committee of the Australian Deafness Council for Deafness Awareness Week.

TELEPHONE MICROPHONES

The reprinted article by Adrian Hope which appeared in the Sept./Dec. 1978 issue of the Bulletin of the Australian Acoustical Society was an interesting look at some of the history of microphones. There can be some disagreement however about the conclusions in the article about the suitability of the carbon granule microphone for use in modern telephones.

Alternatives to the carbon transmitter (microphone) have been in use in the telephones of a number of countries for some years now. In Australia, Telecom's special long line telephone uses an alternative to the carbon transmitter. In this application a carbon transmitter would have the disadvantage of low sensitivity because of the low d.c. feeding current (the current used to supply the electrical power) available from the exchange at the end of a long telephone line.

Early in 1978 Telecom Australia placed a contract for the development of a replacement for the carbon transmitter. The new transmitter will be a capsule containing a linear microphone and an integrated circuit amplifier. It is intended that the new transmitter will ultimately replace the carbon transmitter in all new standard telephones as well as being used for maintenance purposes.

Whilst it is true that the carbon transmitter does have its merits, alternatives such as that sought by Telecom Australia offer a number of important advantages.

Alternatives have the potential for a lower failure rate and therefore reduced maintenance costs. Even though they are more complex, Telecom expects the alternatives to offer improved reliability. Thus even though the initial cost of alternatives is higher, the overall cost, including maintenance can be less than for a carbon transmitter because failures in telephones usually result in a costly visit to the location of the telephone. In fact the overall savings due to the expected decrease in maintenance costs is the main economic factor influencing Telecom to seek a replacement for the carbon transmitter.

The alternatives also offer superior stability of characteristics. Their performance usually does not degrade as rapidly and they are not subject to the same large variation in performance with change of physical orientation.

Thus subscribers can find that telephones with the alternative transmitters are easier to use because they do not require occasional shaking or tapping to restore sensitivity. Production quality control is easier because "conditioning" (roughly equivalent to shaking) before measurement is not required for non-granual type transmitters. Telephone network planners can be assured of a better correlation between measurement and in use performance because these artificial measurement techniques are not required.

Furthermore, alternative transmitters need not have a sensitivity which decreases as d.c. feeding current decreases (except for very low currents). In fact it is possible to design them such that their sensitivity actually increases. Thus the disadvantage of the subscriber who happens to be further away from the telephone exchange is reduced. A more uniform performance can be offered to subscribers.

Finally, there are some advantages in improved fidelity. For various reason, the frequency response of the existing carbon transmitter is roughly what is required of a replacement. A slight improvement in the high frequency (2 - 4 kHz) response is about the only change required. The non-linear effects of the carbon transmitter can be reduced or eliminated in alternatives. These effects are complex and not necessarily all disadvantageous. It is known however that a well designed alternative does sound better. It is likely that most subscribers will find this aspect a distinct improvement. Alternative microphones would also be a noticeable improvement when the telephone is used as an input device for broadcasts such as in news reports and talk-back programmes. Also, incidental benefits may be experienced by telephone users who have undergone laryngectomy. Such people have reported improved communication when using telephones equipped with experimental alternatives to the carbon transmitter, however further study would be required to verify this.

W. Metzenthen,
Senior Engineer,
Customer Apparatus Section,
Telecom Australia Research
Laboratories.

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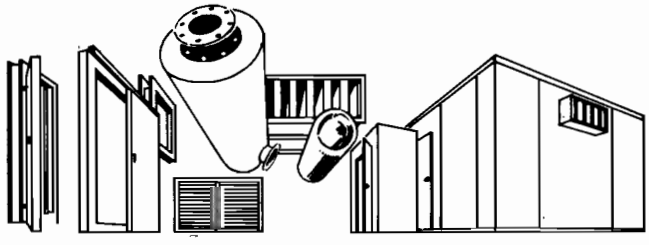

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DIVISION REPORTS

NEWS FROM S.A. DIVISION

During the week following Easter, a course of lectures titled "Industrial and Machinery Noise Control", was conducted at the University of Adelaide. This course was presented by the Mechanical Engineering Department of the University in conjunction with the Institute of Sound and Vibration Research of the University of Southampton. Delegates coming from all over Australia listened to lectures given by staff members of the University of Adelaide, Professor E.J. Richards of the I.S.V.R. and a number of additional speakers. Professor Richards, who has been associated with I.S.V.R. for many years, in fact presented all the papers provided by the Institute.

Some lectures were of an introductory nature, however, most were aimed at or above graduate level and the range of subjects covered was quite large. Subject areas included the fields of research at both the I.S.V.R. and the Mechanical Engineering Department of the University of Adelaide where relevant to industrial and machinery noise. In spite of the obvious "Ivory tower" overtones the course was generally regarded as a great success by all concerned and congratulations must go to the organizers and in particular, Mr. E.C. Semple of the University of Adelaide.

Whilst considering the Mechanical Engineering Department at the University of Adelaide, it is worth noting that quite a number of Ph.D. students in the field of acoustics have recently submitted their theses and have left to pursue their careers in that field. Included in this number are Chris Fuller, Colin Hansen, Renzo Tonin, Michael Norton and Adrian Jones. Of these, Chris Fuller is currently working for Dr. Fahy at the I.S.V.R. in Southampton, Colin Hansen has only recently left to take up a position with the consulting firm of Bolt, Beranek and Newman in Los Angeles, Renzo Tonin has recently gone to Sydney for the consultants Vipac and Partners, Michael Norton has recently been employed by the Mechanical Engineering Division of the CSIRO and Adrian Jones is employed as a muffler designer for Hills Industries, the manufacturer of original muffler systems for many Australian vehicles.

The above group, together with other Ph.D. students in different fields, had been studying at the Mechanical Engineering Department of the University of Adelaide for the last four or five years and their departure has caused a slight change in character at the department. A number of new students recently starting will no doubt continue the high standard of postgraduate work.

Adrian Jones

VICTORIA DIVISION DIARY

CSIRO Visit

The Victoria Division 1979 Programme commenced on February 28th with a visit to the CSIRO Divisions of Building Research and Mechanical Engineering in Highett. As well as being sumptuously dined BBQ style by the CSIRO staff, Society members were shown an extensive range of current projects.

The Division of Mechanical Engineering gave members an insight into current solar energy research, including collector test facilities, a solar simulator and a tour through their low energy consumption house which made use of solar energy for space and water heating. Members were shown the Division's wind tunnel facilities and the Staff effectively demonstrated Cavitation and Flow Induced Resonance and stimulated considerable discussion.

Inspection of the Division of Building Research projects included viewing their Reverberation and Anechoic Chambers and other test facilities. Staff discussed techniques of Anechoic Chamber evaluation and application of their test facilities in measurement of sound power. The use of Impedance Tubes in the design and selection of anechoic linings was explained as well as their method of assessment of Sound Transmission Loss of a curtain lined window.

A most informative and enjoyable evening was had by members and friends, and the Victorian Division would take this opportunity to thank the CSIRO Divisions for arranging our visit.

Professor E.J. Richards Visit

Late in April, the Victoria Division was priviledged to have the opportunity to invite Professor E.J. Richards of the Institute of Sound and Vibration Research, The University of Southhampton, to present an address to the Division at the National Science Centre.

Professor Richards joined Southhampton University in 1950 as the first professor of aeronautics and established a strong research school in aerodynamic noise, subjective acoustics, audiology and engine noise. In 1963 he became the Founder-Director of the Institute of Sound and Vibration Research and after a period as vice-chancellor of Loughborough University returned to the Institute in 1975 to build up a team to study factory deafness and the design basis for quieter factory machinery.

Professor Richards' address subject was 'Machinery Design to Reduce Noise'. His informative address was based on research undertaken by the Institute of Sound and Vibration Research and methods of quantifying acoustic energy produced in the operation of machinery. This enabled the design of equip-

ment to minimise the release of energy in the form of sound. Professor Richards cited case histories including modification of press tooling and weaving looms emphasising his theme by demonstration, particularly for the benefit of weary members present, of 'doing it slowly'. The Professor discussed the introduction of Hearing Conservation Standards throughout the world and highlighted the differences in determination of a Daily Noise Dose.

The address was followed by an informal dinner with Professor Richards at the Park Royal Motel where members took the opportunity to meet with him prior to his departure to the U.K.

Workshop with the E.P.A.

The 38th Technical Meeting of the Victorian Division was in the form of a workshop study group who met with staff of the Environment Protection Authority of Victoria at the Engineering Lecture Theatre, Monash University to consider the Draft Environment Protection Policy No. 59/78 'Control of Noise'.

With Dr. R. Alfredson as Chairman and stimulator of discussion, debate centred on comparison of the E.P.A. Draft Policy with the existing Australian Standard AS 1055 -1978.

Both criteria for environmental noise are essentially in two parts: The PERMISSIBLE NOISE LEVEL is found for either existing or planned premises using the EPA criteria and the Adjusted Measured Sound Level and Noise Area Category are used for the same purpose in the Australian Standard.

The E.P.A. base noise assessment on measurement of L_{eq} whereas AS 1055 makes use of measurement of the average of the 'A' weighted fast response maximum pointer deflections. There was general agreement that the use of L_{eq} provided a more reliable and repeatable measurement than the AS 1055 method of measurement. However concern was expressed at the additional magnitude of cost in measurement of an L_{eq}.

The Tonal Correction calculation as detailed by the E.P.A. in the Draft Policy was considered to allow clear definition of tonal components of sound sources.

Both criteria allow for indoor measurement adjustment. It was suggested that the Draft Policy strongly discourages the application of indoor measurements except 'where not practicable' otherwise.

In a comparison of L_{eq}, L_{eq} impulse and L_{eq} fast, the E.P.A. members considered that true L_{eq} is a reliable measurement of loudness, but not necessarily annoyance and some discussion ensued on the relative merits of these values.

The application of high adjustment for short duration of particular noises as indicated in Figure 2.3 of the Draft Policy stimulated debate, and it was considered that further study of Duration Adjustment would be desirable.

The Procedure for Determining the Permissible Noise Level for zoning as outlined by the E.P.A. Draft Policy was felt to provide a benefit to a prospective noise producing industry by not necessarily penalizing in 5dB steps as does the AS 1055. Considerable discussion followed regarding specific applications, and the E.P.A. members were confident of the ability of the method of calculation to reflect peoples' feelings regarding their home environment. It was pointed out that where mitigating circumstances may occur, in legislation there are appeal provisions where these could be considered.

In considering the Traffic Permissible Noise Level, the E.P.A. members indicated its purpose in removing the necessity of measuring the traffic noise in the area under consideration and also pointed out the obvious advantage of locating a freeway alongside industry. Comments were made regarding Figure 1.2 of the Draft Policy relating the T.P.N.L. to the traffic flow.

The Exceptions as outlined in Clauses 1, 4.1, 2 and 3 stimulated debate, and it was confirmed in conclusion that Construction Noise, Railway traffic Noise and Aircraft Movements were not considered in the Draft Policy.

Geoffrey Barnes
Victorian Division Bulletin Representative

REPORT OF THE CHAIRMAN OF THE NSW DIVISIONAL COMMITTEE FOR THE YEAR JUNE, 1978- MAY 31ST, 1979 TO THE ANNUAL GENERAL MEETING OF THE DIVISION

COMMITTEE

The Committee members for the year were as follows:-

M.A. Burgess*, B. Gore, M. Hall, A. Lawrence, J. Lyon*, G. Patterson, G. Pickford, D. Pickwell*, R. Piesse and E.T. Weston* (*continuing members from 1977-1978). M. Hall was elected to replace B. Longstaff, who resigned prior to the 1978 Annual General Meeting of the Divison, but whose term extended to 1979.

It was with regret that the Committee accepted the resignation of Geoff Pickford in January 1979; Geoff has been a member of the Committee for many years, and acted in the

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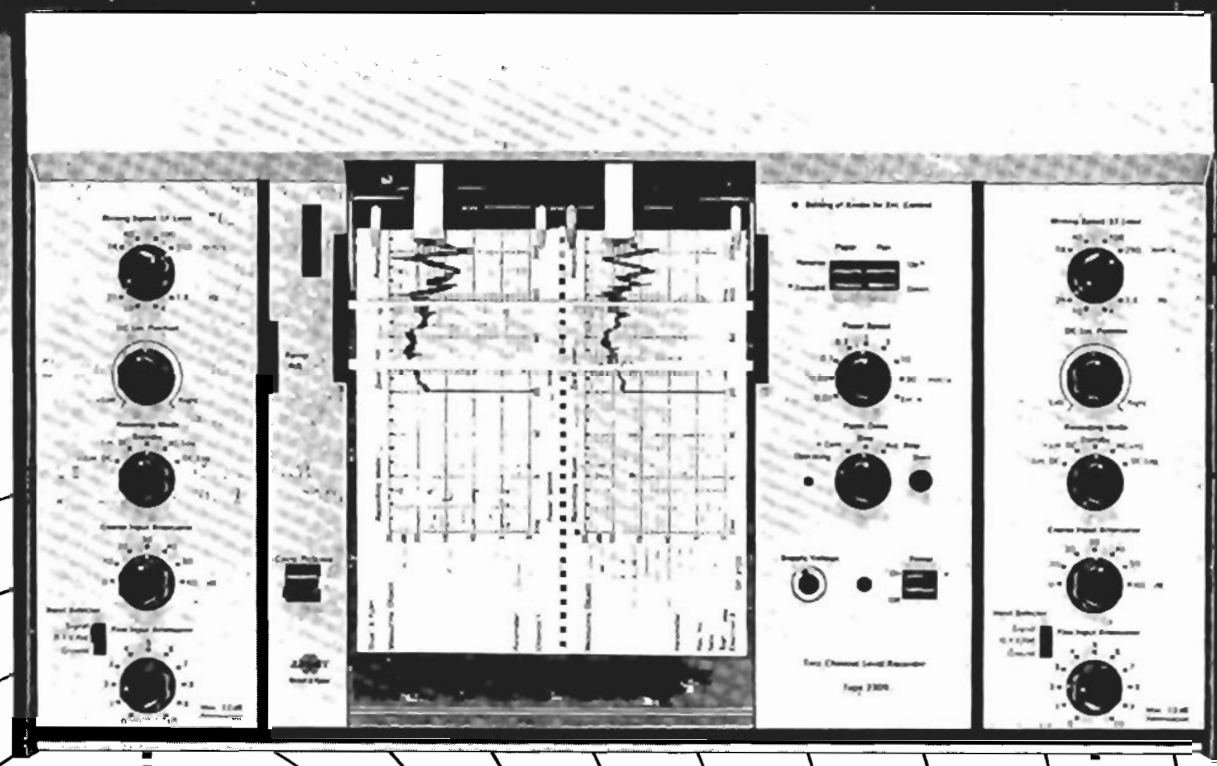

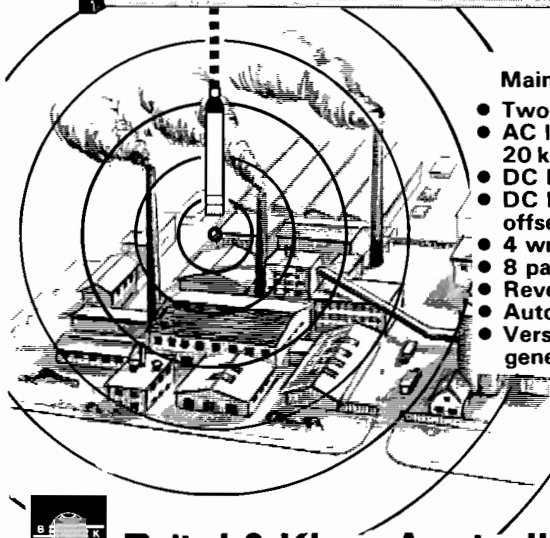

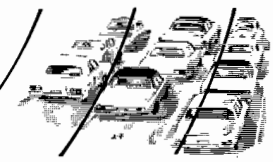

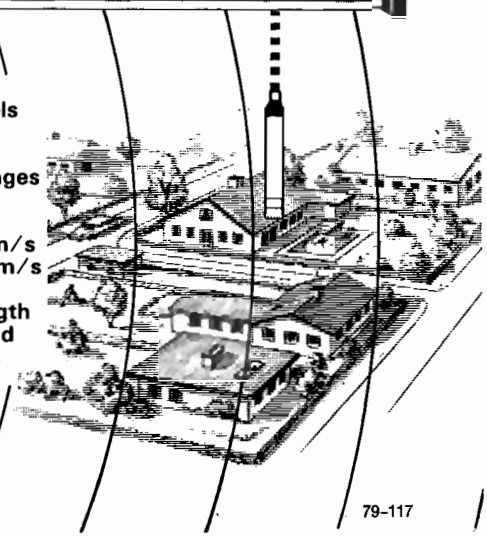

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important role of Divisional Treasurer for most of the time. Under the powers of Article 99, the Committee has appointed Michael Kateifides to fill the vacancy caused by Geoff Pickford's resignation; his term will continue until 1980. All of the Committee members have contributed to the running of the NSW Division of the Society this year - in particular I would like to mention Dennis Pickwell, Vice-Chairman; Marshall Hall, who in his first term as a member of the Committee, took on the job of Secretary; Marion Burgess who took over the job of Treasurer last year and who is now combining this with the position of Divisional Registrar - a combination which it is hoped will lead to more efficient processing of membership changes; Ted Weston, convenor of the Publications sub-committee and who is the other Committee representative with Ray Piesse on the Membership sub-committee which has made a great effort with processing membership applications; John Lyon who combined the positions of Minutes Secretary with Registrar until recently; Bruce Gore, who is the convenor of the Education sub-committee, and last, but not least, George Patterson, who has put a great deal of time into arranging the Technical Programme - George is now being assisted in this task by Michael Kateifides.

MEMBERSHIP

Membership figures are encouraging. Eleven new corporate Members of the Division have been approved by Council and another four are being processed. Two new Subscribers and two new Student members have been approved and another Student member is being processed. Other applications are under consideration by the Division. There have been three resignations during the year, and some thirteen names have been removed from the Divisional mailing list (some of whom were members of various grades who have not responded to several years' requests to become financial.).

The total number of members of the Division is at present: 87 members, 11 Affiliates, 19 Subscribers and 11 Students, a total of 127. Membership applications are now being processed more effectively, since the Council has delegated responsibility for approval to its Membership Standing Committee for non-controversial admissions in the intervals between the biannual Council Meetings.

BULLETIN

Members will now be aware that the Victoria Division has taken over the responsibility of producing the Society Bulletin for the next three years. I am sure that we would not like to let this opportunity pass, however, to express our appreciation of the work done by Ted Weston, Ferg. Fricke, Richard Heggie and John Irvine for their stirling efforts on behalf of the NSW Division, in producing the Bulletin for the Society since its inception in August 1972. We all wish the Victorians success, but this will only be possible if we continue to support them with contributions - Ferg Fricke is the Divisional correspondent and he will be happy to assist anyone with queries regarding the Bulletin.

TECHNICAL PROGRAMME

A total of seven technical meetings were arranged during the year:

June: Prof. POAL Davies "Reactive muffler design and flow duct acoustics" 35 at lecture, 29 at dinner.

July: R.C. Green "Room acoustics for stereo production" Joint meeting with the Audio Group of the IREE. 72 at lecture, 41 at dinner.

August: A. Lawrence "Alternative means of traffic noise reduction" 41 at lecture, 26 at dinner.

October: Visit to Sydney County Council Testing Laboratories, Chatswood. 25 at inspection, 13 at dinner.

February: D. Condon "Introduction to reproducing pianos" 21 at lecture, 15 at dinner.

March: (Cancelled due to inavailability at short notice of the speaker).

April: Visit to the National Measurement Laboratory, Bradfield Park, 40 at inspection, 35 at dinner.

I am sure you will agree that this has been an interesting programme, and attendance has been quite satisfactory (on average 25% of the total Divisional membership has attended). Once again, I would like to thank George Patterson for undertaking all the organisation involved with the technical programme, which is after all, one of the most important of the Division's activities.

1978 AAS ANNUAL CONFERENCE

One of the highlights of the year was the 1978 AAS Conference, hosted by the NSW Division and organised by a very able committee headed by Dick Waugh. Some 168 delegates attended the conference "Occupational hearing loss - conservation and compensation" which was very successful both technically and financially. There are still some copies of the Proceedings, edited by Dick Waugh and John Macrae, available, at a very modest cost.

Anita Lawrence

(b) Social programme

The Opening Ceremony for the Congress will be held on the morning of Wednesday July 9, 1980, in the Concert Hall of the Sydney Opera House. After the Congress has been opened by a prominent Australian statesman, entertainment will be provided by the University of N.S.W. Opera Company in a programme centring on life in Australian colonial times.

The Lord Mayor of Sydney will provide a civic reception in the form of a cocktail hour for 150 distinguished delegates. The reception will be on the evening of Wednesday July 9 and attendance will be by personal invitation from the Lord Mayor.

Concurrently with the Lord Mayoral reception, a cocktail hour for all delegates and accompanying persons will be held at the University of N.S.W.

The Congress banquet will be held at the University of N.S.W. on the evening of Friday 11 July for all delegates and accompanying persons, and entertainment will be included. The cost of the banquet will not be included in the registration fee.

On the last day of the Congress (Wednesday July 16), a closing ceremony will be held at the University of N.S.W. and the I.C.A. Chairman will be asked to deliver the closing address. The ceremony will be followed by a farewell cocktail party.

An additional social event will be a concert at the Sydney Opera House at which the Sydney Symphony Orchestra will perform. Although it is a public concert, a block booking for 200 to 300 ICA delegates has been made (not included in delegate registration fee).

(c) Tours

Two weekend technical visits are being arranged, one to Canberra or the Hunter Valley, and one to the Anglo-Australian telescope at Siding Springs and the radio telescope at Parkes. Costs of these tours will not be included in the delegate registration fees.

Ten half-day technical visits are being arranged, to run concurrently with technical sessions of the Congress. However, the dates of the tours are being arranged so that they do not coincide with technical sessions which cover topics similar to the nature of the technical visit. Costs of transport for the half-day tours will not be included in the delegate registration fees.

Three half-day activities have been planned for accompanying persons, which should provide an interesting introduction to Australia and its wildlife. These will be included in the accompanying persons' fee.

2. Facilities

Facilities required for the Congress, such as lecture theatres, audio-visual aids, refreshments, public address systems, banking, postal and telephone services have been arranged with the University of N.S.W. and the University Union.

3. Satellite and Associated Conferences

Planning for the two Satellite Conferences is proceeding according to schedule. The responses to the First Circular are encouraging, with approximately 30% expressing interest in the Satellite Conference preceding the main Congress and 25% for the one following.

Dates and topics for the two Satellite Conferences are:

July 7 & 8 - "Engineering for Noise Control" Adelaide.

July 18 & 19 - "Basic Causes of Noise Deafness" - Perth.

Both organising committees have called for papers. Approximately twenty papers will be selected for presentation in addition to about three invited papers at each conference. Tours and a small exhibition are being planned to complement both conferences. At this stage the delegate registration fees are estimated at approximately A$75.

Arrangements are being made for group travel from Adelaide to Sydney and from Sydney to Perth to ensure easy and rapid travel.

The associated conference to be held in Auckland, New Zealand, will have two topics:

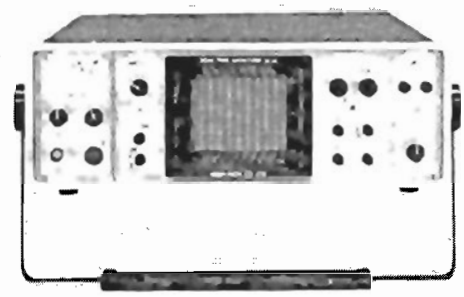
July 19 and 20 - "Acoustics of Educational Buildings"
- "Ambient Noise - the Sea".

The call for papers for the New Zealand conference has been distributed. Further publicity will be included in all 10th ICA announcements.

4. Exhibition

The technical exhibition associated with the main Congress will consist of twenty two stands and will be held in the University of N.S.W. Squarehouse building. This is adjacent to the Roundhouse, which is being used for registration and office facilities and the Congress banquet.

To date, space has been booked for twelve of the stands. Enquiries have been received from the other potential exhibitors and it is anticipated that all available space will be reserved well in advance of the Congress.



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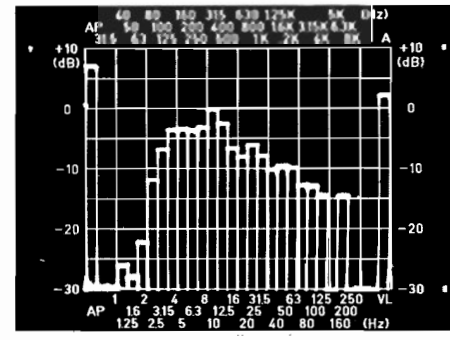

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Makes photographic records and night viewing possible.

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This is possible by means of the optional external battery pack or car battery and gives up to approximately 8 hours' operation.

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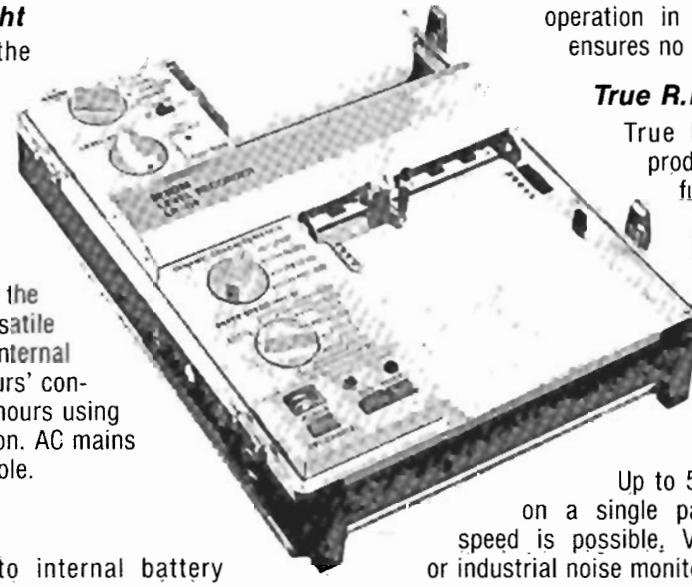

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Up to 50 days' continuous recording on a single paper roll using the slowest speed is possible. Very useful in environmental or industrial noise monitoring situations.

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Additional stands are to be provided in the registration area for display of technical publications.

Exhibitions will be encouraged to use a common display system to ensure uniformity and a high standard of exhibit. They will also be encouraged to portray the Congress theme "Acoustics in the 1980's".

The exhibition will open on Tuesday, 8th July, when the registration desk will be operating and will be open on all week days, generally from the times when technical sessions are in progress.

5. Publicity

The Second Circular is nearing completion, and has been typeset in three languages. It includes the detailed "Instructions to Authors" together with slip-in preprinted sheets for the typing of one page abstracts. This will avoid the delay that would otherwise occur between the receipt of intending authors' replies to the Second Circular, and sending the instructions under separate cover.

Printing of the Second Circular with inclusions is expected to be completed by the end of May 1979.

The names of all persons who returned the reply cards from the First Circular, together with the names of others who have requested information have been compiled by computer on a mailing list. Mailing of the Second Circular will be in early June 1979.

The Third Circular is expected to be distributed by direct mail by November 30, 1979. This will be in the form of a booklet and will include the definitive registration form as a loose-leaf insertion. It will include a list of invited speakers, the advance programme with details of special sessions, delegate fee details and provision for payment, accommodation arrangements, social activities, technical visits, technical exhibition, maps and details of Satellite Conferences.

6. Accommodation

After personal inspections, accommodation bookings have been made at hotels of varying prices in the Sydney central city area, the King's Cross area and near the University of N.S.W. Accommodation has also been booked at student colleges on the University campus. A total of 788 rooms have been booked at this stage.

Bookings have been arranged at hotels which are conveniently grouped to enable delegates to travel together to and from the various venues.

It is hoped that sufficient information will be available from intending delegates to confirm the preliminary bookings (with 10% deposits) about three months prior to the Congress.

BOOK REVIEWS

WAVES IN FLUIDS

by James LightHill

Cambridge University Press 1978; $36 (A)

This book by one of the most eminent of present day mathematicians presents a formidable challenge to any reviewer. A thorough reading could not be done in a time space that would be short enough to keep this review timely. So what is offered here is a more superficial impression.

The arrangement of the book is unusual in that it consists principally of four lengthy chapters, each one of which could stand as a significant monograph in its own right. Chapter I is called "Sound Waves" and Lighthill sketches in the theory with bold strokes with appeal to both physical plausibility and to the reader's knowledge which he assumes to be not inconsiderable. Thus we are lead swiftly to the wave equation and its plane wave solutions. The chapter deals with simple and higher order acoustic sources, particularly dipoles and quadrupoles, and compact source problems, that is those which are small in size compared with the wave length of the disturbance. Non-compact problems discussed are radiations from spheres and plane walls. Incidentally equation (22) on page 5 puzzled me, it may be a misprint.

Chapter II, "One-Dimensional Waves in Fluids", is concerned with longitudinal waves in tubes and channels. The tubes are variously the mathematical fiction defined by ray paths, or actual tubes including those with distensible walls. The subject coverage is impressive and includes the propagation of acoustic waves in bifurcating and trifurcating channels, and series combinations of them, and the theory of cavities and resonators. A discussion of simple waves leads naturally into their distortions and thence to non-linear phenomena, such as shock waves. These are dealt with by appeal to the properties of the Hugoniot adiabatic and the familiar idea of a driving piston. There is no discussion of shock wave reflexion, diffraction, or refraction, and no mention for example of Mach reflexion. The nearest the book comes to these problems is to consider one shock being overtaken by another which is parallel to it. The chapter ends with a short discussion of non-linear acoustics and the famous 3/4 power law of asymptotic decay is demonstrated for a cylindrical wave.

The final two chapters deal with linear dispersion, in Chapter III this is isotropic and in Chapter IV anistropic. A discussion of the exacting theory of non-linear dispersion is deferred to the epilogue. The examples are principally of gravity waves and the author

reminds us of how these are driven by a balance between the fluid inertia and the displacement of a denser fluid underneath a lighter one along with a tendency to seek stable equilibrium. The acoustic interest in these chapters is in the propagation of waves through velocity and property gradients in the atmosphere and in water.

Each chapter ends with a number of problems for the reader to test his understanding and to extend his knowledge. If I have to be critical I would point to the fact that there is little comparison of the theory with experiment. Such as there is seems to have been very carefully selected with the experimental points lying almost exactly on the theoretical curves, for example we see this on pages 382, 412. There is of course nothing necessarily wrong with this, although I am left wondering if all the theory present would agree so well with experiment. Elsewhere there are a number of interesting photographs of natural phenomena in the atmosphere and on the surfaces of rivers, estuaries, and so on, which illustrate the discussions and use is made of waves generated in ripple tanks. In spirit the book is more in the tradition of Lamb's Hydrodynamics than Prandtl's Fluids Dynamics, but I am sure that Lighthill would consider it high praise when I say it is worthy to rank with Rayleigh's, Theory of Sound and like it, it is destined to become an enduring classic.

L.F. Henderson.
University of Sydney

AUDIOLOGICAL HANDBOOK OF HEARING DISORDERS

by Stephen V. Prescod.
Van Nostrand Reinhold Company.
New York. 1978.

This textbook, so it states on the dustcover, was specifically written for the audiologist in clinical pratice. It represents a much needed documentation of an extraordinarily wide range of auditory system disorders, their effects on hearing as demonstrated by audiometric test results, and the techniques for amelioration of the conditions.

The general format of the text is to consider the problems of the auditory system in three distinct parts: the external ear and auditory canal, the middle ear cleft, and the inner ear. Within each of these major areas there is detailed consideration of a substantial number of etiologies, especially their signs and symptoms and their audiological and otological management. As an example, the section on the middle ear cleft includes chapters on acquired and congenital disorders of the middle ear with specific chapters devoted to otitis media and otosclerosis. At the end of each chapter is a list of references and a second list of suggested readings. A criticism of these bibliographical sections is that they are rather limited in the number of references presented and of those that are listed very few refer to recent literature.

Reading this book there is the feeling that there could have been a better balance in the material provided. As an example, it seems rather extravagant to devote an entire chapter of ten pages to collapsible ear canals and only similar amounts to topics such as acoustic neuromas and central auditory disorders. Despite this imbalance every chapter concludes with a capsule summary which should be useful in providing quick access to the essential information of the chapter.

As a handbook of hearing disorders this text is likely to be of value to those not specifically trained in audiology but who work with the hearing impaired or in some associated area. In all probability non-medical groups such as speech pathologists, teachers of the deaf, hearing aid dealers and hearing conservationists would find this book useful since it deals with issues of pathology and treatment in a simple, straightforward way not normally found in such detail in most audiology texts, nor in such understandable terminology in medical texts. On audiological aspects however it assumes a familiarity with pure tone and speech audiometry, as well as impedance audiometry, which many such readers may not have. Explanations of site of lesion tests - both central and peripheral - are provided, but they appear toward the end of the book rather than prior to their reference in the general text.

On the issue of site of lesion testing it is worth noting that most of the more recent techniques are not included. There is nothing on the STAT or Olsen and Noffsinger procedures for evaluating auditory adaptation. Neither are backward - forward or MCL tracings covered in Bekesy audiometry. In the tests for central disorders no mention is made of masking level differences or brain stem evoked response audiometry. There is virtually nothing on electrophysiological measures except a brief mention of "auditory evoked response as a means of testing cochlear reserve and auditory nerve in early infancy." (p. 136) Perhaps such omissions are in keeping with the current state of audiology practised in many clinics, but they tend to make the handbook old before its time.

Despite these criticisms the book provides a unique assemblage of information on a wide variety of auditory disorders, presented in such a way as to facilitate its use in the clinical setting and would be a useful addition to the bookshelves of those in the profession of audiology and associated fields.

Peter Robinson
National Acoustic Laboratories

MECHANICS OF UNDERWATER NOISE

Donald Ross, Pergamon Press, New York, 1976; xiv + 375 pages, illustrated. Price $A24 (soft cover).

This book is primarily about noise produced by ships (there are only 4 pages on noise due to environmental phenomena). The line of argument is of a high standard, and yet generally easy to follow. There are extensive lists of references and a glossary of symbols.

The book is not divided into Parts, but it is convenient to consider it in three parts: (1) fundamentals, (2) Hydrodynamic noise sources, and (3) Generation and transmission of mechanical noises from within the ship.

In Chapter 1, the factors pertinent to passive sonar arrays are discussed. (No comparison is made with active arrays and their accompanying clutter or reverberation).

Chapter 2 is a useful introduction to sound-waves in liquids, although there is a minor faux pas on page 19: "Sound energy is carried by longitudinal waves... Sound waves occur in gases, liquids and solids". I do not understand the argument given on page 39 that leads to the familiar conclusion that the angle of reflection equals the angle of incidence.

Chapter 3 is a helpful summary of hydrodynamic sources of noise, based on Lighthill's analysis. Monopole, dipole and quadrupole sources are described, and an explanation is given as to why quadrupoles are negligible in liquids such as water.

Chapter 4 contains a few pages on underwater ambient noise and on page 69 the interesting hypothesis that "splash noise from breaking waves is a major source of underwater ambient noise" is asserted. The conclusion on page 71 that "remote regions free of shipping show spectra that are practically flat from 20 to 500 Hz..." needs some qualification. The only measurements that support this conclusion were carried out in shallow water. Other measurements made in quiet, deep, water have yielded results in which the noise level varies rapidly with frequency within the 20 - 500 Hz band. This chapter also contains several interesting pages on sound radiated from gas bubbles in liquids, and noise due to splashing, wind, and rain.

Section 6.6 describes flow noise in a generally easy-to-follow manner. At one point however, the flow velocity is said to be a function of the thickness of the disturbed layer, and yet the author's comment is that velocity is "a function of upstream rather than local conditions".

Chapter 7 contains very helpful mathematical and physical descriptions of cavitation. In the section on underwater explosions, however, a figure showing the pressure trace from an explosion is misleading in that it shows the pressure maxima due to bubble-pulses as quasisinusoidal functions of time. The generally accepted result is that the pressure-time curve has a cusp at each of the bubble-pulse maxima.

Chapter 8 deals with propeller cavitation and contains 5 pages on ship-generated ocean ambient noise ("traffic noise"). Chapter 9 is on radiation by dipole sources, and describes examples of dipole sources such as propeller singing and vortex shedding.

The part of the book that deals with the generation ahd transmission of mechanical noises comprises chapters 10, 5, and 6. Chapter 10 gives a comprehensive coverage of the ways in which noise is generated within a ship. There is only one page, however, on "underwater noise implications". Chapter 5 deals mainly with the vibration of bars, and contains 1½ pages on the vibration of ship hulls. Chapter 6 is mainly to do with vibration from plates, and contains a few pages on self-noise.

To conclude, this book is primarily of interest to the scientist or engineer concerned with the sounds radiated from ships or submarines. The topic of ambient noise, (the background noise against which the ship noises are to be detected) receives only scant treatment, and Biological noises are omitted entirely.

Previous reviews of this book have appeared in Ultrasonics 16(2), 90-91 (1978); and in Acustica 40(1), 72 (1978).

Marshall Hall

ACOUSTICS, NOISE AND BUILDINGS

by P.H. Parkin, H.R. Humphreys & J.R. Cowell, 4th Edition, Faber, London, 1979, 297 pages, index. Price: $20.45 (A).

Parkin and Humphreys' book, Acoustics, Noise and Building is a classic work which brought together most of the available information on building acoustics that could be used by Architects. Since Acoustics, Noise and Buildings was first published in 1958 an enormous amount of literature has been published in the field of building acoustics though there is surprisingly little of relevance to a basic textbook on acoustics for Architects. Parkin, Humphreys and Cowell (Humphreys died before the revision had progressed very far and so the revision was undertaken by Parkin and Cowell) have, with great insight, ignored most of the new work and trendy formats of some of their more recent competitors, and have again produced a valuable textbook on building

acoustics. It presents the state of the art rather than the state of the science.

The easiest way to review this edition is to compare it with earlier editions. Although the material has been extensively revised the format of the work is very similar to previous editions. The chapter headings are, Nature of Sound, The Behaviour of Sound in Rooms, The Design of Rooms for Speech, The Design of Rooms for Music, Electro-Acoustic Aids in Auditoria, Principles of Noise and Vibration Control, Criteria for Noise Control, Noise Control by Design, Sound Measurement and Calculation and Noise Control in Practice. The greatest revision is probably in the areas of Criteria for Noise Control and Sound Measurement and Calculation. An unfortunate difference between this and previous editions is the omission of photographs. Photographs are well worth including even if they do make the book date more rapidly. In a book, such as this, which is thankfully devoid of fads and fancies, photographs need not be of contemporary buildings and equipment anyway.

Fergus Fricke

STANDARDS & REGULATIONS

STANDARDS ASSOCIATION OF AUSTRALIA REPORT

The Standards Association of Australia has recently published the following new standards:

1276-1979 Methods for determination of sound transmission class and noise isolation class of building partitions

Describes methods for determining four indices for rating the properties of partitions, including walls and floor-ceiling assemblies, used to divide spaces in domestic and commercial buildings in reducing the transmission of airborne sound; the four indices are sound transmission class, field sound transmission class, noise isolation class, and normalized noise isolation class.

2240-1979 Methods of measurement of the sound emitted by motor vehicles

Describes six test methods for measuring sound levels emitted by new and in-service motor vehicles, including cars, trucks, buses, motor cylces, and their derivatives. The six tests are for moving vehicle acceleration, stationary vehicle, acceleration from a standing start, low speed drive-by, high speed drive-by, and body noise.

2253-1979 Methods for field measurement of the reduction of airborne sound transmission in buildings.

Sets out the methods for the field measurement of the reduction in the transmission of airborne sound between the spaces in a building separated by a partition. The procedures are intended for the measurement of field transmission loss and noise reduction.

2254-1979 Recommended noise ratings for various areas of occupancy in vessels.

Provides design criteria for maximum recommended noise ratings within occupied spaces in new vessels, taking into account the function of the different spaces. It applies to vessels for cargo, pilot, supply, survey, fishing, dredging and research use, to tugs and ferries, to surface effect and air cushion vessels, and to habour work boats and other vessels for hire.

NEW ISO BIBLIOGRAPHY NO. 13 ON ACOUSTICS PUBLISHED

ISO has recently published its 13th bibliography of international standards and other publications, including relevant IEC documents, dealing with the hazards of noise, mechanical vibration and shock.

This latest bibliography will be of special interest to persons concerned with engineering, medical or legislative aspects of these problems.

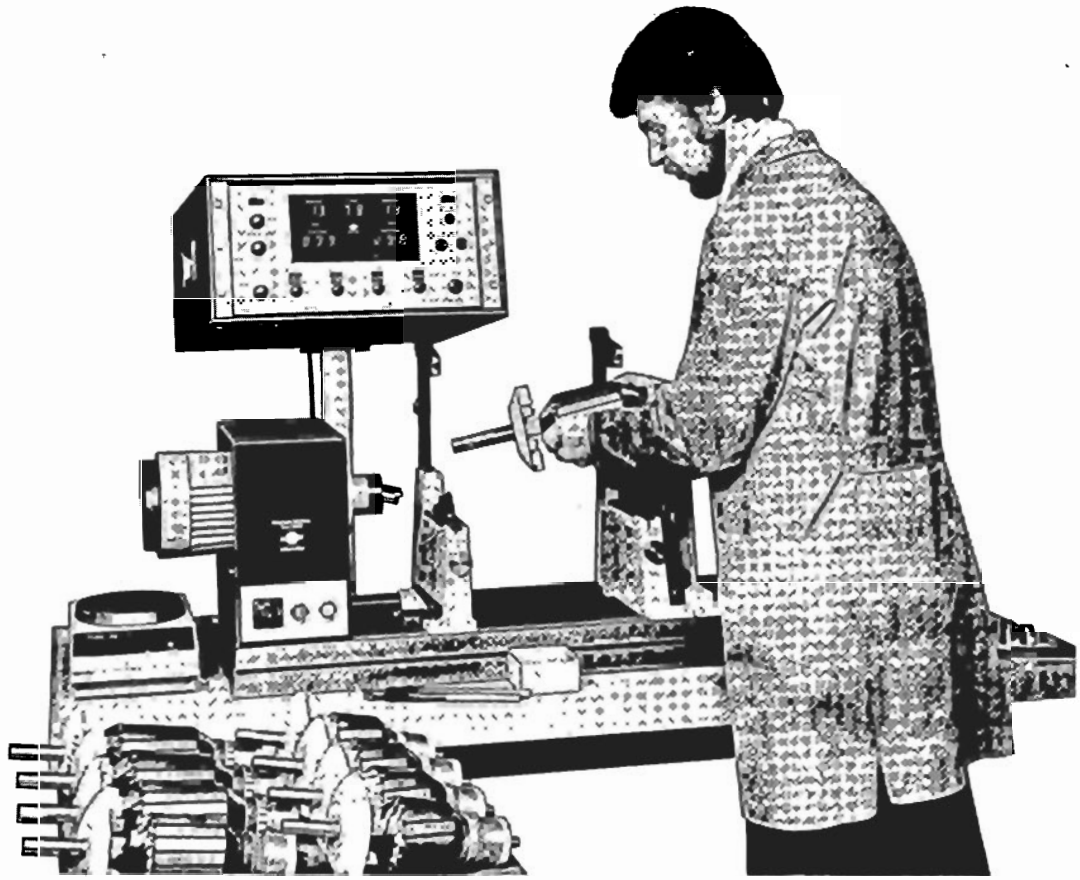
In the part on mechanical vibration and shock, some of the wide range of subjects covered include human response to these subjects, measurement and evaluation as applied to machines, structures and equipment and testing procedures.

The subjects covered in the part on acoustics include terminology, sound power and noise measurement and noise limits, building acoustics, psychological and medical acoustics and sound recording and reproducing techniques.

This bibliography is available from the Standards Association of Australia in capital cities and Newcastle at a cost of $5.25, plus postage and handling.

The Executive of the Association's Acoustics Standards Committee met during April 1979 to consider the programme of the various Acoustics Standards Committees and also the impact of the large volume of international standards, which have been published and are in the process of publication by the International Organization for Standardization (ISO) and International Electro Technical Commission (IEC).

NEW PRODUCTS



BALANCING MACHINE WITH CONSOLE
Type 3905/2504

DYNAMIC BALANCING MACHINE

A universal balancing machine, the Type 3905, has been introduced by Bruel & Kjaer, together with an all-electronic Balancing Machine Console, the Type 2504.

The 3905 is designed for two-plane balancing of work pieces from 10 kg down to 0.5 kg (0.1 kg with special preparation), at either 1500/1800 or 3000/3600 RPM. A precision cardanshaft end-drive to the work piece permits positive and fast identification of unbalance position in both correction planes. The 3905 can be used in conjunction with the 2504, which is also suitable for use with a variety of other soft-bearing balancing machines and spin-up rigs. The 2504 processes the unbalance vibration signals to give direct readings on digital LED displays of unbalance correction required, after stopping the motor drive automatically and quickly. The 3905/2504 combination permits a Balance Quality Grade of G 1 (ISO 1940) to be obtained; the unbalance reduction ratio achievable is 90% to 95%.

Additional features like electronic compensators and plane separators (for easy calibration) provide the flexibility needed for both production and development balancing tasks.

INFORMATION FOR CONTRIBUTORS

Items for publication in the Bulletin are of two types

(a) Shorter articles - which will appear typically under the heading 'News and Notes'

(b) Longer articles - which will appear as refereed technical articles.

The closing dates for the receipt of these articles are as follows:

Vol. 7 No. 3 Longer articles: Mid September; Shorter articles: Mid October.
Vol. 8 No. 1 Longer articles: Mid January; Shorter articles: Mid February

Articles may be sent directly to the editor or via the local State Bulletin representative.

There are no particular constraints on "shorter articles" except that they should be of relevance to the Society and be received on time.

Attention to the following matters will assist when processing "longer articles".

(i) Length - typically from 3 to 4 pages when printed.

(ii) Title and Authors Address - the title should be concise and honestly indicate the content of the paper. The author's name and that of his organisation together with an adequate address should also appear for the benefit of members who may wish to discuss the work privately with the author.

(iii) Summary - The summary should be self contained and be as explicit as possible. It should indicate the principal conclusions reached. That should be possible in less than 200 words. Many more members will read the summary than will read the paper. Everybody seems to be busy these days.

(iv) Main Body of the Article - This should contain an introduction, and be followed by a series of logical events which lead finally to the conclusions or recommendations. The use of headings greatly assists the reader in following the logic of the paper. The conclusions should of course be based on the work presented and not on other material.

(v) References - Any standardised system is acceptable - for example those used by Journal of Sound and Vibration, Journal of the Acoustical Society of America, or The Institution of Engineers, Australia. Page numbers and dates are important, particularly when referencing books.

(vi) Tables and Diagrams - As a general rule, Tables are best avoided. Diagrams may need to be redrawn during the editorial stage. They ought to be totally self explanatory, complete with a title, and with axes clearly labelled and units unambiguously shown.

The papers generally will be subject to review but this is not intended to discourage members. The author no doubt would prefer to have anomaly drawn to his attention privately than to gain notoriety by having errors published widely.