ACOUSTICS AND NOISE CONTROL IN CANADA

THE CANADIAN COMMITTEE ON ACOUSTICS

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L'ACOUSTIQUE ET LA LUTTE ANTIBRUIT AU CANADA

LE COMITÉ CANADIEN DE L'ACOUSTIQUE

JUILLET 1973
VOL.1, N°3

JULY,1973
VOL.1, No.3

ACOUSTICS AND NOISE CONTROL IN CANADA

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CONTRIBUTIONS

Articles in English or French are welcome. They should be addressed to a regional correspondent or to a member of the editorial board.

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CONTRIBUTION

Vous êtes invités à faire parvenir des articles en anglais ou en français. Prière de les adresser à un correspondant régional ou à un membre de la rédaction.

SOUSCRIPTION

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Ce bulletin d'information est publié par le Comité canadien de l'acoustique. La société Radio-Canada, le Ministère de l'Environnement et le Conseil national des recherches s'occupent de la coordination, de l'impression et d'autres services administratifs. Le contenu du bulletin ainsi que les avis exprimés ne représentent pas nécessairement l'opinion du Comité canadien de l'acoustique ou du gouvernement du Canada et des ministères et organismes fédéraux; ce sont les auteurs qui en assument la responsabilité.

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GUEST EDITORIAL

John E. K. Foreman
Faculty of Engineering Science,
University of Western Ontario, London 72, Ontario.
Chairman, Canadian Committee on Acoustics

Committee, Association or Society?

This year marks the eleventh anniversary of the meeting of a group which was later to become known as the Canadian Committee on Acoustics. The editorial in the January 1973 issue of the Newsletter by Tony Embleton gave a brief outline of the history and activity of the Committee since its inception. At the 1970 meeting of the CCA at The University of Western Ontario, there was a general concensus that the time had arrived whereby a reassessment of the structure of the Committee was needed; it was generally felt that, although considerable benefits and useful exchange had resulted over the years through the annual informal meetings of the Committee, its responsibilities as a group, knowledgeable about acoustics and its wide spectrum of applications in Canada, might be better met if the group was more formally organized. Further, a formal arrangement for operation of the CCA could result in improved communication between the Committee and branches of government, municipalities, industry and the universities which have an interest in acoustics and its applications. As a

consequence, for example, a better mechanism should develop whereby problem areas of an acoustical nature involving technological and social issues could be identified--and recommendations for corrective measures subsequently made.

Acoustics is a fragmented field of research in many countries, and particularly in Canada. By its very nature, acoustics is inter-disciplinary in character and crosses traditional academic boundaries and disciplines. It is not exclusively concerned with air-borne noise, but embraces studies in general vibrations, underwater acoustics, electro-acoustics, geophysics, the use of ultra-sound as an analytical tool, speech pathology and audiology, and others. Moreover, there appears to be insufficient integrated research in acoustics and its applications; even less is being done in the way of teaching of fundamental and applied acoustics at Canadian universities and colleges which, in the opinion of many, is a serious deficiency in our academic programs.

At the meeting of the CCA at McGill University last October, a proposal for a study committee on acoustics in Canada, prepared by the executive and addressed to some of the problems as outlined above, was considered by the membership. Although it was felt that an in-depth study on acoustics in Canada might provide valuable information and certain guidelines for development in the future, there was reservation expressed at the meeting as to whether there was a need for a study of such scope at that particular time. There was also some concern about the method by which a study of this nature would be undertaken and reported, and there was the inevitable question of finding financial support for such a study. But it was nevertheless agreed that the CCA was the only broadly based organization existing in Canada at the present time which brings together, through meetings and personal exchange, the acoustic community and its diverse interests and activities. Recognizing that every effort should be made to improve communications between those working in acoustics in Canada, the membership then approved a proposal for the initiation of this Newsletter.

Where do we go from here? Is it logical at this point, with over 150 members, to refer to our group as a "committee"? Have we not reached the stage where we may at least be allowed the privilege of identifying our activities with those of an "association"? Certainly, Committee seems to be a poor description of what we now have and what we now do, and a change in the name of the group, with, perhaps, a constitution, an enlarged executive, and active standing or ad hoc committees should be in order at this point. These committees might be concerned with membership, publicity and publications, and programs (annual or regional conferences?). The committees, for example, might also provide specialized input in dealing with issues involving acoustics in technology, urban community life, or government legislation. These would all seem to

be positive steps toward achieving certain objectives as previously outlined.

On the other hand, there are many who would advocate constituting the group in Canada as a technical society, along the lines of other contemporary societies or, in the case of CCA, as a parallel in Canada to the Acoustical Society of America. Perhaps a recommendation to the ASA for the formation of a Canadian branch of this society would best meet the needs. It is not clear in my mind, however, what advantages may be associated with a technical society (dealing presumably with acoustical matters of a technical nature) as compared with a more general association of individuals and groups whose activities directly or indirectly embrace acoustics.

The agenda for the next annual meeting of the CCA, to be held at the National Research Council in Ottawa on October 18 and 19, 1973 (following the Community Noise Seminars sponsored by the Division of Physics of NRC), is now being drafted. I would hope that each of you who attend this meeting would come prepared to comment during the business session on the possibilities which I have outlined for restructuring of the Committee. I would welcome written comments on this matter at any time.

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ACOUSTICS AT CRIQ

Daryl May and Gilles Crépeau
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Assisting Quebec industry is the goal of Centre de Recherche Industrielle du Québec, a provincial-government corporation recently set up in Quebec City, in Dorval (near Montreal) and in Sherbrooke, under its director-general, Mr. Michel Normandin. CRIQ's technical divisions include an industrial mechanics section inside which is an acoustics group.

Acoustics at CRIQ is, of course, oriented towards industrial needs. Broadly the activities can be divided into two areas. The first is to deal with industrial noise problems. The second is to develop acoustics products for industry to produce itself. Although CRIQ's acoustics section got under way only about a year ago, work in both these areas has grown to quite significant proportions. While many of the details are naturally confidential and only the client may disclose them, some broad evidence of progress may be given here.

Dealing with existing industrial problems has involved working with industrial clients to quieten noisy product lines. These activities are becoming increasingly challenging with the coincidence of the tendency for the public to demand quieter products and the tendency for manufacturers to want to sell lightweight

structures subjected to stringent "value-analysis". Noise control in many products has moved beyond the stage where a crude "double-the-weight" approach will suffice. As an industrial research centre, CRIQ appears well-placed to satisfy industry's needs for scientific solutions to quieten noisy products.

A typical CRIQ service in this way would begin with CRIQ's information service, known as SAIT (Service d'Analyse d'Information Technologique). SAIT illumines the legislative and other pressures for quieter products and, at the same time, advises the acousticians of recent, relevant reports and developments in acoustics materials. CRIQ's acousticians can then discuss with manufacturers a suitable development programme. Typically, this would begin with establishing the present noise output, and agreeing a broad target line. The product would then undergo a noise source analysis - probably in CRIQ's 2000 cu.ft. anechoic chamber - so as to expose the sources which must be tackled. (The need for such an analysis is often a major educational lack in the industrial partner, who may not appreciate the illogicality of tackling non-prominent noise sources). This source survey is facilitated by a line of analysis equipment, covering constant percentage bandwidths from an octave to 6 per cent, taking both microphone and accelerometer inputs.

The noise survey leads in turn to a noise reduction programme. For some such sources, CRIQ has packaged silencing devices, in one case making use of a computer optimisation routine operating on an improved mathematical model for the acoustics in question. Of course, if it served the client best, one would recommend another, perhaps proprietary product... though an interesting observation is that proprietary acoustic materials have so far been found to be too expensive for most applications.

Product noise reduction obviously ends with a reliable measure of the noise output, according to whatever norm pertains. This is also done for manufacturers wishing to certify a noise level, even if CRIQ has not played a part in attaining that noise level. A typical example has been noise certification for the Quebec snowmobile industry according to the SAE J192 procedure now widely incorporated in legislation. CRIQ tests about fifty models each year and issues an independent, unbiased and confidential certificate. A team is available to manufacturers on generally a day's notice.

Industrial noise problems extend increasingly to hearing conservation, with new legislation currently expected to result in something of a scramble for CRIQ's services to measure noise exposure in factories. This has been done in the past though to a limited extent: CRIQ has done some work in furniture plants. In the future, probable tasks will include advice or services in audiometry, as well as in quietening or masking sources, scheduling workdays... or simply giving a plant a clean bill of health regarding noise exposure.

Since its services have been available only a short while, CRIQ has played only a small part in architectural acoustics, consisting of curing a reverberation problem in a broadcast studio, and some transmission problems elsewhere. Also not yet prominent in the activities is advice about the location of future plant, but one problem that was tackled had all the proper components of what can be expected in the future: an assessment of the expected noise output determined from existing plants and from calculation; a study of its propagation to an adjacent residential area; an evaluation of norms and by-laws relating to the noise levels; and, finally, a technical input to the dispute between the promoter and the city government. The result, unfortunately, was a triumph of illogicality: the noise exposure complied with internationally-accepted norms but not with the city by-laws. These the city officials privately acknowledged to be excessively stringent... but conveniently excluded a development they did not want but had no other powers to curb!

The second major area of acoustics endeavour at CRIQ, which is to develop acoustics products, stems from marketing expectations that acoustics is currently expanding fast enough to justify increasing participation by Quebec industry in satisfying future needs. Marketing projections, by an in-house Marketing team as well as independent surveys, project sales increases of some products by as much as 1000% over the next few years. The products under development are naturally not ready for publicity, but the underlying philosophy is to develop a prototype for an industrial partner to mass-produce, since CRIQ is not a production organization. CRIQ's work is seldom a gift to the company involved, which either pays for development as it occurs... or agrees to a delayed refunding based on the sales of the product. The manufacturer may, however, be subsidized by federal or other research grants, and these may be available to him somewhat more simply when he associates himself with a logical, carefully detailed R & D programme plan prepared by CRIQ.

It is obviously desirable in product development to make use of superior technology, and this CRIQ tries to bring to bear wherever possible, taking patents where appropriate. On the other hand, where marketing findings reveal an every-day product currently produced elsewhere but now justifying local production, it may still be desirable to provide the design input to make that possible.

CRIQ's acoustics facilities are in Dorval at 582 Orly Avenue, phone (514)-636-4401 or telex 02-25678. Daryl May will be pleased to discuss their services with potential clients.

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CERTIFICATS DE MESURES ACOUSTIQUES AU C.R.I.Q.

par Gilles Crépeau et Daryl May
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Dû à la pression toujours grandissante, mais croyons-nous justifiée, des organismes pour la protection de l'environnement, certains états américains ont établi une limite évolutive sur le niveau sonore produit par différents genres de véhicules. Cette limite s'est traduite en loi pour certains états, et les véhicules les plus touchés sont évidemment les plus bruyants, soit les camions, les autobus, les motocyclettes et plus précisément, en ce qui nous concerne, les motoneiges.

Au lieu de pénaliser les usagers des véhicules qui ne respecteraient pas la loi, certains états défendent simplement la vente ou l'offre de vente de tout véhicule qui ne respecte pas leur norme (ou loi). Ceci simplifie d'autant le problème de la surveillance qui se fait seulement au niveau des transactions commerciales et surtout au niveau du commerce en gros. Cette politique a aussi l'avantage, tout en requérant un corps policier plus réduit pour la surveillance, de protéger directement le particulier qui, n'ayant pas modifié son véhicule, a la certitude de ne pas avoir de différent avec la loi, du moins sur ce point-là.

Maintenant que les modèles âgés (disons de plus de 5 à 7 ans) se font rares, surtout dû au fait que les propriétaires changent leur véhicule fréquemment, ce genre de contrôle semble très approprié.

L'idée d'établir des normes évolutives plutôt que des normes restrictives dès le départ est une politique très réaliste. En effet, en plus de permettre à l'industrie de franchir les étapes une à une plutôt que de faire des bonds par trop brusques, cette idée de norme évolutive sert aussi et surtout à établir des objectifs à moyen et long terme. Ces objectifs, étant assez éloignés dans le temps, servent de sujet de discussion entre tous les organismes impliqués, soit aussi bien les gouvernements, les organismes de normalisation, que l'industrie, et ils peuvent donc être réajustés avant les délais prévus, si un consensus s'établit sur le sujet. Ces normes évolutives étant des objectifs à long terme, elles sont perçues, au moins plusieurs années avant qu'elles entrent en vigueur, comme une philosophie de la protection de l'environnement pour les années et même les décennies à venir.

Ces normes, ou lois, ayant une très grande audience sont facilement contestées par les deux principaux groupes qui sont concernés: les protecteurs de l'environnement et les industriels. Ces derniers étant préoccupés par l'aspect économique de leurs entreprises, surtout au moment où des récessions se présentent sur certains marchés (cf. l'industrie la plus touchée est certes celle de la motoneige)

trouvent souvent les normes établies exagérément restrictives. On peut comprendre leurs réactions, car n'ayant presque jamais considéré la réalité du bruit de leurs produits auparavant, ils doivent maintenant porter une attention spéciale à ce problème et même plus, y trouver une solution adéquate et ce, dans un laps de temps assez court. Ce qui amplifie leur mécontentement est le fait que les normes en question ne sont qu'une première étape, et que le problème se représentera dans quelques mois ou dans quelques années, lorsqu'il faudra respecter la prochaine étape des normes qui seront encore plus restrictives.

D'autres part, les protecteurs de l'environnement, se basant sur les résultats de nombreuses recherches, exigent que le niveau de bruit des différents genres de véhicules terrestres se tienne à l'intérieur de limites qu'eux considèrent raisonnables. Ils ne semblent aucunement prêts à accepter des excuses d'ordre technologique pour diminuer la rigueur de ces normes, surtout après avoir pris connaissance des prouesses technologiques de l'industrie (cf. surtout si on songe à celles de l'industrie aéronautique et astronautique).

LES MESURES ELLES-MEMES

Bien que, pour la majorité des lois sur le niveau sonore produit par les véhicules, il ne soit pas spécifié par qui doivent être faites ces mesures, certaines des industries qui désirent vendre leurs produits dans un état où il y a une législation, s'adressent directement à nous pour de telles mesures. En plus de les libérer de ce travail, le fait que les mesures soient faites par un organisme para-gouvernemental indépendant donne un poids non négligeable aux certificats qu'ils ont alors en main. Lorsque le client a terminé quelques exemplaires de chacun de ses modèles ou de quelques modèles de l'année à venir, il nous appelle alors pour que nous fassions les mesures. La plupart du temps, nous allons chez le client. Mais lorsqu'il ne peut avoir un terrain adéquat pour les essais ou pour d'autres raisons techniques, le client peut venir nous voir directement et nous faisons les mesures au voisinage de notre Centre de recherche. Ordinairement, il nous est possible de faire les mesures à un jour d'avis.

La plupart des mesures, sinon toutes les mesures faites jusqu'ici, le sont selon les différentes normes de la "Society of Automotive Engineers". Ces normes sont relativement bien connues et généralement acceptées par presque tous les organismes gouvernementaux en Amérique du Nord, du moins en ce qui concerne les procédures de mesure si ce n'est pour la norme proposée par la SAE elle-même.

Les principales mesures normalisées que nous avons faites ou que nous pourrions être appelés à faire dans l'avenir, sont par ordre d'importance décroissante:

no. de la norme	sujet
J192	motoneige
J331	motocyclette
J366a	camion lourd et autobus
J336a	intérieur de cabine de camion
J986a	automobile et camion léger
J919	niveau sonore à la position de l'opérateur
J952b	équipement mu par moteur à explosion
J672a	évaluation du bruit des camions lourds et autobus
J994	signal sonore employé lors de mouvement arrière

Techniquement, la plupart de ces normes se présente de la même façon. Ainsi, le véhicule en question doit passer à 50' devant le microphone qui est à 4' de terre. Le véhicule doit passer au moins de 2 à 4 fois dans chaque direction, et le résultat retenu est la moyenne du côté le plus bruyant. Le tout est mesuré avec la pondération "A" et le temps de réponse "Fast". Pour les tests à l'extérieur, le site doit être un terrain plat et dégagé de tout objet, sur une distance d'au moins 100' de tous les points extrêmes du test, ce qui se traduit globalement par un terrain dégagé sur au moins une surface de 250' par 250'. A l'exception du test J192 (où l'on exige que la surface soit du gazon d'une hauteur n'excédant pas 3" et ce, à cause de l'influence de la nature du sol sur la traction de la chenille, donc indirectement sur le niveau sonore produit), on indique seulement que le sol ne doit pas être recouvert ou constitué d'aucune matière susceptible d'absorber sensiblement le son, telle que neige poudreuse, gazon long, sable mou ou cendre. Cependant, pour le trajet suivi par le véhicule qui fait l'objet du test (encore à l'exception de la motoneige), la surface de cette voie doit être en béton ou en asphalte, relativement sans aspérité, et libre de gravier. A cause des exigences énoncées ci-dessus, il est parfois quelque peu difficile de trouver un site adéquat au voisinage immédiat de l'usine du client, et il faut alors transporter l'équipement et les véhicules au site approprié qui est, assez souvent, un aéroport. Pour le niveau sonore acceptable, une marge de 2 dBA en plus est acceptée à cause de la variation possible dans les conditions de mesure (i.e. le site, la façon d'opérer le véhicule, les gradients de température et de vent, l'équipement utilisé, etc.).

Les résultats sont envoyés au client le lendemain, le tout en 10 copies et sous forme de certificat. Le taux de la consultation correspond au tarif de la Corporation des Ingénieurs du Québec.

L'UTILITE DE CES MESURES ACOUSTIQUES STANDARDS

En plus de fournir à l'industrie des certificats lui permettant de vendre ses véhicules sur tout le territoire (i.e. dans tous les états) où la norme en question s'applique, ces tests standards ont deux autres avantages.

En tout premier lieu, tel que noté ci-haut, les législations derrière ces normes doivent faire prendre conscience aux industriels concernés de la réalité du grave problème du bruit causé par leur véhicule. Cette prise de conscience se situe dans une réalité plus vaste qui est la protection de l'environnement. Les frictions entre les

législateurs et leur conseillers techniques d'une part et l'industrie d'autre part, pourront avoir, à longue échéance, un effet bénifique pour la sauvegarde d'un environnement de vie agréable et sain.

En second lieu, ces législations, de par nature, indiquent à l'industrie quand et où il y a problème. Cette dernière doit alors mettre sur pied un programme de recherche pour résoudre le problème. Ces programmes peuvent aussi bien être menés d'une façon interne qu'externe et, dans ce cas-ci, avec l'aide d'organismes compétents dans le domaine.

C'est à ce niveau que se situe notre action principale, qui s'inscrit alors directement dans la vocation du CRIQ qui est d'aider l'industrie, et plus particulièrement, l'industrie québécoise. Cette collaboration peut revêtir la forme d'une recherche élaborée sur un projet assez vaste ou de consultations sur des points plus précis.

Le CRIQ étant un organisme plutôt jeune, nous n'avons pas encore eu à travailler sur plusieurs recherches de ce genre. Cependant, en jetant un coup d'oeil sur la réaction de l'industrie face à ces lois et aux demandes que nous en avons reçues, il nous est relativement facile de concevoir avec assez de précision notre collaboration future avec l'industrie, collaboration qui, croyons-nous, sera très positive.

L'APPLICATION DE CES NORMES AU CANADA

Il serait complètement inutile, à moins de raison majeure, de concevoir, ici au Canada, d'autres procédures de mesure standardisée, surtout si l'on songe aux effectifs et surtout aux résultats intéressants obtenus par une association telle que la "Society of Automotive Engineers" dans ce domaine. Il serait cependant très intéressant, voire même nécessaire, d'établir des normes qui seraient basées sur les procédures de mesure standardisée de la SAE. Ces normes, qui prendraient force de lois, devraient être établies d'un commun accord et ce, à l'échelle du Canada. En terme de niveau acceptable, ces normes devraient, dans la mesure du possible, correspondre à celles proposées par la SAE, surtout si ces dernières ont force de loi dans la majorité des états américains.

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CURRENT CANADIAN RESEARCH AND DEVELOPMENT/ RECHERCHE ET DEVELOPPEMENT AU CANADA

We intend to publish information on current Canadian research and development on acoustics and noise control. Contributions to this section are welcome. They should be sent to a regional correspondent or to a member of the editorial board.

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Nous avons l'intention de publier des renseignements sur les travaux de recherche et de développement qui sont actuellement réalisées au Canada. Nous invitons donc ceux qui auraient de l'information à ce sujet à communiquer leurs renseignements à un correspondant régional ou à un membre de la rédaction.

Department of Mechanical Engineering, University of British Columbia, Vancouver 8, British Columbia.

Title: Development of Pressure Probes for Use in Turbulent Flow

Investigators: T.E. Siddon, R. Rackl

Studies of jet noise which utilize the "pseudosound" pressure as the source fluctuation are complicated by aerodynamic and acoustic contaminations arising from interaction between the turbulent flow and the pressure probe. Special probe configurations which minimize the contamination are under investigation.

Title: New Cross Correlation Technique for Flow Noise Research

Investigator: T.E. Siddon

A new generalized cross-correlation technique has been established which provides explicit information about the spatial distribution and character of the elementary acoustic sources in fluid flows. By forming cross-correlations between various types of source fluctuation and the resulting far field sound pressure, the radiated intensity, spectrum and correlation area associated with each element of the source region is determined explicitly. The technique offers an important new approach to aircraft engine diagnostics, enabling the acoustic fractions and character associated with any one of several source mechanisms to be studied independently.

Title: Investigation of Jet Noise

Investigators: R. Rackl, T.E. Siddon

The object is to investigate the spatial distribution of acoustic sources in a turbulent jet flow, using versions of the correlation technique described in the previous section. One experiment involves a round turbulent jet flowing adjacent to an infinite rigid wall, the objective being to relate the pressure field on the wall to the distribution of noise sources in the image jet behind the wall. The technique has potential application to the diagnosis of noise generation by turbulent jets.

A second experiment involves a direct correlation between pressure fluctuations in the turbulent jet and the consequent noise field. Various problems of pressure measurement arise. Both experiments are being conducted in small anechoic chamber utilizing a 1 ½ inch diameter air jet capable of velocities up to 500 ft/sec. Results indicate that a large number of incoherent source "eddies" contribute to the noise of turbulent jets, and that the volumetric source strength is most strongly concentrated in regions of high turbulent shear stress.

Title: Noise Generation in Turbomachinery

Investigators: J. Leggat, T.E. Siddon

The objective is to investigate the mechanisms of noise generation on both moving and stationary surfaces in turbomachinery. In an earlier phase of this work, distributions of "surface dipole strength" were obtained by cross-correlation technique, on small flat plate airfoil models. By quantitatively establishing the coherence between the surface pressure fluctuation and the resulting radiated sound pressure it was possible to measure the surface source distributions for several flow phenomena including incident turbulence, vortex shedding, and separated flow. These phenomena, and other more complicated surface interactions contribute to the broad band base spectrum of turbomachinery. In the present project this surface source information is being measured on the rotating blades of an axial flow fan, using a radio link to transmit the blade pressure fluctuation which is subsequently correlated with the far field sound.

Title: Noise Generation Mechanisms for Passenger Car Tires

Investigator: T.E. Siddon

Starting with the premise that intense aerodynamic mechanisms are responsible for a significant fraction of the noise radiated by a relatively smooth tire rolling on a smooth surface, experiments are in progress to identify and quantify such mechanisms. The experiments, which are being conducted on a passenger car vehicle, include flow visualization studies and fluctuating pressure measurements both in the vicinity of the tire-road interface and in the acoustic far field (i.e., with a microphone at the end of a five foot boom). Cross-correlation techniques are being utilized in an attempt to localize the acoustic source mechanisms. The measurements indicate that a strong unsteady flow field exists immediately behind the tire-road interface and that this makes a dominant contribution to the noise. A postulated "vortex interaction" mechanism is being examined presently.

Title: The Measurement of Acoustic Flanking by Cross-Correlation Techniques

Investigators: C. Wakefield, A.J. Price (School of Architecture), T.E. Siddon

Recent experiments have supported the notion that acoustic flanking over partial partitions and through "leaky" walls might be studied very effectively with the aid of cross-correlation techniques. By establishing the time domain coherence between the transmitted sound spectrum with Fourier transforms of the correlation pulses to different flanking paths, enables a determination of the transmissibility

of each path as a function of frequency. The technique may have practical value in the diagnosis of deficient wall construction and in the performance evaluation of small acoustic barriers as are often used in open plan landscaping.

Title: The Noise of Rock Drills in Mine Shaft Environment

Investigators: J. Higginson, J.B. Evans (Department of Mineral Engineering) A.J. Price (School of Architecture) and T.E. Siddon

With the assistance of the B.C. Department of Mines, a study has been undertaken to evaluate the acoustic hazard associated with rock drilling and, in particular, to establish a means of predicting reverberant sound levels at the rock face. Controlling variables include the type of machine used, geometry and dimensions of the shaft at work site, nature of the rock surface, depth of hole, and impact rate. One initial objective is to establish the sound levels directivity and frequency spectra for a variety of manufactured equipment under free field conditions. As an ancillary piece of work, the relative importance of various source mechanisms will be established under real operating conditions. These mechanisms include air discharge, casing vibration, drill steel resonance and rock face vibration.

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RECENT CANADIAN PUBLICATIONS/PUBLICATIONS CANADIENNES RECENTES

Donald H. McKay
Environmental Protection Service
Department of the Environment
Ottawa, Ontario. K1A OH3

We intend to publish information, including abstracts, if provided by the author(s), on recent publications of persons working in acoustics and noise control in Canada. Contributions to this section are welcome. They should be sent to a regional correspondent or to a member of the editorial board.

Publications added to the list after the previous issue of the list was published are indicated by an asterisk(*).

The Department of the Environment assumes no responsibility for the accuracy or the completeness of this list.

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Nous nous proposons de faire publier des informations, y compris des résumés (s'ils sont fournis par l'auteur), sur des ouvrages récents de personnes travaillant dans le domaine de l'acoustique et de la lutte antribruit au Canada. Nous vous invitons à envoyer vos documents à un correspondant régional ou à un membre du conseil de rédaction.

Les ouvrages ajoutés à la liste après la publication de la liste précédente sont indiqués par un astérisque(*)

Le ministère de l'Environnement n'assume aucune responsabilité dans le cas d'une liste inexacte ou incomplète.

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POSITION WANTED

Honours Physics graduate with Masters degree in acoustics and experience in noise control and survey work seeks permanent professional position in acoustics. Age 28. Write to:

Andrew C. McKee,
Physics Department,
University of Calgary,
Calgary, Alberta.

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FUTURE MEETINGS/CONFERENCES A VENIR

Symposium on Noise and the Community-Technical, Planning and Legal Control

The next of the series of information seminars sponsored by the Division of Physics, National Research Council is scheduled for October 15-17, 1973, and will be on Community Noise. Tentative plans are to cover technical, planning and legislative aspects of the subject. Readers wishing to receive further information directly as plans develop should contact T. Embleton, Division of Physics, National Research Council, Ottawa, Ontario, K1A 0S1, telephone (613) 993-2840.

Annual Meeting of the CCA

The 11th Annual Meeting of the Canadian Committee on Acoustics will be held in Ottawa on Oct. 18 and 19, 1973. A full day of technical program is being organized for Thursday Oct. 18 by Doug Allan on the general topic of Industrial Noise Problems, with Friday morning being devoted to the business meeting.

Anyone wishing to present a paper or otherwise contribute to the technical program should contact D.H.W. Allan, Industrial Research Institute, University of Windsor, Windsor 11, Ontario, telephone (519) 253-8862.

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