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# ACOUSTICS AND NOISE CONTROL IN CANADA

THE CANADIAN COMMITTEE ON ACOUSTICS



# L'ACOUSTIQUE ET LA LUTTE ANTIBRUIT AU CANADA

LE COMITÉ CANADIEN DE L'ACOUSTIQUE

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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.

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MINUTES OF THE 11TH MEETING OF THE  
CANADIAN COMMITTEE ON ACOUSTICS  
HELD IN OTTAWA, ONTARIO,  
18 OCTOBER 1973.

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Secretary, Canadian Committee on Acoustics

The 11th Meeting of the Canadian Committee on Acoustics was originally planned to last the 18th and 19th of October. Because many of the participants had taken part in the Noise Symposium for the preceding period, 15th - 17th October, it was decided to shorten the proceedings to only one day, Thursday, 18th October. Forty-seven members attended the meeting.

The members were greeted by the Chairman, John Foreman, who explained the reasons for holding the meeting in Ottawa. The meeting was then handed over to the Technical Program Chairman, Doug Allen. He emphasized the applied slant of the papers to be presented and that this would give a chance for the consultants in the field to share their day-to-day experiences. He also commented on the good response for papers that he had received. He, in turn, then handed the meeting to the morning's Sessional Chairman, Les Russell.

Charles Fankhauser described the recent legislation in the Province of Quebec which requires industrial and commercial establishments to provide a noise-safe working environment for their employees. The Speech and Hearing Division of the Institute of Otolaryngology at the Royal Victoria Hospital, Montreal, receives requests for consultation from industrial physicians. These usually have on their team one or more industrial nurses who do not always have the necessary training, although

the program of the American Industrial Nurses Association is being adapted. The nurses are supplemented by industrial audiometric technicians. There are programs for physicians as well as management seminars in industrial noise control. There are also in-plant programs for management and labour leaders. Throughout, education is emphasized. Advice is also given on audiometric equipment and its calibration.

There was some initial inertial difficulty in instituting the industrial program because, at the moment, hearing conservation causes only minor concern to the various parties. Such programs will be of use in assessing damage claims as well as in retraining and aural rehabilitation. Some of the services are available on a contract basis. There is some check on possible discriminatory practices in hiring to screen out noise susceptible workers.

In the discussion period it appeared that fifteen inspectors were active in the province and that a 50-week, 30 hours per week, course was to be instituted in the CGEPs. The industrial technicians are certificated. It was mentioned that only the most flagrant cases are investigated at present. Ear protectors were mandatory at levels above 95 dB(A), but recommended between 85 - 95 dB(A).

Bob Strachan discussed the Greater Vancouver Regional District Bylaw level of 70 dB(A) ( $L_{10}$ ) at the property line in a commercial area and he thought this to be a realistic guideline. The night-time figure was 5 dB(A) lower and the levels in a 'quiet' zone, 65 and 55. He felt that bylaws were not always good, but that they were necessary. His own preference was not for the too inclusive bylaw approach where a blanket figure is set, but for a method based on the Rosenblith and Stevens method of Composite Noise Rating.

The case of a noisy car wash off a highway was described. The car wash originally gave 85 dB(A) at the property line, and after suitable reduction treatment gave 65 dB(A) at the adjacent residences ( $L_{50}$ ). Even though the corresponding  $L_{10}$  was 70 dB(A) or greater, no complaints were received from the residents. Interestingly the Level of Noise Pollution (LNP) remained the same because  $L_{90}$  (background noise) had increased. In the discussion it was suggested that the situation will change when truck regulations are introduced. The reasonable application of numbers was stressed. The results of the Montreal Urban Community Noise Study showed that raw numbers were not really satisfactory, but that a nuisance seems to arise when a new source intrudes 10 dB(A) above previous ambient level.

Huw Jones described a noise survey carried out in the City of Calgary. Portable measurement stations were used over the city and continuous recordings made. He suspected that some of the NEF curves are out of date. Peak noise levels of 90 dB(A) were often recorded for aircraft although the highest noise measured was from a railway whistle (106 dB(A)) which recurred at 1- $\frac{1}{4}$  hr periods, day and night. Various indoor levels were monitored, and some schools were found to have a 38 dB reduction between outside and inside noise. The screening effect of rows of houses was measured with 15 dB being obtained from a single row, no change from the second row, and an increase in signal by 3 dB from the third.

The Speaker thought the National Building Code should call for vibration insulation between buildings and that tests were needed on completed buildings.

Various comments were made by the audience on the need for a simplified test of barrier wall insulation. The difference between the results from field and laboratory tests was mentioned. Poor construction accounted for some of the difference and the need for builders to be aware of the problem was emphasized. A study of the effect of holes in walls was proposed.

H. Zitko discussed a plant problem in which acoustic resonances induced severe vibrations in two gasholders. A multiple-orifice-plate damper proved ineffective. Based on some laboratory tests using a loudspeaker to actuate standing waves, resonant dampers were proposed. The original dampers were quarter wave resonators tuned with a water manometer. The cure was not too effective, resulting in a 1/2 - 1/3 reduction in the vibration. The laboratory tests were remade using a compressor as a source. Multiple quarter wave dampers were then used, placed so as to remove the fundamental, second and fourth harmonic. A reduction to 10% of the original vibration level was achieved.

Much of the same type of cure was applied to a problem involving a domestic furnace. Here a plate resonance coincided with an organ-pipe effect in the furnace itself. The oscillations were self-sustaining in that a reaction was felt back at the burner itself. Once again a quarter-wave pipe removed the problem.

After a break for lunch the meeting resumed with Aubrey Edwards as the afternoon Sessional Chairman.

John Yeaman described the quietening of a blowing frame, used in the manufacture of automotive glass. Originally 100 dB(A) had been measured 5 ft. from the unit. An enclosure was considered to be too expensive. The duct work was coated with an absorbing material containing lead, and a vinyl based material used for surrounding the flexible connections. The nozzle plate itself was treated with layers of acoustical foam. Peaks in the original spectrum occurred at 250 Hz and 4 kHz. At 25 ft. away from the machine a 10 dB(A) reduction was effected.

Another problem was mentioned concerned with disturbed patients in a hospital. Here the solution followed the usual pattern of doubling the panes of glass in a window, duct silencing the air-flow paths, improving the efficiency of the existing ceiling and gasketing a solid core door.

E.H. Bolstad emphasized the fact that industry is not always the villain and that the need is for equitable codes to protect both sides. He described a problem connected with a gas compressor station in which it was impossible to pinpoint the main noise producer. The noise level was sufficiently high for neighbouring farmers to threaten legal action. The solution was firstly to lag all the pipes with high density fibreglass and mastic, and then surround the treated pipes with aluminum jacketing. The turbines were fitted with inlet and outlet silencers. Noise at the fence line reduced to 60 - 65 dB(A) and at 500 ft. to less than 50 dB(A). Little change was found in the surrounding hills and, in fact, the level sometimes increased 2000 ft. from the station. Some of this seemingly far land was bought for development, but subsequently the owner was bought out by the industrial concern.

Another case concerned an asphalt plant. Here the owners decided to make their own noise suppression system and succeeded in increasing the noise by 2 dB(A). Subsequent measurements found the daytime limits fixed by legislation were not exceeded. There was no problem at night because the plant only worked throughout the day.

Studies of Edmonton truck noise have been made and it was found that the noise peaks occurring just before each gear change (during acceleration) were the same and independent of the speed of the truck. An insight was given as to how the upper level for truck noise was arrived at.

R.A. Howell described methods for measuring noise at the operator's ear. As the sound level meter is difficult to hold close to an ear, an 'ear bug' fitted to the ear is used. The data is taped and must subsequently be A filtered and corrected for diffusivity, angle of incidence, etc. The operator puts his work task on to tape as conditions of work must be known. Even so, two operators on the same task might register a difference of 3 dB(A) which could be a shielding effect.

Measurements inside the drivers' cabs on trucks showed a 2 - 3 dB difference in noise levels, both with windows up and down, depending upon which ear is being used for the measurement. Some aerodynamic noise is expected to be caused around the driver's head.

Very small differences were registered between a handheld instrument and the 'ear bug'.

Lloyd Geake gave some comments on noise from air conditioning duct systems. He described the duct system in a school which gave a very low rumble in the hallway although there was no noise heard in the classrooms. The ceiling space also produced a low rumble but at a lower amplitude. It was found that a 1-in. air space around a light fixture caused coupling between the two spaces and that the hallway resonated like an organ pipe. Sealing the air space removed the hallway rumble.

A similar problem occurred in a conference room. Here the resonance was produced by the ducting, and a grill in the supply created a pure tone. Diagonally placed masonite plates in the ducting removed the problem.

As an added attraction to the program Peter Beamish showed a CBC-produced film on his work with whales. A sailing vessel manned chiefly by high school students had been used off the East Coast to obtain recordings of whales. The whales produce large signal strengths in their sonar systems, 102 dB being recorded in the 10 kHz - 12 kHz band at 1 metre distance. The beam angles of their sonar was of the order of  $1 - 2^\circ$  and it has been suggested that their transmitter could be an end fire array utilizing a long bone structure having a high acoustical velocity. The sonar transmissions are rapidly repeated crisp pulses of carrier frequencies (5 - 20 kHz). It is suggested that when feeding they use the sonar as a side scan system and it is speculated that their large brains could be a correlation system (analogous to the integrating or correlating property of the human eye when viewing an intensity modulated sonar visual display).

In addition to the sonar system the whales also have a low-frequency communication system usable over great distances.

#### B U S I N E S S M E E T I N G

The Chairman, John Foreman, thanked the speakers, sessional and program chairmen, and the Physics Division of NRC for acting as hosts. The minutes of the 1972 meeting were approved and passed.

The Chairman then reviewed the previous decision to set up a group to produce a newsletter. He explained how this had grown out of an earlier Task Force proposal to improve intercommunication primarily between members.

Tony Embleton, the editor of the newsletter "Acoustics and Noise Control in Canada", reviewed the setting up, aims, and experiences with the newsletter during its first months of publication. There were three on the editorial board and some regional correspondents. Technical articles, some peripheral but interesting to acousticians, have been published as well as lists of publications, lists of research projects, and one job wanted advertisement. One of the aims is to spark ideas, comments and criticism and the newsletter is only as good as the contributors. The

newsletter is willing to publish help wanted ads. The circulation list is larger than that for the CCA (300 against 150), but it is difficult to get a stable mailing list while it is growing rapidly. Four hundred copies are usually printed by the federal Department of the Environment. The newsletter can probably accept black and white photographs.

The editor apologized for the initial delay in producing the first issue and explained that the next issue (No. 4) was delayed pending the CCA meeting so that these minutes could be included. He requested contributions, and suggested such items as reports of court cases involving noise nuisance and legislation; contact should be made through the regional correspondents to prevent duplication. The publication is now listed by the National Science Library. The editor was thanked by the Chairman for his achievement, a vote of thanks to the editorial board was proposed by D. Allen, seconded by P. Beamish, and passed.

John Foreman then brought up the subject of the name of our group and proposed it was time to change the word 'committee' in the "Canadian Committee on Acoustics". More public recognition was needed and as an educational task still had to be performed on government, industry and society in general, a more formal name and composition would be more potent. The members have to decide as it is they who will have to write any constitution and bylaws, and serve on committees. The Chairman stressed that no legal steps would be necessary as there was no need to be incorporated.

The meeting was then open for discussion.

G. Thiessen agreed about there being no need for incorporation and desired to keep our present informality, although he agreed the name should be changed. P. Beamish thought the name was not sufficiently professional and he thought it not necessary to do more than change it. A. Brammer suggested that if all the needs are being served by the present arrangement we need then only change our name. A referendum carried out via the newsletter could accomplish this as well as finding out if there were any needs not satisfied. W. Bradley also thought it was only necessary to change the name, particularly when there was some question about his securing expense funds. He was supported by J. Foreman. R. Strachan felt the present name summed up his feelings toward the group, and questioned whether if we changed our name to Society (both 'society' and 'association' had been mentioned as possibilities), it might imply some parallelism to the Acoustical Society of America. The same degree of organization as existed in the ASA was not needed. T. Embleton described how over the years several Canadian societies had been formed with high hopes, especially in the publication field, and several had worked their way down to a duplicated news sheet. In fact, our organization and newsletter were now being used as a model. D. Allen felt we should stay loose, but that the word committee possessed some kind of a stigma. He suggested as an alternative to 'society' or 'association' the name 'forum'. E. Bolstad repeated the advantages of informality, saying that formality was necessary only when the group should exhibit some validity as when discussing the adoption of codes or standards; but he saw nothing wrong in our present name. L. Kende thought that several people were getting into the acoustics field who had little relation to our group. He felt the group should have a wider influence and be able to give guidance. Some members



thought we might be growing, that there could be a need for us in the future to coordinate educational programs, consulting activities and the formalization of qualifications. We must also consider to a greater extent those in the group who are not engineers. A motion proposed by W. Bradley, seconded by A. Edwards, to change our name to 'Association of Canadian Acousticians' was defeated; several speakers were against this name on the grounds of its elitism.

The following possible new names were tabulated:

- ASC - Acoustical Society of Canada
- CAA - Canadian Acoustical Association
- AC - Acoustics Canada
- CCA - Canadian Committee on Acoustics (present title)
- CAF -- Canadian Acoustics Forum
- CAS - Canadian Acoustical Society
- CIA -- Canadian Institute of Acoustics (or Acousticians)
- CA - Canadian Acousticians
- CAG - Canadian Acoustics Group

A motion proposed by R. Strachan and seconded by S. Forshaw to retain the present name was defeated. A straw vote on the above list was proposed by J. Piercy and seconded by J. Yeaman. The three winners in order of preference:

- CAA - Canadian Acoustical Association
- ASC - Acoustical Society of Canada
- CCA - Canadian Committee on Acoustics

A new motion to decide on a new name tonight proposed by J. Yeaman and seconded by E. Bolstad was defeated. P. Beamish proposed that the three names be circulated to the membership through the newsletter and that the membership be requested to rank order their preferences from these three and to write in, if desired, a name of their own choosing. The motion was seconded by J. Yeaman and carried.

Amendments were proposed and seconded by S. Handman et al. that a French equivalent to the proposed names be included and that the returns be signed. Both amendments were carried.

E. Bolstad proposed and J. Yeaman seconded that the next meeting of the CCA (sic) be held in the City of Edmonton under sponsorship of the Western Division of the group, in the University of Alberta, October 1974. It was hoped to arrange, at about that time, a seminar on industrial noise control by the Society of Mechanical Engineers. The motion was carried.

NEW EXECUTIVE

John Foreman, regretfully, announced his intention of retiring the chairmanship. An ad hoc committee nominated that the new chairman be Huw Jones, Physics Department, University of Calgary. D. Allen proposed the list be closed, E. Bolstad seconded, and Huw Jones is your new Chairman. The Secretary remains the same. Aubrey Edwards proposed a vote of thanks to the Past Chairman.

The meeting adjourned with some 20 members retiring to the Eastview Hotel for food and drinks.

\* \* \* \* \*

A SUMMARY OF THE ONTARIO PROVINCIAL NOISE PROGRAM 1973/1974

D. Benwell  
Noise Pollution Control Section  
Air Management Branch, Ministry of the Environment  
880 Bay Street, Toronto, Ontario. M5S 1Z8

To successfully control and abate environmental noise, all levels of government should participate with short and long-range programs. The Federal government could limit the noise potential of all kinds of devices at the manufacturing level. The Provincial government could limit the operation of noises of these devices to assure that they are maintained and operated in the proper way, and enforce sensible land-use practices in the vicinity of high noise-level sources. The Municipal government can deal with the local problem of nuisance noises, and assist with enforcement of provincial legislation.

The following Table summarizes the division of noise complaints made by the residents of Ontario to the Ministries of Environment and Transportation over the past year:

<u>Noise Source</u>	<u>Approximate Percentage of Complaints</u>
1. Individual-vehicle	25%
2. Traffic flow	12%
3. Aircraft and railroad	5%
4. Stationary sources of all types (factories, business establishments, air conditioners, etc.)	45%
5. Nuisance noises (barking dogs, noisy parties, playgrounds, etc.)	10%
6. Recreational devices	3%

The various Phases of the anticipated Ontario noise program are summarized below, roughly in the order that they would come into existence. The overall cost of the program is estimated to be 10¢ per person per year in the areas that it is to be put into effect.

#### Phase 1 - Regulation of Operational Noises of Vehicles

Beginning in late 1973, vehicle noise regulation could be put into effect. It would limit the operational noise levels of individual autos, trucks, buses and motorcycles in different speed ranges and during acceleration. The noise levels are selected so that 5 to 10% of the vehicles may be in violation (many due to noisy driving habits). Also, it would:

- a) Place limitations on horn blowing
- b) Place limitations on noise level of replacement parts
- c) Place limitations on idling
- d) Prohibit the sale of noisy vehicles in the future (as an option).

The proposed regulation is in the final draft stages and at the present time is being field tested by Ministry of Environment personnel and is being reviewed by the Attorney General's office. It is directed toward the control of individual vehicle noise but will have a small and favourable, impact on traffic flow noise. The abatement of freeway "traffic-flow" noise would be undertaken in future years. Control of vehicle operational noise was selected to be initiated first because we are technically ready to do it and have most of the required instrumentation, and it is the most serious noise problem.

This activity could employ two-person "teams" of Air Management Branch (AMB) noise inspectors or engineers and municipal or OPP police officers, thus involving the municipal governments. The team with easily portable equipment will move around the city and at various sites measure the noise of individual passing vehicles. The measurement procedures should be fully specified in the regulation so that the measurement team has little chance to "use their imagination". The noise measurement will be made by the AMB inspector and offending vehicles will be stopped by the local police officer who will issue a violation citation. Because the program is new, "warning citations" are recommended for the first two or three months in the area where it is put into effect.

The activity in late 1973 would be concentrated in the Toronto and Hamilton areas. Early in 1974, one team would begin to visit other cities and some rural areas in Ontario on a rotational basis to introduce the program and acquaint local police officers with the program which would be coming probably next year.

## Phase II - Ambient Noise Level Objectives

Ambient-noise-level objectives for the entire Province could be issued in 1974. They will specify our goals as to desirable and acceptable environmental noise levels. Noise level objectives will be specified for both day and night for the following activity areas:

1. Rural Residential
2. Urban Residential
3. Mixed Residential and Commercial
4. Mixed Residential and Industrial
5. Commercial
6. Industrial

The noise activity areas are independent of the zoning designations used by different cities and are specified in the regulation.

These ambient noise objectives have already been tentatively specified. The suggested levels, however, must be compared with the results of community-noise-level inventories being made in several smaller cities in Ontario and take into account test results being obtained by the City of Toronto before the ambient objectives are issued. These community noise inventories will be completed in the early summer which fixes a fall date for the earliest establishment of ambient noise objectives.

## Phase III - Stationary Source Noise Control

Late in 1974, a second regulation could be issued to regulate the noise and/or vibration emitted from all types of stationary sources. A proposed regulation has already been drafted which places limits on property-line noise levels or at the location of a receptor of the noise. It is directed toward controlling and abating noises which are responsible for a large percentage of complaints coming to MOE. The issuance date is fixed by the completion of community noise surveys in London, Woodstock, and Toronto because these results will have an impact on this regulation.

The stationary source regulation will limit noise levels at property lines. The levels which will be permitted depend upon (1) the activity in the area, (2) the time of day, (3) the duration of the noise, (4) the frequency spectrum of the noise (i.e. its tonal quality), (5) its startle effect, and (6) the existence of mobile noise sources in the area (vehicles, aircraft, trains, etc.). The emphasis is placed upon decreasing the noise level in residential areas. Measurement instrumentation and measurement methods are carefully and completely specified which is an essential feature of all our noise regulations. This regulation must be written so that the courts will accept the specified levels and measurement methods and then we must only prove that the measurements have been made in the way prescribed in the regulation.

The activity will involve the establishment of an approvals process similar to that employed in Ontario for air pollution sources, for (1) new noise sources, (2) expansions and modifications to existing sources and (3) proposed abatement measures. In addition, there will be field investigative and enforcement activity. Key people have been hired to initiate these functions and a significant increase in staff will occur from September onwards. This staff for the first year must be sufficient to serve and respond to noise complaints on a routine basis in selected areas, anticipated as being Metro Toronto and Hamilton. It is expected that over 3,000 noise investigations will be made in the first year. This activity will be expanded in future years to the entire Province by an increase in staff and assigning of people to existing Regional and/or District offices. This activity will be completely staffed by Ministry of Environment personnel.

#### Phase IV - Nuisance - Noise Model By-Law

The problem of local nuisance noises (noisy parties, barking dogs, loud radio and TV, noisy children, etc.) can best be handled by municipal authorities. A model by-law to combat such noise problems which could be put into effect under the Environmental Protection Act or a modified form of the Municipal Act could be drafted during the first year of the noise program. Complete enforcement by Municipal authorities will be proposed. Ministry of Environment personnel will only assist in providing technical assistance and advice to municipal officials when required to interpret and enforce the by-law.

#### Phase V - Control of Operational Noises of Recreational Devices

The use of recreational devices with internal combustion engines are responsible for a small percentage of the noise complaints (about 5%). However, nearly all of the complaints come in the winter months and are directed against snowmobiles. A regulation which limits operational noises of these devices will be proposed, to be put into effect in the fall of 1973. Because these machines are not confined to specific roadways this regulation cannot exactly parallel that used for vehicles.

In early winter of 1974, we will undertake a public education program among snowmobilers and begin enforcing this regulation with respect to snowmobiles at various locations in the Province. Because road vehicle noise measurements are more difficult and less meaningful in winter months due to wet pavements and other factors, some of the vehicle noise control staff will be employed to deal with snowmobile noise in the winter months.

#### Phase VI - Long-Range Noise Control Through Land-Use Policy

The long-range control of noise depends in large measure upon wiser land-use in the vicinity of noise sources which are difficult or prohibitively expensive to abate at the present time (airports, freeways and some industries). At the present time, land-use and residential development around airports is controlled at the provincial level on the

basis of noise exposure. Similar provincial policies and controls are needed to regulate development adjacent to freeways and highways. In addition, the planning of future freeways and highways must consider the attendant noise levels, and control to acceptable levels. The goal is to introduce policies which will not allow the perpetuation of many of our current noise problems, particularly with respect to freeways.

\* \* \* \* \*

VOTE ON NEW NAME FOR THE "CANADIAN COMMITTEE ON ACOUSTICS"

At the Business Meeting on 18 October 1973 the matter of a new name was discussed. Readers are urged to review the Minutes of this meeting, printed on pages 1-8 of this issue of the Newsletter, for a complete report of the discussion.

The three names most favored by those in attendance at the Business Meeting are listed on the next page. Members are requested to rank order their preference, after writing in a name of their own choosing if they so desire - mark 1 against the name you most favour, 2 against your second choice, 3 against your third choice and 4 against your last choice (if there is a fourth choice). For the purposes of this ballot, the Editor defines a voting member as an individual person who reads this Newsletter and is interested enough to tear out and return the ballot; but not including a library, university department or office, or any company or consulting organization - in short, people can vote but offices and organizations can't.

Each person may vote once only and must write his name and full mailing address on the ballot. We shall use this latter to correct and up-date our mailing list, at least in respect to those who return ballots. Please return ballots within one week of receiving this issue of the Newsletter if possible, and in any case no later than 28 December 1973.

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Secretary, Canadian Committee on Acoustics,  
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Ottawa, Ontario. K1A 0R6.

Ballot on New Name:

- ..... Canadian Acoustical Association/Association Canadienne de l'Acoustique
- ..... Acoustical Society of Canada/Société Acoustique du Canada
- ..... Canadian Committee on Acoustics/Le Comité Canadien de l'Acoustique
- .....

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