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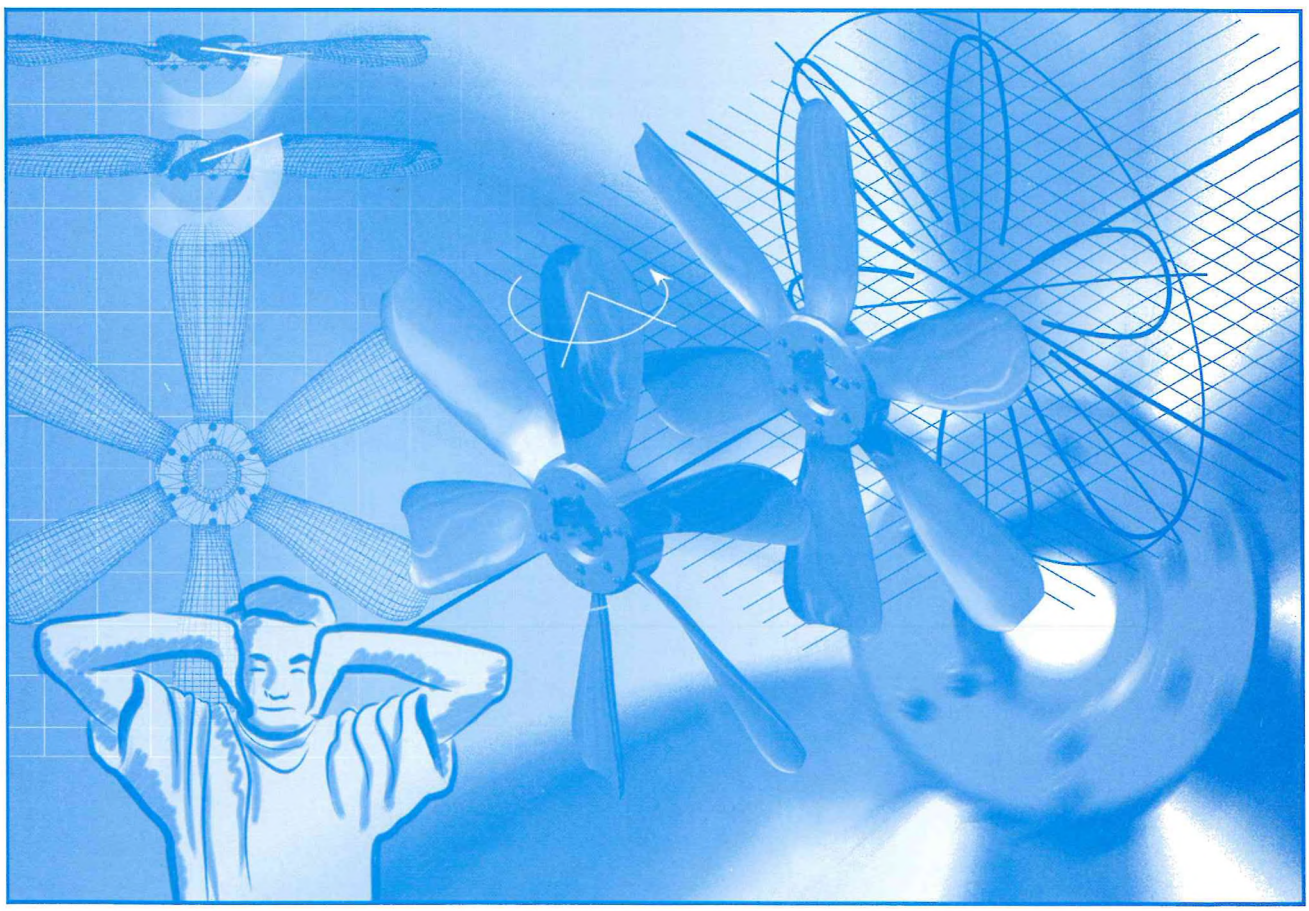

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EDITORIAL / ÉDITORIAL

The June issue will be the third journal that I have had the privilege of editing and finalizing. Perhaps it is time for an interim report. I should begin by thanking the CAA Executive and the Editorial Board for being very supportive in my endeavours. In particular, I would like to thank Francine Desharnais, Chris Hugh and Chantal Laroche for understanding my idiosyncrasies.

Let me point out that I have no backlog of articles and we need at least four articles to keep the cycle in sync. So let me be flooded with articles, reviews, case studies and general interest information.

I have completed my initial correspondence with the Editorial Board. Most of the members have responded positively and pledged their support. A few are already fulfilling their commitments. We are envisaging the following role for the Board: a) each of the members will submit at least one article from their field of expertise, and b) they will assist the two main editors (Chantal Laroche and me) in getting the articles reviewed. The members will be monitored for their pledged support and if need be we will review their membership either annually or bi-annually. Any thoughts on this from the Board members or from the CAA membership are welcome.

This issue of journal has been laid out using Quark Express, the industry standard, and each issue is archived in a ZIP diskette. You would have noticed the improved quality of the Journal print. In addition, the journal formatting becomes efficient and simple. If sufficient funding becomes available, the journal could be printed on 80M-gloss paper, similar to JASA or Noise Control Engineering Journal. The additional cost is not prohibitive. We will continue making such improvements as long as the budget permits these modifications.

Finally, we will be attempting, with the kind cooperation of our News Editor, Francine Desharnais, to broaden the news items. We have made a start in this issue. Do send us your news, and contact Francine at DREA.

Here's wishing you Godspeed in writing and mailing the promised articles.

Le numéro de mois de Juin sera le troisième journal que j'ai eu le privilège de finaliser et d'éditer. Peut-être qu'il est temps de faire un rapport intérimaire. Je devrais commencer par remercier le directeur de l'ACA et le bureau de la rédaction pour m'avoir soutenu dans mes efforts. Je voudrais remercier en particulier, Francine Desharnais, Chris Hugh et Chantal Laroche pour la comprehension de mes idiosyncrasies.

Laissez-moi préciser que je n'ai aucun arriéré des articles et nous avons besoin d'au moins quatres articles pour maintenir le cycle en synchro. Laissez-moi donc être inondé avec des articles, revues, études et avec de l'information d'intérêt générale.

J'ai terminé ma correspondance initiale avec le bureau de la rédaction. La plupart des membres ont répondu positivement et ont mis en gage leur support. Quelques uns accomplissent déjà leurs engagements. Nous envisageons le rôle suivant pour le conseil: a) chacun des membres soumettra au moins un article de leur domaine d'expertise, et b) ils aideront les deux éditeurs principaux (Chantal Laroche et moi) à faire passer les articles en revue. Les membres seront surveillés pour leur support en gage et si besoin en est, nous passerons en revue leur adhésion annuellement ou bi-annuellement. Toutes les idées sur ce sujet de la part des membres du conseil ou des membres de l'ACA sont les bienvenues.

Cette édition du journal a été tirée en utilisant Quark Express, la norme de l'industrie, et chaque issue est archivée dans une disquette sous format ZIP. Vous auriez noté l'amélioration de cette copie du journal. En plus, le formatage du journal devient efficace et simple. Si suffisament d'argent devient disponible, le journal pourrait être imprimé sur de papier 80M-gloss, semblable à celui du JASA ou du "Noise Control Engineering Journal". Le coût supplémentaire n'est pas prohibitif. Nous continuerons donc d'apporter des améliorations aussi longtemps que le budget nous le permet.

Finalement, nous essayerons, avec l'aimable coopération de notre éditeur d'informations, Francine Desharnais, d'élargir la rubrique informations. Nous avons fait un début dans cette voie. Envoyez-nous donc vos nouvelles, et contactez Francine à DREA.

Je vous souhaite donc "Godspeed" dans l'écriture et l'envoi des articles promis.

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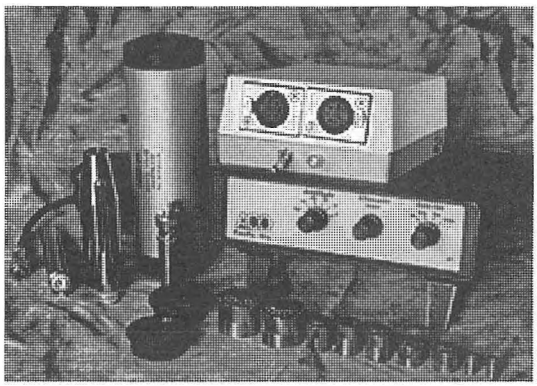

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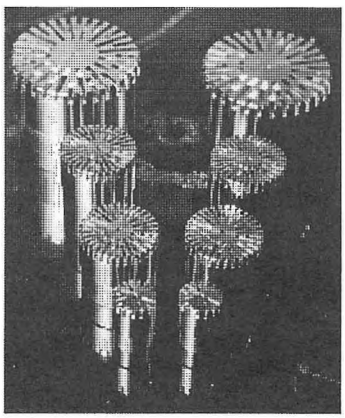

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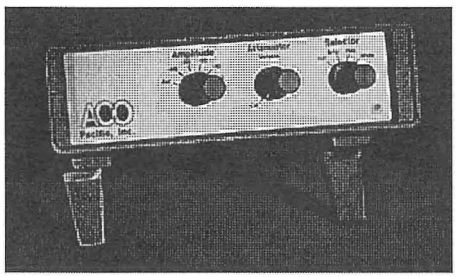

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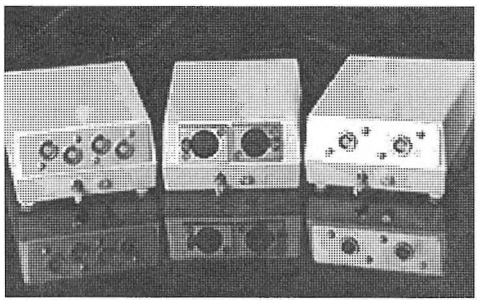

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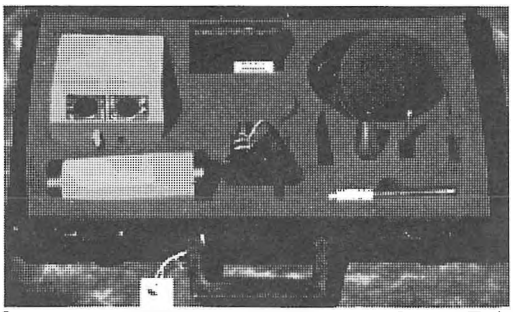

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SIMPLE NOISE CONTROL SOLUTIONS FOR BUILDING SYSTEMS - THREE CASE STUDIES

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ABSTRACT

Conventional methods of controlling noise generated by building HVAC (Heating, Ventilation and Air-Conditioning) systems depend on using silencers, lagging, barriers and or room treatments. Cost benefits of these approaches as well as physical feasibility of applying these methods, for retrofit situations in particular, prohibit any meaningful applications. Three severe noise situations demanded serious rethinking of applying conventional methods and demanded innovative approaches. The investigation of the noise concerns as well as the methods applied to attenuate and/or eliminate the noise problems are presented in this paper.

SOMMAIRE

Les méthodes conventionnelles de contrôle du bruit généré par les systèmes HVAC (chauffage, ventilation et climatisation) dépendent de l'utilisation de silencieux, de revêtements, de barrières et/ou du traitement de l'habitacle. Les avantages financiers de ces approches, ainsi que la faisabilité pratique de ces méthodes dans des situations de modification en particulier, ne permet pas au recours à des modifications signica-tives. Trois situations sévères de bruit ont exigés une révision sérieuse de l'application coventionnelle de ces méthodes et ont requis des approches innovatrices. La recherche des sources de bruit ainsi que les mé-thodes appliquées pour atténuer et/ou éliminer les problèmes de bruit sont discutés dans cet article.

1. INTRODUCTION

Two processes are usually applied to control noise propagation from building systems used for commercial applications such as office towers and strip plaza developments. The first process involves evaluating the noise levels of the building systems and designing control methods at the planning stages of the development. This is usually instituted to satisfy municipal by-law requirements and sometimes if the owner decides to build a quality development. The above process is the preferred method for it provides a wider latitude for noise control engineers and acoustic consultants in designing an acceptable noise environment within a preset budget. Simple solutions normally found in elementary acoustic textbooks [1,2] and seminar literature and trade journals [3, 4] can then be easily instituted in the design. These solutions could be silencers, acoustic barriers, enclosures and duct lagging materials.

The second process comes into effect as a result of complaints from neighbours and/or tenants. The owner of the building complex is forced to retain a noise control engineer to design suitable remedial measures. In such retrofit conditions, simple solutions are usually impractical due to lack of space and/or cost. The noise control engineer is then forced to think of innovative methods to provide satisfactory solutions. Fundamental principles and practices of noise control play a major role in the design process [5].

Three such instances were investigated. In cach of these cases the noise problems were severe and the complaints were also serious. They merited serious attention by a noise control engineer. The investigation of these three cases involved basic measurement techniques to isolate the severity of the problem. Simplistic solutions were found to be not feasible and some of the principles highlighted by Ingemansson [5] were successfully applied. Three configurations of fans were used in these cases: propeller type fans for a set of nine roof-top air-cooled condensers; centrifugal fan of a small compartment unit that served part of the floor of a high rise office complex and three axial fans that supplied an area of a high rise office complex. The results of these three case studies are presented in this paper.

2. ROOFTOP AIR COOLED CONDENSER

2.1 Background

Air-cooled condensers are slowly becoming an alternate sys-

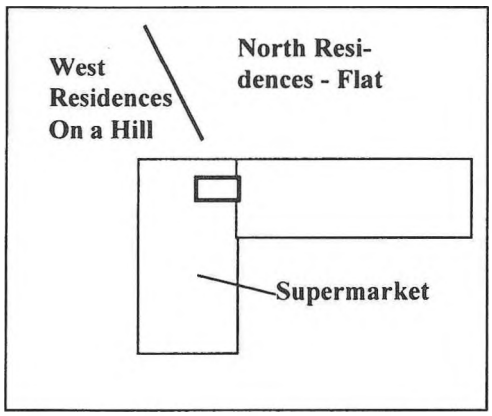

Figure 1. Details of the Strip Plaza and the Residential Developments.

tem for the rejection of hot air into the environment. In particular, they are replacing the onerous requirement for a cooling tower for applications such as grocery store or supermarket of a strip plaza complex that serves local residential subdivisions. In many instances, the downside of a bank of condensers with propeller type fans is the serious noise impact, as these units are usually placed at the edge of the roof of these super markets. The residential units are usually located adjacent to the strip plaza complex without any intervening buffer zones and the noise complaints from new subdivision developments, once the residents start occupying the houses, are one of the major consulting projects handled by the majority of noise control engineers. The severity of these noise concerns is highlighted by the following investigation.

The supermarket under study is part of a typical 'L' shaped strip plaza. The strip plaza is located in a valley and residential subdivisions are located along the west, north and east of the strip plaza. The north side development was under construction during the current investigation. The north side development is at the same elevation as the strip plaza and hence the development has minor shielding from roof top equipment. On the contrary, the west and northwest developments are elevated compared to the strip plaza. There is a direct line-of-sight from the back deck of the nearest houses and the roof top equipment of the supermarket. The layout plan of the strip plaza and the residential developments are shown in Figure 1. The bold box shown in Figure 1 represents the bank of air-cooled condensers. These condensers are screened by a 1.5 m high thin sheet metal barrier.

2.2 Noise Impact Report

A noise impact report was prepared for the north side developments as part of the Ontario planning process. One of the requirements was to establish the noise levels that could impact the proposed development and design control measures if required. The report measured the noise levels from the bank of nine (9) air-cooled condenser fans and predicted the noise levels at the second story bedroom windows of the development. The prediction methods used adjustments for distance, and shielding by the roof screen. The predicted noise levels were only 3 dB more than the noise limit of 45 dBA. Hence the report concluded that a minor modification to the screen would attenuate the noise levels and that the impact from the strip plaza would be within the guideline limits of the Provincial Ministry of the Environment. However, the report did not measure the spectrum of the noise. Hence, some of the adjustment factors as well as the effectiveness of the control measure recommendation were not accurate. The north side developments were approved on this basis and were under construction.

2.3 Current Investigation

After a few months of operation of the strip plaza, while the north side developments were under construction, the west side residences lodged severe complaints against the supermarket. The supermarket retained us to investigate the complaints, review the above noise impact report and comment on the feasibility of the control measures recommended by the noise impact report.

The noise levels from different roof top equipment were measured using a 2-channel real time analyzer fitted with a Type-1 microphone. The levels were measured near the unit, at the back deck of the nearest resident, and at the northwestern edge of the roof of the supermarket.

The measurement results are shown in Figures 2, 3 and 4. The results are shown in terms of 1/3 octave band spectrum from 25 Hz to 10000 Hz. The over-all levels in dBA and dB are also shown in the figure. It must be pointed that there is a direct line of sight to the supermarket's roof from the back deck. One actually looked down on the equipment from the bedroom of these houses. The noise levels at the resident's back deck are shown in Figure 2. In contrast to the levels reported in the noise impact report, the overall level was 52 dBA with a strong tone in the 160 Hz band. If one added a tonal penalty of 5 dB as per the provincial guidelines, the amount of noise reduction required would be 12 dB and not 3 dB as suggested by the impact report.

The noise report (Section 2.2) recommended the following measures for noise control: a) to treat the screen with acoustic lining; b) increase the height of the screen slightly and/or c) treat the condensers with acoustic absorption material. It is immediately obvious that none of the above treatments would provide the required amount of noise reduction and it is even doubtful if they would provide any reduction at all.

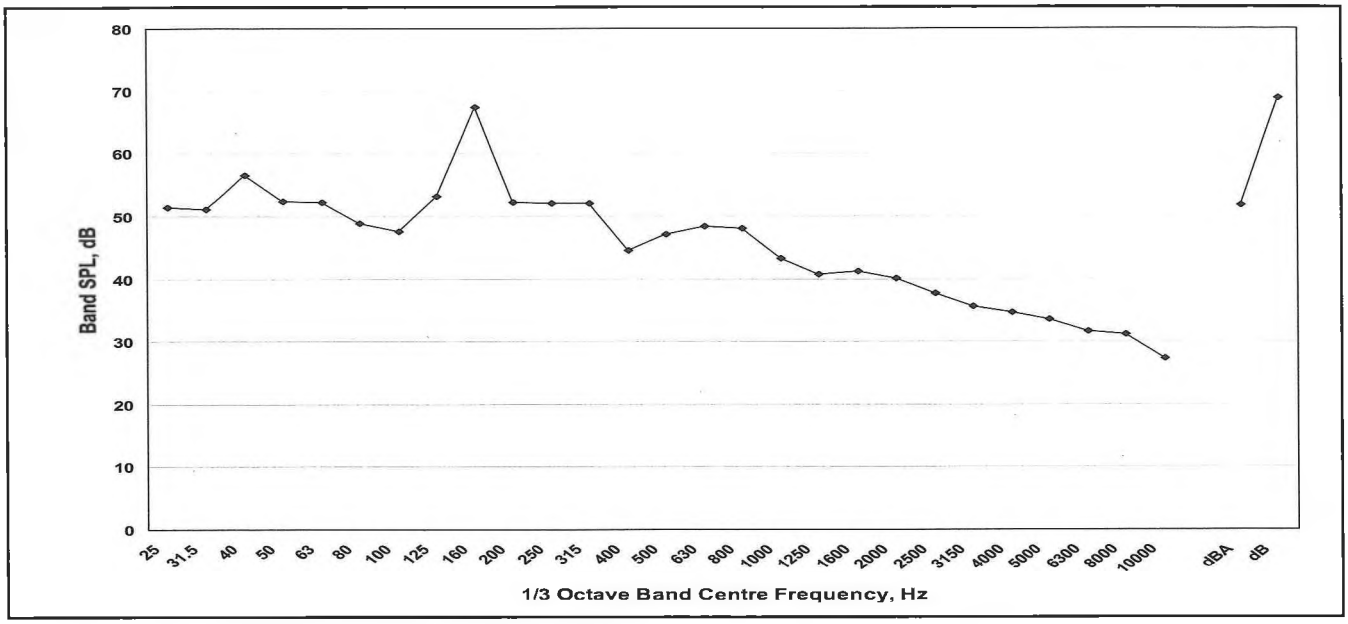

Figure 2. Noise Levels at the Backdeck of the Nearest Receptor.

Three possible conventional treatments could have been considered to attenuate the noise levels at 160 Hz and are discussed below.

Passive exhaust silencers could be installed on each of the nine fans with the insertion loss requirement of 12 dB at 160 Hz. The concept is feasible, but impractical. The length of such a silencer would be in excess of 10 feet and the building roof load may not be adequate to support the weight of the nine silencers. In addition, the warranty on the condenser would be voided if such a silencer were to be installed. Hence such a solution is not possible.

One could build a complete enclosure around the nine bank condenser units with requirement amount of opening for airflow. However, an enclosure is impractical for the same reasons outlined above.

An acoustic barrier with an insertion loss of at least 12 dB at 160 Hz could be built on two sides of the condenser unit. The barrier would be placed at a distance of about 5 feet from the units. The height and weight of the barrier would be prohibitively large since the wavelength at 160 Hz is 2.14 m. Further the height to break the line of sight between the fan and the bedroom windows of the west side residences may be in excess of 10 m.

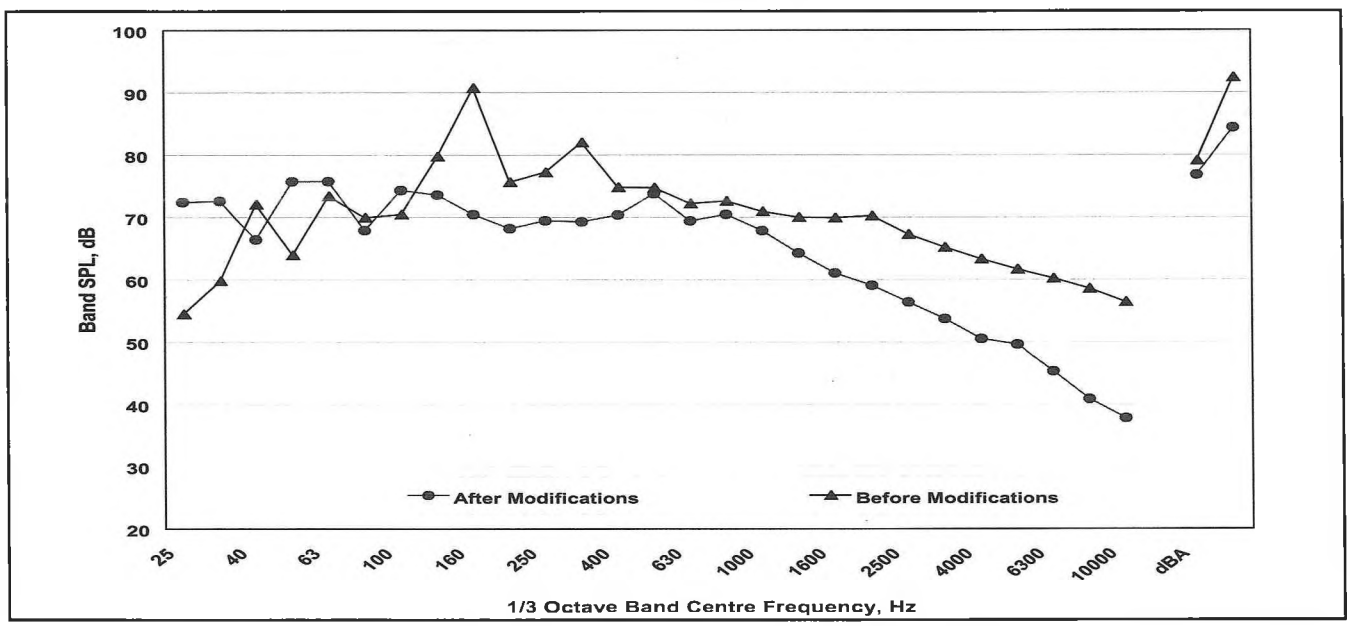

Figure 3. Noise Levels near the Air-cooled Condenser Units.

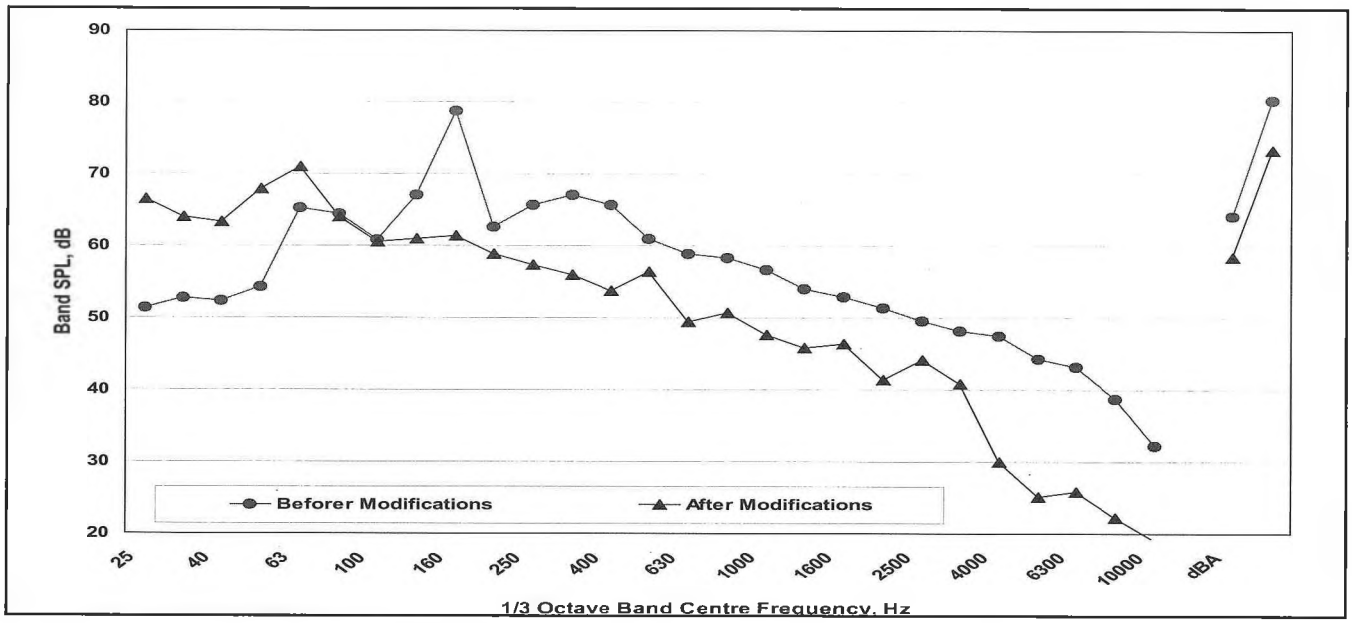

Figure 4. Noise Levels at the Northwest Edge of the Supermarket Roof.

It is seen that conventional treatments are not practical for the above application. However a closer reading of the results show that the noise level at 160 Hz near the condenser units (Figure 3) is in excess of 90 dB. This suggested that perhaps the units are not operating at the design point of these fans and a maintenance check may have to be performed first before attempting to design an attractive solution. Such a practice is unusual in typical noise control applications. However, the current noise conditions precluded an immediate application of conventional control methods. The air-cooled condenser manufacturer was contacted and was requested to balance the units. It was found on inspection that the units indeed were not operating properly. The 4-blade fans were adjusted as follows. The blade pitch was changed from 22° to 29° and the rotational speed was reduced from 1140 RPM to 840 RPM. The noise levels on the roof were remeasured after the modifications and the new noise levels were also shown in Figures 3 and 4. The improvements were dramatic. The noise level at 160 Hz reduced by 20 dB and the 160 Hz tone completely disappeared. The cost of the above fix was a maintenance visit by the manufacturer. The west side residents stopped their complaints and actually complimented the supermarket for responding to their concerns in a timely fashion.

3. Compartment Units

3.1 Background

Compartment units of air-conditioning and heating systems have become popular during the last decade for high rise office complexes. Instead of requiring large mechanical rooms and large duct passages, the compartment units are very compact and are also attractive for being amenable for easy zoning. The only downside of compartment units is the proximity of these units to occupied spaces and the resulting noise levels may be objectionable.

One such installation is a seven (7) story office complex, with two units serving each floor, where noise became a serious concern. The details of the compartment unit (plan and section of a unit) with centrifugal fan are shown in Figure 5. The compartment unit shown is a typical layout used by most of the manufacturers. A prototype of the above unit was tested in a mock-up of an office layout for compliance for noise emission. The mock-up test results showed that the design for a 10000 cfm unit would satisfy the office levels of NC-40 or less. The units when installed on site in the office complex produced severe noise levels. The investigation of the noise complaints and the resolution of the

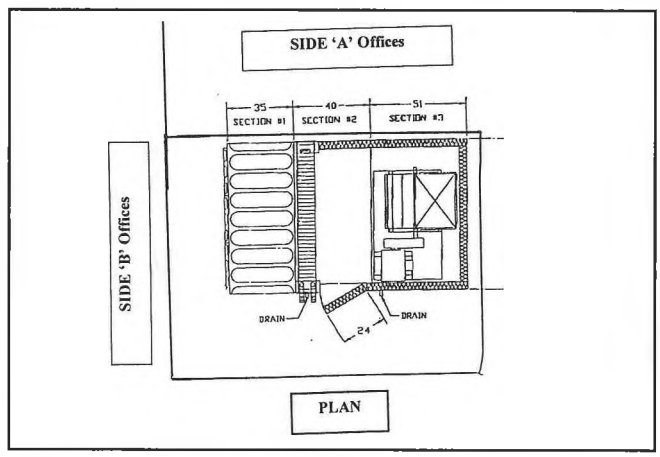

Figure 5a. Layout Plan of the Compartment Unit and Adjacent Offices.

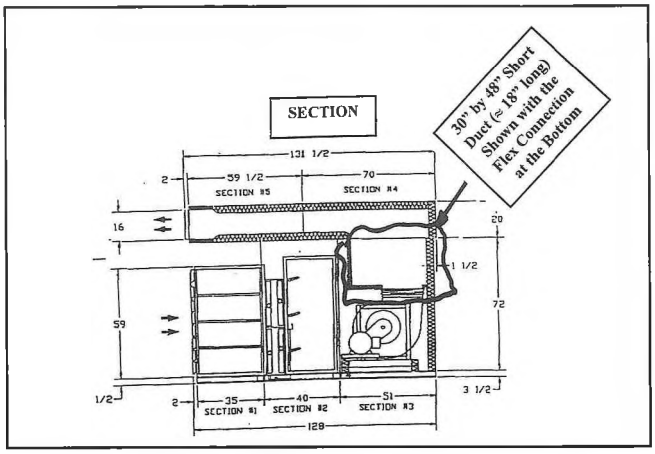

Figure 5b. Section through the Compartment Unit.

noise issue are presented in this section.

The seven story office complex had two 10000 cfm units serving two parts of each floor. The units were contained in a small mechanical room with offices on two sides (Sides A and B) and a simple double layer drywall construction for the walls. The walls extended to the underside of floor beams as the ceiling plenum is used for return air. The unit had its discharge along Side B into the adjacent offices. The high noise levels, even though seemed to be acute in one floor, were present in every floor. Further, the noise levels were severe only on Side A, adjacent to the wall that is along the long side enclosure panel of the compartment unit. The noise levels on the Side B, below the discharge duct of the unit, were well below the NC-40 values. The results of these measurements are shown in Figures 6 thorough 9. The noise levels measured inside the compartment unit for two speeds (80% and 100% of speeds) are shown in Figure 6. The rated speed of the fan is 1800 RPM. The noise levels on the Side B office, below the discharge duct, are shown in Figure 7. The noise levels at two locations on Side A, approximately 10 feet (middle) and 15 feet (aisle) from the wall separating the mechanical room, are shown in Figures 8 and 9. The two locations represent a strong standing wave pattern. A strong tone at the full rated speed in the 63 Hz band is evident from the measurements. The levels in the 63 Hz band are presented in Table 1 below.

Table 1. Noise Level in the 63 Hz Band. (Fan Speed 1800 RPM)

Location	Noise Level, dB
Inside Unit	101
Side B	59
Side A, Middle	87
Side A, Aisle	74

Even though only clerical offices are located adjacent to the compartment unit, the noise levels exceeds the NC-40 by more than 15 dB. A strong standing wave pattern is evident, not only in the general office space but also in the private offices located on Side A. The noise levels at the blade passage frequency around 250 Hz band and its harmonics are also evident in the spectrum shown in Figure 6.

The building management office conducted its own investigation and found similar noise levels. Further, they found the noise levels were reduced, if the short duct that is downstream of the fan was dampened. The main transmission path was found to be the casing of the unit, the drywall sep-

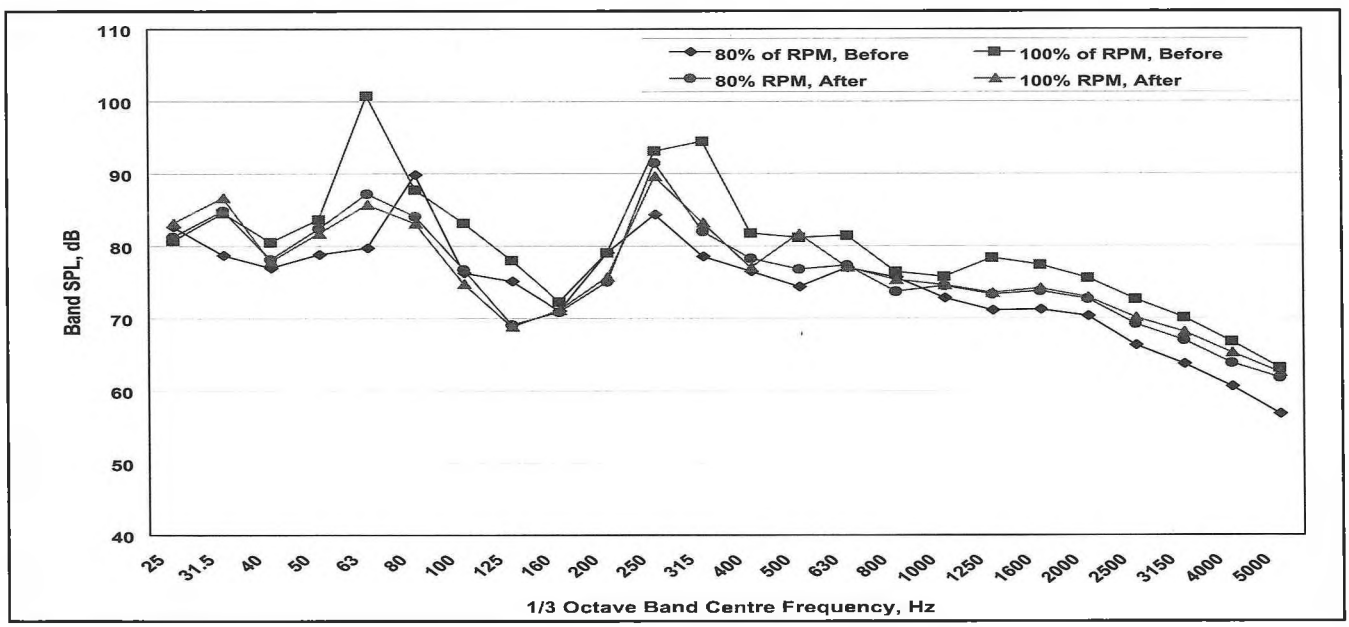

Figure 6. Noise Levels inside the Compartment Unit.

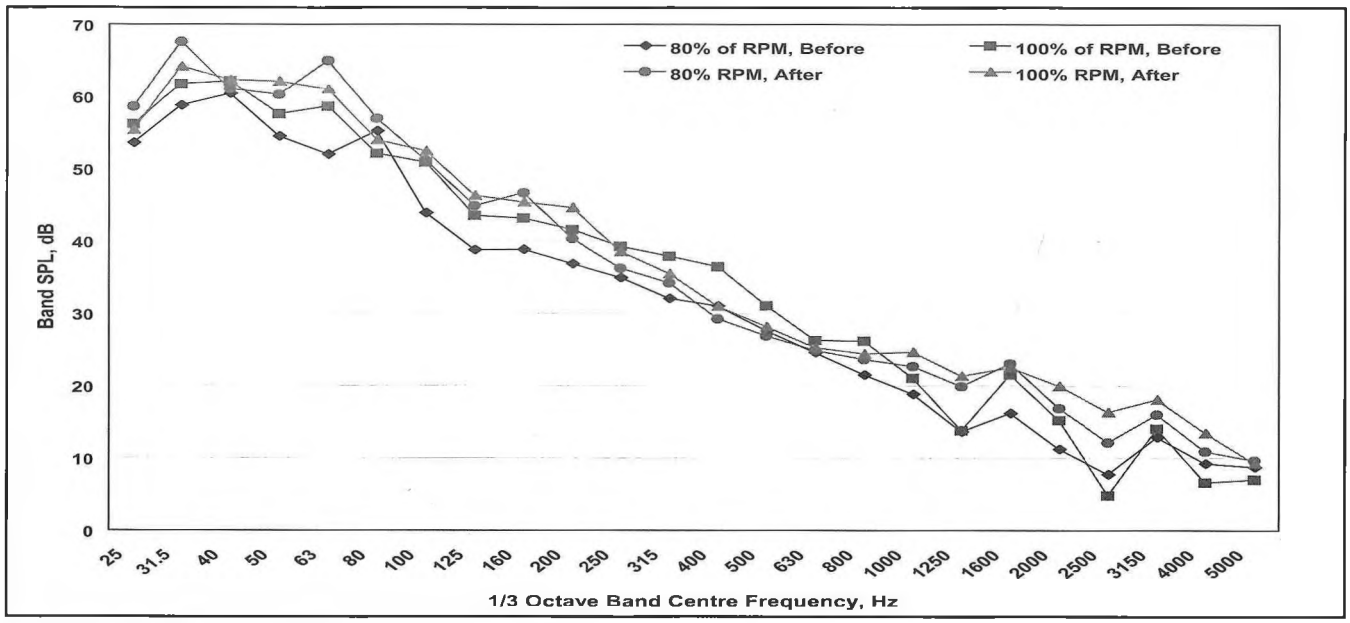

Figure 7. Noise Levels in East Side Offices.

aration between the mechanical room and the offices. Some of the recommended solutions were the conventional solution of increasing the mass and damping of the casing, increasing the mass of the drywall by adding another layer so as to remove the resonance of the wall. Even a quarter wave resonator inside the compartment was considered to absorb the strong 63 Hz tone at the source.

Our noise measurements confirmed most of the findings of the earlier investigations. Our findings showed the existence of the strong standing wave pattern in all the floors. Many of the suggested conventional recommendations were not practical and their performance was also not certain. Our next stage included a detailed vibration measurement programme in and around the compartment unit. Before we started the next stage, the collected data was analysed. The review of the drawings showed that the 30" by 48" short duct (approxi-mately 18" long and highlighted in Figure 5) was supposed to have been connected to the fan discharge through a flexible connection. But visual inspection showed that the flexible connection was at the discharge end of this plain duct. This explained the reason for the strong vibration of this short duct. Earlier measurements indicated that the noise levels seemed to reduce if this duct was dampened. It was hypothesized that the short duct was set into resonance and re-radiated high levels of noise. The casing of the unit

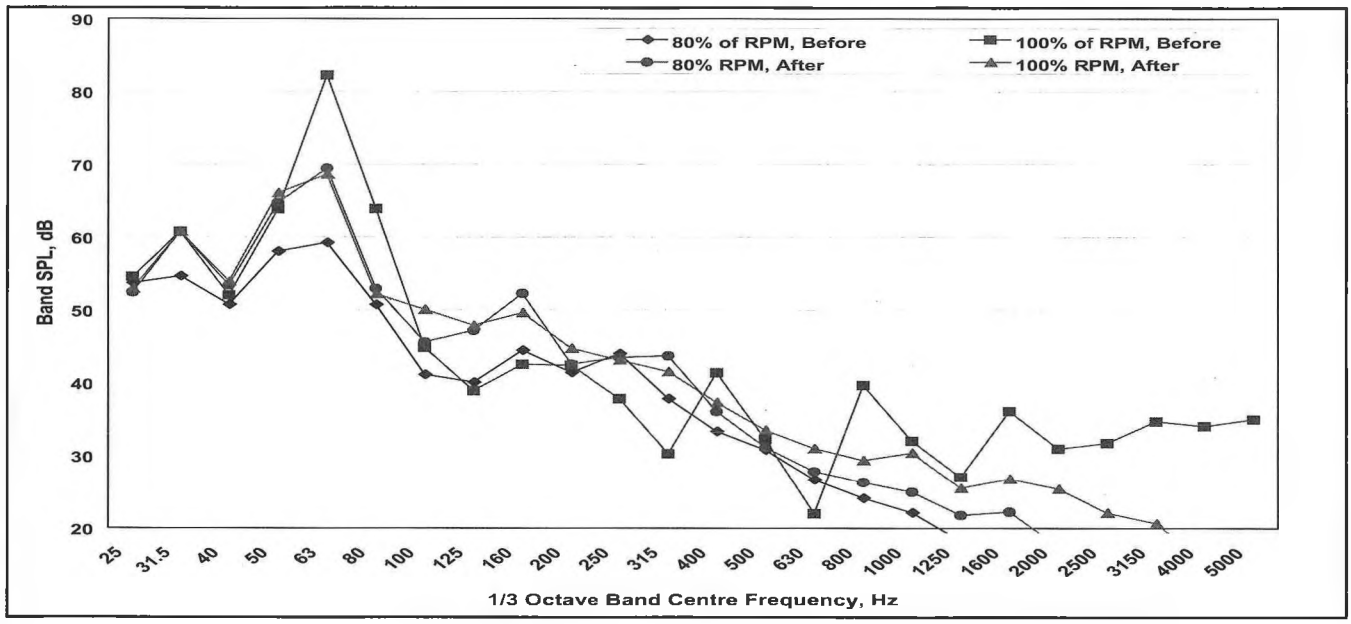

Figure 8. Noise Levels in North Side Offices, Middle.

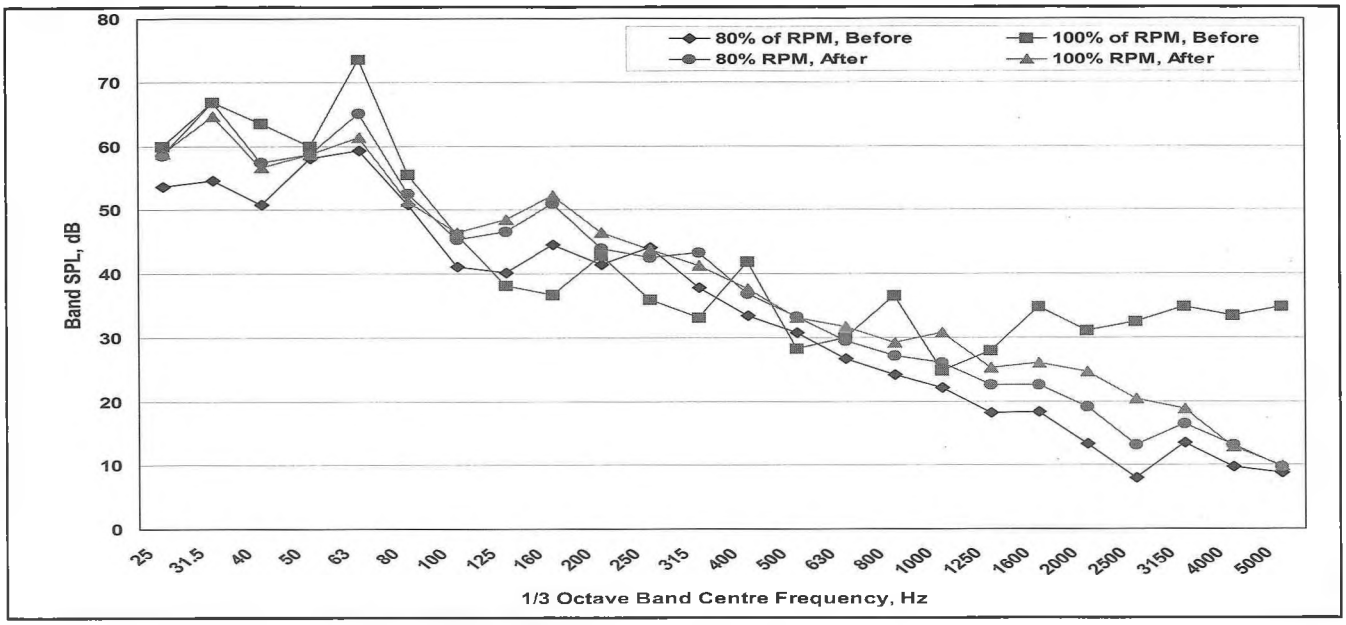

Figure 9. Noise Levels in North Side Offices, Aisle.

and the drywall partition of the mechanical room provided only about 15 dB of noise reduction at 63 Hz due to coupling effects and hence the office room levels were in the 80 dB range. This was further complicated due to the strong standing wave pattern at 63 Hz, resulting in amplified noise levels within the office space. Whereas, along the inlet and discharge side, higher noise reduction was possible due to uncoupled transmission through the casing and the mechanical room wall. The lining and the flexible connection attenuated the discharge duct noise levels adequately so that the Side B office noise levels were below the NC-40 limits. We concluded therefore that the noise source was confined to within the compartment unit. Our first recommendation, the only recommendation as it turned out to be, was to interchange the short duct and the flexible connection. This was undertaken before our Stage 2 measurement programme and it involved the mere unscrewing and screwing of approximately 12 to 16 screws per unit. The noise levels in the most severe floor were remeasured.

The measurements, conducted after the modifications, were influenced by higher ambient levels such as computer fans, and shredding machine fans. Even then, the results were dramatic. The strong tone within the compartment unit at 63 Hz reduced by 15 dB and similar reduction was seen in the general office areas. The levels were below the NC-40 val-

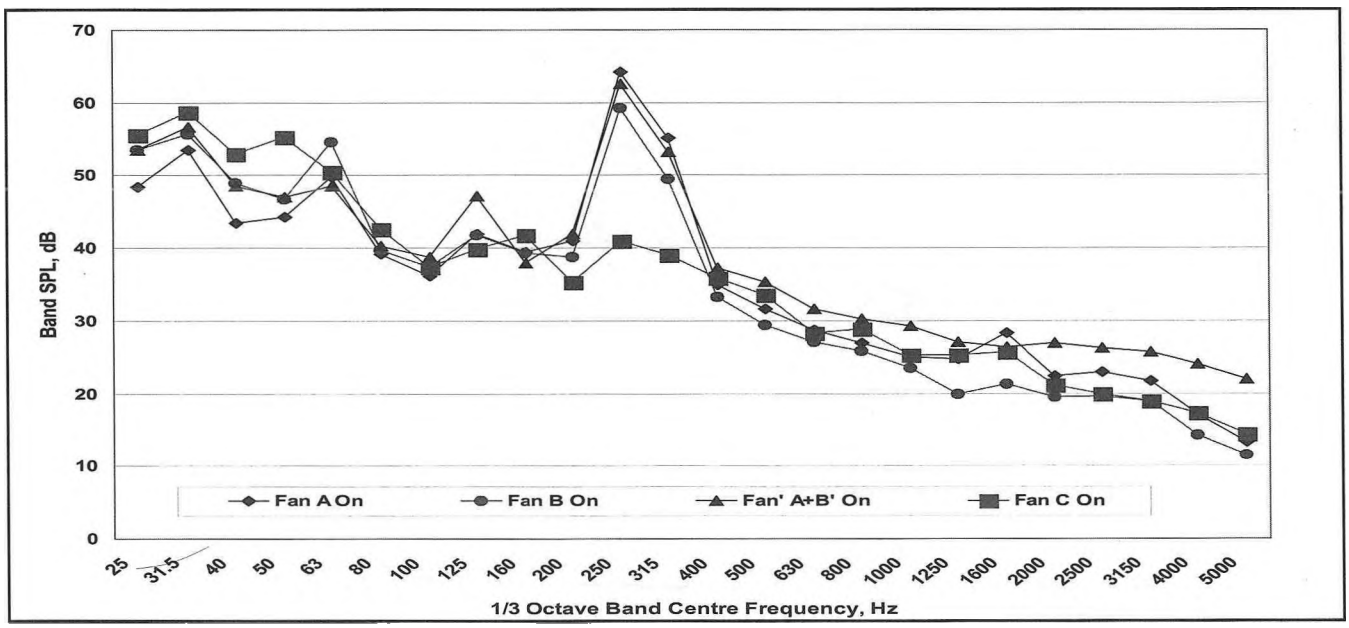

Figure 10. Noise Levels in the Open Area.

ues and the noise complaints were satisfactorily resolved.

4. Axial Supply Fans

4.1 Background

The final case study involves the severe noise generated by a set of three axial fans that were supplying conditioned air to the southwest corner of a seven story Head Quarters building of a public service organization. The three axial fans were located in a large double high (approximately 35 feet) mechanical room. The drawings showed that the fans were in a large inlet plenum and were isolated by spring isolators from the plenum. The large plenum was not connected to the ceiling slab (At least the drawings showed no connection). A small department with three private offices and a reception area was located above the mechanical room. Two of the fans (Fans A and B) were on one side of an expansion joint in the ceiling slab. Fan C was located on the other side of the expansion joint. Two of the fans would be operating at any time. It is seldom that one of the fans would be operating in isolation. All the three fans may operate together under severe load conditions (mid-winter or mid-summer).

The three fans are the axial type (4 blades, 3600 rpm) and severe complaints were received from the department staff. The levels were audible everywhere inside the three private offices. However, the levels were the maximum at two locations - inside one private office and just outside that office.

The measured noise levels in the open area, just outside the private office, are shown in Figure 10. The results show a strong tone at the blade passing frequency in the 250 Hz band. Fan 'C' does not seem to have any effect. Fan 'A' is seen to be the worst culprit. The determination of the transmis-sion path and possible control measures follow traditional consultant's short project methods and are described below. Vibration measurements were not conducted since no strong vibration signatures were observed. The main observations of the noise measurements were:

The noise levels were mainly from the operation of Fans A and B;

Strong standing wave pattern was noted in the general office area;

The three fans were isolated by spring hangars from the plenum structure;

No visible connection of the plenum to the ceiling slab;

The noise levels in the 250 Hz band were of the same magnitude from each of the three fans - (i.e.) each fan produced between 90 and 92 dB in the 250 Hz band inside the plenum;

The discharge duct from each of the fan joined the main supply duct with radiused turning vanes and had sharp turns depending on its location. Fan 'C' had the longest length and its connection was smoother than the other two. Fan 'A' had the sharp edge and the shortest length to the main supply duct - schematic details of the layout are shown in Figure 11.

The main conclusions (how wrong we were!) drawn from these observations were:

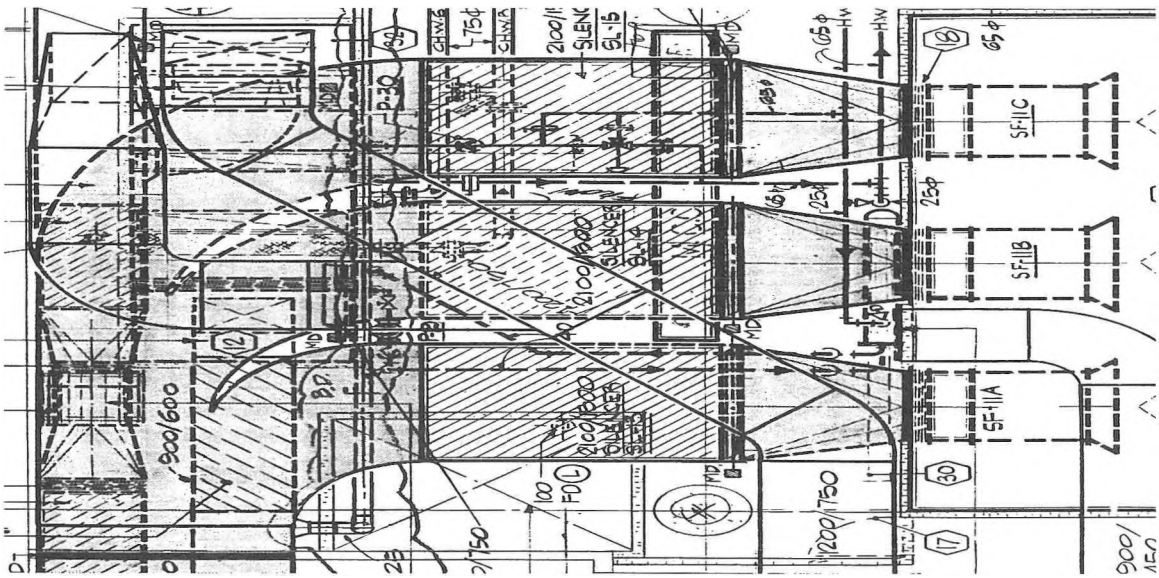

Figure 11. Details of the three Fans inside the Plenum and the sharp Discharges.

The generated noise was transmitted into the office areas through the supply duct;

The length of the discharge duct and the sharp corner for Fan 'A' created a separated flow and generated strong tones at the blade passage frequency;

The effect was slightly smaller for Fan 'B' when compared to Fan 'A';

At least 10 dB of noise reduction must be provided by any control measure.

The observations and the conclusions (wrong ones) made us decide on the following course of remedial action. The space available to install a conventional passive silencer was very limited. In addition, the system could not handle any extra pressure drop by the silencer. So it was felt that active noise control with a preset system from one of the main suppliers would be an ideal solution. Further, the system could be installed with minimal pressure drop and at the entry point of the branch supply duct to the office area. The client was very interested in the system and the cost was also within the budget allocated.

A site visit was arranged with the active noise control system unit's manufacturer. During the site visit, a lightly loaded metal cabinet was in the private office (which was not there during the earlier site visit) and was visibly vibrating a lot. The active noise control designer requested that we isolate the cause of the vibration before designing an active system.

One had to go back to the drawing board again and conduct a series of vibration measurements. [A lesson for all noise control engineers - Never trust the drawings completely and visually double check everything]. The vibration levels were measured on the floor over the carpet (this floor was above the plenum of the three fans in the mechanical room) through a lead plate. The measured levels on the floor near the door of the private office were:

Table 2. Vibration Level at the Blade Passing Frequency of 269 Hz.

Condition	Vibration Level, dB re. 10 m/sec^2
Fan A	-25
Fan B	-41
Fan C	-84

The above measurements completely invalidated the earlier conclusions and remedial actions. A local installer climbed on the plenum structure and found eight (8) rods connecting the plenum structure to the floor slab above. The rods were approximately 24" long. The reasons for the earlier noise emissions became obvious immediately. The revised conclusions were:

The rods above Fan 'C' were across the expansion joint and hence had no major influence on the office area under study;

The main rods, structurally, transmitted the vibrations from Fan 'A' and to a lesser degree from Fan 'B' and the vibrations levels were re-radiated as noise by the drywall construction.

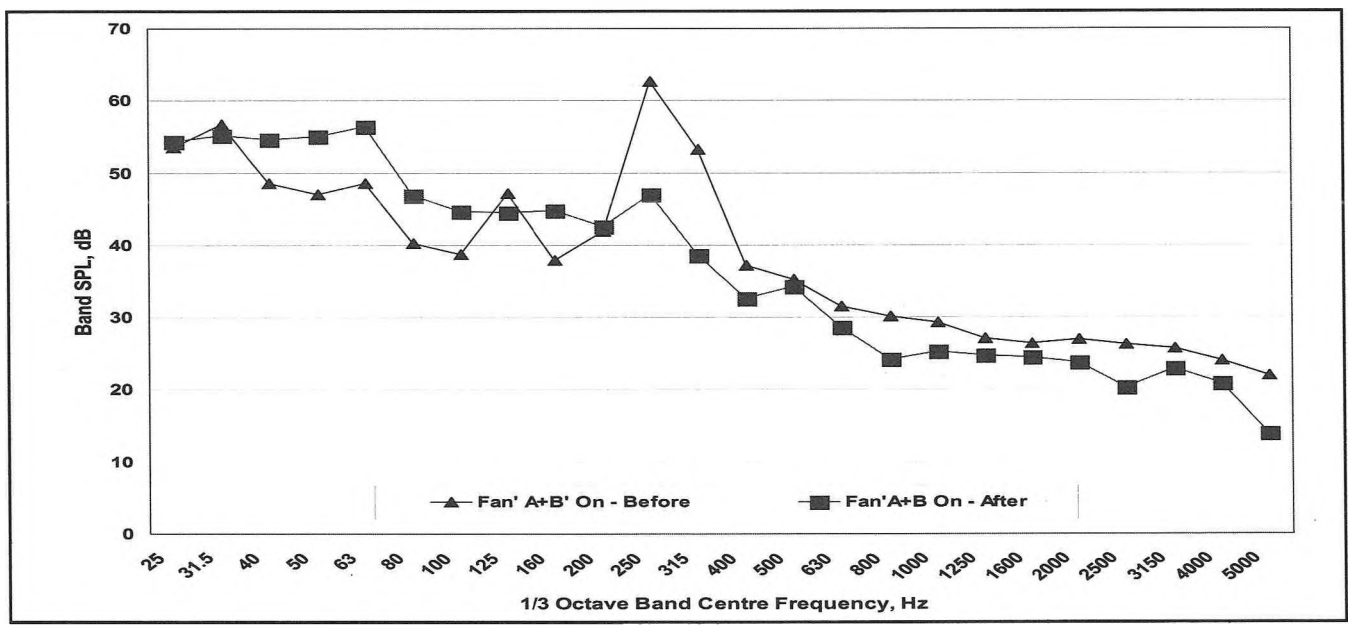

Figure 12. Noise Levels in the Open Area.

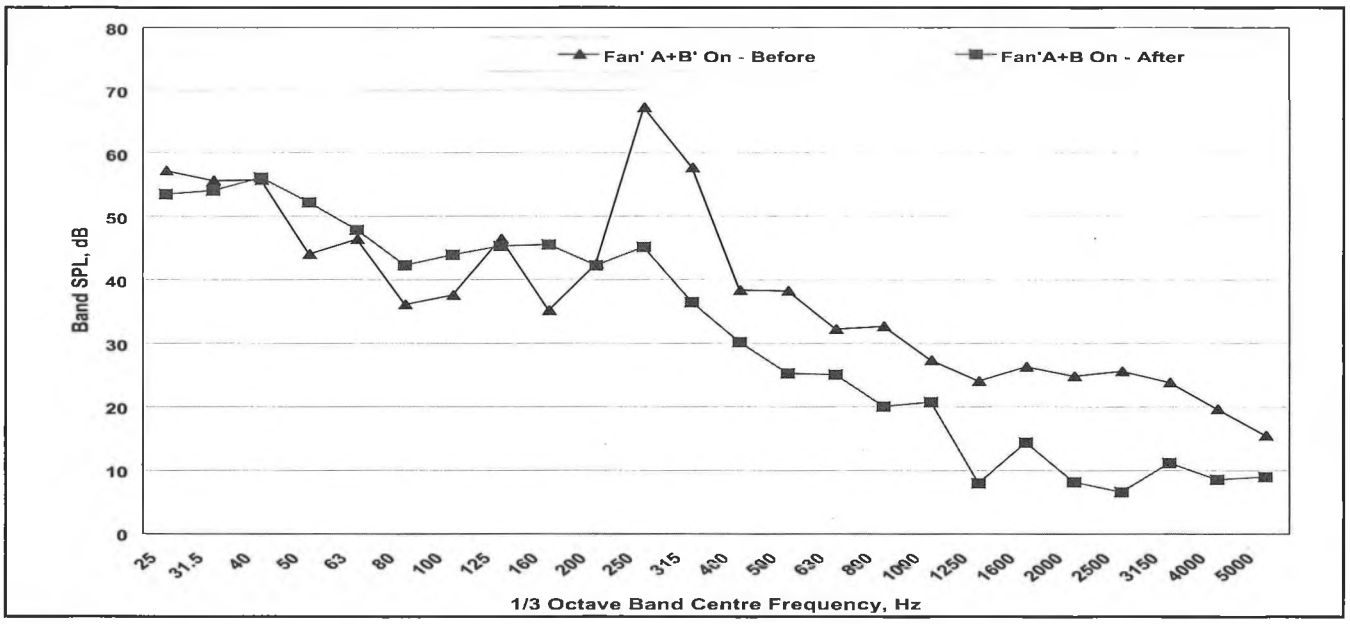

Figure 13. Noise Levels in the Private Office.

The remedial actions became clear from the measurements and vibration isolation was recommended. The isolation hangars within the plenum (4 per fan) were all replaced to provide a minimum of 1" deflection. The ceiling rods were replaced with isolation hangars with a minimum of 1" isolation. More than 1" deflection was not possible due to space limitation and installation difficulties.

The vibration and noise levels were measured again after the installation of the vibration isolators. The vibration results are presented in Table 3 below.

Table 3. Vibration Level at the Blade Passing Frequency of 269 Hz.

Condition	Vibration Level, dB re. 10 m/sec^2
Fan A	-57
Fan B	-70
Fan A + B	-50

The vibration levels reduced by 25 dB or more, which was a substantial reduction. The noise levels in the two office areas are shown in Figures 12 and 13. The noise levels are attenuated by more than 20 dB. However, the blade passage frequency is still audible, albeit slightly over the ambient, in the occupied spaces. The above investigation shows that the conventional method of passive silencing would not have been fruitful.

5. Conclusions

Three case studies of severe noise concerns of fans were investigated. In all the three cases, any attempt to install conventional treatments would have been a wasted effort. Proper analysis, with in depth visual observation, was necessitated and slightly unusual methods were instituted, successfully in the end, to ameliorate the noise concerns.

6. Acknlowedgements

The above investigations and noise control consulting were undertaken while the author was a senior consultant at Vibron Limited in Mississauga, Ontario. The case studies are published with permission from Vibron Limited and we acknowledge their cooperation during the preparation of this paper.

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New Health Canada / Canadian Standards Initiative Machinery Noise Emission Declarations*

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2800 Speakman Drive, Mississauga, Ontario, L5K 2R7, Canada

* - Appeared originally in the OHAO Forum.

As part of the formation of the European Union, there has been considerable activity in harmonising all European standards and preparing new ones. This activity has been reflected in the preparation of a great many new and updated ISO standards which affect standards bodies around the world. One such initiative is the standards work associated with machinery noise emission declarations. EU directives aimed at harmonising noise at work legislation and machinery noise labelling within the EU have created a large nucleus of countries who require noise declarations for all machinery installed by industry. As a result, many new ISO standards have been written primarily to allow the required information to be collected.

This considerable European activity affects North America in two ways. First, our manufacturers have to be able to measure sound levels from their equipment in conformance with the EU/ISO requirements if they wish to sell equipment to the EU countries. Second, it gives industry here the opportunity to take advantage of the newly available information on machinery noise emissions when making purchasing decisions. The result is a ripple down effect whereby European legislation may ultimately assist Canadians in building quieter facilities.

Health Canada has long been concerned with the prevalence of noise induced hearing loss and its costs to employees, to workers compensation boards and to society. While regulation of workplace noise outside Federal facilities and territories is clearly a provincial responsibility, labelling of machinery is a federal concern. Health Canada has asked the Canadian Standards Association to assist them in preparation of voluntary guidelines for Machinery Noise Emission Declarations in Canada. A working group has been formed under the auspices of the CSA Industrial Noise Subcommittee and is currently drafting the guidelines, which will be harmonised with the EU Machinery Directives and their supporting ISO standards.

The guidelines will provide Canadian manufacturers with guidance on measurement standards and the noise emission declaration process. It will also give Canadian industry guidance in how to use Noise Emission Declarations to help purchase quiet equipment for their facilities.

A second draft of the guidelines are currently being reviewed by the working group, who will be seeking public comment from industry and labour. Anyone wishing to receive a copy of the next draft when it becomes available in order to provide comments to the working group may contact the author, or Stephen Bly at Health Canada: 613-954-0308. A limited number of spaces may also be available on the working group for interested individuals.

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CANADA'S CONTRIBUTION TO NAOSH WEEK IN MEXICO

Tim Kelsall
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This year I was pleased to be invited to join Canada's delegation to the Third National and International Week of Safety, Health, Employment and Productivity in Monterrey Mexico. This trinational conference was held as part of NAOSH week, a week devoted to Occupational Safety and Health throughout North America. The Mexican conference was organised under the auspices of the NAFTA free trade agreement to help Canada, the US and Mexico grow closer together in their approach to Occupational Health and Safety. Specifically, the US and Canada are trying to help Mexico to lift their industry's OSH standards and enforcement in line with theirs, to understand the challenges facing Mexico in achieving this goal and to learn from their achievements.

The event was held at the INTERMEX Conference Centre in downtown Monterrey and attracted an audience of about 400. Simultaneous translation was offered as speakers from all three countries provided insights into their approach to Health and Safety.

This year's Canadian delegation were Al Pighin of HRDC in Ottawa, Ken Lau, Chief Boiler Inspector in Alberta, and myself, representing Hatch. Al Pighin, head of the Canadian delegation, spoke about the Canadian approach to OSH and attempted to make sense of the 14 different jurisdictions responsible for OSH in this country.

Dr. Ken Lau is an internationally recognised authority on boilers and pressure vessels and heavily involved with ASME and the National Board. His organisation in Alberta is responsible for the most pressure vessel inspections in the country (primarily for the oil patch) and for certifying boiler inspectors and operators across the country. He emphasised the overwhelming power of boiler explosions, which can take out a city block, and invited Mexico to join the international efforts of ASME and the National Board in constructively controlling this power.

I head the Acoustics group and the EHS Specialties discipline at Hatch, one of Canada's largest consulting engineering companies. I was invited to speak about Noise and Noise Control in industry because the Mexicans recognise that it is one of their most widespread problems and the largest source of Workers' compensation claims for industrial disease (excluding physical injuries, back problems, etc.). I reviewed why noise is a concern and the limits used in Canada and Mexico. Mexico's standard is quite advanced, with a limit of 85 dBA and a 3 dB (Leq) exchange rate. I also discussed practical methods for controlling noise in industry, including noise specifications, silencers, enclosures and lagging. A demonstration of the basics of enclosure design using a coffee mug, an alarm clock and a small piece of fiberglass insulation earned an extra round of applause from the audience.

The Mexican speakers described recent progress in their country. They have had OSH legislation since 1911 and in the last couple of years have drastically remodelled and streamlined it. Many of their OSH standards have been extensively modified in the last few years. They were straightforward in acknowledging the economic and social challenges facing them as they work to bring their industries up to world OSH standards.

One speaker from the bottling industry candidly admitted that funds for noise control were scarce but outlined the framework of a good hearing conservation programme to ensure hearing protection is worn by all noise exposed employees.

The US and Canadian delegations were generously welcomed by the Mexican organisers. Events included a visit to the world renowned Alfa Science Centre and a barbecue in our honor. The former included a tour of a collection of early Mexican artifacts, an IMAX film (made within walking distance from Hatch's office), virtual reality displays and much more. Our Mexican hosts were uniformly hospitable and put on a first rate conference. Monterrey is a modern industrial city with high employment, a subway and first class galleries and museums. Located in the Northern state of Nueva Leon it has clearly benefited from the free trade agreement but has had to work hard to handle the resultant growing pains. This increased prosperity is allowing them the flexibility to face their very real OSH issues in the workplace. Progress will not be easy or smooth, but undoubtedly there are many in the country who can see the clear benefits and are working to implement practical solutions.

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Canadian Acoustical Association
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Minutes of the CAA Board of Director's Meeting
05 June 1999, Toronto, Ontario

Present:	John Bradley	John Hemingway	Trevor Nightingale
	Ramani Ramakrishnan	Don Jamieson	N. Atalla
	Stan Dosso	D. Whicker	W. Sydenborgh
	T. Kelsall	K. Pichora-Fuller	
Regrets:	Annabel Cohen	Dalila Giusti	D. DeGagne

Meeting called to order at 10:05 a.m.

Minutes of the October Board of Director's meeting and of the Annual General Meeting were approved as written in the December 1998 issue of Canadian Acoustics. (Moved by R. Ramakrishnan, seconded by W. Sydenborgh, carried).

President's Report
J. Bradley reiterated that the priority of the organization must the Journal and the annual conference to which there was consensus. Comments and suggestions on the recently issued Operations Manual were received and briefly discussed. There was discussion regarding the problem of achieving quorum at Board meetings. (Currently, five of the eight directors must be in attendance to achieve quorum: the Executive may voice opinions but can not vote). There was also discussion of the possibility of requiring a mail-in-vote to allow more members to participate in major decisions of the organization, such as changing membership fees, electing Board members and the Executive. J. Bradley reported that these issues would be addressed in a new initiative on the by-laws that would be tabled later in the meeting. (Acceptance of the President's report was moved by R. Ramakrishnan, seconded by K. Pichora-Fuller, carried).

Secretary's Report
T. Nightingale reported that the membership is down and that there is consistent erosion in all but one category: sustaining subscribers. The total paid membership (including non-voting journal subscriptions) is 299 as of 04 June 1999. The same time one year earlier the number was 322 and two, and three years earlier the numbers were higher, being 325, and 369, respectively. There was much discussion regarding this. It was agreed that we must take action beginning with the Board and the Executive contacting ten potential members to invite them to join. The idea of an exit poll to determine why people are leaving the organization was discussed. T. Nightingale reported that this was part of a new initiative on Outreach that would be tabled later in the meeting. Secretarial operating costs were higher this year than last due to a one-time cost associated with integrating the student awards mailing list with the membership database. This integration will make announcements of student awards and travel subsidies much easier. Operational costs for the first ten months of the fiscal year (beginning 01 August) were $1070. (Acceptance of the Secretary's report was moved by T. Kelsall, seconded by R. Ramakrishnan, carried).

Treasurer's Report
The recent membership fee increase has stabilized the finances. Following the direction of the Board of Directors meeting in October, $20k was transferred from the Operating Fund to the Capital Fund where it can be invested for a longer term with higher yield. Account balances are Operating Fund $45k and Capital Fund $148k. The lower interest rates mean that approximately $133k of the $148k in the Capital Fund is required to support $8k in prizes. It was reported that there are difficulties in tracking the receipt of payments for advertising in the Journal. The Treasurer moved that, "Paul A. Busch of 5780 Timberlea Blvd., Suite 207, Mississauga, Ontario, L4W 4W7 continue as the appointed Auditor of the Canadian Acoustical Association, with an annual budget of $1500 (+GST)." The motion was seconded by D. Whicker, and carried. The Treasurer announced his intention to resign in October. (Acceptance of the Treasurer's report was moved by W. Sydenborgh, and seconded by N. Atalla, carried).

Membership Chair's Report
The Chair reported that mailing to universities for student prizes has been completed. It was also suggested that each new member receive a letter from the President welcoming him/her to the Association. J. Bradley agreed to draft a letter and give an electronic copy to the Secretary who would then mail a copy to each new member. Improvement of the CAA Website (located on the server of the University of Western Ontario at WWW://uwo.ca/hhcru/caa/) continued throughout the year. There was much discussion as how the organization could best attract and retain new members. Ideas included regional chapter meetings, contacting non-

traditional areas such as Canadian Aeronautical Engineers to attract those interested in noise control, contacting persons who are members of the Acoustical Society of America but not members of the CAA, etc. N. Atalla commented that graduate students studying in physical acoustics at the University of Sherbrooke must become members of the CAA. K. Pichora-Fuller pointed out that she had found that there were some forty persons working in the area of speech and hearing but in many different departments at the University of British Columbia. There was general discussion as to how we should go about identifying other possible members in other disciplines and at other universities. Again it was agreed that each Board of Directors member would contact ten potential members and invite them to join. (Acceptance of the Membership Chair's report was moved by D. Whicker, and seconded by K. Pichora-Fuller, carried).

Editor's Report and New Initiative I on Canadian Acoustics

R. Ramakrishnan reported that he has access to new software to make publishing the journal faster and easier. The new software is the industry standard and will allow higher resolution print, submission to the printers in an electronic form, and the ability to electronically archive the Journal. Editorial Board members are to solicit at least one paper a year for the journal. Failure to do so will result in removal from the Editorial Board. New initiates for the journal were also discussed. They included creation of a sub-committee under R. Ramakrishnan to formulate a proposal that would outline steps to increase the appeal and circulation of the Journal. The proposal will be circulated to the Board of Directors and the Executive by end of August so that a definite proposal could be presented at the October Board of Directors. It was generally agreed that Canadian Acoustics would not regularly attract world class research papers but could be relied upon to provide smaller research papers, and various practical papers and lots of acoustical news. R. Ramakrishnan will contact various Board Members to form a Committee. Interested parties not on the Board are welcome to participate by contacting R. Ramakrishnan directly. (Acceptance of the Editor's report was moved by W. Sydenborgh, seconded by T. Kelsall, carried).

Past and Future Conferences

1998 London: D. Jamieson reported that 83 persons registered for the London conference and that after all expenses a profit of $735 was realized. The Board thanked D. Jamieson and M. Cheeseman for making the London Conference a success.

1999 Victoria: S. Dosso reported that organization is well underway with the hotel booked, technical chairs assigned and about forty abstracts already received. The conference website is at www://ceor.seos.uvic.ca/acoustic/CAA99.

2000 Sherbrooke: N. Atalla reported that his committee is in the process of booking the hotel and that the conference will be held on 27-29 September.

2001: There was some discussion of possible locations and it was thought that an East Coast venue might be desirable. Volunteers are welcome.

Student Travel Subsidy

T. Nightingale tabled a revised Student Travel Subsidy policy that outlined how the CAA might satisfy the requirement to limit the total amount spent on subsidies while also allowing students to know, in advance of attending the conference, how much money they are likely to receive. After much discussion the tabled document was modified to provide more time for the Treasurer and Secretary to adjudicate how much each student will likely receive. Also, the minimum of $150 was deleted. J. Hemingway proposed a motion, "to allocate $2500 for the purpose of partially subsidizing the travel expenses of students who attend the 1999 conference and meet the requirements of the revised travel policy." (Motion seconded by D. Whicker, all in favour, carried).

Award Coordinator's Report

A. Cohen provided a written report summarizing the Awards activities this year. The following is a summary by prize:

Edgar and Millicent Shaw Postdoctoral Prize in Acoustics: S. Abel, the prize coordinator, reported that the committee had two outstanding candidates this year. After much discussion it was moved by K. Pichora-Fuller and seconded by Tim Kelsall that CAA should offer two Shaw prizes this year only because applications were received from two excellent candidates. The motion was rejected. (2 in favour, 6 opposed and 2 abstentions).

Alexander Graham Bell Graduate Student Prize in Speech Communication and Behavioural Acoustics: No applicants. D. Jamieson coordinator.

Fessendon Student Prize in Underwater Acoustics: Awarded to Nicolle Ellen Collison of the University of Victoria. Project title: "Source localization using regularized matched-mode procession." D. Chapman award coordinator.

Eckel Student Prize in Noise Control: No update. M. Hodgson award co-ordinator.

CAA Canada-Wide Science Fair Award (Youth Science Foundation): Alan Kaufman and Kodie Taber (Edmonton): Project Title Aqua-link. A. Cohen award co-ordinator.

Raymond Hetu Memorial Undergraduate Award: Book prize: Advertisement of this new prize was not undertaken this year. The committee will develop a description of the competition for inclusion in the brochure next year. The final wording of the description can be brought to the Board of Directors at the Fall meeting.

Directors' Awards: For best papers in Canadian Acoustics. No report. D. Giusti Co-ordinator.

Student Presentation Awards: The responsibility for administering the judging will be undertaking by the local Conference Organizing Committee.

New Initiative II on Outreach and CAA Website

T. Nightingale tabled a discussion document intended to provide 'primer' ideas for a new committee that would look at how CAA might be made more accessible to existing members and perspective members through increasing the appeal of our website. Ideas included a listing at our website of Canadian universities having courses and offering degrees in acoustics, listing the abstracts of papers appearing in Canadian Acoustics, providing summaries and application notes for CSA standards, etc. It was agreed that we must determine why people are leaving CAA and that we might find answers through an exit poll of persons who do not renew their membership. It was also agreed that the Secretary would compile a list of persons leaving CAA, which would be broken down by region so that the director in that region could contact the person(s) directly. D. Giusti had agreed to head the outreach and website initiative. D. Whicker agreed to help with issues relating to the website while K. Pichora-Fuller would research people working in acoustics in Canada. The committee will develop a proposal that will outline steps to improve our website and to assess the strengths and weaknesses of the organization. The proposal will be circulated to the Board and Executive by the end of August. Additional volunteers are sought.

New Initiative III on Developing a Proposal for By-Law Changes

J. Bradley tabled a document that outlined his perception of the difficulties with the current by-laws. Namely, the difficulty in attaining quorum at meetings (because five of the eight directors are required since the Executive can not vote), and the potential for a small number of people at the AGM to make decisions that are not necessarily representative of the majority of the membership. General discussion followed and it was agreed that the quorum issue was a priority needing immediate attention. J. Bradley agreed to create a draft revision of the by-laws to address the quorum issue by allowing the Executive to vote. At the same time the responsibility of the Board members and the Executive would be examined. J. Bradley agreed to circulate a draft to the Board for their consideration and comment prior to being published in the September issue of Canadian Acoustics. The proposal would be brought before the Board of Directors in October for ratification, if successful it would be brought before the general membership at the Annual General Meeting (October 1999) for their consideration and subsequent vote.

Other Business

W. Sydenborgh suggested that the current membership categories of Student and Member might be too restrictive as many organizations have categories for emeritus members, seniors and the unemployed. There may be a reduced membership fee for these categories. W. Sydenborgh agreed to create a proposal for fee/membership categories.

Adjournment

R. Ramakrishnan moved to adjourn the meeting, seconded by J. Hemingway, carried. Meeting adjourned at 3:55 p.m.

Special Action Items Arising from the Meeting

J. Bradley

- Create a letter of welcome for all new members of CAA;
- Create a proposal for changing the by-laws along with a draft revision that will be circulated to Board of Directors and Executive by end of August.

T. Nightingale

- Circulate to each of the members of the Board and Executive a list of the persons leaving the organization so that the departing persons may be contacted;
- Modify the student travel subsidy and forward to R. Ramakrishnan and S. Dosso by 17 June 1999.

R Ramakrishnan

- Form a committee to consider and act on the Initiative I on Canadian Acoustics. The committee is to provide and circulate to the Board of Directors and Executive a plan and recommendations by end of August.

D. Giusti

- Form a committee to consider and act on the Initiative II on Outreach and the Website. The committee is to provide and circulate to the Board of Directors and Executive a plan and recommendations by end of August.

ALL

- Contact ten potential new members

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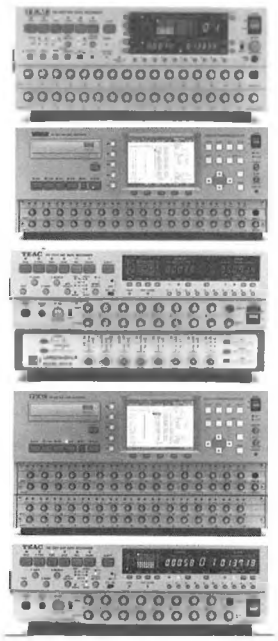

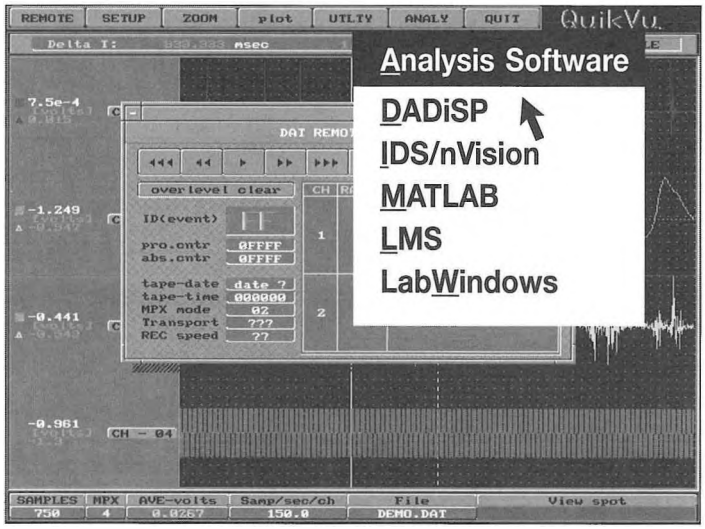

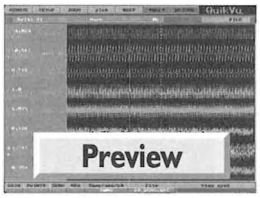

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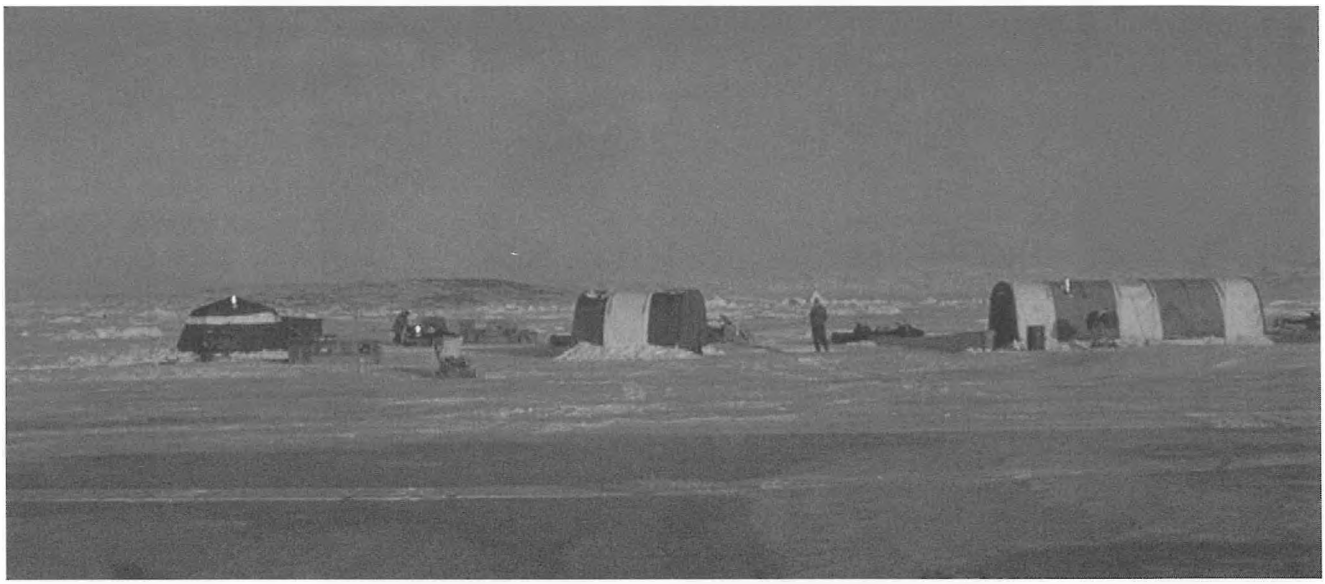


ICESHELF-1999 DREA's Arctic Field Trial

from G.J. Heard, Group Leader, Surveillance Acoustics

With the closure of the Defence Research Establishment Pacific (DREP) and the Esquimalt Defence Research Detachment (EDRD) in Victoria, BC, the responsibility for research topics in Arctic Underwater Acoustics has moved to the Surveillance Acoustics Group at the Defence Research Establishment Atlantic (DREA) in Dartmouth, NS.

During April of 1999, DREA conducted a successful field trial in the Arctic in collaboration with members of the Navigation Group at the Defence Research Establishment Ottawa (DREO). The objectives of this field trial were to evaluate new sensors for ice deployed sonobuoys, train personnel in Arctic field operations, evaluate short-baseline differential-GPS compass operation at high latitudes, field test a new low-cost flextensional acoustic source, and collect cold-water bacteria samples for the University of Victoria.

Photo: DREA's field camp in Black Cliffs Bay near Williams Island which is visible in the background.

ICESHELF-1999 Les essais du CRDA dans l'Arctique

de G.J. Heard, Chef de groupe, Surveillance Acoustique

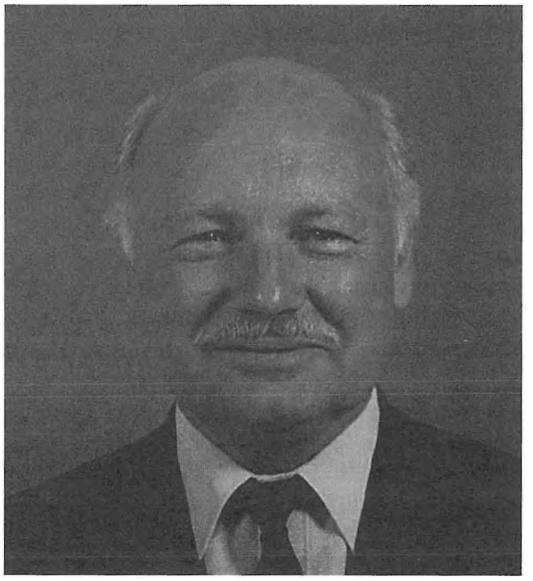
Après la fermeture du Centre de Recherches de la Défense Pacifique (CRDP) et du Détachement de recherche pour la Défense Esquimalt (DRDE) à Victoria, C.-B., la recherche en acoustique sous-marine en milieu arctique est devenue la responsabilité du groupe Surveillance Acoustique du Centre de recherches de la Défense Atlantique (CRDA) à Dartmouth, N.-É.

En avril 1999, le CRDA a exécuté avec succès un essai dans l'Arctique en collaboration avec des membres du groupe Navigation du Centre de recherches de la Défense à Ottawa (CRDO). Les objectifs de l'essai sur place étaient d'évaluer de nouveaux senseurs pour bouées acoustiques déployées sur glace, entraîner du personnel pour des opérations dans l'Arctique, évaluer l'opération à latitude élevée de compas GPS différentiel à ligne de base courte, tester sur le terrain une nouvelle source flextensionnelle économique, et recueillir des échantillons de bactéries d'eau froide pour l'Université de Victoria.

Photo : Le campement du CRDA à la Baie de Black Cliffs près de l'île de Williams, visible en arrière-plan.

A message from John Bradley - The Role of a CAA DIRECTOR

A director of the Canadian Acoustical Association is expected to enthusiastically and energetically support and promote the interests of the association wherever possible. Directors are responsible for managing theaffairs of the association and are expected to attend two board of directors meetings each year. Directors are expected to take an active role in the association including helping to organise sessions at our annual conference and by encouraging authors to submit contributions to our journal Canadian Acoustics.



Carman Bright retires

Carman Bright, Deputy Director General of the Defence Research Establishment Atlantic (DREA), retired on 16 April 1999. Carman has worked on navy sonar signal processing for most of his career, and he was responsible for many of the improvements incorporated into the sonars currently fitted to naval ships in Canada, United Kingdom, Belgium and Portugal.

Raised in Manitoba, Carman Bright came from the University of Manitoba to DREA in October 1963. Outside of a two-year Scientific Exchange Assignment in the UK (with the Admiralty Underwater Weapons Establishment), his first years as a Defence Scientist were spent at DREA, though he collaborated extensively with scientists in the US, UK, other NATO countries, Australia and New Zealand. He became Head of DREA's Signal Processing Section in 1977, and moved to National Defence Headquarters in 1986 as Director Research and Development Air, and subsequently as Director Research and Development Maritime (1988). Carman returned to DREA in 1991 as Director of the Sonar Division, and he was appointed Deputy Director General in 1995.

A reception in honor of Carman's retirement was held at DREA in April. Besides receiving an excellent send off by the DREA staff he received well wishes from a number of his international colleagues. The staff will always be happy to put him on thin ice... at all future DREA Curling Bonspiels! The Canadian Acoustical Association extends its best wishes to Carman Bright.

Carman Bright prend sa retraite

Carman Bright, Directeur général adjoint du Centre de recherches pour la défense Atlantique (CRDA), a pris sa retraite le 16 avril 1999. Durant sa carrière, Carman a travaillé surtout sur le traitement de signal pour sonar naval, et il est responsable de plusieurs améliorations incorporées dans les sonars qui équipent les navires des forces navales canadiennes, britanniques, belges et portugaises.

Élevé au Manitoba, Carman Bright a commencé au CRDA en octobre 1963, dès sa sortie de l'Université du Manitoba. À part un échange scientifique de deux ans en Angleterre (avec le Admiralty Underwater Weapons Establishment) il a passé ses premières années au CRDA en tant que scientifique de la Défense, et a collaboré étroitement avec des chercheurs des États-Unis, Royaume-Uni et autres pays de l'OTAN, Australie et Nouvelle-Zélande. Il est devenu Chef de la Section Traitement de signal du CRDA en 1977, puis il a été transféré au Quartier général de la Défense nationale en 1986 où il a pris le poste de Directeur Recherche et développement (Air), puis en 1988 le poste de Directeur Recherche et développement (Maritime). Carman est retourné au CRDA en 1991 comme Directeur de la Division Sonar, et il a été nommé Directeur général adjoint en 1995.

Une réception en l'honneur de la retraite de Carman a eu lieu au CRDA en avril. Plusieurs de ses collègues internationaux ont joint leurs meilleurs souhaits à ceux des employés du CRDA. Les employés d'ailleurs invitent Carman à se joindre à eux au cours de leurs prochains tournois de curling. La Société canadienne d'acoustique envoie ses meilleurs voeux à Carman Bright.

CANADIAN NEWS... / NOUVELLES CANADIENNES...
THESES DE DOCTORAT

(By Mr. Olivier Foin, GAUS, Universite de Sherbrooke)

Titre

Outils de prédiction numériques pour l'optimisation des stratégies de contrôle de bruit à la source

Résumé

L'objet principal de ce doctorat est le développement de techniques numériques permettant la réduction des nuisances sonores dues à la vibration de structures résonantes. Pour ce faire, des formulations théoriques originales ont été développées, puis implantées dans des codes numériques. Les résultats obtenus par ces codes ont fait l'objet d'une analyse minutieuse afin de dégager les principes physiques qui permettent de diminuer le rayonnement acoustique d'une structure soumise à des vibrations stationnaires. Trois sujets sont successivement abordés, (1) l'amortissament des vibrations d'une plaque par l'ajout d'un traitement viscoélastique, total ou partiel, (2) l'isolation acoustique procurée par l'ajout d'un matériau de masquage sur une plaque immergée dans l'eau et (3) l'évaluation numérique du champ acoustique rayonné par une structure à partir de la mesure de son champ de déplacement.

Dans le cadre de l'étude de l'amortissement d'une structure par l'ajout de matériaux viscoélastiques, une formulation théorique originale a été développée : elle traite le cas d'une plaque rectangulaire, bafflée, simplement appuyée et couverte par un traitement partiel, constitué d'une couche viscoélastique et d'une couche rigide. L'équation de mouvement de la structure multicouche couplée au fluide est obtenue avec la formulation variationnelle et la méthode de Ritz. Le rayonnement de la structure bafflée est calculé à l'aide de la méthode intégrale, les impédances de rayonnement sont évaluées à l'aide d'une méthode semi-numérique qui permet une bonne convergence en hautes-fréquences, tout en évitant des instabilités numériques. L'analyse des résultats a permis de mettre en évidence les points suivants :

1. L'existence d'un module d'Young optimum de la couche viscoélastique qui entraine un amortissement maximum des vibrations de la structure, a été montrée. Ce module d'Young optimum est une fonction linéaire de la fréquence.
2. Dans le cas où l'on considère un traitement viscoélastique qui ne couvre qu'une partie de la plaque, on remarque que l'augmentation d'amortissement est une fonction logarithmique du pourcentage de couverture, ce qui signifie que l'amortissement augmente beaucoup entre 0 % et 25 % de couverture alors que la différence est très faible entre 75 % et 100 %.
3. Une méthode est proposée pour optimiser la position de la couverture partielle sur la plaque de base, pour les premiers modes de structure. Cette méthode consiste à rechercher les zones qui vont maximiser les déformations de cisaillement transversal dans la couche viscoélastique, car elles sont principalement responsable de la dissipation d'énergie. Pour les modes de hauts-ordres, la position de la couverture importe peu, car la dimension de la couverture étant très supérieure à la longueur d'onde structurale, la même efficacité est obtenue quelle que soit la position de la couverture sur la plaque.

Afin d'étudier l'isolation acoustique procurée par l'ajout d'un matériau de masquage sur une structure immergée dans l'eau, un modèle théorique a également été développé. La structure considérée est une plaque rectangulaire, bafflée, simplement appuyée et recouverte par un matériau de masquage. Le matériau de masquage est immergée dans l'eau alors que l'autre face de la plaque est dans l'air. La plaque de base est traitée avec la théorie classique pour la flexion de Love-Kirchhoff, alors que le matériau de masquage est décrit à l'aide du modèle à réaction localisée qui définit le matériau comme une répartition uniforme de ressorts sans masse. Ce modèle ne prend en compte que la déformation du matériau dans le sens de l'épaisseur, car c'est cette déformation qui est principalement responsable de l'isolation acoustique procurée par le matériau de masquage. L'analyse des résultats montre que l'isolation obtenue par le matériau de masquage croit en fonction de la fréquence. De plus, la diminution de la rigidité du matériau de masquage améliore l'isolation acoustique de manière uniforme.

La troisième partie de ce doctorat est consacrée au développement d'une méthode qui permet l'évaluation numérique du champ acoustique rayonné par une structure, à partir de la mesure de son champ de déplacement. Cette méthode permet de localiser les sources acoustiques dans le cas d'une structure complexe, elle permet également d'évaluer la contribution due au rayonnement acoustique de la structure dans le bruit total rayonné dans un local occupé par d'autres sources de bruit. Là encore, une formulation théorique a été développée, elle considère deux hypothèses pour la structure, (1) le cas où elle est entièrement bafflée et (2) le cas où elle est entièrement non-bafflée. Ces deux cas constituent un indicateur maximum et minimum pour le cas où la structure réelle n'est ni entièrement bafflée, ni entièrement non bafflée. Cette méthode a fait l'objet de nombreuses validations qui ont permis de montrer que bien qu'elle soit définie pour des structures planes, elle donne encore des résulats précis pour des structures avec une légère courbure.

CANADIAN NEWS... / NOUVELLES CANADIENNES...

DOCTORAL DISSERTATION

(BY MR. OLIVIER FOIN, GAUS, SHERBROOKE UNIVERSITY)

Title

Numerical predicting tools to optimise the noise control of resonant structures

Abstract

The aim of this dissertation was to develope numerical techniques for the design of structures with less noise potential. Original theoretical formulations were developed and implemented in numerical codes using C++ language. The principles that control the reduction of noise and vibration from resonant structures were determined from the above analysis.

Three parameters are investigated : (1) the vibration damping of plates using partial viscoelastic coverage, (2) the acoustic reduction due to decoupling coating on submerged structures and (3) the numerical evaluation of the radiated sound power of a structure using vibration measurement.

For the first investigation, a rectangular, baffle plate covered by a constrained viscoelastic treatment is considered. The steady-state equation of motion of the fluid-loaded structure is obtained by the Rayleigh-Ritz method. The radiation impedance matrix is evaluated by a semi-numerical method that avoids convergence problem in high frequencies. Experimental measurements confirmed the hypothesis used for the theoretical model.

The following were the highlights of the above analysis :

A linear law was found between frequency and the optimum Young's modulus of the viscoelastic layer. This optimum Young's modulus leads maximum damping of the structure.

The fact that maximum shear strain of the viscoelastic layer occurs when the base structure experiences the maximum bending deformation is used to develop a criteria for the optimization of the location of the partial coverage in low frequencies.

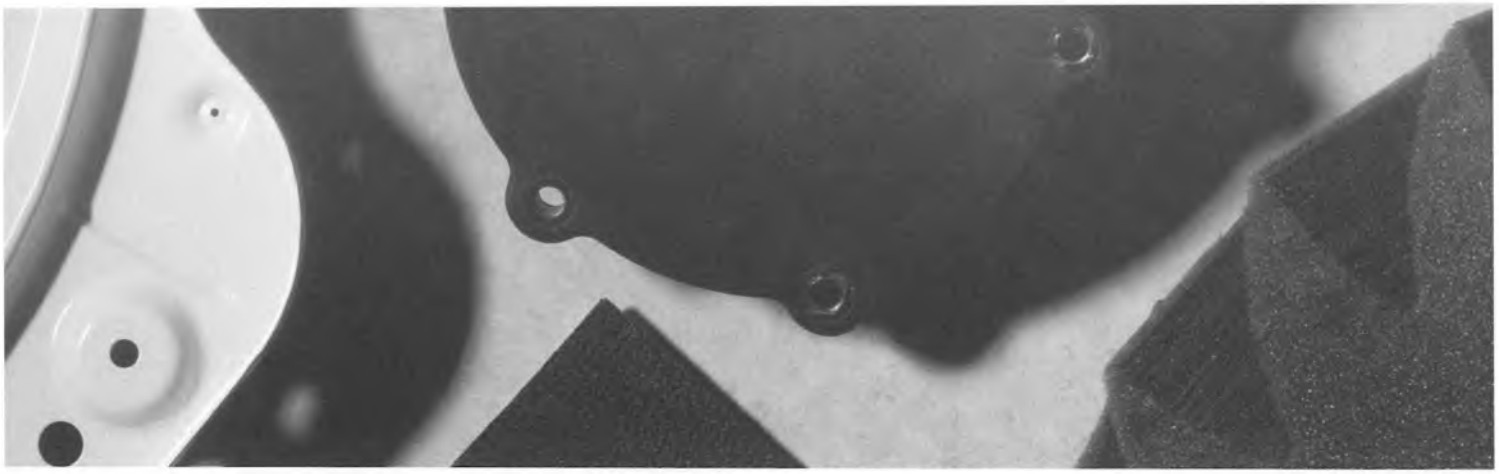
The aim of the second investigation is to study decoupling coating to reduce the noise radiated by submerged structures. A theoretical formulation was developed to treat the case of a rectangular baffle plate covered by a decoupling layer. The Love-Kirchhoff bending theory is considered for the base plate, while the decoupling layer is treated with the locally reacting model that assumes the layer as evenly distributed springs in the transverse direction. The analysis shows that the noise reduction increases with frequency. The noise reduction also increases with decreasing coating stiffness.

The third investigation is dedicated to an hybrid method that allows the numerical calculation of the acoustic response of a structure by using vibration measurement. This method is able to localise the noisy acoustic sources of a complex structure. It also allows to calculate the sound due to the vibration of a structure by removing the other types of noise (like aerodynamics noise, fan noise, jet noise...). The first step of the method consists of measuring the velocity spectra at several points on the structure. The radiated acoustic power of the structure is then evaluated from the velocity. Two limiting cases are considered : (1) the structure is entirely baffled and (2) the structure is without baffles. This method was intensively validated and precise acoustic response of complex structure, like an aircraft fuselage, even in high frequencies could be determined.

A message from John Hemingway - The Role of a CAA TREASURER

After serving several years as Treasurer of the CAA, I have decided that the time has come to pass the reins on to someone else. As Past President I am also responsible for finding a replacement! If you would be interested in taking on the post of Treasurer or know of someone who might be interested, please call me at (416) 798-0522. The following is a listing of the Treasurers duties:

- Update the CAA Ledger for the Operating and Capital Funds from Monthly Bank Statements;
- Receive paying in slips from the Secretary who does the banking of membership fees;
- Write Cheques for Prizes, Student Travel Subsidy, Journal expenses etc.;
- Liaise with the Advertising Sub-Editor re payment of Journal advertising fees;
- Receive and bank cheques (mainly advertising fees); and
- Present the Ledger, receipts, vouchers, statements, etc. annually to the Auditor.



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The Boundary Element Method in Acoustics
Stephen Kirkup

Integrated Sound Software, Hebden Bridge, West Yorkshire, UK
ISBN 0953403106 (Prices range from US$35 to US$325 depending on the package)

The above book is subtitled "A Development in Fortran." Dr. Stephen Kirkup is a professor at the University of Liverpool and his 1989 doctoral dissertation from Brighton Polytechnic, Brighton was 'The Solution of Exterior Acoustic Problems by the Boundary Element Method.' Even a cursory reading of the book indicates that the book was the development of the doctoral work. The book limits itself to three acoustic problems: the interior problem, the exterior problem and the interior modal analysis.

The book is divided into six chapters: Introduction, Boundary Representation, The Discrete Helmholtz Operators, The Interior Acoustic Problem, The Exterior Acoustic Problem, and The Interior Modal Analysis. The book in its preface promises to develop the BEM (Boundary Element Method) in a bottom-up way. It is not clear what this means - shall we assume that the reader is expected to know a lot about the basic development of acoustical problems?

Chapter 1 provides a basic introduction to the book in general. The chapter is broken down to the following subjects in that order: the treatment of BEM formulation and the method of collocation; the basic partial differential equations that govern acoustical problems (Wave equation and Helmholz equation) and computer programs. Only a cursory treatment was given to these subjects and its progression doesn't seem to follow the typical text book development. The reader is expected to have strong prior knowledge of these formulations. At the end of the chapter, the reader realizes that this is more of a *User's Manual* to a set of computer codes that were developed by the author.

Chapter 2 describes the ways the boundary is represented by the computer codes. Since the *book* deals with only the BEM method, perhaps it is appropriate that the boundary is given immediate attention.

Chapter 3 deals with the formulations of the various integral operators and their development into basic subroutine codes written in FORTRAN 77. The evaluation of elementary Green's functions for Two-D, Three-D and Axisymmetric cases and their derivatives is described briefly. The evaluation of the operators, their problems and the required quadratures for the boundary operators are also touched upon.

Chapter 4 discusses interior acoustic formulations and jumps to describing the organization of the computer codes. A brief description is included for the interface between the interior codes and the general codes developed in Chapter 3. A simple example of the solution within a Two-D car is shown. The reader is expected to read about three earlier works to evaluate the accuracy and/or the usefulness of the formulations described in this text.

Chapter 5 and Chapter 6 follow the outlines established in Chapter 4 for exterior problems and interior modal analysis. Chapter 5 describes briefly an improved formulations to overcome the difficulties (such as descretization of certain operators) of earlier formulations. These improvements are stated matter-of-fact without serious analysis. Sample cases are shown with a brief description of organizing the computer codes and the appropriate interfaces.

The main drawback of this book seems to be that it suffers from an identity crisis - one is not sure if this a *text book* or if it is a *user's manual*. We are convinced that this is more a user's manual. However its organization as a user's manual needs considerable effort and considerable rethinking.

The codes are developed using the BEM formulation with *collocation* solution scheme. The text claims that this is a superior and easier method without proof. Collocation is a fundamental solution formulation for the BEM method and has a few advantages in a few limited cases. Its main drawback is that it can't be used for interior and exterior problems. It can only be used for interior or exterior problems with closed boundaries. Open and/or complicated boundaries pose additional problems. The more general variational formulation seem to be a better alternative.

The above manual with a set of codes is priced right as compared to SYSNOISE and BEMAP, two popular industry softwares that the reviewer is familiar with, and perhaps these softwares can be applied for many different problems in a simple way. However, the accompanying documentation has not succeeded in communicating the usefulness of these codes.

Reviewed by:

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NEWS / INFORMATIONS

CONFERENCES

The following list of conferences was mainly provided by the Acoustical Society of America. If you have any news to share with us, send them by mail or fax to the News Editor (see address on the inside cover), or via electronic mail to desharnais@drea.dnd.ca

1999

23-25 June: 13th Rotterdam Symposium on Echocardiology, Rotterdam, The Netherlands. Contact: PAOG, Eramus University Rotterdam, PO Box 1738, 3000 DR Rotterdam, The Netherlands; Fax: +31 10 436 7271; Email: secr@paog .fgg.eur.nl

27-30 June: ASME Mechanics and Materials Conference, Blacksburg, VA. Contact: Mrs. Norma Guynn, Dept. of Engineering Science and Mechanics, Virginia Tech, Blacksburg, VA 24061-0219; Fax: 540-231-4574; Email: nguynn@vt.edu; WWW: http://www.esm.vt.edu/mmconf/

28-30 June: 1st International Congress of the East European Acoustical Association, St. Petersburg, Russia. Contact: EEAA, Moskovskoe Shosse 44, St. Petersburg 196158, Russia; Fax: +7 812 127 9323; Email: krylspb @sovam.com

28 June - 1 July: Joint Conference of Ultrasonics International '99 and World Congress on Ultrasonics '99 (UI99/WCU99), Lyngby, Denmark. Contact: L. Bjorno, Department of Industrial Physics, Technical University, Building 425, 2800 Lyngby, Denmark; Fax: +45 45 93 01 90; E-mail: lb@ipt.dtu.dk; WWW: www.msc.cornell.edu/~ui99/

4-9 July: 10th British Academic Conference in Otolaryngology, London, UK. Contact: BOA-HNS, The Royal College of Surgeons, 35-43 Lincoln's Inn Field, London WC2A 3PN, UK; Fax: +44 171 404 4200.

5-8 July: 6th International Congress on Sound and Vibrations, Copenhagen, Denmark. Contact: F. Jacobsen, Department of Acoustic Technology, Building 352, Technical University of Denmark, 2800 Lyngby, Denmark; Fax: +45 45 880577; Email: fjac@dat.dtu.dk; Web: www.dat.dtu.dk

2-6 August: International Symposium on High-Power Ultrasonics, Vitebsk. Fax: +375 212 24 39 53; Email: lpm@ita.belpak.vitebsk.by

1-4 September: 15th International Symposium on Nonlinear Acoustics (ISNA-15), Gottingen, Germany. Contact: W. Lauterborn, Drittes Physikalisches Institut, Universitat Gottingen, Burgerstr. 42-44, 37073 Gottingen, Germany; Fax: +49 551 39 7720; Email: lb@physik3.gwdg.de

15-17 September: British Society of Audiology Annual Conference, Buxton, UK. Contact: BSA, 80 Brighton Road, Reading RG6 1PS, UK; Fax: +44 0118 935 1915; Email: bsa@b-s-a.demon.co.uk; Web: www.b-s-a.demon.co.uk

CONFÉRENCES

La liste de conférences ci-jointe a été offerte en majeure partie par l'Acoustical Society of America. Si vous avez des nouvelles à nous communiquer, envoyez-les par courrier ou fax (coordonnées incluses à l'envers de la page couverture), ou par courrier électronique à desharnais@drea.dnd.ca

1999

23-25 juin: 13e Symposium de Rotterdam sur l'écho cardiologie, Rotterdam, Pays-Bas. Info: PAOG, Eramus University Rotterdam, PO Box 1738, 3000 DR Rotterdam, The Netherlands; Fax: +31 10 436 7271; Email: secr@paog.fgg.eur.nl

27-30 juin: Conférence ASME sur la mécanique et les matériaux, Blacksburg, VA. Info: Mrs. Norma Guynn, Dept. of Engineering Science and Mechanics, Virginia Tech, Blacksburg, VA 24061-0219; Fax: 540-231-4574; Email: nguynn@vt.edu; WWW: http://www.esm.vt.edu/mmconf/

28-30 juin: 1er Congrès international de l'Association d'acoustique de l'Europe de l'Est, St. Petersburg, Russie. Info: EEAA, Moskovskoe Shosse 44, St. Petersburg 196158, Russia; Fax: +7 812 127 9323; Email: krylspb @sovam.com

28 juin - 1 juillet: Conférence conjointe de "Ultrason International '99" et "Congrès mondial '99 sur les ultrasons" (UI99/WCU99), Lyngby, Danemark. Info: L. Bjorno, Department of Industrial Physics, Technical University, Building 425, 2800 Lyngby, Denmark; Fax: +45 45 93 01 90; E-mail: lb@ipt.dtu.dk; WWW: www.msc.cornell.edu/~ui99/

4-9 juillet: 10e Conférence académique britannique sur l'otolaryngologie, Londres, Royaume-Uni. Info: BOA-HNS, The Royal College of Surgeons, 35-43 Lincoln's Inn Field, London WC2A 3PN, UK; Fax: +44 171 404 4200.

5-8 juillet: 6e congrès international sur le son et les vibrations, Copenhague, Danemark. Info: F. Jacobsen, Department of Acoustic Technology, Building 352, Technical University of Denmark, 2800 Lyngby, Denmark; Fax: +45 45 880577; Email: fjac@dat.dtu.dk; Web: www.dat.dtu.dk

2-6 août: Symposium international sur les ultrasons de haute puissance, Vitebsk. Fax: +375 212 24 39 53; Email: lpm@ita.belpak.vitebsk.by

1-4 septembre: 15e Symposium international sur l'acoustique nonlinéaire (ISNA-15), Gottingen, Allemagne. Info: W. Lauterborn, Drittes Physikalisches Institut, Universitat Gottingen, Burgerstr. 42-44, 37073 Gottingen, Germany; Fax: +49 551 39 7720; Email: lb@physik3 .gwdg.de

15-17 septembre: Conférence annuelle de la Société britannique d'audiologie, Buxton, Royaume-Uni. Info: BSA, 80 Brighton Road, Reading RG6 1PS, UK; Fax: +44 0118 935 1915; Email: bsa@b-s-a.demon.co.uk; Web: www.b-s-a.demon.co.uk

18-19 October: 1999 Acoustics Week in Canada, Victoria, BC, Canada. Contact: Stan Dosso, School of Earth & Ocean Sciences, University of Victoria, Victoria, BC, Canada, V8W 3P6; Fax: (250) 721-6200; Email: sdosso@uvic.ca

20-22 October: Iberian Meeting of the Spanish Acoustical Society and the Portuguese Acoustical Society, Avila, Spain. Contact: Spanish Acoustical Society, c/Serrano 144, 28006 Madrid, Spain; Fax: +34 91 411 7651; email: ssantiago @fresno.csic.es

1-5 November: 138th meeting of the Acoustical Society of America, Columbus, OH. Contact: Acoustical Society of America, 500 Sunnyside Blvd., Woodbury, NY 11797; Tel.: 516-576-2360; Fax: 516-576-2377; email: asa@aip.org; WWW: asa.aip.org

2000

20-24 March: Meeting of the German Acoustical Society (DAGA), Oldenburg, Germany. Contact: DEGA, FB Physik, Universität Oldenburg, 26111 Oldenburg, Germany; Fax: +49 441 798 3698; Email: dega@aku.physik.uni-oldenburg.de

4-7 July: 7th International Congress on Sound and Vibration, Garmisch-Partenkirchen, Germany. Contact: H. Heller, DLR, Postfach 3267, 38022 Braunschweig, Germany; Fax: +49 531 295 2320; email: hanno.heller@dlr.de; WWW: www.iiav.org/icsv7.html

3-6 September: 5th French Congress on Acoustics - Joint meeting of the Swiss and French Acoustical Societies, Lausanne, Switzerland. Contact: M.-N. Rossi, Ecole Polytechnique Fédérale, 1015 Lausanne, Switzerland; Fax: +41 21693 26 73.

3-5 October: WESPRAC VII, Kumamoto, Japan. Contact: Computer Science Dept., Kumamoto Univ., 2-39-1 Kurokami, Kumamoto, Japan 860-0862; Fax: +81 96 342 3630; Email: wesprac7@cogni.eecs.kumamoto-u.ac.jp

16-18 October: 2nd Iberoamerican Congress on Acoustics, 31st National Meeting of the Spanish Acoustical Society, and EAA Symposium, Madrid, Spain. Contact: Spanish Acoustical Society, c/Serrano 144, 28006 Madrid, Spain; Fax: +34 91 411 7651; email: ssantiago@fresno.csic.es

16-20 October: 6th International Conference on Spoken Language Processing, Beijing, China. Contact: ICSLP 2000 Secretariat, Institute of Acoustics, PO Box 2712, 17 Zhong Guan Cun Road, 100 080 Beijing, China; Fax: +86 10 6256 9079; Email: mchu@plum.ioa.ac.cn

2001

2-7 September: 17th International Congress on Acoustics (ICA), Rome, Italy. Contact: A. Alippi, Dipartimento di Energetica, Universita di Roma "La Sapienza," Via A. Scarpa 14, 00161 Rome, Italy; Fax: +39 6 4424 0183; WWW: www.uniroma1.it/energ/ica.html

18-19 octobre: Semaine canadienne d'acoustique 1999, Victoria, BC, Canada. Info: Stan Dosso, School of Earth & Ocean Sciences, University of Victoria, Victoria, BC, Canada, V8W 3P6; Fax: (250) 721-6200; Email: sdosso@uvic.ca

20-22 octobre: Rencontre ibérique de la Société d'acoustique espagnole et de la Société d'acoustique portuguaise, Avila, Espagne. Info: Spanish Acoustical Society, c/Serrano 144, 28006 Madrid, Spain; Fax: +34 91 411 7651; email: ssantiago@fresno.csic.es

1-5 novembre: 138e rencontre de l'Acoustical Society of America, Columbus, OH. Info: Acoustical Society of America, 500 Sunnyside Blvd., Woodbury, NY 11797; Tél.: 516-576-2360; Fax: 516-576-2377; email: asa@aip.org; WWW: asa.aip.org

2000

20-24 mars: Rencontre de la Société allemande d'acousti-que (DAGA), Oldenburg, Allemagne. Info: DEGA, FB Physik, Universität Oldenburg, 26111 Oldenburg, Germany; Fax: +49 441 798 3698; Email: dega@aku.physik.uni-oldenburg.de

4-7 juillet: 7e Congrès international sur le son et les vibrations, Garmisch-Partenkirchen, Allemagne. Info: H. Heller, DLR, Postfach 3267, 38022 Braunschweig, Germany; Fax: +49 531 295 2320; email: hanno.heller@dlr.de; WWW: www.iiav.org/icsv7.html

3-6 septembre: 5e Congrès français d'acoustique - Rencontre con-jointe des Sociétés suisse et française d'acoustique, Lausanne, Suisse. Info: M.-N. Rossi, Ecole Polytechnique Fédérale, 1015 Lausanne, Suisse; Fax: +41 21693 26 73.

3-5 octobre: WESPRAC VII, Kumamoto, Japon. Info: Computer Science Dept., Kumamoto Univ., 2-39-1 Kurokami, Kumamoto, Japan 860-0862; Fax: +81 96 342 3630; Email: wesprac7@cogni.eecs.kumamoto-u.ac.jp

16-18 octobre: 2e congrès ibéro-américain sur l'acoustique, 31e Rencontre nationale de la Société d'acoustique espagnole, et Symposium de l'EAA, Madrid, Espagne. Info: Spanish Acoustical Society, c/Serrano 144, 28006 Madrid, Spain; Fax: +34 91 411 7651; email: ssantiago@fresno .csic.es

16-20 octobre: 6e conférence internationale sur le traitement de la langue parlée, Beijing, Chine. Info: ICSLP 2000 Secretariat, Institute of Acoustics, PO Box 2712, 17 Zhong Guan Cun Road, 100 080 Beijing, China; Fax: +86 10 6256 9079; Email: mchu@plum.ioa.ac.cn

2001

2-7 septembre: 17e Congrès international sur l'acoustique (ICA), Rome, Italie. Info: A. Alippi, Dipartimento di Energetica, Universita di Roma "La Sapienza," Via A. Scarpa 14, 00161 Rome, Italy; Fax: +39 6 4424 0183; WWW: www.uniroma1.it/energ/ica.html

The Canadian Acoustical Association/l'Association Canadienne d'Acoustique

PRIZE ANNOUNCEMENT

A number of prizes, whose general objectives are described below, are offered by the Canadian Acoustical Association. As to the first four prizes, applicants must submit an application form and supporting documentation to the prize coordinator before the end of February of the year the award is to be made. Applications are reviewed by subcommittees named by the President and Board of Directors of the Association. Decisions are final and cannot be appealed. The Association reserves the right not to make the awards in any given year. Applicants must be members of the Canadian Acoustical Association. Preference will be given to citizens and permanent residents of Canada. Potential applicants can obtain full details, eligibility conditions and application forms from the appropriate prize coordinator.

EDGAR AND MILLICENT SHAW POSTDOCTORAL PRIZE IN ACOUSTICS

This prize is made to a highly qualified candidate holding a Ph.D. degree or the equivalent, who has completed all formal academic and research training and who wishes to acquire up to two years supervised research training in an established setting. The proposed research must be related to some area of acoustics, psychoacoustics, speech communication or noise. The research must be carried out in a setting other than the one in which the Ph.D. degree was earned. The prize is for $3000 for full-time research for twelve months, and may be renewed for a second year. Coordinator: Sharon Abel, Mount Sinai Hospital, 600 University Avenue, Toronto, ON M5G 1X6. Past recipients are:

1990	Li Cheng	Université de Sherbrooke	1995	Jing-Fang Li	University of British Columbia
1993	Roland Woodcock	University of British Columbia	1996	Vijay Parsa	University of Western Ontario
1994	John Osler	Defense Research Estab. Atlantic			

ALEXANDER GRAHAM BELL GRADUATE STUDENT PRIZE IN SPEECH COMMUNICATION AND BEHAVIOURAL ACOUSTICS

The prize is made to a graduate student enrolled at a Canadian academic institution and conducting research in the field of speech communication or behavioural acoustics. It consists of an $800 cash prize to be awarded annually. Coordinator: Don Jamieson, Department of Communicative Disorders, University of Western Ontario, London, ON N6G 1H1. Past recipients are:

1990	Bradley Frankland	Dalhousie University	1994	Michael Lantz	Queen's University
1991	Steven D. Turnbull	University of New Brunswick	1995	Kristina Greenwood	University of Western Ontario
	Fangxin Chen	University of Alberta	1996	Mark Pell	McGill University
	Leonard E. Cornelisse	University of Western Ontario	1997	Monica Rohlfs	University of Alberta
1993	Aloknath De	McGill University	1998	Marlene Bagatto	University of Western Ontario

FESSENDEN STUDENT PRIZE IN UNDERWATER ACOUSTICS

The prize is made to a graduate student enrolled at a Canadian university and conducting research in underwater acoustics or in a branch of science closely connected to underwater acoustics. It consists of $500 cash prize to be awarded annually. Coordinator: David Chapman, DREA, PO Box 1012, Dartmouth, NS B2Y 3Z7.

1992	Daniela DiIorio	University of Victoria	1994	Craig L. McNeil	University of Victoria
1993	Douglas J. Wilson	Memorial University	1996	Dean Addison	University of Victoria

ECKEL STUDENT PRIZE IN NOISE CONTROL

The prize is made to a graduate student enrolled at a Canadian academic institution pursuing studies in any discipline of acoustics and conducting research related to the advancement of the practice of noise control. It consists of a $500 cash prize to be awarded annually. The prize was inaugurated in 1991. Coordinator: Murray Hodgson, Occupational Hygiene Programme, University of British Columbia, 2206 East Mall, Vancouver, BC V6T 1Z3.

1994	Todd Busch	University of British Columbia	1996	Nelson Heerema	University of British Columbia
1995	Raymond Panneton	Université de Sherbrooke	1997	Andrew Wareing	University of British Columbia

DIRECTORS' AWARDS

Three awards are made annually to the authors of the best papers published in Canadian Acoustics. All papers reporting new results as well as review and tutorial papers are eligible; technical notes are not. The first award, for $500, is made to a graduate student author. The second and third awards, each for $250, are made to professional authors under 30 years of age and 30 years of age or older, respectively. Coordinator: Delila Giusti, Jade Acoustics, Concord, ON L4K 4H1.

STUDENT PRESENTATION AWARDS

Three awards of $500 each are made annually to the undergraduate or graduate students making the best presentations during the technical sessions of Acoustics Week in Canada. Application must be made at the time of submission of the abstract. Coordinator: Ramani Ramakrishnan, Aiolos Engineering, Toronto ON M9W 1K4, Tel: (416) 674-3017.

The Canadian Acoustical Association/l'Association Canadienne d'Acoustique

ANNONCE DE PRIX

Plusieurs prix, dont les objectifs généraux sont décrits ci-dessous, sont décernés par l'Association Canadienne d'Acoustique. Pour les quatre premiers prix, les candidats doivent soumettre un formulaire de demande ainsi que la documentation associée au coordonnateur de prix avant le dernier jour de février de l'année durant laquelle le prix sera décerné. Toutes les demandes seront analysées par des sous-comités nommés par le président et la chambre des directeurs de l'Association. Les décisions seront finales et sans appel. L'Association se réserve le droit de ne pas décerner les prix une année donnée. Les candidats doivent être membres de l'Association. La préférence sera donnée aux citoyens et aux résidents permanents du Canada. Les candidats potentiels peuvent se procurer de plus amples détails sur les prix, leurs conditions d'éligibilité, ainsi que des formulaires de demande auprès du coordonnateur de prix.

PRIX POST-DOCTORAL EDGAR ET MILLICENT SHAW EN ACOUSTIQUE

Ce prix est attribué à un(e) candidat(e) hautement qualifié(e) et détenteur(rice) d'un doctorat ou l'équivalent, qui a complèté(e) ses études et sa formation de chercheur, et qui désire acquérir jusqu'à deux années de formation supervisée de recherche dans un établissement reconnu. Le thème de recherche proposée doit être relié à un domaine de l'acoustique, de la psycho-acoustique, de la communication verbale ou du bruit. La recherche doit être menée dans un autre milieu que celui où le candidat a obtenu son doctorat. Le prix est de $3000 pour une recherche plein temps de 12 mois avec possibilité de renouvellement pour une deuxième année. Coordonnatrice: Sharon Abel, Mount Sinai Hospital, 600 University Avenue, Toronto, ON M5G 1X6. Les récipiendaires antérieur(e)s sont:

1990	Li Cheng	Université de Sherbrooke	1995	Jing-Fang Li	University of British Columbia
1993	Roland Woodcock	University of British Columbia	1996	Vijay Parsa	University of Western Ontario
1994	John Osler	Defense Research Estab. Atlantic			

PRIX ÉTUDIANT ALEXANDER GRAHAM BELL EN COMMUNICATION VERBALE ET ACOUSTIQUE COMPORTEMENTALE

Ce prix sera décerné à un(e) étudiant(e) inscrit(e) dans une institution académique canadienne et menant un projet de recherche en communication verbale ou acoustique comportementale. Il consiste en un montant en argent de $800 qui sera décerné annuellement. Coordonnateur: Don Jamieson, Department of Communicative Disorders, University of Western Ontario, London, ON N6G 1H1. Les récipiendaires antérieur(e)s sont:

1990	Bradley Frankland	Dalhousie University	1994	Michael Lantz	Queen's University
1991	Steven D. Turnbull	University of New Brunswick	1995	Kristina Greenwood	University of Western Ontario
	Fangxin Chen	University of Alberta	1996	Mark Pell	McGill University
	Leonard E. Cornelisse	University of Western Ontario	1997	Monica Rohlfs	University of Alberta
1993	Aloknath De	McGill University	1998	Marlene Bagatto	University of Western Ontario

PRIX ÉTUDIANT FESSENDEN EN ACOUSTIQUE SOUS-MARINE

Ce prix sera décerné à un(e) étudiant(e) inscrit(e) dans une institution académique canadienne et menant un projet de recherche en acoustique sous-marine ou dans une discipline scientifique reliée à l'acoustique sous-marine. Il consiste en un montant en argent de $500 qui sera décerné annuellement. Coordonnateur: David Chapman, DREA, PO Box 1012, Dartmouth, NS B2Y 3Z7.

1992	Daniela DiIorio	University of Victoria	1994	Craig L. McNeil	University of Victoria
1993	Douglas J. Wilson	Memorial University	1996	Dean Addison	University of Victoria

PRIX ÉTUDIANT ECKEL EN CONTRÔLE DU BRUIT

Ce prix sera décerné à un(e) étudiant(e) inscrit(e) dans une institution académique canadienne dans n'importe quelle discipline de l'acoustique et menant un projet de recherche relié à l'avancement de la pratique en contrôle du bruit. Il consiste en un montant en argent de $500 qui sera décerné annuellement. Ce prix a été inauguré en 1991. Coordonnateur: Murray Hodgson, Occupational Hygiene Programme, University of British Columbia, 2206 East Mall, Vancouver, BC V6T 1Z3.

1994	Todd Busch	University of British Columbia	1996	Nelson Heerema	University of British Columbia
1995	Raymond Panneton	Université de Sherbrooke	1997	Andrew Wareing	University of British Columbia

PRIX DES DIRECTEURS

Trois prix sont décernés, à tous les ans, aux auteurs des trois meilleurs articles publiés dans l'Acoustique Canadienne. Tout manuscrit rapportant des résultats originaux ou faisant le point sur l'état des connaissances dans un domaine particulier sont éligibles; les notes techniques ne le sont pas. Le premier prix, de $500, est décerné à un(e) étudiant(e) gradué(e). Le deuxième et le troisième prix, de $250 chacun, sont décernés à des auteurs professionnels âgés de moins de 30 ans et de 30 ans et plus, respectivement. Coordonnateur: Delila Giusti, Jade Acoustics, Concord, ON L4K 4H1.

PRIX DE PRÉSENTATION ÉTUDIANT

Trois prix, de $500 chacun, sont décernés annuellement aux étudiant(e)s sous-gradué(e)s ou gradué(e)s présentant les meilleures communications lors de la Semaine de l'Acoustique Canadienne. La demande doit se faire lors de la soumission du résumé. Coordonnateur: Ramani Ramakrishnan, Aiolos Engineering, Toronto ON M9W 1K4, Tel: (416) 674-3017.

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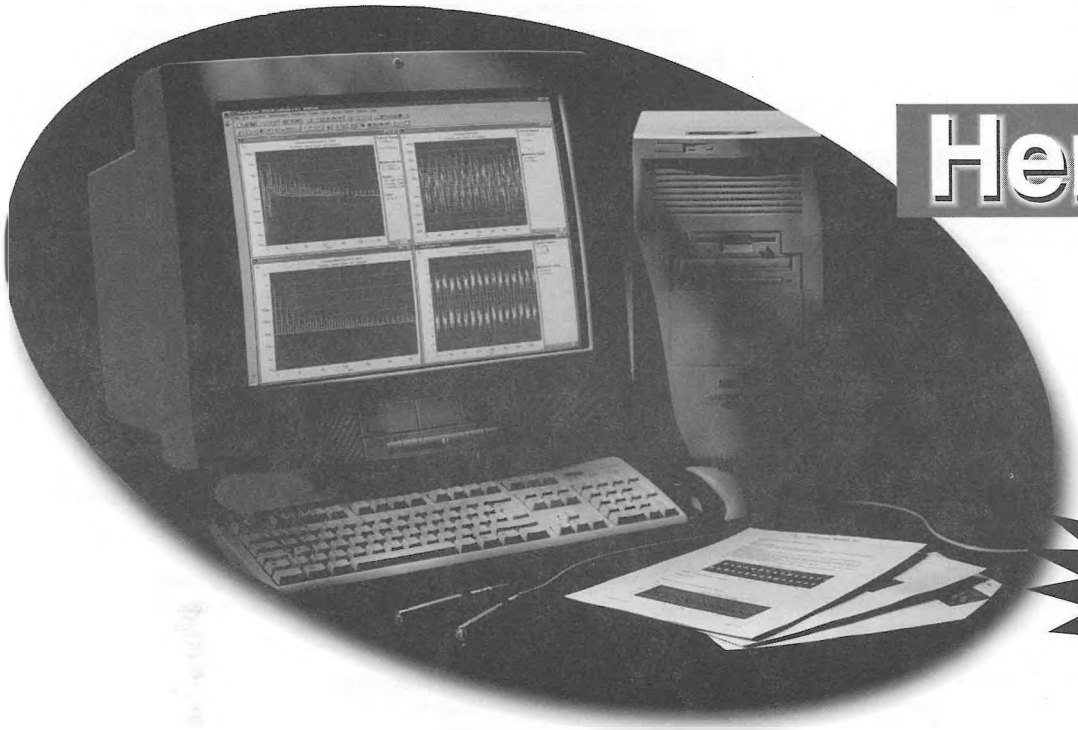

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Brüel & Kjær

Second Notice

Acoustics Week in Canada 1999

Laurel Point Inn, Victoria, BC
October 18-19, 1999

Acoustics Week in Canada 1999 will consist of two days of technical and special sessions comprising topics throughout the field of acoustics and vibration. Papers will be presented on various areas of acoustics, including:

Legislation / Environmental Noise	Architectural Acoustics	Musical Acoustics
Speech Perception and Production	Psycho-acoustics	Physiological Acoustics
Underwater Acoustics and Sound Propagation	Vibration Control	Noise Control
Occupational Hearing Loss and Hearing Protection	Canadian Standards	Sound Quality

Please check the Acoustics Week in Canada 1999 website, **http://ceor.seos.uvic.ca/~acoustic/CAA99/**, for the list of titles of papers to be presented.

A reminder to those of you who have submitted abstracts - **summary papers** are due August 7, 1999. This deadline will be strictly enforced to meet the publication schedule of the proceedings issue of *Canadian Acoustics.*

Accommodation and meeting space for delegates of Acoustics Week in Canada 1999 will be at the Laurel Point Inn, located on the harbour in scenic downtown Victoria, BC (see photos of the Laurel Point Inn and the Victoria Harbour at http://www.laurelpoint.com). The special room rate for delegates starts at $65.00 per night. To reserve accommodation, contact the Laurel Point Inn at 1-800-663-7667, stating that you will be attending Acoustics Week in Canada 1999. For more information on Victoria, check out the links on the CAA 99 web page.

Space will be available for **Exhibits** by companies and organizations in the field of acoustics. **Sponsorship** of nutrition breaks and/or lunches is also welcome. If you are interested in either of these opportunities, please contact Doug Whicker, (604) 988-2508, dwhicker@bkla.com.

CAA99 Registration Fees	Regular *(includes lunches, coffee and banquet)*	Student *(includes lunches and coffee only)*
Member		
Early registration (before September 15)	$145.00	$40.00
Registration after September 15	$170.00	$50.00
Non-Member		
Early registration (before September 15)	$195.00	$50.00
Registration after September 15	$220.00	$60.00
Additional banquet tickets $50.00		

Send registration to:

CAA99
c/o Centre for Earth & Ocean Research
University of Victoria
PO Box 3055
Victoria, BC
V8W 3P6
Tel: (250) 721-8848
Fax: (250) 472-4100

Registration can be paid by cheque (payable to: University of Victoria), VISA, Mastercard or American Express. Registration forms can be obtained by fax or mail by contacting the address above, or the Acoustics Week in Canada 1999 website.

For more information contact: Dr. Stan Dosso, Centre for Earth and Ocean Research, University of Victoria
Telephone: (250) 472-4341 Fax: (250) 472-4100
sdosso@uvic.ca

DEUXIEME APPEL

Semaine canadienne d'acoustique 1999

Laurel Point Inn, Victoria, CB
18-19 octobre, 1999

La semaine canadienne d'acoustique 1999 consistera en deux jours de sessions techniques et spéciales comprenant des sujets du domaine de l'acoustique et des vibrations. Des communications traitant des sujets suivants ou de sujets additionnels dans le domaine de l'acoustique sont sollicitées:

Réglements et bruit environnemental	Acoustique architecturale	Acoustique musicale
Perception et production du language	Psycho-acoustique	Physio-acoustique
Acoustique sous-marine et propagation du son	Contrôle de vibration	Contrôle de bruit
Audiologie	Normalisation canadienne	Qualité du son

Veuillez consulter le site internet Semaine Canadienne d'Acoustique 1999 à **http://ceor.seos.uvic.ca/~acoustic/CAA99/** pour la liste des publications présentées.

Nous rappelons à ceux qui ont soumis des résumés que l'échéance pour la réception des **sommaires** est le 7 aoû 1999. Cette écheance sera strictement respectée afin de pouvoir publier le programme dans les actes *d'Acoustique Canadienne.*

L'hébergement des participants à la semaine canadienne d'acoustique et les communications se tiendront à l'auberge Laurel Point Inn, située au centre ville (sur le port) de Victoria,CB (des photos de Laurel Point Inn et du port de Victoria sont disponibles à http://www.laurelpoint.com). Les participants bénéficient de tarifs spéciaux pour les chambres commençant à $65 par nuit. Pour réserver votre chambre, contacter Laurel Point Inn au 1-800-663-7667 en mentionnant votre participation à la Semaine Canadienne d'Acoustique 1999. Pour plus d'informations sur Victoria, consulter les liens sur le site internet de CAA 99.

Des espaces seront disponsibles pour des **Expositions** de sociétés et d'organisations dans le domaine de l'acoustique. Des **Sponsors** pour les pauses alimentaires et/ou déjeuners sont aussi les bienvenus. Si vous êtes intéressés par l'une de ses offres, contacter Doug Whicker, (604) 988-2508, dwhicker@bkla.com.

Frais d'inscription à CAA 99	Régulier *(inclut déjeuner, café et banquet)*	Etudiant *(inclut déjeuner et café seulement)*
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Inscriptions avancées (avant le 15 septembre)	$145.00	$40.00
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Les inscriptions peuvent être payées par chèques (payable à "University of Victoria"), VISA, Mastercard ou American Express. Des formulaires d'inscription peuvent être obtenus par fax our courrier en contactant l'adresse donnée ci-dessus ou à partir du site internet de CAA99 (http://ceor.seos.uvic.ca/CAA99/).

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Téléphone: (250) 472-4341 Fax: (250) 472-4100 sdosso@uvic.ca

Acoustics Week in Canada 1999
PREPARATION OF SUMMARY PAPERS FOR PUBLICATION IN CONFERENCE PROCEEDINGS ISSUES

Authors are asked to submit both a camera-ready paper copy and digital file of their summary paper (in RTF format) by August 7th. Digital files may be submitted by either mailing a disk (PC) or as an e-mail attachment to ramani@aiolos.com. The mailing address for summary papers is:

Ramani Ramakrishnan
Aiolos Engineering
51 Constellation Court, Suite 200
Toronto, Ontario M9W 1K4

Summary papers should be prepared according to the following specifications:

1) Maximum two pages in two-column format (column width of 3.4" and separation of 1/4").

2) Do not include an abstract.

3) All text in Times-Roman font. Title in 12pt bold with single (12pt) spacing, centred on the page. All other text in 9pt with 0.75 (9pt) line spacing.

4) Authors' names and addresses centred on page with names in bold type. Section headings in bold type.

5) Place figures at the top and/or bottom of the pages, if possible.

6) List references in any consistent format at the end.

Semaine Canadienne d'Acoustique 1999
PREPARATION DES SOMMAIRES POUR LEUR PUBLICATION DANS LES ACTES DE LA CONFERENCE

Les auteurs doivent soumettre un article prêt à copier et une copie digitale de leur sommaire (format RTF) avant le 7 août Les copies digitales peuvent être soumises soit en envoyant par courrier une disquette (PC) soit comme attachement a un courrier electronique adresse a ramani@aiolos.com. Adresser les envois par courrier a:

Ramani Ramakrishnan
Aiolos Engineering
51 Constellation Court, Suite 200
Toronto, Ontario M9W 1K4

Les sommaires doivent être prepares suivant les intructions suivantes:

1) Deux pages maximum avec deux colonnes par page (largeur des colonnes de 3.4" et séparation de 1/4").

2) Ne pas inclure de résumé.

3) Tout le texte en caractère Times-Roman. Titre en 12pt, caractère gras, en simple interligne (12 pt), centré sur la page.

4) Les noms et adresses des auteurs centrés sur la page avec les noms en caractères gras. Les titres de sections en caractères gras.

5) Placer les figures en haut et/ou en bas des pages si possible.

6) Donner la liste des références dans un format logique à la fin.

CAA Student Travel Subsidy and Student Presentation Award
Application Form
DEADLINE FOR RECEIPT 07, August, 1999

Procedure

- Complete and submit this application at the same time as the abstract to the Technical Chair of the Conference. Both must be received on or before deadline listed above.
- By 31 August 1999, the CAA Secretary will notify you of the Travel Subsidy funding that you can expect to receive.
- Subsidy cheques will be mailed directly to you within 30 days of the end of the Conference

Eligibility Requirements

In order to be eligible for the Travel Subsidy you must meet the following requirements:

1. Full-time student at a Canadian University;
2. Student Member in good standing of the Association;
3. Distance traveled to the Conference must exceed 150 km (one way);
4. Submit a summary paper for publication in the Proceedings Issue of Canadian Acoustics with the applicant as the first author;
5. Present an oral paper at the Conference. Due to limited funding, a travel subsidy can only be given to the presenter of the paper even though there may be more than one student authors.

Section A: All applicants must complete this section

Name of Student:_____

Address:_____
(where the cheque is to be sent)

Title of the proposed paper:_____

Is the paper to be judged in the Student Presentation Award(s) [Yes/No]:_____

Name and Location of the University: _____, _____

Faculty and Degree Being Sought: _____, _____

Section B: Complete this section only if you are applying for the CAA Student Travel Subsidy

I hereby apply for a travel subsidy from the CAA

Proposed Method of Transport to conference:_____
Brief description of the route and method of transportation (e.g., bus, train, air, etc.)

Estimated Cost of Transportation:_____
Provide least expensive transportation cost.

Date of Departure to, and Return from the Conference: _____, _____

Other Sources of Travel Funding:_____
List other sources of travel funding and the amount

Signature of Applicant	**Signature of University Supervisor**
_____	_____
I certify that the Information provided above is correct	I certify that the applicant is a full time student
_____	_____
Print Name	Print Name

Subvention de l'ACA pour les Frais de Déplacement des Etudiants et Prix Récompensant les Présentations d'Etudiants - Formulaire d'Inscription
DATE LIMITE DE RÉCPTION, 7 AOUT 1999

Procédure

- Compléter le formulaire et le soumettre en même temps que le sommaire au Président Technique de la Conférence. Tous deux doivent être reçus avant la date limite indiquée ci-dessus.
- Le Secrétariat de l'ACA vous enverra une note avant le 31 Août 1999 indiquant la Subvention que vous êtes susceptible de recevoir.
- Les chèques de Subvention vous seront directement envoyés dans les 30 jours suivant la fin de la Conférence.

Conditions d'Eligibilité

1. Pour avoir droit à la Subvention pour les Frais de Déplacement, vous devez remplir les conditions uivantes:
2. Etre étudiant à temps plein dans une Université Canadienne;
3. Etre Membre de l'ACA;
4. La distance parcourue jusqu'à la Conférence doit être supérieure à 150km (aller simple);
5. Soumettre un sommaire en vue de sa publication dans les actes d'Acoustique Canadienne, l'étudiant doit être le premier auteur du som maire;
6. Présenter une communication orale pendant la conférence. En raison du financement limité, une Subvention pour les Frais de Déplacement ne peut être attribuée qu'à l'étudiant présentant la communication même si plusieurs étudiants sont auteurs du sommaire.

Section A: Tous les candidats doivent remplir cette section

Nom de l'étudiant:_____

Adresse: _____
(où le chèque doit être envoyé)

Titre de la communication proposée: _____

La communication est elle inscrite au concours pour le Prix Récompensant les Communications d'Etudiants [Oui/Non]: _____

Nom et adresse de l'université: _____

Faculté ct niveau d'étude en cours: _____

Section B: Compléter cette section si vous postulez pour une Subvention des Frais de Déplacement
Je postule par le présent document à une Subvention de l'ACA pour des Frais de Déplacement

Moyen de Transport proposé pour se rendre a la conférence: _____
Brève description du trajet et du moyen de transport (i.e bus,train,avion etc.)

Coût estimé du Transport: _____
Fournir le coût de transport le moins élevé
Date de Départ pour la Conférence et de Retour: _____

Autres sources de financement pour le transport:_____
donner la liste des sources de financement et leur montant

Signature du candidat

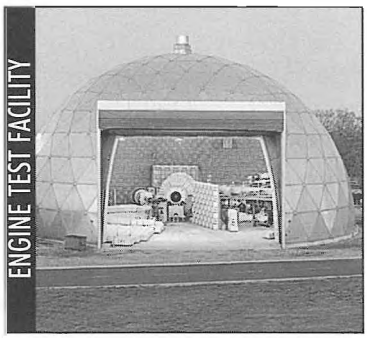
_____
Je certifie que les informations fournies ci dessus sont correctes

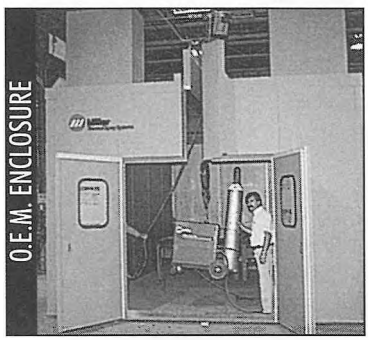
_____
Nom

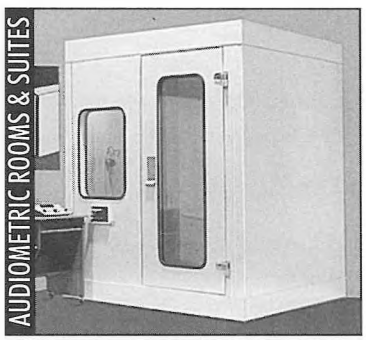
Signature du superviseur

_____
Je certifie que le signataire est un étudiant à temps plein

_____
Nom







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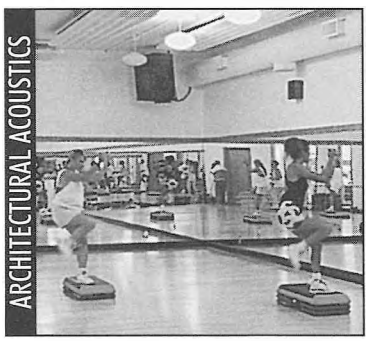

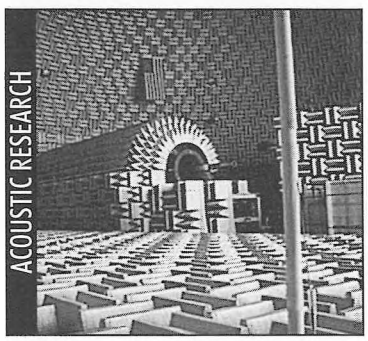

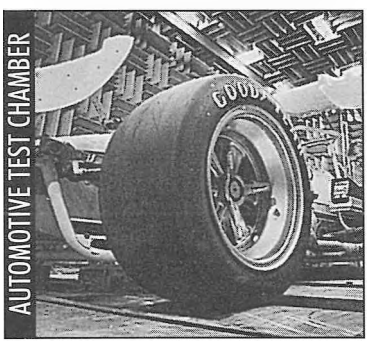

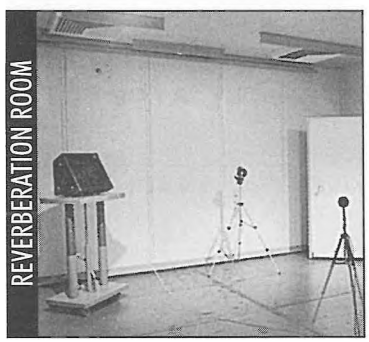

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INSTRUCTIONS TO AUTHORS FOR THE PREPARATION OF MANUSCRIPTS

Submissions: The original manuscript and two copies should be sent to the Editor-in-Chief.

General Presentation: Papers should be submitted in camera-ready format. Paper size 8.5" x 11". If you have access to a word processor, copy as closely as possible the format of the articles in Canadian Acoustics 18(4) 1990. All text in Times-Roman 10 pt font, with single (12 pt) spacing. Main body of text in two columns separated by 0.25". One line space between paragraphs.

Margins: Top - title page: 1.25"; other pages, 0.75"; bottom, 1" minimum; sides, 0.75".

Title: Bold, 14 pt with 14 pt spacing, upper case, centered.

Authors/addresses: Names and full mailing addresses, 10 pt with single (12 pt) spacing, upper and lower case, centered. Names in bold text.

Abstracts: English and French versions. Headings, 12 pt bold, upper case, centered. Indent text 0.5" on both sides.

Headings: Headings to be in 12 pt bold, Times-Roman font. Number at the left margin and indent text 0.5". Main headings, numbered as 1, 2, 3, ... to be in upper case. Sub-headings numbered as 1.1, 1.2, 1.3, ... in upper and lower case. Sub-sub-headings not numbered, in upper and lower case, underlined.

Equations: Minimize. Place in text if short. Numbered.

Figures/Tables: Keep small. Insert in text at top or bottom of page. Name as "Figure 1, 2, ..." Caption in 9 pt with single (12 pt) spacing. Leave 0.5" between text.

Photographs: Submit original glossy, black and white photograph.

References: Cite in text and list at end in any consistent format, 9 pt with single (12 pt) spacing.

Page numbers: In light pencil at the bottom of each page.

Reprints: Can be ordered at time of acceptance of paper.

DIRECTIVES A L'INTENTION DES AUTEURS PREPARATION DES MANUSCRITS

Soumissions: Le manuscrit original ainsi que deux copies doivent être soumis au rédacteur-en-chef.

Présentation générale: Le manuscript doit comprendre le collage. Dimensions des pages, 8.5" x 11". Si vous avez accès à un système de traitement de texte, dans la mesure du possible, suivre le format des articles dans l'Acoustique Canadienne 18(4) 1990. Tout le texte doit être en caractères Times-Roman, 10 pt et à simple (12 pt) interligne. Le texte principal doit être en deux colonnes séparées d'un espace de 0.25". Les paragraphes sont séparés d'un espace d'une ligne.

Marges: Dans le haut - page titre, 1.25"; autres pages, 0.75"; dans le bas, 1" minimum; latérales, 0.75".

Titre du manuscrit: 14 pt à 14 pt interligne, lettres majuscules, caractères gras. Centré.

Auteurs/adresses: Noms et adresses postales. Lettres majuscules et minuscules, 10 pt à simple (12 pt) interligne. Centré. Les noms doivent être en caractères gras.

Sommaire: En versions anglaise et française. Titre en 12 pt, lettres majuscules, caractères gras, centré. Paragraphe 0.5" en alinéa de la marge, des 2 cotés.

Titres des sections: Tous en caractères gras, 12 pt, Times-Roman. Premiers titres: numéroter 1, 2, 3, ..., en lettres majuscules; sous-titres: numéroter 1.1, 1.2, 1.3, ..., en lettres majuscules et minuscules; sous-sous-titres: ne pas numéroter, en lettres majuscules et minuscules et soulignés.

Equations: Les minimiser. Les insérer dans le texte si elles sont courtes. Les numéroter.

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Photographies: Soumettre la photographie originale sur papier glacé, noir et blanc.

Références: Les citer dans le texte et en faire la liste à la fin du document, en format uniforme, 9 pt à simple (12 pt) interligne.

Pagination: Au crayon pâle, au bas de chaque page.

Tirés-à-part: Ils peuvent être commandés au moment de l'acceptation du manuscrit.

The Canadian Acoustical Association

l'Association Canadienne d'Acoustique

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L'abonnement pour la présente année est dû le 31 janvier. Les nouveaux abonnements reçus avant le 1 juillet s'appliquent à l'année courante et incluent les anciens numéros (non-épuisés) de l'Acoustique Canadienne de cette année. Les abonnements reçus après le 1 juillet s'appliquent à l'année suivante.

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The Canadian Acoustical Association
l'Association Canadienne d'Acoustique

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