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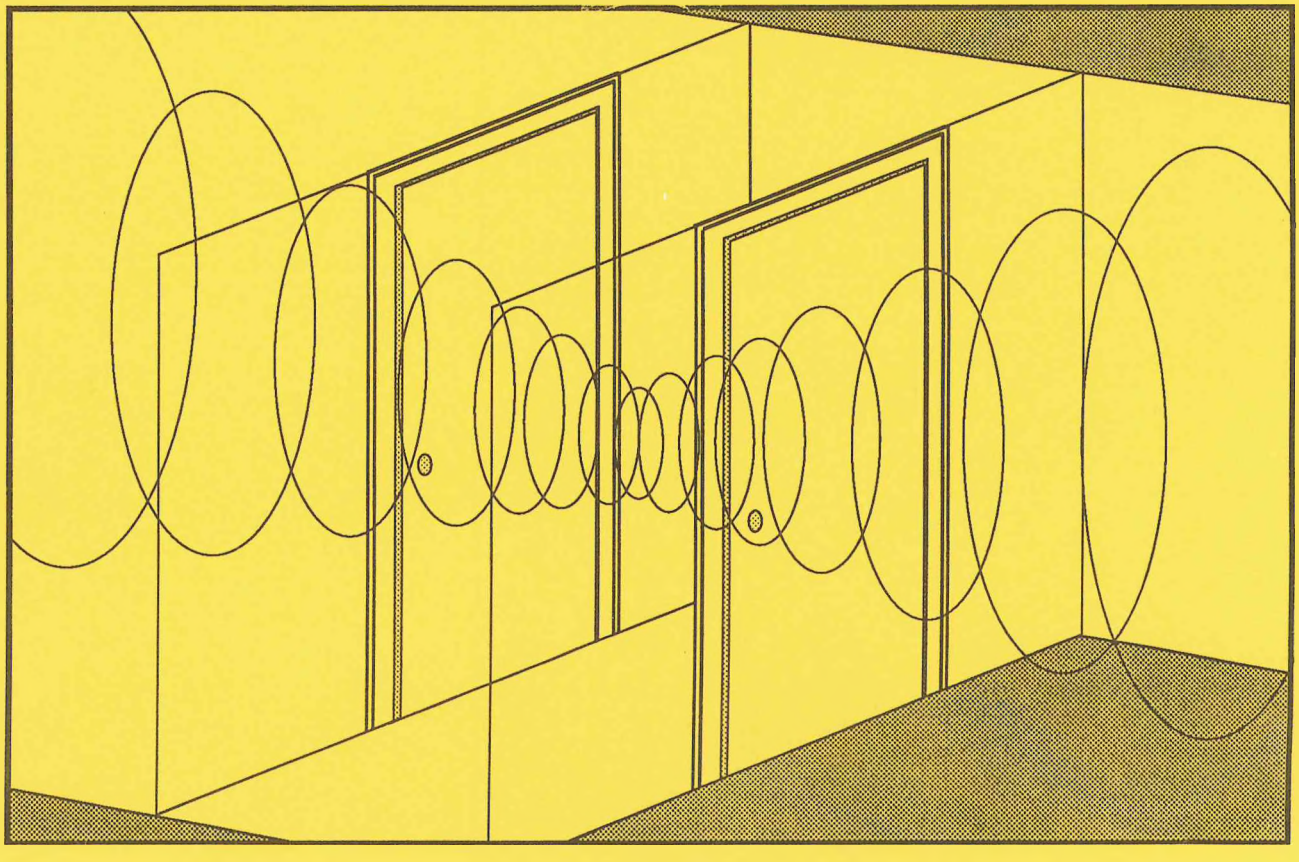

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CANADIAN ACOUSTICS publishes refereed articles and news items on all aspects of sound and vibration. Papers reporting new results as well as review or tutorial papers, and shorter research notes are welcomed in English or in French. Two copies of submission should be sent to either the Editor-in-Chief (English articles), or to the Editor (French articles). Complete information to authors concerning the required camera-ready copy is given in the first issue of each volume.

ACOUSTIQUE CANADIENNE publie des articles arbitrés et des informations sur tous les domaines du son et des vibrations. Les manuscrits seront inédits ou bien des aperçus, ainsi que des notes techniques, rédigés en françcais ou en anglais. Deux copies seront soumis au rédacteur en chef (articles en anglais), ou au rédacteur (articles en français). La forme et la préparation des manuscrits exigées pour reproduction se trouveront dans le premier numéro de chaque volume.

EDITORIAL

After the summer of '86 will acoustics ever be the same in Canada? One would hope not. One would hope that the stimulating flourish of acoustical meetings this past summer will provoke a variety of new interests and new activity within the broad area of acoustics. There seems to be broad agreement that all of the meetings were quite successful with at the most niggling complaints of possible even better conferences. This issue contains 5 accounts of the various conferences starting with Edgar Shaw's review of the 12th ICA. These accounts should be interesting reading for the meetings that you were not able to attend.

Will CANADIAN ACOUSTICS be the same after the summer of "86. We hope not. With 100 papers contributed to the main ICA congress by Canadian authors, and many more to the various other associated meetings, we can only expect a considerable influx of contributions. We expect them, but we don't have them. We need your contribution now! Expand that ICA paper a little and submit it now to CANADIAN ACOUSTICS.

There will be a change of editorial staff after this issue. Changing priorities at the National Research Council are forcing two of us to resign. After a three year effort to improve CANADIAN ACOUSTICS, we feel that progress has been made and that your journal is now poised to go on to even bigger and better things. Details of the staff changes are not yet finalized and we expect a transition period to follow through the time of the next issue.

Send us your manuscripts, research papers, technical notes or news material today!

EDITORIAL

Le 12e Congrès international d'acoustique est maintenant chose du passé. Le succès du Congrès ainsi que celui des congrès associés sont généralement reconnus par tous. Vous trouverez dans ce numéro cinq comptes rendus des diverses conférences en commençant par un aperçu de l'ICA-12 par Edgar Shaw. Il y a eu à peu près 100 contributions d'auteurs canadiens. On retrouve aussi des canadiens parmi les organisateurs de sessions structurées. L'acoustique semble donc être un sujet très actif au Canada. Il est à espérer que ces signes se transforment en actions positives pour l'association et en particulier pour l'ACOUSTIQUE CANADIENNE.

Ce numéro marque la fin du Volume 14 pour 1986. Le prochain volume apportera des changements à l'équipe de rédaction. Une réorientation des priorités du Conseil national de recherche force deux d'entre nous á démissionner. Les détails concernant la nouvelle équipe ne sont pas encore finalisés mais le seront prochainement. Durant son mandat des trois dernières années, la présente équipe s'est efforcée de maintenir et d'améliorer l'évolution de l'ACOUSTIQUE CANADIENNE amorcée il y a quelques années. Le nombre élevé de contributions canadiennes à l'ICA témoigne du potentiel pour l'ACOUSTIQUE CANADIENNE et encourage son existence. Cependant, à l'heure actuelle nous ne trouvons pas le pourcentage de soumission attendu; en effet les soumissions brillent par leur absence. Les trois prochaines années pourraient être cruciales pour l'avenir de l'ACOUSTIQUE CANADIENNE. L'activité en acoustique au Canada est-elle vraiment suffisante pour supporter une revue arbitrée? Si oui, alors pourquoi avons-nous de la difficulté à obtenir un nombre adéquat de soumissions? Est-ce que l'ACOUSTIQUE CANADIENNE servirait mieux les membres de l'association dans un autre rôle? Es-ce que l'ACOUSTIQUE CANADIENNE devrait élarger ses frontières et activement encourager la soumission de manuscrits de l'étranger? Dans cette éventualité, l'ACOUSTIQUE CANADIENNE devra définer sa position par rapport aux autres revues comme le JASA, Applied Acoustics et Journal of Noise Control Engineering, pour n'en nommer que quelques unes. La nouvelle Société Franąise d'Acoustique est en pleine évolution et l'actuelle Revue d'acoustique devrait suivre le pas. Toutes ces questions et options devrait être considérées par la nouvelle équipe de rédaction de l'ACOUSTIQUE CANADIENNE. Nous sommes convaincus que l'implication des membres de l'association sous forme de lettres au commentaires serait appreciée.

Ce fut un plaisir de vous servir à l'ACOUSTIQUE CANADIENNE. Au revoir.

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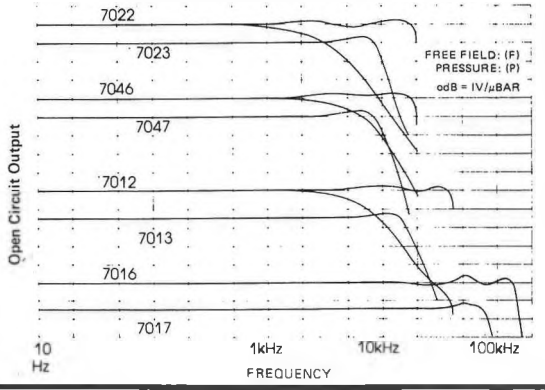

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SOUND TRANSMISSION THROUGH DOUBLE DOORS

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National Research Council of Canada,
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ABSTRACT

This report presents the results of a series of tests to evaluate sound transmission through a double door system (two doors with an airspace between). The main purpose of these tests was to establish that such a system using conventional door panels can provide substantial noise reduction. The secondary goal of the series was to evaluate typical office doors including the effect of minor modifications that could increse the noise reduction provided by the door system.

SOMMAIRE

Ce rapport présente les résultats d'une série d'essais visant à évaluer la transmission du son à travers un système de porte double (deux portes séparées par une lame d'air). Le principal objectif visé était de montrer qu'un pareil système, constitué de panneaux de porte classiques, peut assurer une réduction importante du bruit. L'objectif secondaire consistait à évaluer la performance des portes de bureau types, notamment l'effet de modifications mineures susceptibles de réduire davantage la transmission du bruit à travers les systèmes de portes.

INTRODUCTION

The main purpose of these tests was to establish that a double door system (comprising two conventional doors with an airspace between) can provide sufficient noise reduction for confidential speech privacy - in specific, that they can achieve a sound transmission class (STC) of 45 or higher. An STC of about 45 is required to provide confidential speech privacy in a typical office environment. The secondary goal of the series was to evaluate typical doors including the performance of weatherstripping and other features that could affect the noise reduction provided by the door system in the long or short term.

Because of the large potential benefits (savings for major landlords, or improved office performance for occupants) if an inexpensive alternative to commercial acoustical doors can be developed, an extensive series of tests was performed. In total, thirty three sound transmission tests were run, including five cases that were repeated to test variability of the acoustical performance of weatherstripping. Two types of weatherstripping were tested, and to assess their effectiveness, measurements were also made with the doors sealed. The tests used two types of doors (a solid-core wood door and a hollow metal door) to determine whether their acoustical differences would be significant in this application. Two door frame systems were tested, to show the dependence of the sound transmission on the space between the two doors, and to establish the minimum inter-door spacing that could reliably achieve the target of STC 45. The effect of adding acoustically absorbing material to the space between the two doors was also examined.

DESCRIPTION OF THE MEASUREMENTS

The sound transmission characteristics of the doors were determined in accordance with ASTM Standard E90-85, "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Elements". The Sound Transmission Class (STC) was calculated from the resulting sound transmission loss data, in accordance with ASTM Standard Classification E413-73.

The transmission loss expresses in decibels what fraction of the sound energy striking a building element is transmitted through it. The higher the transmission loss, the better the noise reduction by the element. The ASTM E90 test method requires measurement of transmission loss in the 16 standard 1/3-octave frequency bands whose centre frequencies range from 125 Hz to 4000 Hz; normal practice in this laboratory includes measurements in additional frequency bands. Although the data for all of these frequency bands are useful for analysis of the factors controlling sound transmission, a single-figure rating is required for convenient comparison of two or more elements.

In keeping with common practice, the rating used here is the Sound Transmission Class (STC). This rating has been shown to correlate well with subjective impressions of the sound insulation provided against sounds such as speech.

The door frame was installed in a partition 2.44 m high x 3.05 m wide in the test frame between two reverberation rooms. This partition was supported by two rows of lightweight 90 mm steel studs; a 25 mm space separated the two rows of studs. Glass fibre batts of nominal 90 mm thickness were placed between the studs in each row. Two layers of 16 mm gypsum wallboard were applied to each face of this partition; the nominal surface density was 23 kg/m^2. The wall details and frame installation are shown in Figs. 1 and 2.

Tests with the door opening blocked showed that the partition had higher transmission loss than the doors at all frequencies (the wall STC was 61). In the following analysis of the test results, sound transmission through the partition may be ignored in most cases, and the double door system (whose area was 2.23 m^2) is treated as the only sound transmission path. In the case of the best door systems, flanking transmission through the surrounding partition slightly reduced the apparent transmission loss at low frequencies. The true transmission losses of the door systems were calculated (using the measured transmission loss of the gypsum board partition) and the corrected data are presented below. Even for the best doors, this systematic distortion of the results did not reduce the STC by more than 2 dB, and for doors whose STC was under 45, the effect of flanking was less than the measurement uncertainty. Overall, the effect of flanking was less serious than the variability associated with how firmly the door was latched, and how the weatherstripping mated with the door surfaces.

DESCRIPTION OF DOOR SYSTEMS

The wood door was a standard commercial solid-core door with hardboard faces. The door dimensions were 2134 mm high x 914 mm wide x 45 mm thick. Weight of the door was 46.7 kg with hardware. The steel door was a commercial hollow metal door with 18 gauge wipecoat galvanised steel faces and 20 gauge internal steel stiffeners. The door dimensions were 2115 mm high x 905 mm wide x 45 mm thick. Weight of the door was 50.1 kg with hardware.

For the first series of tests, the two doors were mounted on opposite sides of a single door frame of 16-gauge pressed steel with an opening 2135 mm high x 915 mm wide. To reduce sound transmission due to vibration of the door frame itself, two layers of 16 mm gypsum wallboard were fastened inside this frame as shown in Fig. 1, and all visible cracks and holes were plugged with caulking. The space between the surfaces of the two doors was 65 mm. To obtain a larger spacing between the doors, for the second series of tests the doors were mounted in adjoining 16-gauge pressed-steel door frames with door separation of 228 mm, as shown in Figure 2.

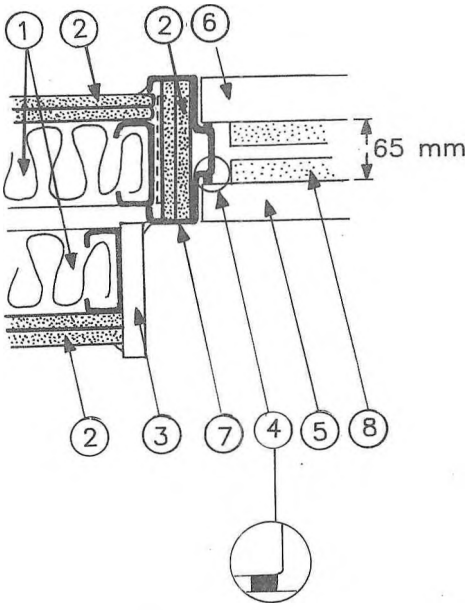

Fig. 1: Cross section sketch showing installation of the single doorframe in the partition. Door separation is 65 mm.

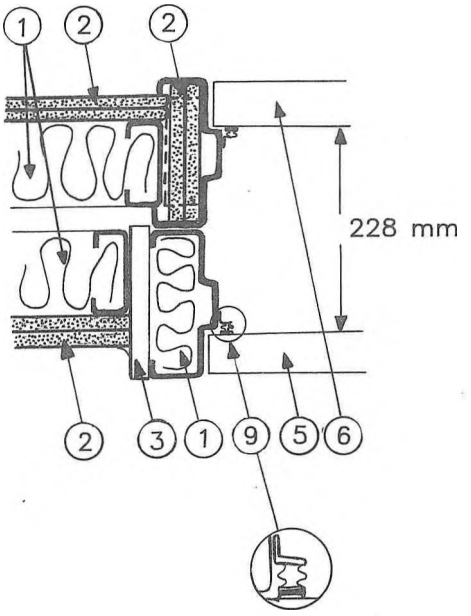

Fig. 2: Cross section sketch showing installation of the double doorframe in the partition. Door separation is 228 mm.

Components are: (1) glass fibre batts between studs and inside doorframe, (2) double layer of 16 mm thick gypsumboard, (3) 16 mm thick plywood, (4) closed-cell foam weatherstrip compressed between door and frame, (5) hollow metal door, (6) solid core wood door, (7) 16 gauge pressed steel doorframe, (8) 25 mm thick open cell polyurethane acoustical foam, (9) magnetic weatherstrip.

Conventional hinges, door handles, latches, and strike plates were installed to permit normal opening and closing of both doors. At the bottom of the door, a plywood threshold gave essentially the same profile as the door frame had at the sides of the door.

For some of the tests with each door frame system, weatherstrip was installed to reduce sound transmission around the four edges of each door. With the single frame (65 mm between the doors) two types of weatherstrip were tested: closed cell foam and a magnetic type similar to refrigerator door gaskets. Only the magnetic weatherstrip was tested with the larger (228 mm) space between the doors. Typical location of the foam or magnetic weatherstrip are shown in the expanded details in Figures 1 and 2. Self-adhesive metal strips (to mate with the magnetic weatherstrip) were applied to the face of the wood door. With each spacing between the doors, acoustically absorbing material was mounted on the face of one or both of

the doors for some of the tests. The location of the absorbing material is illustrated in Figure 1. The material used was 25 mm thick open cell polyurethane acoustical foam; in some cases with the larger space between the doors, a double layer was used.

MAJOR TEST RESULTS

It was clearly established that a simple double door system, using two conventional doors with typical gaps at the perimeter and no special acoustical treatment, will not give an STC as high as 45. With quite simple modifications, however, an STC appreciably above STC 45 is attainable. A summary of the test results is presented in the following table. This is followed by a brief discussion of the acoustical effect of various modifications to the door system.

Table 1: Typical Sound Transmission Class (STC) values for door systems tested.

	No Seal	Weatherstrip	Fully Sealed
Wood door	22	26 - 30	31
Steel door	17	28 - 32	35
Both (no absorption)			
65 mm separation	29	39 - 41	47
228 mm separation	34	49 - 50	52
Both (with absorption)			
65 mm separation	41	43 - 45	49
228 mm separation	43	51 - 53	54

To examine the significance of leakage around the doors and compare the acoustical potential of the two types of doors, each door was tested by itself with several treatments to reduce leakage between the door and the frame. The results for the wood door are shown in Figure 3; those for the steel door are in Figure 4. Adding weatherstrip at all four edges of the door gives substantial acoustical improvement. The magnetic weatherstrip provided much better high frequency transmission loss than the foam seals, but gave only slightly higher STC values.

To compare the wood door's potential noise reduction with that of the metal door, both were tested with the cracks between door and frame sealed by weatherstrip at one face, and at the other face with an impervious tape (the heavy solid curves at the top in Figures 3 and 4). Previous studies of sound transmission have shown that for small cracks this provides similar performance to caulking the openings. The metal door had the higher STC but with typical weatherstripping, sound leaks around the door panel would largely eliminate this difference. Without any seals at the perimeter (bottom curves in Figures 3 and 4), the wood door provided more noise reduction than the metal door because the cracks between the wood door and frame were about 1/3 the width of those around the metal door. The test results for "double doors" are for one wood and one steel door, but use of two wood or two metal doors would not greatly affect the performance.

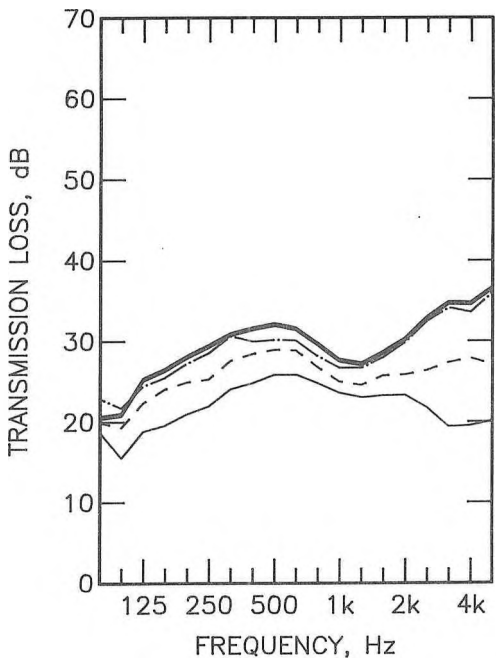

Fig. 3: Transmission Loss of wood door:
(———) no seals, STC 22;
(– – –) foam weatherstrip, STC 26;
(—·—) magnetic weatherstrip, STC 30;
(▬▬▬) fully sealed, STC 31.

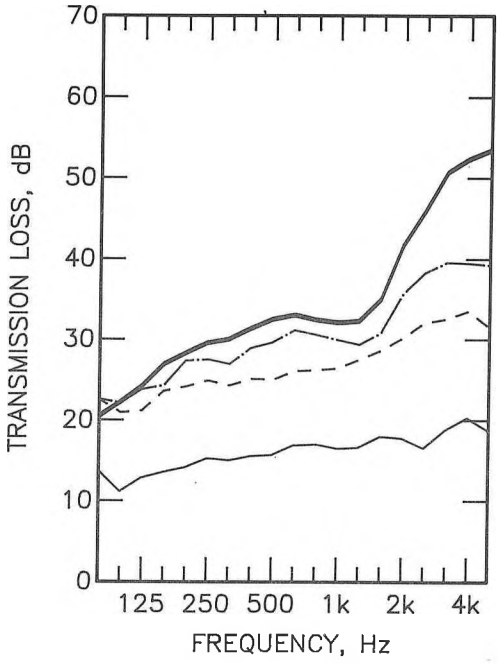

Fig. 4: Transmission Loss of metal door:
(———) no seals, STC 17;
(– – –) foam weatherstrip, STC 28;
(—·—) magnetic weatherstrip, STC 32;
(▬▬▬) fully sealed, STC 35.

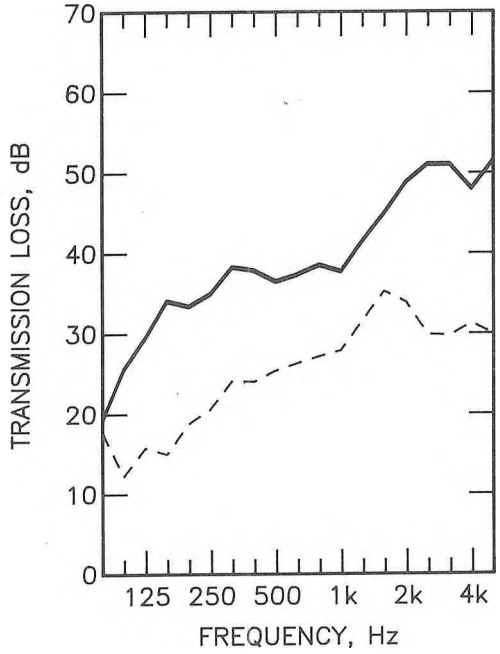

Fig. 5: Sound Transmission Loss for double door with 65 mm airspace:
(– – –) no seals, STC 29;
(———) magnetic weatherstrip, STC 41.

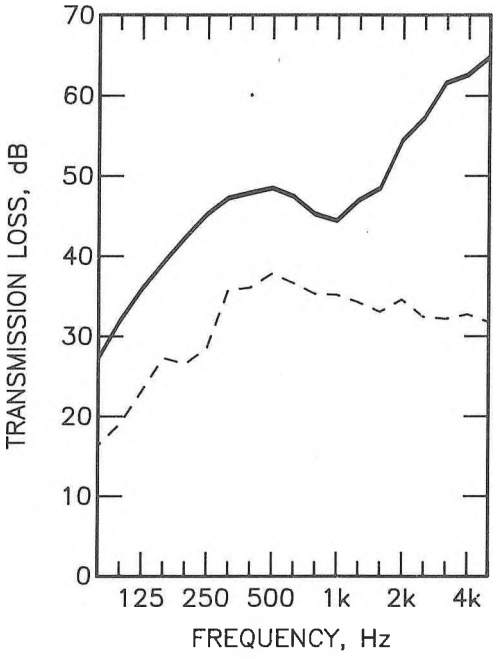

Fig. 6: Sound Transmission Loss for double door with 228 mm airspace:
(– – –) no seals, STC 34;
(———) magnetic weatherstrip, STC 49.

Test results with both doors closed are given in Figure 5 (for the 65 mm separation) and Figure 6 (for the 228 mm separation). The dashed curves (for the case with no treatment at the perimeter of the doors) show that simple double door systems of this type do not provide high STC. Even with the larger spacing, the STC was only 34. Without seals, most of the sound energy goes around the doors rather than through them. Reducing the sound energy going around the edges of the doors, by adding weatherstrip at the perimeter, gave much higher transmission loss as shown by the solid curves in Figures 5 and 6. With the larger spacing, the STC of the weatherstripped doors was well above the design target of 45.

Even higher transmission loss was obtained by adding acoustically absorbing material to the cavity between the two doors. The change in transmission loss from adding 25 mm of acoustical foam on the face of each door is shown in Figure 7 for both interdoor spacings. In both cases, adding absorptive material increased the transmission loss noticeably, especially near the midfrequency dip (around 1kHz for the 228 mm spacing, and slightly lower for the smaller spacing). The transmission loss was not affected strongly by the amount of absorption added, after the initial 25 mm thickness. Overall, adding absorption typically increased the STC by 2 or 3. This effect is appreciably less than that observed when absorption is added to cavity walls. With the doors sealed, the increase due to added absorption was even smaller and was confined to a small frequency region, as shown in Figure 8. Subsequent measurements of acoustic intensity showed that the change in radiated sound energy was localised near the crack at the door perimeter. It seems reasonable to argue that the absorption in the cavity is effective primarily in reducing the effect of the leaks around the door.

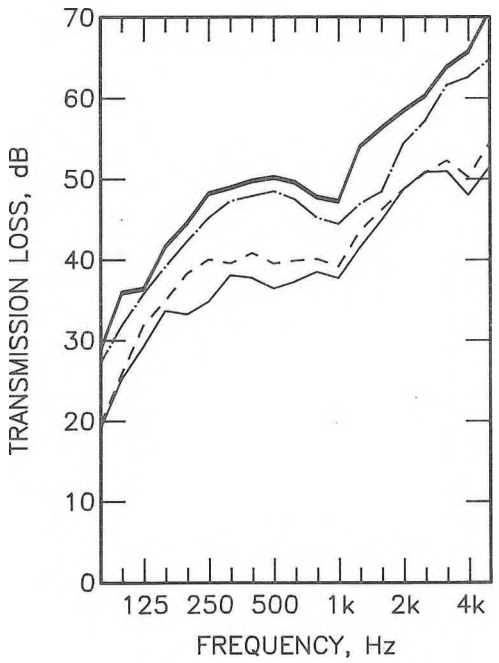

Fig. 7: Sound Transmission Loss for double door with magnetic weatherstrip
65 mm interdoor space:
(———) no absorption, STC 41;
(– – –) with absorption, STC 44;
228 mm interdoor space:
(—·—) no absorption, STC 49;
(▬▬▬) with absorption, STC 52

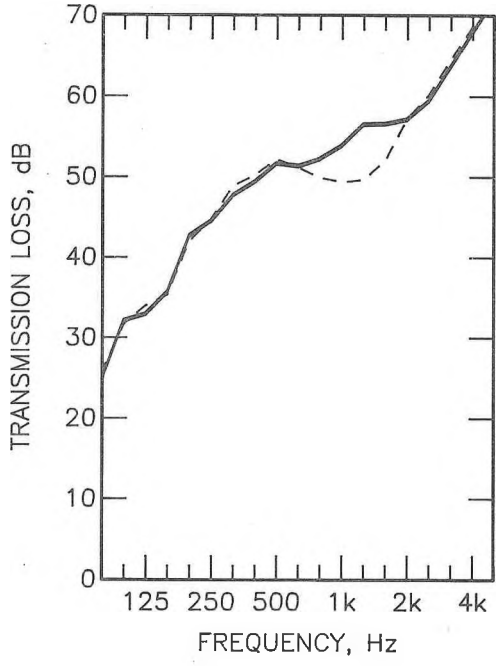

Fig. 8: Sound Transmission Loss for double door with 228 mm airspace and both doors sealed :
(– – –) no absorption, STC 52;
(———) with 25 mm absorption on each door face, STC 54.

The negligible effect of absorption at most frequencies suggests that airborne sound transmission through the inter-door cavity is not dominant when the doors are sealed. The most likely alternative is vibration transmission through the steel doorframe. In these tests, only minor efforts were made to control this transmission path, but eliminating structural coupling would presumably be worthwhile if STC values appreciably above 50 are desired.

The data for the weatherstripped double door systems show some benefit from the addition of absorption, but do not present a compelling case for its use. Without weatherstripping, however, the effect of added absorption is much more obvious. Figure 9 illustrates the increase in transmission loss from adding absorption with a 65 mm inter-door space. The corresponding data for the larger spacing are given in Figure 10. From a practical point of view, not only does adding acoustical absorption to the face of one (or preferrably both) of the doors increase the noise reduction, but also it limits the deterioration in acoustical privacy that would occur if the weatherstripping were damaged or badly installed.

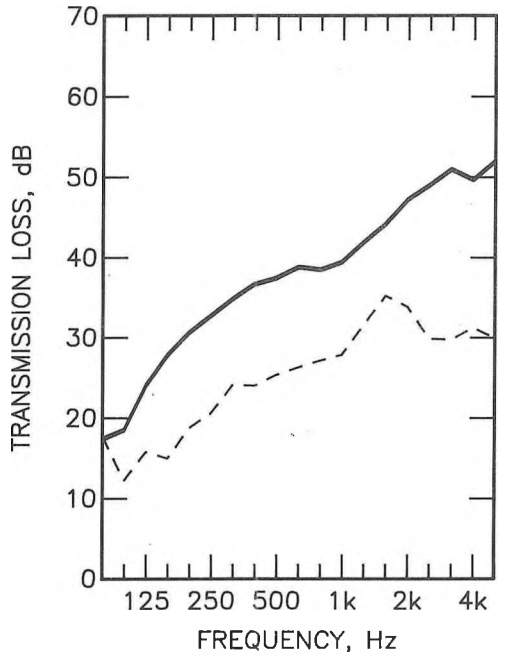

Fig. 9: Sound Transmission Loss for double door with 65 mm airspace and no weatherstripping:
(– – –) no absorption, STC 29;
(———) with 25 mm absorption on each door face, STC 41.

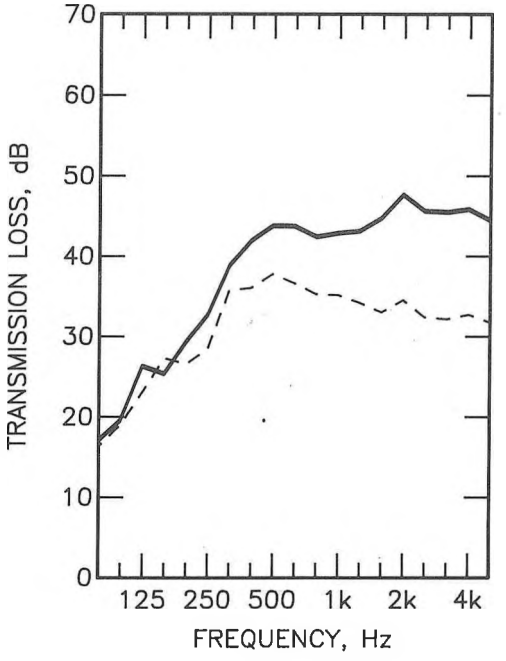

Fig. 10: Sound Transmission Loss for double door with 228 mm airspace and no weatherstripping:
(– – –) no absorption, STC 34;
(———) with 25 mm absorption on each door face, STC 43.

CONCLUSIONS

1. Double door systems using conventional door panels without weatherstripping or other acoustical modifications will not provide an STC much over 30, and thus do not give effective speech privacy.

2. Use of weatherstripping at all four edges of the door gives substantial acoustical improvement. These tests suggest that magnetic weatherstrip is slightly superior to compressed foam gaskets, with the added benefits of permitting much easier opening and closing of the door, and a good record for longevity in residential applications. However, the acoustical advantage of the magnetic weatherstrip is slight, and other types of weatherstripping could provide adequate noise reduction performance for typical applications.

3. Adding acoustical absorption to the face of one (or preferrably both) of the doors increases the noise reduction still further, and drastically lessens the deterioration in acoustical privacy that would occur if the weatherstripping were damaged or badly installed.

4. With weatherstripping on both doors, and acoustical absorption between the doors, a space of approximately 75 to 100 mm (3 to 4 inches) is required between the doors to reliably achieve the target of STC 45 used here as the indicator of acceptable speech privacy.

5. Design of a retrofit system to be added to existing conventional single doors seems to be a feasible (and apparently less expensive) alternative to replacement with commercial acoustical doors. Insensitivity to perfection of the weatherstrip should be much improved relative to typical acoustical doors.

ACKNOWLEDGEMENTS:

The financial support of this study by the Security Engineering branch of the Royal Canadian Mounted Police, and their permission to publish the results, are gratefully acknowledged. This paper is a contribution of the Institute for Research in Construction, National Research Council Canada.

OUTPUT LEVELS FROM

MEDICAL DIAGNOSTIC ULTRASOUND DEVICES

SOLD IN CANADA

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ABSTRACT

Health and Welfare Canada, the World Health Organization and the National Council on Radiation Protection and Measurements and other health organizations have recommended that information on acoustic output levels from diagnostic ultrasound devices be made available to the user to minimize unnecessary exposure to ultrasound. To help achieve this, a survey of output levels from all diagnostic ultrasound devices sold in Canada was conducted in the spring of 1985. Statistical results of this survey are presented here. The results showed a wide spread in output levels for devices with the same claimed purpose. Comparison of the output level data to biological effects data indicated that, for many devices, a small but significant risk, due to unnecessary ultrasound exposure, cannot be ruled out.

RÉSUMÉ

Santé et Bien-être social Canada, l'Organisation modiale de la Santé, le National Council on Radiation Protection and Measurements ainsi que d'autres organisations sanitaires ont recommandé que des renseignements sur les niveaux d'intensité sonore provenant des instruments de diagnostic par ultrasons soient mis à la disposition de l'usager afin de minimiser l'exposition inutile aux ultrasons. À cette fin, une étude de tous les instruments de diagnostic par ultrasons vendus au Canada a été effectuée au cours du printemps de 1985. Le rapport présente les résultats statistiques de cette étude, lesquels font état d'un important écart entre les niveaux sonores d'instruments ayant le même but. Selon une comparaison établie entre les données sur le débit sonore et celles sur les effets biologiques, on ne peut écarter la possibilité d'un risque minime mais néanmoins significatif d'une exposition aux ultrasons.

I. INTRODUCTION

Over the past decade there has been a considerable national (and international) effort dedicated to the safety of diagnostic ultrasound, particularly for obstetrical applications. There are several reasons for this. First, it has been estimated that 80% of all newborn Canadians are now exposed to ultrasound at least once prior to birth (1). In addition, the developing human fetus is generally considered more sensitive to damage than the adult human. Furthermore, biological effects of ultrasound both in vivo and in vitro have been observed, though usually at output levels higher than those produced by diagnostic equipment (2).

A number of guidelines for the safe use of diagnostic ultrasound have been established over the past decade (2-6). Common to all of them is the recommendation that information on output levels from diagnostic ultrasound devices be made conveniently available to the user. In this way unnecessary acoustical exposure can be minimized through the informed purchase and use of these devices. Furthermore, output level information is needed for updating assessments of safety and for traceability of patients in the event that a health hazard be discovered for high output levels. However, at present only seven manufacturers of obstetrical devices sold in Canada receive AIUM commendations (7) for making this data public.

In order to get a more complete set of output levels, a survey was conducted in 1985 by the Bureau of Radiation and Medical Devices to obtain information on output levels from all known manufacturers of diagnostic ultrasound devices sold in Canada. The results of this survey are presented here.

A detailed statistical analysis was performed on 120 devices (excluding fetal heart monitors and detectors) with the claimed purpose of use in obstetrics.

The results of this analysis were consistent with other published surveys (2,4,6,8,9). There continues to be a wide spread of output levels for devices with the same claimed purpose, which suggests that unnecessary ultrasound exposure could occur during clinical examinations. Furthermore, comparison of the output levels to biological effects data indicates that for some devices, a small but significant risk, due to unnecessary ultrasound exposure, cannot be ruled out.

II. METHOD

A questionnaire was sent to all manufacturers believed to be selling diagnostic ultrasound equipment in Canada. A total of 48 companies received the questionnaire. All data presented here were received between November 1984 and September 1985. Since the information was not required by law, further contact with the companies was needed to maximize response. The questionnaire was designed to provide information on the type of scan, the transducer assembly, the scan method, the intended use and the absolute maximum output levels from each transducer assembly in each scan mode (as indicated by the AIUM/NEMA Safety Standard (4) and Canadian Guidelines (Safety Code 23) (3)). Similar information is requested for new devices, by law, by the U.S. Food and Drug Administration in their 510(k) reporting guide (10).

III. RESULTS

1.0 General Information

There were 25 replies. Eighteen of the respondents were selling devices in Canada. All but one gave the information requested. It is known that at least three other companies, which did not reply, sold (and still sell) devices in Canada. It was found that there were at least 150 devices on the market for three major applications of ultrasound: obstetrics, abdominal and cardiography.

The most common devices sold were those which provided real time imaging. Very few manual scanning systems are now being sold. Most of the imaging devices also had an M-mode option which provides a picture of motion at a single location. In addition some pulsed Doppler devices were being sold for the purpose of measuring fetal blood flow.

The majority of transducers were found to be mechanical auto-scanning devices with an M-mode option. This was mainly due to a preponderance of such devices sold by one manufacturer. Amongst the other manufacturers there was approximately an even split between linear arrays (electronic scanning) and mechanical scanners.

For obstetrical use, most transducers operate nominally at 3.5 and 5 MHz with a much smaller number at 2.25 and 7.5 MHz. Generally, as the frequency increases, the depth of penetration decreases but resolution increases. This probably accounts for the wide use of 3.5 and 5 MHz as a compromise between these two desired properties.

2.0 Output Levels

For devices with the claimed purpose of use in obstetrics, statistical analysis was done for two reported output levels (i) I(SPTA), the spatial peak, time average intensity and (ii) I(SPPA), the spatial peak pulse average intensity. These quantites are the largest values of time average and pulse average intensity found in the free field ultrasound beam measured in room temperature water. The instantaneous intensity, I(t), is approximated as

$$I(t) = p^2(t)/\rho c \qquad (1)$$

where p(t) is the acoustic pressure (measured with a calibrated hydrophone), ρ is the density of room temperature water and c is the speed of sound in room temperature water. The quantities I(SPTA) and I(SPPA) are then determined by integrating I(t) over the entire pulse. The integrated quantity, called the pulse intensity integral, is then divided by the pulse repetition period (time between pulses) to obtain I(SPTA). The pulse intensity integral is divided by the pulse duration (length of the pulse) to yield I(SPPA). Precise definitions of pulse duration, I(SPTA) and I(SPPA) can be found in the AIUM/NEMA safety standard (4). All the devices analyzed, operated in the pulsed mode with pulse durations on the order of a microsecond and pulse repetition periods on the order of a millisecond.

The output level data was broken down into four groups: (i) I(SPTA) for auto-scanning (real time imaging) transducer assemblies where the ultrasound beam is constantly moving, (ii) I(SPTA) for static transducer assemblies (manual scanning or M-mode) where the beam is stationary, (iii) I(SPPA) which includes auto-scanning, manual scanning and M-mode and (iv) I(SPTA) for pulsed Doppler mode. Detailed histograms are shown for the first three groups.

There were insufficient numbers for a histogram of pulsed Doppler devices with claimed obstetrical use. However, it still appeared that there was a wide spread in the output levels. These devices were found to have a mean I(SPTA) value of 463 mW/cm^2 with a standard deviation of 226 mW/cm^2. The largest value reported was 874 mW/cm^2.

The histogram of Figure 1 indicates a wide spread in I(SPTA) for auto scanning devices but a very low mean of only 19 mW/cm^2. By far the majority of devices are below 20 mW/cm^2. The wide spread of output levels shown in Figure 1A is due to the inclusion of mixed M-mode and real time imaging scanners. With the mixed mode scanners, the ultrasound beam spends more time at one position than with the purely real time imaging mode. This leads to larger I(SPTA) values. Figure 1B indicates that there is a wide spread in output levels even at the low I(SPTA) values found with the purely real time imaging devices.

The histogram for static devices is shown in Figure 2. The mean I(SPTA) value is 74 mW/cm^2. As expected, this is substantially larger than for auto-scanning devices because the ultrasound beam remains at a fixed position. About 20% of the devices have values above 100 mW/cm^2 as shown in Figure 2. Again there is a very wide spread in I(SPTA). The wide spread in I(SPTA) could be due to a wide spread in the ratio of pulse duration to pulse repetition period as well as in I(SPPA) for the various transducer assemblies.

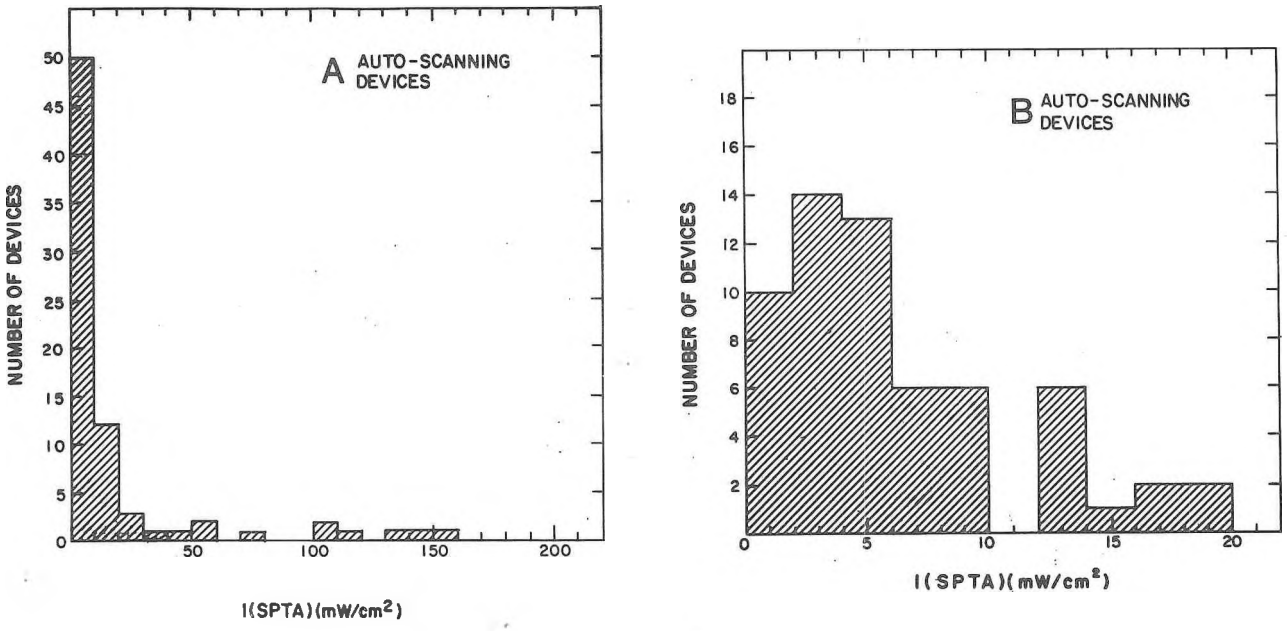

Figure 1.

Histogram of number of auto-scanning devices as a function of spatial peak, temporal average intensity I(SPTA) in mW/cm^2. Figure 1B is an expansion of the first two sample intervals of Figure 1A.

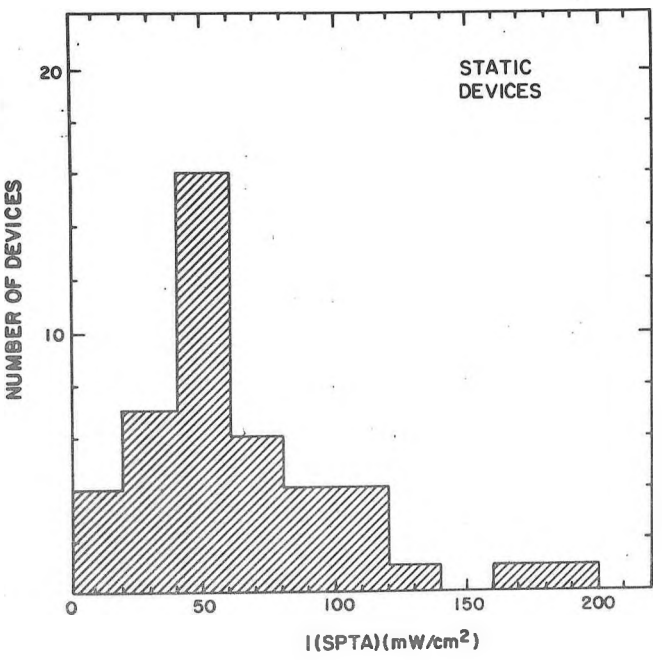

Figure 2.

Histogram of number of static devices as a function of spatial peak, temporal average intensity, I(SPTA) in mW/cm^2.

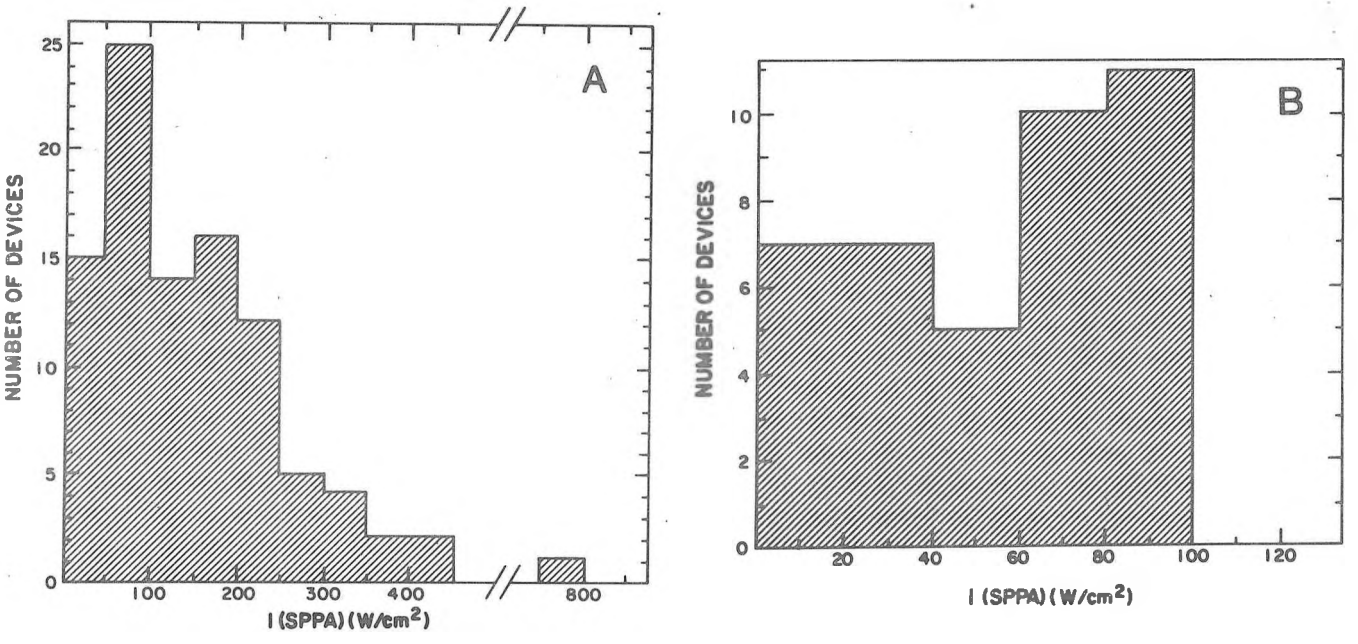

Figure 3.

Histogram of number of devices as a function of spatial peak, pulse average intensity, I(SPPA) in W/cm^2. Figure 3B is an expansion of the first two sample intervals of Figure 3A.

The histogram of Figure 3 indicates that there is a wide spread in I(SPPA) with a mean of 156 W/cm^2. Remarkably, the lowest I(SPPA) value was only 0.1 W/cm^2 and the highest value was 750 W/cm^2. Most values were greater than 100 W/cm^2.

Generally, there is a wide spread in output levels for all the quantities analyzed. Most devices fall in a range covering 1-2 orders of magnitude for each of the histograms of Figures 1-3, with the occasional device extending the full range even further. Even allowing for the possibility of measurement error this must be considered a large variance for equipment with the same claimed purpose. This strongly suggests that, based on present device design, the potential exists for unnecessary exposure to ultrasound during obstetrical examinations.

3.0 Comparison to Biological Effects Data

The maximum available value for I(SPPA) in the histogram of Figure 3 is well above the threshold for which transient cavitation (the violent and biologically damaging collapse of a microbubble) has been predicted in a low viscosity, aqueous medium with stabilized cavitation nuclei (11). In addition, it is well above the observed threshold for transient cavitation observed in insect larvae (12). However these systems may not be suitable models for human tissue and extrapolation from these biological effects to a hazard to human health is not possible. Nonetheless, from the above studies, it is clear that a biologically damaging effect can occur at output levels from many currently available diagnostic ultrasound devices. Therefore, at present we cannot rule out the potential for transient cavitation to cause a small but significant risk from some current imaging devices.

For dwell times (the dwell time is the amount of time the applicator remains in one place) of more than ten minutes, no biological effects in mammals have been observed below I(SPTA) values of 100 mW/cm^2 (2). Nor are any effects expected at these low output levels based on the heating of tissue via the absorption of ultrasound. By extrapolation from the animal model (2), below 100 mW/cm^2, significant heating of the fetus is extremely unlikely. In our survey, both the Doppler and M-mode equipment yield I(SPTA) values above 100 mW/cm^2. Only the mixed M and B-mode auto-scanning devices yielded I(SPTA) values above 100 mW/cm^2. Most auto-scanning devices yielded I(SPTA) values less than 20 mW/cm^2. Hence, purely real time imaging devices almost certainly will not heat the fetus in a damaging way. Typical dwell times for M-mode examinations are less than 5 minutes. Hence, heating should still be very unlikely with this mode. The question of heating with fetal pulsed Doppler devices needs to be addressed. The dwell times and I(SPTA) values of some of these devices fall into the regime where significant in vivo mammalian biological effects have been observed.

A number of epidemiological studies have found no significant adverse health effect due to fetal exposure to diagnostic ultrasound (2). Only one study (13) has stated the maximum output levels for the exposures. Based on the output levels reported by Stark et al (13), it was estimated that, in their study, the maximum I(SPPA) and I(SPTA) values were 30 W/cm^2

30 mW/cm^2, respectively. It is uncertain whether the assumption of safety, based on epidemiological studies done at allegedly low output levels, can be extrapolated to the higher output levels from the devices presently sold in Canada.

IV. CONCLUSIONS

Based on the above results and discussion, it appears that at present there exists the potential for a small risk to human health due to unnecessary exposure to ultrasound during obstetrical ultrasound examinations. It is not known whether this risk is significant or entirely negligible. Furthermore, it is not known how long it will take for a reliable risk assessment. If the risk is truly due to unnecessary radiation, as suggested by the results of this survey, then it is sensible to initiate, prior to a more definitive risk assessment, attempts to minimize this radiation. This can be done with both accurate labelling of output levels and calibrated output level controls to allow the user to get useful diagnostic information with the minimum required acoustical exposure. To help achieve this the Acoustics Unit at the Bureau of Radiation and Medical Devices is developing a measurement apparatus to monitor the accuracy of output levels specified by the manufacturer.

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ACOUSTICAL MEASUREMENTS IN SOME CANADIAN HOMES

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ABSTRACT

The means and standard deviations of several acoustical quantities are presented from measurements in 602 multiple residence homes. Although not a random sample, the homes included approximately equal numbers of apartment blocks and row housing as well as owners and renters from three different urban areas. The acoustical values included background noise levels and complete transmission loss measures of common walls.

SOMMAIRE

L'auteur présente, à partir de mesures effectuées dans 602 habitations à logements multiples, les moyennes et les écarts types de plusieurs quantités acoustiques. Même s'il ne s'agissait pas d'un échantillonnage au hasard, il était constitué d'un nombre approximativement égal d'immeubles et de maisons en rangée, et de propriétaires et de locataires de trois régions urbains. Les valeurs acoustiques qui ont été mesureés sont les suivantes: les niveaux de bruit de fond, les temps de réverbération et la perte par transmission des murs mitoyens.

INTRODUCTION

As part of a large survey to relate subjective and objective measures of party walls between adjacent homes, values of several acoustical quantities were obtained in a large number of Canadian homes. In the complete survey residents in 602 homes, (301 pairs of homes), were interviewed. The homes were evenly distributed among three Canadian urban areas: Toronto, Vancouver, and Montreal, and were approximately evenly divided between apartment blocks and row housing. There was also an approximately even split between owners and renters for each type of housing. Homes included in the survey were selected from available row housing and apartment blocks to give the broadest possible range of STC values while fulfilling the required balance between building types and between owners and renters. Thus the survey data do not represent a random sample of all types of Canadian homes. In spite of this limitation, the data provided a large sample of measurements that can be used to obtain 'typical' values of several acoustical quantities for these types of multiple residence buildings. Such information is often useful for making calculations of expected effects under such 'typical' conditions, and is published here so that others can make use of this data.

The main goals of the survey were to relate subjective and objective measures of party wall sound insulation, to evaluate various sound insulation measures with respect to subjective judgements, to determine other factors influencing subjective judgements, and to produce data to aid in determining acceptable levels of sound insulation between homes. The results of analyses to study these factors will be published in other papers as they become available.

MEASUREMENTS

The acoustical measurements included integrated A-weighted background noise levels in each of the 602 homes, and complete sound transmission loss measurements of the 301 party walls. Background noise measurements were made

using Metrosonics dB-301 integrating dosimeters positioned in the living room of each home for a 24 hour period. These provided A-weighted LEQ, (energy averaged sound level), measurements for the day, night, and complete 24 hour periods, and are referred to as LEQD, LEQN, and LEQ24 respectively. The day period was from 7:00 a.m. to 10:00 p.m. and the night period was from 10:00 p.m. to 7:00 a.m.

Sound transmission loss measurements were made generally in accordance with ASTM E336 procedures[1], and normally between living rooms. Sound levels were recorded in the source and receiving rooms with the noise source on and in the receiving room with the noise source off to obtain background noise levels. Reverberation times, RT, were measured in the receiving room in 1/3 octave bands from 100 to 4000 Hz to include all bands required for the ASTM E336 standard as well as those required by the related ISO standards[2]. The transmission loss, TL, was calculated in each 1/3 octave band according to equation (1).

$$TL = NR + 10.\log(S/A) \qquad (1)$$

where $NR = SPLs - SPLr$

and NR is the noise reduction between rooms in dB
SPLs is the space averaged source room sound pressure level in dB
SPLr is the space averaged receiving rooom sound pressure level in dB
S is the area of the common wall in m^2
A is the total sound absorption in the receiving room in metric sabins

From the 1/3 octave TL values the overall sound transmission class, STC, was calculated according to ASTM E413[3], as well as the difference in A-weighted levels, DA, between the source and receiving room with a pink source spectrum.

RESULTS

The mean and standard deviation of the principal variables are given in Table I. The mean LEQ24 was 46.2 dBA with a standard deviation of just under 8 dBA. As would be expected the daytime LEQ was slightly higher and the nightime LEQ was a few decibels lower. The standard deviations were quite similar for all three measures. The distribution of LEQ24 values in Figure 1 is seen to be quite regular.

TABLE I Means and Standard Deviations of Principal Quantities

Measure	Mean	Standard Deviation
LEQ24	46.2 dBA	7.9 dBA
LEQD	47.5 dBA	8.0 dBA
LEQN	39.8 dBA	8.4 dBA
STC	49.7	4.7
DA	51.3 dB	5.1 dB
Volume	57.0 m^3	64.1 m^3
Area	10.7 m^2	6.0 m^2

Measured STC values ranged from a low of 30 to a high of 60 with a mean of 49.7 and a standard deviation of 4.7. Thus in spite of efforts to obtain a broad range of STC values most walls had STC values between 45 and 55. Figure 2 shows the distribution of measured STC values. The mean measured DA value as given in Table I was 51.3 dB with a standard deviation of 5.1 dB. Table I also includes the mean and standard deviation of the common wall areas and of the receiving room volumes.

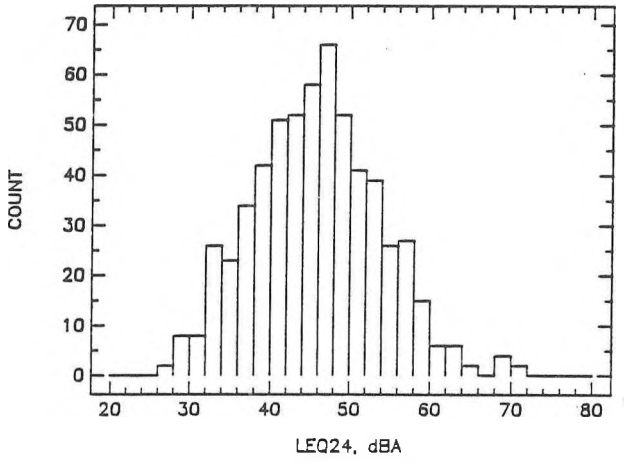

Figure 1. Distribution of Measured LEQ24 Values.

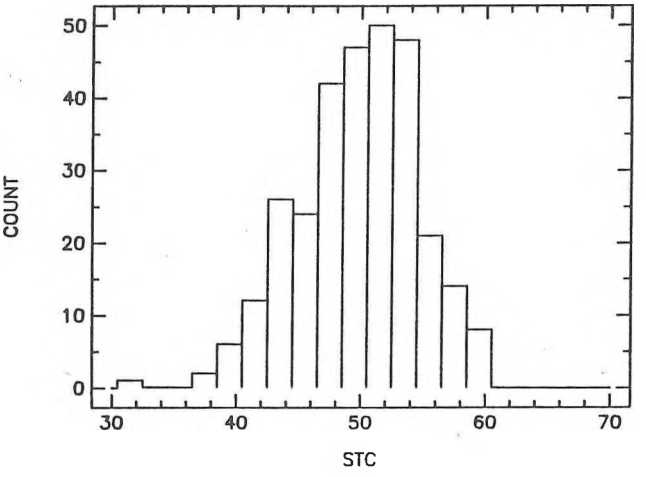

Figure 2. Distribution of Measured STC Values.

Figure 3 plots the mean 1/3 octave NR as well as 1 standard deviation above and below the mean values. Data for TL values are similarly plotted in Figure 4. The 1/3 octave means and standard deviations of the NR and TL values are also given in Table II.

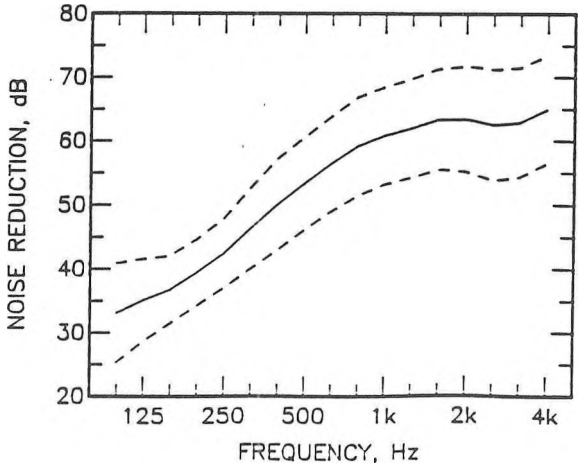

Figure 3. Mean NR Values versus Frequency ——, and ± 1. Standard Deviation - - -.

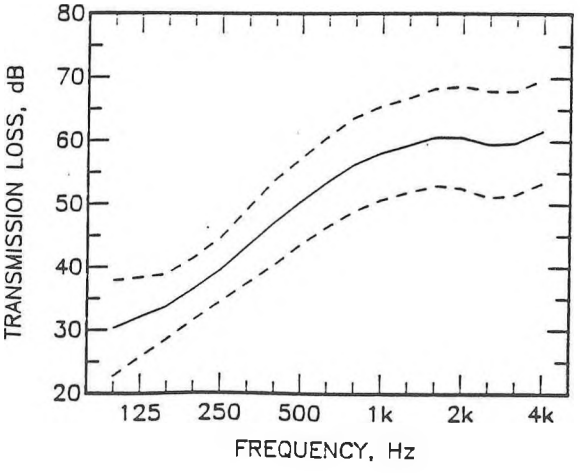

Figure 4. Mean TL Values versus Frequency ——, and ± 1. Standard Deviation - - -.

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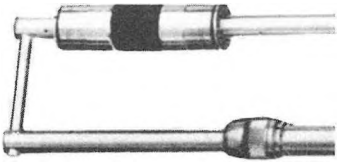

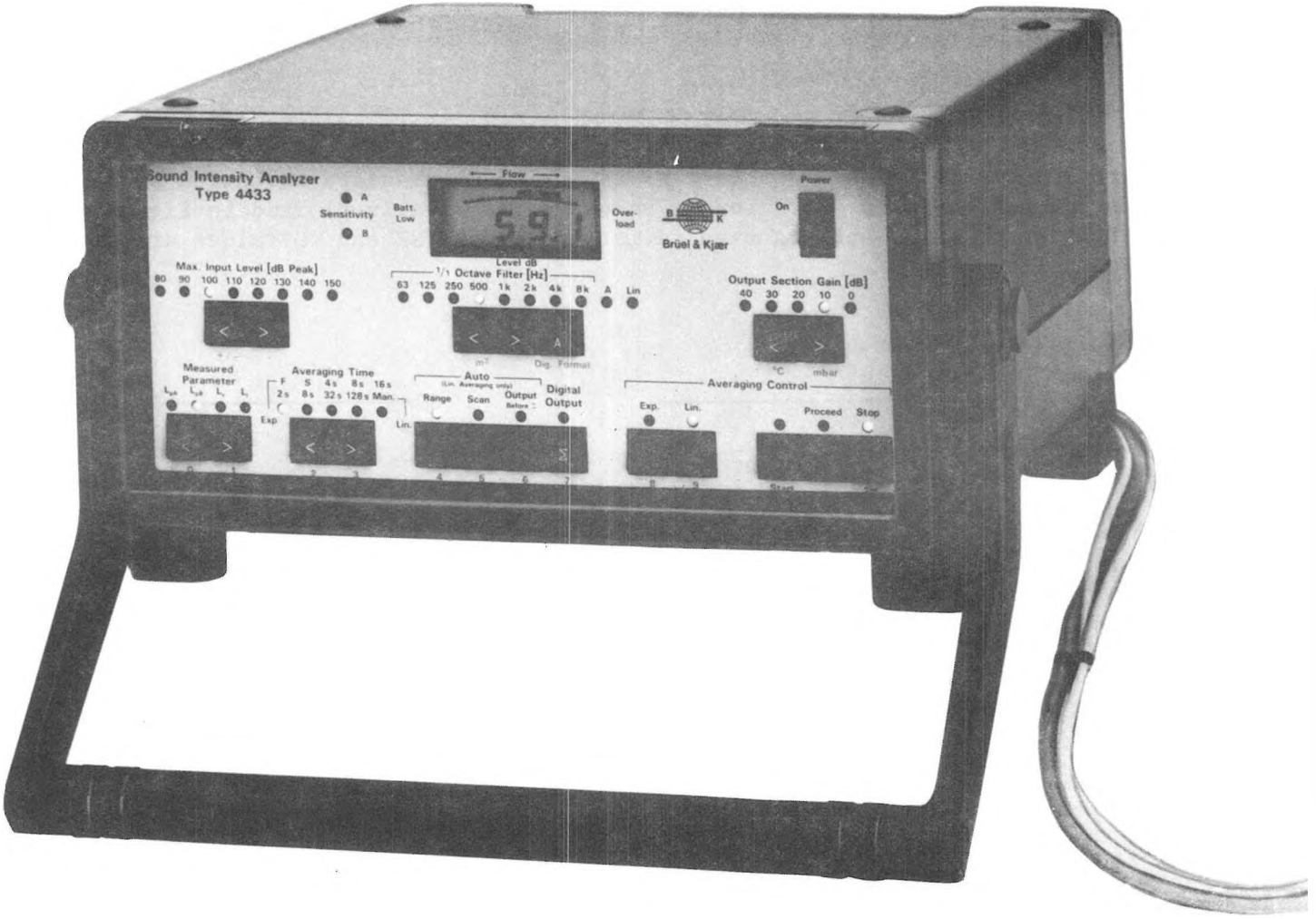

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TABLE II. NR and TL 1/3 Octave Means and Standard Deviations in dB

Frequency	NR		TL	
	Mean	Standard Deviation	Mean	Standard Deviation
100	33.1	7.8	30.3	7.6
125	35.1	6.5	32.0	6.3
160	36.8	5.3	33.6	5.2
200	39.5	5.2	36.4	5.0
250	42.5	5.4	39.5	5.1
315	46.4	6.3	43.4	5.9
400	50.1	7.1	47.1	6.7
500	53.3	7.2	50.4	6.8
630	56.4	7.4	53.5	7.1
800	59.2	7.7	56.3	7.4
1000	60.9	7.6	58.1	7.4
1250	62.1	7.7	59.3	7.4
1600	63.5	7.9	60.6	7.7
2000	63.5	8.3	60.5	8.1
2500	62.5	8.7	59.4	8.4
3150	62.9	8.6	59.7	8.2
4000	64.9	8.5	61.6	8.2

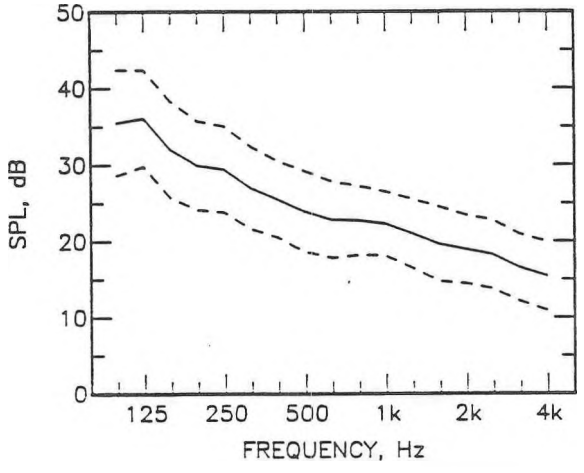

Figure 5. Mean Residual Background Noise Levels Versus Frequency ——, and ± 1. Standard Deviation - - -.

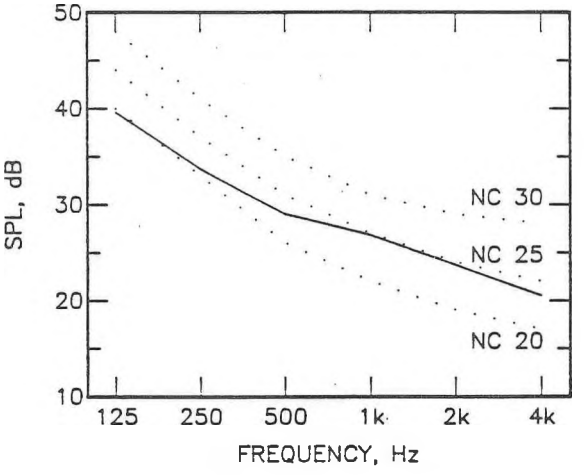

Figure 6. Mean Octave Band Residual Background Noise Levels versus Frequency ——, and NC contours - - -.

Figure 5 plots the mean and a one standard deviation range about the mean of the measured receiving room 1/3 octave background noise levels. These levels represent the residual background noise levels in homes with no occupant activity and so they are not for the same conditions as the LEQ values in Table I. Figure 6 plots the same residual background noise levels in octave bands along with three noise criterion, NC, contours. The overall mean residual background level is thus seen to approximate NC 25.

The mean measured receiving room reverberation times and a one standard deviation range are given in Figure 7. In all 1/3 octave bands the mean reverberation time was close to 0.4 seconds with a standard deviation of just under 0.1 seconds.

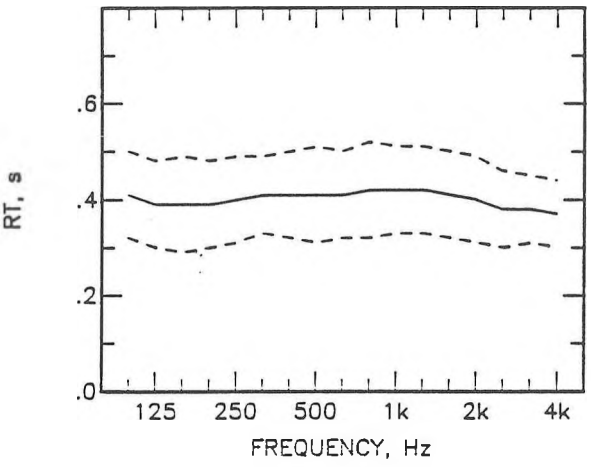

Figure 7. Mean RT versus Frequency ——, and ± 1. Standard Deviation - - -.

CONCLUSIONS

The data presented in this paper can be used to typify acoustical conditions in Canadian homes in multiple residence buildings. The typical home has an LEQ24 of 46.2 dBA and a residual background noise without occupant activity that approximates NC 25. The average party wall has an STC of approximately STC 50, and an average living room has a reverberation time that is close to 0.4 seconds at all measured frequencies. Details of mean 1/3 octave spectra of NR, TL, RT, and residual background levels were also presented. It is hoped that these values will provide a reliable data base for various calculations concerning acoustical conditions in these types of homes.

ACKNOWLEDGEMNTS

The data used in these analyses was obtained from three measurement contracts with the following consultants: Valcoustics Canada Ltd.of Toronto , Harford Kenedy Ltd. of Vancouver, and SNC Inc. of Montreal.

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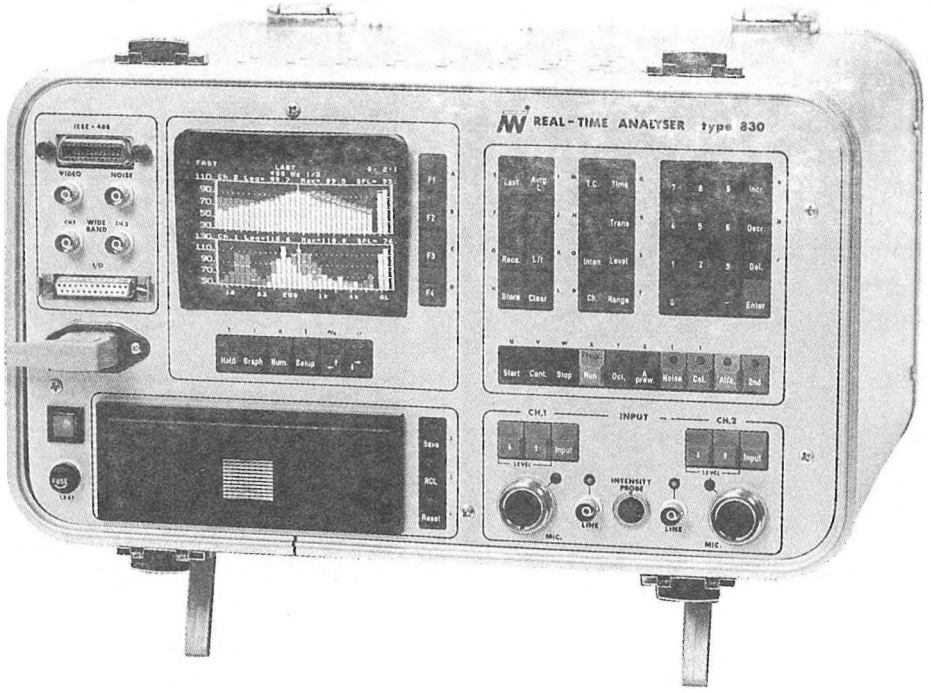

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BOOK REVIEW

Inter-Noise 85. Proceedings. Federal Institute for Occupational Safety Report Series. Dortmund, 1985. Two volumes, 1500 pages.

These are the proceedings from the 14th Conference on Noise Control Engineering, organized by VDI-Kommision Lärmminderung, the German member of the International Institute of Noise Control Engineering (INCE).

The Conference was held in Munich between September 18 and 20, 1985. It was sponsored by the Federal Institute for Occupational Health and by the Ludwig-Maximilian University.

As is usual for INCE conferences, Inter-Noise was very well attended and a variety of papers on different topics were presented by authors from many countries. A wide variety of experiences are reflected in the 351 papers contained in both volumes.

Since it is impossible to review all of the papers individually, this reviewer thinks that the best way of presenting the information is by examining the table of contents.

Three Plenary papers are published at the beginning of the Proceedings. They are:

A.O. Vogel: Regulations and technical standards of noise control, G. Jansen: Noise induced health disturbances, and H. Peeken et al: Principles of machine noise reduction.

There is no indication why these papers (or topics) were selected to be plenary session papers.

The same applies to the next sections where eight survey papers are included. Both the survey and the plenary papers are presented in full (approximately 10 pages each).

The rest of the papers are each four pages in length. They are presented following the INCE classification of subjects (that is similar to the one used by the Acoustical Society of America).

The following sections are included:

- General (10 papers)
- Emission: Noise Sources (52 papers)
- Physical Phenomena (28 papers)
- Noise Control Elements (30 papers)
- Vibration: General transmission, isolation and reduction (32 papers)
- Immission: physical aspects of environmental noise (38 papers)
- Immission: effects of noise (44 papers) - Analysis (84 papers), and
- Requirements (22 papers).

As usual with Proceedings, their main use is to find out who is doing what and where one can find him. Also, some information regarding the subjects that the noise control community is dealing with can also be extracted.

The two volumes of the Proceedings will be most useful as a consulting document in libraries either at research institutions or at universities.

Alberto Behar

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Impressions of the 12th International Congress on Acoustics Toronto, July 24–31, 1986

It is never easy to write objectively of events in which we have been deeply immersed. Nevertheless it seems safe to say that 12ICA was an outstanding success.

The Congress opened Thursday morning (July 24) in a festive mood with greetings from Her Majesty the Queen delivered by the Honourable Lincoln M. Alexander, Lieutenant Governor of Ontario. In a warm and colourful address His Honour welcomed the large assembly of Congress participants and family members gathered in Roy Thomson Hall and expressed his appreciation of the remarkable diversity of fields of learning and human endeavour represented in the field of acoustics as we know it today. Professor Henri Myncke, Chairman of the Commission in Acoustics, enlarged on this theme noting, with others, that acoustics is "rich in unsolved and intriguing problems" and, with its ever-changing parade of topics, "like Alice's Wonderland". Speaking also in French and German, he paraphrased Heinrich Heine: "Acoustics is an old story that still remains new" ("Die Akustik ist eine alte Geschichte, doch noch immer bleibt sie neu") expressing confidence that this newness would be reflected in 12ICA. It was my privilege, as Congress President, to welcome our visitors on behalf of the Canadian Acoustical Association and affirm our link with the International Union of Pure and Applied Physics by bringing greetings from Dr. Larkin Kerwin President-designate of IUPAP and mentioning some of the aims of the Union: the stimulation and promotion of international cooperation, the sponsoring of international meetings such as 12ICA, the fostering of free circulation of scientists and the encouragement of research and education. In so doing, I noted that, with few exceptions, it was economic rather than political factors that made it difficult for poor countries to participate in meetings such as 12ICA. With support from IUPAP and elsewhere we had been able to assist a few scientists from developing countries but much more help was needed.

The Opening Ceremony concluded with a splendid concert by the Toronto Symphony Brass Quintet performing music of various periods and styles including classical works by Bach, Gabrieli, Albinoni, Ewald, Farnaby and Mowet, music from "American Brass Band" and a suite by Canadian composer Morley Calvert. The program was made all the more enjoyable by the well-chosen words of explanation provided by trombonist Frank Harmantas who endeared himself to his audience by inviting them to explore the acoustical characteristics of the hall from various locations.

After a brief break for lunch, the Technical Program opened in the Metro Toronto Convention Centre with an informative review of "Ocean acoustics: the remarkable sea of sound" by R.R. Goodman, the first of seven Plenary Lectures presented to the Full Congress. The others dealt with the "Physical properties of sound in rooms and subjective effects in man" (Y. Ando), "Recent achievements in quantum acoustics" (Yu. V. Gulyaev), "L'évaluation des propriétés mécanique et structurales des matériaux par les méthodes ultrasones" (J.E. Roux), "Human responses to vibration" (M. Griffin) "Auditory time analysis in echolocating bats" (G. Neuweiler) and the "Nonlinear behaviour of sound waves" (D.T. Blackstock). These afternoon lectures, displaying the "Wonderland" of acoustics, drew large and appreciative audiences.

Each half day the participants were offered a wide choice of subject matter: six sessions of contributed papers and one or two structured sessions on well-defined themes running in parallel. All fourteen sub-fields of acoustics were present in the Program and seven of these, Architectural and Building acoustics, Physiological and Psychological acoustics, Noise, Ultrasonics, Quantum and Physical effects, Musical Acoustics, Speed Communication and Shock and Vibration, were strongly represented. The fifteen structured sessions dealt with such diverse subjects as Arctic Acoustics, Otoacoustics, and Cochlear mechanics, Education in Acoustics and the Measurement of Hearing protector Attenuation.

To guide participants through this complex tapestry of activity, each was given a 3 kg package reading material on arrival at the Congress: a Printed Program of 150 pages with abstracts and some 1300 pages (three volumes) of Proceedings. It was obvious that the many months of meticulous planning by our Technical Program Committee paid handsome dividends: In the choice of topics and organization of sessions, in the presentation of the calendar and abstracts, in the editing and printing and in the day-to-day running of the program, the work of the 12ICA Committee was clearly impeccable. The high level of discipline established by the Committee was also evident in the small number of disruptive gaps that appeared in the sessions: some 580 of the 620 papers printed in the Program and Proceedings were actually presented at the Congress.

The first day of the Congress ended with a "Welcome" Reception in the rotunda of Toronto City Hall. It was a happy occasion, one of several Congress events bringing

people together informally in congenial circumstances and so providing invaluable opportunities for the development and renewal of friendship and the exchange of ideas.

Many of us who work in highly specialized areas of acoustics share a common interest in music. This interest was recognized in many ways at 12ICA especially with "Music at Midday" commencing on Friday with a recital by Douglas Bodle in St Andrew's Church demonstrating the 50-stop mechanical action organ built by Karl Wilhelm in the Classical French Style. It continued on Monday, July 28 in the Convention Centre with presentations of tape-recorded electro-acoustic music by various composers coordinated by Composer David Keane. Tuesdays "Midday" concert, given by the Armin Electric Strings, featured the first performance of a quartet by John Rae, commissioned by the Canada Council in celebration of the International Year of Canadian Music. A second concert of electroacoustic music was given on Wednesday, July 30. These concerts were widely appreciated and clearly added lustre to the Congress. They were arranged by Annabel Cohen and John Swallow and supported by a grant from the Ontario Ministry of Citizenship and Culture (Wintario Division).

On Friday evening, Dr. Ted Schultz, with the assistance of a quartet of Toronto Symphony String players, Organist Patricia Kruger and John O'Keefe with his pistol, gave a special pre- concert lecture for 12ICA participants demonstrating the variable acoustics of Roy Thomson Hall. It was an impressive performance. Indeed, to the music critic of the Globe and Mail, the concert of popular music that followed was an anticlimax.

Earlier that day, the accompanying persons were taken on a City bus tour, the first of many social tours arranged for 12ICA participants and their families as a counterpoint in the formal program. As expected, the most popular of these was the trip to Niagara Falls and Niagara-on-the-Lake on Sunday which attracted one third of the participants. In a less conventional mode, a small but enthusiastic group in search of adventure sampled white water rafting on the Ottawa River. Others at various times were taken to the Thousand Islands Region, the Royal Ontario Museum, Black Creek Village or St Marie-among-the-Hurons, visited Ontario Place at night, or enjoyed Dinner Theatre in Toronto or Shakespeare at Stratford.

The 12ICA International Exhibition, perhaps the best display of acoustical instruments and concepts ever presented in Canada, opened on Monday, July 28. Twenty organizations participated representing a wide range of interests: from the comprehensive ten-booth display mounted by Bruel and Kjaer to the specialized exhibits presented by small high-tech Canadian companies and government departments offering special underwater transducers, digital speech processing devices, audiometric instruments, analytical systems and new regulations pertaining to noise. The location of the Exhibition, between the Plenary Lecture Theatre and the cafeteria, undoubtedly contributed to its success.

On Monday evening, the Congress enjoyed the exclusive use of the Ontario Science Centre meeting first for a reception and buffet supper and later exploring the spacious exhibit halls. It was an evening of quiet charm: the serene architecture of the building, the simple meal tastefully presented, the kaleidoscope of imaginative exhibits and the delight of unexpected reunions with colleagues from other countries as one moved from hall to hall.

The 12ICA Banquet in the Royal York Hotel on Tuesday evening was clearly and the highlight of the Congress. The dinner, graciously served in the Canadian Room, was preceeded by the CAA Reception which filled the Ontario Room and overflowed into the corridors where our presence was honoured by a visually colourful and aurally invincible fife and drum band. The evening concluded with a program of films arranged with the invaluable guidance and assistance of the National Film Board. These films presented Canada in three entirely different ways: the first ("Crac") impressionistic and poetic, the second ("Canada Today") realistic and official, the third ("Propaganda Message") introspective and satirical. Our international audience was clearly delighted. During the banquet, the 12ICA Student Prize was awarded to P.C. Pandey, C. Gigure and W.F. Thompson for their manuscripts contributed to the Congress Proceedings and presented at the Congress. Fourteen other participating students received honourable mention for their contributions.

The final musical presentation of the Congress was given in St Andrew's Church on Wednesday evening when Prof. Ralph Aldrich and other musicians from the University of Western Ontario demonstrated the eight instruments of the violin octet developed by the Catgut Acoustical Society. The instruments and the music and were introduced by Carleen Hutchins. Earlier in the evening the Ontario Ministry of the Environment gave an international reception in honour of the Commission and in recognition of many who had contributed to the

Congress in various ways.

The Closing Ceremony on Thursday gave me an opportunity to express my gratitude to the many members of the 12ICA enterprise (list elsewhere) who had participated with so much energy, intelligence and enthusiasm in the organization of the Congress and Associated Symposia mentioning especially three key members of the Executive Committee: Tony Embleton for his faultless work as Chairman of the Technical Program Committee, John Manuel for his tireless and resourceful efforts as Secretary General and Sharon Abel for her leadership of the Local Planning Committee and her personal interest in accommodation. These three then came to the podium in turn to identify and thank those who had worked with them.

Speaking as Chairman of the Commission, Prof. Henri Myncke was unstinting in his praise of our efforts: 12ICA would be remembered as one of the greatest Congresses of all time in the field of acoustics. As a personal expression of his appreciation he presented me with a beautiful medal commemorating the founding of the Catholic University of Louvain as a seat of learning in 1425; this gracious gesture touched me deeply. Prof. Ira Dyer, President of the Acoustical Society of America, rising on behalf of all participants, then sought recognition bringing with him to the podium leading representatives of four acoustical and linguistic communities: Prof. Hikara Date of Japan, Prof. Chung Fu Ying of China, Prof. J.E. Roux of France and Prof. Gerhard Sessler of Germany. Together they, and Prof. D. Sette of Italy who had spoken in similar vein on Wednesday, raised a pæan that went far beyond the requirements of courtesy.

It was Prof. Myncke's privilege as Commission Chairman to confirm what was already common knowledge that the next Congress would be held in Yugoslavia. And so, for a few minutes our attention was diverted from the present to the future as Prof. Petar Pravica warmly invited us to assemble for 13ICA in Belgrade in August 1989.

As we bade our visitors farewell at the Closing reception we knew that the field of acoustics in its international dimension had been truly celebrated at 12ICA. The high quality of the Technical Program and Proceedings, the spacious meeting place in which we were housed, the receptions, the special events and activities, the music, the Exhibition and the splendour of the City all came together in Toronto.

Early in 1986, we were much concerned that tightening purse strings around the world might seriously restrict the attendance at 12ICA. That prospect was erased by a surge of registrations during the final weeks and on the opening day. As a consequence the final numbers were very satisfactory: approximately 964 participants from 37 countries and 133 accompanying persons were present at the congress. If one adds the authors of papers printed in the proceedings but not presented at the Congress the total number of participants would be close to 1000. In addition 170 people associated with the Exhibition were admitted by passes. Congress Treasurer James Ayres expects to be able to close the books within a few weeks at which time we are hoping to be told that we are in the black.

The specialized symposia held in association with 12ICA in Halifax, Montreal and Vancouver were also highly successful as can be seen from the reports printed elsewhere. A total of approximately 280 people attended the symposium on Underwater Acoustics in Halifax and the overlapping but independent meeting on Acoustical Imaging with which it was linked, approximately 200 attended the Symposium on Speech Recognition in Montreal and approximately 180 attended the Symposium on Acoustics and Theatre Planning for the Performing Arts in Vancouver. These three symposia were supported by the Canadian Acoustical Association and planned in consultation with the 12ICA Executive Committee. The Committee also worked closely with others to ensure coordination between the Congress and various independent meetings especially Inter-Noise 86 in Cambridge, Massachusetts, an International Symposium on Musical Acoustics organized by the Catgut Acoustical Society in Hartford, Connecticut and a Conference on Non-Destructive Materials Characterization in Montreal.

Clearly 1986 is a year the members of the acoustical community in Canada will wish to remember.

Edgar A.G. Shaw

ICA Satellite Meeting: Montreal Symposium on Speech Recognition

Melvyn J. Hunt

National Research Council

This meeting was held at McGill University on July 21 and 22, *i.e.* immediately prior to the ICA in Toronto. It was organized by speech researchers at INRS Télécommunications and BNR in Montreal and at McGill. Around fifty papers were presented by speakers from Japan, Europe and North America. The papers covered a wide range of topics in automatic speech recognition and in speech perception, but papers concerned in some way with acoustic/phonetic representations for the front-ends of speech recognition systems formed the largest group. The majority of the speakers were from academic institutions, and this perhaps led to there being relatively little emphasis on practical applications, on robustness to signal degradations or on statistical modeling techniques.

The meeting opened with a paper by the invited speaker, Prof. E. Zwicker, from the Technical University, Munich. He spoke on "Peripheral preprocessing in hearing and psychoacoustics as guidelines for speech recognition" and emphasized the probably important role of feedback in the action of the inner ear. This paper was part of a particularly interesting session concerned with auditory models in speech recognition. As humans continue to outperform machines even in recognizing nonsense words, where speech understanding can play no part, growing interest is being shown in the use of auditory models as the front-ends to speech recognizers. After some initial disappointments, results are now appearing suggesting that these models can indeed outperform more conventional acoustic analyses. One such result was reported at this meeting by Jordan Cohen, formerly of IBM.

MIT was well represented. Dennis Klatt, Ken Stevens and Victor Zue each gave a paper setting out their differing views on approaches to phonetic recognition: Klatt favoring acoustic templates for the present, Stevens arguing for feature detection, and Zue arguing for a top-down rule-based approach, though they all took pains to stress that their viewpoints had much in common.

Participants at the meeting were provided with a copy of the 106-page proceedings containing the mostly two-page texts of the papers presented.

Speech recognition cannot be rigidly separated from other aspects of speech research, nor indeed from other aspects of auditory perception work. One might have expected, then, that participants at this satellite meeting would also have been interested in the ICA itself, where a roughly equal number of speech papers were presented in addition to many papers on auditory perception. In fact, the majority of North American participants did not go on to the main meeting, and some were not even aware that it would contain speech sessions. One result was that what is probably Canada's largest speech research group - the BNR/INRS group, which did a good job in organizing the Montreal Symposium - was essentially not represented at a major international acoustics conference in Canada. One has to wonder whether by combining this satellite meeting together with the speech sessions of the ICA and perhaps being a little more selective in accepting papers it would not have been possible to turn what were from the point of view of speech researchers two quite good meetings into one very good meeting, more comparable in importance with the annual IEEE ICASSP meetings.

HALIFAX MEETINGS

The 15th Symposium on Acoustical Imaging and the 12th ICA Associated Symposium on Underwater Acoustics were held in Halifax, prior to the ICA Toronto Symposium, on 14 – 18 July last. The two conferences were linked by having common sessions on matters relating to both Underwater and Imaging Acoustics, on Wednesday 16th July.

The attendance was:

Registered for:	
Acoustical Imaging Symposium only	59
Both Symposia	77
Underwater Acoustics Symposium only	122
Total registration for both Symposia	258

There were delegates from 21 countries.

The Imaging Conference was opened by the Honourable Alan R. Abraham, Lt. Governer of Nova Scotia, and the Underwater Conference by Dr. Derek Schofield the Chief of Research and Development, Department of National Defence.

The conferences were different in style in many ways. The Acoustical Imaging chose to have only one invited paper; the opening paper by Glen Wade on "A History of Acoustical Imaging", this was in keeping with the tradition of the series. The Underwater Conference had fifteen invited papers. It is difficult in a short note to describe and comment on the contents of the papers except to say that in the writers opinion, the quality of the papers, as a whole, has to be judged to be excellent.

A list of the topics discussed can be gleaned from the title of the sessions:

A History of Acoustical Imaging
Tomography & Image Reconstruction
Tissue Characterization
Transducers & Arrays
Image and Signal Processing
Direct Imaging
Tomography
Acoustical Microscopy
Scattering by Biological & Other Bodies
Transducers, Radiation & Acoustic Instrumentation I
Sound Propagation in the Ocean I
Characterizing the Ocean and Its Bottom II
Underwater Acoustic Imaging I
Underwater Acoustic Imaging II
Characterizing the Ocean & Its Bottom I
Sound Propagation in Shallow Water
Sound Propagation Over Sloping Bottoms
Transducers, Radiation II
Signal Processing & Beamforming I
Signal Processing & Beamforming II

The proceedings of the conference will be published by Pelenum Publishing Corp., 227 West 17th Street, New York, N.Y., 10011, USA at a cost of $80.00 per copy.

H.W. Jones

Ministry of Transportation & Communications Hosts the Annual Summer Symposium of the Transportation Research Board's Committee on Transportation Related Noise & Vibration, July 23rd, 24th, 25th, 1986

The recent "Transportation Research Board's Committee on Transportation Related Noise and Vibration" Symposium was hosted by the Ministry of Transportation and Communications. The organizer for this symposium was Soren Pedersen, Design Development Analyst, Highway Design Office, Committee member of the Transportation Research Board.

Previous meetings had been held annually in the United States. This was the first time it was held in Canada.

The Transportation Research Board Committee stimulates research concerning the nature and performance of transportation systems to keep abreast with the ever growing demand for innovative systems. The committee is involved in the dissemination and exchange of information regarding all aspects of transportation related noise. It encourages the application of the results of research projects.

People attending this symposium were civil and acoustical engineers, representing various transportation departments from the United States as well as some American acoustical consulting firms. Also in attendance were representatives from the Provincial Governments, Canadian consultants and manufacturers who are involved in the field of acoustics.

The agenda consisted of presentation of papers in the mornings and tours of facilities in the afternoons. The tours covered three areas of interest: tour of highway facilities, tour of DeHavilland Aircraft of Canada Limited, tour of Toronto Transit Commission System.

The tour of noise barrier installations was conducted by Soren Pedersen and other Ministry staff. The aircraft noise segment, conducted by the staff of DeHavilland Aircraft of Canada Limited, concerned the development of the propeller design to reduce noise on aircraft. DeHavilland also provided a demonstration of the DASH

7 and 8. The rail portion, conducted by representatives of the Toronto Transit Commission, consisted of a tour of the subway system and a demonstration of their noise abatement techniques.

The meeting was a very successful one. Those attending the meeting felt that the variety and content of the presentations, along with the arrangements, were outstanding.

Strong support for a future meeting to be held in Toronto under the auspices of the Ministry of Transportation and Communications in Canada was expressed by committee members.

Soren Pedersen

ACOUSTICS AND THEATRE PLANNING FOR THE PERFORMING ARTS

Vancouver, August 4-6, 1986

This conference, one of the official satellite meetings to the 12th ICA, was a truly international affair. It attracted over 160 participants who came to hear the 34 papers presented by authors from 11 different countries. The organizing team of John Walsh and Doug Whicker should be extremely proud of the very impressive and smoothly organized meeting. The presence of almost all major recent contributors to the study of the acoustics of spaces for the performing arts was a key factor in the success of the conference. The papers included a range of material from quite practical reports on new halls by consultants to more fundamental research studies. The meeting avoided the profusion of monotonous non-technical slide shows that regretably plague many ASA meetings. At the same time there seemed to be evidence of a "great Atlantic divide" between the European and the American approach to auditorium acoustics.

One of the most impressive presentations was that of Blauert and Lindeman from West Germany who had re-examined the question of early lateral reflections. Their subjective studies confirmed very clearly the importance of early lateral reflections to the overall impression of a space, and went on further to determine that there are in fact two distinct dimensions associated with the perception of early lateral reflections. Early lateral reflections with energy above about 3 kHz contribute to perceived enhancement of source width, while lower frequency early lateral reflections support the perception of depth. Gade from Denmark summarized his subjective studies of orchestra platform acoustics, combining results from both laboratory and in-situ studies to develop design criteria.

There were a number of papers concerning acoustical modeling techniques, using both computer models and physical scale models. While Borish from the USA and Vian from France described studies involving computer models, Els from West Germany, Pollack from France, Orlowski of England, and Barron from England discussed the use of quite sophisticated physical scale models. Other authors included mention of the use of scale models in discussions of the design of particular halls.

Approximately 10 years ago Germany seemed to be the centre of research in auditorium acoustics; the center of gravity of research activity now seems to have moved to France. Representatives of three French groups participated in this meeting and indicated a strong continuing effort in France. These included Vian who has developed an advanced computer model as a design tool, Jullien who has carried out extensive investigations into the interrelationships between the various newer measures, and Pollack who is working on a system of computer aided scale model measurements. The "great Atlantic divide" still remains, and there seems to be two quite different approaches to acoustical problems. There is certainly much more research activity in Japan and Europe, and a much greater appreciation of the value of this research. However, even European consultants seem to take a much more quantitative scientific approach to acoustics, than do many American consultants who seem to rely on a more qualitative approach.

My only criticism is not really of the conference itself, but the apparent lack of coordination between it and the main ICA congress in Toronto. The Toronto meeting included a heavy emphasis on architectural acoustics including a structured session of invited papers covering the subject of the Vancouver meeting. In retrospect it might have been better to add these to the satellite to make it an even more successful affair.

Proceedings of the meeting are available and include quite complete versions of each paper. For anyone at all interested in the acoustics of performing arts spaces this would be a very worthwhile purchase.

J.S. Bradley

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The Digital Sona-Graph® model 7800 is a DC-32kHz spectrum analyzer designed for the analysis and display of non-stationary signals (such signals include speech, Doppler shifts from Ultrasound and telemetry signals, sonar and radar returns, animal sounds, music, heart sounds or any sound that has frequency characteristics which change over time). The complex nature of these signals requires an analyzer which incorporates the features of a sound spectrograph, a waveform printer, signal splicer/editor and a spectrum analyzer.

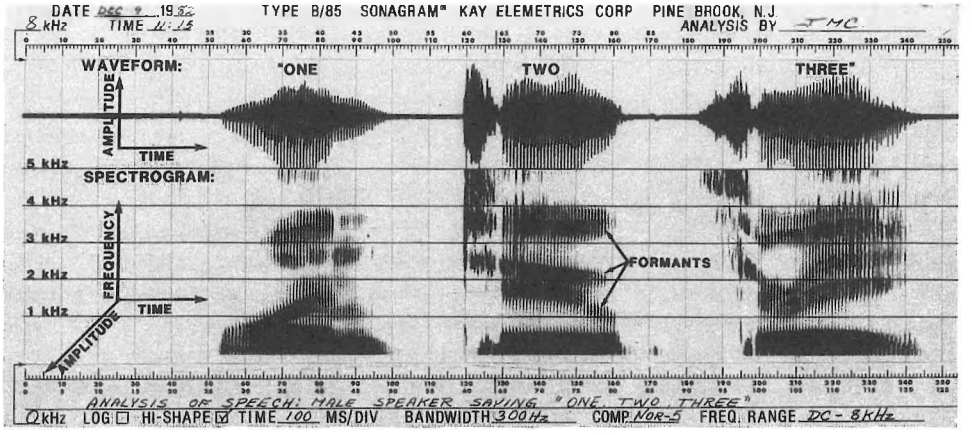
SOUND SPECTROGRAPH

The 7800 captures and stores the input signal to a real time rate of 32kHz in a large 128K word (each word is 11 bits wide) solid state memory (RAMs). The 7800 can accept single or dual channel input. Once stored, the signal(s) can be analyzed (to a 60dB dynamic range), displayed and printed in many ways. The spectrographic display is most revealing for non-stationary signals which are characterized by spectral (frequency) changes over time. This 3-D display (amplitude vs. frequency vs. time) is shown to the right.

- **Print Resolution: 1000 (H) X 400 (V) X 23 Grey Scale Levels**

SPECTRUM ANALYZER

Any two points in the large memory can be analyzed and printed as a standard (frequency vs. amplitude) spectrum analysis display. The 7800 also has an optional FFT module which can analyze any of the stored 512 blocks of data (each block has 256 data points) in 0.005 seconds for a real time bandwidth up to 20kHz. The input signal can also be analyzed in real time for monitoring. The large input buffer memory minimizes triggering problems. An oscilloscope is required for the display of this real time FFT analysis.



SIGNAL SPLICER/EDITOR

The large 128K word (by 11 bit) memory can record and store 5.12 seconds (in the 8kHz range) of input signal. The splicer/editor feature lets the user listen to or remove, selected portions of the audio signal or splice separate segments together.

AUDIO WAVEFORM PRINTER

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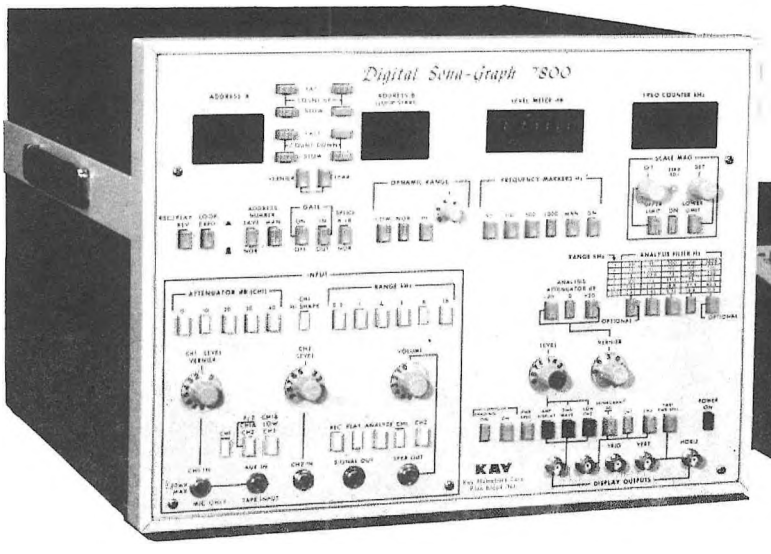

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NEWS

COMMERCIAL AND INDUSTRIAL ULTRASOUND

A one day course on commercial and industrial ultrasound is being presented in Ottawa by Health and Welfare Canada on November 17, 1986. The course will include lectures on the basic physics of ultrasound, biological effects, standards and protective measures, as well as measurement techniques. For further information please contact Dr. S. Bly, Health and Welfare Canada, Room 233, Environmental Health Centre, Tunney's Pasture, Ottawa, K1A 0L2.

INDUSTRIAL HYGIENE IN MANITOBA

The newly formed Manitoba section of the American Industrial Hygiene Association will be presenting a one-day Symposium on Hearing Conservation and Noise Control in Winnipeg on October 30, 1986. The keynote speaker will be Tim Kelsall who will focus on the practical application of engineering controls to reduce workplace noise exposures. The symposium will also provide an overview of all aspects of workplace hearing conservation. It is intended to inform participants why hearing conservation programmes are needed, how to establish an effective programme in accordance with Manitoba's new hearing conservation and noise control regulation, and where to locate the required resources. For further information please contact Jim F W MacKay, 1000 – 330 St. Mary Avenue, Winnipeg, Manitoba, R3C 3Z5, (204 945–3614).

AUDIO ENGINEERING SOCIETY

The Toronto chapter of the Audio Engineering Society held its annual meeting at Ontario Place July 10, 1986. The focus of the meeting was a technical tour and discussion of the new Ontario Place sound system. This consists of six loudspeaker clusters suspended under the Forum's roof and another four delayed clusters mounted around the canopy for the lawn seating locations. With a total power handling capacity of 22,400 watts, the system can deliver average sound pressures levels in excess of 120 dB in the covered section of the Forum. Members stayed on to hear a concert of the Preservation Hall Jazz Band as a demonstration of the system.

The chapter's September meeting was held at the York Woods Library Theatre on September 16, 1986. Peter Moore of Adcom Electronics gave an overview of the history, concepts, and principles behind SMPTE timecode with respect to its application in the audio industry. The discussion was supplemented by demonstrations intended to act as a background tutorial for other SMPTE-relate topics to be held later this year.

The chapter's October meeting will be held at Manta Sound and will focus on a comparison of the use of analogue and digital equipment at this studio.

CAA TORONTO CHAPTER

Sharon Able and Chris Krajevsky have, after many years of tremendous effort, stepped down from the Toronto chapter steering committee. Their efforts have been greatly appreciated by chapter members. The new faces are Marilyn Pike and Victor Schroter. While they are new to the steering committee, they have been active members of the Toronto Chapter since its inception. The steering committee now includes: Alberto Behar (Ontario Hydro), Winston Sydenborgh (H.L. Blachford Ltd.), Ron Newman (Bruel & Kjaer Canada Ltd.), Mohan Barman (Barman, Coulter, Swallow Associates), Marilyn Pike (MoL), Victor Schroter (MoE).

Planned future meetings include:
– Building Vibrations, November 18, 1986, (Mohan and Victor)
– Visit to New B&K Installation, January 13, 1987 (Winston and Ron)
– Hearing Testing in Industry, March 10, 1987 (Marylin and Alberto)

SEPTEMBER MEETING

The first meeting of the Toronto Chapter for the year 1986–87 was held at the Ontario Hydro Auditorium on September 23, 1986. Three speakers presented talks on different aspects of ultrasound.

Dr. Stephen Bly, the first speaker, talked about the basics of ultrasound, different applications and the work his section is developing related to controlling and monitoring commercial instruments. Dr. Bly is head of the Acoustical Unit, Non-Ionizing Radiation Section, Health and Welfare Canada.

The second speaker, Mr. David MacDonald, is the Product Manager of Ultrasonic Equipment for Siemens Electric Ltd. In a very vivid presentation, he reviewed the history of ultrasonic sonography (imaging) from the early days (in the sixties) until the present. He presented the view that sonography is one of the fastest moving branches of the science where tremendous progress has been made in only a few years.

Ms. Lynn Campkin, Marketing Manager with Squibb Canada, was the last speaker. She spoke on the sub-

ject of the diagnostic use of ultrasound equipment, reviewing progress both in equipment and in knowledge. In discussing the diagnostic application for pregnant women, she pointed out that in Germany a minimum of two tests have to be performed during a pregnancy.

Presentations were well received and many questions were asked and answered by the speakers. Winston Sydenborgh announced that an extra session will be called to discuss new noise regulations. Those on the regular mailing list will be notified of the date and the speakers for this session.

Alberto Behar

REQUEST FOR CANADIAN DATA

The CAA has received a request from Dr. W. Passchier-Vermeer of TNO Institute of Preventive Health Care, PO Box 124, 2300 AC Leiden, Wassenaarsweg 56, The Netherlands, for data concerning health risks due to physical, chemical, biological, ergonomical, organisational and social factors in the work environment. The project is limited to the following types of industries: (1) food, drink and tobacco industry, (2) paper, printing and publishing industry, and (3) road transport. Dr. Passchier-Vermeer is concerned about sound and vibration aspects of the problem and would appreciate learning of relevant data, reports, and references. Please contact her directly.

ASTM NEWS

The task group on Practices and Criteria for Audiometric Booths of ASTM Committee E33 on Environmental Acoustics is seeking people interested in developing guidelines for specifying and installing audiometric booths. Contact David Bradley, ASTM, 1916 Race Street, Philadelphia, PA 19103, (215 299-5504).

The California Association of Window Manufacturers have requested: that the E90 method of measurement of sound transmission loss be revised to include the development of a single number rating suitable for outdoor noises, and a standard be produced describing practices for installing windows in a way that will provide maximum possible sound isolation.

The task group on Ceiling Insertion Loss Measurements is experimenting with a method to measure how noise from air-conditioning units directly above ceilings is attenuated. The task group has found that standard sound transmission loss measurements overestimate the attenuation provided in this situation.

A specification for a standard reference specimen for sound transmission loss tests will be prepared by another E33 task group. Specimens made according to the specifications can be used during repeatability and reproducibility testing.

A HOLY UPROAR

A British journal has reported that a church in north London has been declared an official noise nuisance. A noise abatement notice has been served on the First Born Church of the Living God at the Angel, Islington, by the local council. If the church fails to comply with the notice, it will face fines of up to 400 pounds under the British Control of Pollution Act. Members of the choir, which is made up of West Indians from all over London, feel that they are victims of a campaign by a small minority of residents who object to Christian worship. Mr. John Francis, son of the church's pastor, said: "All we are doing is praising God in our way. Would the council prefer that our youngsters were out on the streets looting?" A Council spokeman said: "They can praise the Lord by all means, but not to the extent that it disrupts the rights of their neighbours to the quiet enjoyment of life." The church in White Lion Street attracts congregations of up to 400. A resident living close by took it to court last year on the grounds that the "loud singing, organ music, and clapping from the church choir was so bad that it amounted to a noise nuisance." The magistrates decided to adjourn the case indefinitely. One of them commented: " It is important that we should be able to live in harmony with our neighbours. Although the choir may be emotional, spiritual and moving to those attending the church, if you are sitting in your home trying to relax it could be very distressing."

SAE CONFERENCE ANNOUNCED

Ralph Hilquist, General Chairman of the 1987 SAE Noise and Vibration Conference, has announced that planning is well advance for the event to be held April 28-30 1987 in Traverse City, Michigan. The General Committee is seeking papers on a wide variety of subjects including noise and vibration measurement, vehicle design, vehicle noise and vibration, component noise and vibration, and subsystems. For the 1987 meeting the scope will be expanded to include marine and rail applications, manufacturing, and quality assurance applications. Contact Laura Feix-Baker, SAE, Dept. 921, 400 Commonwealth Drive, Warrendale, PA 15096, USA.

NEW BOOKS

Seismic Inversion and Deconvolution, Part A: Classical Methods: Handbook of Geophysical Exploration, Sec. 1. Seismic Exploration
Enders A. Robinson
Geophysics Press, London, 1984

Applied High Resolution Geophysics Methods, (Offshore Geo-engineering Methods)
Peter K. Trabant
International Human Resources Development Corporation, Boston 1984

Stereophonic Techniques, (An Anthology of Reprinted Articles on Stereophonic Techniques)
John M. Eargle (editor)
Audio Engineering Society, Mew York, 1986

Mechanics of Continua and Wave Dynamics, (Springer Series on Wave Phenomena)
L. Brekhoviskikh and V. Goncharov
Springer-Verlag, Berlin, 1985

Rayleigh Wave Theory and Application, (Springer Series on Wave Phenomena)
E. A. Ash and E. G. S. Paige (editors)
Springer-Verlag, Berlin, 1985

J. Sauveur, Collected Writings on Musical Acoustics (Paris 1700-17
Rudolf Rasch (editor)
Diapason Press, Utrecht, 1984

Basic Physics and Technology of Medical Diagnostic Ultrasound
M. Hussey
MacMillan Publishers Ltd., London, 1985

The Physics of the Violin
L. Cremer, (translated by S. Allen)
MIT Press, Cambridge, Mass, 1984

Fundamentals of Hearing: An Introduction, 2nd ed.
William A. Yost and Donald W. Nielsen
Holt, Rinehart and Winston, New York, 1985

Hearing Conservation in Industry
Alan S. Feldman and Charles T. Grimes, (editors)
Williams and Wilkens, Baltimore, 1985

Hearing Conservation: A Practical Manual and Guide
Donald C. Gasaway
Prentice-Hall, New Jersey, 1985

Explosive Shocks in Air, 2nd edition
Gilbert F. Kinney and Kenneth J. Graham
Springer-Verlag, New York, 1985

Vertical Seismic Profiling-Technique Application, and Case Histories
A. H. Balch and M. W. Lee, (editors)
International Human Resources Development Corp., Boston, 1984

Adaptive Signal Processing
Bernard Widrow and Samuel D. Stearns
Prentice-Hall, New Jersey, 1985

The Effects of Noise on Man, (2nd edition)
Karl D. Kryter
Academic Press, Orlando, 1985

Clinical Examination of Voice
Minoru Hirano
Springer, New York, 1981

Stochastic Wave Propagation
Kazimierz Sobczky
Elsevier, Amsterdam, 1985

Handbook of Clinical Audiology, 3rd edition
J. Katz, editor
Williams and Wilkins, Baltimore

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BRANCHES THROUGHOUT CANADA

MINUTES OF CANADIAN ACOUSTICAL ASSOCIATION ANNUAL MEETING

1) Welcome

The meeting was called to order at 4:05 pm on July 29, 1986, at the Metro Toronto Convention Centre, Toronto. 36 people were present.

2) Minutes of 1985 Annual Meeting

The minutes of the 1985 Annual Meeting were circulated to members by publication in Volume 14(1) of Canadian Acoustics.

MOTION: That the minutes of the 1985 meeting be accepted as printed.
CARRIED

3) Treasurer's Report of 1985/86 to date
(Appendix A & B)

Treasurer Tom Ho has moved to Hong Kong. The treasurer's report was presented by the acting Treasurer, Claudio Bulfone. Claudio presented a revised report of the 1985 Treasurer's summary (rearrangement of the figures only) (Appendix A). An Interim report was presented for 1985/86 showing an excess of receipts over disbursements of $6,184.18, and a total capital of $30,753.72 (Appendix B).

4) Correspondence Highlights

A brief report of correspondence highlights was presented by the president summarized as follows: –

(a) National Consortium of Educational and Scientific Societies (NCESS). The Association has been invited to join this consortium. As a result of discussion the following motion was made.

MOTION: That the directors investigate the specific benefits and costs of joining the National Consortium of Education and Scientific Societies, and that the directors be empowered to take action as appropriate.
CARRIED

(b) A letter was sent to the Acoustical Society of Japan congratulating them on their 50th Anniversary.

5) Editor's Report for 1985 – 1986

Editor John Bradley reported that the journal expects to break even by the year end with the exception of approximately $1000 spent in printing extra copies of the journal to hand out at 12ICA. There are 2 current problems: (1) more papers are needed, and (2) more help is required, particularly a news editor. During discussion it was noted that no papers had been rejected this year and about 20% were rejected last year. Technical notes (i.e. case studies, research notes, etc.) would be welcomed.

MOTION: It is moved that the Editor be authorized to spend up to $1500 per issue for the next 5 issues for assistance in the assembly and for improvement in quality and content.
CARRIED

6) Membership Report for 1985/86

This report on activity to increase membership was presented by Annabel Cohen. To date this year there are 443 members (not counting those joining at this meeting). Last year's total membership was 489. A yellow bilingual pamphlet describing the CAA is now available. A special effort has been made to increase membership in Manitoba (chosen as a province with a low membership). The data base provided by Alf Warnock works very well. A membership report was published in the April 1986, issue of Canadian Acoustics. There are a large number of drop-outs in membership this year. Discussions resulted in the suggestions of (a) more regional chapters, and (b) a phoning group in the major centres.

D. Quirt presented a short report on the membership data base provided by Alf Warnock. This is computerized and can be put on an IBM PC. Alf Warnock is planning to discontinue this service and volunteers are requested to take over the job.

7) Directors' Award 1985

The award (a scroll signed by the Directors) was presented to Gilles Lemire, University of Sherbrooke, with the Association's congratulations.

8) Report from 12ICA Executive

This was presented by Edgar Shaw. The financial position has not been finalized but it appears that 12ICA will at least break even. The very successful Technical Program consists of some 620 contributed papers and 6 plenary papers published. Registration is well over 1000 participants. The Exhibition is very successful. The team effort of Canadian acousticians was acknowledged. Joe Piercy reported that the 3 satellite symposia and other related meetings (7 in all) have also been successfully melded into the timetable.

Other statistics include: over 100 Canadian authors. The representation over all is approximately 35% from Europe, 35% from North American, 25% from China and Japan. In total 37 countries (including the USSR) are represented at 12ICA.

9) Report from Directors and Officers Meeting

The President reported that the Directors and Officers met on Monday, July 28, 1986. All activities discussed are covered under Agenda Items for this meeting.

10) Annual Meetings

a) 1987 Calgary. Peter Vermeulen, convenor, presented a short report. The meeting will be held October 5 – 9, 1987, in downtown Calgary.

b) 1988 Halifax. Conveners will be Bob Cyr and Peter Terroux

c) 1989 Toronto. Convenor – Alberto Behar

11) Fee Structure for 1986 – 87

MOTION: That the membership fee for 1987 be:

$5.00 for students

$15.00 for members

$15.00 for subscribers and organizations.
CARRIED

12) Update on Various Activities

(a) Changes to the National Building Code. The 1985 Code has been published. The process for updating the 1990 Code has started and any action should be taken within the next 18 months.

(b) Industrial Noise Control Manual. Sales 85/86 = $695.00.

(c) Membership Directory. Published in April Volume 14(2) Canadian Acoustics. It was suggested that the Directory be published regularly in the July issue of Canadian Acoustics and that unpaid members should be flagged. New members could be listed after the Annual General Meeting.

ACTION: Directors

13) Report from International INCE

No report given.

14) Report of Nominating Committee

The past president, Tom Northwood, presented the list of nominations as follows:

President	– Sharon Abel, Toronto
Executive Secretary	– Moustafa Osman, Toronto
Treasurer	– Claudio Bulfone, Surrey
Editor	– John Bradley, Ottawa

Directors – Two to be appointed, for four-year terms, to replace David Quirt and Raymond Hétu

Gary Faulkner, Edmonton
Bruce Dunn, Calgary

(Note: Continuing Directors are as follows: John Legget – Halifax, Peter Vermeulen – Calgary, Lola Cuddy – Kingston, Jean Nicolas – Sherbrooke, Winston Sydenborgh – Oakville, Nicole Lalande – Montreal.

MOTION: That a new office of Membership Chairman be established.
CARRIED

A nomination from the floor that Jean Gabriel Migneron to be a director was presented and accepted.

A nomination from the floor that Annabel Cohen be made Membership Chairman was accepted.

MOTION: That nominations be closed.
CARRIED

15) Elections

Ballots were distributed with Winston Sydenborgh and Richard Guy as scrutineers. The result was a 18:18:18 tie for the 3 directors. After some discussion Bruce Dunn's offer to be made an Officer-at-large was accepted.

The result of the elections was that the officers were accepted by acclamation, that Bruce Dunn was appointed Officer-at-large, and that the new Directors are Gary Faulkner and Jean-Gabriel Migneron.

16) New Business

(a) Eaton's Auditorium, Toronto. John Withrow, retired member of CBC and on the Board of Governors of the Roy Thomson Hall and Massey Hall and on the Board of Directors of the Canadian National Exhibition presented a 6 minute brief promoting the Eaton's Auditorium and the Winter Gardens in Toronto, neither of which are presently operating.

(b) Change of Head Office Address. Dee Benwell explained that the Corporation Act requires a Head Office that is not a PO Box. The present Head Office is John Manuel's home address. The only mail sent to this address is the Annual Summary that has to be filed under the Canada Corporation Act.

MOTION: That the Head Office address for the Annual Summary of the Canada Corporations Act be changed to the home address of the new secretary, Moustafa Osman.
CARRIED

The new PO Box arrangements will be handled by the new Board of Directors and Officers:

ACTION: Directors

(c) Auditor for 1986/87

MOTION: That Doug Whicker audit the books of the Canadian Acoustical Association for the year 1986–87. CARRIED

17) Adjournment

The meeting adjourned at 5:50 pm

Prepared by D.A. Benwell
July 31, 1986.

APPENDIX A
CANADIAN ACOUSTICAL ASSOCIATION
STATEMENT OF RECEIPTS AND DISBURSEMENTS
(Unaudited – See Notice to Reader)
YEAR ENDED AUGUST 31, 1985

Receipts

ICA Single contribution	$225
ICA Annual contribution	542
Industrial noise manual	1,576
Interest Income	1,815
Membership	10,945
Ontario Grant for ICA	25,000
Reprints	1,950
Sustaining subscription	2,094
1984 Acoustic Week in Canada	2,997
Total Receipts	47,144

Disbursements

CAA printing	$7,030
Postage	165
Printing – noise control manuals	2,970
Sundry	192
1985 Contribution to I. INCE	164
1986 Acoustic conferences	1,000
12th International Congress on Acoustics	30,000
Total Disbursements	41,521
Excess of receipts over disbursements	5,623
Member's capital, beginning of year	18,947
Member's capital, end of year	$24,570

APPENDIX B
CANADIAN ACOUSTICAL ASSOCIATION
STATEMENT OF RECEIPTS AND DISBURSEMENTS
SEPTEMBER 1, 1985 – JULY 24, 1986

Receipts

ICA Contribution	$1,942.94
Donation re CAA Scholarship Prize	100.00
Industrial Noise Manual	695.00
Interest Income (up to June 30/86)	1,690.83
Membership	6,458.80
Sustaining Subscription	895.00
Proceeds from CAA Conference Oct 85	350.00
Funds received from 1985 Symposium	1,947.61
Funds received from advertisements in CAA Magazine	2,774.03
Funds received from order for 15 × CAA Vol. 14	60.00
Reprints	445.00
Reimbursement for Coffee at 1985 CAA Symposium	79.17
Total receipts	17,438.38

Disbursements

CAA Printing	$7,497.20
Postage	305.71
1986 Contribution to I. INCE	228.82
Advance to 1985 Symposium	500.00
1986 ICA – Halifax Committee	1,300.00
1986 ICA – Vancouver Committee	1,000.00
Filing Fee – Annual Return 1986	30.00
Office Supplies/Stationery	209.46
Slides, Slide Holder, Tray	89.01
Debit Memos – returned cheques (Memberships)	85.00
Bank Service Charge	9.00
Total Disbursements	11,254.20
Excess of receipts over disbursements	6,184.18
Member's capital, beginning of year	24,569.54
Member's capital, end of year	30,753.72

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