NOISE/NEWS INTERNATIONAL

Volume 14, Number 3
2006 September

A quarterly news magazine with an Internet supplement published by I-INCE and INCE/USA

INTER-NOISE 2007
Announcement and Call for Papers
Istanbul, Turkey

Personal computer, printer, and portable equipment noise in classrooms

Noise of consumer products: Consequences for environmental health

MEMBER SOCIETY PROFILE
The Turkish Acoustical Society
See page 95

NOISE/NEWS INTERNATIONAL

Volume 14, Number 3 — 2006 September

A quarterly news magazine with an Internet supplement published by I-INCE and INCE/USA

Features

Departments

Cover Photo:
Istanbul
Courtesy of the organizers of INTER-NOISE 2007

Advertising Sales Manager
Richard J. Peppin
Scantek, Inc.
7060 Oakland Mills Road, Ste. L
Columbia, MD 21046-1360
e-mail: PeppinR@asme.org

Produced by
Iowa State University College of Engineering
Engineering Communications and Marketing

Noise/News International (ISSN 1021-643X) is a quarterly news magazine published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA, Inc. (INCE/USA). *Noise/News International* is distributed to the Member Societies of I-INCE and to members of INCE/USA as a member benefit. Advertising sales are handled by Richard J. Peppin. Feature articles for this magazine are selected by the editors. Responsibility for editorial content rests upon the authors, and not upon I-INCE or INCE/USA, the Member Societies of I-INCE, or their members. Product information is published as a service to our readers, and does not constitute an endorsement by the societies or their members. **SUBSCRIPTIONS:** Members and Associates of INCE/USA and the Member Societies of International INCE receive *Noise/News International* as a membership benefit. Other individual or library annual subscriptions are 60 USD in the USA. Subscribers in other counties should add 10 USD per year for first class mailing to Canada and Mexico, and air mail postage overseas. Address inquiries concerning subscriptions to the INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153. **EDITORIAL CORRESPONDENCE:** Address editorial correspondence to George C. Maling, Jr., 60 High Head Road, Harpswell, ME 04079, USA. Telephone or FAX: +1 207 729 6430; e-mail: maling@alum.mit.edu.

NOISE/NEWS INTERNATIONAL

The printed version of Noise/News International (NNI) and its Internet supplement are published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA (INCE/USA).

I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its Internet supplement. I-INCE has an active program of technical initiatives, which are described in the Internet supplement to NNI. I-INCE currently has 46 Member Societies in 39 countries.

INCE/USA

The Institute of Noise Control Engineering of the USA (INCE/USA) is a non-profit professional organization incorporated in Washington, D.C., USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE/USA publishes the technical journal, *Noise Control Engineering Journal*, and, with I-INCE publishes this quarterly magazine and its Internet supplement. INCE/USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE/USA Members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an Associate of INCE/USA and receive both this magazine and *Noise Control Engineering Journal.*

NNI Internet Supplement

www.noisenewsinternational.net

- Links to the home pages of I-INCE and INCE/USA
- Abstracts of feature articles in the printed version
- Directory of the Member Societies of I-INCE with links, where available, to the Member Society Profiles and home pages
- Links to I-INCE Technical Initiatives
- Calendar of meetings related to noise—worldwide
- Links, where available, to NNI advertisers
- Links to news related to the development of standards
- Link to an article "Surf the 'Net for News on Noise," which contains links to noise-related sites—worldwide

Three Aspects of Sound

In education at universities in Japan, acoustics is not recognized as an independent department. Consequently, individuals are being educated separately in their respective research fields. It is regrettable that acoustics does not play a major role in these fields. The author has been in charge of lectures on engineering acoustics in architecture and information engineering departments. In these lectures, I usually start with the theme of this article—*three aspects of sound*.

Informational aspect: Animals receive the information of the outside world through their sense organs. Among them, auditory sense is essential and working all the time. Animals make communication each other using sound (voice). Especially, human beings exchange intellectual information by languages. The knowledge obtained using language is systematized and conceptualized and provides the basis of consideration. Children with hearing impairments are most seriously handicapped in this context. It is often said that visual sense is superior to auditory sense and the former accounts for eighty percent of all information, but the basis for this statement is weak.

Recently, my research group has been investigating acoustical problems in school buildings. In school education, sound is one of the most important media for comunication. Nevertheless, it is regrettable that consideration for acoustics is apt to be neglected in the process of architectural design. It is, however, not limited to school buildings. Another example showing informational aspect of sound is public-address system in public spaces and transportation facilities.

Cultural aspect: As another aspect of sound, is as an important factor in art. Only man possesses the ability to enjoy sound (music). Besides musicology, such research fields as musical acoustics, instrument acoustics and concert-hall acoustics have recently being developed in acoustics. The concept of "soundscape" proposed by R. Murray Schafer in the 1960s has become popular today. This concept allows a broad interpretation and deals with various kinds of sounds that exist in the living environments. It is important to observe the environments through auditory sense.

Social aspect: The third property of sound is its "social (sociological) aspect". While the economic growth, urbanization and development of transportation facilities provide us enormous improvements in living standards and convenience, they inevitably produce negative effects; that is, various kinds of environmental pollution. In recent years, global warming and CO_2 problems have become widely known, but environmental noise/vibration problems have to be considered as familiar and daily environmental conditions closely related to "Quality of Life." In almost all developed and developing countries, water and air pollution problems have been taken up first and the problem of community noise has been dealt with at the later stage. Such a process can be considered natural because most noise problems are indirect to physical damages and are rather related to the quality of the living environment.

In the 1960s, community noise in advanced countries was recognized to be a serious environmental pollution problem. This recognition led to the formation of INCE/USA in 1971, and the first international congress on noise control engineering, "INTER-NOISE" was held in 1972 in Washington DC. At the 3rd congress, INTER-NOISE 74, I-INCE was established.

Generally, acoustics belongs to physics but it has an aspect of human science. Especially in the case of noise control technology, not only technical/engineering factors but also such sociological factors as politics, economics, transportation systems and land-use planning are important. These factors are closely related to "Social (sociological) acoustics."

In annual yearly INTER-NOISE congresses and in the Technical Study Groups (TSGs) in I-INCE, "Global Noise Policy" is one of the most important topics. At INTER-NOISE 2006 in Hawaii, several special sessions related to this topic will be held. Each country has its own geographical, traditional, cultural, religious and social conditions and these differences have to be greatly respected in this kind of discussion. However, such general problems as the methods for the measurement and assessment of the noises in living and working environments, and legislative system for the preservation of sound environment should be and must be discussed on a global basis. It is expected that I-INCE will play a central role in this area.

Hideki Tachibana
President, International INCE

Keeping it Quiet

It has been observed by many authors and commentators in the field of environmental noise that, historically, research, policy and noise control initiatives have tended to focus primarily on issues involving high noise exposures. Indeed, if one looks back far enough, the main priority in the efforts of all those involved was on occupational noise—at levels high enough to damage hearing. Gradually, emphasis moved to issues of amenity, annoyance, sleep disturbance, and other health effects.

This has produced a situation in which the majority of current standards, guidelines etc. for community noise are designed to prevent harmful effects of noise. However, absence of harmful noise does not in itself guarantee a good sound environment or "soundscape" and, therefore, questions arise over whether or not current guidelines are applicable to situations involving quiet areas.

Also of relevance is the increasing "tension" between the pressure being put on rural areas, national parks etc. from housing development, industry and transport on the one hand, and the growing awareness and increased expectations of people concerning their environment.

In his study report on "Definition, Identification and Preservation of Urban & Rural Quiet Areas" for the EU Working Group on the assessment of exposure to noise (WG AEN), Dr Mike Fillery noted:

> *"If we ask the question 'What beneficial purpose does an area of quiet within a busy urban soundscape serve?' then the probable response from most people would be that the area of quiet provides a space for peaceful relaxation, for natural contemplation and for gentle conversation. It should provide a breathing space away from the hurly burly of city life."*

A similar concept of quiet areas as places of "restoration" from an otherwise noisy life has been the subject of specific research by environmental psychologists for many years. In fact, in 1999 Sweden set up specific program, funded by the Swedish Foundation for Strategic Environmental Research, with the overall title "Soundscape Support to Health." This acted upon the hypothesis that access to quiet areas (a quiet side, quiet recreational areas close to the home, etc.) significantly affects the perception of the noise environment and affects health and well being. The program aimed to develop scientific methods and models to predict and optimize the soundscape in connection with traffic and town planning aimed at improving residents' health and well being.

Furthermore, the World Health Organization (WHO), in the 1999 Guidelines report, recognized the issue and included in its recommendations for new studies:

> *"Studies to characterize 'restoration areas' which provide the possibility for rest without adverse noise load"*

The same WHO Guidelines document, in outlining strategies and policies for Noise Management, pointed out the need to;

> *"Assess the effectiveness of noise policies in reducing adverse health effects and exposure, and in improving supportive 'soundscapes.'"*

This Topic of "Quiet Areas" has come into more practical prominence in recent years, because of the need to address it in the actual implementation of the EU Environmental Noise Directive and related Action Plans.

Thus Article 2 "Scope" of the Directive reads:

> *This Directive shall apply to environmental noise to which humans are exposed in particular in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise sensitive buildings and areas.*

As a result of this requirement, the topic has been tackled in different ways in different EU Member States, and some of these efforts featured in a Special Session at the Euronoise 2006 conference in Finland earlier this year.

In the Netherlands, the Dutch State Secretary for the Environment requested the national Health Council to supply available scientific evidence on the influence of quiet areas on health, behavior and well-being

continued on page 125

Bernard Berry

European Editor
I-INCE VP for Europe and Africa

The Turkish Acoustical Society

The Turkish Acoustical Society (TAS) is an independent, non-profit, non-governmental organization founded in 1992, composed of individual members interested in all aspects of acoustics. The founding members were primarily members of university faculty and researchers from different departments, including disciplines of architecture, audiology, public health, electrical, mechanical and civil engineering. Membership has grown to include representatives from various industries, including household appliance manufacturers, producers of acoustical materials, automotive industry, and noise control consultants.

TAS became a full member of European Acoustical Association (EAA) in 1995. The Society has been a full member of I-INCE as well as the International Institute of Acoustics and Vibration (IIAV) since 1997.

The work of the society and its members is guided by the following seven objectives;

- To distribute scientific knowledge and the new technologies in all aspects of acoustics and noise control engineering,
- to establish relationships between Turkish researchers,
- to organize congresses and seminars on acoustics,
- to cooperate with other international acoustical societies,
- to warn the community and especially younger generations on the negative effects of noise and noise pollution,
- to assist the community and individuals with solutions to environmental noise problems, and
- to cooperate with the governmental authorities to promote legislation about noise control.

The society maintains three commissions: Commission for Standards and Regulations, Commission for Terminology, and the Commission for Inventory of Acoustics studies and research environments in Turkey.

TAS has maintained an active schedule since its founding. The society so far has organized seven national congresses on acoustics and noise control engineering. It has also hosted numerous training seminars on various topics including:

- Acoustical problems encountered in environment, buildings and industry,
- building acoustics,
- applied modal testing,
- sound quality, and
- NVH problems in automotive industry.

TAS has also organized poster, composition and cartoon contests to increase the awareness of society on noise related issues. Technical excursions and meetings on case studies were organized for the members.

TAS will host INTER-NOISE 2007, which will be held August 28-31 in Istanbul. The theme for the event, which is the first-ever organized by this society, is "Global Approaches to Noise Control." More information is available on the Congress website: www.internoise2007.org.tr, and the Announcement and Call for Papers begins on page 122 of this issue.

More information on the society is available at its website: www.takder.org. Many of the pages within the site are available in English. TAS also can be contacted by email at guney@itu.edu.tr

This is the 55th in a series of articles on the Member Societies of International INCE.

Personal computer, printer, and portable equipment noise in classrooms

Robert D. Hellweg, Jr.[a], Egons K. Dunens[b], and Terrence Baird[c]

Introduction

The American National Standard on classroom acoustics - ANSI S12.60-2002[1]- presents criteria for background noise in classrooms. The background noise criteria in ANSI S12.60 do not apply to the noise from portable or permanent built-in equipment used during the course of instruction, such as computers, audiovisual equipment, and printers. ANSI S12.60 provides general guidance on the selection and installation of such equipment in an Annex; however, the standard does not present specific recommendations to ensure that these products meet classroom acoustical needs when purchased by schools. This paper updates the recommendations made in a NOISE-CON 2003 paper[2] on an approach for ensuring that computers and instructional material are acceptable acoustically in classroom environments. This paper also recommends product sound power criteria based on levels necessary to meet the ANSI S12.60 sound pressure level criteria, our experience and existing environmental criteria.

In order to minimize possible adverse effects from computers, audiovisual equipment, and printers when installed in classrooms, schools should purchase equipment that meet unambiguous specifications that include product A-weighted sound power level criteria. Schools should then install and operate the equipment in a manner to minimize noise emissions— considering both location of products and students as well as special noise reduction techniques. This paper recommends a purchase specification format which includes sound power criteria and recommends procedures for installing and locating such equipment in the classroom to minimize noise.

By following the approach recommended in this paper, schools can ensure that computer products and instructional material are acoustically acceptable in classroom environments.

ANSI S12.60 Background A-weighted Sound Level Criteria

The ANSI S12.60-2002 standard on noise in classrooms includes background noise level criteria which are maximum one-hour A-weighted and C-weighted sound pressure levels. The maximum A-weighted one-hour steady background noise levels are 35 dB for core learning spaces having a volume less than 566 m^3 and 40 dB for core learning spaces having a volume greater than 566 m^3 and for ancillary spaces. The background noise criteria applies to noise from building services and utilities, such as cooling, heating, ventilating and dehumidifying equipment, and from external noise sources such as highways and airplanes. If transportation noise dominates the background noise during the noisiest hour, then these limits are increased by 5 dB. Please refer to reference 1 for details.

Not all sources of classroom background noise are covered by the background noise criteria in ANSI S12.60. Noise generated within a classroom by its occupants, such as voices and sounds generated by moving chairs, are excluded. Furthermore, noise from portable or permanent built-in equipment used during the course of instruction (such as computers, audiovisual equipment, and printers) is excluded. The fact that computer products and projectors are excluded from ANSI S12.60 does not imply that these sources could not interfere with instruction. ANSI S12.60 annex B5 provides general guidance on the selection and installation of such equipment; however, the standard does not present either recommended criteria or specific recommendations for purchasers of such equipment.

Sound Power Criteria for Computers, Projectors, and Printers

An approach for controlling the noise from computers, projectors and printers in classrooms is for schools to specify acceptable acoustic noise emissions from the product, to purchase products that meet those criteria, and to install them properly. A-weighted sound power level L_{WA} is the proper metric to use for such specifications since it does not change with installation conditions, and it is a quantity that the manufacturer of those products can control. The manufacturer cannot

This feature article is an edited version of a paper titled "Personal computer, printer, and portable equipment noise in classrooms" by Robert D. Hellweg Jr., Egons Dunens, Terrence Baird, and John N. Olsen, which appeared in the Proceedings of NOISE-CON 05, The 2005 National Conference on Noise Control Engineering, Minneapolis, Minnesota, USA. Paper NC05_097.

a Hewlett-Packard Co., 200 Forest Street, Marlborough, Massachusetts, USA
b Hewlett-Packard Co., 20555 State Highway 249, Houston, Texas, USA
c Hewlett-Packard Co., 11311 Chinden Blvd., Boise, Idaho, USA

control how the product is installed—which affects the resulting A-weighted sound pressure levels, L_{pA}, in the classroom. Thus, L_{pA} is not the appropriate metric that describes the product noise emissions and should not be specified when purchasing products.

The proper metric for specifications of information technology (IT) products is the "declared" or statistical maximum A-weighted sound power level, L_{WAd}, in bels according to ISO 9296.[3] (Sound power level in "bels," abbreviated B, is used to avoid confusion with sound pressure level in "decibels.")

L_{WAd} is about 0.3 bels greater than the average A-weighted sound power level, L_{WA}; this difference of 0.3 bels is due to both product unit-to-unit variation and laboratory-to-laboratory measurement variation. ISO 9296 specifies how to determine and verify L_{WAd} when the A-weighted sound power levels are determined according to ANSI S12.10-2002,[4] which is the American version of ISO 7779.

When these IT products are installed in classrooms, the important acoustical parameter for the student or teacher in the classroom is the A-weighted sound pressure level L_{pA} at their ears. References 2 and 5 developed transfer functions, TF, that relate product A-weighted sound power level L_{WAd} values to the A-weighted sound pressure level L_{pA} values at receivers' ears within a classroom based on the relationship between the location of the product and the receiver. The transfer function TF is defined by the following equation:

$$TF = (L_{WAd} \times 10 - L_{pA}), \text{dB}$$

Table 1 presents the source-to-receiver sound power to sound pressure level transfer functions TF for classrooms. These transfer functions

Robert Hellweg has BS and MS degrees in engineering from the University of Illinois. He has 25 years experience with HP (via the mergers with Compaq and Digital Equipment Corp) in quieting and testing IT products. Bob is a Board Certified member of INCE/USA and a Fellow in ASA. Bob serves as chair of ITI TC6 Product Acoustics and of ANSI S12 Noise standard committee and is a member of other ANSI, Ecma, INCE, and ISO working groups.

Terry Baird received BA from Michigan State University and has been involved in IT equipment hardware testing with HP for 24 years. Terry is currently the senior noise and vibration test engineer for HP's LaserJet Hardware Test Lab where recent work has included component noise diagnostics and printer sound quality. Terry is a member of several committees on computer noise including the INCE TC on IT noise emissions.

Egons Dunens received his B.E.E., M.S.E.E. and Ph.D degrees from the University of Minnesota. He has 30 years experience in noise measurement and control with the last 20 years with the computer industry, the last 15 years with HP (from the merger with Compaq). Egons serves as chair of Ecma TC26 Product Acoustics and is a member of ITI, INCE, ANSI, and ISO computer noise committees.

were obtained from analyses using several different experimental, analytical and empirical methods. The transfer functions TF in Table 1 were used to determine the sound pressure levels in classrooms resulting from the recommended sound power levels for computers and business equipment in the following sections.

Personal Computers (PC)

A Swedish standard, Statskontoret 26:6, has recently established recommended highest noise emission values, L_{WAd}, for PCs intended for classrooms, quiet offices, and homes. For idle mode, the L_{WAd} is 4.5 B and for operating mode the L_{WAd} is 5.0 B.[6] Statskontoret 26:6 was updated after considerable inputs from its independent acoustical expert and the Information Technology Industry Council Technical Committee 6 on product acoustics (ITI TC6). Based on our analysis of recent noise data associated with accessing hard disk drives in personal computers, we recommend a lowering of the Statskontoret 26:6 operating mode L_{WAd} value by 0.2 B to 4.8 B. Our recommendations for desktop PC idle and operating mode L_{WAd} are lower than the previous existing European Eco-label values: 0.3 B for idle mode and 0.7 B for hard disk operation.[2]

Desk-side products are farther from the user and are partially blocked by the desk so that the resulting sound pressure level at the user's ears is lower than from a closer desktop computer with the same L_{WAd} value. Statskontoret 26:6 has an adjustment of 0.3 B for desk-side PCs L_{WAd} values in comparison to desktop PCs in classrooms, quiet offices and home environments. Being slightly conservative, we recommend this same value so that the sound pressure levels at the user's ears are the approximately the same from both types of products in classrooms.

The sound pressure levels, L_{pA}, in classrooms resulting from the operation of PCs meeting these criteria were obtained by applying the transfer functions from Table 1 to the PC L_{WAd} values given above. For a PC on a student's desk in a classroom TF = 11 dB and the L_{pA} at that student's ears would be 34 dB during PC idle operation and 37 dB during hard disk drive (HDD) operation; for a deskside PC, the resulting L_{pA} at the student's ears are 33 dB and 36 dB, respectively. These L_{pA} values are consistent with the ANSI S12.60 criteria for background noises and will result in acceptable acoustical conditions in classrooms. If the PC has an "energy saving" mode, in which the fans and HDD stop spinning, there would be no noticeable noise from the PC and the one-hour L_{pA} from the PC would be lower.

Notebook Computers

L_{WAd} values for notebook computers should be slightly lower than desktop PCs for several reasons. Since a notebook computer is physically closer to the user's ears by less than half the distance, the L_{WAd} must be lower by 0.3 to 0.5 B to have similar L_{pA} values at user's ears as from PCs. This is achievable because notebook computers are generally less powerful than desktop PCs, and their disk drives are smaller and quieter than desktop PCs. The IT industry has recognized the demand from customers to have products which produce similar noise at user's ears resulting in notebook computers that have lower L_{WAd} values than PC values. Thus, we recommend an idle mode L_{WAd} value of 4.0 B for notebooks which agrees with the Statskontoret 26:6 criteria. We have recently performed a similar analysis on disk operating noise from notebook computers, and we conclude that an appropriate notebook operating mode L_{WAd} is 4.3 B, which is 0.2 B lower than the Statskontoret 26:6 criteria for notebook operating mode. The resulting L_{pA} values from notebook computers in classrooms are lower than the ANSI S12.60-2002 criteria.

Printers

The recently-adopted Swedish Statskontoret 26:6 acoustical criteria for inkjet and laser printers depend on the printing rate in pages per minute (ppm). For classrooms, the Swedish L_{WAd} criterion for a printer installed near students or teachers is given by the following equation:

$$L_{WAd} = 6.0 + \log (L_2/8) \quad \text{in bels,}$$

where L_2 is printer operating speed in pages per minute; if $L_2 < 8$ ppm, use $L_2 = 8$.

The Statskontoret 26:6 acoustical criterion during the printing mode is a L_{WAd} of 6.0 B if the print speed is less than 8 ppm. Instead of including a formula based on print speed in a specification, we recommend criteria based on the range of print speeds: L_{WAd} = 6.2 B if the print speed is 9-14 ppm and 6.4 bels if the speed is 15–20 ppm. Noisier and larger printers may be installed in classrooms provided they are at a further distance and shielded to reduce noise at the students' ears. The Statskontoret formula is 0.6 B higher for larger printers in general offices. We recommend printer idle mode noise values that are the same as those in Statskontoret 26:6 or that will result in equivalent L_{pA} values. A summary of our recommendations for printer L_{WAd} criteria and restrictions on location is included in Table 2.

By applying the transfer functions between L_{WAd} and L_{pA} from Table 1 to the recommended criteria in Table 2, one sees that the resulting idle mode sound

Table 1: Source-to-receiver TF transfer function between sound power level and sound pressure level for computer sources for a receiver seated at a desk in a classroom[2].

	TF - Transfer Function (L_{WAd} x 10 - L_{pA}), dB — Location of computer product in classroom				
Partial height barriers present between source and receiver's desk?	Desktop	Deskside	Table-Top near desk	~ 3 m from receiver	> 4 m
N - Classroom w/o acoustical screens	11	15	15	19	22
Y - Classroom with acoustical screen between noise source and receiver	—	—	19	23	26

pressure level L_{pA} values are less than the background noise criteria in ANSI S12.60 and equal to or less than the L_{pA} values from PCs. For printers that meet our L_{WAd} recommendations in Table 2, the L_{pA} values are equal to or less than the values from small printers: 45 dB or less. Since classroom printers are not used for long durations, these levels are compatible with the one-hour criteria of ANSI S12.60. Faster printers and dot-matrix printers, which are noisier, should be located further away and behind acoustical screens or in other rooms. The recommended installation considerations given in Table 2 are based on the operating L_{WAd} values in Table 2; installation restrictions could change if a product's actual L_{WAd} is greater or less than those in Table 2.

Projectors

Typically a projector in a classroom will be located on a table near desks with a transfer function between L_{WAd} and L_{pA} of 15 dB. In larger classrooms, the projector will be greater than 3 meters from the nearest desk with a transfer function of at least 19 dB. With the ANSI S12.60 background criteria of 35 dB, these result in L_{WAd} values of approximately 5.0 and 5.5 B. The sound pressure levels from the projectors will be comparable to PC noise values in the idle mode. Furthermore, when projectors are operating the PCs should be in the energy save mode, so the PC noise levels are almost inaudible and are not contributing to background noise levels in the classroom.

Small Servers and Other Multi-user Computers

Some classrooms may have a small server to which other units are connected. Normally these servers should not be located near desks unless they are sufficiently quiet. A small deskside server should have the same criteria as a deskside PC. Other servers will be acceptable provided that they are installed in a manner that will reduce noise emissions at the receivers by using a combination of distance from the source and the proper use of noise barriers or a shield. Using the ANSI S12.60 background sound pressure level of 35 dB as a basis and the transfer function from Table 1 for a product located more than 4 meters from desks with an acoustical screen (TF = 26 dB), the resulting "one-hour" L_{WAd} value is 6.1 B. Considering the difference in idle and HDD operating noise from servers installed in such a manner results in L_{WAd} values of 6.0 B for idle mode and 6.2 B for operating mode.

Summary of Recommended L_{WAd} Values

Table 2 presents a summary of the recommended L_{WAd} values for computers, projectors and printers that will result in acceptable sound pressure levels in classrooms. Conditions, if any, for installation of these products are also presented in Table 2. Additional L_{WAd} values for other installation conditions are also presented. The values for the additional L_{WAd} values were determined using the methodology described previously relating L_{WAd} values to L_{pA} values at students' and teacher's locations and the ANSI S12.60 criteria for sound pressure levels in the classroom.

Format for Purchase Specification

In order for schools to purchase products that are acoustically acceptable for classrooms, schools must use unambiguous

Table 2: Recommended LWAd values and installation restrictions for computer and instructional products located in classrooms

Product Type	L_{WAd} per ISO 9296, Bels: Idle	L_{WAd} per ISO 9296, Bels: Operating	Recommended closest location to desk or installation
Personal Computer			
Desktop	4.5	4.8	No restriction
Deskside	4.8	5.1	No restriction
Notebook PC	4.0	4.3	No restriction
Printer- inkjet or laser			
< 8 ppm	4.5	6.0	Table near desk
9 – 14 ppm	5.3	6.2	~ 3 m or behind acoustical screen
15 -20 ppm	5.3	6.4	~ 3 m or behind acoustical screen
21 – 25 ppm	5.4	6.5	> 4 m or behind acoustical screen
> 25 ppm	5.6	7.1	> 4 m and behind acoustical screen or in another room
Printer – dot matrix	5.3	7.2	> 4 m and behind acoustical screen or in another room
Projector	5.0	5.0	Table near desk
Projector	5.5	5.5	~ 3 m or with acoustical screen
Small Server	4.8	5.1	Floor next to desk or table near desk
Small Server	5.3	5.5	~ 3 m
Small Server	5.6	5.8	> 4 m
Small Server	6.0	6.2	> 4 m with acoustical screen

Note: The recommended installation considerations given in Table 2 are based on the operating L_{WAd} stated in Table 2; installation conditions could change if product's actual L_{WAd} is greater or less than that stated.

Table 3: Sample acoustic noise specification for IT equipment in a classroom: Acoustics. A-weighted sound power level L_{WAd} in accordance with ISO 9296 shall be no greater than the values shown in this table.

Product	Maximum Declared A-weighted sound power level per ISO 9296 L_{WAd}	
	Idle Mode	Operating Mode
Desktop PC	4.5 B	4.8 B
Notebook PC	4.0 B	4.3 B
Small Projector	5.0 B	5.0 B
Printer, < 8 ppm	4.5 B	6.0 B

purchase specifications with appropriate A-weighted sound power level criteria (L_{WAd}.). The noise criterion should be selected from those presented in Table 2 for the conditions in which the school will install the products. The acoustical noise portion of the purchase specification should, as a minimum, contain the required L_{WAd} values for each mode of operation, and the standard which defines how the L_{WAd} values were determined and can be verified (ISO 9296).

The following is an example of such a specification for a desktop PC:

> *"Acoustics. A-weighted sound power level L_{WAd} in accordance with ISO 9296 shall be no greater than 4.5 bels for the idle mode and 4.8 bels for the operating mode."*

If more than one type of equipment is being purchased, a table similar to that shown in Table 3 should be used to specify the L_{WAd} values for the several product types.

A manufacturer's declaration certifying that the data meet ISO 9296 and ANSI S12.10 (or ISO 7779) is sufficient to satisfy purchase specifications, and thus there is no need to measure sound pressure levels in rooms to verify compliance. If conformance of the products to the specification is questioned, then the procedures in ISO 9296 for verification of the L_{WAd} values should be used.

Install and Operate Computers and Equipment Properly

To obtain the benefits of products with appropriate sound power levels, the users should install computers and instructional equipment in classrooms in a manner to minimize noise levels as suggested in ANSI S12.60 annex B5. The following are approaches that may be successful depending on the actual noise emissions of the product: More powerful printers could be installed away from students and teachers and behind acoustical screens depending on the L_{WAd} values. Noisier servers should be in a second room or installed with special noise control features behind a screen. Projectors could be located away from students and on acoustical mattes to isolate structure-borne noise from the table and to absorb sound. Mini-tower PCs could be installed on the floor next to the desk instead of on top of desks.

Inkjet printers have several modes of operation, which differ substantially in sound power output, and classroom users should have the option of printing in normal mode, which is much quieter (0.3 to 0.8 bel depending on the printer) than the fastest mode. We recommend that in classrooms inkjet printers be operated in the default or "normal" mode, and not be operated in the fastest and noisiest mode.

Recommendations

Schools should purchase equipment which meets the A-weighted sound power level criteria, L_{WAd}, per ISO 9296 that we have recommended as appropriate for products installed in classrooms. Schools should then install and operate the equipment in a manner to minimize noise emissions – considering both location of the products and students and special noise reduction techniques. We recommend modifying ANSI S12.60 to include an informative annex on computers, projectors, printers and other instructional equipment. The annex should contain the table of recommended L_{WAd} values given in Table 2; a recommended format for purchase specifications for this equipment in classrooms, and guidelines for installing, operating, and locating these products in classrooms. The procedures outlined in the proposed annex can easily be used by school systems to ensure that computers, printers, projectors and instructional material are acceptable acoustically in classroom environments. Products are available today that meet our recommendations in Table 2, and they are acoustically suitable in classrooms.

References

1. *ANSI S12.60-2002 Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools*. Acoustical Society of America, Melville, NY, USA, 2002
2. Robert D. Hellweg, Egons Dunens, and Terry Baird, "The Control of Computer and Portable Equipment Noise in Classrooms," *Proceedings of NOISE-CON 2003*, Cleveland, Ohio, USA, 2003.
3. *ISO 9296-1988 Declared Noise Emission Values of Computer and Business Equipment*, International Standard. International Organization for Standardization. Geneva, Switzerland, 1988
4. *ANSI S12.10-2002 Acoustics - Measurement of Airborne Noise Emitted by Information Technology and Telecommunication Equipment*. Acoustical Society of America, Melville, NY, USA,2002
5. Robert D. Hellweg, Jr., "Room sound pressure levels from computer and business equipment meeting sound power level criteria," *Proc. NOISE-CON 96*, (INCE/USA, Ames, IA, 1996), pp. 79-84
6. *Statskontoret Technical Standard TN 26:6 Acoustical Noise Emission of Information Technology Equipment*, Statskontoret, the Swedish Agency for Administrative Development, Stockholm, Sweden, 2004

Books

Noise and Vibration Control Engineering, 2nd Edition

István L. Vér and Leo L. Beranek, Editors

John Wiley and Sons, Inc., 2006

x + 966 pp., hardcover, 175 USD. ISBN 0-471-44942-3

The first edition of *Noise and Vibration Control Engineering* was published in 1992, and was a greatly expanded version of Leo Beranek's classic book, *Noise and Vibration Control*, which was first published in 1971.

Most of the chapters in the first edition have now been updated, and several chapters have been added, or have been completely rewritten. The new or rewritten chapters are indicated by an asterisk after the chapter title below.

This volume contains a wealth of information about noise from specific sources, such as stationary machines. The emphasis, however, is on the fundamental elements of noise control engineering such as the properties of acoustical materials, impact noise, transmission of sound in air and in structures, interactions of sound waves with structures, silencers, determination of noise emission, etc. There is a long chapter on the principles of active noise control. The fundamentals of wave propagation, acoustical terminology, and criteria for noise control—both indoors and outdoors—are also covered. There are 21 chapters and three appendices. Appendix B is titled "American System of Units," which outlines the difficulties with the system, and encourages the use of the metric system—which of course is widely used in noise control engineering.

The names of almost all of the authors will quickly be recognized by those professionally involved in noise control engineering. Perhaps the best way to give an indication of the breadth of subjects covered is simply to list titles and authors of the chapters in the book:

1. **Basic Acoustical Quantities: Levels and Decibels,** *Leo L. Beranek*
2. **Waves and Impedance,** *Leo L. Beranek*
3. **Data Analysis,** *Allan G. Piersol*
4. **Determination of Sound Power Levels and Directivity of Noise Sources,** *William W. Lang, George C. Maling, Jr., Matthew A. Nobile, and Jiri Tichy*
5. **Outdoor Sound Propagation,*** *Ulrich J. Kurze and Grant S. Anderson*
6. **Sound in Small Enclosures,** *Donald J. Nefske and Shung H. Sung*
7. **Sound in Rooms,** *Murray Hodgson and John Bradley*
8. **Sound-Absorbing Materials and Sound Absorbers,*** *Keith Attenborough and István L. Vér*
9. **Passive Silencers,** *M.L. Munjal, Anthony G. Galaitsis and István L. Vér*
10. **Sound Generation,*** *István L. Vér*
11. **Interaction of Sound Waves with Solid Structures,** *István L. Vér*
12. **Enclosures, Cabins, and Wrappings,** *István L. Vér*
13. **Vibration Isolation,** *Eric E. Ungar and Jeffrey A. Zapfe*
14. **Structural Damping,** *Eric E. Ungar and Jeffrey A. Zapfe*
15. **Noise of Gas Flows,** *H.D. Baumann and W.B. Coney*
16. **Prediction of Machinery Noise,** *Eric W. Wood and James D. Barnes*
17. **Noise Control in Heating, Ventilating, and Air Conditioning Systems,*** *Allan T. Fry and Douglas H. Sturz*
18. **Active Control of Noise and Vibration,*** *Ronald Coleman and Paul J. Remington*
19. **Damage Risk Criteria for Hearing and Human Body Vibration,** *Suzanne D. Smith, Charles W. Nixson and Henning E. Von Gierke*
20. **Criteria for Noise in Buildings and Communities,*** *Leo L. Beranek*
21. **Acoustical Standards for Noise and Vibration Control,*** *Angelo Campanella, Paul Schomer, and Laura Ann Wilber*

Appendix A is a list of general references to other books related to digital signal processing, acoustics shock and vibration, statistical energy analysis, and noise control engineering. Appendix B is on the American System of Units as mentioned above, and Appendix C is a convenient list of conversion factors. The book contains a complete 24-page index.

Noise of consumer products: consequences for environmental health

Dieter Schwela, Stockholm Environment Institute at York University, York, YO10 5DD, United Kingdom

Introduction

In this paper, a consumer product is defined as a good or service which is purchased and used by an individual in contradistinction to a manufacturer who produces the good or service and a wholesaler or retailer who distributes and sells it.* Noise may be defined as the "most impertinent of all interruptions because it interrupts or even crushes our own thoughts."[1] This definition of noise has the advantage that it covers both the perceptions of the originator of sound who likes and does not reflect on it and the bystanders for whom the sound is unwanted.

I-INCE publication 05-1[2] defines noise from consumer products as "unwanted sound at the position of a user or bystander of a noise-producing product over which an individual may have some control…" A problem in this definition is that user or bystander perceptions of sound are implicitly assumed to be the same. A user, however, who has control over the consumer product, may consider the sound not as unwanted while the bystander, who has no control over it, does (e.g. the user of a motorcycle who likes the full sound of the vehicle).

In this article, exposure to noise from consumer products is limited to include exposure to noise from

- recreational activities (e.g., use of guns, model airplanes, motorcycles, snowmobiles, go carts, all-terrain vehicles, video arcades, and private planes);
- hobbies/workshop (e.g., chain saws, power saws, shop vacuums, routers, lawn mowers, leaf and snow blowers);
- household appliances (e.g. garbage disposals, food blenders, vacuum cleaners, washers and dryers, air conditioners, and refrigerators);
- information technology equipment (computers, printers, fax machines, copiers, scanners, telephones);
- toys (cap guns, firecrackers, talking dolls, toy vehicles, wind-up toys)
- private vehicles (inside) such as cars, vans, boats, and on a motorcycle;
- home and car audio, music in dance bars and fitness classes, personal stereo system.

In contrast to I-INCE publication 05-1, the noise inside public transport vehicles (buses, trains, ferries, and aircraft) is not considered as a consumer product noise but rather as environmental noise heard inside the vehicles since, in general, public transport vehicles are not considered as consumer products.

There is some potential overlap between noise from consumer products and environmental or community noise. Environmental noise is considered in the *WHO Guidelines for Community Noise*[3] to include noise emitted from outdoor and indoor sources except noise at the industrial workplace (occupational noise). In the WHO document, consumer product noise is part of environmental noise, and no separation is made as in I-INCE publication 05-1.

The European Commission Directive 2002/49/EC[4] relates to the assessment and management of environmental noise, which is defined as "unwanted or harmful outdoor sound created by human activities." This definition would cover outdoor noise from air conditioning and heating, powered gardening equipment, powered tools used outdoors and toys used outdoors, which, according to I-INCE publication 05-1, is attributed to consumer product use.

In all societies throughout the world, the general population is increasingly exposed to environmental and consumer product noise, however defined. The health effects of these exposures constitute an increasingly serious public health problem. Each additional source of noise to the environment, even if its contribution is small, affects everyone. Most persons are exposed to several noise sources or combinations of noise exposure from more than one source. In contrast to many other environmental problems, noise pollution continues to grow and is accompanied by an increasing number of complaints by noise-exposed persons. Noise pollution from all types of sources—occupational, environmental, or consumer-product-related—is, therefore, unsustainable. Driving forces for the increase in consumer product noise are the neglect of the value of silence and the technological development of consumer products. Expected future growth in the use of information technology, household appliances, powered gardening equipment, powered tools, air conditioning and heating units will increase the problem. Therefore,

* *Amalgamation from the definition of 'consumer' in Answers.com, Internet URL: http://www.answers.com/topic/consumer and the definition of 'product' in Deardorff's Glossary of International Economics, Internet URL: http://www-personal.umich.edu/~alandear/glossary/p.html.*

strategic action is urgently required—including continued noise control at the source and noise management locally, regionally, nationally, and internationally. As in the case of emissions of chemicals from consumer products, exposure assessment is an important part of risk assessment. Little has been published, however, about noise exposure scenarios, models, and noise exposure factors such as physiological factors and time use patterns of consumers when using various products.

This article is organized as follows: A brief description of the adverse health impacts of noise and the ranges of sound pressure levels of certain consumer products is followed by a discussion on the measurement of noise exposure. The legislation in the European Union, Canada and the United States is then outlined. A final section is devoted to the advocacy of a global policy for noise management for consumer products.

Adverse Health Impacts and Ranges of Sound Levels from Consumer Products

In the WHO 2000 document, reference 3, an adverse effect of noise is defined as a "change in morphology and physiology of an organism, which results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increase in susceptibility to the harmful effects of other environmental influences." This definition includes any temporary or long term lowering of physical, psychological or social functioning of humans or human organs. Adverse effects of noise include hearing impairment, interference with speech communication, sleep disturbance, physiological effects, performance effects, annoyance, and behavioral effects.

Noise Induced Hearing Impairment

Noise-induced hearing impairment is an increase in the threshold of hearing caused by noise. According to ISO 1999[5] noise-induced hearing impairment can be sufficient to affect one's personal efficiency in the activities of daily living, usually expressed in terms of understanding conventional speech in low levels of background noise. An equivalent A-weighted sound pressure level of 70 dB is a sound level for which 24-hour exposure does not lead to hearing impairment.[3] Most countries have promulgated an A-weighted equivalent sound pressure level of 85 dB or 90 dB during an 8-hour exposure as protective against hearing impairment for most occupationally exposed persons.[6, 7, 8, 9] By adopting Directive 2003/10/EC,[10] the European Commission has reduced the lower and upper action exposure limits (A-weighted) for hearing impairment of workers to 80 dB and 85 dB, respectively.

Noise-induced hearing impairment has emerged as a significant social and public health problem. Noise-induced hearing impairment in children and young adults has been linked to recreational noise and leisure activities. In 1985, Axelson and Jerson[11] evaluated noisy toys as possible sources of noise induced hearing loss (NIHL) in children. Several studies have reported an increasing tendency of noise-

Dr. Dieter Schwela was educated as a physicist (Dr rer.nat) and worked from 1975 to 1994 on air quality management in the Centre for Air Pollution Research, Essen, Germany. From May 1994 to March 2003, Dr. Schwela was responsible for the normative work of the World Health Organization Headquarters in Geneva in the field of air quality and noise pollution. He was responsible for the WHO Guidelines for Community Noise. From April 2003 to March 2005, Dr. Schwela worked at the Institute for Health and Consumer Protection of the European Commission Joint Research Centre, Ispra, Italy, in the field of exposure to and health impacts of releases of chemicals and noise from consumer products. Since then Dr Schwela has been with the Stockholm Environment Institute at York University, York, UK, working in the "Implementing Sustainability Group" on issues of air quality (including noise) management.

induced hearing impairment in children and adolescents. Niskar *et al.*[12] estimated that 12.5% of children aged 6 to 19 years in the United States have noise-induced threshold shifts. Chung *et al.*[13] reported through a questionnaire survey that 61 per cent of 9693 respondents had experienced tinnitus or temporary hearing impairment while attending rock concerts.

Acoustic Trauma

Acoustic trauma—an immediate, severe and persistent hearing loss—may result from a short-duration sound of sufficient intensity. Less intense exposure to noise may initially cause only temporary hearing loss, which generally subsides once the ears have had a rest from the noise. Over time, repeated exposure to sounds that cause a temporary hearing loss may gradually cause permanent noise-induced hearing loss.

Interference With Speech Communication

Noise interference with speech communication reduces speech comprehension and may result in a large number of personal disabilities, handicaps and behavioral changes. Problems include concentration reduction, fatigue, uncertainty and lack of self-confidence, irritation, misunderstandings, decreased working capacity, problems in human relations, and a number of stress reactions. Particularly vulnerable to these types of effects are the hearing impaired, the elderly, children in the process of language and reading acquisition, and individuals who are not familiar with the spoken language.

Sleep Disturbance

Noise during sleep period times causes sleep disturbance and awakenings (primary effects).Secondary effects such as reduced perceived sleep quality, increased fatigue, depressed mood or well-being, and decreased performance can occur the day after the night-time exposure to noise.

Physiological Effects

Noise may have a large temporary and permanent impact on physiological functions in man. The magnitude and duration of effects in general populations (including children) living in noisy areas around airports, industries and on noisy streets are determined in part by individual characteristics, lifestyle behavior, and environmental conditions. Sudden and unfamiliar sounds also evoke reflex responses.

Annoyance

Noise accompanied by vibrations and low frequency components or noise containing impulses affects the exposure-response curves for annoyance. Annoyance is indicated in the WHO guidelines[3] as the percentage of highly annoyed persons in a population and given as a function of the day and night continuous equivalent sound level. When noise exposure is increased over time compared with situations with a stationary noise exposure, temporary stronger annoyance reactions occur.

Consumer Product Noise

All of these health impacts of noise can also be produced by consumer products. Open air events such as ceremonies, festivals, and entertainment events all over the world have long been recognized as a significant source of noise pollution, delivering A-weighted sound levels between 100 and 150 dB, although for short durations. For this noise exposure, the WHO defines guideline values of L_{Aeq} = 100 dB and a $L_{Amax, fast}$ = 110 dB.[3] Music through headphones and home stereos has A-weighted levels between 60 and 110 dB, and repeated exposures to levels above 80 dB can lead to hearing impairment. WHO defines guideline values L_{Aeq} = 85 dB and $L_{Amax, fast}$ = 110 dB. A-weighted impulse noise levels from toys, fireworks and firearms range between 105 and 140 dB. For children, the $L_{Amax, fast}$ is recommended to be below 120 dB in order to avoid hearing impairment.[3]

Table 1 shows some A-weighted sound levels for consumer products and services and the human response. Depending on the sound level and exposure time, all of these sources pose a potential risk of a gradual, noise-induced hearing impairment.

Measurement of Noise Immissions

Different approximate metrics are used to describe exposure to consumer product noise (immission). The health impacts due to exposures to permanent noises such as those of air conditioning and heating units, those of powered gardening equipment and powered work tools have to be combined with those from recreational noise and environmental noise. The effect of a combination of noise events is related to the combined sound energy of those events. The sum of the total energy (squared sound pressure) over some time period, T, results in an equivalent level, $L_{Aeq,T}$. Where there are distinct events to the noise such as aircraft or railway noise, one should, in addition to $L_{Aeq,T}$ value, obtain measures of the individual events such as the maximum level of individual noise events, L_{Amax}, or their A-weighted sound exposure level, SEL.

There are limitations to these simple measures but also many practical advantages, including economy and the benefits of a standardized approach. There are additional measures such as the day-night equivalent sound level, L_{dn}. However, most of the existing data refer to $L_{Aeq,T}$ and L_{Amax}, from which. therefore, WHO guideline values[3] were derived. The EC Directive 2002/49/EC[4] recommends the use of the day-evening-night equivalent sound level, L_{den}, but even this indicator will not cover the complexity of exposure to consumer product noise or to environmental noise.

EU Legislation

The Fifth Environmental Action Programme[16] identified noise as one of the most pressing environmental problems in urban areas and the need to take action with regard to various noise sources including consumer products. In its Green Paper,[17] the Commission announced its intention to propose a framework directive to control noise emission by equipment for use outdoors.

Table 1: Sources, A-weighted sound pressure levels and human responses

Source	Sound levels (dB)	Human response
Five firecrackers (distance 3 m)[11]	125-156	Hearing impairment for adults at $L_{Amax, fast} > 140$ dB and children at $L_{Amax, fast} > 120$ dB[3]
Toy weapons (distance 50 cm)[11]	153	Hearing impairment for children at $L_{Amax, fast} > 120$ dB[3]
Ceremonies, festivals and entertainment events[3]	100-150	Hearing impairment for $L_{Aeq} > 100$ dB for 4-hour exposure and $L_{Amax, fast}$ of 110 dB[3]
Impulse noise from toys, fireworks and firearms ranges[3]	105-140	Hearing impairment for children at $L_{Amax, fast} > 120$ dB
Shotgun firing[14]	130	Threshold of pain
Toy xylophone (distance 30 cm)[14]	129	Regular exposure to this level of more than 1.5 s risks permanent hearing impairment
Toy drum (distance 30 cm)[14]	122	Regular exposure to this level of more than 8 s risks permanent hearing impairment
Discotheque[14]	120	Regular exposure to the upper level of more than 10 s risks permanent hearing loss
Squeaky toys (at the ear)[14]	118	Regular exposure to the upper level of more than 15 s risks permanent hearing loss
Power tools[15] Pneumatic drill	85-113	Regular exposure to the upper level of more than 60 s risks permanent hearing loss
Music through headphones and personal stereo systems[15]	60-110	Regular exposure to the upper level of more than 90 s risks permanent hearing loss
Music in dance bars[15]	90-110	
Rattle with small bell in it (distance 10 cm)[14]	110	Regular exposure to this level of more than 90 s risks permanent hearing impairment
Squeaky toys (distance 10 cm)[11]	78-108	Regular exposure to the upper level of more than 120 s risks permanent hearing loss
Home and car audio[15]	84-108	
Toy power tools (distance 10 cm)[11]	74-102	No more than 10 min. unprotected exposure recommended.
Moving toys such as toy vehicles or robots (distance 10 cm)[11]	82-101	No more than 15 min. unprotected exposure recommended.
Garbage truck[14]	100	
Music in fitness classes[15]	89-96	No more than 40 min. unprotected exposure at the upper level recommended
Toy trumpet (distance 10 cm)[14]	95	Exposure to this level of more than 1 hour risks permanent hearing impairment
Motorcycle[14] Lawnmower[14]	90	Very annoying
Electric razor[14]	85	Level at which hearing damage begins (8 hours)
Garbage disposal[14]	80	Annoying. Interferes with conversation
Vacuum cleaner[14] Hair dryer[14] Inside a car (without car audio)[14]	70	Intrusive. Interferes with telephone conversation
Air conditioner[14]	50	Comfortable

The framework Directive 2000/14/EC[18] harmonizes the nine existing directives on noise emissions for construction plant and equipment, as well as a directive on lawnmowers.[18,19] The aim is to reduce the noise emissions of equipment used outdoors, such as compressors, generators, different types of saws, mixers, etc. and thereby improve the health and well-being of the population. The Directive[18] provides for four types of action:

- Harmonization of noise emission standards;
- harmonization of conformity assessment procedures;
- harmonization of noise level marking;
- collection data on noise emissions.

The Directive sets out the obligations incumbent on the Member States with regard to the placing on the market and putting into service of the equipment covered by the Directive. The manufacturer or the person placing the equipment on the market or putting it into service in the Community must ensure that they have

- drawn up a declaration of conformity certifying that each of item of equipment is in conformity with the provisions of the Directive;
- affixed an indelible legible CE marking to each item of equipment indicating the guaranteed sound power level.[19]

When a Member State ascertains that equipment does not comply with these conditions, it must withdraw it from the market or prohibit its use.

Noise emission limits are laid down for certain types of equipment used by consumers such as power generators, compressors, lawnmowers, and lawn and lawn edge trimmers. Other equipment—such as portable chain saws, grass and grass edge trimmers, leaf blowers and collectors, scarifiers (a machine equipped with an assembly appropriate to slit or scratch the surface of the lawns in gardens) and shredders—are subject to noise marking only. Member States may take measures to regulate the use of equipment in sensitive areas by restricting the working hours of the equipment.

The Directive lays down in Annex III the methods of measurement of airborne noise that shall be used for the determination of the sound power levels of equipment covered by the Directive on the basis of EN ISO standards and determines the conditions of operation of the equipment during test procedures. Responsibility for monitoring the noise emission limits applicable to the equipment is vested in a notified body set up by the Member States. These monitoring controls apply both to the equipment design phase and the equipment production phase. On the other hand, it is not necessary to monitor the design of equipment that is subject only to compulsory marking.[19]

Household appliance noise is controlled in the EU

Other annexes address the subjects of conformity declaration, CE marking of conformity, internal control of production, unit verification and quality assurance. The Directives existing prior to 2000/14/EC[18] on noise emissions by construction plant and equipment and by lawnmowers were repealed effective 2002 January 03.

The Directive 2000/14/EC[18] was amended by Directive 2005/88/EC[20] on the basis of a review by the Working Group on Outdoor Equipment, which concluded that some of the noise limits for outdoor equipment such as dozers, lawnmowers and lawn trimmers were not technically feasible. In consequence, the deadlines for data collection and reporting were extended by two years and some noise limits were classified as only indicative.

The Directive 86/594/EEC[21] lays down provisions relating to:

- The general principles regarding the publication of information on the airborne noise emitted by household appliances;
- the measuring methods for determining the airborne noise emitted by household appliances;
- the arrangements for monitoring the levels of airborne noise emitted by household appliances.

By household appliances, the Directive means any machine, portion of a machine or installation manufactured principally for use in dwellings, including cellars, garages and other outbuildings, in particular household appliances for upkeep, cleaning purposes, preparation and storage of foodstuffs, production and distribution of heat and cold, air conditioning, and other appliances used for non-professional purposes.

The information to be supplied by the manufacturer of a household appliance includes the A-weighted sound power level of the household appliance, expressed in dB with reference to one picowatt. For household appliances according to the Directive 92/75/EEC[22] on labeling specific household appliances, the label should contain information on the sound power level. The Directive regulates the test methods to determine the airborne noise, the sample size, the acceptable uncertainty in and acceptance probability of a tested batch of household appliances.

Toy caps and noise making guns and other toys are a source of sound pressure levels that can damage hearing.[23] A Directive and a Decision of the European Commission address the noise emissions of toys for children. Directive 88/378/EEC[24] is fairly general and states that toys may be placed on the market only if they do not jeopardize the safety and/or health of users or third parties when they are used as intended or in a foreseeable way, bearing in mind the normal behavior of children. In the condition in which it is placed on the market, taking account of the period of foreseeable and normal use, a toy must meet the safety and health conditions laid down in this Directive. The Directive does not mention noise as a potential source of hearing impairment, but notes that the users of toys must be protected against health hazards and risk of physical injury; these terms cover noise-induced hearing impairment.

Commission Decision 2001/579/EC[25] amends Clause 4.20(d) of standard EN 71-1: 1998[26] which laid down a C-weighted peak emission sound pressure level of 140 dB for a toy using percussion caps.[25, 26] In order to conform with the provisions of Directive 88/378/EEC,[24] from 2001 August 01, the C-weighted peak emission sound pressure level produced by a toy using percussion caps, shall not exceed 125 dB, measured as specified in the standard.

The provisions of the Directive 2001/95/EC[27] on general consumer product safety (GPSD), although not explicitly addressing noise, regulate the requirements for "safe" products to not represent for the consumer risks or only the minimum risks compatible with the product's use. The reliance on market mechanisms, however, may help only if the perception of people on what is noise and what is not has become clearer and if the potential health impacts of noise and even of wanted sound are recognized in the general population.[27]

The GPSD aims at ensuring that consumer products placed on the EU market are "safe." The objectives of the Directive are both to protect consumer health and safety and to ensure the proper functioning of the internal market. The GPSD is intended to ensure a high level of product safety throughout the EU for consumer products not covered by sector legislation. The Directive provides a generic definition of a safe product. Products in conformity with the specific rules applicable in the Member State in which they are in circulation are deemed to meet the definition of safe product. In the absence of specific national rules, the safety of a product shall be assessed having regard to European standards, Community technical specifications, national standards of the country in which the product is in circulation, codes of good practice, the state of the art, and expectations of consumers. In addition to the basic requirement to place only safe products on the market, manufacturers must inform consumers of the risks associated with the products they supply. The obligations apply to manufacturers and any professional in the supply chain who affects the safety characteristics of a product. Distributors must help ensure compliance with the general safety requirement. In particular, they must not supply products that they know or should presume to be dangerous. The Directive obliges the Member States to take the necessary measures to enforce the requirements on producers and distributors.

The Directive sets up a system for rapid exchange of information between Member States and the Commission on products causing serious risks (the RAPEX-system). Temporary decisions on measures to be taken on Community level with regard to such products can be taken under the provisions of the Directive.[28] Since its initialization the RAPEX system did not report cases of consumer products being hazardous due to excessive sound pressure levels.

Legislation in non-European Countries

Canada

In Canada, the federal, provincial and municipal levels of government have different roles and responsibilities with respect to noise-related issues. The federal government is responsible for establishing and ensuring compliance with standards for noise emission labeling and maximum noise emission for consumer products, equipment, and vehicles. These regulations do not extend to "after sale" situations where products deteriorate and exceed sound levels required at the time of manufacture. Provincial governments are also responsible through various statutes for controlling the operational noise levels of many consumer products, equipment, and vehicles. Municipalities exercise consumer product noise control through municipal noise control by-laws. A recent example is the Cape Breton Regional Municipality which has passed a noise by-law, which applies to about two dozen activities including loud engines, horns, power tools, stereos and singing. The bylaw also restricts the operation of recreational vehicles, including ATVs, within 1,000 feet of a residence, with a potential CAD 5,000 fine.[29]

Canada has an active legislative program for noise

The Canadian Motor Vehicle Safety Act regulates interior (and exterior) noise levels of motor vehicles. Health Canada led the development of Canadian Standards Association voluntary national standard CSA Z107.58-02 – Noise emission declaration for machinery. Noise emission declarations identify the machinery, label the A-weighted noise emission level (sound pressure level, sound power level). For impulsive noise, the C-weighted peak emission sound level at a workstation is noted. Emission declarations advise consumers to purchase quieter machinery, help reduce noise-induced hearing loss, reduce annoyance in the neighborhood, and ensure compliance with environmental noise regulations.[30]

The Product Safety Programme (PSP) assists in the protection of Canadians by researching, assessing and collaborating in the management of the health risks and safety hazards associated with noise.[31]

Toys that emit noise exceeding 100 dB measured at the distance that the toy "ordinarily would be from the ear of the child using it" are prohibited in Canada under the Hazardous Products Act.[32] Toys producing noise of an explosive nature, such as firecrackers or toys imitating firearms, are exempt from the Hazardous Products Act's sound level regulations. The safety of these toys is regulated by the Explosives Division of Energy Mines and Resources Canada. There are no Canadian noise level standards for fireworks, with the exception of toy pistol caps, which must not exceed 153 decibels measured at a distance of 45 cm from a cap.[14]

United States of America

In the United States, the safety of consumer products is regulated in the 1972 Consumer Product Safety Act amended as of 1994.[33] The purposes of this Act are to

1. protect the public against unreasonable risks of injury associated with consumer products;
2. assist consumers in evaluating the comparative safety of consumer products;
3. develop uniform safety standards for consumer products and to minimize conflicting State and local regulations; and
4. promote research and investigation into the causes and prevention of product-related deaths, illnesses, and injuries.

The Consumer Product Safety Commission (CPSC) as established in the Consumer Product Safety Act is charged with protecting the public from unreasonable risks of serious injury or death from more than 15,000 types of consumer products under the agency's jurisdiction. The CPSC is committed to protecting consumers and families from products that pose a fire, electrical, chemical, or mechanical hazard or can injure children. The CPSC works to ensure the safety of consumer products such as toys, cribs, power tools, and household appliances but does not mention noise-induced hearing impairment or other ailments caused by sound pressure levels from consumer products.

With respect to toys, the CPSC launched a "Holiday Toy Safety Campaign"[34] and published a flyer with a warning against loud noise from toys.[35] *"Toy caps and some noisemaking guns and other toys can produce sounds at noise levels that can damage hearing. The law requires the following label on boxes of caps producing noise above a certain level: 'WARNING - Do not fire closer than one foot to the ear. Do not use indoors.' Parents should not give these caps to children too young to understand this warning."* Caps producing noise that can injure a child's hearing are banned.

Noise pollution abatement is also regulated in the Clean Air Act laid down in the U.S. Code under Title 42, Chapter 85.[36] The CAA postulated to establish within the U.S. Environmental Protection Agency (EPA) an Office of Noise Abatement and Control (ONAC) to carry out "a full and complete investigation and study of noise and its effect on the public health and welfare in order to identify and classify causes and sources of noise, and determine effects at various levels (§ 7461)." This formulation is general enough to include noise from consumer products.

The U.S. EPA created the ONAC before the enactment of the Noise Control Act of 1972, which was promulgated in 1972 under Title 42, Chapter 62, of the U.S. Code.[37] In the Noise Control Act, Congress states that

- inadequately controlled noise presents a growing danger to the health and welfare of the U.S. population, particularly in urban areas;
- the major sources of noise include transportation vehicles and equipment, machinery, appliances, and other products in commerce.

For this reason, Federal action was indicated to control noise including noise of consumer products. The Act[37] lays down provisions to regulate

- noise emission standards for products distributed in commerce (§ 4905);
- labeling (§ 4907);
- the development of low-noise-emission products (§ 4914);
- motor carrier noise emission standards (§ 4917)

ONAC regulations regarding consumer products included those for "Low-Noise-Emissions Products" and "Product Noise Labeling."[38]

In 1981 Congress agreed to cease funding for ONAC, however, did neither repeal § 7461 of the CAA nor the Noise Control Act, nor ONAC's regulations. The U.S. EPA ceased most noise abatement activities after ONAC's funding was eliminated. The U.S. EPA does, however, use minimal resources for limited enforcement of existing noise regulations and disseminating information created during ONAC's existence. Responsibility for the enforcement of EPA's motor carrier emission standards was shifted to the Department of Transportation, which, however, does not have authority to promulgate new or amended emission standards different from those adopted by EPA.

Several times, a Bill has been introduced for consideration by the Congress to re-establish the ONAC, but it has never become a law. The latest version is H.R. 2895.[39]

Noise Management for Consumer Products

Many countries have regulations on environmental noise from road, rail traffic, construction machines, and industrial plants through applying emission standards, on the construction of barriers, and on the acoustic properties of buildings. In contrast, few countries have regulations on consumer product noise, probably due to lack of a method to define and measure it, and the difficulty of controlling it. An exception is the European Commission Directives on outdoor machine noise, on household appliances noise, on the safety of toys, and the General Product Safety Directive. Canada has regulated interior noise of vehicles and noise from toys. The U.S.A. has promulgated some regulations low-noise-emission standards for commercial goods, development of low-noise emission products and labelling. The Office of Noise abatement and Control was, however, shut down more than 20 years ago, thus preventing further regulation on noise abatement by the Environmental Protection Agency.

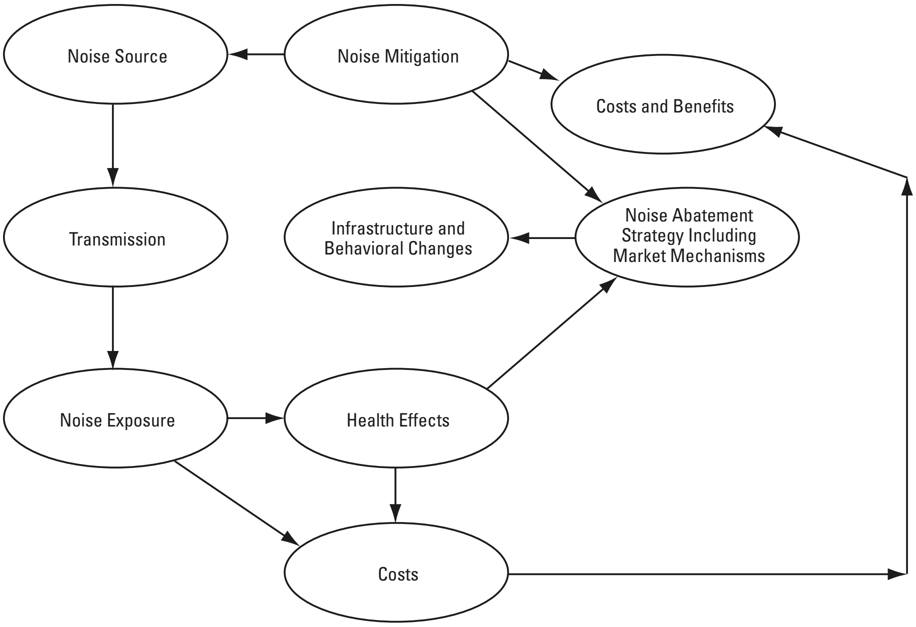


Fig. 1: Stages involved in noise management.[3]

It can be seen from the above examples on existing legislation that neither European countries (as represented by the European Union) nor the North American countries use a fully integrated approach to regulate consumer product noise. The European approach, however, is closer to an integrated noise policy than the approaches for the North American countries.

In view of the serious health impacts noise can have on the hearing ability of children and young adults, a global noise policy on noise abatement in consumer products is needed. Figure 1 depicts the various stages of a global noise policy applicable also to consumer product noise as laid down in the WHO guideline document.[3]

Conclusions

In order to improve environmental health with respect to consumer product noise, the following issues are important:

1. Possibility of a clear distinction of environmental and consumer product noise;
2. raising public awareness on the noise levels of consumer products, especially toys and audio devices;
3. research on reasons for mitigation measures for the intentional or unscrupulous causation of noise;
4. understanding of the risk perception of people (e.g., users and bystanders);
5. improvement of exposure assessment as part of noise risk assessment.

References

1. Schopenhauer, 1851. Über Lärm und Geräusch. In: Parerga und Paralipomena. Kleine Philosophische Schriften, zweiter Band, Athur Schopenhauer's Sämmtliche Werke, fünfter Band, pp. 553-556. Globus Verlag, Berlin, 1902.
2. A global approach to noise control policy. I-INCE publication 05-1 circulated for comment and approval. *Noise Control Eng. J.*, **52**, 250-298 2004
3. *Guidelines for Community Noise.* Published by the Institute of Environmental Epidemiology, Ministry of Environment, Singapore and the World Health Organization, Geneva, Switzerland. Internet URL: www.who.int/peh/.
4. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise. *Official Journal L 189 , 18/07/2002 P. 0012 – 0026.* Internet URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0049:EN:HTML
5. ISO 1999: 1990. Acoustics – Determination of occupational noise exposure and extimate of noise-induced hearing impairment. International Organization for Standardization, Geneva, Switzerland.
6. Council Directive 86/188/EEC of 12 May 1986 on the protection of workers from the risks related to exposure to noise at work. *Official Journal L 137 , 24/05/1986 P. 0028 – 0034.* Internet URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31986L0188:EN:HTML
7. Noise – Occupational Exposure limits in Canada. Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, 2005. Internet URL: http://www.ccohs.ca/oshanswers/phys_agents/exposure_can.html
8. Criteria for a Recommended Standard. Occupational Noise Exposure. Revised Criteria 1998. Internet URL: http://www.cdc.gov/niosh/98-126a.html
9. Occupational and Community Noise. Factsheet No. 258. World Health Organization, Geneva, Switzerland, 2001 Internet URL: http://www.who.int/mediacentre/factsheets/fs258/en/
10. Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC). *Official Journal L 042 , 15/02/2003 P. 0038 – 0044.* Internet URL: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2003/l_042/l_04220030215en00380044.pdf
11. Noisy toys: a possible source of sensorineural hearing loss, A. Axelsson

and T. Jerson, Pediatrics. **76**, 574 –578, 1985.

12. Estimated prevalence of noise-induced hearing threshold shifts among children 6 to 19 years of age, A.S. Niskar, S.M. Kieszak, A.E. Holmes, E. Esteban, C. Rubin, and D.J. Brody, The Third National Health and Nutrition Examination Survey, 1988–1994, United States. *Pediatrics*, **108**, 40-43, 2001. Internet URL: http://pediatrics.aappublications.org/cgi/content/full/108/1/40?ijkey=2d59e2ac913fd6896d57104ad2637945438de7e5
13. Evaluation of noise-induced hearing loss in young people using a web-based survey technique, J.H. Chung, C.M. Des Roches, J. Meunier, and R.D. Eavey, *Pediatric*, **115**, 861-867, 2005. Internet URL: http://pediatrics.aappublications.org/cgi/content/full/115/4/861#T3
14. General facts about hearing loss, The Canadian Hearing Society, 2002. Internet URL: http://www.chs.ca/info/noise/facts.html
15. Hearing Loss and Leisure Noise, Health Canada, 2005. Internet URL: http://www.hc-sc.gc.ca/iyh-vsv/environ/leisure-loisirs_e.html and http://www.hc-sc.gc.ca/iyh-vsv/alt_formats/cmcd-dcmc/pdf/leisure_e.pdf
16. Towards Sustainability. A European Community Programme of policy and action in relation to the environment and sustainable development, 1993. *OJ C 138/5, 17.5.93, p. 5-98.* Internet URL: http://ec.europa.eu/environment/env-act5/5eap.pdf
17. Future Noise Policy. European Commission Green Paper, 1996. Internet URL: http://europa.eu.int/en/record/green/gp9611/noise.htm
18. Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors, 2000. *OJ L 162, 3.7.2000, p. 1–78.* Internet URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0014:EN:HTML
19. Noise emission by equipment used outdoors. Activities of the European Union. Summaries of legislation, 2006. Internet URL: http://europa.eu/scadplus/leg/en/lvb/l28048.htm
20. Directive 2005/88/EC of the European Parliament and of the Council of 14 December 2005 amending Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors (Text with EEA relevance). *Official Journal L 344 , 27/12/2005 P. 0044 – 0046* Internet URL: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2005/l_344/l_34420051227en00440046.pdf
21. Council Directive 86/594/EEC of 1 December 1986 on airborne noise emitted by household appliances. *Official Journal L 344 , 06/12/1986 P. 0024 – 0027*. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31986L0594:EN:HTML
22. Council Directive 92/75/EEC of 22 September 1992 on the indication by labeling and standard product information on the consumption of energy and other resources by household appliances. *Official Journal L 297 of 13.10.1992.* Internet URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0075:EN:HTML
23. Consumer rights for children safety products – Final Report. European Child Safety Alliance. European Consumer Safety Association. Internet URL: http://ec.europa.eu/consumers/reports/rights_child_safety_prod.pdf
24. Council Directive 88/378/EEC (Text with EEA relevance) (notified under document number C(2001) 1905. Internet URL: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l_205/l_20520010731en00390040.pdf, http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_205/l_20520010731en00390040.pdf, Council Directive 88/378/EEC of 3 May 1988 on the approximation of the laws of the Member States concerning the safety of toys . *Official Journal L 187 , 16/07/1988 P. 0001 – 0013.* Internet URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31988L0378:EN:HTML
25. 2001/579/EC, Commission Decision of 30 July 2001 on the publication of the reference of standard EN 71-1: 1998 "Safety of toys — Part 1: Mechanical and physical properties", Clause 4.20(d) in accordance with EC,2001. Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety. *Official Journal L 011 , 15/01/2002 P. 0004 – 0017.* Internet URL: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_011/l_01120020115en00040017.pdf
26. Safety of toys – Part 1: Mechanical and physical properties. Standard EN 71-1: 1998. European Committee for Standardisation (CEN), Brussels.
27. Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety. *Official Journal L 011 , 15/01/2002 P. 0004 – 0017.* Internet URL: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_011/l_01120020115en00040017.pdf
28. Guidelines for the management of the Community Rapid information System (RAPEX) and for notifications presented in accordance with Article 11 of Directive 2001/95/EC. European Commission, Brussels. Internet URL: http://ec.europa.eu/consumers/cons_safe/prod_safe/gpsd/rapex_guid_en.pdf
29. By-law respecting noise in the Cape Breton Regional Municipality., Internet URL: http://www.cbrm.ns.ca/portal/civic/bylaws/noisebylaw.asp and http://www.cbrm.ns.ca/portal/civic/bylaws/PDF/NoiseBy-law.pdf
30. Noise control and impact assessment at Health Canada. Internet URL:

http://www.inspq.qc.ca/jasp/archives/pdf/2004/20041201/01Bruit/JASP2004-Bly-HealthCanada.pdf
31. Product Safety Programme. Health Canada. Internet URL: http://www.hc-sc.gc.ca/ahc-asc/branch-dirgen/hecs-dgsesc/psp-psp/index_e.html
32. Products banned under the Hazardous Products Act. Canada-Ontario Business Service Centre, Ottawa, Ontario. Internet URL: http://www.cbsc.org/servlet/ContentServer?pagename=CBSC_ON%2Fdisplay&lang=en&cid=1096457965175&c=Regs
33. Consumer Product Safety Act. Amended as of 1994. Internet URL: http://www.herc.org/library/cpsa.pdf
34. CPSC launches Holiday Toy Safety Campaign. Release #82-051. U.S. Consumer Product Safety Commission, Washington, D.C. 20207. Internet URL: http://classaction.findlaw.com/recall/cpsc/files/1982dec/82051.html
35. For Kids' Sake. Think toy safety. CPSC report #281. U.S. Consumer Product Safety Commission, Washington, D.C. 20207. Website: http://www.cpsc.gov/CPSCPUB/PUBS/281.pdf
36. U.S. Code collection Title 42, Chapter 85, Subchapter IV – Noise pollution. Internet URL: http://www.law.cornell.edu/uscode/html/uscode42/usc_sup_01_42_10_85_20_IV.html
37. U.S. Code collection. Title 42 – The Public Health and Welfare/Chapter 65 – Noise Control. Internet URL: http://www.law.cornell.edu/uscode/search/uscode42.html
38. Noise references in the United States Code of Federal Regulations. Noise Pollution Clearinghouse, Monpellier. Internet URL: http://www.nonoise.org/epa/reg.htm
39. H.R. 2895, Quiet Communities Act of 2005. Introduced into the U.S. House of Representatives on 2005 June 14. Congress, 2003. A Bill to reestablish the Office of Noise Abatement and Control in the Environmental Protection Agency, and for other purposes. Internet URL: http://www.govtrack.us/congress/bill.xpd?bill=h109-2895.

AUSTRALIASIA

Listen Hear! Report—The Economic Impact and Cost of Hearing Loss in Australia

Many of us are aware of relatives or friends with hearing loss, and the significant impact that this has on their ability to communicate and to participate in society, but few of us would be aware that hearing loss represents a real financial cost to Australia of 11.75 billion AUD per annum or 1.4% of GDP according to a new research study by *Access Economics*. The report, officially delivered at the opening of the Audiology Australia National Conference in Perth, says that 1 in 6 Australians is affected by hearing loss, and this number is projected to increase to 1 in every 4 Australians by 2050. Hearing loss is age-related, affecting 3 of every 4 people over 70 years of age.

The Listen Hear! Report, commissioned by the Cooperative Research Centre for Cochlear Implant and Hearing Aid Innovation (CRC HEAR) in partnership with VicDeaf, identifies that productivity loss related directly to hearing impairment accounts for well over half (57%) of the total financial costs – or some 6.7 billion AUD per year. CRC HEAR CEO, Associate Professor Bob Cowan, says the study is the first of its kind to quantify the economic costs and impact on Australia associated with deafness, and will be important for informing policy making and directing heath and research resources to the preventive and therapeutic interventions that are most cost effective.

> *"Deafness suffers from low exposure and its full implications are not immediately obvious. However, this report allows the community to better understand the cost and resource issues associated with hearing loss. The study reports that hearing loss ranks with asthma, diabetes and musculoskeletal diseases in terms of burden of disability, and should be considered as a national health priority. Hearing loss reduces the capacity to communicate, and this in turn impacts on a person's life chances through the reduced opportunity to equitably participate in education, to gain competitive skills and employment and to participate in relationships. While interventions such as hearing aids and cochlear implants can enhance a person's ability to communicate, the majority of people with hearing loss (85%) do not use such devices."*

Excessive noise in the work place and social environments is not conducive to good hearing retention. With 36% of hearing loss attributable to excessive noise exposure, all of which is preventable, approaches to better management of noise prevention are needed. "Now that the true costs are known, it's time to act to significantly reduce this impact on Australia's economy." Associate Professor Cowan said. "Research into mechanisms and behavioral approaches that encourage hearing loss prevention, improvements in hearing technology, and more efficient ways to undertake clinical hearing assessments and (re)habilitation particularly in rural and remote areas are all required if we are to address the projected increase in hearing loss in our community"

Report is available from www.audiology.asn.au/pdf/ListenHearFinal.pdf

Hearing Loss Costs are 1.4% of Australian GDP

Australia/New Zealand Conference November 2006

In 2006, the Australian and New Zealand Acoustical Societies have their first joint conference on 2006 November 20 to 22. The theme is "Noise of Progress" and a strong technical program is evolving, see www.nzas.auckland.ac.nz/. The conference will be held at the spectacular Clearwater Resort in Christchurch, New Zealand. The timing is ideal for those who are able to detour via New Zealand on the way to the American Acoustical Society meeting followed by INTER-NOISE 06 in November - December in Hawaii.

ICSV 14, July 2007, Cairns

The 14th International conference on Sound and Vibration, ICSV14, incorporating the Annual Conference of the Australian Acoustical Society will be held on 2006 July 9 to 12 July in Cairns, Queensland. The last time this international conference was held in the Asian region was in Hong Kong in 2001. Abstracts are due on 2006 December 1, and information may be found at the URL www.icsv14.com

JAPAN

Progress in Road Traffic Noise Map Production

Japan has experienced serious noise problems for road traffic since the 1960s. The government has developed noise control policies both for noise

continued on page 115

Pan-American News

Paul R. Donavan, Pan-American Editor

Noise Policy Workshop at INTER-NOISE 2006

USA

Policy "Action" Workshop to be Held at INTER-NOISE 06

A fourth Global Noise Policy Workshop will be held during INTER-NOISE 2006 in Honolulu, Hawaii, on Monday, December 4. The theme of this workshop is *"Implementation and Enforcement of Noise Control Policies."* The workshop will feature morning and afternoon sessions by experienced engineers from countries around the world, and the presentation sessions will be followed by a question-and-answer discussion period.

Panelists will speak on the development, implementation, and enforcement of noise control regulations in their country at local, state, and national levels. Participants will learn what is in effect, what is in progress, what has worked, and what has not been successful. As we work toward global cooperation in noise control policy, it is now time to change the focus from what we already know—that policy is needed to improve quality of life worldwide—and start developing action plans.

Research Center Designed to Analyze Noisy Products

Three leading NVH (noise-vibration-harshness) technology companies have cooperated to create a 65,000-square-foot Application Research Center that will help manufacturers in the automotive, appliance, HVAC, electronic and telecom industries to make their products quieter.

The three companies are MSC (Material Sciences Corp.), manufacturer of Quiet Steel; Brüel & Kjær North America, producer of sound and vibration measurement products; and Link Engineering, designer and builder of NVH test systems.

The facility encompasses a unique combination of testing systems for both structural and rotating components, all under one roof. A Sound Transmission Loss (STL) Suite includes a fully-anechoic chamber, with sound-capturing anechoic wedges on all six surfaces, that allows isolation and evaluation of even the smallest system-radiated noise. A second hemi-anechoic chamber with a lower-level reverberation room permits STL testing on horizontal panels such as floor/carpet systems. All anechoic chambers are mechanically and acoustically isolated from the building. www.quietsteel.com

The information below supplements the text of the feature article by Robert Hellweg et al., which appears elsewhere in this issue.—Ed.

The Acoustical Society of America Takes a Position on the Use of Sound Amplification in the Classroom

The Acoustical Society of America has taken the following position on the use of sound amplification in the classroom. This information is available as a PDF file at asa.aip.org/amplification.pdf

Introduction

In recognizing the importance of good speech communication to classroom learning, the American National Standards Institute (ANSI) Accredited Standards Committee S12, Noise, which is administered by the Acoustical Society of America, developed a standard for classroom acoustics, ANSI S12.60-2002.The standard specifies the acoustical conditions needed to achieve acceptable speech intelligibility for teachers and students in mainstream classrooms. The standard specifies maximum sound levels (35 dB, A weighted) for unoccupied classrooms, maximum reverberation times (0.6 s), and minimum sound insulation requirements between classrooms and adjacent spaces.

Channels of Communication

There are three channels for speech communication in classrooms: (1) student to student, (2) student to teacher, and (3) teacher to student. Sound amplification only improves the 3rd channel, if at all. If the room is too reverberant (maximum reverberation time exceeds 0.6 s), then sound amplification does nothing to improve communication; it only increases the sound level. Sound amplification does little to improve and may worsen the first two channels of communication, student to student and student to teacher. Sound amplification refers to any method that acoustically amplifies sound so as to be presented to others.

Low Background Sound Levels Ensure High Speech Intelligibility

To achieve the high speech intelligibility needed for effective learning; speech sound levels must exceed background sound levels by at least 15 decibels (15 dB Signal to Noise Ratio [SNR]). Background sound levels of 35 dB or less ensure the 15 dB

SNR needed for effective learning. While sound amplification can improve speech intelligibility if the room is not too reverberant, recent data suggest that personal communication systems (e.g., FM systems) for hearing impaired students provide much better speech intelligibility than sound amplification systems; FM systems are largely immune to reverberation.

For these reasons and the additional reasons outlined below, the Acoustical Society of America takes the position, in agreement with ANSI S12.60-2002, that:

- Sound amplification should not be routinely employed in typical small mainstream classrooms, and
- All new or renovated small mainstream classrooms should be designed to conform with ANSI S12.60 to ensure satisfactory speech communication for learning.

Additional Reasons Why Sound Amplification Should NOT be Routinely Employed in Classrooms

- Sound amplification increases rather than reduces overall classroom sound levels. Such increased sound levels may be excessive for comfortable listening. Also, unless classroom walls, ceilings, and floors are acoustically upgraded to improve their sound insulation, amplified sound may be heard in adjacent classrooms, interfering with learning there.
- Sound amplification systems require regular maintenance and user training. Improperly maintained microphones and loudspeakers or poor user skills can cause even poorer speech communication than no amplification system. Good classroom acoustics *can* be achieved passively with good architectural design practice. Good classroom acoustics in existing schools can usually be achieved through renovation. Unlike amplification, good acoustics that are "built in" to the classroom require little or no maintenance or user training.

AIA Posts Article on Children's Learning

The American Institute of Architects has posted an article titled "Children's brains are the key to well-designed classrooms." Among other topics, architectural settings for children's learning are discussed. The discussion includes the effects of noise on learning.

For the full article, go to: http://www.aia.org/aiarchitect/thisweek06/0623/0623eberhard.cfm

Other Classroom Acoustics Resources

Publications available from ASA
http://asa.aip.org/classroom.html

Fact sheet on classroom acoustics
http://www.access-board.gov/acoustic/index.htm

International guidelines on classroom acoustics
http://education.umn.edu/kls/ecee/acoustics.html

National Clearinghouse for Educational Facilities – Classroom acoustics
http://www.edfacilities.org/rl/acoustics.cfm

Asia-Pacific News *continued from page 113*

The Japanese Noise Metric for Road Traffic Noise is Changed

mitigation and noise monitoring. Recent progress in these policies is an improvement in the procedure for noise monitoring.

Noise monitoring was included as a mandatory clause in the Noise Regulation Law (revised in 2000, [Article 18]). This was issued just after the revision of the Environmental Quality Standards for Noise (renewed in 1999), where L_{Aeq} was adopted instead of L_{50} as a noise metric for road traffic noise. The evaluation of the noise environment is executed with the noise levels to which respective buildings are exposed. The achievement is, in principle, evaluated by obtaining numbers of houses at which noise levels exceed Environmental Quality Standards values.

The actual implementation of this procedure is based on noise mapping. However, the noise map must be drawn using data from outdoor noise measurements according to the notice of the government. Since it is almost impossible to measure the noise at individual buildings in all areas, the mapping has not progressed well so far.

Five years later, in June 2005, the Ministry of the Environment issued a notice that the government approves the estimation of noise levels by a prediction model as a substitute for measurement. This notice gives the road traffic noise prediction model an important position. If the prediction model is accurate and reliable, the noise map is expected to be well developed and the action planning for noise mitigation will be greatly speeded up. The noise mapping manual is now under review by the government.

European News

Bernard Berry, European Editor

Neighbor Noise is a Problem in Scotland

FINLAND

Euronoise 2006 was held in Tampere, Finland on 2006 May 30-June 1

The conference which drew 582 participants from 34 different countries, was sponsored by the European Acoustics Association, the Acoustical Society of Finland, and the Technical Research Center of Finland.

A Noise Policy Workshop was held during Euronoise on 2006 May 30-31. Participants included members of national and local government agencies, acoustical engineers, educators, and environmental consultants.

The workshop panelists presented papers which issued a challenge to link European noise policy with global noise policy in the areas of occupational, community, and consumer product noise. Following each of the three sessions, a discussion period further emphasized the need for more active participation by noise control specialists in establishing global noise policies.

More information about the workshop will appear in the December issue of this magazine. For more information on the conference and the conference proceedings, go to www.euronoise2006.org.

UNITED KINGDOM

Environmental Noise Regulations to Come into Force in October

The Environmental Noise (England) Regulations 2006 - http://www.opsi.gov.uk/si/si2006/uksi_20062238_en.pdf - have been laid before Parliament and will come into force on 1st October. Comments on the government consultation on transposition of the Environmental Noise Directive are also available. The comments may be viewed at http://www.defra.gov.uk/corporate/consult/end-two/index.htm.

The Positive Aspects of Soundscapes to be Studied

The strong focus of traditional engineering acoustics on reducing noise level ignores the many possibilities for characterizing positive aspects of the soundscapes around us.

This new project, funded by the Engineering and Physical Sciences Research Council and starting in 2006 October aims to change this. The aims of the project are:

- To acknowledge the relevance of positive soundscapes, to move away from a focus on negative noise and to identify a means whereby the concept of positive soundscapes can effectively be incorporated into planning; and
- the evaluation of the relationship between the acoustic/auditory environment and the responses and behavioural characteristics of people living within it.

Details are at URL http://www.acoustics.salford.ac.uk/research/davies_files/projects/soundscapes/positive_soundscapes_home.asp

Nearly Two Thirds of Scots Bothered Neighbor Noise

A new Ipsos MORI survey[1] indicates that in Scotland nearly two thirds of people are bothered by noise from neighbors. The noises that disturb people most are those from everyday living—footsteps, doors slamming and shouting. The survey finds that footsteps bother 14% of those surveyed and slamming doors 15%.

The poll, commissioned by NSCA highlights neighbor noise issues affecting people across the UK at the start of Noise Action Week. It also found that 7% of those surveyed in Scotland say that noise affects their quality of life, with 11% of Scots having been kept awake by neighbor noise

Many neighbor noise problems are the result of inconsiderate behaviour, and can be solved by the common sense, practical solutions being promoted at local level during Noise Action Week. The survey also found that 17% of Scots believe themselves to be noisier than their neighbors, but that they are less likely to make a complaint about noise than people in England and Wales. During Noise Action Week The Scottish Federation of Housing Associations are running briefings on Housing and Sound Insulation, aimed at property maintenance and development staff, in Glasgow and Edinburgh, and organisations across Scotland will be promoting practical solutions to noise problems.

Audiology Graduate Wins Prestigious D W Robinson Prize

Wayne Ellis has been chosen as the recipient of the 2006 prestigious D W Robinson Prize. Wayne was presented with his award by Colin English, President of the Institute of Acoustics at Southampton University's prize-giving ceremony in July.

This annual prize, which consists of a Certificate and a cheque for £200, is made jointly between the Institute of Sound and Vibration Research at Southampton and the Institute of Acoustics in memory of the late Professor Douglas Robinson. It is awarded to the writer of the best ISVR MSc dissertation on a topic in the human aspects of sound or Audiology.

Wayne, who completed his MSc in Audiology last year, was awarded the prize for his thesis entitled "Auditory Learning with Interaural Level Difference". Interaural level difference is a binaural cue to sound-source location. The two main aims to this study were to (i) to obtain measurements on the time-course of learning on ILD and compare it with that previously reported for interaural time difference (ITD) (ii) explore how ILD generalises across frequency. This research enhances our knowledge regarding the processing of binaural cues used for localisation and the effects of auditory training. Research in this area has wider clinical implications and may ultimately lead to therapeutic training tools for hearing-impaired populations.

1. The Ipsos MORI (Market and Opinion Research International) survey comprised inhome face-to-face interviews with 1,962 adults aged 15+ throughout Great Britain, with 162 interviews conducted in Scotland and 97 in Wales. The sample is nationally representative, and interviews were conducted in 195 sampling points between 16-21 March 2006. Results are weighted to the GB population profile in terms of gender, age, region & work status. Full survey, contact lsalter@nsca.org.uk

International Representatives

Below is a list of international contacts for the advertisers in this issue. The telephone number is followed by the fax number where available. In cases where there are several telephone numbers per location, or several locations within a country, a bullet (•) separates the telephone number(s) from the respective FAX number. Advertisers are asked to send updated information by e-mail to: IBO@inceusa.org.

01dB-METRAVIB

Asia: 01dB Asia Pacifique
+60 3 563 22 633 • +60 3 563 18 633
patrice.pischedda@01db.com.my

Belgium: Acsoft Belgique
+32 (4) 366 00 22 • +32 (4) 367 53 74
jean.nemerlin@acsoft.be

Brazil: 01dB Brasil
+55 (11) 5089 6463 • +55 (11) 5089 6454
nicolas.isnard@01dB.com.br

Denmark: Butina & Larsen technic
+45 (44) 48 46 60 • +45 (49) 70 75 90
blt@post8.tele.dk

Finland: Metric Industrial Oy
+358 9 4761 6742
juuso.jaakola@metric.fi

Greece: Dynamic Acoustics N.Kolettis and Cie EE
+30 210 65 61 251 • +30 210 65 61 252
dynac@hol.gr

Germany: 01db GmbH
+49 (3423) 758 657 • +49 (3423) 758 658
grit.mueske@01db.de

Italy: 01dB Italia
+39 (0) 63610954 • +39 (0) 586411209
notini@01db.it

Netherlands: Acoutronics
+31 (162) 42 44 21 • +31 (162) 42 56 52
a.hendriks@acoutronics.nl

Portugal: MRA
+351 21 421 74 72 • +351 21 421 81 88
n.dias@mra.pt

Roumania: Vibrotest
+40 (212) 12 47 12 • +40 (212) 12 47 14
vibrotst@fx.ro

Russia: OCTAVA+
+7 (095) 799 90 92 • +7 (095) 799 90 93
msergeyev@octava.ru

South Africa: Acoustics, Noise and Vibration Consultancy
+27 11 679 2342 • +27 11 679 2342
jhassall@pixie.co.za

Spain: Alava Ingenieros
+34 91 567 9700 • +34 91 570 2661
l.esteban@alava-ing.es

Switzerland: Norsonic Brechbühl
+41 (34) 431 31 21 • +41 (34) 431 31 22
info@01db.ch

USA: 01dB Inc
+1 (248) 592 2996 • +1 (248) 592 2991
dominique.fernier2@01db-metravib.com

United Kingdom: Acsoft Ltd
+44 (12) 96 682 686 • +44 (12) 96 682 860
jshelton@acsoft.co.uk

ACO Pacific

Hong Kong/China: AP Technology Limited
852 3114 6028 • 852 3114 6038
ManLi88@netvigator.com

Hong Kong/China: Gelec(HK) Limited
852-2919-8383 • 852 2591-0548
alexwu00@hotmail.com

Korea: ABC Trading
+82-2-2226-3161 • +82-2-2226-7383
abctrd@abctrd.com

Data Physics

China: Data Physics (China) Branch
+86-21-621-86533 • +86-21-621-73370
sales@dataphysics.com

France: Data Physics (France) S.A.
+33-(0)1-39-30-50-60 • +33-(0)1-39-30-50-79
sales@dataphysics.com

Germany: Data Physics (Deutschland) GmbH
+49-61-01-50-95-61 • +49-61-01-50-95-62
sales@dataphysics.com

India: Data Physics (Bharat) Pvt. Ltd.
+91-80-656-5810 • +91-80-656-2609
sales@dataphysics.com

UK: Data Physics (UK) Ltd.
+44-(0)1-480-470-345 • +44-(0)1-480-470-456
sales@dataphysics.com

USA: Data Physics Corporation
+1-408-437-0100 • +1-408-437-0509
sales@dataphysics.com

G.R.A.S.

Australia: ACU-VIB Electronics
02 9680 8133 • 02 9680 8233
info@acu-vib.com.au

Australia: ETMC Technologies (Aust) Pty Ltd
02 9555 1225 • 02 9810 4022
info@etmc.com.au

Austria: LB-acoustics Messgeräte GmbH
+43 1 25 93 444 4400 • +43 1 25 93 444 3400
office@lb-acoustics.at

Austria: Ing. Wolfgang Fellner GmbH
+43 1 282 53 43 • +43 1 280 41 97
fellner@schallmessung.com

Belgium: Akron N.V. - S.A.
+32 16 23 01 03 • +32 16 23 26 96
info@akron.be

Brazil: SIGNALWORKS Com. Imp. Export. Ltda.
+55 11 5501 5310 • +55 11 5505 5682
info@signalworks.com.br

Canada: Novel Dynamics Inc.
+1 519 853 4495 • +1 519 853 3366
metelka@aztec-net.com

Canada: Novel Dynamics Inc.
+1 613 598 0026 • +1 613 598 0019
Stan@noveldynamics.com

Denmark: G.R.A.S. Sound & Vibration
+45 4566 4046 • +45 4566 4047
gras@gras.dk

Finland: NOVOTEK Finland OY
+358 19-871 131 • +358 19-871 1300
info@novotek.fi

Finland: MIP Electronics Oy
+358-9-294 1773 • +358-9-294 7084
jouni.lukkari@mipoy.com

France: 01dB - Metravib
+33 4 7252 4800 • +33 4 7252 4747
florent.perrin@01dB-metravib.com

France: OROS France SAS
+33 1 69 91 43 00 • +33 1 69 91 29 40
orosfrance@oros-signal.com

Germany: Bertram Schapal - AVM
+49 (0)6152 56176 • +49 (0)6152 53590
bertram.schapal.AVM@t-online.de

Germany: Schmeisser, Handelsvertretung
+49 8131 8 02 90 • +49 8131 8 02 70
handelsvertretung.schmeisser@t-online.de

Germany: Wölfel Meßsysteme Software GmbH + Co. KG
(+49) 9 31/4 97 08-5 00 • (+49) 9 31/4 97 08-5 90
deckert@woelfel.de or wms@woelfel.de

Greece: Paragon LTD
+30-210-2220008 • +30-210-2220019
paragon1@otenet.gr

Hong Kong: S & V Samford Instruments Ltd
+85 228 339 987 • +85 228 339 913
sales@svsamford.com

Hungary: MEGA KFT
+36 (06) 62 438 214/237 • +36 (06) 62 438 214/237
mega@tvnetwork.hu

India: Adams Technologies Pvt. Limited,
+91 44 28173711, 28171631, 52068668 • +91 44 28172676
ganeshhv@adams-tech.net

India: AIMIL Limited
+91 22 2261 5654/55 • +91 22 2261 7524

India: Structural Solutions Private Limited
+91-40-2763 6433 • +91-40-2763 6435
magaffar@stsols.com

Iran: Khadem Sound & Vibration Technology Ltd.,
+98 (0) 2120 279 95/88 • +98 (0) 2120 27982
KHADEM@modares.ac.ir

Italy: S.C.S. Controlli e Sistemi S.R.L.
+39 049 9200 975 • +39 049 9201 239
g.m.amadasi@scs-controlsys.com

Japan: Marubun Corporation
+81 3 3639 9881 • +81 3 5644 7627
tsaito@marubun.co.jp

Japan: Riko Associates
+81 4 5935 6995 • +81 4 5935 6993
yas-riko@mars.dti.ne.jp

Korea: SV Corporation
+82 31 501 4030 • +82 31 501 4032
jyjoo@svdigital.com

Korea: RECTUSON Co., Ltd.
+82 55 231 3333 • +82 55 231 4444
rts@rectuson.com

Korea: SEVIT Tech
+82 2 2617 8740 • +82 2 6091 1310
sevit@sevitkorea.com

Malaysia: INFO-TRAX SDN BHD
+603 4270 6085 • +603 4270 6054
faisal@infotrax.com.my

Mexico: Christensen, S.A.
+52 55 56812379 • +52 55 56556021
christensen@christensen.com.mx

Mexico: Technology Calibration and Sales
+52 55 59906925 or 59906964 • +52 55 55906858
aarellano@tcsrl.com.mx

New Zealand: ECS Ltd
+64 9 279 8833 • +64 9 279 8883
grantm@ecs-ltd.co.nz

Norway: Norsonic A/S
Phone: +47 32 85 89 00
Fax: +47 32 85 22 08
E-mail : sbohn@norsonic.com

P. R. China: Landtop Technologies CO., Ltd
+86 10 6802 5665 • +86 10 6801 8063
info@landtop.com

P. R. China: S & V Samford Instruments Ltd
Phone: +85 228 339 987
Fax: +85 228 339 913
E-mail : sales@svsamford.com

Portugal: MRA Instrumentacão, S.A.
+351 21 421 7472 • +351 21 421 8188
mra@taguspark.pt

Russia: OCTAVA + Company
+7 (095) 799 90 92 • +7 (095) 799 90 93
info@octava.ru

Singapore: Sound & Vibration Control Pte Ltd
(+65) 64 480 383 • (+65) 62 412 181
wupsj@singnet.com.sg

Singapore: SHAMA Technologies (S) Pte Ltd
+65 776 4006 • +65 773 5056 or +65 776 0592
shama@singnet.com.sg

Spain: ALAVA Ingenieros S. A.
+34 91 567 97 00 • +34 91 570 26 61
alava@alava-ing.es

Sweden: Acoutronic AB
+46 8 765 02 80 • +46 8 731 02 80
acoutronic@acoutronic.se

Switzerland: Norsonic Brechbühl AG
+41 34 431 31 21 • +41 34 431 31 22
Matthias.Brechbuehl@norsonic.ch

Taiwan ROC: IEA Electro Acoustics Co. Ltd.
+886 2 2795 5908 • +886 2 2794 0815
iea888@ms71.hinet.net

Taiwan ROC: Purtek Enterprise Co., Ltd.
+886 2 2756 7581 • +886 2 2756 7582
purtek@ms13.hinet.net

Taiwan ROC: Samwell Testing Inc.
+886 2 2692 1400 • +886 2 2692 1380
samwells@ms48.hinet.net

Taiwan ROC: Systems Access Company Ltd.
+886 2 8792 6266 • +886 2 8792 6265
sac.tw@msa.hinet.net

The Netherlands: AcouTronics B.V.
+31 (0)162 42 44 21 • +31 (0)162 42 56 52
mailbox@acoutronics.nl

Turkey: Bias Mühendislik
+90 216 4745701 • +90 216 4745705
bias@bias.com.tr

Turkey: DTA Design Test Analysis Ltd Sti
+90 224 225 37 41 • +90 224 225 37 42
akif.goksu@dta.com.tr

United Kingdom: AcSoft Ltd.
+44 (0)1296 682 686 • +44 (0)1296 682 860
sales@acsoft.co.uk

United Kingdom: Campbell Associates
+44 (0)1371 871030 • +44 (0)1371 879106
info@campbell-associates.co.uk

USA: G.R.A.S. Sound & Vibration
440 779 0100 • 440 779 4148
sales@gras.us

Norsonic AS

Australia: ETMC Technologies PTY Ltd.,
+61 295551225
wiepko@maxi.net.au

Austria: Ing. Wolfgang Fellner Ges.M.B.H.
+43 12825343
fellner@schallmessung.com

Belgium: Akron
+32 16230103
info@akron.be

China (P.R.): LandTop Technologies Co., Ltd.
+86 1068025665
info@landtop.com

Czech Republic: Ekola Norsonic s.r.o.
+420 274784927
ekola@ekolagroup.cz

Denmark: GRAS Sound & Vibration
+45 45664046
gras@gras.dk

Finland: MIP Electronics OY
+358 92941773
info@mipoy.com

France: Fondis Electronic
+33 13 452 1030
info@fondiselectronic.com

Germany: Norsonic-Tippkemper GmbH
+49 252993010
tippkemper@norsonic.de

Greece: Ergoakoustiki Ltd.
+30 2 10 6980601
info@ergoakoustiki.gr

India: EME - Electro Mechanical Enterprises
+91 120 2431309
emeindian@sancharnet.in

Italy: Microbel s.r.l.
+39 11 2257 418
info@microbel.it

Korea: Cylos Co., Ltd
+82 31 251 1905
sales@cylos.co.kr

Malaysia: Shamatech
+65 6776 4006.
shamasvc@singnet.com.sg

New Zealand: Jepsen Electronics Ltd
+64 6 357 7539
njepsen@ihug.co.nz

Norway: Norsonic AS
+47 32858900
info@norsonic.com

Poland: Energocontrol Sp.z.o.o.
+48 12 4180710
cad@energocontrol.com.pl

Singapore: Shamatech
+65 6776 4006.
shamasvc@singnet.com.sg

Slovakia: Norsonic Slovensko
+421 2 57296421
kamenicky@norsonic.sk

Spain: Aries
+34 915702737
lrodriguez@aries-ingenieria.com

Sweden: Norsonic AS, Norway
+47 32858900
info@norsonic.com

Switzerland: Norsonic Brechbühl AG
+41 34 4313121
info@norsonic.ch

Taiwan: Purtek Enterprise Co. Ltd, Taipei
+886 226567581
purtek@ms13.hinet.net

Turkey: Marmatek
+90 216 442 10 90
info@marmatek.com

United Kingdom: Campbell Associates
+44 1371871030
info@campbell-associates.co.uk

USA/Canada/Mexico: Scantek, Inc,
+1 410 2907726
PeppinR@scantekinc.com

PCB Pieoztronics International Distributors

Australia: Davidson Measurement Pty. Ltd.
+61 3 9580 4366 • +61 3 9580 6499
info@davidson.com.au

Austria: nbn-Elektronik Handelsges.m.b.H. & Co
+43-316-402805 • +43-316-402506
nbn@nbn.at

Belgium & Luxembourg: Tech5 bvba-sprl
(+32) 26573164 • (+32) 26574925
info@tech5.be

Brazil: SIGNALWORKS
Comércio,Importação & Exportação Ltda.
(+55-11) 5501 5310 • (+55-11) 5505 5682
pprado@signalworks.com.br

Canada: Dalimar Instruments, Inc.
+001 450-424-0033 • +001 450-424-0030
daniel@dalimar.ca

China: PCB Piezotronics Inc.
Beijing Representative Office
(+86) 010 84477840 • (+86) 010 84477913
pcbchina@pcb.com

China: PCB Piezotronics, Inc.
Shanghai Representative Office
(+86) 021 63741517 • (+86) 021 63741510
pcbchina@pcb.com

Czech Republic: nbn ELEKTRONIK
(+42) 385 724308 • (+42) 385 724191
nbn@nbn.cz

Denmark: B&L Technic
+45 44 48 46 60 • +45 49 70 75 90
info@bl-technic.dk

Egypt: Scientific Services Co.
(+202) 4027345 • (+202) 4010874
ssco@commnet.com.eg

Finland: Novotek Finland Oy
(+358) 19 8711372 • (+358) 19 8711300
juhani.yrjana@dosesoft.fi

France: PCB Piezotronics S.A.
+33 (0) 1 69 33 19 60 • +33 (0) 1 69 33 19 76
pcbfrance@pcb.com

Germany: Synotech GmbH
+49 2462 99190 • +49 2462 99179
info@synotech.de

Greece: Paragon LTD
(+30) 210 2220008 • (+30) 210 2220019
paragon1@otenet.gr

Hungary: Professzionális Ipari Méréstechnika Bt.
(+36) 1 424 0099 • (+36) 1 424 0097
pim-bt@axelero.hu

India: Structural Solutions Private Limited
+91 40 2763 6433 • +91 40 2763 6435
info@stsols.com

Indonesia: PT Klaras Pusaka Instrumindo
+62 (21) 7694487 • +62 (21) 758182
bsugiharta@klaras.co.id

Ireland: Environmental Measurements
+353 (0) 1 414 9445 • +353 (0) 1 405 7917
daraghobrien@e-m.ie

Israel: Arrow Rapac Ltd.
(+972) 3 9203486 • (+972) 3 9203443
arrow@arrow-israel.co.il

Italy: PCB Piezotronics srl
T+39 035 201241 • +39 035 201241
info@pcbpiezotronics.it

Japan: Toyo Corporation - Team PCB
(+81) 332451240 • (+81) 352052030
pcb@toyo.co.jp

Malaysia: Benima Engineering Sdn Bhd
+60 (3) 5632 7441 • +60 (3) 5632 7401
benimarail@yahoo.com

Mexico: Comercial Anfra, S.A. de C.V.
(+52) 55 55642571 • (+52) 55 55648718
anfra@attglobal.net

Netherlands: Tech 5 B.V.
(+31) 184615551 • (+31) 184615451
info@tech5.nl

New Zealand: Machinery Monitoring
(+64) 96233147 • (+64) 96233248
mamos@clear.net.nz

Norway: RH Semitronic AS
+47 22803780 • +47 22803825
nordby@rh-semitronic.no

Pakistan: Affiliates International
(+92) 21 2852151 • (+92) 21 5870384
affiliat@cyber.net.pk

Philippines: Menvirotek Enterprises Corp.
(+63) 2 9300538 • (+63) 2 9300538
menvirotek@hotmail.com

Poland: Energocontrol Sp. Z.O.O.
(+48) 124180752 • (+48) 124114517
cad@energocontrol.com.pl

Portugal: MRA Instrumentacao
(+35) 1214217472 • (+35) 1214218188
mra@mra.pt

Puerto Rico: VibrAnalysis, Inc.
+001 (787) 283-7500 • +001 (787) 283-7680
FLaboy@vibranalysispr.com

Russian Federation: Octava+ Company
+7 495-799-90-92 • +7 495 -799-90-93
info@octava.ru

Singapore: Spectra Instruments Pte Ltd
(+65) 67478857 • (+65) 67475873
spectrainst@pacific.net.sg

South Africa: Andersen & Hurley Instruments
(+27) 11 679 3815 • (+27) 11 675 0694
mail@andersen-hurley.co.za

Spain: Alava Ingenieros SA
(+34) 91 5679700 • (+34) 91 5702261
icomellas@alava-ing.es

Sweden: PCB Scandinavia AB
(+46) 8 4443870 • (+46) 8 4443875
info@pcbscandinavia.se

Switzerland: Ing. Bureau Dollenmeier GmbH
+41 18854511 • +41 18854512
sales@ibdoll.ch

Romania: ROMEGA
(+40) 21 2225729 • (+40) 21 2225730
dragos_muntean@mail.dntcj.ro

Saudi Arabia: 3E-Engineering Equipment EST
(+966) 3 38985246 • (+966) 3 38985246
ksd3e@sahara.com.sa

South Korea: KTM Engineering, Inc.
+82 2-3413-2002 • +82 2-3413-2222
sales2@ktme.com

Taiwan: Prowave Engineering Inc.
(+886) 3 521 0504 • (+886) 3 521 0571
info@prowavegroup.com

Thailand: Dynistec Company Limited
+66 (2) 946-1732 • +66 (2) 946-1738
sombat@intro.co.th

Turkey: E3TAM A.S.
+90 (212) 275 22 80 • +90 (212) 273 23 19
sedat@e3tam.com

Rion Co., Ltd.

Australia: Acoustic Research Laboratories Pty Ltd
+61 2 9484 0800 • +61 2 9484 0884
sales@acousticresearch.com.au

Austria/Hungary/Yugo/Slovenia/ Czech/Croatia: LB-acoustics Messgeraete GmbH
+43 1 259 34 44 4400 • +43 1 259 34 44 3400
Office@LB-acoustics.at

Canada, Mexico, USA: Scantek Inc.
+1 410 290 7726 • +1 410 290 9167
info@scantekinc.com

continued on page 120

continued from page 119

Finland: MIP Electronics Oy
+358 9 2941773 • +358 9 2947084
jouni.lukkari@mipoy.com

Germany: ZINS Ziegler-Instruments GmbH
+49/(0)2166/955-58 • +49/(0)2166/955-800
sales@ziegler-instruments.de

Hong Kong: Science International Corporation
+852 2 543 7442 • +852 2 541 4089
tonyleung@scienceintal.com

India: Mecord Systems and Services Pvt. Ltd.
+91-22-5008604, +91-22-5008128 • +91-22-5007560
mecord.systems@vsnl.com

Indonesia: PT Transindotama Sinar Perkasa
+62 21 4584 0670 • +62 21 4584 2942
transit@dnet.net.id

Ireland: Industrial Acoustics Limited
+353-1-2828034 • +353-1-2828427
industrial@eircom.net

Italy: S.C.S. Controlli e Sistemi S.r.l.
+39-049-920 09 75 • +39-049-920 12 39
gaita@scs-controlsys.com

Korea: Sunil Measuring System Co., Ltd.
+82 2 572 8481 • +82 2 572 7931
sunilms@sunilms.co.kr

Malaysia: O'Connor's Engineering Sdn. Bhd
+60 3 7953 8400 • +60 3 7957 7871
mawardis@oce.com.my

Netherlands, Belgium, Luxembourg:
Goffin Meyvis Analytical & Medical Systems B.V.
+31-76-508 60 00 • +31-76-508 60 86
bstuart@goffinmeyvis.com

New Zealand: Machinery Monitoring Systems Ltd
+64 9 623 3147 • +64 9 623 3248
mms@bitz.co.nz

Portugal: M.R.A. Instrumentacao S.A.
+351-21-421 74 72 • +351-21-421 81 88
n.dias@mra.pt

Republic of South Africa:
Environmental Instruments International cc
+27 21 910 3403 • +27 21 919 7783
env.inst@iafrica.com

R.O.C, Taiwan: Ring-In Trading Development Co., Ltd.
+886 2 2381 6767 • +886 2 2381 2423
ringin@ms6.hinet.net

Singapore: O'Connor's Singapore Pte Ltd
+65 6473 7944 • +65 6472 4508
tan.wheelee@oconnor.com.sg

Spain: ALAVA Ingenieros S.A.
+34-91-567 97 00 • +34-91-570 26 61
j.ruiz@alava-ing.es

Sweden: Acoutronic AB
+46 8 765 02 80 • +46 8 731 02 80
acoutronic@acoutronic.se

Switzerland: A -TECH&Consulting GmbH
+056 634 26 26 • +0566 345 345
a-tech@swissonline.ch

Thailand: Sithiporn Associates Co., Ltd.
+66 2 433 8331 • +66 2 433 1679
purchase@sithporn.co.th

United Kingdom: ANV Measurement Systems
+44-1908-64 28 46 • +44-1908-64 28 14
info@noise-and-vibration.co.uk

Scantek, Inc.

Mexico and South America: CIAAMSA División Acústica
(55) 1054 3209 • (55) 1054 3210
nbenitez@ciaamsa-acustica.com

SoundPLAN LLC

Argentina: Dakar ingenieria acustica Argentina
+54 11 4865 79 84
Soundplan@dakar-acustica.com.ar

Australia: Marshall Day Acoustics
+61 39416 1855 • +61 39416 1231
noelmorris@marshallday.com.au

Brazil: GROM Acustica & Automacao
+55 21 263 0792 • +55 21 263 9108
comercial@grom.com.br

Canada: Navcon Engineering Network
+1 714 441 3488 • +1 714 441 3487
Forschner@navcon.com

China: BSWA Technology Co., Ltd
+86 10 6200 6160 • +86 10 6200 6201
chenfeng@bswa.com.cn

Czech Republic: SYMOS s.r.o.
+42 2 57 22 56 77 (78) • +42 2 57 22 56 76 (79)
symos@symos.cz

Dennmark: Delta Acoustics & Vibration
+45 45 20 12 00 • +45 45 20 12 01
JKL@Delta.dk

Egypt: Elnady Co for Engineering and Agencies
+20 23420896 • +20 23426977
tamer@elnadycompany.com

Finland: Delta Acoustics & Vibration
+45 45 20 12 00 • +45 45 20 12 01
JKL@Delta.dk

France: Euphonia
+33 02 40 18 05 18 • +33 02 40 19 05 20
bsuner@euphonia.fr

Germany: Braunstein + Berndt GmbH
+49 7191 91 44 0 • +49 7191 91 44 24
bbgmbh@soundplan.de

Greece: Industrial Acoustics Hellas
+3010 6630 333 • +3010 6630 334
dpramas@hotmail.com

Hungary: VIBROCOMP GmbH
+36 1 275 2138 • +36 1 275 2138
Vibrocomp@matavnet.hu

India: Foretek Marketing Pvt. Ltd.
+91 80 526 6813 • +91 80 526 6813
info@foretekin.com

Israel: Labgoods Ltd.
+972 3 6121341 • +972 3 6121328 email:
ronen@labgoods.com

Italy: Spectra s.r.l.
+39 039 613321 • +39 039 6133235
spectra@spectra.it

Indonesia: SHAMA Technologies (S) Pte Ltd
+65 6776 4006 • +65 6776 0592
shama@singnet.com.sg

Japan: Consutling Group Technical Center
+81 45 935 3818 • +81 45 935 3806
Watanan@onosokki.co.jp

Korea (South): ABC TRADING
+82 2 2226 3151 • +82 2 2226 7383
kslee@abctrd.com

Kuwait: KuwaitGIS
+965 2447733 • +965 2456760
info@KuwaitGis.com

Malaysia: SHAMA Technologies (S) Pte Ltd
+65 6776 4006 • +65 6776 0592
shama@singnet.com.sg

New Zealand: Marshall Day Associates
+64 9 379 7822 • +64 9 309 35 40
keith@Marshallday.co.nz

Norway: Delta Acoustics & Vibration
+45 45 20 12 00 • +45 45 20 12 01
JKL@Delta.dk

Poland: PC++ Software Studio S.C.
+48 602 228317 • +48 58 677 1847
koniarek@interecho.com

Portugal: AAC Centro de Acustica Aplicada SL
+349 45 298233 • +349 45 298261
alberto@aac.pt-alava.es

Russia: Oktava+
+7 095 799 90 92 • +7 095 799 90 93
info@actava.ru

Singapore: SHAMA Technologies (S) Pte Ltd
+65 6776 4006 • +65 6776 0592
shama@singnet.com.sg

Spain: AAC Centro de Acustica Aplicada SL
+349 45 298233 • +349 45 298261
alberto@aac.pt-alava.es

Sweden: Sveriges Provnings-och Forskningsinstitut
+46 33 16 53 40 • +46 33 165 420
Andreas.Gustafson@sp.se

Taiwan: Purtek Engerprise Co Ltd
+886 2 2769 3863 • +886 2 2756 7582
purtek@ms13.hinet.net

Turkey: Hidro-Tek Ltd.Sti
+90 2126598636 • +90 2126598639
aakdag@hidro-tek.com.tr

United Kingdom: Technical Development & Investigation
+44 1206 762617 • +44 1206 762617
tdi.ltd@ntlworld.com

USA: Navcon Engineering Network
+1 714 441 3488 • +1 714 441 3487
Forschner@navcon.com

inter-noise 2007 Announcement

INTER-NOISE 2007, the 2007 International Congress and Exposition on Noise Control Engineering, will be held in Istanbul, Turkey on 2007 August 28-31. The theme of the congress is Global Approaches to Noise Control. The congress is sponsored by the International Institute of Noise Control Engineering, and is being organized by the Turkish Acoustical Society. Professor Dr. H. Temel Belek will be the congress president. The Turkish Acoustical Society, as the organizers of INTER-NOISE 2007, would like to welcome all the prospective participants to Istanbul and make them feel at home with the warmest Turkish hospitality.

The venue for INTER-NOISE 2007 will be The Istanbul Convention & Exhibition Centre (ICEC). The Centre has everything needed to organize memorable and successful congresses and expositions in the city of Istanbul. The ICEC is next to Istanbul Hilton Hotel, overlooking the Bosphorus, the winding strait that separates Europe and Asia. Its shores offer a delightful mixture of past and present, grand splendor and simple beauty. Istanbul is the only city in the world to bridge two continents. As such it has a varied and unique culture, a blend of East and West, which can be seen in everyday life around the city in architecture, social habits, and cuisine.

The Opening Ceremony will take place in the Anadolu Auditorium of the ICEC at 16:00 hours on August 28. Registration opens at 08:00 hours at the same venue on the same day.

Organizing Committee

President	Prof. Dr. H. Temel Belek
Vice-President	Prof. Dr. Zerhan Yüksel
Secretary General	Prof. Dr. Ahmet Güney
Scientific Program	Prof. Müjgan Serefhanoglu Sözen
	Prof. Dr. Sevtap Yilmaz Demirkale
	Assoc. Prof. Dr. Haluk Erol
	Prof. Dr. Tuncer Toprak
	Assoc. Prof. Dr. Hüseyin Ugur
Publications	Müjgan Serefhanoglu Sözen
	Osman Sirel
	Hüseyin Ugur
Treasurer & Finance	Tuncer Toprak
	Ahmet Güney
Sponsorship Committee	Prof. Dr. Ahmet Arisoy
Scientific Exhibition	Haluk Erol
Technical Visits	Faruk Bayraktar
Social Program	Yaman Yamaner
Public Relations	Mustafa Kartopu

and Call for Papers

International Advisory Committee

Robert D. Hellweg, Jr.	U.S.A.
Rajendra Singh	U.S.A.
Semyung Wang	Korea
Antonio Perez-Lopez	Spain
Serge Lewy	France
Robert J. Bernhard	U.S.A.
Samir N.Y. Gerges	Brazil
Carsten Lemvigh Fog	Denmark
Adnan Akay	U.S.A.
Gilles Daigle	Canada
Tor Kihlman	Sweden
David K. Holger	U.S.A.
Sonoko Kuwano	Japan
Hugo Fastl	Germany
Michel Vallet	France
Jens H. Rindel	Denmark
Tjeert ten Wolde	The Netherlands
Bernard Berry	U.K.
Joachim Scheuren	Germany
Ulf Sandberg	Sweden
David J. Ewins	U.K.
Gerrit L.G. Vermeir	Belgium
Hideki Tachibana	Japan
John G. Casali	U.S.A.
Michael Vorlander	Germany
Josef Novak	Czech Republic
Per V. Brüel	Denmark
Goran Pavic	France
Patricia Davies	U.S.A.
William Lang	U.S.A.
Luigi Maffei	Italy
Jaime Navarro Casas	Spain

Congress Technical Program

Papers related to the main theme, *Global Approaches to Noise Control*, are especially welcome for presentation at INTER-NOISE 2007, but technical papers in all areas of noise control may be submitted for inclusion in the technical program.

A list of the topics that will be included at the Congress is given below. A number of technical and special sessions are being organized. A link for the electronic submission of the abstracts and the paper submittal form will soon be available on the INTER-NOISE 2007 web site.

1 Acoustical Imaging of Sound Sources
2 Active Noise and Vibration Control
3 Aeroacoustics and Fan Noise
4 Aircraft Noise Control
5 Airport Noise (Physical and Human Aspects)
6 Assessment Methods for Environmental Noise due to Airports, Railways, Road Traffic and Industry
7 Assessment Methods for Noise Exposure
8 Building Acoustics
9 Community Noise
10 Community Response and Exposure Criteria
11 Economic Aspects of Noise, Cost and Benefit Analysis
12 Effects of Sound on Humans
13 Effects of Vibration and Shock on Humans
14 Environmental Noise Problems and Approaches
15 Hearing Protective Devices
16 IT Equipment Noise
17 Low frequency noise and vibrations
18 Machinery Noise (including components and subassemblies)
19 Measurement Techniques and Instrumentation
20 Metrology
21 Modal Analysis
22 Noise and Vibration Mapping
23 Noise Barriers
24 Noise Control Engineering Education
25 Noise Control Materials
26 Noise Control of Home Appliances
27 Noise Policy and Noise Management
28 Numerical Modeling and Simulation Techniques (FEM, BEM, IFEM, SEA)
29 Operational Modal Analysis
30 Psychoacoustics
31 Room Acoustics
32 Signal Processing and Condition Monitoring
33 Sleep Disturbance
34 Sound Intensity
35 Sound Power
36 Sound Propagation
37 Sound Propagation in Ducts and Pipes
38 Sound Quality
39 Soundscape and Community Noise
40 Standards, Legislation and Regulations
41 Transportation Noise
42 TIre and Road Noise
43 Ultrasound
44 Underwater Acoustics
45 Vehicle Noise Vibration and Harshness
46 Vibration Isolation and Damping
47 Vibrations of Rotating Machinery
48 Vibroacoustics and Vibrations



Key Dates

- **Deadline for receipt of abstracts**
  January 31, 2007
- **Travel planning and registration information**
  February 28, 2007
- **Notification of acceptance of technical papers**
  March 31, 2007
- **Deadline for the receipt of the complete manuscripts**
  May 31, 2007
- **Congress dates**
  August 28 - 31, 2007

Abstract Submission

The deadline for abstracts is 31 January 2007. Please forward your abstracts with your pre-registration form either

- by e-mail to the Congress Secretariat **contact@internoise2007.org.tr**
- or, through our web site **www.internoise2007.org.tr**

Congress Hotel

The main congress hotel will be the Hilton Istanbul. With a magnificent view overlooking the Bosphorus strait, the Hilton Istanbul is situated in 15.3 acres of garden, and has a total of 498 rooms— including 15 suites. The hotel is next to ICEC within few minutes walk to the congress venue. Feast on Turkish kebabs at Bosphorus Terrace Restaurant or Chinese cuisine at Dragon Restaurant. The hotel is 30 minutes from the Ataturk International Airport. For more information, go to http://www.hilton.com.tr/Oteller_HiltonIstanbul_en.htm.

Congress Venue

The main Istanbul Conference and Exhibition Centre (ICEC) building features a total of 21 meeting rooms with capacities ranging from 600 to 60. The Rumeli Fair & Exhibition Hall offers a further 5 boardrooms and 6 VIP suites as well as a 45 sq.m. (485 sq.ft.) business centre. Plus, on the lower level of the Rumeli Hall, there is enough stand space to accommodate a full-size exposition in conjunction INTER-NOISE 2007. The ICEC and its new Rumeli Fair & Exhibition Hall are the centerpiece of a complete *Conference Valley*, offering more than 6.000 guest rooms within easy walking distance of ICEC, including 6 five-star hotels.

Exhibition and Sponsors

The organizers invite all the companies and organizations to market their services and products at the congress exhibition. If you are interested in the exhibition or possibilities to sponsor the congress, please contact the Congress Secretariat.

Social Events and Technical Visits

Details of the social events such as the Opening Ceremony & Welcome Reception, Farewell Dinner, Accompanying Persons Programme, Istanbul city tours, pre and post Congress tours and technical visits will be given in the travel planning article to appear in the 2007 March issue of *Noise/News International*.

Language

The language of the congress is English.

Detailed Information about Turkey and Istanbul

For detailed information about the congress city, Istanbul, where the two continents meet, go to http://english.istanbul.com

For visas and other useful information to plan your trip to Turkey, please see the Turkish Embassy website: http://www.turkishembassy.org

Pre-Registration

If you would like to be kept informed of progress in the organization of INTER-NOISE 2007, please forward the following data by e-mail to the Congress Secretariat **contact@internoise2007.org.tr**

- Family Name
- Name
- Title
- E-mail address
- Phone
- Fax
- Organization/Company
- PostalAddress
- City
- Postal Code
- Country

- Preferred Accommodation

☐ ✶✶✶✶✶ HOTEL
☐ ✶✶✶✶ HOTEL
☐ ✶✶✶ HOTEL
☐ ✶✶ HOTEL
☐ Student Housing

Congress Secretariat

Turkish Acoustical Society
Yeni Krizantem Sok. No 78
Ic Levent, 34330 Istanbul, Turkey
Tel: +90 212 279 95 22
Fax: +90 212 264 65 07
E-mail: contact@internoise2007.org.tr
Web: www.internoise2007.org.tr

Editor's View *continued from page 93*

and on indicators to assess quietness. This request was detailed in several aspects, e.g. with respect to sensitive groups, the appropriateness of sounds, and research possibly needed to expand existing knowledge. An ad hoc committee of the Health Council was installed in 2005. The final report was released in July 2006. The URL is:

http://www.gr.nl/adviezen.php?ID=1398&highlight=Quiet%20Areas

In the UK, the Department for Environment Food and Rural Affairs, DEFRA, has commissioned new research on the specific issue of how to define Quiet Areas. The outcome of this research is awaited at the time of writing and will be featured in the European News Department when available. We will then be able to see just how much agreement or otherwise there is across Europe on this issue, and whether we have need of yet more stages of harmonization of the methods we use for assessing "quiet," just as we have had for noise.

Scantek

PCB Piezotronics

Scantek

Scantek Announces the Availability of New Instruments

Scantek, Inc. is pleased to announce the availability of a palmtop instrument.

Called the RealWave Pocket Analyzer from SV Corporation, the pocket device does

Real-time FFT (0.5 Hz to 1 2.8 kHz)

- Sound level meter Z, A, B, C weighting (two simultaneously) I, F, S responses (8 to 134 dB with 50 mV/Pa microphone)
- Vibration meter, acceleration, velocity, displacement, 0.03 m/s^2 to 500 m/s^2 with 50 mV/g accelerometer)
- Amplitude traces
- FFT based tachometer
- Human vibration measurement (ISO 8041, ISO 6954)
- Spectrogram
- Waveform recording and playback of recorded signal
- 1/1, 1/3, 1/6 octave band analysis

The instrument, based on an HP iPAQ comes in a rugged aluminum case. Available with microphone, accelerometer, headphone. Introductory price, with PDA, 4,995 USD

A second offering is a new multi-function sound analyzer. The RION NA-28 Sound Level Meter and Real Time Analyzer is the successor to the NA-27. The NA-28, with a high-contrast TFT-LCD color display, simultaneous measurement and display of 1/3rd and 1/1 octave bands, uses card storage (with up to 300,000 data sets stored). Along with comparator output, and optional uncompressed WAV file recording, from 12 to 20k Hz frequency response. For further information, go to : http://www.rion.co.jp/asp/product/sound/ProC_2.asp?div=1&type=NA-28&pos=I3&no=0

Also available is a compact, rugged, tri axial vibration meter from MMF. The VM-30 is a 12 oz (350 g) unit is suited for bearing vibration, whole-body-, and hand-arm-vibration.

- Machine vibration can be measured as acceleration, velocity or displacement with selectable frequency ranges between 0.4 Hz and 10 kHz
- Display of true RMS, maximum RMS (MTVV), interval RMS, vibration dose (VDV), total vibration value (aW), peak, maximum peak and crest factor
- Memory for over 1000 measurements with PC interface
- Well suited as vibration dosemeter due to its small dimensions, waterproof design and long battery lifetime

The unit is said to meet the requirements of ISO 2631, 5349, 8041, and 10816. The unit includes sensors. It comes in the following configurations:

- VM30-H without sensor
- VM30-HA including a hand-arm measuring kit
- VM30-WB including a whole-body measuring kit
- VM30-HAWB including a hand-arm and whole-body measuring kit

Send inquiries to: Richard Peppin, President, Scantek, Inc., 7060 #L Oakland Mills Road, Columbia, MD 21046 USA

PCB Piezotronics

PCB Piezotronics Introduces a New Preamplifier and Microphone Nose Cone

PCB Piezotronics, Inc. has introduced two new items into its line of acoustic products. Model 426A11 is a 1/2" preamplifier that operates from ICP® Sensor Power. The preamplifier allows the user to select 0 or +20 dB of gain and either a 20 Hz (-3dB) High Pass Filter or A-Weighted filter output response, in lieu of flat unfiltered response, via two switches, located on the external diameter. An overload detector senses both polarity overload signals in front of the filters. The unit comes standard with TEDS and is programmable upon request.

The Model 426A11 preamplifier includes both A-weight and selectable "High Pass" filter, for automotive or aerospace cabin testing requirements. The "A-weight" filter attenuates signals less responsive to the human ear, normally below 1 kHz and above 4 kHz. To make the cabin less noisy, a random incidence microphone (such as PCB Model 377B20), designed to measure sound from different angles of incidence, along with A-weight filter, is the choice of test equipment.

When an "in-cabin" automotive test is performed, some manufacturers will sometimes dangle a microphone and preamplifier inside the car's cockpit. Any movement will cause the microphone to sway, generating low frequencies that are not the target of the test and adversely affecting results.

The "High Pass" filter eliminates low frequencies, which are not of interest, consuming the dynamic range and overloading output signals. This filter, along with the low noise rating of the microphone and preamplifier combination, helps ensure minimal Noise Floor. The 426A11 has a guaranteed electrical noise rating of 5.6 μV (3.7 μV typical) at the output, while set on 0 dB gain and with high Pass filter selected.

The 426A11 is designed to work in a wide range of temperatures (-20 °C to +70 °C), which makes it an excellent choice for "Under Hood" automotive noise source identification, or brake noise tests, where higher operating temperatures may be required. The product can also be used in standard automotive "Pass By" Tests, which is conducted to minimize the noise outside the vehicle, while in operation.

The 426A11 is offered with PCB's "Total Customer Satisfaction" policy. If for any reason, at any time, you are not satisfied with our product, you can return it for an exchange or refund.

The Vibration Division of PCB® Piezotronics, Inc. has also introduced a new accessory model to its acoustic product line. Model 079B21 is a Nose Cone designed to be used with ½" (12 mm) condenser test and measurement microphones. The 079B21's aerodynamic shape is designed to minimize noise due to wind and other high-speed laminar flows, while permitting the sound intended to be measured to pass through. Another advantage of the nose cone is its ability to protect and minimize damage to the diaphragm due to sand, dirt and other contaminates that might be picked up and directed toward the microphone by the wind. Typical applications are wind tunnel testing and outdoor environmental testing.

In addition to this product, PCB offers a complete line of modern prepolarized (0V) and traditional externally polarized (200V) microphones to go along with our value oriented array electret microphones and acoustic related accessories, to service most sound pressure, NVH or holography, acoustic test and measurement application.

For further information, contact Andrea Mohn, Marketing Coordinator, PCB Piezotronics, Inc., 3425 Walden Avenue, E-Mail: mktg@pcb.com

Larson Davis

Larson Davis Names Alain DeLandsheer Product and Marketing Manager

Larson Davis, a PCB Piezotronics division, is pleased to announce the addition of Alain DeLandsheer as Product and Marketing Manager, responsible for the implementation of new product strategy, introduction and development.

In this leadership role, Alain will help to define new products and features for all of Larson Davis's dosimeter, sound level meter, and real-time analyzer product lines, helping customers to make more effective and efficient sound and vibration measurements.

Alain brings to Larson Davis more than 20 years of global expertise in the sound and vibration industry, beginning his career as a mechanical engineer with Honda R&D in Japan, then transitioning to LMS, where he most recently served as a Business Unit Manager. He holds a degree in Electromechanical Engineering from the Catholic University of Belgium, with emphasis on vibration, modal analysis and model sub-structuring, as well as a post-graduate degree in Management from the Free University of Brussels (CEPAC).

For more information on Larson Davis products, please visit www.LarsonDavis.com.

illbruck

illbruck offers new product literature for SONEXvalueline™ Panels

illbruck acoustic, inc. has new literature available for its SONEXvalueline™ Panels. The panels are suitable for settings such as manufacturing facilities, broadcast recording studios, churches and classrooms that strive for acoustical control.

SONEXvalueline Panels are especially effective at absorbing excess sound at middle frequencies (500 to 1,000 Hz) where unwanted noise and reverberation can interfere with communication. The product's noise reduction coefficients (NRC) range from 0.75 to 1.05.

Visit www.illbruck-acoustic.com/vlit to obtain product literature.

Larson Davis

illbruck

Acknowledgements

INCE/USA Liaison Program

ACO Pacific, Inc. .... Belmont, California
AVAC Continuing Education .... Pittsburgh, Pennsylvania
Colin Gordon and Associates .... San Bruno, California
Acoustical Solutions .... Richmond, Virginia
Cavanaugh Tocci Associates .... Sudbury, Massachusetts
G.R.A.S. Sound and Vibration .... Vedbaek, Denmark
Harris Miller Miller & Hanson Inc. .... Burlington, Massachusetts
Noise Control Engineering, Inc. .... Billerica, Massachusetts
Overly Door Company .... Greensburg, Pennsylvania
Scantek, Inc. .... Columbia, Maryland
Vibro-Acoustics .... Scarborough, Ontario, Canada
Wyle Laboratories .... Arlington, Virginia

Sustaining Members of International INCE

Brüel & Kjær .... Nærum, Denmark
Cesva Instruments, S.L. .... Barcelona, Spain
Ecophon .... Hyllinge, Sweden
G.R.A.S. .... Vedbaek, Denmark
LMS International, NV Numerical Integration Technologies .... Heverlee, Belgium
Narita International Airport Corporation (NAA) .... Narita-City, Japan
Norsonic AS .... Tranby, Norway
Rion Company, Ltd. .... Tokyo, Japan

Institutional Members of International INCE

Argentina .... Centro de Investigacion en Acustica, Buenos Aires
Belgium .... Laboratorium voor Akoestiek en Thermische Fysica, Leuven
France .... Centre Technique des Industries Méchanique, Senlis
Korea .... Center for Noise and Vibration Control Engineering, Korean Institute for Science and Technology, Science Town, Taejon-Chi
New Zealand .... Centre for Sound Studies
Portugal .... Laboratorio Nacional de Engenharia Civil, Lisboa
Sweden .... Department of Applied Acoustics, Chalmers University of Technology, Gothenburg
USA .... Graduate Program in Acoustics, The Pennsylvania State University, State College, Pennsylvania

Conference Calendar

Below is a list of congresses and conferences sponsored by International INCE and INCE/USA. A list of all known conferences related to noise can be found by going to the International INCE page on the Internet, www.i-ince.org.

2006 September 18-21
ACTIVE 2006
The 2006 International Symposium on Active Control of Sound and Vibration
Adelaide, Australia
Contact: ACTIVE 2006 Conference, School of Mechanical Engineering, The University of Adelaide, SA 5005 Australia
Internet: www.active2006.com

2006 December 03-06
INTER-NOISE 2006
The 2006 International Congress and Exposition on Noise Control Engineering
Honolulu, Hawaii, USA. Contact: Institute of Noise Control Engineering, INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153. Tel. +1 515 294 6142; Fax: +1 515 294 3528; e-mail: IBO@inceusa.org. Internet: http://www.inceusa.org.

2007 August 28-31
INTER-NOISE 2007
The 2007 International Congress and Exposition on Noise Control Engineering
Istanbul, Turkey.
Contact: Turkish Acoustical Society
Yeni Krizantem Sok. No 78
Ic Levent, 34330 Istanbul, Turkey
Tel: +90 212 279 95 22 • Fax: +90 212 264 65 07
E-mail: contact@internoise2007.org.tr
Internet: www.internoise2007.org.tr

2007 October 22-24
NOISE-CON 07, The 2007 National Conference on Noise Control Engineering
This conference will be held at the Grand Sierra Resort in Reno, Nevada. Contact: Institute of Noise Control Engineering, INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153. Tel. +1 515 294 6142; Fax: +1 515 294 3528; e-mail: IBO@inceusa.org. Internet: http://www.inceusa.org.

Directory of Noise Control Services

Information on listings in the Directory of Noise Control Services is available from the INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153; +1 515 294 6142; Fax: +1 515 294 3528; IBO@inceusa.org. The price is USD 400 for 4 insertions.

The **Index of Advertisers** contained in this issue is compiled as a service to our readers and advertisers; the publisher is not liable for errors or omissions although every effort is made to ensure its accuracy. Be sure to let our advertisers know you found them through *Noise/News International* magazine.

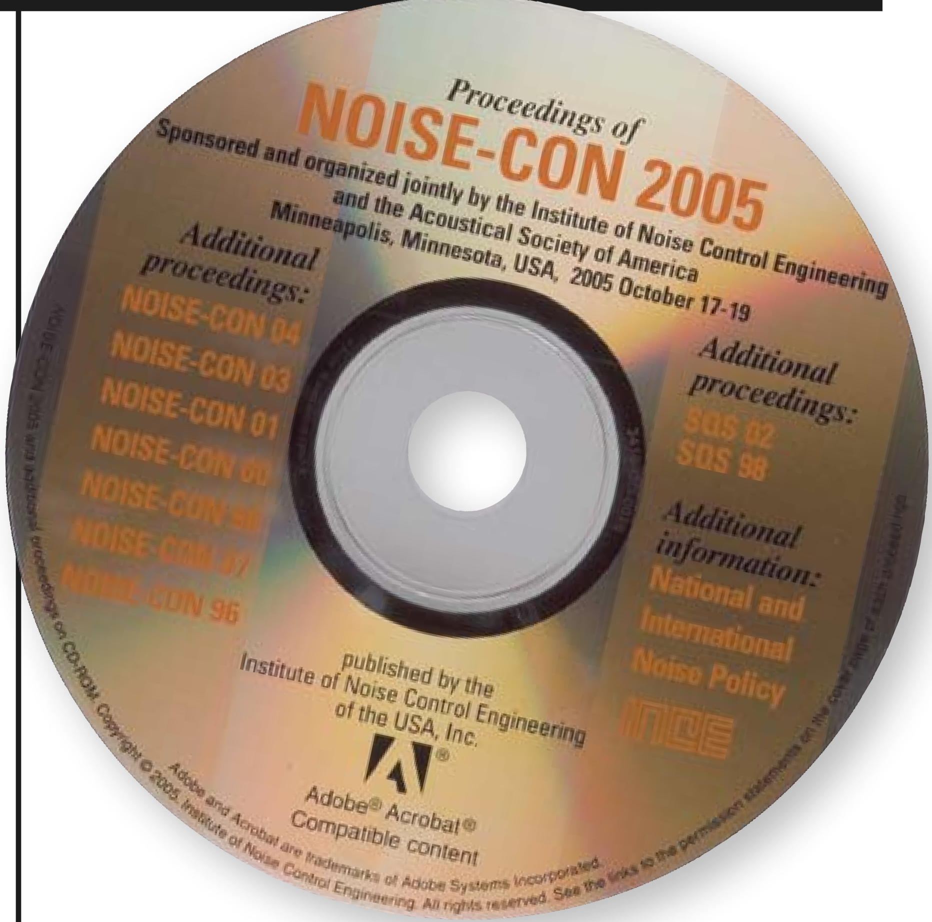
NOISE-CON 05 CD-ROM

WITH ADDITIONAL PROCEEDINGS

This searchable CD-ROM contains 198 papers presented at the joint NOISE-CON 05/ASA 150th meeting as well as 749 papers from the NOISE-CON conferences held in 1996, 1997, 1998, 2000, 2001, 2003, and 2004 as well as the papers from the Sound Quality Symposia held in 1998 and 2002. All papers are PDF files.

Several papers are taken from sessions organized by the Noise, Architectural Acoustics and Structural Acoustics Technical committees for this 150th ASA meeting. The three plenary lectures related to noise and its impact on the environment are included. Also included are papers in one or more organized sessions in the areas of aircraft noise, tire/pavement noise, and hospital noise. Other papers cover to noise materials, mufflers and silencers, statistical energy analysis, acoustical facilities, product noise emissions, sound quality and perception, sound insulation of buildings, community noise, and environmental noise criteria. A collection of papers on United States and international noise policy is also included on the CD-ROM.

These papers are a valuable resource of information on noise control engineering that will be of interest to researchers in the academic community, government workers, engineers, acoustical consultants, and students.



NOISE-CON 05 CD ORDER FORM

Enclosed is my check (or credit card authorization) for ________ U.S. dollars. Please send me ________ copies of the NOISE-CON 2005 CD-ROM at 70 U.S. dollars each. Shipping and handling charge: domestic, 2 U.S. dollars; all other countries, 5 U.S.dollars. Shipped by first class mail in the United States and by air mail to other countries. Stock number: Nc05.

Name ☐ Mr. ☐ Ms. ☐ Dr. ☐ Prof. ____________________

Address ____________________

City ____________________ State/Province ____________ Zip/Postal Code __________

Country ____________________

E-mail ____________________

Credit card authorization: ☐ Visa ☐ MasterCard ☐ American Express ☐ Discover card

Name on card (please print) ____________________

Card number: ____________________

Expiration date (MM/YY): ____________________

Signature ____________________

You may order by postal mail, telephone (USA and Canada only), by FAX, or by e-mail. Postal mail: Bookmasters, Inc., Distribution Services Division, 30 Amberwood Parkway, Ashland, OH 44805, USA. Telephone: 1 800 247 6553; FAX: 1 419 281 6883; e-mail: order@bookmaster.com. Internet: Go to the INCE/USA page at Bookmasters Atlas Bookstore. http://www.atlasbooks.com/marktplc/00726.htm