INTERNATIONAL CO-OPERATION IN ACOUSTICS*

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I. THE PURPOSE OF INTERNATIONAL CO-OPERATION

Acoustics was, up to the first decades of this century, a branch of physics. The subject acoustics embraced at that time primarily sound and sound waves. Perception of sound through the ear was treated to a minor degree. The increasing interest during the first half of this century in pure and applied acoustics resulted in the establishment of acoustics as an independent discipline. Acoustics rapidly developed to become an important interdisciplinary activity - perhaps to a greater extent than has been the case with any other engineering discipline. Acoustics is today a broad field which treats subjects as for example: Physical Acoustics, Physiological Acoustics, Psychological Acoustics, Speech, Musical Acoustics, Shocks, Vibrations, Electroacoustics, Architectural Acoustics, Room Acoustics, Noise Emission, Noise Immission, Town Planning, Effects of Noise, and Measurement of Noise.

International co-operation in the province of Acoustics comprises the following three important subjects.

Research

It is of great value for research scientists to be informed -- at international meetings - about the latest advances in research all over the world. It is important to get the opportunity to meet colleagues and discuss subjects of common interest. Exchange of information and experience may promote the research carried out by the individual research workers.

Noise Control Engineering

Engineers occupied with noise control are, of course, interested in information about noise control procedures developed in other countries. It is important to pool the knowledge and experience which exist in all countries. The task to carry out a proper noise control programme is so enormous that it is absolutely necessary to take advantage of methods and principles developed in other countries. The individual country cannot afford to solve all problems. International co-operation is, therefore, also of great value for engineers occupied with noise control.

Standardization

An efficient international co-operation in science and engineering implies a proper harmonizing of vocabulary. Co-operation in Acoustics implies, furthermore, a

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proper harmonizing of physical quantities and units. First, but not least, the necessity of the harmonization of methods of measurements used in acoustics should be realized. Harmonizing of vocabulary, physicaql quantities and units, and methods of measurements are objects of international standardization.

II. INTERNATIONAL ORGANIZATIONS ON ACOUSTICS

A number of International Organizations - as well as Regional Organizations - have been established since World War II. Five such International Organizations will be quoted as examples.

II.1 'The International Commission on Acoutics' (ICA)

ICA is a 'special commission' of 'The International Union of Pure and Applied Physics' (UPAP). The purpose of ICA is to advance the science of acoustics throughout the world. ICA was established in 1951. The most important activity of ICA is to sponsor ICA Congresses on Acoustics. ICA Congresses are held every third year. ICA Congresses act as international meeting places with a broad international attendance.

Eleven ICA Congresses have been held so far:

1953	Delft	1971	Budapest
1956	Boston	1974	London
1959	Stuttgart	1977	Madrid
1962	Copenhagen	1980	Sydney
1965	Liège	1983	Paris
1968	Tokyo		

The number of participants have been between 750 and 1600 depending on the location of the congress. The number of papers have been between 250 and 850. Participants came from 25-40 countries. The papers represent nearly every aspect of acoustics. Typical categories of contributions are papers on:

1. Speech communication
2. Physiological acoustics
3. Psychological acoustics
4. Noise
5. Shock and vibration
6. Architectural acoustics
7. Bioacoustics
8. Ultrasonics
9. Underwater sound
10. Physical acoustics
11. Aeroacoustics
12. Musical acoustics
13. Acoustical measurements

Scientists and research workers engaged in the field of Acoustics meet at ICA Congresses and present and discuss the latest results of their work.

A proper understanding of the theory of physics dealing with Acoustics and the effects of sound on human beings is an absolute condition for a satisfactory solution of practical problems in Acoustics, e.g. problems in Architectural Acoustics, Room Acoustics, Underwater Acoustics, Communication, Noise Control, and Shock and Vibration. The participants in ICA Congresses are, therefore, not only scientists and research workers, but also engineers who have a fairly good education in physics and mathematics.

The next ICA Congress will be the 12th International Congress on Acoustics. The congress will be held in Toronto, Canada, 24 July - 1 August 1986.

II.2 'International Commission on Biological Effects of Noise' (ICBEN)

Noise is a problem that millions of individuals feel in such forms as impaired hearing, annoyance, intrusion of privacy, and sleeplessness. The noise exposure in industry causes hearing damage and annoyance. The environmental noise produced by industry or traffic causes annoyance. The noise in our homes produced by neighbours, industrial activities or traffic causes annoyance and sleeplessness. The object of the International Commission on Biological Effects of Noise is to promote research related to the biological effects of noise.

An International Congress on 'Noise as a Public Health Problem' is held once every fifth year. The papers presented at these congresses provide a comprehensive coverage of the complex and extensive biological correlations that exist between man and noise. ICBEN was established in 1968.

The activities at these congresses are organized around eight International Noise Teams, each composed of approximately ten scientists who are renowned for their expertise in the area in which that team works. The eight teams are:

Team 1 Noise-Induced Hearing Loss
Team 2 Noise and Communication
Team 3 Non-Auditory Physiological Effects Induced by Noise
Team 4 Influence of Noise on Performance and Behaviour
Team 5 Noise-Disturbed Sleep
Team 6 Community Response to Noise
Team 7 Noise and Animals
Team 8 Effects of Interaction Between Noise and/or Other Physical and Chemical Agents

ICBEN Congresses are held every fifth year. Four Congresses have been held so far.

1968 Washington
1973 Dubrovnik
1978 Freiburg
1983 Turin

II.3 'International Institute of Noise Control Engineering' (I-INCE)

The enormous expansion during the last 25 years of the surface and air traffic, the industrial revolution with mechanization of industry and the introduction of more and more office machines and electric domestic appliances involve that the noise exposure has increased drastically after World War II. Noise is an insidious poison. The repeated exposure to noise day after day through many years may be a threat to our health. It is, therefore, of the greatest importance that we provide an environment free from noise that jeopardizes the public health and welfare.

The increasing public concern for the environment in the sixties resulted in widespread activities relating to noise. The results of these activities are that we have a good understanding of the noise problems. The knowledge collected through extensive research and development makes it possible to solve many noise problems satisfactorily. The task we have is primarily to disseminate our knowledge, though further research, of course, shall be carried out. It was realized that an organization which could undertake the international leadership in applying noise control technology should be established. The International Institute of Noise Control Engineering was established in 1974. I-INCE is a non-profit organization.

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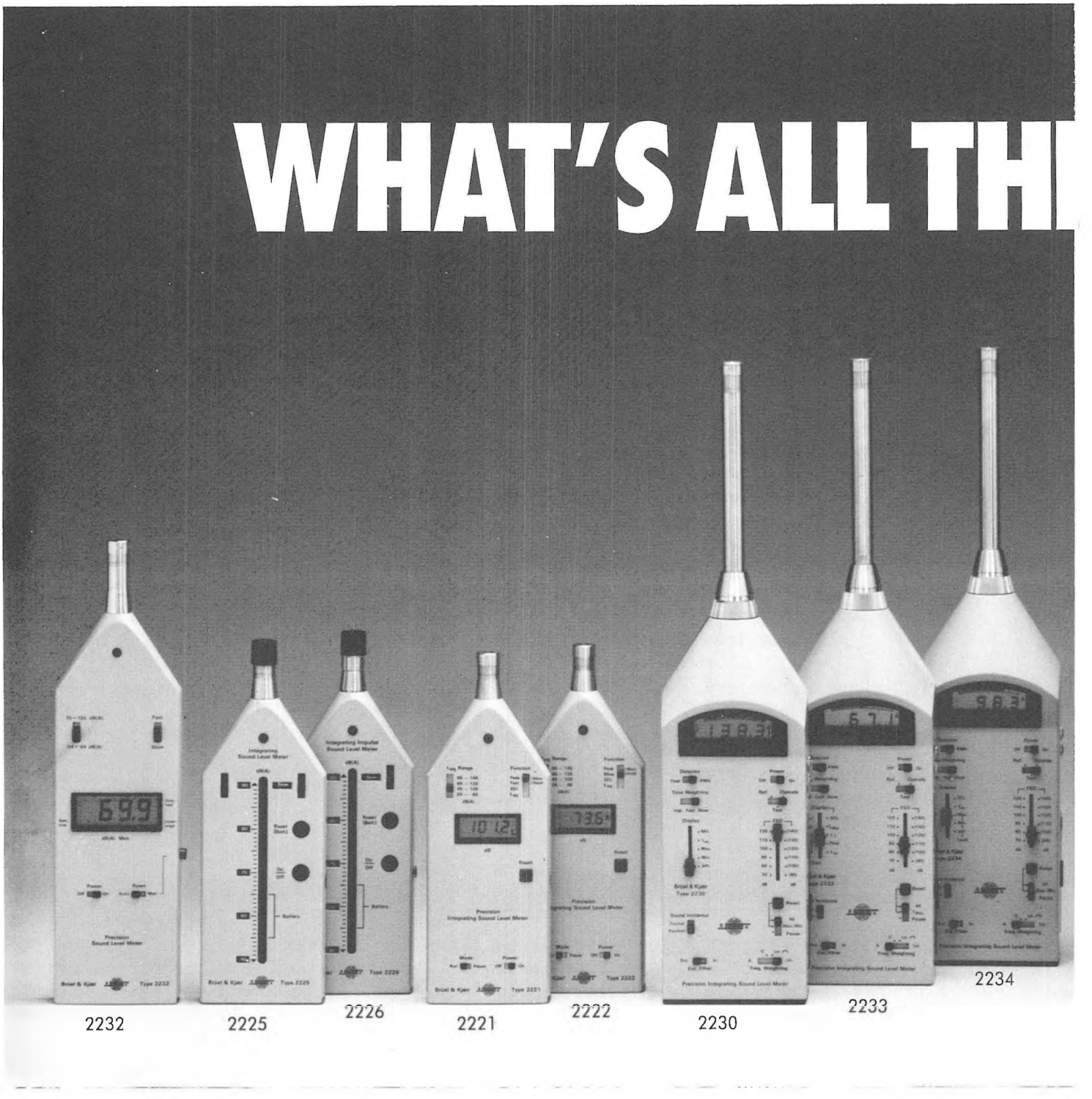

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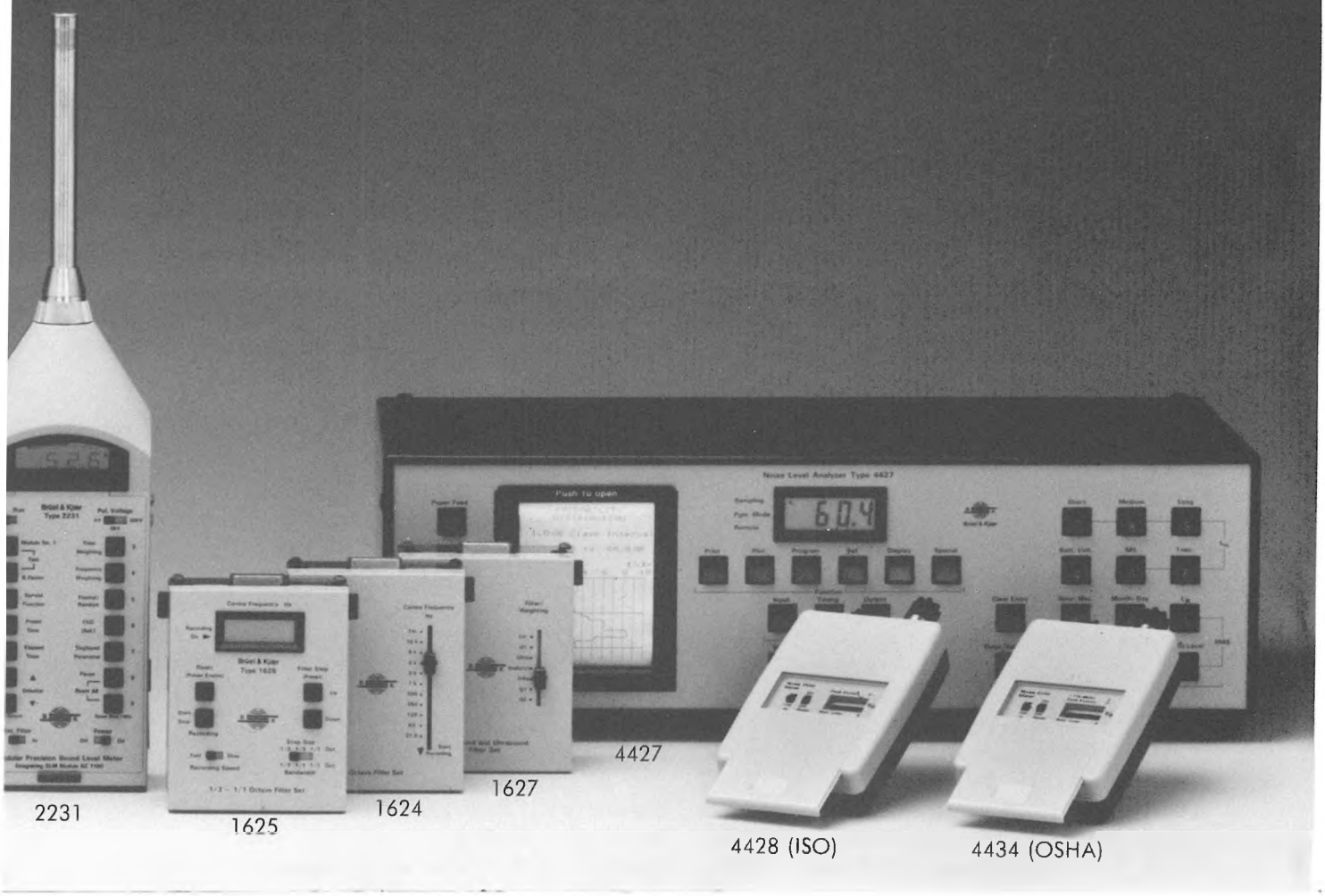

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Purpose

The purpose of I-INCE comprises:

a) the organization of international conferences
b) the international exchange of information and news items
c) the promotion of international co-operation in research on noise control and the application of engineering techniques for the control of noise
d) the development of interdisciplinary contacts between noise control engineering and other related fields of work.

Membership

I-INCE has three classes of membership:

- Member Societies (Acoustical Societies and Acoustical Commissions)
- Associate Members (non-profit education institutions and research organizations)
- Sustaining Members (organizations, corporations, or persons contributing a fixed annual fee).

INTERNATIONAL/INCE has twenty-three member societies in twenty-one countries spread over five continents and five sustaining members. INTERNATIONAL/INCE is certainly a true international organization. INTERNATIONAL/INCE is expecting applications for membership from a number of other societies.

INTER-NOISE Conferences

In fulfilling its purpose the Institute initiates and sponsors INTER-NOISE Conferences in countries of member societies. The conferences provide a medium for the exchange and dissemination of information on the engineering aspects of noise control. This information is of interest to the public, industry, and governmental bodies. The INTER-NOISE Conferences are the only international forum for such activities. INTER-NOISE Conferences have until now been held in the U.S.A. in even-numbered years and outside the U.S.A. in odd-numbered years. Twelve INTER-NOISE Conferences have been held so far:

1972	Washington, U.S.A.	1979	Warsaw, Poland
1973	Copenhagen, Denmark	1980	Miami, U.S.A.
1974	Washington, U.S.A.	1981	Amsterdam, The Netherlands
1975	Sendai, Japan	1982	San Francisco, U.S.A.
1976	Washington, U.S.A.	1983	Edinburgh, Scotland
1977	Zürich, Switzerland	1984	Honolulu, U.S.A.
1978	San Francisco, U.S.A.	1985	Munich, Fed. Rep. of Germany

The number of participants have been between 400 and 800. The number of papers have been between 100 and 350. Participants came from 20-35 countries. Typical categories of contributions are papers on:

- Noise Sources
- Noise Control Elements
- Vibrations (Generation, Transmission, Isolation, and Reduction)
- Environmental Noise
- Effects of Noise
- Noise Measurement and Analysis
- Standards
- Legislation

The next INTER-NOISE Conference, INTER-NOISE 86, will be held in Boston, U.S.A., 21-23 July 1986.

II.4 Technical Committee ISO/TC43: 'ACOUSTICS'

ISO/TC43 is a Technical Committee established by 'The International Organization for Standardization'.

Purpose

The International Organization for Standardization - ISO - is a non-profit organization whose aim is 'to promote the development of standards in the world with a view to facilitating international exchange of goods and services and to developing mutual co-operation in the sphere of intellectual, scientific, technological, and economic activity'.

Members

A member body of ISO is the national body 'most representative of standardization in its country'. The number of member bodies is 74. ISO was established in 1946.

Technical Committee ISO/TC43: 'Acoustics'

ISO's activities within the field of acoustics are undertaken by the Technical Committee TC43, 'Acoustics', and its two Subcommittees, TC43/SC1 'Noise' and TC43/SC2 'Building Acoustics'. The scope of TC43 reads: 'Standardization in the field of acoustics, including methods of measuring acoustical phenomena, their generation, transmission and reception, and all aspects for their effects on man and his environment'.

The scope of TC43/SC1 reads: 'Standardization in the field of noise in all aspects, including methods of measurement of noise produced by diverse sources in diverse environments and the assessment of the effects of sound on man'.

The scope of TC43/SC2 reads: 'Standardization in the field of building acoustics, including architectural acoustics, acoustical properties of building materials and constructions, and sound propagation in buildings'.

The number of documents prepared by TC43 and the two subcommittees was, by the end of 1983:

International Standards (ISO)	49
Draft International Standards (DIS)	32
Draft Proposals (DP)	20

TC43 was established in 1953 and holds its meetings with intervals of some 18 months.

Technical Committee ISO/TC108: 'Mechanical Vibrations and Shock'

The scope of TC108 is:

Standardization in the field of mechanical vibration and shock, including:

- terminology
- excitation by sources, such as machines, and vibration and shock testing devices
- elimination, reduction and control, especially by balancing, isolation and damping
- evaluation of acceptable limits for man, and in machines, vehicles and structures
- methods and means of measurement and calibration
- methods of testing

Liaison with ISO/TC43-Acoustics and IEC/TC29-Electroacoustics, on a mutually agreed basis.

The number of documents prepared by TC108 and its four subcommittees was by the end of 1983:

International Standards (ISO)	22
Draft International Standards (DIS)	19
Draft Proposals (DP)	16

TC108 was established in 1963 and holds its meetings with intervals of some 24 months.

II.5 Technical Committee IEC/TC29: 'Electroacoustics'

IEC/TC29 is a committee established by 'The International Electrotechnical Commission' (IEC). The scope of TC29 is: 'to prepare international standards in the field of electroacoustics and vibrations within the frequency range of infra, audio and ultrasound'. IEC was established in 1906. A member body of IEC is the national body most representative of all electrical interests in the country concerned. The number of members are 42. IEC documents are designated Recommendations and not Standards as it is the case with the documents developed by ISO. IEC/TC29 and ISO/TC43 have a close co-operation and hold usually consecutive meetings. The activities of IEC/TC29 Subcommittee C are especially of great interest to ISO/TC43.

III. CONCLUSION

The number of countries participating in this co-operation is growing rapidly. Many countries are, however, not yet represented at all or are only represented by a very modest number of scientists or engineers. It is hoped that many more scientists and engineers will take advantage of the valuable international exchange of information which takes place in the province of Acoustics. It is, furthermore, hoped that representatives of countries not yet participating in the international co-operation in Acoustics will be present in the future.

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