

## ACOUSTICAL NEWS—USA

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### Dedication of Vern O. Knudsen Hall, University of California, Los Angeles

On 16 May 1964, the University of California, Los Angeles, dedicated its new Physics Building as Vern O. Knudsen Hall in honor of the retired professor, Graduate Dean, and Chancellor of the University, a world renowned figure in acoustical science, and one who has participated actively in the affairs of the Acoustical Society of America since its founding. One of the charter members of the Society, Dean Knudsen was its first Vice President (1929-1933) and its third President (1933-1935). He was the first recipient of the Society's Wallace Clement Sabine award for contributions to architectural acoustics (1957). He is also one of the four living honorary members of the Society.

The same dedicatory ceremony honored Dean Knudsen's long-time colleague and friend, the late E. Lee Kinsey, former chairman of the Department of Physics at UCLA, for whom

the old Physics Laboratory has been named. Professor Joseph Kaplan of UCLA and Professor Gerhard H. Dieke of The Johns Hopkins University addressed the gathering in Schoenberg Hall on the UCLA campus on the life and scientific work of Dr. Kinsey. Chancellor Franklin D. Murphy of UCLA presided at the exercises, at which the first E. Lee Kinsey Memorial Scholarship was presented to a senior in the Physics Department.

Recollections of Vern Knudsen were presented by Dr. Harvey Fletcher, formerly Director of Research at the Bell Telephone Laboratories and now Dean of Science at Brigham Young University in Provo, Utah. Dr. Fletcher recalled in witty fashion his early association with Dean Knudsen as his professor in Utah and later as his colleague and supervisor at the BTL. He also paid tribute to Knudsen's outstanding scientific achievements and made particular mention of his important role in the formation and advancement of the Acoustical Society of America, which had its origin in the same year (1929) in which Knudsen began his professional academic career at UCLA.

Further appreciation of Dean Knudsen's work was presented by Dr. Simon Ramo of the Thompson Ramo Wooldridge Company. He emphasized particularly the very significant contributions to physical acoustics involved in Knudsen's researches on relaxational absorption in gases, the basic paper that won him the \$1000 prize at the AAAS meeting in 1934. He also stressed the premier position Knudsen has held in the field of architectural acoustics in the United States of America for many years. Knudsen has always approached these problems from the standpoint of not only the technical scientist but of that of the humanist as well, interested intensely in the welfare and satisfaction of human



HARVEY FLETCHER  
who spoke at the dedication of  
Knudsen Hall at UCLA



Los Angeles Times

VERN O. KNUDSEN  
in front of Knudsen Hall, University of California, Los Angeles

beings. This broad human outlook stood him in good stead in his long career as an academic administrator. His deanship of the Graduate School of UCLA was a notable epoch in the history of that institution.

President Lee A. DuBridge, of the California Institute of Technology, spoke for the associated institutions of higher education in California and paid tribute to both Kinsey and Knudsen as great teachers and scientists.

The occasion was a fortunate one in that Dean Knudsen himself could be present. He made a brief response marked by wit but also by warm human feeling. This closed the formal dedicatory exercises. They were followed by an official luncheon, guided tours of the physics laboratories of UCLA, and a social hour in the Faculty Center in the late afternoon.

The Acoustical Society of America takes pride in this well-deserved honor paid to one of its leading members.



ACOUSTICAL "GREATS"  
Three of the founders of the Acoustical Society of America at the dedication of Knudsen Hall, UCLA. From left to right: Floyd R. Watson, Vern O. Knudsen, and Wallace Waterfall

## Report to the National Science Foundation on Conference on Education in Acoustics

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### INTRODUCTION

On 11 December 1963, a grant of \$10 900 was made by the National Science Foundation (grant Ge-3822) to the American Institute of Physics to enable the Acoustical Society of America to hold a conference "to evaluate the role and significance of the subject matter of acoustics in higher education and to chart the future of education in acoustics." To arrange the program and other details of the conference, the President of the Society appointed a steering committee consisting of F. V. Hunt (Harvard University), Wayne Rudmose (Tracor, Incorporated), and R. B. Lindsay (Brown University), *Chairman*. Professor Hunt participated in the planning of the conference but was unfortunately unable to attend. Professors John C. Johnson (Pennsylvania State University) and Robert Shankland (Case Institute of Technology) were co-opted as members of the committee, but Professor Shankland found it impossible to attend.

### ACTIVITIES

Thirty-six authorities in various fields of acoustics and of various professional affiliations were invited to participate in the conference, which was held at the American Institute of Physics in New York on 12 and 13 March 1964. The list of participants is attached to this report as Appendix A. The program of the proceedings is attached as Appendix B.

### SUMMARY OF PROCEEDINGS AND CONCLUSION

The proceedings of the conference will be published separately. We present here the principal points brought out and the conclusions reached.

### MANPOWER PROBLEM IN ACOUSTICS

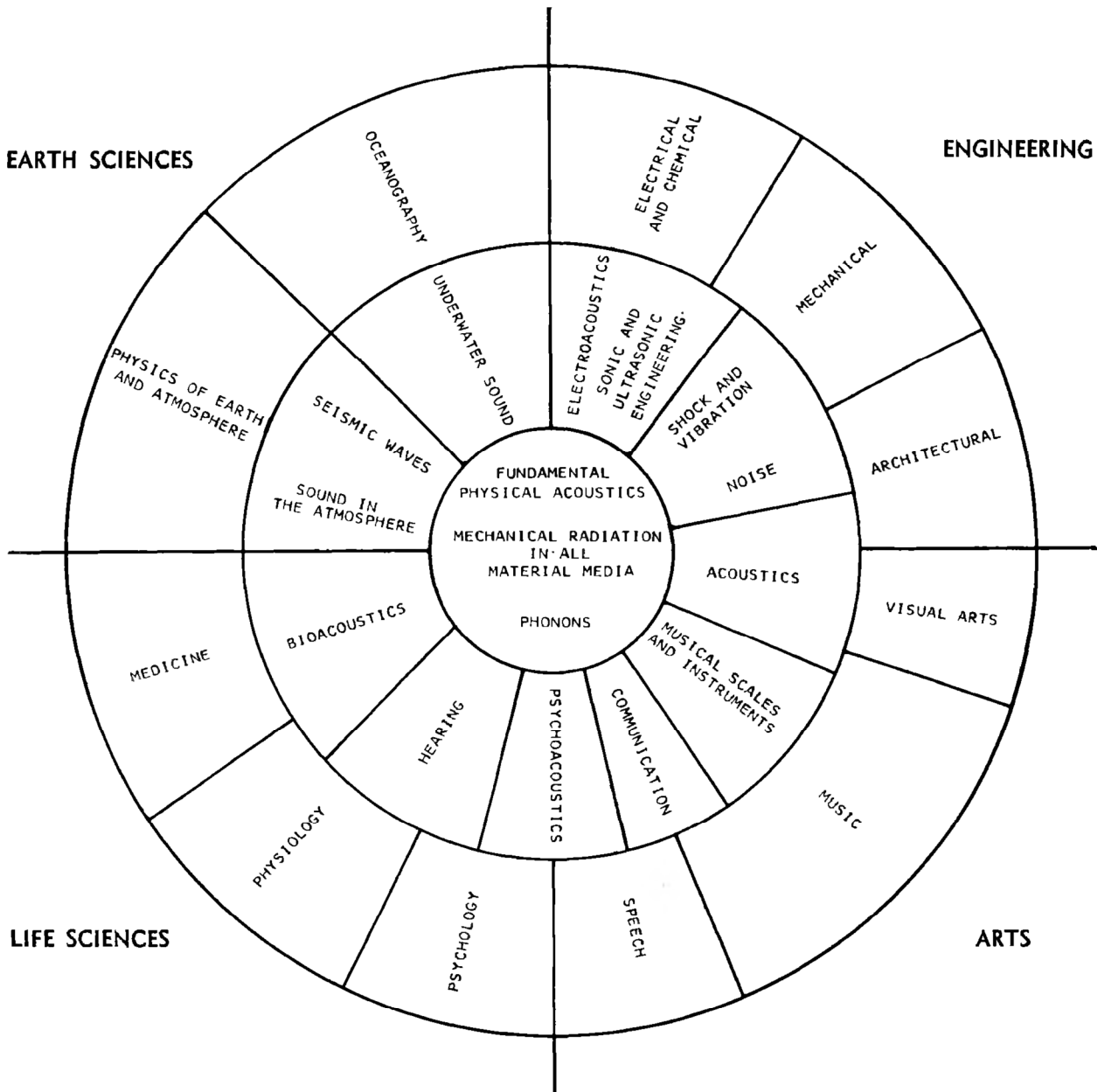
On the basis of evidence presented by the participants, it became the consensus of the conference that the demands for

personnel trained in acoustics by industry and government at the present time far exceed the available supply. Physics departments in the universities are turning out only ten Ph.D.'s a year specifically in acoustics, and even if one were to supplement this with Ph.D. production in engineering, physiology and psychology having some connection with acoustics, the number could hardly be increased by a factor of more than three or four. The demand is therefore being met largely by the employment of personnel trained in other fields of science and engineering, e.g., electronics, with supplementary on-the-job training to fit the workers for specialized acoustical tasks, as in underwater sound, for example. While this scheme *can* be applied with some success, the consensus was that it is rather wasteful and expensive and therefore ultimately unsatisfactory. It was agreed that more extensive training in acoustics is essential in the universities to meet adequately the current and future demands. It was agreed that departments of physics, many of which have neglected the teaching of acoustics in recent years, should reexamine their positions in this matter. It was indeed recognized that the obligation to provide instruction in acoustics now rests heavily also on other departments, notably in the engineering field.

### TEACHING OF ACOUSTICS

In the detailed discussion of the teaching of acoustics in the schools, colleges, and universities that made up a large part of the conference, it was pointed out by several participants that the name *acoustics* is now widely misunderstood not only by the general public but by scientists and educators generally. This is having an adverse effect on the teaching of the subject. In too many quarters, it is still narrowly conceived in the 19th century sense and restricted to those branches of sound that relate directly to the human being. The modern view, as represented by the Acoustical Society of America and its *JOURNAL*, which considers acoustics as the science of mechanical radiation in all its aspects and applications, including *origin* (vibration of material media, etc.), *transmission* through material media, at all frequencies and under the most diverse conditions, and *reception*, has somehow eluded the attention of teachers of physics. The very generality of

THE SCIENCE OF ACOUSTICS



the discipline and the fact that it touches on practically every facet of human experience, as shown in the accompanying Figure, has probably reacted unfavorably on the adequate teaching of it in recent times, especially in the face of the tremendous advances of physical knowledge on all fronts and the concentration of the attention of physics teachers on the fashionable fields of atomic and quantum physics. Some members of the conference felt that the name *acoustics* is definitely detrimental to satisfactory education preparatory to a professional career in one of its many fields, but the consensus was that the name is too well-established and precious to discard and the chief problem is one of publicizing the full significance of the discipline that it represents as widely as possible—in other words, to educate the educators.

Several participants discussed what is currently being taught in the way of acoustics courses. Thus, of 130 institutions having graduate schools offering the Ph.D. degree, in 57 of these the departments of physics offer undergraduate courses specifically in acoustics (beyond the acoustics content of the elementary general-physics course) and/or graduate courses in special phases of acoustics. Of these same 130 institutions, 88 offer in the engineering department courses that could rank as acoustics, though in more than half the cases these are restricted to mechanical vibrations. It was the consensus that the physics courses in acoustics, which are almost always elective courses, are taken by relatively few students, except in institutions having strong research programs in physical acoustics, and even in these there

is a tendency to allow students to work up their own background in connection with actual participation in research. In spite of the vast range of current engineering applications of acoustics, few engineering departments offer courses specifically in acoustical engineering or electroacoustics.

Study of textbooks currently in use in elementary-physics courses in colleges and universities discloses in general a decidedly inadequate treatment of acoustics. Usually, sound is introduced as part of a chapter on wave motion, with acoustical illustrations chosen from strings and organ pipes and with little or no reference to the newer and more exciting branches of acoustics, like ultrasonics. Apparently few, if any, acoustical experts write textbooks of elementary physics. It therefore cannot be expected that physics students will, in general, develop any interest in acoustics from the elementary course. The same applies to engineering majors.

Given the present situation, how, then, *do* workers in acoustics get educated? It was the consensus of the conference that the majority of them get on-the-job training, having entered industrial or government employment with college majors or even graduate degrees in various branches of engineering, applied mathematics, or nonacoustical physics. Since the bright ones do all right and make successful careers in acoustics, it would be natural to ask why worry about formal education in acoustics? But the problem cannot be dismissed so simply. Most of the participants in the conference, who employ young acoustical workers, expressed the strong opinion that, while on-the-job training is effective and probably necessary to a certain extent for nearly all new employees, it can be very expensive. Greater economy and faster training could be achieved if the young worker came in with at least an introduction to the foundations of acoustics, i.e., general radiation theory. Many industries find it necessary to let their employees take out-of-hour courses in basic acoustics or advanced applications thereof at nearby universities, when these are available. This is obviously not an economical procedure, though very helpful where it is possible.

There appears to be no lack of good experimental equipment for laboratory work in advanced courses in acoustics, but its availability does not always seem to have come to the attention of teachers. Instrument manufacturers put out too few kits of easily assembled equipment for elementary laboratory purposes, and manuals for use in the design and conduct of experiments are much needed. The relatively poor treatment of acoustics in elementary-physics texts has already been mentioned. There is no

lack of good texts in sound and mechanical vibration on the intermediate and advanced levels. Excellent monographs exist on special fields like ultrasonics, for example. The greatest weakness in the book line was thought by the members of the conference to be the absence of an intermediate text in general radiation physics, covering wave propagation in general from an analytical point of view, with emphasis on both mechanical and electromagnetic radiation, their similarities and differences. This would be a great stimulus to an advanced integrated undergraduate course in radiation physics.

## RECOMMENDATIONS

The conference passed no formal resolutions, but out of the deliberations the following recommendations definitely emerged:

1. It is recommended that the Acoustical Society of America appoint a committee on education in acoustics to undertake a continuous exploration of methods of improving and expanding the teaching of acoustics at all levels from the elementary school through the graduate school.

2. It is recommended that the committee on education in acoustics of the Acoustical Society of America shall examine ways of publicizing the nature of the science of acoustics and the professional opportunities inherent in it. Among the various methods of doing this should be the preparation of a booklet on careers in acoustics for distribution particularly in schools and colleges.

3. It is recommended that the committee further explore thoroughly the possibilities provided by interdisciplinary programs in acoustics in universities, involving cooperative action by departments of physics, engineering, biology, psychology, oceanography, etc., as well as establishing acoustics as a major field of graduate study.

4. It is recommended that the committee give careful consideration to a project for the setting up, with assistance by an appropriate governmental agency, of one or more institutes of acoustics in present major universities having strength in acoustical research. Such institutes might combine both educational and research programs in certain fields of outstanding need and significance such as underwater acoustics, low-temperature acoustics, aerodynamic acoustics, etc.

R. BRUCE LINDSAY  
*Brown University*

## APPENDIX A

### Participants

#### *Members of the Steering Committee*

John C. Johnson, Pennsylvania State University  
Wayne Rudnose, Tracor Inc.  
R. Bruce Lindsay (Chairman), Brown University

#### *From the Acoustical Society of America*

C. Paul Boner, President  
Cyril M. Harris, President-Elect  
Martin Greenspan, Vice-President  
Wallace Waterfall, Secretary  
Herbert A. Erl, Treasurer

#### *From the American Institute of Physics*

Elmer Hutchisson, Director  
William Kelly, Director of Education

#### *Educational Institutions*

Robert T. Beyer, Brown University  
Robert O. Fehr, Cornell University  
William J. Fry, University of Illinois  
Joseph L. Hunter, John Carroll University  
Lloyd A. Jeffress, The University of Texas  
L. E. Kinsler, U. S. Naval Post Graduate School

C. W. Kosten, Technical University, Delft, Netherlands (guest)  
Theodore A. Litovitz, The Catholic University of America  
Alan Powell, University of California, Los Angeles  
I. Rudnick, University of California, Los Angeles  
Kenneth N. Stevens, Massachusetts Institute of Technology  
Sanford P. Thompson, Randolph Macon College

#### *Industry*

David C. Apps, General Motors  
Laurence Batchelder, Raytheon Company  
B. B. Bauer, CBS Laboratory  
Leo L. Beranek, Bolt Beranek and Newman  
Daniel W. Martin, The D. H. Baldwin Company  
Harry F. Olson, RCA Laboratories  
R. H. Nichols, Jr., Bell Telephone Laboratories

#### *Government*

Richard K. Cook, National Bureau of Standards  
W. S. Cramer, U. S. Office of Naval Research  
Harold E. Nash, U. S. Underwater Sound Laboratory  
Benjamin L. Snavely, Naval Ordnance Laboratory  
Horace M. Trent, U. S. Naval Research Laboratory  
Robert W. Young, U. S. Navy Electronics Laboratory  
Hanns J. Wetstein, Institute of Naval Studies