

IEEE

NEWSLETTER



SONICS & ULTRASONICS GROUP

No. 33

AUGUST 1970

Editor:

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Panametrics, a Subsidiary
of Esterline Corporation
221 Crescent Street
Waltham, Ma. 02154



1970

ULTRASONICS

SYMPOSIUM

The annual Ultrasonics Symposium will be held on October 21-23 at the Jack Tar Hotel in San Francisco. In place of the usual combinations of invited and contributed papers in parallel sessions there will be single invited sessions each morning. These morning meetings will be limited to three papers providing enough time for a tutorial review of each topic in addition to reporting a summary of recent researches. The invited sessions are as follows:

SURFACE WAVES AND MATERIALS

Wednesday, October 21

Surface Waves, Theory -

B. A. Auld, Stanford U.

Surface Waves, Devices -

E. Stern, MIT Lincoln Labs

Materials -

J. de Klerk, Westinghouse

ULTRASONIC APPLICATIONS

Thursday, October 22

Acoustical Holography -

A. Metherell, Douglas Rsch. Labs

Ultrasonics in Communications -

K. D. Bowers, Bell Tel. Labs

PHYSICAL ACOUSTICS

Friday, October 23

Waves in Liquid He -

I. Rudnick, UCLA

Spin-Phonon Interactions -

D. I. Bolef, Washington U.

Acousto-Optics -

R. Adler, Zenith

The afternoon sessions will be made up of contributed and solicited short papers of current researches in the fields of sonics and ultrasonics including industrial ultrasonics, biological and medical ultrasonics, elasto-optic interactions, physical acoustics, materials, continuum mechanics and lattice dynamics.

In addition there is planned a special evening discussion session on photolithography. Time and rooms will be available for informal "rump sessions" on particularly active areas in ultrasonics.

The deadline for contributed papers is August 1. Further information including format instructions can be obtained from:

Dr. W. J. Spencer
Bell Telephone Laboratories
555 Union Boulevard
Allentown, Pennsylvania 18103

CALL FOR PAPERS

1970 IEEE ULTRASONICS SYMPOSIUM

sponsored by
IEEE Group on Sonics and Ultrasonics

October 21-23

Jack Tar Hotel, San Francisco

Papers are desired on new discoveries, recent advances, new devices, and applications in all areas of sonics and ultrasonics, including industrial ultrasonics, biological and medical ultrasonics, elasto-optic interactions, physical acoustics, materials, continuum mechanics and lattice dynamics.

In order to insure that the Symposium will serve as a forum for the most current work, the deadline for the submission of contributed papers has been set at the latest possible date. Every effort will be made to include a small number of post-deadline papers containing significant new contributions.

Deadline for Contributed Papers

August 1, 1970

Abstracts must be submitted typed in the format described in the attached instructions and sent to the Chairman of the Technical Program Committee:

W. J. Spencer
Bell Telephone Laboratories, Inc.
555 Union Boulevard
Allentown, Pennsylvania 18103

Abstracts failing to meet the format may be refused on this ground alone.

NOTE TO OUR OVERSEAS FRIENDS

The preliminary program is scheduled for mailing by regular mail on September 1, 1970. Consequently, it may not reach you before the meeting date. If you desire a copy to be mailed to you by airmail, please send an appropriate request to W. J. Spencer at the above address.

PREPARATION OF ABSTRACTS

1970 Symposium on Sonics and Ultrasonics

In order to save time and money in the printing of the Program for the Symposium on Sonics and Ultrasonics, authors are asked to prepare their abstracts for direct reproduction by offset, without retyping. Except for photographic reductions, the material will appear exactly as the author prepares it. The following rules will apply to invited as well as contributed papers.

1. The abstract should be typed on plain bond paper, single-spaced. The type size should not be smaller than "elite".
2. The typed material (including title, authors, their affiliations, footnote references, etc.) must fit into a 13.5 cm x 13.5 cm (5-1/4" x 5-1/4") square which is positioned about 8 cm from the top of the page.
3. Within the space allotted, the author may use diagrams, equations, etc.
4. The title should be all in capitals, underlined, leaving a 5-space indentation in the first line for insertion of an abstract number, e.g., F11, to be assigned by the Program Committee.
5. The authors' names should be all in capitals, not underlined, and their institutions should be in initial capitals and lower case.
6. In a space 2.5 cm x 10 cm (1" x 4") below the abstract, there should appear the name and complete mailing address of the author to whom further correspondence should be sent.
7. Remember that errors, erasures, smudges, etc., will be reproduced in the Program. If you wish to draw a 13.5 cm by 13.5 cm square, and type within it, you may use very light blue lines since they are not reproduced in a photographic copy. Do not fold the abstract for mailing since the fold lines may reproduce in the copy.
8. The original and one good copy should be mailed to the Program Committee Chairman:

Dr. W. J. Spencer
Bell Telephone Laboratories, Inc.
555 Union Boulevard
Allentown, Pennsylvania 18103

The deadline for the receipt of abstracts of both contributed and invited papers is August 1, 1970. Post deadline papers of unusual interest will be considered for inclusion in a supplementary program and should be submitted in the same format.

9. Authors of contributed papers may submit an additional information supplement of up to 500 words (not to be published) to assist the Program Committee in its evaluation of the abstract.

INVITED SPEAKERS

In addition to the 9 review and tutorial papers discussed in the article entitled "Format of 1970 Ultrasonic Symposium," the following papers will be included as invited:

- Piezoelectrically Powered Pacemakers -
D. L. White, Bell Telephone Labs
- Vibrations in Contoured Quartz Crystals -
J. L. Bleustein, Yale University
- A New View of the Elastic Theory Upon Which Ultrasonic Testing Is Based -
R. A. Nickerson, Lawrence Radiation Lab
- A Tunable Optical Filter -
S. Harris, Stanford University
- Ultrasonic Thermometry -
L. C. Lynnworth & E. P. Papadakis, Panametrics, Inc.
- Parametric Effects in Surface Waves -
G. Kino, C. Quate, & H. J. Shaw, Stanford University
- Surface Wave Filters -
R. H. Tancrell, Raytheon
- Acoustic Emission in Nondestructive Testing -
H. Dunegan, Dunegan Research Corp.

MEETING & PROGRAM COMMITTEE

The next Program Committee meeting will be at Bell Telephone Labs, 555 Union Blvd., Allentown, Pennsylvania, on Monday, August 10, 1970. The meeting will begin at 9:30 a.m. with lunch at 12:00 noon, and a short tour of the ultrasonics work at Bell Labs at 1:15. The meeting will continue at 2:00 p.m. until the program is complete.

Allentown was chosen, notes Chairman Bill Spencer, because of the ease of getting there from Chicago, Pittsburgh, Boston, and Schenectady-Troy. If members want to stay overnight, one of the following motels are suggested:

Allentown Motor Inn	(215) 437-9876
George Washington Motor Lodge	(215) 433-0131
Holiday Inn East, Bethlehem	(215) 866-0941
Holiday Inn West, Allentown	(215) 395-3731
Howard Johnson's Motel	(215) 867-8681

It is hoped that a full program of abstracts will be submitted by August 21 for consideration.

The Program Committee members are J. de Klerk, D. L. Hammond, M. G. Holland, S. Jacke, C. K. Jones, L. W. Kessler, E. May, Jr., H. Matthews, J. T. McElroy, R. W. Moss, W. L. Nyborg, D. W. Oliver, E. P. Papadakis, D. A. Pinnow, R. V. Pole, E. K. Sittig, H. F. Tersten, and R. M. White.

NEW ADCOM MEMBERS

Three new members have been elected to the Administrative Committee of the Group on Sonics and Ultrasonics. They are Donald A. Berlincourt, Donald L. Hammond, and Thyrgve R. Meeker. For Trig Meeker, this is his second stint. We wish them a prosperous three-year tour.

OFFICERS LISTED OR

BLOOD, SWEAT, TOIL AND TEARS DEPARTMENT

OFFICERS TO 12/31/70

Chairman - W. J. Spencer
Vice Chairman - E. P. Papadakis
Secretary-Treasurer - L. W. Kessler

Other ADCOMM Members: Dates of Termination

1970

B. A. Auld
R. W. Moss
J. H. Rowen*

1971

N. F. Foster
S. E. Jacke
E. Stern
D. L. White*

1972

D. Berlincourt
D. L. Hammond
T. R. Meeker
E. K. Sittig*

*Past Chairmen

STANDING COMMITTEE CHAIRMEN

Awards	- D. L. White
Meeting & Papers	-
Membership	- E. P. Papadakis
Newsletter Editor	- E. P. Papadakis
Nominations (1970)	-
Transactions Editor	- O. E. Mattiat
West Coast	- Vincent Salmon
Standards Committee on	
Resonators and Transducers	- J. E. May, Jr.
Subc. on Medical Ultrasonics	- W. F. Konig
Subc. on Delay Lines	- J. E. May, Jr.

CHAIRMAN'S NOTES



by William J. Spencer

In order to get more technical representation into the Board of Directors and to give more stature to some of the larger groups within the IEEE, the entire Group structure has been formed into six divisions. The Group on Sonics and Ultrasonics is in Division 4 which is comprised of the following Groups:

- G-3 Antennas & Propagation
- G-15 Electron Devices
- G-17 Microwave Theory & Techniques
- G-20 Sonics & Ultrasonics
- G-21 Parts Materials & Packaging
- G-33 Magnetics

Dr. William Lang of IBM is the appointed director of this division pending the outcome of an election this year. G-SU's candidate for director is Dr. H. Jaffe, Director of Research at Gould-Clevite. The name, Electro Sciences, has been tentatively associated with Division 4.

The new IEEE structure has highlighted some of the similarities between Groups, and during the Technical Activities Board meetings has fostered discussion about joint meetings, co-sponsorship of existing meetings, financial and membership problems and other areas of mutual interest. Although Group membership in the IEEE is at an all time high, tight money and increasing costs have led to contingency requirements of 10-15% in all Group meetings. The G-SU has, based on well run technical meetings and the introduction of page charges, remained solvent and faces no immediate financial problems. However, reduced attendance at all technical meetings this year, coupled with a proliferation of meetings overlapping the current areas of interest to the G-SU members, should lead us to examine closely the future of our own group.

The G-SU grew out of a need for a forum for presentation of papers in ultrasonics about 15 years ago. The Group has continued to grow and currently has about 1400 members. We can be rightly proud of the technical content of our Transactions and the annual Ultrasonics Symposium. We are, however, one of the smallest groups in number of total members. Only recently has the first local chapter in the U. S. A. (in the Boston area) been formed, and there is very little student activity in the G-SU. In part, this may reflect the overall tight job situation.

The G-SU business is handled by the Administrative Committee which meets regularly twice a year; at the March convention in New York and at the Ultrasonics Symposium. Other Ad Com members are listed on the inside cover of the G-SU Transactions. Your ideas concerning the future of the G-SU should be transmitted to the Ad Com through one of the members, or by letters to the Newsletter, or by attendance of the Ad Com meeting personally. Only through your participation by attending the G-SU symposia, publishing in its Transactions, and stimulating its leadership can the Group remain an active and viable organization.

THE CHICAGO 43

"Calling Group 20; where are you?" could be the subtitle of a tabulation sent out by R. M. Emberson. He lists the group members by Sections (geographically situated); it is interesting to see where we really are. The list reads like a scorecard, "Tokyo over Boston, 81 to 74," etc. The largest regions are listed here: Tokyo, 81; Boston, 74; Washington, D. C., 66; New York, 47; Chicago, 43; Long Island, 43; North Jersey, 41; Philadelphia, 38; Santa Clara, 33. All those over 30 are listed.

THE RECORDER UNWINDS, OR

NEW CHAPTER

Summary of Recent AdCom Meeting

by Larry W. Kessler, Secretary-Treasurer

The G-SU AdCom met in New York during the IEEE meeting on March 25, 1970 with its newly-elected officers presiding: W. J. Spencer, Bell Telephone Labs, Chairman, and E. P. Papadakis, Panametrics, Vice-Chairman. A. H. Meitzler has retired from his position as Secretary-Treasurer of the AdCom. He has done an outstanding job in that capacity for the last several years and G-SU owes him a real vote of thanks for a job well done. L. W. Kessler of Zenith Radio Corp. has agreed to take over the Secretary-Treasurer position.

Three persons were elected by the general membership to serve on the AdCom for three-year terms ending December 31, 1972. They are:

- T. R. Meeker of Bell Telephone Labs (re-elected)
- D. A. Berlincourt of Clevite Corporation
- D. L. Hammond of Hewlett-Packard Company

Our thanks to Dick Damon and Dan Bolef who are retiring, and to Emmanuel Papadakis who is taking over as Vice-Chairman and Newsletter Editor.

The reorganization of IEEE technical activities was the subject of much discussion. G-SU is a part of Division 4, the "Electrosciences Division," which also includes the following groups: Electron Devices, Magnetics, Microwave Theory and Techniques, and Antennas and Propagation. Bill Land, the acting director of our division until December 31, 1970 described the rationale behind the reorganization. Heretofore, all Groups were represented by one man, the IEEE Vice President for Technical Activities. By grouping the technical activities into 6 Divisions, each represented by an elected Director, communication ties will be strengthened between the AdComs of the groups and the IEEE Board of Directors.

Nominations for position of Director originate from the groups themselves, and are submitted to a Nominations and Appointments Committee who will reduce the number of nominees to about 3.

The duties of the Director are as follows:

- 1) Inform the IEEE Board about all activities of the groups within his Division and interactions of groups with each other and with IEEE.
- 2) Inform Group AdComs of what's going on at the IEEE Board level.

Hans Jaffe was nominated by G-SU AdCom for the position of Division 4 Director and this was unanimously approved.

We are sorry to report that two of our Associate Editors, R. Bechmann and F. Fry, have been ill. We wish them both speedy recoveries.

The G-SU has an open seat on the AdHoc Committee to plan the "Transportation Conference" October 11-14, 1970 in Chicago, which is jointly sponsored by IEEE and ASME. Anyone interested in transportation problems? (truck strikes???) Contact W. J. Spencer, Bell Telephone Labs, 555 Union Blvd., Allentown, Pa. 18103.

by Harold Johnston, Digital Equipment Corporation
(reprinted from the "Reflector," IEEE Boston Section)

On January 26th, a new Group Chapter on Sonics and Ultrasonics was added to the present Group Chapters making up the Boston Section. The organizer of this new Chapter is Dr. Mel Holland, Manager of the Signal and Data Processing Group at the Raytheon Research Center.

In commenting on the formation of the Chapter, Dr. Holland said, "It was clear to many people working in this field that the Boston Section had the largest membership in the Sonics and Ultrasonics field in the country but there was no initial interaction between local members except for the yearly Symposium in New York and an occasional Section meeting. We felt that it would be advantageous to form a local Chapter in order to further interaction between scientists in the Boston area who were doing research in Sonics and Ultrasonics."

At present, there are approximately 76 members which is second only to the Tokyo Sonics and Ultrasonics Group Chapter which has approximately 80 members.

Commenting on future Group Chapter activities, Dr. Holland said, "The first two meetings were on Macrosonics and Surface Waves with future sessions embracing subjects such as Magnetoelastics, Elasto-Optics, Medical Ultrasonics, Material Testing, Ultrasonic Devices, in addition to many other subjects related to the Sonics and Ultrasonics field carrying out research on thermal transport, phonon interactions; and cryogenics including thermoelectric power, thermal and magneto-thermal conductivity, superconductivity, ultralow temperatures, ultrasonic attenuation, phonon-photon interactions, and surface ultrasonic waves.

Dr. Holland has published more than 25 technical papers in his field and has given talks at a number of International Symposia.

TC-TR

SYSTEMATIZES PIEZOMAGNETISM

The Technical Committee on Transducers and Resonators of the IEEE under John E. May, Jr., on 24 March 1970 approved the draft of a new Standard, "Magnetostrictive Materials - Piezomagnetic Nomenclature, 1970" prepared by the TC-TR Subcommittee on Piezomagnetism under the chairmanship of R. S. Woollett. Editor of the draft was S. L. Ehrlich. The subcommittee consisted of R. S. Woollett, Chairman; H. G. Baerwald, S. L. Ehrlich, R. L. Harvey, P. L. Smith, C. M. van der Burgt, and R. H. Whymark.

The document relies upon the earlier ones (1949, on piezoelectric crystals, 1957 on piezoelectric vibrators, 1958 on piezoelectric parameter measurements, and 1961 on piezoelectric ceramics); its main function is to define differences and similarities between piezoelectric ceramics and piezomagnetic polycrystalline materials. The main point is that the biased or poled magnetostrictive material held in a linear region by its bias or poling resembles closely the poled ferroelectric (therefore piezoelectric) ceramic. Useful comparisons on transduction efficiency can therefore be made.

DROP-OUTS

AT THE SPEED OF SOUND

"It's a bird! It's a plane! It's the ultrasonic drop-out!"
ZOOOM! But where's he gone?

That's the question raised by R. M. Emberson concerning the number of members dropping out of groups and out of the IEEE itself. He tabulates the numbers as follows:

1970 IEEE members, but terminated 1969 membership in G-20 Sonics & Ultrasonics	145
Former IEEE members who did not renew either 1969 IEEE membership or Group membership	104
Number of individual non-member subscriptions that have not been renewed since January 1970	43
For reference, the present Group membership is	1247
For reference, the present number of individual non-member subscriptions is	197

The group membership is holding steady above the 1200 level, so much of the decrease noted above is compensated for by new membership. The flux may be due to the changing direction of careers, funding, and priorities. Certainly the quality of group activities is not at fault; the Symposia are maintaining quality and the Transactions is improving and expanding as it has consistently. Yet 292 people who received it last year are not getting it this year. Do you know any of them? Can you prod them to renew their subscriptions or membership? The Membership Committee is making letter-contacts, but they are dry compared with personal invitations.

ULTRASONICS COURSES

Among the courses to be offered next semester by Northeastern University in its Extension School in Weston, Mass. (Rte. 128 area) is one on ultrasonics. These courses are billed as "State-of-the-Arts" courses, and are slanted toward engineers, scientists, administrators, and knowledgeable technicians outside the academic community. As presently conceived, the courses are supposed to provide a broad overview with some penetration in depth. An experiment in group teaching is undertaken, led by L. C. Lynnworth, Department Head for Nondestructive Testing at Panametrics of Waltham, Mass. Also lecturing are C. A. Carey, K. A. Fowler, and E. P. Papadakis of Panametrics. In the spring term a course on Underwater Acoustics was offered by John Butler of Parke Mathematical Laboratories. Information on the State-of-the-Arts programs can be obtained from

Mr. Donald French
Northeastern University
Center for Continuing Education
360 Huntington Avenue
Boston, Mass. 02115

TRIANGLE TO PRODUCE TAPED SERIES

New York, May 22, 1970... The Educational Services Division of Triangle Publications has been named producer for a new series of cassettes which will be part of the continuing education programs of the Institute of Electrical and Electronics Engineers, Inc. Commencing in 1970, Triangle will produce, on monaural two-track cassette tapes, quarterly round table discussions among leading electrical and electronic experts for sale and distribution to the 167,000 members of the IEEE throughout the world.

The taped discussion programs are designed to keep IEEE members abreast of current developments in the electronics and electric fields by listening to experts discuss current problems and developments on topics of immediate importance to them. The content will be compiled under the direction of IEEE's Dr. Walter Beam. The cassettes will be distributed under the name of "SOUNDINGS" for IEEE members. Format for IEEE "SOUNDINGS" will follow a pattern designed to adequately cover a specific topic while retaining the ability to touch on other areas of interest.

Tapes will be produced at Triangle's Radnor, Pennsylvania, headquarters. Following an initial quarterly schedule, it is expected that the service will be expanded to six times a year.

Production of "SOUNDINGS" on audio tape recognizes a rapidly developing trend toward putting information for professional men in an aural mode as a convenience for busy people. With taped information, the listener can assimilate the material while riding in his auto, or in other situations where reading would not be practical or convenient.

The Division will also produce for the IEEE membership selected portions of the IEEE International Convention at New York this year, plus a series of learning tapes on programming for industrial process computers, which will include four 90-minute discussions and will be produced on two-track monaural tapes, each 90 minutes in length.

Additionally, Triangle's Educational Services will edit and produce a 60-minute presentation "Management Principles for Engineers", which offers an introduction and review of the principles of management by objectives and relates this topic to electrical and electronics engineers.

- (1) "... and God said, Let there be light, and its velocity was 3×10^8 m/sec...."
- (2) "A reasonable unit for the snail's pace is furlongs per fortnight."

N.B.S. METRIC STUDY

(DID NOT INCLUDE THE ABOVE QUOTE)

Secretary of Commerce Maurice H. Stans reported pending activities in the U. S. Metric Study now being conducted in the Department's National Bureau of Standards (NBS). This undertaking was authorized by the Congress under Public Law 90-472. The Director of the U. S. Metric Study is Daniel V. DeSimone of NBS.

National Metric Study Conferences are scheduled in August 1970 with engineering industry and professional societies, in September and October with consumer-related groups, in October with educators, the construction industry, and labor, and in November with groups from other sectors of the economy.

In addition, surveys will be carried out by means of questionnaires, meetings and interviews.

(1) A Manufacturing Survey has been approved by the Bureau of the Budget. This survey has been in the making for a year and a half and is being pursued in cooperation with the American National Standards Institute and numerous other industry associations.

(2) A Nonmanufacturing Survey, which is now being reviewed by the Bureau of the Budget, will be aimed at selected nonmanufacturing industries where the issues of this study are of sufficient concern to warrant inquiry. This survey is being undertaken on the basis of a probability sample and personal interviews.

(3) A Defense Study is concerned with the probable effects on national security of alternative courses of action with respect to metrication. It is being conducted by a special team in the Department of Defense and will cover all branches of the military.

(4) A Federal Survey is underway, with some 35 major agencies and departments taking part. This survey is seeking information with respect to the probable impact of metrication on government operation and areas of responsibility.

(5) A special investigation of commercial weights and measures has been organized because of the substantial impact that metrication would have in this area. The analysis will determine what effects and practical difficulties could be expected with respect to both weighing and measuring devices, and the operations of State weights and measures officials.

(6) A Standards Survey concerns the very important question of how U. S. engineering standards compare with internationally adopted standards and to what extent a change in our measurement system would be a significant factor, if any, in the effectiveness of the United States in international standards negotiations. This survey is half done and moving along.

The purpose of the U. S. Metric Study is to provide information, through surveys and research, with respect to three central issues: (1) What is the present impact within the United States of increasing worldwide and domestic use of the metric system? (2) What would this impact be in the future, assuming that the use or nonuse of the metric system continues as at present, with no coordination among the various sectors of the society? (3) Alternatively, what would be the effect of a coordinated national program to increase the use of the metric system?

The Secretary expects to make his report on the U. S. Metric Study to the Congress in August 1971. In the intervening period of slightly more than a year, data will be gathered and analyzed to provide the basis for the report.

Associated in an advisory relationship to the U. S. Metric Study Group is a panel, whose chairman is Louis F. Polk, and which consists of some 50 private citizens who have volunteered to provide the Study Group with assistance in areas in which the panel members are expert. This expertise covers a broad range of activities in our society.

A.S.T.M.

DISCUSSES ACOUSTICAL THERMOMETERS

Acoustical Thermometry was discussed at an Evening Workshop Session of the American Society for Testing and Materials (ASTM Committee E-20, Sub VI) on June 25 in Toronto, Canada, as part of the 1970 Annual Meeting and North American Materials Exposition. ASTM's E-20 Subcommittee VI on Acoustical Thermometers was formed in April 1969 at the Society's Philadelphia headquarters (see ULTRASONICS Oct. 1969).

The purpose of the Toronto session was to review Government, industrial and research requirements on acoustical thermometers, to report on applications in the nuclear, jet engine, steel and glass industries, calibration, temperature profile determinations, remote sensing, cryogenic and high temperature applications, etc.

The group heard progress reports on the Resonant Sensor Thermometer developed by Prof. J. F. W. Bell, now at the University of Aston in Birmingham, England; on A. Arave's in and -of-pile reactor tests using W/Re sensors to ~2500 C at the Idaho Nuclear Corporation; on R. L. Shepard's 600 hour transducer tests at 500 C at 2 Mw in the Oak Ridge National Laboratory

bulk shielding reactor (BSR), as well as design details and Shepard's preliminary results on a composite thermocouple/ultrasonic sensor; and on multiple echo techniques developed by E. P. Papadakis, L. C. Lynnworth and K. A. Fowler of Panametrics. Brief reports on dual measurements such as temperature plus flow, temperature plus pressure, temperature plus viscosity, etc., and reference to the jet engine work of S. S. Fam, et al. of Panametrics conducted for a jet engine manufacturer, and also Solar's work for the Navy, were included. K. A. Fowler's temperature measurements on steel at 1000 C were also cited. Cryogenic calibration work is proceeding in the USA and Great Britain, but progress reports were unavailable from the laboratories performing this work.

Further details are available from the investigators mentioned above, or from the Chairman of the Acoustical Thermometers subcommittee, L. C. Lynnworth, Panametrics, 221 Crescent Street, Waltham, Mass. 02154 USA.



IEEE

SONICS & ULTRASONICS GROUP

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC
345 EAST 47TH STREET, NEW YORK, NEW YORK 10017

COMING EVENTS

July 14-16, 1970

Electromagnetic Compatibility Symposium, Convention Center, Anaheim, Cal. Tech. Program Chairman: Jim C. Senn, P. O. Box 1970, Anaheim, Cal. 92803

July 20-24, 1970

Conference on Dielectric Materials, Measurements & Applications, University of Lancaster, Lancaster, England. Write: IEEE Office, Savoy Place, London, England.

August 3-7, 1970

International Conference on Precision Measurement & Fundamental Constants, NBS Gaithersburg Maryland complex. Contact: Dr. Ernest Ambler, Rm. A363, Bldg. 221, National Bureau of Standards Washington, D. C. 20234

August 17-21, 1970

National Metric Study Conferences, National Bureau of Standards, Washington, D. C. Write to: Jeffrey V. Odom, Manager, National Conference Program, National Bureau of Standards, Washington, D. C. 20234

August 18-21, 1970

Int'l Conference on Microelectronics, Circuits & Systems Theory, University of South Wales, Kensington, Sydney, Australia.

September 6-18, 1970

R. F. Electrical Measurement Practice, University of Kent, England. Contact: The Conference Sec'y, The IEE, Savoy Place, London, W. C. 2.

September 7-10, 1970

1970 6th Int'l Quantum Electronics Conference, Kyoto Int'l Conference Hall, Kyoto, Japan. Contact: Prof. M. Kamiyama, Dept. of EE, Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan.

September 21-24, 1970

International Conference on Engineering in the Ocean Environment, Panama City, Fla. Program Chairman, C. B. Koesy, Code P750, Naval Ship Research and Development Laboratory, Panama City, Fla. 32401. Deadline for abstracts, March 3, 1970.

October 21-23, 1970

1970 IEEE Ultrasonics Symposium, Jack Tar Hotel, San Francisco, Cal. General Chairman: Dr. A. J. Bahr, Stanford Research Institute Palo Alto, Cal. Program Chairman: Dr. W. J. Spencer, Bell Telephone Labs., Allentwon, Pa. Deadline for abstracts Aug. 1, 1970.

October 26-28, 1970

National Electronics Conference, Conrad Hilton Hotel, McCormick Place, Chicago, Ill. Write to: National Electronics Conference, Oakbrook Executive Plaza #2, 1121 W. 22 St., Oak Brook, Ill. 60521

October 28-30, 1970

Int'l Electron Devices Meet, Sheraton Park Hotel, Washington, D. C. Write to: E. O. Johnson, RCA Corp., Electronic Components, 415 S. 5th St., Harrison, N. J. 07029

November 3-6, 1970

Acoustical Society of America, 80th Meeting, Houston, Texas. Chairman: Dr. Douglas Muster, Dept. of Mechanical Engineering, University of Houston, Houston, Texas 77004. Deadline for abstracts is Aug. 4, 1970.

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