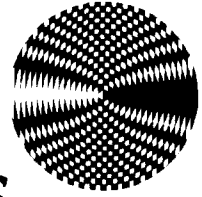




IEEE



# SONICS AND ULTRASONICS GROUP NEWSLETTER

NUMBER 48 - APRIL 1980

EDITOR: FRED S. HICKERNELL

## GSU Honors



JOHN de KLERK  
FIRST GSU ACHIEVEMENT AWARD

Dr. John de Klerk, consulting scientist at the Westinghouse R&D Center is the first recipient of the GSU Achievement Award in acknowledgment of outstanding contributions in the field of Sonics and Ultrasonics and to the GSU.



RICHARD C. WILLIAMSON  
FIRST GSU NATIONAL LECTURER

Dr. Richard C. Williamson of MIT Lincoln Labs has been designated the first National Lecturer for SU. Dr. Williamson will be available to speak to appropriate interested groups on the topic "Surface Acoustic Wave Signal Processing in a Digital Age".

## GSU ACHIEVEMENT AWARD

John de Klerk is the first recipient of the GSU Achievement Award. The Award, which is to be made at the 1980 Ultrasonics Symposium in Boston, is intended to acknowledge outstanding contributions in the field of Sonics and Ultrasonics and to the GSU.

John de Klerk was responsible for a number of major developments in SAW devices and microwave acoustics. He designed the first SAW device which encoded and decoded a 13-bit Barker phase code which is now in use in nearly all 3-D ground radar systems. He holds four U.S. patents in the field of ZnO thin film transducers -- work which has led to the development of bulk mode delay lines and resonators and has contributed to the fundamental knowledge of bulk mode propagation phenomena. In 1978 he was the recipient of A Special Patent Award by the Westinghouse Electric Corporation. He is currently a Consulting Scientist at the Westinghouse R&D Center, Pittsburgh, PA, having served previously as Manager of the Praetersonics Department. He has served as Editor of the Ultrasonics Symposium Proceedings and has been Vice President and President of the Group on Sonics and Ultrasonics.

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## FIRST SU NATIONAL LECTURER

The SU AD COM announces that Dr. Richard C. Williamson has been designated the first National Lecturer for SU. As such Dr. Williamson will be available to speak before SU Chapters, graduate and undergraduate student university seminars and other appropriate local interested groups. Dr. Williamson's topic for these talks will be

### SURFACE ACOUSTIC WAVE SIGNAL PROCESSING in a DIGITAL AGE

The establishing of the National Lecturer program and providing a stipend to cover travel expense by SU is indication of the interest of the AD COM in supporting activities of sonics and ultrasonics interested groups. In addition to present SU Chapters, groups which are considering chapter formation, university groups and other IEEE groups which have an SU interest are encouraged to schedule the national lecturer for their group. It is urged that interested groups should contact the national lecturer as early a date as practical so that he can organize his talks and schedules to best fit the groups' needs. Please feel free to xerox or extract from the full page announcement of the national lecturer elsewhere in this newsletter.

Richard C. Williamson was born in Minoqua, WI on September 10, 1939. He received his B.S. and Ph.D. degree in Physics from the Massachusetts Institute of Technology, Cambridge, in 1961 and 1966, respectively.

From 1966 to 1970, he was a Staff Physicist at the NASA Electronics Research Center in Cambridge, MA. While there he was involved in research programs concerning ultrasonics studies of critical phenomena and phase transitions in ordinary fluids, and liquid crystals. During this period he was also a Visiting Scientist at the M.I.T. Center for Materials Science and Engineering. In 1970, he joined the Staff of M.I.T. Lincoln Laboratory where he has been involved in the development of surface acoustic wave devices for signal processing RADAR and communication including reflective array compressors and acousto-electric convolvers. He became Associate Group Leader for the Surface Wave Technology Group in 1974. In January, 1980, he became Group Leader of the Applied Physics Group which investigates optical signal processing technology.

Dr. Williamson is a member of the American Physical Society, Sigma Xi and the IEEE. He is on the AD COM of the Sonics and Ultrasonics Professional Group. He is General Chairman of the 1980 SU Symposium in Boston and Co-Editor of the up coming joint MTT-SU Transactions on Application of SAW Devices.

\* \* \* \* \*

## HP EUROPHYSICS PRIZE

The 1979 Hewlett-Packard Europhysics Prize was awarded for contributions to surface acoustic wave technology to the following members and friends of GSU;

Eric A. Ash, University College, London  
Jeffrey H. Collins, University of Edinburgh, Edinburgh  
Yuri V. Gulaev, Institute of Radio Engineering, Moscow  
Kjell A. Ingebrigtsen, Norwegian Institute of Technology, Trondheim  
Edward G.S. Paige, Department of Engineering Science, Oxford University

The winners will divide a prize of 20,000 Swiss francs. Our congratulations to this group for their pioneering efforts in the field of surface acoustic wave technology.

\* \* \* \* \*

Where would the GSU be today if Jacques and Pierre hadn't put the squeeze on tourmaline 100 years ago?

## AWARDS COMMITTEE REPORT

As every year, the Awards Committee is again in the process of selecting the Best Paper published in last year's IEEE Transactions on Sonics and Ultrasonics. This is never an easy task. Close to 50 papers are published every year, and at first it seems impossible to come up with a winner. However, it turns out that most of the time a really good paper is recognized by several committee members. In 1978, there was a clear winner in Martin D. Fox for his paper titled: "Multiple Crossed-Beam Ultrasound Doppler Velocimetry," which was published in the September 1978 issue. The Award was made because the paper presented a clever solution to a longstanding problem of measuring the vector representing fluid flow and was very well supported by theory and experiment. Those of you who attended the 1979 Ultrasonic Symposium know that the Best Paper Award was presented at the start of the Plenary Session. Again, we extend our congratulations to Martin Fox.

This year, the task of the Awards Committee has been extended. At the last Administrative Committee Meeting a proposal to initiate a "Sonics and Ultrasonics Achievement Award" was accepted. The proposal stated that this award will be made aperiodically to any individual who has made outstanding contributions to or technical achievements in the field of Sonics and Ultrasonics. The award consists of a certificate, plaque and \$1000. It gives me great pleasure to announce at this time that the first recipient of the Achievement Award is John de Klerk. John has made many valuable technical contributions to the field of Ultrasonics over nearly three decades. Also, in addition to his technical achievements, he has made extremely valuable contributions to the advancement of sonics and ultrasonics by his tireless efforts in behalf of the group on SU; he was chairman for two years, and it was he who started the Ultrasonics Symposium Proceedings, and is still its editor. As our other awards, this award will also be presented at the 1980 Symposium. Our congratulations to John de Klerk.

One of the tasks of the G-SU Awards Committee is also to nominate (or aid in the nomination of) candidates for the various IEEE awards. As Chairman of the Awards Committee, I receive every year from the IEEE a complete package containing a description of the awards and nomination forms. The awards are periodically described in The Institute. If anybody in the SU community knows of suitable candidates for any of these awards, or would like to nominate somebody himself, please contact me. The 1980 recipient for

the Harry Diamond Award is Martin Greenspan (retired from the National Bureau of Standards) "For contributions to the fields of acoustics and elasticity." We congratulate Martin Greenspan for winning this award. The presentation is planned for the 1980 Ultrasonics Symposium to be held in Boston.

H. van de Vaart, Chairman

\* \* \* \* \*

### CONGRATULATIONS TO NEW IEEE FELLOWS

Each year, the IEEE Board of Directors elevates a group of the Institute's Senior Members to the grade of Fellow. This election is a great honor because, according to the IEEE Bylaws, the Fellow grade is one of "unusual professional distinction, to be conferred upon a person of outstanding and extraordinary qualifications and experience in the fields of electrical engineering, electronics, radio, allied branches of engineering, or the related arts and sciences, who has made important individual contributions to one or more of these fields." We extend our congratulations to the following associated with the ultrasonics area who have been elected to the prestigious group.

Jeffrey H. Collins, University of Edinburgh, "For contributions to the field of magnetic and surface acoustic wave delay line technology, and to engineering education;"

Floyd Dunn, University of Illinois at Urbana-Champaign, "For contributions to the understanding of the interaction of ultrasonic waves with living tissue;"

Errol P. EerNisse, Quartex Inc., "For outstanding contributions to the analysis and development of piezoelectric devices,"

Norman G. Einspruch, University of Miami, "For research in the transport properties of electronic materials and acoustic effects in solids;"

Ernest Stern, Massachusetts Institute of Technology, Lincoln Laboratories "For leadership in the development of surface acoustic wave devices for signal processing in radar and communications systems;"

Our Fellows Chairman, Gordon Kino and his committee welcome suggestions and nominations for this award.

NEWLY ELECTED ADCOM MEMBERS



ROBERT L. MELCHER

Robert L. Melcher received his B.S. in physics and mathematics from Southern Methodist University in 1962. His M.S. and Ph.D. in solid state physics were received in 1965 and 1968 respectively, from Washington University in St. Louis. He spent one year at the Universitat Zu Koln, Cologne, West Germany (1963-64). After two years (1968-70) as a research associate at Cornell University, he joined the IBM Thomas J. Watson Research Center in 1970 where he is presently manager of the acoustics group.

He has authored or co-authored approximately 60 publications in the field of physical acoustics. His contributions have been in the fields of nuclear acoustic resonance, spin wave theory in ferromagnets, the theory and experimental verification of rotationally invariant magnetoelastic interactions, and the elastic properties of materials undergoing cooperative Jahn-Teller or metal-nonmetal phase transitions. For the past five years he has investigated the nonlinear bulk wave phenomena at radio and microwave frequencies in piezoelectric and nonpiezoelectric materials (including crystals and powders) and their application to the fields of signal processing, information storage and solid state spectroscopy.

Dr. Melcher has served for several years on the program committee of the IEEE Ultrasonics Symposium, he is a member of the program committee for the 1979 International Phonon Scattering Conference, he is a member of the IEEE Group on Sonics and Ultrasonics, and a fellow of the American Physical Society.

Bob enjoys traveling, national and international. He is an outdoor enthusiast and skis, hikes and camps as time permits. Jogging is another one of his favored activities.



MANFRED B. SCHULZ

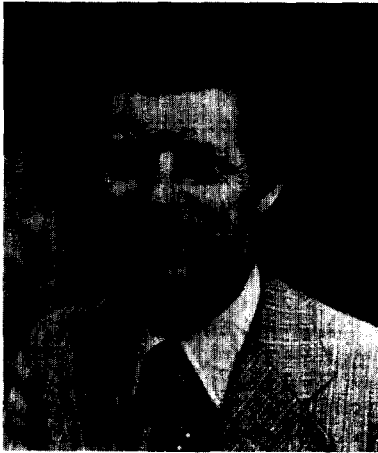
Dr. Schulz received his B.A. in physics from the University of California at Berkeley in 1960, with highest honors. He received his Ph.D. in physics in 1966, also at Berkeley.

In the summer of 1966, Dr. Schulz joined the staff of the Generalized Filters and Microwave Ultrasonics Group of the Raytheon Research Division. His early work was in the area of acousto-optic interactions and included the construction of a system for pulse compression of a linear FM waveform using Brillouin scattering. In 1972, Dr. Schulz was placed in charge of the surface wave device fabrication facility at the Raytheon Research Division and in early 1973 was appointed Program Manager of the Generalized Filters and Microwave Ultrasonics Group.

From early 1977 to April 1978, he was a staff member at M.I.T. Lincoln Laboratory in the surface wave technology group where he was responsible for development of SAW chirp transform systems. In April 1978, he rejoined Raytheon Research Division to assume the duties of Marketing Manager. In addition, he serves as acting leader of the Microwave Ultrasonics Group.

Dr. Schulz is a Senior Member of the IEEE. He is the Associate Editor for Surface Waves of the IEEE Transactions on Sonics and Ultrasonics. He has also served on several program committees of the IEEE Ultrasonics Symposium and during 1977 to 1978 was Chairman of the Boston Chapter of the IEEE Group on Sonics and Ultrasonics.

Fred is an avid opera buff. He enjoys philatelic and numismatic activities (collects stamps and coins). He enjoys all season back-packing and hiking to places "where most people don't like to hike".



FREDERIC S. WELSH

Frederic S. Welsh received the BSEE degree from Princeton University in 1964, and then went on to receive his Ph.D. in Applied Physics from Cornell University. Since completing his work at Cornell in 1968, he has been a member of the Piezoelectric Device Department at Bell Laboratories in Allentown, Pennsylvania. There he has worked on the characterization of materials, especially lithium tantalate, lithium niobate, and quartz, for piezoelectric resonators, and on electromechanical filters. He has worked on the design and application of piezoelectric transducer devices, and was formerly Supervisor, Exploratory Piezoelectric Devices. Recently Fred has moved up a notch in frequency and over to the EM area where he is currently Supervisor, Exploratory Optical Subsystems.

Fred has been an active member of the Group on Sonics and Ultrasonics for many years, and has for several years served as a member of the program committee for the Ultrasonics Symposium, and in 1978 was General Chairman of the Symposium. He is a former Associate Editor of the Transactions on Sonics and Ultrasonics and also a member of the Subcommittee for Piezoelectric Crystals which has recently published a new IEEE Standard.

Fred and his wife Wendy live in an old Pennsylvania farmhouse in Coopersburg with their two boys, Jason and Charlie. Fred is an active member of Trinity Episcopal Church. He is an overenthusiastic gardener and wages a never ending battle against the weeds in spring and summer! Sailing is also one of his favorite activities.



A MESSAGE FROM THE PRESIDENT

During the past six months, several things have taken place in the IEEE which are of interest to the membership of the Sonics and Ultrasonics Group.

First, the 1980 IEEE budget contains a significant change in the way that the Technical Activities Board (TAB) services at IEEE Headquarters are to be funded. In the past, IEEE Headquarters has supported its Technical Activities out of the General Fund and an assessment on all the technical groups like ours. As administrative and publication costs grew within the Technical Activities Department, the assessment on the groups increased to the point that another funding scheme had to be developed. Since much of the service delivered by this Department to us is in the form of printing and publication activities, it was decided to try a scheme in which a major portion of the printed matter (the Symposium Proceedings, in particular) would be sold through IEEE at a "profit" sufficient to support part of the Technical Activities Department. In 1980, all of our Ultrasonic Symposium Proceedings will be sold to IEEE for a price that will provide our group with a modest income. The IEEE Publications Department will then sell them to libraries and other customers for enough of an additional markup to enable it to become self-supporting and thus eliminate any special assessments on the groups. Since this scheme introduces a strong incentive for minimizing administration costs and increasing publication services, the IEEE Finance Committee has agreed to support the experiment for a few years to see how it works. It is anticipated that this change will not affect the cost of the Proceedings to our members, but it will change our group's income from the sale of our Proceedings to non-members.

(President's message continued)

A second item of interest comes from the fact that the past few decades have seen a dramatic growth in medical applications of electronics in general and ultrasonics in particular. Perhaps you have even had ultrasonic diagnostic procedures used on yourself or on your family members at your own local hospital. Our group has not been idle throughout this development as the number of ultrasonic imaging or tissue characterization papers at our Symposium or in our Transactions will attest. We must continue to encourage these activities within our group, and we must cooperate with other groups to see that this growing body of knowledge is properly used and disseminated. Two developments are of immediate interest. One is the development of standards for safe levels of ultrasonic intensity in various medical applications, and the other concerns the use of ultrasonic techniques for imaging. The Technical Activities Board of IEEE has asked us to take an active part in their Committee on Man and Radiation (COMAR) as it strives to set up national safety standards for non-ionizing forms of radiation, such as microwaves and ultrasonics. This board is also acting through its Publications Committee to see if a new IEEE Transactions Journal on Medical Imaging can or should be formed by the cooperative efforts of our group with the Engineering in Medicine and Biology Society, the Nuclear and Plasma Sciences Society, the Acoustics, Speech and Signal Processing Society, the Systems, Man and Cybernetics Society, and the Computer Society. Dr. Jim Miller of Washington University has agreed to be our representative in these activities and would be happy to hear from you if you have any comments or opinions.

George A. Alers

#### AD COM BRIEFS

The IEEE Group on Sonics and Ultrasonics (G-Su) held its Administrative Committee (Ad Com) meeting, September 25, 1979 in New Orleans in conjunction with the 1979 Ultrasonics Symposium. G.A. Alers (Rockwell International), G-Su President, raised for discussion fundamental questions regarding G-Su financial condition. He briefly reviewed the group's financial situation and indicated that a number of options are being examined to use the surplus for direct benefit to G-Su members. L.K. Anderson (Bell Labs), Division IV Director participated in discussion with the Ad Com by providing an overview of IEEE and TAB finances, answering questions and listening to the concerns of

the G-Su Ad Com. W.D. O'Brien, Jr. (University of Illinois), G-Su Secretary - Treasurer, reported on the trend of the group's increasing financial surplus since 1972. Some concerns were raised as to the appearance that IEEE, through a variety of proposal programs, is attempting to utilize group and society reserves for other than technical activities.

W.D. O'Brien, Jr. reported that the projected year-end financial condition for 1979 would be approximately break-even (income and expenses about \$112K) with a surplus around \$100K.

R.A. Moore (Westinghouse) examined G-Su sponsoring a national lecture program, presented his findings and recommended that this program be established for at least three years. This was unanimously approved by the Ad Com. L.W. Kessler (Sonoscan) performed a preliminary study on ways to improve the Newsletter and based upon his recommendation the Ad Com approved the cost for a feasibility study on publishing a new type of publication which would replace the Newsletter. S. Wanuga (General Electric), Editor, IEE Transaction on Sonics and Ultrasonics, noted that there were two Associate Editor changes and that 512 pages are planned for 1980, which includes a special November issue on SAW applications. B.R. McAvoy (Westinghouse) reported on the continued success of the Symposium Proceedings, noting that all but 1978's publication is sold out.

R. Stern (UCLA), General Chairman and G.A. Alers, Technical Program Chairman for the 1979 Ultrasonics Symposium presented an overview of the meeting. Future meetings are scheduled as follows:

November 5-7, 1980 in Boston; October 14-16, 1981 in Chicago; October 27-29, 1982 in San Diego; 1983 in Atlanta; 1984 in Dallas; 1985 in either San Francisco or Portland and 1986 in Williamsburg, VA.

M. Levy (University of Wisconsin-Milwaukee) announced the results of the Ad Com election. H. van de Vaart (Sperry Research Center) recommended that G-Su institute a "Sonics and Ultrasonics Achievement Award" to be awarded aperiodically which would consist of a certificate, plaque and \$1000. The Ad Com unanimously approved the establishment of the award.

G.A. Alers was reelected G-Su President and T.W. Bristol (Hughes Aircraft Co.) was reelected G-Su Vice-President. The next G-Su Ad Com meeting will be scheduled in March, 1980 in Chicago.

W.D. O'Brien, Jr.  
G-Su Secretary-Treasurer

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## SAW ENGINEERS

Andersen Laboratories is seeking exceptional Engineers to further accelerate our growth in the SAW market place. The projects include:

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- Convolvers
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- Subsystems

The responsibilities include:

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- Project definition and management

The prerequisites include:

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- Knowledge of SAW applications
- Advanced degree preferable

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- A large staff of professionals
- Excellent facilities
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1980 ULTRASONICS SYMPOSIUM COMMITTEE



BOSTON 5-7 NOV. 1980

THE 1980 SYMPOSIUM IN BOSTON

The "Call for Papers" has been sent out, and it is time to make your plans to attend the 1980 IEEE Ultrasonics Symposium at the Park Plaza Hotel in Boston, Massachusetts. The Symposium will be held on Wednesday, Thursday and Friday, November 5, 6 and 7. This allows attendees the opportunity to linger over the weekend and enjoy the sights, sounds and scenes that make Boston an exciting place to visit. The Park Plaza Hotel is within easy walking distance of the Boston Common, Quincy Market and the Freedom Trail.

July 3, 1980 is the deadline for submission of Abstracts. Contributed papers are requested on recent discoveries, advances, new devices, new techniques, and applications in all areas of sonics and ultrasonics.

Dick Williamson of Lincoln Laboratories will be the General Chairman and Herman van de Vaart of Sperry Research Center will be the Technical Chairman. They will be assisted by Alan Budreau, Local Arrangements; Larry Lynnworth, Publication; Tom Parker, Finance; and Lee Solie, Publicity.

This will be the third time the Ultrasonics Symposium has been held in Boston. It is also the 100th anniversary of the discovery of piezoelectricity.

More detailed information concerning submission of papers and accommodations is included in the Call for Papers. Anyone desiring copies of the Call for Papers may write to Leland Solie, Sperry Research Center, Sudbury, MA 01776.

General Chairman:

Dr. Richard C. Williamson  
Room D-331  
MIT Lincoln Laboratory  
P.O. Box 73  
Lexington, MA 02173  
(617) 862-5500 Ext. 358

Technical Program Chairman:

Dr. Herman Van de Vaart  
Sperry Research Center  
100 North Road  
Sudbury, MA 01776  
(617) 369-4000 Ext. 309

Local Arrangements:

Mr. Thomas L. Szabo  
Mail Stop 30  
RADC/EEA  
Hanscom AFB  
Bedford, MA 01731  
(617) 861-4663

Publications:

Dr. Lawrence C. Lynnworth  
Panametrics, Incorporated  
221 Crescent Street  
Waltham, MA 02154  
(617) 899-2719 Ext. 146

Finance:

Dr. Thomas E. Parker  
Raytheon Research Division  
28 Seyon Street  
Waltham, MA 92154  
(617) 899-8400 Ext. 2475

\* \* \* \* \*

FUTURE MEETINGS

1981 - CHICAGO, Oct. 14, 15, 16

McCormick Inn  
L.W. Kessler  
W.D. O'Brien, Jr.

1982 - SAN DIEGO, Oct. 27, 28, 29

Town and Country Hotel  
J. de Klerk  
B.R. McAvoy

1983 - ATLANTA,

M. Levy  
R. Kagiwada

1984 - DALLAS-FT. WORTH

1985 - SAN FRANCISCO AREA

1986 - WILLIAMSBURG, VIRGINIA

1987 - ORLANDO, FLORIDA



COMMENTS BY THE NEW ORLEANS PROGRAM COMMITTEE

The recent meeting in New Orleans was an outstanding success, both because of the locale and the quality of the papers. More papers than ever were submitted--230--and a near-record attendance--403--was achieved. A record number of papers were accommodated into the program--199--because room was available to set up two enlarged poster sessions. Although these poster sessions actually ran in parallel with the regular sessions, they were well-attended; and very few comments were received that too many good papers occurred at the same time. The Program Committee tried valiantly to find room for all the papers, but some--31--had to be rejected or combined in order to avoid evening sessions or a four-day meeting. In general, the criteria for rejection were usually based on inappropriate subject matter that did not fit into sessions that formed around particular topics. Unfortunately, there were also some papers that had to be rejected because the abstract was so vague or short that the Committee could not judge its timeliness or originality.

We are sorry that the abstract booklets came out to be of such a cumbersome size. A combination of haste to minimize the time between the abstract deadline and the printing deadline, coupled with an overloaded publisher, forced some last-minute shortcuts by the printer that prevented reducing the submitted copy. Thus, the nice pocket-sized programs that have been developed so carefully by past Program Committees have not been forgotten, and we plan to insist on a return to this convenient format for future meetings.

For those who are interested in the "ethnic" composition of our Symposium participants, an impressive 27% came from foreign countries (mostly Japan and France). Of those papers presented by U.S. participants, 46% represented university laboratories, 43% came from industry, and 11% came from government laboratories. Since we try to regularly rotate the meeting sites between locations around the country, it is useful to observe that 44% came from the East, 33% came from the West, and 23% from the central section of the United States. The large percentage of foreign contributors reflects the strong international character of our ultrasonic profession, and it has been seriously considered that we should include the word "international" in our title. However, the problems associated with changing the name of our Proceedings in libraries and of convincing bookkeepers that we are not sneaking a foreign meeting into their budgets have temporarily (at least) prevented this change in name from becoming effective.

The Technical Program Committee for the 1979 Ultrasonics Symposium wishes to thank all of you for taking part in the meeting. The city was exciting, the natives were hospitable, and the hotel was generous with its services. We look forward to seeing you all again next year in Boston.

George Alers  
Richard Stern

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SU TRANSACTIONS

There have been several changes in Associate Editors in the Transactions; M. Ahmed of the University of California, Irvine is now Associate Editor for "Acoustic Imaging", L. Lynnworth of Panametrics is now Associate Editor of "Industrial Applications", E.P. Papadakis of Ford Motor Co. is now Associate Editor of "Non Destructive Evaluation" and C.S. Tsai of Carnegie-Mellon is now Associate Editor for "Acousto-Optic Interactions". The names and addresses of all of the Associate Editors is published on the inside cover of every Transaction. Special thanks and appreciation to Alex Metherell and Eric Lean departing Associate Editors, for their dedicated years of service to the Transactions.

There are numerous ways that members can contribute in the publication of our Transactions.

- a) Write "papers" and submit them to our Transactions for Publications.
- b) Encourage others in our technology who are not members to publish their paper in the Transactions.
- c) As authors, rigidly follow the instructions that appear on the outside of the back cover of all our Transactions.
- d) Include a signed Copyright form with the paper submission.
- e) If you are asked to review a paper, please do the reviewing in the time commitment promised to the Associate Editor.

These simple but crucial guidelines would help speed up the paper publication, improve the appearance and make our transactions more desirable for paper submission.

The six issues for 1980 will consist of approximately 512 pages. Included in this year's publications will be a November special issue on "SAW Applications".

The Publication and Ad Com committee would like to thank all who contribute to the Transactions and asks your support by carrying out the requests as outlined in this report.

Stephen Wanuga  
Editor, Transaction on  
Sonics and Ultrasonics

IEEE - SONICS & ULTRASONICS GROUP  
NATIONAL LECTURER PROGRAM

presents

SURFACE - ACOUSTIC - WAVE SIGNAL PROCESSING  
IN A DIGITAL AGE

by

DR. RICHARD C. WILLIAMSON  
LINCOLN LABORATORY, MA, INSTITUTE OF TECHNOLOGY  
LEXINGTON, MA 02173

WHEN \_\_\_\_\_

WHERE \_\_\_\_\_

ABSTRACT

Advances in surface-acoustic-wave (SAW) device technology occurring over the last decade have yielded a variety of components which provide efficient means for processing wide-bandwidth signals. As a result, SAW devices are becoming widely used in communications, radar, and signal-analysis equipment. At the same time, advances in digital technology continue at an impressive rate and now almost every electronic system has a mix of analog and digital components. Both digital and SAW-based techniques exist for performing critical signal-processing functions such as fixed and programmable matched filtering and Fourier transformation. This talk reviews the operation of wide-bandwidth SAW signal processors including pulse compressors, convolvers and chirp-transform units. The critical issues of processing flexibility, of analog/digital interfaces, and of matching the bandwidth and coherence time of SAW devices to incoming signals are addressed. A comparison of digital and SAW signal processors is made by analyzing the required size and computation rate of hypothetical digital systems which might potentially replace SAW devices. It becomes clear that for many types of wide-bandwidth signal-processing functions, SAW devices will provide significant advantages for the foreseeable future.

Dr. Williamson received his Ph.D. in Physics from M.I.T. in 1966. He is presently Group Leader of the Applied Physics Group at the M.I.T. Lincoln Laboratory which investigates optical Signal Processing. Previously he led development of SAW devices for signal processing including reflective array compressors and acousto-electric convolvers.

Dr. Williamson is a member of the American Physical Society, Sigma Xi and IEEE. He is on the AD COM of the Sonics and Ultrasonics Professional Group, Co-Editor of the upcoming joint MTT-SU Transactions on Application of SAW Devices and the first IEEE - SU Designated National Lecturer.

## CHAPTER ACTIVITIES REPORT

Congratulations to our present SU Chapters and other groups providing outstanding sonics and ultrasonics programs for the technical community. 1979-80 SU Chapter Chairmen are as follows:

Boston Chapter - Dr. John Melngailis  
MIT Lincoln Laboratory  
244 Wood Street  
Lexington, MA 02173  
Phone-(617) 862-5500 X5487

Pittsburgh Chapter - Dr. C.S. Tsai  
Carnegie-Mellon Univ.  
Scheneley Park  
Pittsburgh, PA 15213

Washington - Baltimore - N. Virginia -

Dr. D.C. Webb  
Naval Research Laboratory  
Code 5253  
Washington, DC 20375  
Phone-(202) 767-2862

Persons interested in attending these chapter meetings should contact the chairmen for latest program schedule information.

In addition to existing chapter, interest is growing in developing other chapters. It will be the purpose of this column in the future to provide a list of persons serving as the focus of such efforts so interested persons in the area can make contact. At present the following are identified as chapters in forming efforts:

San Francisco Bay Area - Dr. W.R. Shreve  
Hewlett-Packard Labs.  
1501 Page Mill Road  
Palo Alto, CA 94304  
Phone-(415)856-2664

Persons interested in chapter or joint chapter possibilities in other areas will find the IEEE most co-operative in providing necessary material and with follow through. Additionally, the writer (who worked closely with the establishing of an existing Chapter) would be happy to discuss, work with or provide assistance. His contact is R.A. Moore, Westinghouse Defense and Electronic System Center, P.O. Box 1521, MS 3608, Baltimore, MD 21203, Phone (301) 765-7287. Besides local benefits, one benefit of chapter chairmanship is an invitation from the SU AD COM to attend its (normally) two meetings year.

Chapter Chairmen who are working on next year's programs should include the new National Lecturer in their plans and may make arrangements by contacting him directly. More information on both the program and this

year's speaker is elsewhere in the newsletter. When new officers are identified be sure to notify the writer so that we can maintain most effective communication. Similarly if program plans are sent to the writer as developed (preferably late summer) they will be made available to all chapter chairmen. In some cases where speakers are scheduled to be in an area they may be able to serve more than one chapter.

R.A. Moore  
Chapter Coordinator

\* \* \* \* \*

## CHAPTER NEWS

Baltimore, Washington, Northern Virginia

Our chapter is just completing its third year of activity. Joint meetings with MT&T and with A&P Subsections yielded big, enthusiastic turnouts. On December 11, Steve Parks of National Bureau of Standards, spoke on Ultrasonic Imaging. Particularly interesting were the demonstrations on imaging and the video tapes of medical ultrasound images. On January 10, Dr. Bob Moore of Westinghouse gave a lecture entitled "Resonators-State of the Art in Bulk Microwave Acoustics". This meeting opened up some lively interaction between members of the audience and the speaker. Microwave Bulk resonators are seen by some as serving future radar signal needs.

Chapter officers this year were:

President: Denis Webb, NRL  
Vice President: Kenneth Davis, NRL  
and  
Secretary/Treasurer: Christopher Vale,  
Westinghouse

Boston

In the '79 - '80 season the Boston Chapter of Sonics and Ultrasonics has had an active program of monthly meetings with the following speakers:

- October, R.R. Rhodes and R.C. Williamson of Lincoln Lab on "A Satellite-Borne SAW Spectrum Analyzer for Demodulation of FSK Communication Signals" (Joint meeting with Communications and Information Theory Local Chapters).
- November, W.A. Crofut of Andersen Labs on "Current and Emerging Production Applications of SAW Devices".

(Boston Chapter News continued)

1975 PROCEEDING LEFT-OVERS

- December, R.A. Becker of Lincoln Lab on "High Performance Elastic Convolver for Signal Processing".
- January, C. Biber of Polaroid on "Ultrasonics Echo Ranging, Auto Focusing for the Polaroid SX-70 Camera".
- February, R.H. Tancrell of Raytheon on "Acoustic Fields in Medical Ultrasonics - Generation and Measurement" (Joint meeting with Engineering in Medicine and Biology Local Chapter).
- March 25, John N. Lee of Harry Diamond Labs on "Signal Processing Techniques Using Optical Interactions with Surface Acoustic Waves".
- May 7, J.C. Sethares of RADC Hanscom Field on "Magneto Static Waves and Applications in Phased Array Antenas" at 6:00 P.M. at Sperry Research Labs in Sudbury.

The meetings are held at 6:00 P.M. in Boston area laboratories. The attendance this year has increased to an average per meeting of 30.

The S.U. Boston Chapter officers are:

John Melngailis of M.I.T., Chairman  
 Alan Budreau of RADC Hanscom AFB, Vice Chairman  
 Richard Ralston of Lincoln Lab, Secretary/  
 Treasurer

All back issues of the Ultrasonics Symposium Proceedings have been sold out up to 1977 with the exception of 1975. About thirty copies of the 1975 edition remain in stock.

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SECOND EDITION OF  
 ULTRASONIC SYMPOSIUM  
 PAPERS AVAILABLE

The second edition of the Ultrasonics Collected papers is now available from the IEEE Service Center-order forms appeared in the last Newsletter. The first edition sold out very quickly and the editors have responded to several dozen unhappy subscribers. Back orders have been held at the Service Center and are now being filled.

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