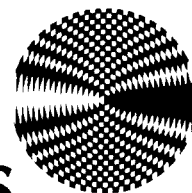




IEEE

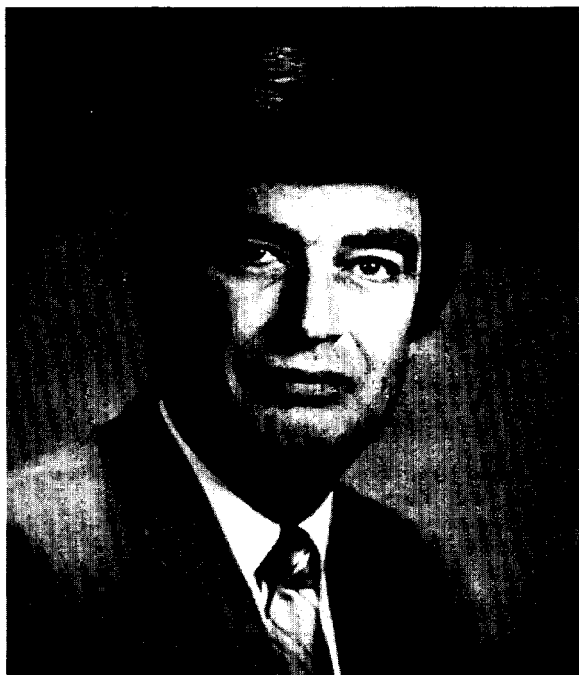
# SONICS AND ULTRASONICS GROUP NEWSLETTER



NUMBER 56, APRIL 1984

EDITOR: FRED S. HICKERNELL

## G-SU SELECTS



HERMAN VAN DE VAART

G-SU PRESIDENT

Dr. Herman van de Vaart, Director of Research at SAWTEK Inc. in Orlando, Florida, was elected to lead the Sonics and Ultrasonics Group in 1984.



ARTHUR BALLATO

G-SU NATIONAL LECTURER

Dr. Arthur Ballato of the U.S. Army Electronics Technology and Devices Laboratory in Ft. Monmouth, New Jersey is the National Lecturer for 1984-85.

## PRESIDENT'S MESSAGE

It is a pleasure and an honor to serve you as President of the Group on Sonics and Ultrasonics and to represent you and our group on the Technical Activities Board (TAB) of the IEEE. I recently attended the first meeting in 1984 of that Board, which was held in Washington, D.C. in conjunction with many other IEEE Board meetings, and was followed by a conference on U.S. Technology Policy. I was struck by the enormous diversity of the IEEE membership and by the complexity of the IEEE organization, which has grown over the years to serve our many interests. As I mentioned, as a member of a group or society, we are represented on the Technical Activities Board. At the same time, living in a particular geographical area, we are represented on the Regional Activities Board. Our standards are looked after by the Standards Board, The Transactions are represented on the Publications Board, our educational interests are served by the Educational Activities Board, our professional well-being is promoted by the United States Activities Board, and at some time in our career we may get a medal from the Awards Board.

Despite its complexity, the IEEE works, and works very well. This is in large part due to the fact that the IEEE is basically a volunteer organization. It is the volunteers who organize and run the conferences (in 1983 the IEEE sponsored or cosponsored 191 conferences!), and who edit the conference proceedings and the Transactions and Journals.

No dramatic decisions were made at the first 1984 TAB meeting that I referred to earlier. A proposal by the Regional Activities Board to substantially increase the difference in registration fees between IEEE members and non-members received a cold reception, and was referred back to the Meetings Committee. TAB was strongly in favor of granting the IEEE Council on Robotics and Automation permission to start publishing a journal, but a final decision was deferred to the May meeting so that some details could be worked out. The first issue is scheduled for January 1985. A proposal to form a Fiber Optics Council was voted down. The Steering Committee that oversees the operation of the Transactions on Lightwave Technology, and on which our group has representation, will remain a committee. Conferences in this field will continue to be run by the Quantum Electronics and Applications Society.

As reported elsewhere in this issue, our own Administrative Committee (AdCom) has been struggling with the problem of how to handle the increase in the number of papers submitted and presented at the Ultrasonics Symposia. A questionnaire was distributed to all attendees at the 1983 Symposium in order to help guide the AdCom in its decision. However, as is often the case with such questionnaires, results indicated no clear consensus. After lengthy discussion, AdCom decided that the IEEE Ultrasonics Symposium shall remain a three-day meeting with a maximum of four parallel sessions. Details on the length of sessions and the size of poster sessions are

still being worked out.

AdCom also expressed concern about our Transactions. The major problem is the lack of sufficient papers being submitted for publication. Probably one of the main reasons for this decline is our Annual Symposium Proceedings. I would like to point out that publishing in the Proceedings is not a substitute for publishing in the Transactions. Papers in the Proceedings are not reviewed, and are only distributed to Symposium attendees and to those people who specifically order them. Papers in the Transactions are reviewed by your peers, and the Transactions are distributed to more than 3400 subscriber and Libraries all over the world. Even though the Proceedings have proven to be extremely useful, they are not an archival journal; the Transactions are. Let me, therefore, urge all of you to submit papers to the Transactions. There is great satisfaction in having your paper reviewed by your peers and accepted for publication; a rejection, while not pleasant, should urge you to do better next time.

This is the IEEE Centennial year. Judging by the growth in membership (the IEEE is the largest technical organization in the world!), it seems to have served its members well. If you, as a member of the Group on Sonics and Ultrasonics, have concerns or suggestions on how we can serve you better, do not hesitate to contact me or other members of the Administrative Committee. At the same time, we also welcome your help on any of our committees. Volunteers are always needed.

H. van de Vaart

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HERMAN VAN DE VAART

Herman van de Vaart was born in Arnhem, The Netherlands. He received the Ingenieurs degree in Applied Physics in 1958 and the Ph.D. degree in 1969, both from the Technological University, Delft, The Netherlands.

From 1958 to 1960 he served in the Dutch Army Signal Corps as a Radar Officer. He came to the U.S. in 1960 and joined Transitron Electronic Corporation in Wakefield, MA, where he did research on diffusion processes in silicon. In 1962 he joined the Sperry Research Center, Sudbury, MA, where he was engaged in research at microwave frequencies in ferrites and more recently on surface acoustic wave device studies. In 1973 he became the manager of the Signal Processing Department, and from 1980 until the Sperry Corporation closed the Research Center at the end of 1983, he was Director of the Applied Physics Laboratory. In 1984 he joined SAWTEK, Inc. in Orlando, Florida, as Director of Research.

Dr. van de Vaart is a senior member of the IEEE and a member of the American Physical Society. He has been Chairman of the G-SU Awards Committee (1973-1980) and Secretary-Treasurer of the Administrative Committee (1980-1983). He has served on the Ultrasonics Symposium Technical Program Committee since 1976, and was Chairman of that committee in 1980.

IEEE - SONICS AND ULTRASONICS GROUP  
NATIONAL LECTURER PROGRAM

FREQUENCY AND TIME SOURCES -  
PAST, PRESENT, & FUTURE

Arthur Ballato  
U.S. Army Electronics Technology and Devices Laboratory  
Fort Monmouth, NJ 07703

ABSTRACT

Time as a concept is older than the pyramids. Instruments for marking its passage, such as sundials, have been in use for millenia, and have been systematically improved, particularly within the past few centuries, when precise astronomical observations became possible. The idea of frequency as measuring the number of repetitive events in a unit time is considerably younger than the idea of time, although it is, as we now realize, the other side of a single coin. Generation and measurement of frequencies to accuracies comparable to those attained for timekeeping did not become possible until the advent of electronics when the quartz oscillator was introduced. Since then, time and frequency generation, control, measurement, and distribution have experienced explosive rates of growth in accuracy, availability, and convenience. The ever-present quartz wristwatch delivers time accuracies to seconds per month in a non-laboratory environment for very low cost, while frequency has advanced to become the most accurately measurable entity known to mankind.

The talk considers landmarks in the history of frequency control and timekeeping, then passes on to the technologies involved in the latest classical and quantum mechanical standards, with a discussion of present capabilities and their areas of application. The conclusion of the talk gives projections of future applications and stability requirements, barriers to their realization, and potential means of overcoming these barriers.

BIOGRAPHY

ARTHUR BALLATO (S '55 - M '59 - SM '71 - F '81)

Arthur Ballato received the S.B. degree in electrical engineering from the Massachusetts Institute of Technology in 1958, the M.S. degree in electrical engineering from Rutgers University in 1962, and the Ph.D. degree in electrophysics from the Polytechnic Institute of New York in 1972.

In 1958 he joined what was the Army Signal Corps R&D Labs and is now the U.S. Army Electronics R&D Command, Fort Monmouth, New Jersey. Since that time he has worked on analytical and experimental aspects of frequency control and selection. Specific areas of interest include evaluation of material constants of quartz and other piezoelectric substances, development of equivalent networks for bulk and SAW resonators, filter crystal and crystal filter design, measurement of circuit parameters of signal processing devices and precision resonators, development of crystal parameter measurement equipment, and growth of high-purity quartz. Most recently, he has investigated the properties of stress- and thermal-transient-compensated resonators and high frequency, stable sources. These results have been presented at the Ultrasonics, Frequency Control, Microwave, Circuits and Systems, and other symposia, and published in over 100 articles and patents.

Dr. Ballato is a member of the American Physical Society and Sigma Xi, and is a Chartered Engineer of the Institution of Electrical Engineers (London). He was recipient of the 1978 C.B. Sawyer Memorial Award "for contributions in the field of piezoelectric crystals such as: stacked filters, electric circuit analogs and stress effects in doubly rotated plates," and received the U.S. Army Research & Development Achievement Award for 1980. This is the highest R&D award bestowed by the U.S. Army, and was given "in recognition of major contributions to the state-of-the-art of high precision frequency control."

He serves on the Technical Program Committee of the Annual Frequency Control Symposium, and was Chairman in 1982. Dr. Ballato is a member of the Administrative Committee of the IEEE Sonics & Ultrasonics Group, and is its Technical Activities Chairman. He is a member of the Technical Advisory Group TC-49 (Piezoelectric Crystals) of the International Electro-technical Commission.

Dr. Ballato may be reached at 201/544-2773 or 2751.

## New AdCom Members

Our new AdCom members will be serving a three-year term which began January 1, 1984. They are your representatives. Let them know your suggestions and feelings about G-SU so that it can serve you more effectively. They can be reached as follows:



E.A. ASH  
Dept. of Electronics  
University College  
Torington Place  
London, WC1  
United Kingdom



JANET BROWN  
Schlumberger-Doll Research  
P.O. Box 307  
Old Quarry Rd.  
Ridgefield, CT 06877

\* \* \* \* \*

### CONGRATULATIONS

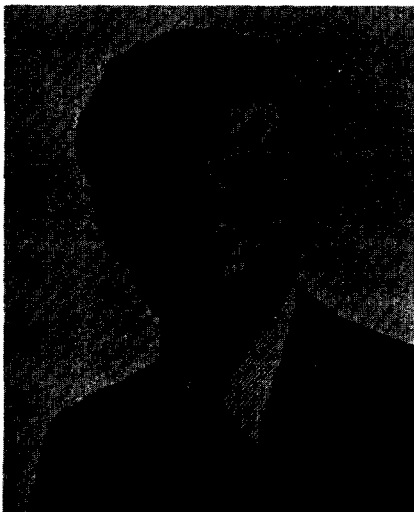
\* To Shrinivas G. Joshi who was promoted to the rank of Professor in the Dept. of Electrical Engineering and Computer Science at Marquette University, Milwaukee, Wisconsin.

• To Eric Albert Ash who has been awarded the tenth Marconi International Fellowship in Communications and Technology.

Professor Ash was cited for his outstanding leadership and pioneering work in the emerging technologies of surface-acoustic-wave devices, optical-fiber-based communications, acoustic optics, and acoustic imaging.

The fellowship, which includes a \$35,000 grant, is awarded each year to further research by a leading scientist who has made distinguished contributions to those areas of science and technology that improve the quality of life. It is given in the name of Guglielmo Marconi, the Italian electrical engineer and inventor.

\* To Bruce McAvoy who was elected Vice-President of the Sonics and Ultrasonics Group and to Reynold Kagiwada who is our new Secretary-Treasurer.



R.H. TANCRELL  
Raytheon Research Division  
131 Spring St.  
Lexington, MA 02173

## Committee Reports

### Technical Activities Committee

1. The G-SU TAC is currently responsible for seven items, four standards and three "projects."

#### 2. Surface Acoustic Wave Devices - E.A. Mariani

A poster paper entitled "SAW Devices - Terms and Definitions" was presented at the 1983 Ultrasonics Symposium. The list of terms and definitions presented had been previously prepared by members of the SAW Devices Standards Subcommittee. The poster session presentation provided an opportunity to achieve full consensus with the technical community, thereby permitting additions and modifications prior to final coordination with the IEEE. The poster session provided several changes and additional terms; these modifications are currently being incorporated into the existing list. A follow-up meeting of the subcommittee was held in Atlanta; it was decided to review the final list of terms and definitions during the early Spring of 1984 with final approval of the subcommittee to occur during a meeting at the 1984 Frequency Control Symposium in May.

#### 3. Piezoelectric Crystals - T.R. Meeker

The March 1984 Transactions will consist of two parts; the second part will be a reprint of IEEE Standard 176-1978 on Piezoelectricity. The first part will be the regular Transactions issue and will contain a letter to the editor with comments on, and corrections to, the standard. Future revision of the standard will be discussed at the next subcommittee meeting, to be held at the Frequency Control Symposium in May 1984.

#### 4. Ultrasonics in Medicine - F.W. Kremkau

This subcommittee has been reconstituted and consists of: F. Kremkau, P. Edmonds, F. Barber, L. Frizzel, S. Goss, L. Kessler, J. Larson, and W. O'Brien. A group of editors and contributors has been assembled to work on PAR 790: Medical Ultrasound Field Parameter Measurement Guide; categories have been assigned, and work is progressing well. A meeting will be held at the Ultrasonics Symposium in Dallas to consider the status of the document at that time.

#### 5. Delay Lines - A.A. Comparini

The acousto-optic functions of the old DL & AO subcommittee have been assigned to the newly formed acousto-optics subcommittee (q.v.). The delay lines subcommittee is currently performing a survey to determine the most pertinent topic for its work.

#### 6. Acousto-Optics - D.L. Hecht

This is a new subcommittee that takes over the A/O functions of the DL & AO subcommittee, formerly under A. Comparini, which has been reconstituted as the Delay Line Subcommittee (q.v.). The membership is being reorganized to some extent, and will meet during the Dallas Symposium, or perhaps sooner. Its present work consists of P 1022 "Acousto-Optic Devices: Properties, Nomenclature, Glossary," which was approved as a project by the IEEE Standards Board on December 8, 1983.

#### 7. Industrial Ultrasonics - R.S. Woollett

The "high-power ceramic transducer for industrial application," discussed by WG-3 of TC-29 during the August 1983 IEC meeting in Paris, is being reviewed.

Arthur Ballato  
Chairman

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#### Subcommittee on Ultrasonics in Medicine

This subcommittee is currently developing a Medical Ultrasound Field Parameter Measurement Guide. This document is a guide to measurement-device construction and procedures in which alternative approaches to good practice are suggested, but no clear-cut recommendations are made. It is a compilation of "how-to-do-it" or "cookbook" descriptions of how to build and use devices which measure medical ultrasound field parameters such as pressure, power, and intensity. It is to be used by persons involved in measurement of acoustic fields produced by medical ultrasound instruments. A single source describing construction and use of these devices does not presently exist. Devices and techniques included are:

- o hydrophone
- o radiation force
- o thermoelectricity
- o calorimeter
- o optics
- o cavitation

When this document is completed, the committee may take on one or more of the following activities:

- o technical definitions
- o imaging performance test procedures
- o real-time instrument output measurement
- o instrument standardization.

F.W. Kremkau  
Chairman

## 1983 Ultrasonics Symposium Report

The 1983 IEEE Ultrasonics Symposium was held in Atlanta, Georgia on October 21, November 1 and 2, 1983. It is an International Conference of the IEEE Group on Sonics and Ultrasonics. There were a total of 44 sessions including a Plenary session which featured The President's Speaker, Dr. R.J. Greaves, who spoke on "3-D Seismic Monitoring of an Enhanced Oil Recovery Project." There were 19 invited speakers in the regular sessions which offered a total of 255 contributed papers; of these a 100 were foreign contributions. Therefore we can truly say that this is an International Conference. Among the 557 attendees, there were 134 foreign attendees. There were 274 G-SU members in attendance.

This was the first time that an organized exhibitors' program was offered at the conference. There were 23 exhibitors. The program was excellent and contributed to the overall success of the conference.

On Monday evening we had a reception around a swimming pool courtyard that was surrounded by verandahs and greenery. From time to time the Dome was opened to allow us to view a clear starry sky, while we were partaking several rounds of beef. On Tuesday evening 240 of us attended an Evening of Glamour, Glitter and Gracious Entertainment Southern style. A Dixieland band and a group of Cloggers entertained us well into the evening. During the daytime three excursions were planned for the Spouses Program. On Monday eight persons went to view elegant Atlanta and the Cyclorama; on Tuesday, 12 people spent a Day in the Georgia Mountains; and, on Wednesday 12 people participated in the Mystique of Margaret Mitchell.

I would like to thank individually the members of the symposium committee: Dr. Reynold Kagiwada, Technical Chairman; Dr. G.P. Rodrigue, Local Arrangements; Dr. Mark C. Lee, Publications; Dr. Harry L. Salvo, Jr., Finance; Dr. Kuo-hsiung Yen, Publicity; and, Dr. Ralph A. Treder, Social Program. They contributed numerous hours and a great deal of their thinking and concern towards the success of this conference.

I want to thank the Technical Program Committee for organizing the sessions and selecting the invited speakers and thus setting the tone of the conference. I want to thank the exhibitors and L.R.W. Associates for pioneering our first and very successful exhibitors' program.

Most importantly, I want to thank the authors of the contributed papers and the participants in the sessions.

Moises Levy  
General Chairman



Bertram Auld receives the 1983 G-SU Achievement Award from W.D. O'Brien Jr.



Exhibitors galore at the 1983 Symposium.

## Winners

Congratulations to the following lucky winners of the G-SU Exhibits Drawing at the 1983 Ultrasonics Symposium:

Peter Edmonson	Disk Camera
Clifford Curry	GE Radio
Jouni Tornberg	Quartz Watch
Joe Trivisonno	TI Computer

Steven Norton was the lucky winner of a \$50 cash prize for the Symposium questionnaire drawing. Photographs were taken by Alan Budreau.



## Frequency Control Symposium

The Annual Frequency Control Symposium is an international meeting devoted to frequency control and precision timekeeping. Each year over 700 people from industry, universities, government laboratories and foreign countries attend. The symposia have served as the leading technical conference addressing all aspects of frequency control and precision timekeeping. The papers presented deal with recent progress in research, development and applications in areas represented by, but not restricted to, the following topics:

- o Fundamental Properties of Natural and Synthetic Piezoelectric Crystals
- o Theory and Design Piezoelectric Resonators
- o Resonator Processing Techniques
- o Filters and Signal Processors
- o Surface Acoustic Wave Devices
- o Quartz Crystal Oscillators and Frequency Control Circuitry
- o Clocks
- o Atomic and Molecular Frequency Standards
- o Laser Frequency Standards
- o Frequency and Time Coordination and Distribution
- o Radio and Systems Applications of Frequency Control Devices
- o Specifications and Measurements.

A centralized products, equipment and information exhibit area will also be featured at the symposium.

The Frequency Control Symposium, presently in its 38th year, is now co-sponsored by the Sonics and Ultrasonics Group and the U.S. Army. The meeting will be held May 30, 31 and June 1, 1984 at the Marriott Hotel in Philadelphia, Pennsylvania. Seventy-eight papers will be presented covering the topics of crystal oscillators, filters, SAW devices, frequency control circuitry, atomic frequency standards, frequency and time coordination and distribution, system applications, measurement and specifications, properties of piezoelectric crystals, theory, design and processing of piezoelectric resonators. Members of the Sonics and Ultrasonics Group will automatically receive the advance program, registration and exhibit information, but otherwise they can be obtained from:

Frequency Control Symposium  
RD 1, Box 352  
Brinley Plaza, Route 38  
Wall Township, New Jersey 07719  
\* \* \* \* \*

### AWARDS PROGRAM

#### Introduction

For a number of years, sentiment has been expressed at Symposium program committee meetings for the creation of Symposium sponsored awards that recognize outstanding contributions in all fields covered by the Annual Frequency Control Symposium. Therefore, in early 1983, the program committee voted to create two such awards. One, the Cady Award, named after Walter Guyton Cady, is to recognize outstanding contributions related to piezoelectric frequency control

devices. The other, the Rabi Award, named after Prof. I.I. Rabi, is to recognize outstanding contributions related to fields such as atomic and molecular frequency standards, time transfer, and frequency and time metrology. Each award consists of \$500.00, and a limited edition original print and certificate in a leather binder. The awards are presented to the recipients at the Symposium. At the discretion of the Technical Program Committee, the recipients may be reimbursed for travel expenses to attend the ceremony during which the award is presented.

#### Eligibility Criteria

Either award is open to any worker in any of the fields of endeavor traditionally associated with the Annual Frequency Control Symposium. The nominee for either award should be responsible for significant contributions of a technical nature to the field selected. No posthumous awards will be made. The time span over which the contributions have occurred is not limited, and nominations will be considered for totality and breadth of achievement as well as specificity and depth of contribution.

The significance of the contributions may be measured, in part by:

- o The degree of initiative, ingenuity, and creativity displayed.
- o The quality of the work and degree of success attained.
- o The overall importance of the work and impact on the frequency control and associated communities.

#### Nominations

Anyone may nominate another for either award. Each nomination should include the following:

1. Name of nominee.
2. Current address.
3. Name of award for which nominated.
4. Description of accomplishments, including:
  - a. Initiative, ingenuity, and creativity;
  - b. Quality and degree of success;
  - c. Importance of the work and impact on the frequency control and associated communities.
5. Name, address and phone number of nominator.

It is strongly suggested that the nomination not exceed two typewritten pages. Nominations for the award should be submitted to the Chairman of the Technical Program Committee by the date announced for the submission of summaries.

#### Selection of Recipients

The selection of the recipient for each award will be made by the Technical Program Committee during the spring meeting. The decision of the committee is final. If, in the opinion of the committee, no suitable nominee exists, no award will be given.



# 1984 Ultrasonics Symposium

## General

The 1984 Ultrasonics Symposium will be held November 14 through November 16 at the Dallas Hilton Hotel in Dallas, Texas. In addition to an outstanding technical program, this year's symposium will again feature exhibits keyed to the interests of the attendees. The Symposium Committee has planned a program of social functions in true Texas style: bigger and better. The plans include a lavish reception on the first evening, a full spouse's program, and a Western style outing. Pack along your trail duds, you may be asked to punch a doggie or two.

## Technical Subjects

Sessions are planned in the following areas;

- AE Acoustic Emission
- AM Acoustic Microscopy
- ACE Acousto-Electric Effects and Devices
- AO Acousto-Optic Effects and Devices
- AOS Acousto-Optic Signal Processing
- ABS Arrays and Beam Steering
- BB Bioeffects and Biophysics
- BW Bulk Wave Effects and Devices
- CU Consumer Ultrasonics
- DMC Defect and Material Characterization
- IU Industrial Ultrasonics
- PF Piezoelectric and Ferroelectric Materials
- IS Inverse Scattering
- HT Hyperthermia
- MSW Magnetostatic Waves and Devices
- MU Medical Ultrasonics
- NDE Nondestructive Evaluation
- PAS Photoacoustics
- PMC Process Monitoring and Control
- PA Physical Acoustics
- SFT SAW Filters and Transducers
- SMP SAW Materials and Propagation
- SRO SAW Resonators and Oscillators
- SSP SAW Signal Processing
- SSA SAW System Application
- TFB Thin Films for Bulk Wave Devices
- TFS Thin Films for SAW Devices
- TC Tissue Characterization
- SEN Sensors
- PM Porous Media

Abstracts should be submitted no later than Friday June 29, 1984.

## Symposium Exhibit

A professionally managed exhibit will again accompany the symposium. The exhibit will be held in the Dallas Hilton, adjacent to the Technical Sessions. Last year's exhibit was very well received, and we hope to increase participation in Dallas. Currently the following companies have reserved exhibit space:

- Anderson Labs
- Crystal Technology, Inc.
- Hitachi Metals
- MATEC, Inc.
- Murata Erie North America, Inc.
- Panametrics, Inc.
- RF Monolithics, Inc.
- SAWTEK, Inc.

- Sonoscan, Inc.
- Texas Instruments
- Ultrasonics-Butterworth Scientific, Ltd.
- Valpey-Fisher
- Westinghouse (DESC)

Companies interested in participating in the symposium exhibits should contact LRW Associates, 1218 Balfour Drive, Arnold, MD 21012, (301) 647-1591.

## Student Travel Assistance

Some limited travel assistance is available to support student attendance at the 1984 Ultrasonics Symposium in Dallas. Awards will be made on a competitive basis. Further information and applications can be obtained from: G.W. Farnell, Dean, Faculty of Engineering, McGill University, 817 Sherbrooke Street West, Montreal, Quebec, Canada, H3A 2K6. The deadline for applications is July 13, 1984.

## Dallas

Dallas has long represented the "Old West" mystique to millions of people. The Dallas of the 80's is a World Class Marketplace offering industries, arts, and families fertile ground for growth and development. World Class sports teams, fine stores and restaurants, Six Flags Amusement Park, a modern Convention Center and the world's largest wholesale market complex combine with one of the world's newest airports to generate an exhilarating environment. The population of the "Metroplex" formed by Dallas, its western neighbor Fort Worth, and surrounding communities, now exceeds three million. The weather forecast for the symposium is mild, with average November temperatures in the upper 50's, and an average humidity of 83%.

Airline service is through the outstanding Dallas/Ft. Worth Airport. Taxi service to the Dallas Hilton will cost approximately \$20. The public Surtran Bus System will transport you from the airport to the door of the Hilton for about \$6.

## Information

Further information concerning the symposium can be obtained by contacting:

- General Chairman L.T. Claiborne
- Texas Instruments
- P.O. Box 225936 MS134
- Dallas, TX 75265
- (214) 994-2426

- Technical Chairman W.J. Tanski
- Schlumberger-Doll Research
- P.O. Box 307
- Ridgefield, CT 06877
- (203) 431-5472

## ADCOM Briefs

The Administrative Committee (AdCom) of the Group on Sonics and Ultrasonics (G-SU) met on Sunday, October 30, 1983 at the Marriott Hotel in Atlanta, Georgia, presided over by W.D. O'Brien, President of G-SU. The newly elected members of AdCom, E.A. Ash and R.H. Tancrrell, were introduced. Also elected was J. Brown, who was unable to attend the meeting.

Considerable time was taken up by a discussion in the status of the Transactions on Sonics and Ultrasonics. The page budget of 500+ pages will not be met this year. There are presently 12 papers in various stages of review processing. However, there is a zero backlog of papers and the November 1983 and January 1984 issues will be late. The major problem experienced is the lack of sufficient papers being submitted for publication. Possible reasons for this are the ease of publishing in the Ultrasonics Proceedings, and that many people simply seem to be too busy. We have to urge everybody in the Group to submit papers to the Transactions; if we do not succeed in this endeavor, the only alternative is to reduce our issues back to four per year from the present six per year. Several special issues are planned, including Digital Ultrasonic Imaging (July 1984), Ultrasound Hyperthermia (September 1984), Acoustic Microscopy (March 1985), and SAW Correlators and Convolvers (July 1985). Also, the Piezoelectric Standards will be published in the January 1984 issue, and plans are underway to publish the proceedings of the 1983 Ferroelectrics Symposium in the Transactions.

The budgets for the 1983 and 1984 Proceedings were presented by B.R. McAvoy, the Proceedings Editor. For both years, about 1100 copies will be printed, of which half are sold at the Symposium and half are sold to IEEE under the Book Broker program. It was noted that the G-SU hardly gets any benefit from the Book Broker program because of the size of our Proceedings and the particular formula used in calculating the proceeds to G-SU.

Another topic that generated a lot of discussion was the problem on how to handle the continued increase in the number of papers submitted and presented at the Ultrasonics Symposia. R.C. Williamson presented a memorandum, prepared jointly with J.D. Larson and G.W. Farnell, outlining the various alternatives. This memorandum was already published in the Fall Newsletter and basically proposed three possibilities: 1) Add more parallel sessions to a three-day Symposium, 2) Go to a four-day Symposium, and 3) Be more selective in accepting contributed papers. A questionnaire was passed out at the Registration desk to poll the membership. Because a firm decision had to be made for 1984 and the results of the questionnaire would not be available until the second day of the Symposium, R.C. Williamson proposed to form a small subcommittee which would tabulate the

the results and be empowered to make a decision as to which of the three alternatives to follow. However, it was felt that the issue was too important to be settled by a small subcommittee and that AdCom as whole should decide. It was therefore decided to call a second AdCom meeting for the third day of the Conference, at which time the results of the questionnaire would be available. The results, as reported at this second meeting, were as follows: Add more parallel sessions - 34; Go to four days - 48; Be more selective - 57. Because these results indicated no clear consensus, although most people seem to favor a three-day symposium, a motion was presented that "the Annual IEEE Ultrasonics Symposium shall be a three-day meeting with a maximum of four parallel sessions." This motion passed with only one opposing vote. A second motion providing stronger guidelines to the Program Committee by limiting the number of hours was tabled for more extensive discussion at the Spring AdCom meeting.

G.P. Rodrigue gave a short expose of the Atlanta Symposium and Exhibit arrangements. He reported that 22 booths were sold. It was noted that an exhibit is definitely planned for 1984. The decision for 1985 will be made at the 1984 Fall AdCom meeting.

The budget for the 1984 Symposium was presented by the General Chairman, L.T. Claiborne, and accepted by AdCom. The Symposium will be held November 13-16, 1984 in the Dallas Hilton, with W.J. Tanski acting as Technical Program Committee Chairman. The 1985 Symposium will be held in the Jack Tar Hotel, San Francisco; 1986 - Williamsburg, Virginia; 1987 - Denver, Colorado; 1988 - Chicago, Illinois; 1989 - Orlando, Florida. The budget for the 38th Annual Frequency Control Symposium, which is now cosponsored by G-SU, was presented by T.E. Parker. The Symposium will be run by Systematics General Corp.

W.A. Smith, as representative of the Ferroelectrics Subcommittee, reported that the International Symposium on Applications of Ferroelectrics (ISAF) was held June 1-3, 1983 at the National Bureau of Standards, Gaithersburg, Maryland. It was the consensus of the committee that the ISAF was perhaps the most successful meeting in this series which began in 1968. The registered attendance at the Symposium was 282, which exceeded that of any previous ISAF by about 30%. Scientists from 15 countries presented 115 papers at this meeting. As mentioned before, the possibilities are being explored to publish the Proceedings in the G-SU Transactions.

The Awards Committee selected B.A. Auld, Stanford University, as the winner of the 1983 G-SU Achievement Award. The citation read, "For scientific excellence and distinction through theoretical contributions to ultrasonics." The Best Paper Award for 1982 was won by I.R. Smith and R. Wickramasinghe, from University College, London, U.K., for their paper "Dichromatic Differential Phase Contrast Microscopy," which appeared in the November issue of the Transactions.

In addition to the six local chapters in the U.S., the first G-SU chapter outside the U.S. has been formed in Tokyo, Japan. The organizer and interim Chairman is Nobuo Mikoshiba from Tohoka University.

The G-SU Technical Activities Committee, chaired by A.D. Ballato, has been very active and is currently responsible for four standards and two "projects." The committee consists of six subcommittees: SAW Devices (E.A. Mariani), Piezoelectric Crystals (T.R. Meeker), Ultrasonics in Medicine (F.W. Kremkau), Delay Lines (A.A. Comparini), Acousto-Optic Devices (D.L. Hecht), and Industrial Ultrasonics (R.S. Woollett).

E. Stern was invited to the AdCom meeting to present a proposal to AdCom for G-SU cosponsorship for a Signal Processing Device Workshop he is organizing. This is planned to be an invitational conference, limited to about 70 people. The AdCom was in favor of cosponsorship, and a motion to that effect passed unanimously.

As this was the last AdCom meeting of the year, elections for officers for 1984 were held. H. van de Vaart was elected President and B.R. McAvoy was elected Vice-President. R.S. Kagiwada was later appointed Secretary-Treasurer.

H. van de Vaart  
Secretary-Treasurer  
November 15, 1983

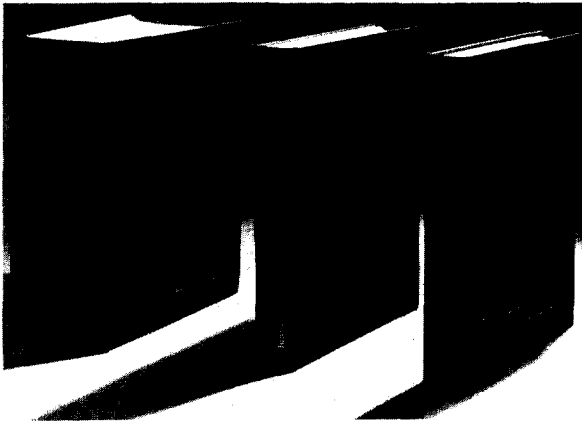
## CALL FOR LECTURERS

This is a call for lecturers to apply for a 1984 IEEE Distinguished Lecture Tour of Region 9. This approximately two week tour is scheduled for the fourth quarter of this, our Centennial, year; the proposed itinerary includes visits to some or all of the following countries: Brazil, Chile, Colombia, Mexico, Peru and Venezuela. Participants will interact with IEEE Section officers and members throughout South America. Funding is the responsibility of the individual lecturer.

IEEE members who wish to be considered as potential lecturers should send letters indicating their interest in this tour, accompanied by their resume and a summary (limited to one typewritten page) of their proposed technical lecture, to their respective Society/Council president. A copy should also be sent to Dr. M.E. Van Valkenburg, Chairman, IEEE Transnational Relations Committee, c/o Ms Barbara Ettinger, TRC Administrator, IEEE, 345 East 47th Street, New York, NY 10017.

The deadline for submitting applications is July 15, 1984.

\*\*\*\*\*



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## Chapter Activities Reports

### Baltimore, Washington and Northern Virginia

This year's activities will have consisted of at least four dinner-meetings with the format of a technical talk by an invited speaker following a dinner at a nearby Mexican restaurant. This past October our first speaker, Prof. Vernon Newhouse from Drexel University, spoke on "A New Approach to the Ultrasonic Characterization of Random Media," with applications to such diverse areas as the grain density in metals and the cell density in human tissue. This was followed in December by Mr. Douglas L. Hogan, a senior scientist with Sparta in McLean, VA, addressing the group on "Speech Output and Synthesis Systems." In his talk, Mr. Hogan presented many interesting samples of both pre-recorded compressed speech, and speech generated from written text strings. Then, in February of this year, Dr. Norman Berg from the Dept. of Army's Harry Diamond Laboratories spoke on "Acoustic-Optics and Signal Processing" to a large audience. Dr. Berg concluded his talk with the demonstration of a functional miniature acousto-optic correlator in which he led the development. The average attendance at these meetings was twenty-three people from the Washington-Baltimore-Northern Virginia area.

This April we are looking forward to hearing the SU National Lecturer Dr. George Alers, president of Magnasonic in New Mexico, speak to us on "Quantitative Nondestructive Evaluation - A Timely Confluence of Science, Engineering, and Economics." A final meeting planned for May, on the popular subject of new technologies in audio speakers, is having a difficult time coming to fruition for want of a human speaker on the subject.

The newly elected officers of the Washington-Baltimore-Virginia Section of the Sonics and Ultrasonics group for the 1983-84 session are:

Chairman: Gerald V. Blessing  
National Bureau of Standards  
(301) 921-3646

Vice-Chairman: Narendra K. Batra  
Naval Research Laboratory  
(202) 767-3505

Secretary-Treasurer: Joel Rosenbaum  
Litton/Amecom  
Industries  
(301) 454-9839

Meeting Arrangements: Manas K. Roy  
Bendix Corporation  
(301) 823-2200

Gerry Blessing  
Chairman

### Boston Chapter Activities

The Boston Chapter of the IEEE Group on Sonics and Ultrasonics is expanding its interests. In recent years meetings have been dominated by Surface Acoustic Waves. Because this technology has matured, and with SAW devices now commercially available many acousticians are seeking out other areas of research. This year, for example, we scheduled two presentations on bulk acoustic waves, one on nondestructive evaluation, another on piezoelectric phenomena, and a final one on magnetostatic waves.

The year began with the highly informative talk entitled "Quantitative Nondestructive Evaluation - A Timely Confluence of Science, Engineering, and Economics" by our National Lecturer George A. Alers. He pointed out how industry spends nearly \$120 billion a year on preventing and repairing fracture damage, and showed how Fracture Mechanics, Ultrasonics and Computer Signal Processing work together to solve fracture problems. Dr. Alers founded Magnasonics, an Albuquerque based company to put some of these ideas to work.

Dr. Robert A. Moore of Westinghouse gave us new insights into the application of bulk acoustic waves to gigahertz frequency high Q resonators and to microwave time delays for phased array antennas. Resonator Q's greater than 50,000 near 2,000 MHz were achieved with less than 10 db transmission loss. Bob is very active in the National Sonics and Ultrasonics scene, serving on the Administration Committee, being responsible for SU Chapter development, and for the National Lecturer Program.

The talk on new piezoelectric applications in December by Robert Carter of Piezo Electric Products in Cambridge, Mass. was very popular. Not only did he give an impressive demonstration of piezoelectric fans moving air very efficiently, but he provided an informative presentation of the basic design equations used in this application. Here is an idea with many new applications for an old technology.

The final two meetings of the year will feature alternate techniques for obtaining tunable nanosecond time delays for use in phased array antenna systems. Alan Budreau of Sanders Associates will present recent findings on voltage controlled acoustic time delays. These delays are extremely linear with voltage. Although the amount of tunability obtained with this technique is a fraction of a percent the resulting time delays are frequency independent - a very attractive feature for phased array systems. Dr. John Owens from the University of Texas at Arlington will present a state-of-the-art review of magnetostatic wave technology. This includes recent progress in achieving

(Continued next page)

nondispersive delays. Significant advances have been made in this technology over the past two years and the meeting should prove to be informative.

Next year we hope to establish joint meetings with several other Boston Section Groups. This should boost attendance at our meetings, which has dropped off in recent years, and result in meetings with a wider variety of topics covered.

James C. Sethares  
Chairman

\* \* \* \* \*  
Tokyo Chapter

The Tokyo Chapter was formed on August 5, 1983. Officers elected for the year 1983-84 were the following:

Chairman: Nobuo Mikoshiba  
Research Institute of Electrical  
Communication  
Tohoku University  
Katahira, Sendai, Japan

Vice Chairman: Yasutaka Shimizu  
The Center for R&D of Educational  
Technology  
Tokyo Institute of Technology  
Oh-okayama, Meguro-ku, Tokyo, Japan

Secretary: Kenshiro Takagi  
Institute of Industrial Science  
The University of Tokyo  
Minato-ku, Tokyo, Japan

Treasurer: Masatsune Yamaguchi  
Department of Electrical Engineer-  
ing  
Chiba University  
Chiba, Japan

The Tokyo Chapter-SU is one of the sponsors for research meetings on ultrasonics, which have been held once a month, since October, 1983. The Tokyo Chapter-SU is also one of the sponsors for the Symposium on Ultrasonic Electronics, which is held once a year (December) in Tokyo. Statistics on these three-day Symposiums since their start in 1980 are the following:

	1st 1980	2nd 1981	3rd 1982	4th 1983
Attend.	254	195	236	276
# of Papers	75	64	68	67

Meeting activities of the Tokyo Chapter-SU have been the following:

- Oct. 14, N. Mikoshiba, Tohoku University, recent activities on Sonics and Ultrasonics.
- Oct. 20, C. Nakaya, Hitachi Ltd., Medical Ultrasonic Transducer Using PZT/Polymer Composites.
- Oct. 20, M. Ueda, Tokyo Inst. Tech., Measurement of Sound Velocity and Attenuation Coefficient of Biological Tissues.
- Nov. 22, N. Mikoshiba, Tohoku University, Report on 1983 IEEE Ultrasonics Symposium (Part I).
- Nov. 22, Y. Shimizu, Tokyo Inst. Tech.,

Report on 1983 IEEE Ultrasonics Symposium (Part II).

Dec. 6, H. Nakazawa, Tokyo Inst. Tech., Ultrasonic Monitoring Techniques of Crack Growth and Fracture Mechanics - Evaluation of Materials.

Dec. 7, A. Kawabata, Kyoto University, Fabrication Techniques and Properties of Piezoelectric Thin Films.

Dec. 8, T. Suzuki, University of Tsukuba, Nonlinear Acoustics and Its Physical Meaning.

Dec. 8, O. Nomoto, Kobayashi Inst., Ultrasonic Researches in Japan.

Dec. 19, Y. Miyazaki, Toyohashi University Tech., Optical Active Devices by Using Surface Acoustic Waves.

\* \* \* \* \*  
Chapters Coordinator Report

Now we have seven U.S. and one Japanese chapters. Contacts for each are given in their report in the Newsletter or, if not, at the end of this article. Those living in the area of each chapter are encouraged to participate.

There is some indication that one of the benefits of having an active chapter in an area is an increase in Group membership. At least two chapters are reporting significant membership increases since their formation. This is during a time when total membership has decreased.

Perhaps there are other areas where there is sufficient membership to warrant a chapter. Listed below are several areas listed by state for which membership might be great enough.

State	Total State Membership	Membership In Possible Chapter Area
Connecticut	45	
New Jersey	71	50 in New Jersey coast area
New York	116	37 in NY City to Conn. border
Pennsylvania	77	31 in Philadelphia-Trenton area
Illinois	68	52 in Chicago area
Texas	81	40 in Dallas-Ft. Worth area
Arizona	18	15 in Phoenix area
California	291	
Washington	53	44 in Seattle area.

Most chapters draw attendance from acoustically related societies in the area as well as technologically related IEEE Societies. Most chapters also have joint meetings with several other groups, both IEEE and non IEEE. The chapters serve as a good method of mixing with others in different parts of the profession locally.

In most areas there are excellent local program possibilities. Further each year the SU Professional Group designates a National Lecturer whose expenses are paid to each of the chapters and other appropriate locations. The National Lecturer would be most receptive to an invitation from any group considering SU chapter status as well. Any group interested in considering chapter status or person interested in organizing a chapter should contact IEEE headquarters or the

(Continued next page)

writer who will be most happy to assist in any possible way. I may be contacted at (301) 765-4027 by phone or by mail at Westinghouse Defense and Electronic Center, P.O. Box 746, Mail Stop 335, Baltimore, MD 21203.

Contacts for chapters are as follows:

BOSTON

James C. Sethares, RADCE/EEA, Mail Stop 30,  
Hanscom AFB, MA 01731.

SOUTHERN CALIFORNIA

C.S. Tsai  
University of California  
School of Engineering  
Irvine, CA 92717

LONG ISLAND

Dr. Richard La Rosa  
Hazeltine Corporation  
Greenlawn, NY 11740

SANTA CLARA VALLEY

John D. Larson  
143 Tennyson Avenue  
Palo Alto, CA 94301

WASHINGTON

Dr. Gerald V. Blessing  
National Bureau of Standards  
Room A-147, Building 233  
Washington, DC 20234

PITTSBURGH

Mark A. Jerabek  
West Virginia University  
Dept. of Elec. Engineering  
Engineering Sciences Bldg.  
Morgantown, WV 26506

TOKYO, JAPAN

Nobuo Mikoshiba  
Res. Inst. Elec. Commun.  
Tohoku University  
Katahira Sendai Japan

OREGON

Robert D. Chew  
12875 S. Barlow Road  
Beaverton, OR 97005

R.A. Moore  
Chapters Coordinator

\* \* \* \*

MEMBERSHIP

The Sonics and Ultrasonics Group membership is currently 2073, a decrease of 2.6% from the same time last year. We have attempted to increase membership in the past year by offering free first year membership to persons attending the 1983 Ultrasonics Symposium, which seven people took advantage of. In addition we sent a letter to some 1500 people on our non-member mailing list discussing the Sonics and Ultrasonics Group. This promotional effort gained us only four new members.

In this note we wish to ask all current members to help in recruiting new members as well as retaining current members who may not feel that their needs are being adequately served. I believe that personal contact is the single most effective method in promoting membership. As an aid in doing this, we have reproduced below portions of our recent letter to non-members. We hope that this information will help you in presenting our case to prospective members.

"The G-SU, a technical society within the IEEE, is devoted to advancing the state-of-the-art in theory, design, and applications relating to the generation, transmission, and detection of bulk and surface mechanical waves. The areas of interest range from fundamental studies in physical acoustics to the design of sonic and ultrasonic devices and their application to industry, biomedicine, and signal processing. The Group serves the scientific, professional, and educational needs of engineers and scientists with an active interest in sonic and ultrasonic phenomena. With over 2000 members worldwide, G-SU is the leading forum for the exchange of information concerning the study and application of mechanical waves."

"Significant activities of the Group include publication of the Transactions on Sonics and Ultrasonics (bimonthly), co-sponsor of the IEEE Transactions on Medical Imaging and the Transactions on Ferroelectrics, the G-SU Newsletter (semi-annual), and the Proceedings of the Ultrasonics Symposium (annually). The Group sponsors the annual IEEE International Ultrasonics Symposium, and co-sponsors the annual Frequency Control Symposium and the IEEE International Symposium on Applications of Ferroelectrics. The G-SU also sponsors local chapters, subgroups formed in localities (Boston, Washington, D.C., and Palo Alto for instance) with a significant number of active workers, which have regularly scheduled meetings and other activities throughout the year. Six chapters are active in the U.S.A. with one being organized, and three chapters are being organized outside of the U.S. The chapters provide members a unique opportunity to interact with other workers in their field, continually and with minimal expense. In addition, we sponsor a National Lecturer and make periodic awards to recognize achievement and contributions to the field of ultrasonics."

We sincerely appreciate your help in this very important effort.

William J. Tanksi  
G-SU Membership Chairman

## Division IX Report

This is my first "letter" as Division Director, and it may be appropriate to briefly describe the new Division structure. As many of you may recall, the Institute bylaws were changed last year to authorize 10 technical divisions and the various Councils, Societies, and Groups were regrouped into these divisions. Commonality of technical interests was used as the primary criterion for the grouping.

Division IX, called Signals and Applications, contains four Societies and one group. These are:

- |                                                             |                                           |
|-------------------------------------------------------------|-------------------------------------------|
| o Aerospace and Electronic Systems Society . . . . .        | } all three previously<br>in Division III |
| o Geoscience and Remote Sensing Society . . . . .           |                                           |
| o Ocean Engineering Society . . . . .                       |                                           |
| o Acoustics, Speech and Signal Processing Society . . . . . | previously in Division I                  |
| o Sonics and Ultrasonics Group . . . . .                    | previously in Division IV.                |

Incidentally, there is no essential difference between a Society and a Group. However, the word "Society" appears to carry some added prestige, especially when interacting with an outside organization, e.g., the American Physical Society, or the Society of Mechanical Engineers. I have discussed the question of changing from Group to Society with Dr. Herman van de Vaart, President of the SU Group, and he will consult with his AdCom to see whether they wish to make a change.

One of my hopes is that we will be able to identify a few projects where joint efforts by several Societies would be desirable to produce synergistic results. One idea being considered by other Divisions is to introduce a Division Magazine, which may be unaffordable by individual Societies. Another idea is to replace or supplement the Society Newsletters by a Division Newsletter: the larger circulation may produce cost savings and additional advertising. Still another idea is to open joint Chapters in Sections where the number of members of individual Societies is too small to support separate chapters of their own.

I would like to invite your ideas on these and related topics, and will discuss them with the Society leadership to see if some of them would be suitable for our Division. It will take a while for the five Presidents and me to get to know each other's views, but I am sure that all of us will be eager to receive such suggestions from our collective membership.

\* \* \* \* \*

By now every IEEE member knows that 1984 is our Centennial Year. The first major Institute-wide Centennial events were held in Washington in February. These included the Technical Press Briefing, and the Technology Policy Conference, both of which have been reported upon in the INSTITUTE. In parallel with these meetings there was a TAB orientation and management seminar for incoming Society Presidents and other offices, and a full-day TAB meeting. This intensive activity was exhausting but productive, and the participants came out of it with a greater awareness of the problems and issues, and also of the resources available in the Institute to resolve these problems.

I hope all members will try to attend at least one Centennial event during the year in their area. Almost all Sections are organizing Centennial Awards ceremonies, and in many cases these occasions provide an excellent opportunity for our society members to meet the local IEEE leaders and discuss setting up joint programs. Additional Institute-wide events are scheduled for May in Boston, October in Philadelphia, and December in San Francisco. Let us all participate in them this year when we can--not many of us will be here for the next Centennial!

Saj Durrani  
Director, Division IX

\* \* \* \* \*



## 38th Annual Frequency Control Symposium



MAY 30, 31 & JUNE 1, 1984  
PHILADELPHIA, PENNSYLVANIA

## GSU Fellows Roster

Robert Adler  
 Alessandro C. Alberigi  
 E.A. Ash  
 B.A. Auld  
 Hans G. Baerwald  
 A.D. Ballato  
 R. Bartnikas  
 Laurence Batchelder  
 Vitold Belevitch  
 L.L. Beranek  
 D.A. Berlincourt  
 J.V. Bouyoucos  
 Paul H. Carr  
 S.D. Chatterjee  
 M. Chodorow  
 Larry A. Coldren  
 J.H. Collins  
 H.W. Cooper  
 Wallace H. Coulter  
 James A. Cronvich  
 C.C. Cutler  
 Louis J. Cutrona  
 Richard W. Damon  
 S. Duinker  
 Floyd Dunn  
 E.P. Eernisse  
 R.M. Emberson  
 G.W. Farnell  
 Francis J. Fry  
 Eduard A. Gerber

P.A. Grivet  
 E. Hafner  
 Eric Herz  
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 E.O. Johnson  
 Irving Kaufman  
 Hisao Kimura  
 Gordon S. Kino  
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 Albert Macovski  
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 F. Massa  
 F. Mayer  
 James D. Meindl  
 A.H. Meitzler  
 Shota Miyairi  
 F.R. Morgenthaler  
 Tsuneo Nakahara  
 V.L. Newhouse  
 Tatsuji Nomura  
 Kanichi Ohashi  
 A.A. Oliner  
 Morio Onoe

Veljko Radeka  
 J.A. Rajchman  
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 Richard C. Williamson  
 L.T. Zitelli

Is there a G-SU member's name that should be on this list? If so contact the Chairman of our Fellows Committee, Gordon Kino and he'll be happy to let you know the procedure. You can reach him at 415/497-0205.

\* \* \* \* \*

The editor appreciates the articles from various members which make-up this issue of the G-SU newsletter. Newsworthy articles are always welcome. The editor gratefully acknowledges the work of Bob Mills who patiently typed this edition.

\* \* \* \* \*

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