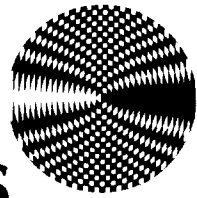




IEEE

SONICS AND ULTRASONICS GROUP NEWSLETTER



NUMBER 58, MAY 1985

EDITOR: FRED S. HICKERELL

G-SU NATIONAL LECTURER SELECTED

The Administrative Committee of the Group on Sonics and Ultrasonics has announced the selection of Dr. Robert E. Newnham as the G-SU National Lecturer for 1985-86. As the National Lecturer Dr. Newnham will be available to speak before SU Chapters, graduate and undergraduate student university seminars and other appropriate local interested groups. Dr. Newnham's topic for these talks will be:

TRANSDUCERS, SENSORS, AND ACTUATORS

The establishing of the National Lecturer program and providing a stipend to cover travel expense by SU is indication of the interest of the AdCom in supporting the activities of groups interested in sonics and ultrasonics. In addition to present SU Chapters, groups which are considering chapter information, university groups and other IEEE groups which have an SU interest are encouraged to schedule the national lecturer. 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 given in this newsletter. Dr. Newnham may be reached at Pennsylvania State University, University Park, Pennsylvania 16802, (814) 865-1612 or 1451



Robert E. Newnham

IEEE - SONICS AND ULTRASONICS GROUP
NATIONAL LECTURER PROGRAM

TRANSDUCERS, SENSORS, AND ACTUATORS

Robert E. Newnham
Materials Research Laboratory
The Pennsylvania State University
University Park, PA 16802

ABSTRACT

More than a century ago, long before they began their historic research on radioactivity, the Curie brothers discovered that tourmaline and other polar crystals generate electric charge under mechanical stress, the phenomenon of piezoelectricity. The advent of ferroelectricity fifty years later led to the development of poled piezoelectric ceramics and a host of composite transducer materials made in many different sizes and shapes.

Although the structural properties of composite materials receive far greater attention than do their electromechanical properties, the use of multiphase solids in sonics and ultrasonics is surprisingly widespread. As the advantages and disadvantages of ferroelectric composites become better understood, an even greater range of applications will develop in the future; we can expect to see many kinds of passive and active components in which ferroelectric materials are combined with polymers, metals, or ceramics to optimize their physical and chemical response.

In this talk we review some of the basic ideas underlying composite electroceramics: sum and product properties, connectivity patterns leading to field and force concentration, the importance of periodicity and scale in resonant structures, the symmetry of composite materials and its influence on physical properties, polychromatic percolation and coupled conduction paths in composites, electrostriction and other nonlinear effects, coupled phase transformation phenomena in composites, and the important role that porosity and interfaces play in many composites.

The ideas will be illustrated with electromechanical transducers, sonochemical sensors, active vibration absorbers, electronic actuators, and a variety of other applications—both real and imagined.

BIOGRAPHY

ROBERT E. NEWNHAM

Robert Newnham received a B.S. degree in mathematics from Hartwick College in 1950, an M.S. degree in physics from Colorado State University in 1952, and Ph.D. degrees from the Pennsylvania State University (Physics and Mineralogy, 1956), and Cambridge University (Crystallography, 1960).

In 1958 he joined the faculty of the Laboratory for Insulation Research at the Massachusetts Institute of Technology. Eight years later Professor Newnham returned to Penn State to become Chairman of the Solid State Science Program. His research interests span a wide range of topics in crystal physics, crystal chemistry, electroceramics, and composite materials including piezoelectricity, ferroelectricity, elasticity, electrostriction, ferrimagnetism, and non-linear optical properties. Since 1978, Dr. Newnham has concentrated on design principles for composite transducers, sensors, and actuators. A rich variety of composite devices made from ceramics, polymers, and interleaved metal electrodes have been fabricated at the Materials Research Laboratory where he works. In 1982 Dr. J. V. Biggers, Dr. L. E. Cross and Dr. Newnham founded the Center for Dielectric Studies at Penn State for research on capacitors and insulators. The results of his studies have been presented at numerous technical meetings and published in more than 200 papers, patents, and books.

Dr. Newnham is a member of the American Ceramic Society, the American Physical Society, and the Mineralogical Society of America. He is President of the American Crystallographic Association and past Secretary of the Materials Research Society. At Penn State, Professor Newnham has been awarded the Wilson Prize for Outstanding Teaching, and the Faculty Scholar Medal for Research on composite transducers and sensors. He was Secretary of the last International Meeting on Ferroelectricity, and is Program Chairman of the next International Symposium on the Applications of Ferroelectrics, both of which were co-sponsored by IEEE.

Professor Newnham may be reached at 814/865-1612 or 1451.

IEEE CENTENNIAL KEYS
TO THE FUTURE

1984-1985 G-SU National Lecture
Frequency and Time Sources-Past,
Present & Future

At a special banquet concluding IEEE's Centennial Year, held November 30, 1984 in San Jose, California and attended by some 700 engineers and scientists as well as leaders from government, industry and academe, "Keys to the Future" were presented by Richard J. Gowen, 1984 IEEE President, to 34 individuals representing the Institute's technical societies. Honored as the Centennial Young Engineer from the IEEE Group in Sonics and Ultrasonics at this occasion was Supriyo Datta from the School of Electrical Engineering at Purdue University, West Lafayette, IN. He was identified as an individual in the early stages of his/her career "who best demonstrates sound understanding of the evolving technologies" in the individual's chosen field and whose "progress shows the greatest promise for applying these technologies to the development of new industrial products and systems for the improvement of society." The keys were laser cut from a three-inch silicon disc composed of 256k metal oxide semiconductor (MOS) material.

Supriyo Datta was born in 1954 in Dibrugarh, India. He completed his undergraduate education in electronics at the Indian Institute of Technology, Karagpur in 1975 and latter joined the University of Illinois at Urbana-Champaign where he obtained his M.S. in 1977 and his Ph.D. in 1979. After two years as a Visiting Assistant Professor at the University of Illinois he joined Purdue University where he is currently an Associate Professor in the Department of Electrical Engineering.

His chief research contributions are in the area of microwave acoustics where his work on the generation and reflection of surface acoustic waves is widely used in the design of surface acoustic wave filters and resonators. He contributed to the development of an acousto-electric technique currently being used for the measurement of carrier mobility in amorphous silicon. His research interests also include integrated opto-electronics where he has been involved in the study of new materials and phenomena in quantum wells and superlattices grown by Molecular Beam Epitaxy.

Photo caption: Left to Right: Richard J. Gowen, 1984 IEEE President, Supriyo Datta holding his Centennial Key to the Future, and Herman van de Vaart, 1984 President, IEEE Group on Sonics and Ultrasonics.

* * * * *

Professor Y. Kikuchi passed away in October of 1984 at the age of 74. He was a pioneer in the field of Applied Ultrasonics. He was a Professor Emeritus at Tohoku University in Sendai, Japan.

Arthur Ballato

DATE	PLACE	SPONSOR
Dec 84	Tokyo Kyoto Sendai	G-SU Tokyo Section
Mar 19	Univ. Central Florida	Orlando Section, Comm. Soc.
20	PINY	Long Island Section
Apr 2	Univ. Maryland	Balt., Wash., N. Virginia Section
3	Lexington, MA	Boston Section
4	Univ. Maine	EE Dept.
11	Rensselaer Poly Inst.	Mechanics/Phys. Depts.
16	Univ. California Irvine	EE Dept.
17	Palo Alto, CA	Santa Clara Valley Section
18	Beaverton, OR	Tektronix
23	Marquette Univ.	EE Dept.
24	Chicago	Fox Valley Sub- section
25	Univ. Illinois Urbana/Champaign	EE Dept.
26	John Carrol Univ.	Physics Dept.
May 1	Univ. Pennsylvania	Philadelphia Section
8	Lexington, MA	Raytheon Research
June 7	St. Louis, MO	MTT Workshop

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President's Message

The year 1984 marked the end of the first century for the IEEE, 1985 marks the start of a new one. As your president, I was fortunate to be able to attend many of the centennial celebrations, such as the IEEE Centennial Convocation and the Centennial Reception for the Learned Societies and Associations that took place in Boston, Massachusetts in May, and the Centennial Keys to the Future event that took place in San Jose, California, in November. The Centennial Convocation was a special occasion not soon to be forgotten, with a special presentation titled: "Generation of Giants", portraying Benjamin Franklin, Michael Faraday, Thomas Alva Edison, Alexander Graham Bell, Charles Proteus Steinmetz, Nikola Tesla and Johann von Neumann.

The final celebration in San Jose focused on at the future of Electrical Engineering, rather than the past. Gordon Moore of Intel gave a very inspiring talk on that theme followed by the presentation of Centennial Keys to 34 young engineers, one from each technical society in the IEEE. Benjamin Franklin again made an appearance, issuing a challenge encouraging Key recipients to follow in the tradition of their forebears, serving others with technical skills. The Sonics and Ultrasonics Group recipient was Supriyo Datta from Purdue University. His picture appears elsewhere in this newsletter.

Even though the Group on Sonics and Ultrasonics enters 1985, our 32nd year, in a healthy condition, there may be some clouds on the horizon. During the past six years, the IEEE overall membership has grown at a nearly 6% clip. However, the G-SU membership has declined during the same period. In 1980 our membership (excluding students) stood at 2138, now it is 2034. Granted, we grew at a 5% pace during the seventies, no doubt in part because of the emergence of surface acoustic wave technology, but our membership has declined 1.2% per year since 1980. Your AdCom has been concerned about this problem, especially since our involvement in related technologies has increased. For example, apart from the Ultrasonics Symposium, we now co-sponsor the annual Frequency Control Symposium and are the sponsor of the very successful triannual Ferroelectrics Symposium. At the last AdCom meeting, and Ad Hoc Committee was established to study this issue, come up with proposals to possibly formally broaden our field of interest, and draw people from both the Frequency Control and Ferroelectrics community under the G-SU umbrella. Such a change might include a new name for our group (is "Sonics" still part of our effort?), as well as rewriting the Constitution.

1985 will also mark a change for our Transactions. Probably not many of the present members of G-SU realize that since its inception in 1956, the Transactions on Sonics and Ultrasonics has had only two Editors-in-Chief: Oskar E. Mattiat from 1956 to 1971, and Steven Wanuga since 1971. After

14 years at the helm, Steve has decided to resign as Editor effective with the July 1985 issue. His experience and devotion will be sorely missed. It is not an overstatement to say that being Transactions Editor is probably the most involved and busiest volunteer job on the AdCom. Having done it for so many years, he deserves our admiration and sincere thanks. With the September issue, the new Editor-in-Chief will be Bill O'Brien, who was the G-SU's Secretary-Treasurer from 1972 to 1980, and President during 1982 and 1983.

With the start of 1985, the three newly elected members on AdCom are; David L. Hecht, Joseph S. Heyman and Richard M. White. Leaving us after a three-year term are Thomas W. Bristol as past President, Bruce Chick and Larry A. Coldren. John D. Larson, the other elected member for 1981-1984, will remain ex-officio on AdCom as Chairman of the Nominations Committee. We welcome the new members and thank the retiring members for their time and effort.

H. van de Vaart
President
March 22, 1985

The above message was written just before the Administrative Committee Meeting, which was held in Chicago on March 26, 1985. Because some far reaching decisions were made at that meeting, a brief postscript to my original message to inform the membership of these changes is in order.

The AdHoc committee, referred to above, presented to AdCom a very thorough review of the various fields of interest we are now involved in and where papers in these fields are published. Without going into detail in this brief note, it was clear that there appears to be a lack of an appropriately focused publication vehicle inside or outside the IEEE for either Ferroelectrics (the commercial journal "Ferroelectrics" is prohibitively expensive) or Frequency Control. To channel papers in those subjects on a regular basis into our Transactions, an appropriately encompassing name change seems needed. AdCom, after some discussion, decided to accept the committee's recommendation, and voted to change our name from "Sonics and Ultrasonics" to "Ultrasonics, Ferroelectrics and Frequency Control". This name will of course also appear on the Transactions. In addition, AdCom decided to "join the crowd" and change from a "Group" to a "Society" (we were one of only two "Groups" left in the IEEE, all the others are "Societies"). Hence, in the future we will be known as the "Society on Ultrasonics, Ferroelectrics and Frequency Control". These changes must now be submitted to the IEEE Technical Activities Board (TAB), and by TAB to the Executive Committee of the IEEE for approval. This process has been started, and it is hoped that we will have all the necessary approvals before the end of this year.

Finally, a Bylaws change specifying the election procedure for AdCom members was

accepted, thereby implementing a previously approved Constitutional change to increase the elected membership on AdCom. This procedure is outlined in the following article.

H. van de Vaart
President
April 1, 1985

Bylaws Change

For several years the G-SU Administrative Committee has had two concerns about its own make-up. First, despite nearly one-third of our membership residing outside the US and Canada, it has been nearly impossible to get a nominee from for instance Europe or Japan elected to AdCom membership. Second, while the number of ex-officio members has increased over the years due to our increased activities the number of elected members has remained the same, resulting in an imbalance between the number of ex-officio members and elected members. To correct both problems, AdCom voted at its last meeting to increase the number of elected members from 9 to 12 (four to be elected each year instead of three), and to specify in the Bylaws a mechanism to insure that each year at least one member is elected who resides outside North America. The relevant revised sections are printed below for your information. The underlying Constitutional changes (together with other changes, see the President's message) are presently going through the IEEE review and approval process, and the complete revised Constitution will be published in the Fall '85 Newsletter for membership approval. The complete revised Bylaws will be printed in the Spring '86 Newsletter.

AdCom Makeup. Article 5, Section 5.1 of the constitution provides that the AdCom shall consist of 12 elected members, of which at least 3 must be from regions 8 through 10, plus not more than 15 ex-officio members. Article 7, Section 7.1 provides that a quorum shall be nine members, without distinction between elected members and ex-officio members, and that all members shall have an equal vote. Unless otherwise provided, a majority vote of the members attending an AdCom meeting shall be sufficient for the conduct of its business.

Nomination of Members. A slate of nominees for vacancies on the AdCom shall be prepared by the Nominations Committee for presentation of the AdCom at its Spring meeting. The number of nominees shall be at least six from regions 1 through 7 and at least two from regions 8 through 10, and proper consideration shall be given to technical interest. A Nominating petition carrying at least 25 names of Society members places that nominee automatically on the slate to be presented by the Nominating Committee to the AdCom. Nominees can also be presented from the floor by members of AdCom. A simple majority vote will place the nominee

on the ballot. All nominees must be members of the Society in good standing at the time of nomination.

Election of Members. The election to fill forthcoming vacancies on the AdCom shall be by mail ballot to the entire Society membership. To ensure representation from regions 8 through 10, each member shall vote for three nominees from regions 1 through 7, and for one nominee from regions 8 through 10. The deadline for the return of the ballots shall be not less than 30 days after the actual date of mailing of the ballots. Distribution, collection, and counting of ballots shall be done by IEEE Headquarters. Election shall be based on the highest number of votes, taken in descending order for the candidates from regions 8 through 10. Ties shall be broken by the AdCom. The Chairman of the Nominations Committee shall insure an orderly progression and completion of the election procedure prior to the last scheduled AdCom meeting of the year.

Nominations Committee Report

A slate of candidates for the 1986 - 88 term on the GSU Ad Comm is proposed below. All candidates are IEEE and GSU members.

Dr. Jeffrey S. Schoenwald
Rockwell International
Thousand Oaks, CA

Dr. R.W. Ralston
M.I.T. Lincoln Laboratory
Lexington, Mass.

Professor James Miller
Washington University
St. Louis, Missouri

Professor Colin Campbell
Mc Master University
Hamilton, Ontario, Canada

Professor Nobuo Mikoshiba
Research Institute of
Electrical Communication
Sendai, Japan

Professor Moises Levy
The University of Wisconsin
Milwaukee, Wisconsin

The nominations Committee has selected these candidates with an eye to balancing the Ad Comm representation in the areas of SAW, NDE, and Medical Ultrasonics. These areas will become under-represented with the departure of the class of 1985.

Ballots will be sent to G-SU members shortly. We have an outstanding slate of candidates. Consider each candidates qualifications and an area of representation and be sure and vote.

J.D. Larson, Chairman
Nominating Committee

1984 Ultrasonics Symposium

The 1984 Ultrasonics Symposium was held at the Dallas Hilton, Dallas, Texas on November 14-16, 1984. Of the 547 attendees, 147 traveled from outside the United States to attend this prestigious international meeting. Attendees were treated to outstanding technical and social programs and mild fall weather typical of north central Texas.

The Symposium consisted of an opening session featuring a plenary speaker, 39 regular technical sessions featuring 19 invited papers, and one poster session. Of the 287 papers presented, 130 were contributed from outside the United States, underscoring the international participation in this meeting.

The plenary session began with opening remarks by General Chairman L.T. Claiborne of Texas Instruments and Technical Chairman W.J. Tanski of Schlumberger - Doll Research. The following awards were presented by G-SU President H. van de Vaart:

- o The G-SU Achievement Award was presented to Prof. G.S. Kino of Stanford University.
- o The G-SU Best Paper Award was presented to R.F. Wagner, S.W. Smith, J.M. Sandrick, and H. Lopez of the National Center for Devices and Radiological Health for papers entitled "Statistics of Speckle in Ultrasound B-Scans," and "Low Contrast Detectability and Contrast/Detail Analysis in Medical Ultrasound," both of which appeared in the May 1983 Transactions on Sonics and Ultrasonics.
- o The 1984-85 G-SU National Lecturer is Dr. A. Ballato, U.S. Army Electronics Technology and Device Laboratory, whose lecture topic is "Frequency and Time Sources: Past, Present and Future."
- o IEEE Centennial Medal Winners:
R. Adler, Zenith Radio Corp.
G.W. Farnell, McGill University
G.S. Kino, Stanford University
B.R. McAvoy, Westinghouse Research Labs
T.R. Meeker, Bell Laboratories
W.D. O'Brien, Jr., University of Illinois
R.C. Williamson, MIT Lincoln Laboratory
H. van de Vaart, Allied Corporation

The 1984 G-SU President's Speaker, R.L. White, Department of Electrical Engineering, Stanford University, gave the plenary paper "The Stanford Artificial Ear Project."

The traditional first-evening reception attracted 400 attendees to a bountiful spread that included desserts and coffee, compliments of RF Monolithics, Inc. After a hectic day of technical activities, spirits were soothed by a flute and harp duet from the Southern Methodist University Music Program. The

atmosphere stimulated discussion (and debate) and that continued late into the evening.

The primary social event was the extravaganza at Big D Ranch, where 355 attendees were treated to dinner-theater type entertainment in the atmosphere of an 1880's Texas frontier town. The evening featured an authentic Texas barbeque dinner with an open bar, compliments of Andersen Laboratories, and entertainment by the Big D Revue, a polished Broadway-style dinner show. A country and western band and a roving magician rounded out the bill.

The spouse's program included free continental style breakfasts and attracted 15 participants who toured Dallas landmarks such as Southfork Ranch and the marvelous museums of our western neighbor, Ft. Worth.

The symposium was supported in part by 19 exhibitors who displayed their goods and services in a professionally managed exhibition. The two-volume soft-bound versions of the Proceedings have been issued, with hard-bound versions forthcoming. As usual, the participation was excellent, with over 95% of the presented papers appearing in the Proceedings. Due to an unfortunate series of oversights, the text of the President's Speaker's paper and the papers in poster session PB were left out. A third volume including these papers will issue shortly.

There were drawings for prizes given in the exhibitor area on two of the afternoons. The lucky winners and their prizes were the following:

Donald Lowcavage	TI-66 calculator
Gary Bandenburger	Binoculars
Michel Chomiki	Digital Alarm Clock
Hans Frederickson	TI-66 calculator
Paul Carr	Quartz watch
Richard Ralston	Digital Alarm Clock

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FUTURE ULTRASONIC SYMPOSIA

October 16-18, 1985
Cathedral Hill Hotel (formerly Jack Tar)
San Francisco, CA
General Chairman: W.R. Shreve

November 17-19, 1986
Williamsburg Conference Center
Williamsburg, VA
General Chairman: R.A. Moore

October 14-16, 1987
Sheraton Technology Center
Denver, CO
General Chairman: R.S. Wagers

1988-Chicago, Illinois
General Chairman: W.D. O'Brien Jr.

1989-Orlando, Florida

1984 Ultrasonics Symposium

SPECIAL PRESENTATIONS



G-SU ACHIEVEMENT AWARD TO G.S. KINO, PRESENTED BY R.S. WAGERS



G-SU NATIONAL LECTURER AWARD TO A.D. BALLATO PRESENTED BY H. VAN DE VAART



BEST PAPER AWARD ACCEPTED BY STEPHEN SMITH FROM H. VAN DE VAART



SPEAKER FOR THE PLENARY SESSION R.L. WHITE OF STANFORD UNIVERSITY

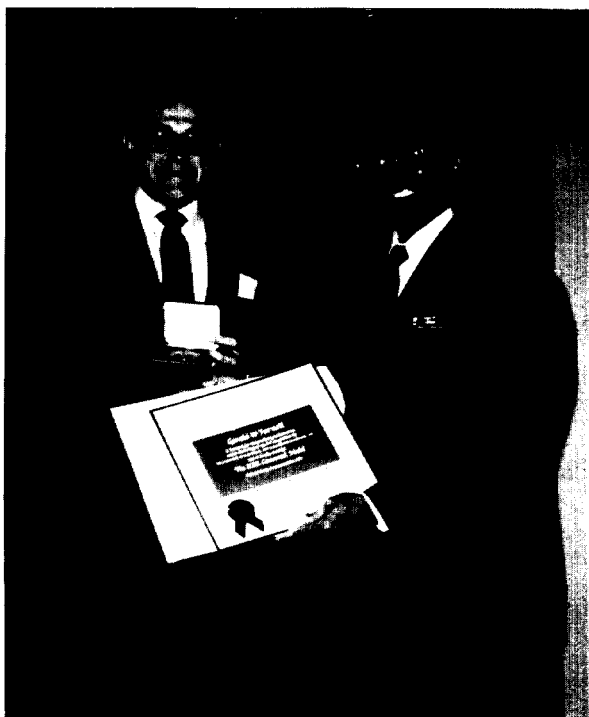
G-SU CENTENNIAL MEDALISTS
AWARDS PRESENTED BY S.H. DURRANI



R. ADLER



G.S. KINO



G.W. FARNELL



B.R. MCAVOY

G-SU CENTENNIAL MEDALISTS
AWARDS PRESENTED BY S.H. DURRANI



T.R. MEEKER



H. VAN DE VAART



W.D. O'BRIEN JR.



R.C. WILLIAMSON

Chapter Activities Reports

Tokyo Chapter

1. NATIONAL LECTURER IN TOKYO

A most delightful event for the SU Tokyo Chapter was the acceptance by Dr. Arthur Ballato of its invitation to speak in Japan as the G-SU national Lecturer in December 1984. Dr. Ballato presented 8 lectures in Tokyo, Kyoto and Sendai. His talks were very fruitful for us and were understandable even though he spoke in English without an interpreter. The photograph shows Dr. and Mrs. Ballato with Prof. Mikoshiba, Chairman of the Tokyo Chapter, after the Tokyo lecture.



2. THE SYMPOSIUM ON ULTRASONIC ELECTRONICS

The fifth Symposium on Ultrasonic Electronics was held December 4-6, 1984 sponsored by the SU Tokyo Chapter. Seventy papers were presented and 317 people attended; Dr. Ballato was one of the invited speakers. The proceedings of the Symposium will be published as a supplement of the Japan Journal Applied Physics.

3. TECHNICAL MEETINGS

The Tokyo Chapter held 11 technical meetings and 69 papers were presented in 1984 in conjunction with the Technical Group on Ultrasonics of the Institute of Electronics and Communication of Japan as follows:

DATES	PAPERS	PLACE
January 31	6	Kyoto
February 21	3	Tokyo
March 22	7	Tokyo
May 21	4	Tokyo
June 21	14	Tokyo
July 23	4	Tokyo
August 21	7	Yokosuka
September 28	7	Nagaoka
October 25	6	Tokyo
November 26	7	Toyohashi
December 13	4*	Tokyo

*Including IEEE Lecture by Dr. Ballato

Yasutaka Shimizu
Vice-Chairman
G-SU Tokyo Chapter

Boston Chapter

The Boston Chapter scheduled six technical meetings for the 1984-85 season. Four of the technical presentations are related by the common theme of acoustic-semiconductor interactions. Professor P. K. Das of Rensselaer Polytechnic Institute described nondestructive testing of semiconductors using surface acoustic waves. The technique uses the electric field associated with a SAW on LiNbO_3 to probe the surface of an adjacent semiconductor. Dr. S.W. Merritt of United Technologies Research Center discussed GaAs/SAW programmable tapped delay line technology. Here, a SAW on GaAs propagates through active field effect transistors, creating non-linear signals useful for signal processing applications. Professor M.J. Hoskins of the University of Illinois and Electronic Decisions Inc. told us about acoustic charge transport. This phenomenon combines features of both CCD's and SAW's, wherein the free charge is contained by the SAW potential wells and swept through the GaAs at the SAW velocity. At our May meeting, we plan to have a presentation on gap-coupled programmable transversal filters which use silicon on LiNbO_3 structures. We hope to continue this acoustic-semiconductor series next year with one presentation on thin film bulk wave transducers deposited on semiconductors and another on hybrid LiNO_3 - GaAs programmable transversal filters.

On the topic of frequency control, we scheduled two lectures. Dr. T.E. Parker of Raytheon Research explained various techniques for measurement of phase noise. He emphasized the problems that can befall even the most careful experimentalist in his quest for accurate noise measurements. We look forward to our April 3 meeting which will feature Dr. Arthur Ballato delivering the G-SU National Lecture entitled "Frequency and Time Sources - Past, Present and Future."

Nominees for Chapter officers for 1985-1986 are: Chairman, Joe Callera of Raytheon Research; Vice Chairman, Tom Szabo of Hewlett-Packard; and Secretary-Treasurer, Gary Montross of Raytheon Research. Elections will be held at the May meeting. I encourage G-SU members to contact a Chapter officer with your ideas for topics and speakers for future group meetings. Help us to continue providing you with stimulating and informative technical presentations.

Rick Webster
Chairman
G-SU Boston Chapter

Long Island Chapter

The Long Island SU Chapter held a joint meeting with the L.I. MTT Society and the L.I. Section February 20th at the Farmingdale campus of the Polytechnic Institute of New York.

Dr. J. Douglas Adam of the Westinghouse R & D Center in Pittsburgh gave a technical talk on magnetostatic wave devices. We went through the whole evening without seeing a single interdigital transducer. He showed a narrow band filter bank in which the channel bandwidth was controlled by the width of a single microstrip conductor. There were 29 attendees who identified themselves plus some shy people who didn't fill out attendance cards. A lively informal discussion followed the meeting. Douglas has a very understanding and gracious way of dealing with questions, and we are most appreciative of his efforts.

We are looking forward to a joint L.I. Section and SU Group meeting on March 20th at PINY, Farmingdale, Dr. Arthur Ballato, SU National Lecturer, will speak on Frequency and Time Sources - Past, Present, and Future.

We would like to have had a meeting on ultrasonic transducers with a speaker from one of the transducer material manufacturers. This would be helpful to the many workers in small companies on Long Island who make tooth brushes, cleaners, flow meters, liquid level meters, proximity sensors, and other products. We did not attempt it this year because we were unable to set up a means to contact these people.

Fred Freyre did a great job as program chairman. It was necessary to hold joint meetings due to a small number of active SU members. We also sent post cards to New York City and Connecticut SU members.

Dick LaRosa
L.I. SU Group Chairman

Baltimore-Washington-Virginia

This year we scheduled five technical meetings at a central location for our audience. On October 1, 1984, Dr. A. E. Clark of NSWC, MD gave a very good talk on magnetostrictive transducer materials. In the next talk on December 4, 1984, Dr. Boro Djordjevic of Martin Marietta showed a very interesting robotic C-scan operation of very large aerospace parts. Dr. V. Nedzelnitsky (of NBS) - the speaker and about 20 other dedicated I.E.E.E. members drove through snow and sleet on February 5, 1985 to attend an extremely informative talk on the ear and the hearing aids. This meeting was a joint meeting in collaboration with Acoustical Society of America. However, the last minute change in weather took some fun out for the people who could not make it. Considering the large geographical area our chapter covers, on the average (12) the attendance has been quite good.

We are looking forward to our next two talks -- "Frequency and Time Sources - Past, Present and Future" by national speaker, Dr. Arthur Ballato on April 2, 1985 and "Acousto-optic Devices for Microwave Applications" by Dr. Joseph F. Weller of NRL on June 4, 1985.

In summary, the year has been very successful and is moving very well for all our dedicated I.E.E.E. Sonics and Ultrasonics members.

Narendra K. Batra
Chairman

Santa Clara Valley

The following schedule of talks represents the spring activities for the G-SU Santa Clara Valley Chapter.

<u>DATE</u>	<u>SPEAKER</u>	<u>AFFILIATION</u>	<u>TOPIC</u>
February 20	Bob Addison	Rockwell	Non-Destructive Testing
March 20	Amin Hanafy	Acuson, Inc.	Transducer Technology
April 17	Arthur Ballato	U.S. Army	Frequency & Time Sources
May 15	Waguhi Ishak	Hewlett Packard	Surface Acoustic Waves

Alan Selfridge
Chairman

CHAPTERS REPORT

Special features and results of IEEE SU chapter activities recently have come to my attention of which I feel the membership should be aware. One point is that the Group Administrative Committee is more and more recognizing the contribution of chapters to total Group well being. One way of tangibly recognizing the chapter efforts is by holding the chapter presidents' luncheon during each year's Ultrasonics Symposium. The concept of the luncheon grew out of the Atlanta Symposium in 1983 with a chapter president's breakfast. At the Dallas Symposium the breakfast became a luncheon and included more of the Group Officers along with the chapter presidents. The Administrative Committee feels that it is only with this level event that the value of the chapter is properly recognized. Chapter presidents or their alternates should make plans to be at the Chapter Presidents' Luncheon this fall at the San Francisco Symposium.

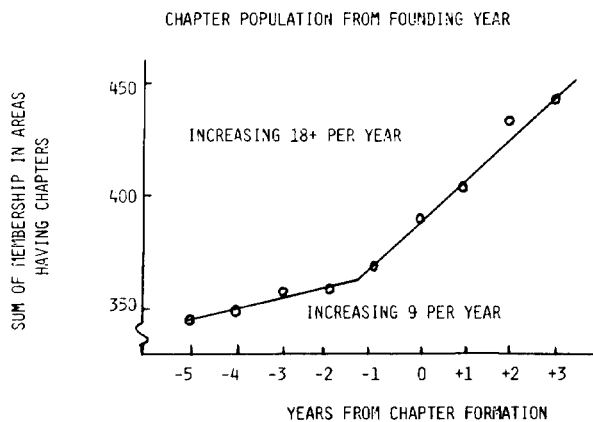
Some tangible evidence of the value of chapters to total group membership is illustrated by the following chart. The IEEE headquarters in New York was very helpful in providing me with Group membership statistics from 1971 through 1984. From 1971 through 1984, total membership increased by 66%. Groups with chapters increased 73.5% over the same

period. The same statistics for the U.S. only is 52% and 66%, respectively. Though this is a little more dramatic, it still does not tell the full story. In fact, you might expect areas with chapters to increase more rapidly in membership than the total membership since chapters are naturally in areas active in sonics and ultrasonics. To see the real value of chapters to membership it was necessary to chart SU membership in areas that have chapters with reference to their founding dates. When this is done and the sums of memberships in areas having chapters is taken, the chart below is obtained. Note only that new Tokyo chapter is not included in a membership history after founding. Note that the sum of chapter memberships referenced to their founding dates increases by twice the rate after founding than more than a year before. The fact that the higher rate of membership growth begins at founding year minus one suggests that from the time the organization which is to become the chapter becomes active the membership is benefiting.

While charting chapter membership, areas with significant membership which do not have a chapter were also noted. The following table suggests there are areas of opportunity. Several of these areas have SU membership populations larger than all but our largest chapters and certainly sufficiently large to support a chapter. Anyone interested in forming a chapter or who knows of someone else who might be interested in forming a chapter is invited to call or write me at (301) 765-4027 or Westinghouse DEC, P.O. Box 746, MS 335, Baltimore, MD 21203.

Philadelphia - 38	Dallas - 40
Chicago - 58	Seattle - 34
Houston - 31	NYC - 45

R.A. Moore
Committee Chairman



For any who are in the areas served by our chapters a list of contacts is given below.

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FREQUENCY CONTROL SYMPOSIUM

The 39th Annual Frequency Control Symposium will be held May 29-31, 1985 at the Marriott Hotel in Philadelphia, PA. Approximately 80 papers will be presented covering the topics of acoustic (BAW and SAW) resonators and filters, atomic and molecular frequency standards, and various other aspects of frequency control. This meeting has served for many years as the leading technical conference addressing all aspects of frequency control and precision time-keeping. Further information concerning the Frequency Control Symposium can be obtained from the address shown below.

Frequency Control Symposium
Rd 1, Box 352
Brinley Plaza, Route 38
Wall Township, N.J. 07719

News and Views

S. H. Durrani, Director, Division IX

I would like to address two issues and invite your comments. Please forgive me if I don't respond to you individually; I tried to do so last time and it quickly became too much to handle!

Election Procedures

Some of you may recall a question I raised last summer regarding multiple vs single nominations for the two top offices in the Institute (President-Elect and Executive Vice President). To refresh your memory, the procedure is as follows: The IEEE Nominations and Appointment Committee presents several names to the Board of Directors; additional nominations can be made from the floor; and the Board selects the names to be placed on the ballot for these offices. The bylaws allow the Board to pick one or two names for each office (in addition to any other names put up by petition). The question was: does it help or hurt a volunteer organization like the IEEE to pit two highly qualified candidates against each other.

I received about 45 responses, and a large majority (almost 2:1) favored single nominations. I presented the results to the Board in its November 1984 meeting. but several Directors felt (rightly so) that the sample was too small to draw any general conclusions. Also, some of them had heard from their local "constituents" to the effect that members should be "given a choice." Consequently the Board voted to name two candidates for each office. Since all nominees are highly qualified, we don't have any cause for concern this time. However, one wonders if we tend to give too much attention to a vocal minority at the expense of the silent -- or soft-spoken -- majority.

Finances and Dues

In recent years, several Societies have built up healthy financial reserves. Of course this did not happen by chance or by itself; they worked hard to get the income through publications and conferences, and then preserved the reserves through prudent management. Similarly, the general fund has built up a large reserve. However, the reserves held by Regions and Sections are much smaller.

In addition, many Sections -- both large and small -- are finding it hard to maintain normal activities because of increased costs and almost constant income. Their income primarily consists of a "rebate" sent by Headquarters, computed on the basis of number of members, meetings held, and certain other criteria. The average rebate is between \$3 and \$4 per member per year, compared to the basic annual dues of \$52.

Clearly the Sections need additional income, and the matter has been discussed by the Board of Directors on several occasions. In early 1984 the Board allocated about \$38,000 from the general fund to support needy Sections; later in the year it approved an additional \$90,000 for this purpose, this being the amount received by Headquarters as its share of surplus from the Electro conference. However, these are temporary measures, and the question is how to find a permanent remedy, assuming that costs are kept to a minimum and we still need additional income to support Sections and Chapters.

Several approaches have been proposed, some of which are highly controversial. Let me summarize a few and ask your opinion.

1. Allocate a fixed fraction of the basic dues -- say 10% of the \$52 -- to Sections. The drawback: this will reduce the amount left over for other services, which will have to come from the general reserve.


2. Raise the basic membership dues by say \$2, and allocate the entire increased revenue to Section. Counterpoint: Are Sections the only entity needing support? How about the needs for additional funds to support Professional Activities in Regions 1 thru 6 (U.S.A.), where a \$2 increase is also being suggested? Should the dues be increased by \$4 in these regions, and if so, is that too high an increase?

3. Take a part of the Society reserves and give it to Sections. Counterpoint: This is like robbing Peter to pay Paul. The Societies worked hard to build up their reserves, and no money should be taken away from them arbitrarily.

4. Take a certain fraction of the surplus from each successful conference (or a fraction of the surplus above a certain threshold), and give it to Sections. Question: Does it mean penalizing success? And who will come to the aid of Societies if they start losing money?

5. Help the Sections help themselves, through joint activities with Societies. For example Societies can offer financial and administrative cosponsorship of conferences and short courses to Sections. Similarly, Societies can assist Sections and Chapters in better serving the members, e.g., by providing Distinguished Speakers at no cost, or by partially reimbursing the expenses of Chapter meetings.

My preference is for the last approach, because I believe self-help is the best help! Moreover, I have a high regard for the capabilities of Section leaders; given the freedom to experiment and proper motivation, I am sure they will come up with many innovative ideas for new revenues. I also believe Societies are ready to help whenever a specific request is made by a Section or Chapter. What we need is a concerted effort to develop a few pilot projects and show what can be done.



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IEEE publications are a prime source of new information. At a very low cost, they help you to learn about important new subject areas, to apply new methods and new devices in your work — to meet the rapidly changing demands of your profession. IEEE members are entitled to purchase one copy of each publication at the member rate (M). Additional copies are at the non-member rate (NM).

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Please remember that the delivery of the hardbound copies of the Proceedings is several months after the distribution of the softbound volumes. The binding process is separate from and slower than that for the soft edition. Thank you for your patience.

B.R. McAvoy
Editor, Ultrasonics
Symposium Proceedings

ADCOM ROSTER

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Ultrasonics, Ferroelectrics and Frequency Control

Sounds Like A Winning Combination

AdCom Briefs

The Fall G-SU AdCom meeting was held November 13, 1984 a day preceding the Ultrasonics Symposium in Dallas Hilton, Dallas Texas. AdCom members were privileged enough to enjoy southern hospitality Texas style. The President Herman van de Vaart called the AdCom meeting to order at 1:00 p.m. and introduced the newly elected AdCom members who will serve from 1/1/85 to 12/31/87. They were D.L. Hecht and R.M. White. Also elected for the same period was J.S. Heyman, who was unable to attend this meeting.

A great deal of interest focused around expanding the field of interest for G-SU. AdCom is considering expanding the role of the Transactions so they will include topics from Frequency Control and Ferroelectrics. R.C. Williamson mentioned that as far as the Frequency Control is concerned, the charter already exists for publishing material on quartz crystal oscillator. Atomic and Molecular Frequency Control is a major extension. Ferroelectrics is beyond the present charter for the Transactions. B. McAvoy urged that the AdCom act relatively quickly and have a position by the next AdCom meeting. H. van de Vaart requested that the committee consisting of R.C. Williamson, A.D. Ballato, C.E. Land, T.E. Parker, and R.M. White have a report for the next AdCom meeting.

H. van de Vaart presented highlights of the Spring TAB meeting which was held in Boston, Massachusetts on May 15, 1984. The first item of interest was TAB endorsement that the 1985 Student Society membership fees be set at 50% of the regular Society membership fee. Another item of interest was TAB OPCOM proposition that there be a charge for the expenses incurred resulting from the withdrawal or modification of papers after the start of publication. This measure was defeated by TAB because in some circumstances it was out of the control of the author. There was also some discussion to have the Society Vice President attend the TAB meetings especially from those Societies whose Presidents serve only for one year. Since TAB already had 50 to 55 members, no formal agreement was passed. However, if one of the Presidents made a request, he or she could have the Vice President attend. Also discussed was whether a Society could request that TAB allow the appointment of a permanent representative rather than Society President. This recommendation is under future study. However, several people on TAB feel that only Society Presidents can vote, and the President may appoint his representative for each meeting but not a permanent member. Another topic of interest was the Fellow-Election Procedure. Mr. R.F. Lawrence, Division VII, Director and former president of the Power Engineering Society is chairing a Adhoc Committee on this subject. This committee will investigate apparent disparities between rating of candidates by the IEEE Fellow Committee and the individual Society Fellow Evaluators/Committee. The final topic was

Society name changes. The Quantum Electronics and Applications Society will change its name to the Laser and Electro-Optics Society. And the Electrical Insulation Society will become the Dielectric and Electrical Insulation Society.

The G-SU treasury will be put into the newly established T-Bill Society Investment Plan. No savings account or checking account is required under this plan. G-SU funds would be given the greatest return on its investment in this plan.

S. Wanuga presented the status of the Transaction on Sonics and Ultrasonics. For 1985, there will be two special issues. The first will be in March and it will be entitled "Acoustic Microscopy." The second special issue is entitled "SAW Convolver and Correlators" and it will be the July issue. For 1986, S. Wanuga is seeking guest editors. Topics under consideration are "Acousto-Optics Interactions" and "Acoustic Sensors." As a final topic, S. Wanuga announced that as Editor-in-Chief, his last Transactions on Sonics and Ultrasonics will be the July 1985 issue. H. van de Vaart thanked S. Wanuga for doing a good job for over twelve years as editor. H. van de Vaart thought the special issues were excellent. Other areas for future special issued are Ferroelectrics, Non Destructive Testing (NDT) and Frequency Control. H. van de Vaart will find a replacement for Editor-in-Chief for the Transactions.

G. Farnell presented a list of forthcoming Ultrasonics Symposia and their General Chairman. They are: 1985 San Francisco, W.R. Shreve; 1986 Williamsburg, R.A. Moore; 1987 Denver, R.S. Wagers; 1988 Chicago, W.D. O'Brien; and 1989 Orlando, H. van de Vaart. For 1990 both Boston and Montreal were suggested, although some people felt 1990 should be on the West Coast.

B. McAvoy presented his Ultrasonics Symposia Proceedings Report. For 1985, he expects to have a surplus that is close to previous years. Both the 1985 Ultrasonics Symposium budget and Proceedings Budget were unanimously approved.

In regard to Exhibits with the Symposia, everyone felt that it added a good dimension for the Symposia and that they should be continued. LRW Associated will be responsible for running the exhibits for the Ultrasonics Symposia in 1986 and 1987.

The final report for the 38th Annual Frequency Control Symposia and the preliminary budget for the 39th Annual Frequency Control Symposium were presented by T.E. Parker. The budget was approved by AdCom. H. van de Vaart also noted that the General Chairman and the Technical Program Chairman for the Annual Frequency Control Symposium should be appointed by the administrators. The administrators are the President of G-SU and the Director of U.S. Army Electronics Technology and Device Laboratory.

The activities of the G-SU Ferroelectrics Committee was presented by W.A. Smith. The Spring Ferroelectrics Committee Meeting was held in Pittsburg, PA on April 29, 1984. For the 1986 International Symposium on Application of Ferroelectrics (ISAF), the Ferroelectrics Committee plans to publish either a full proceeding or a technical digest of paper in accordance with IEEE guidelines. The Ferroelectrics Committee felt there was no accessible Ferroelectrics publication. They were considering starting a new IEEE Transactions or having the present G-SU Transactions broaden the scope and name to include Ferroelectric work.

The Division IV Director, S.H. Durrani, presented the IEEE electron results where Dr. Bruno O. Weinschel was elected for 1985 President-Elect of the IEEE. Also Merlin Smith was elected Executive Vice President. S.H. Durrani pointed out that there are many things in the IEEE Professional Activities Field that one might get involved in such committies like Telecommunication Policy, Research and Development, and Environmental Quality. S.H. Durrani stated in general Societies are doing well financially. Unfortunately, the Sections are not doing well. This problem is presently being investigated by the IEEE. As a final request, S.H. Durrani asked that G-SU consider changing its name to a Society. Other activities discussed were Newsletter - F. Hickernell, Journal on Light-wave Technology - D. Hecht, Membership - W.J. Tanski, Awards - R. Adler, Chapter - R.A. Moore, Fellowship - G.S. Kino, Nomination/Elections - J.D. Larson, Technical Activities - A.D. Ballato, National Lecture - R.A. Moore and New Business - H. van de Vaart.

The final event for the meeting was the acclamation to re-elect H. van de Vaart as President and B. McAvoy as Vice President. The next regular meeting of the AdCom will be held on March 26, 1985 at the Holiday Inn O'Hare/Kennedy in Chicago, Illinois.

Reynold S. Kagiwada
Secretary - Treasurer

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 paper entitled "Terms and Definitions for SAW Devices" has been submitted to Steve Wanuga for review and publication in our transactions. This action follows the recent format of TAC subcommittees in publishing work that is up for revision or for submission to the IEEE Standards Board. Responses from our readers will be incorporated by the subcommittee into the version sent to the Standards Board. This subcommittee, and its chairman, are to be commended on the rapidity and thoroughness with which they completed the job. Standardization work, unfortunately often proceeds at a glacial pace.

3. Ultrasonics in Medicine - F.W. Kremkau

The subcommittee met in Dallas in November and discussed the progress of the measurement guide. It is planned to expand the membership further to twelve people.

Work on the "Measurement Guide" (P790) is progressing. The following have been received.

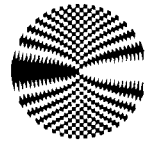
<u>section</u>	<u>contributions</u>	<u>authors</u>
hydrophone	18	13
radiation force	12	10
thermoelectricity	1	1
calorimeter	0	0
optics	2	2
cavitation	5	4
degassing	8	8
Total	46	33*

*Some authors contributed to more than one section.

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**IEEE 1985
ULTRASONICS SYMPOSIUM**



OCTOBER 16-18, 1985
CATHEDRAL HILL HOTEL, SAN FRANCISCO, CA.

* * * * *

The Editor thanks Liz Ewing for typing the manuscript for this edition of the newsletter

IEEE 1985 Ultrasonics Symposium

GREETINGS FROM SAN FRANCISCO!!

Preparations for the 1985 Ultrasonics Symposium at the Cathedral Hill Hotel in San Francisco are progressing rapidly. The conference will be held from Wednesday, October 16, through Friday, October 18. Because the Symposium is in October this year, not November as it has been the past two years, the deadlines for abstract submission, hotel registration and advance registration are correspondingly earlier. I think the earlier time frame is justified; October is one of the best times of the year in San Francisco. Please note these dates so you are not disappointed -- June 7 is the deadline for receipt of abstracts, September 15 is the deadline for advance registration and also the date the hotel will release the block of 350 rooms reserved for us. Make your reservations and plans early. An advance registration form and hotel registration form are reproduced in this newsletter for your convenience.

John Larson, Technical Program Chairman, and his Program Committee are organizing the three days of technical sessions to include a plenary speaker, 20 invited speakers, and 230 contributed papers. We will run four parallel oral sessions and one poster session with no parallel activity. Exhibits are also included as they have been in past years.

We have contracted with United Airlines to provide discount airfares to San Francisco from anywhere within the continental U.S. See the accompanying article for details.

If you plan to vacation in San Francisco, we are setting up a program for attendees and guests that will let you see why San Francisco is renown for its variety and splendor. As well as the guests' program during the technical sessions, we are planning a Saturday tour of the wine country and other surprises that are not firmed up yet. Come to the Symposium and stay to enjoy the Bay area. I look forward to seeing you here.

William R. Shreve
General Chairman

UNITED AIRLINES OFFERS SAVINGS ON TRAVEL TO SAN FRANCISCO

United has joined with the IEEE ultrasonics Symposium to offer special airfares, not available to the general public when you attend the symposium in San Francisco and travel between October 12, 1985 and October 22, 1985 inclusive.

To obtain a 35% discount from the unrestrictive Day Coach fare OR a 15% discount from the Easy Saver fare (requiring a Saturday night stay), whichever is lower depending on your dates of travel, simply follow these easy steps:

1. Call United toll-free at 800-521-4041, Monday through Friday, 8:30 a.m. to 8:00 p.m. Eastern time.
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5. In the current competitive "air fare war" there may be some sporadic and shortlived discounted fares from specific cities to San Francisco. These fares have restrictions and are limited. Please be sure to ask United's Convention Specialists to assist you in determining if your travel plans meet these specific restrictions.

Seats are limited, so CALL EARLY for best availability. Fares are guaranteed at the time of ticket purchase. Why not call today!

GET TO KNOW THE BAY AREA

San Francisco is everyone's favorite city for reasons as numerous as the people who visit her. The following tours sample the tradition, color, and elegance of this famous port and her spectacular surroundings to allow guests to form their own description of the City by the Bay.

SAN FRANCISCO SIGHTSEEING & ALCATRAZ TOUR

Wednesday, October 16, 8:30-4:30

This morning the group will take a sightseeing tour starting at the Cathedral Hill Hotel which will feature the major sights and attractions of San Francisco, including Twin Peaks, Golden Gate Park, the Cliff House, the famed Golden Gate Bridge, the Fisherman's Wharf area, Nob Hill, and Chinatown.

The group will then enjoy a lovely lunch at Maxwell's Plum, a magnificent restaurant at Ghirardelli Square noted for its ambience, its cuisine, and its breathtaking views of the Golden Gate.

After lunch, members of the group will board the ferry for the brief bay crossing to Alcatraz Island, best known as the former

(1985 Symposium Continued)

federal prison. The fascinating walking tour of the island's grounds and prison is conducted by the National Park Service.

Following the tour of "the Rock," tour members will be returned to their hotel by approximately 4:30 P.M.

Features of the tour:

- * Lunch at Maxwell's Plum
- * Full sightseeing and admissions as outlined
- * Full ground transportation
- * CTC guide service
- * All applicable taxes and tips

Per Person Price: \$42.00

WOODSIDE, ALLIED ARTS &
STANFORD UNIVERSITY TOUR

Thursday, October 17, 8:30-4:30

This morning the group will take the leisurely drive to Woodside for a tour of Filoli, a spectacular estate built early in the century which is pictured in the television series "Dynasty." After the group is guided through the lower floor of the mansion, there will be ample time to stroll through the extensive gardens.

Following a tour of Filoli, the group will travel to Menlo Park for lunch at the Allied Arts Guide which also has lovely grounds as well as specialty shops on the property.

The group will then take an abbreviated driving tour of the Stanford University Campus and make a stop at Sunset Magazine prior to transferring back to San Francisco, with arrival at approximately 4:30 P.M.

Features of the tour:

- * Lunch at the Allied Arts Guild
- * Full sightseeing and admissions as outlined
- * Full ground transportation as outlined
- * CTC guide service
- * All applicable taxes and tips

Per Person Price: \$36.00

PACIFIC HEIGHTS, CHINA TOWN &
MUIR WOODS TOUR

Friday, October 18, 8:30-4:30

This morning the group will take a tour of some of the most beautiful victorians and mansions in San Francisco's prestigious Pacific Heights districts, an exclusive residential area overlooking the Golden Gate.

Following a docent tour of the Haas Lilienthal House, one of the finest examples of Vistorian architecture in the city, the group will tour the Whittier Mansion, presently

the home of the California Historical Society.

The tour will then continue to exciting Chinatown, the largest Chinese community outside of the Orient. Tour members will enjoy a gala luncheon banquet at the Empress of China, one of the most beautiful Oriental restaurants in the world. Following lunch, there will be ample time to shop at the stores along Grant Street for fine silk, jade and ivory goods.

The group will then drive across the famed Golden Gate Bridge for the scenic drive to Muir Woods, a national monument featuring ancient and towering redwood trees.

Afterwards, it is off to Sausalito, colorful community overlooking the bay which is known for its shopping and outstanding vistas of the Golden Gate.

The group will then return to the city, with arrival back at the hotel at approximately 4:30 P.M.

Features of the tour:

- * Lunch at the Empress of China
- * Full sightseeing and admissions as outlined
- * Full ground transportation as outlined
- * CTC guide service
- * All applicable taxes and tips

Per Person Price: \$46.00

WINE COUNTRY TOUR

Saturday, October 19, 8:30-5:00

This morning the group will cross the world renowned Golden Gate Bridge and travel through the scenic Marin headlands to the beautiful tapestry of the wine country.

Passing fabled hills and valleys, the group will first make a stop at the Sebastiani Vineyards, one of the oldest and largest family owned wineries in California. Following a private guided tour of this sprawling winery, and an introduction to the art and science of winemaking, the group will enjoy a selection of Sebastiani's fine wines in the tasting room.

The group will then enjoy an elegant lunch at the exclusive Sonoma Mission Inn.

Then it is off to the Napa Valley for another winery tour and wine tasting at a smaller winery along the historic Silverado Trail.

The group will then return to San Francisco via Vallejo and the Oakland Bay Bridge, with a stop at Treasure Island for a spectacular view of the city's skyline, with arrival back at the hotel(s) at approximately 5:00 P.M.

Per Person Price: \$35.00

IEEE 1985 Ultrasonics Symposium

ADVANCE REGISTRATION IEEE 1985 ULTRASONICS SYMPOSIUM

Attendees are encouraged to advance register for the Symposium to reduce lines at registration. Each registered attendee (except students) will receive a soft cover copy of the Proceedings. Additional copies of the Proceedings can be ordered at the conference.

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