

IEEE ULTRASONICS, FERROELECTRICS AND FREQUENCY CONTROL SOCIETY NEWSLETTER

Number 5, April 1988

EDITOR: Fred S. Hickernell



Gerry Farnell
UFFC-S President



Joe Heyman
Distinguished Lecturer

Frequency Control Symposium
Baltimore, MD
June 1-3

ISAF Symposium
Zurich Switzerland
Aug. 20 - Sept. 1

President's Message

Over many years Bruce McAvoy has contributed in many ways to the development of our Society, but the leadership he has shown as President during the past two years has been especially noteworthy. When many of us were showing panic with respect to the deteriorating financial position of the UFFC, he maintained a calm purposeful approach which has led us around this corner. Several new initiatives were introduced during his tenure which are bound to improve the quality and scope of the Society and the services it offers to its members. While he will no longer be our President, Bruce will continue his active roles on key committees and especially as the Editor of the Proceedings of the Ultrasonics Symposium. It is indeed a pleasure to thank him both for his past efforts on our behalf and his willingness to continue to work for the IEEE in general and the UFFC in particular.

The semi-annual meeting of the AdComm was held in Dallas on February 9, 1988 in conjunction with the first technical program meeting of the 1988 Ultrasonics Symposium and the last technical program meeting of the 1988 Frequency Control Symposium. It appears that the general financial health of the Society is gradually improving though our reserves are still well below the level recommended by IEEE Headquarters. The improvement comes through the intensive work done by the organizing committees of our symposia which has allowed them to finish with surpluses and from the increasing number of authors who are honoring the voluntary page charges for their papers published in the Transactions.

AdComm has been worried for some time about the backlog of papers which have been accumulating for the Transactions and about the resulting publications delays. It was voted to increase the number of pages to be published in 1989 by about 50% over the limit for 1988. Because of the financing formula for publications of the IEEE it is not possible to implement this increase before next year. There was also discussion of introducing a UFFC LETTERS section to the Transactions to allow the rapid publications of short significant papers. Bill O'Brien, Editor of the Transactions is studying the modalities of operating such a new section.

The total number of members of the UFFC Society declined last year by some 7%. Part of this drop may reflect the gradually changing technical interests of the Society which has seen some of the long-time supporters move out of the fields while the newcomers have yet to recognize the importance of the Society to our discipline through its publications, its major symposia, its regional and standards activities and its liaison role with other professional societies. It is hoped that all of our current members will make an effort to ensure that any of their colleagues who are working in, or publishing in, fields under the purview of the UFFC are encouraged to join us.

I am looking forward to working with all of you during the coming year in the promotion of our discipline.

G.W. Farnell
President UFFC-S

AdCom Briefs

The second AdCom meeting for 1987 was held on October 13, 1987 at the Sheraton Denver Tech Center, Denver, CO. Twenty-nine people attended this meeting. The highlight of the meeting was the election of Gerry W. Farnell as President and Jan Brown as Vice-President. The meeting was called to order by B.R. McAvoy, who introduced the newly elected members of AdCom, Nobuo Mikoshiba, Tom Parker and Rolf Weglein. Eric Cross was also elected but was unable to attend.

H. Van de Vaart presented the UFFC-S Operating Financial Statement. The good news is that periodical loss will not be as great as anticipated so that 1987 should show a surplus. He also presented his Basic Symposium Form for summarizing the Symposium financial statements. AdCom encouraged the symposia chairman to use this form.

R.A. Moore summarized the results of the AdHoc Committee on Finance and Operation. The committee recommended the formation of a Long Range Planning Committee and a Finance and Operations Committee. AdCom approved the formation of a Long Range Planning Committee to be chaired by the Vice President. AdCom also approved the formation of the Finance and Operations Committee. B. McAvoy then appointed H. Van de Vaart the chairman of this committee.

H.L. Salvo's membership report pointed out that UFFC-S had a net loss of 128 members. This was due to the fact that 355 members did not renew their membership. The former UFFC-S members will be contacted and asked why they dropped out of the society.

M.A. Breazeale talked about the various places he planned to present his Distinguished Lecture.

W.D. O'Brien presented his report about the UFFC-S Transaction status for 1987 and 1988. He pointed out that because of the page limitation the backlog is constantly growing.

R.H. Tancrell reported on Jean-Pierre Monchalin receiving the 1986 "Best Paper" award, for his paper on "Optical Detection of Ultrasound". He also talked about Thrygve R. Meeker receiving the 1987 "Achievement Award", for "pioneering contributions, ranging from concept to practical implementation in the fields of bulk wave resonators and dispersive delay lines; and diligently pursuing standards on piezoelectric crystals".

G.W. Farnell had various Ultrasonics Symposia Chairpersons report on their status. He said that he received a comprehensive proposal from H. L. Salvo for Baltimore in 1992. For the 1993 Ultrasonics Symposium, G.W. Farnell is soliciting an offshore site.

T.E. Parker presented the final report for the 41st Annual Frequency Control Symposium and the budget for the 42nd Annual Frequency Control Symposium which will be held in Baltimore.

A. Ballato presented a request from Peter Edmonds that UFFC-S AdCom support the IEC meeting in Philadelphia. This request was approved by AdCom.

Reynold S. Kagiwada
Secretary Treasurer

IEEE Ultrasonics, Ferroelectrics and Frequency Control Society

1988-89 Distinguished Lecturer Program

NDE IN AEROSPACE-REQUIREMENTS FOR SCIENCE, SENSORS AND SENSE

Joseph S. Heyman
NASA - Langley Research Center
Hampton, VA 23665

ABSTRACT

Nondestructive Evaluation (NDE) is the technology of measurement, analysis and prediction of the state of material systems, for safety, reliability and mission assurance. It is an old technology yet still in its infancy. The opportunities for research and application are great and the need demands national attention. Those of us in the field are witnessing an awakening of the engineering and management awareness to the importance of NDE. This is an exciting and dynamic time.

Although conventional NDE has been quite successful, it is generally based on correlative relationships which can be complex and multifaceted. Modern NDE depends on four factors - quantitative measurement science, physical models for computational analysis, realistic interfacing with engineering decisions, and direct access to management priorities. Quantitative relationships, the direction of advanced NDE, often lead to benefits such as reliable standards, prediction capability, and enhanced reliability with smart systems.

In this talk, aspects of aerospace NDE will be reviewed and recent advances discussed. The measurement focus will be on ultrasonics with generous case examples. Problem solutions to be highlighted include critical stress in fasteners, residual stress in steel, NDE in laminated composites, and three dimensional NDE laminography. As an example, a physical ultrasonics model of the solid rocket motor (SRM) will be discussed. The propagation model revealed information that explained the difficulty in using conventional time domain pulse techniques on the SRM. The model further identified that a frequency domain approach could successfully examine the buried bondlines. Experimental verification of the model will be presented as will comparisons with other NDE techniques.

BIOGRAPHY

Joe Heyman began his studies in English at Cornell University from 1961-63. He then went into the sciences and received an Honors B.A. in Physics from Northeastern University in 1968. His education included 5 years as a cooperative student at NASA Langley Research Center. He received an M.A. and PhD. in Physics from Washington University in 1971 and 1975 respectively.

He began working at NASA Langley Research Center in 1964. His first research area, radiation interactions with solids, resulted in a low energy ion accelerator for solar wind simulation. He developed the model and analysis for the Apollo Solar Wind Experiment and performed heavy ion implants to ion calibrate material for moon rock studies.

In 1971, he started the NASA Laboratory for Ultrasonics which has grown to a major NDE research center. He has over 15 patents primarily in the field of ultrasonics NDE and over 120 papers and presentations covering a broad area of measurement science such as particle detection in flowing fluids, acoustic spectroscopy and its calibration, transducers, high resolution acoustic phase monitors, NDE in composites, residual and applied stress measurement, and thermal NDE. In 1979, he was made an Adjunct Professor of Physics with The College of William and Mary and in 1985 was appointed by Governor Robb to the Hampton Roads Sanitation District Commission.

Dr. Heyman has received numerous awards including four IR-100 awards for his technology developments, the NASA Exceptional Service Award in 1979, the Arthur S. Fleming Award for Outstanding Federal Employee in Science in 1981, NASA Inventor of the Year Award in 1982, the NASA Technology Utilization Annual Award in 1979 and 82. He has also received the Federal Laboratories Award for Technology Transfer and the Langley Award for Leadership.

Dr. Heyman is a member of the IEEE, SEM, APS, SX and AAAS. He was an ADCOM member from 1983-7, local and general Chairman of the Ultrasonics Symposium (86,87), and has been Chairman of numerous NDE Symposia/Workshops. He may be reached at 804-865-3036.

He is currently Head of the Materials Characterization Instrumentation Section at NASA and is Program Manager of the Agency's Research in Advanced NDE. He lives in Williamsburg, Virginia with his wife, Berna and daughter, Laura and enjoys stimulating interest in measurement science in students and faculty.

42nd Annual Frequency Control Symposium

The 42nd Annual Frequency Control Symposium will be held on June 1-3, 1988 at the Stouffer Harborplace Hotel in Baltimore, MD. The Frequency Control Symposium is the leading international technical conference dealing with frequency control and precision timekeeping. Papers will be presented by some of the world's leading experts in the field. Authors for this year's program will represent 10 countries from Asia, Europe, and North America.

This is the first year since 1980 that the symposium will not be held in Philadelphia. In the future, the symposium will oscillate from the East coast to the West coast in alternate years. This year's location, the Stouffer Harborplace Hotel, is a brand new facility. It is situated in the newly rebuilt Inner Harbor area of Baltimore, with the world famous Aquarium and other activities close at hand.

The technical program will feature 82 papers, in 18 sessions (see Figure 1), on topics ranging from superconductivity to dielectric resonators to time coordination. In addition, there will be sessions on quartz crystal resonators and oscillators and rubidium and cesium frequency standards.

The symposium will begin with a plenary session at which three prestigious awards will be presented. The Cady Award is presented annually by the technical program committee to recognize outstanding contributions related to piezoelectric frequency control devices. This year the award recipient will be Dr. Baldwin Sawyer. The Rabi Award, which takes on special significance this year due to the passing of Nobel Laureate I. I. Rabi, is presented to recognize outstanding contributions related to fields such as atomic and molecular frequency standards, time transfer, and frequency and time metrology. This year's recipient is Dr. Gernot Winkler. The third award, sponsored by Sawyer Applied Research Products, is presented in honor of C. B. Sawyer for the most outstanding recent contribution to advancement in the field of quartz crystals and devices. The recipient of the C. B. Sawyer Memorial Award is selected by an independent committee and will be announced at the Symposium.

The highlight of the technical program will be a tutorial session on the evening of Thursday, June 2, 1988. The topic will be Noise. Two invited papers will be presented. The first is entitled "Noise Processes" and will be delivered by Dr. J. Barnes, a noted authority on noise processes in clocks. The second paper in the session is "Frequency Domain Characterization" by Dr. Percival. This paper will provide new insights into the subject as well as serve as a tutorial.

Several other invited papers are "High-Temperature Superconductivity -- Novel Concepts, Fundamental Issues, and Frequency Control Aspects" by G. Iafrate and T. Parker, "Advances in the Perfection of Cultured Quartz" by R. Laudise, R. Barnes, D. Stevens, and E. Simpson, "A New Measurement of the Basic Elastic & Dielectric Constants of Quartz" by B. James, "Dielectric Resonators" by P. Guillon, "Materials for Dielectric Resonators" by J. Mage, and "New Technology for Detection and Removal of Surface Contamination Involving Particulates or Water/Organic Materials" by S. Hoenig.

In addition to the technical program there will be a centralized products, equipment, and information exhibit area.

The annual banquet will be something special to remember. It will include dining and dancing on a cruise ship which will sail from the Inner Harbor. The dinner and cruise will take place on Wednesday, June 1, 1988.

Wed AM	Award Presentation Superconductivity and Frequency Control	
Wed PM	SAW/MSW	Cs Standards
	Oscillators	Piezoelectric Resonators
Thurs AM	Resonator Theory	Rb Standards
	Oscillators	Time Coordination
Thurs PM	Quartz Material	Dielectric Resonators
	Quartz Material	Precision Measurements
Thurs PM	Noise Tutorial	
Fri AM	Frequency Stability	Filters
	Resonator Processing	Synthesizers

Figure 1

Raymond L. Filler
Publicity Chairman

Acknowledgments

The editor wishes to thank all those who submitted articles and photographs for this issue of the UFFC-S Newsletter. Also a special thank you to Liz Rau for typing the manuscript. Articles of interest to UFFC-S members are welcome. For inclusion in the fall issue, please send by August 1, 1988, to Fred Hickernell, Motorola Inc., Government Electronics Group, 8201 E. McDowell Road, Scottsdale, Arizona 85252.

Nominations Committee Report

With the widened scope of the Society on Ultrasonics, Ferroelectrics, and Frequency Control, it is felt that the Ad Comm members should reflect the new mix of technical specialties encompassed in the Society. Specifically, candidates for the class of 1991 should include individuals able to represent the Frequency Control or Ferroelectrics positions.

The Nominations Committee dealt with the issue of re-balancing the Ad Comm to include more representatives from the Frequency Control and Ferroelectrics technical area, while providing representatives for the diverse technologies found in the traditional ultrasonics area.

Our solution is to run strong candidates in those areas which will not be represented during the term of office in question, and to continue to seek candidates to represent the Frequency Control and Ferroelectrics positions.

The following candidates were approved by the Ad Comm.

- | | |
|-------------------------------|-------------------|
| 1. Prof. Helmut Ermert | NDE |
| University of Erlangen | |
| Federal Republic of Germany | |
| 2. Dr. Andrea De Marchi | Frequency Control |
| University of Ancona | |
| Italy | |
| 3. Dr. Donald B. Sullivan | Frequency Control |
| National Bureau of Standards | |
| 4. Dr. Alister M. Glass | Ferroelectrics |
| 5. Dr. Gene Haertling | Ferroelectrics |
| University of Missouri, Rolla | |
| 6. Dr. Celia Yeack | NDE |
| IBM | |
| 7. Dr. James F. Greenleaf | Medical |
| Mayo Clinic | |
| 8. Prof. Donald Malocca | SAW |
| University of Florida | |

The election will be held in June with the results available at the Fall Ad Comm meeting.

John D. Larson
Chairman

President's Speaker

Dr. Simon Foner of the National Magnet Laboratory of Massachusetts Institute of Technology will be the President's Speaker at the 1987 Ultrasonics Symposium to be held October 3rd-5th in Chicago. The title of Dr. Foner's talk will be "The Impact of High Temperature Superconductors on Applications".

Standards Activities Report

1. Our society is currently responsible for seven items, four standards and three projects.
2. Piezoelectric Crystals - T. R. Meeker (176-1978)

Galley proofs of ANSI/IEEE Std 176-1987, IEEE Standard on Piezoelectricity have been returned to the Standards Office after review. The next step is printing, which should take place within the next month or so.
3. Ultrasonics in Medicine - F. W. Kremkau (P790)

The final version of the Medical Ultrasound Field Parameter Measurement Guide was approved by official ballot, and will be submitted to the IEEE Standards Board.
4. Time and Frequency - J. R. Vig

This new subcommittee will interface with the newly approved IEEE Standards Coordinating Committee (SCC) on Time and Frequency. The SCC is presently comprised of members from IM, MTT, and UFFC Societies.
5. Sensors - J. Schoenwald

This is a newly created subcommittee, chaired by Dr. Jeff Schoenwald; it is in the formative stage. One of its tasks will be to maintain liaison with other IEEE Societies' sensor standards group.
6. Surface Acoustic Wave Devices - E. A. Mariani (P1037)

The draft standard "Terms and Definitions for SAW Devices" will be coordinated with TC49/WG10 of the IEC.
7. Piezomagnetic Technology - S. L. Ehrlich (319-1971)

The revision of Standard 319 (Magnetostrictive Materials: Piezomagnetic Nomenclature) is getting under way. A new PAR will be submitted to the IEEE Standards Office.
8. Industrial Ultrasonics - E. P. Papadakis

Committee E-7 on Nondestructive Testing of ASTM has responded favorably to a UFFC-S Standard Committee letter calling for joint cooperation in the review of NDE standards. The matter is up for formal discussion and approval at their next Executive Committee meeting.
9. Ferroelectrics - A.H. Meitzler (180-1986)

Pyroelectricity and electrostriction are two areas under consideration for possible standardization work.
10. Acousto-Optics - D. L. Hecht (P1022)

A draft nomenclature standard is in preparation.
11. Delay Lines - A. A. Comparini

Presently inactive

Arthur Ballato
Chairman, Standards Activities

Chapter Activities

BALTIMORE, WASHINGTON AND NORTHERN VIRGINIA

The Baltimore, Washington and Northern Virginia Chapter has a program of 5 lecturers and one seminar scheduled for the 1987 - 1988 season. Our meetings are held every two months at the Holiday Inn - Calverton which is a central location for the Baltimore Washington metropolitan areas.

Our first program was held in October. The speaker was Dr. George Gilmour of the Westinghouse Oceanic Division of Annapolis, MD. His talk was titled "High Resolution Sonars." Dr. Gilmour's presentation described high resolution imaging sonars and the technologies involved in their development. The talk included pictures of actual sonar images of underwater formations.

In December our lecturer was Dr. Williams Hanson of Piezo Crystal company of Carlisle, PA. Dr. Hanson's presentation was "Quartz Resonators and Ceramic Actuators". The current status of precision quartz resonators for use in military - aerospace and industrial applications was reviewed. Dr. Hanson discussed some of the more critical device parameters such as; phase noise, vibration sensitivity and aging and the latest results in improving these characteristics. Also discussed were Ceramic Actuators for use in advanced laser and robotic technology for precise positioning.

The UFFC Distinguished Lecturer, Dr. Mack Breazeale of the University of Tennessee visited us in February. In addition to his national lecture on "Physics and Engineering Principles of Nonlinear Acoustics," Dr. Breazeale shared some of his remembrances of his visit to mainland China which he had visited just prior to our meeting.

In April we will be having a lecture on Acoustic Charge Transport devices. Dr. Daniel Fleisch of Electronic Decisions Incorporated of Urbana, IL has agreed to address our chapter. Dr. Fleisch has indicated that he will be describing the physics of ACT operation and current device architectures and performance. The talk will also include applications of ACT technology to military and commercial signal processing systems.

For the second year the Baltimore, Washington and Northern Virginia will be hosting a mini-course. This year the topic is Acousto-optic Signal Processing. The lecturers will be Dr. D. Mergerian of the Westinghouse Advanced Technology Laboratory and Dr. John Lee of the Naval Research Laboratory. The seminar will run approximately 6 hours including a dinner break. The seminar is designed to examine AO interactions in order to develop an understanding of the basic principles, the current limitations on the parameters of available AO cells, and to establish the types of signal processing functions which best lend themselves to AO implementation.

Harry L. Salvo, Jr.
Chapter President

SOUTHERN CALIFORNIA CHAPTER

The following four technical meetings have been held since the start of the new academic year:

1. Oct. 1, 1987 - "Image Processing and Holography with Incoherent Light" Professor Emmett Leith, The University of Michigan.
2. Oct. 12, 1987 - "Research on Acoustics at Nanjing University," Professor W.J. Wu, Nanjing University China.
3. Oct. 12, 1987, "New Sensor in Liquid Using Leaky SAW," Professor Toyosaka Morizumi Tokyo Institute of Tech., Japan.
4. Jan. 12, 1988 - "An Ultrasonic Touch - Sensing System for Computer Displays," Dr. Robert Adler, Zenith Electronics Corp., Illinois.

All meetings were well attended with an average audience of 40 persons. The audiences were well balanced, consisting of graduate students, faculty members, and industrial colleagues.

Chen Tsai, Chapter Chairman
University of California, Irvine
(714) 856-5144

ORLANDO CHAPTER

The Orlando Section is finalizing its spring program of meetings. The first meeting was held at the University of Central Florida and discussed the current research programs in acoustic devices at UCF, presented by D.C. Malocha. The second meeting will be in March with Mr. Gary Monnetti presenting "SAW Applications." Plans for Professor Collin Campbell of McMaster's University to speak in April are underway.

The Orlando Section had its annual awards banquet on February 20, 1988. Mr. Robert Smythe was nominated by the UFFC chapter as its Engineer of the Year and he also was chosen as the Section's Engineer of the Year. Congratulations are due to Bob for his many contributions in the areas of bulk wave devices, monolithic filters and frequency control.

D.C. Malocha
Chapter Chair

TOKYO CHAPTER

The Tokyo Chapter invited the UFFC National Lecturer, Professor M. A. Breazeale in December 1987. He presented several very impressive lectures on nonlinear acoustics and other topics in Tokyo, Sendai and Kyoto. Prof. and Mrs. Breazeale and several members of Tokyo Chapter enjoyed a shabu-shabu dinner.

The Tokyo Chapter sponsored USE 87 (the 8th Symposium on Ultrasonic Electronics) which was held in Tokyo December 8th - 10th. Eighty-three papers including the invited lecture by Professor Breazeale were given and more than 320 attended. Other technical meetings held during the past half a year were:

Date	Papers	Place
June 22 '87	8	Tokyo
July 23	6	Tokyo
Aug. 26	5	Tokyo
Sept. 21/22	12	Yamagata
Oct. 24	5	Tokyo
Nov. 30	7	Nagoya
Dec. 14	6	Tokyo*
Jan. 28 '88	10	Kyoto

*Professor Breazeale gave an invited lecture.

Our vice-chairman has changed and the officers for 1988 are:

Chairman: Prof. Noriyoshi Chubachi
Faculty of Engineering, Tohoku University,
Sendai

Vice-Chairman: Prof. Kenshiro Takagi
Institute of Industrial Science,
University of Tokyo, Tokyo

Secretary: Prof. Masatsune Yamaguchi
Faculty of Engineering,
Chiba University, Chiba

Treasurer: Prof. Tadashi Shiosaki
Faculty of Engineering,
Kyoto University, Kyoto

The Tokyo Chapter members discussed having the 1990 Ultrasonic Symposium in Hawaii and all agreed to cooperate to make it a success.

Kenshiro Takagi
Vice Chairman, Tokyo Chapter

Membership Report

As of December 31, 1987, the Ultrasonics, Ferro-electrics, and Frequency Control Society consisted of 2,183 members. This membership is broken down as follows:

88	Fellows
265	Senior Members
1,519	Members
124	Associates
180	Students
7	Affiliates

Members who are involved in conferences which would be of interest to persons in the ultrasonics, ferro-electrics and frequency control community are urged to have UFFC membership materials on display at their conference. These materials can be obtained from

Dr. Harry L. Salvo, Jr.
333 Gordon Avenue
Severna Park, MD 21146

In addition to conferences, this material is available to local chapters and any society members who need them.

We wish to welcome the following new members who joined the society during the second half of 1987.

Atlar, Abdullah	Holland, Mark R.
Barzi, Bita	Hsiung, Harry L.
Biernacki, John	Jung, Seung H.
Blakely, Barry A.	Kitapci, Aysin
Boska, Joseph M.	Kueng, Roland
Broadwin, Alan	Lewis, Gary K.
Brown, Stephen A.	Liaw, Jinnan J.
Bugajski, Paul R.	Mahant, Mukul C.
Burick, Ronald J.	Malm, J. F.
Burke, Eric G.	Metze, Armin
Cattley, David R.	Mostarshed, Shahriar
Chin, Ronny B.	Negahban, Shahab S.
Chu, Bright H.	Powers, Edward D. (Jr.)
Coates, Keven D.	Rezaeian, Mohamad H.
Coloma, Jorge	Robitaille, Michael A.
Coraielus, Jean L.	Roth, Patrick J.
Cotten, Whitworth W. (Jr.)	Schmidt, V. Hugo
Cronin-Golomb, Mark	Siegert, Joachim
Farine, Pierre A.	Staples, Edward J.
Fechner, Jimmy R.	Steyn, Robert L.
Ghazvini, Ali R.	Stone, Barbara A.
Goeking, Kent V.	Sullivan, Donald B.
Greenberg, Ralph D.	Swaminathan, K.
Grosse, Ralph H.	Tantiwiwat, Yutthana
Haley, Paul V.	Tehrani, Fleur T.
Hall, Maclyn S.	Temple, R. E.
Haman, Leo J.	Tseng, Ling-Yuan
Hoffert, W. J.	Ussery, W. Warren (Jr.)

IEEE UFFC-S Members Elected to Fellow Grade

Congratulations to the following members of the Ultrasonics, Ferroelectrics and Frequency Control Society who were recently elected to the grade of IEEE Fellow.

Professor James F. Greenleaf
Biodynamics Research Unit
Mayo Foundation
200 First Street, S. W.
Rochester, MN 55905

For contributions to the development
of advanced medical imaging.

Professor Nobuo Mikoshiba
Tohoku University
2-1-1 Katahira
Sendai 980, Japan

For contributions to the development
of physical acoustics and surface
acoustic-wave devices.

Mr. Robert A. Johnson
13222 Woodland Drive
Tustin, CA 92680

For contributions to mechanical
filters.

Dr. Leland P. Solie
EDI
1776 Washington Avenue
Urbana, IL 61820

For contributions to the development
of reflective array surface acoustic-
wave filters and multistrip filter
techniques.

Dr. Eric G. Lean
IBM Corporation
T. J. Watson Research Center
Post Office Box 218
Yorktown Heights, NY 10598

For contributions to the development --
and application of bulk and thin-film
acoustooptic anisotropic diffraction
devices and to optical probing of
acoustic surface wave nonlinear
effects.

Dr. Herman van de Vaart
Allied-Signal, Inc.
Post Office Box 1021R
Columbia Road and Park Avenue
Morristown, NJ 07960

For contributions to the field of
surface acoustic-wave delay line
technology.

They join the following list of Fellows for our UFFC-S Society. If you know of society members who would be qualified for this honor, consider nominating them. The fellow nomination forms may be obtained from IEEE headquarters by writing Dolores Wright, Staff Assistant, IEEE Fellow Committee, 345 East 47th Street, New York, N.Y. 10017-2394 or by calling (212) 705-7750. Fellow nominations are due at IEEE headquarters in April of each year. This year's deadline is April 30th.

IEEE Fellows Roster

0193904 LF 312-391-7871 ROBERT ADLER ZENITH CENTER 1000 MILWAUKEE AVE GLENVIEW IL 60025	0673319 F E A ASH IMPERIAL COLLEGE OF SCI & TECH LONDON SW7 2AZ ENGLAND	0457978 F 415-723-0264 B A AULD STANFORD UNIV HANSEN LABS STANFORD CA 94305	0916601 F 201-544-2773 A BALLATO 150 ATLANTIC AVE LONG BRANCH NJ 07740
0096289 LF LAURENCE BATCHELDER 983 MEMORIAL DR CAMBRIDGE MA 02138	0114595 LF 617-576-3141 L L BERANEK 975 MEMORIAL DR SUITE 804 CAMBRIDGE MA 02138	0368126 F D A BERLINCOURT 21 KENTON RD CHAGRIN FALLS OH 44022	5699079 F 212-643-4832 HENRY L BERTONI POLYTECH INST OF BKLYN 333 JAY ST BROOKLYN NY 11220
0841585 F 716-359-1000 J V BOUYOUKOS BOX 23447 ROCHESTER NY 14692	0830547 F C K CAMPBELL MCMASTER UNIV DEPT OF ELEC & COMP ENG 1260 MAIN ST WEST HAMILTON ONT CANADA L8S 4L7	5839907 F PAUL H CARR 178 OLD BILLERICA RD BEDFORD MA 01730	0439521 LF S D CHATTERJEE 91 BALLYGUNGE PL CALCUTTA 19 INDIA
5604327 F 02-966-1931 ZANG-HEE CHO KAIS PO BOX 150 CHONGYANGMI SEOUL KOREA	0227959 LF M CHODOROW STANFORD UNIV GINZTON LAB STANFORD CA 94305	0399295 LF 301 927-7681 H W COOPER 7211 WINDSOR LANE HYATTSVILLE MD 20782	0138941 LF 504-865-5785 JAMES A CROMVICH 101 COLONIAL CLUB DR MARAHAN LA 70123
7690035 F 814-865-1181 LESLIE E CROSS PENNSYLVANIA STATE UNIV MAT RES LAB UNIVERSITY PARK PA 16802	0172197 LF 415-723-0261 C C CUTLER GINZTON LAB STANFORD UNIV STANFORD CA 94305	0296665 LF 619-481-7049 LOUIS J CUTRONA 13339 BARBADOS WAY DEL MAR CA 92014	0239962 F 617-369-2087 RICHARD W DAMON 1623 MAIN ST CONCORD MA 01742
1349893 F 015-601901 S DUINKER CHAIRMAN EXECUTIVE BOARD AND CHIEF EXECUTIVE OFFICER OLDFELT GROEP NV/POB 72 2600 MD DELFT NETHERLANDS	6757868 F 217-333-3133 FLOYD DUNN UNIV OF ILLINOIS DEPT OF ELEC & COMP ENG 1406 WEST GREEN ST URBANA IL 61801	1521475 F 801-266-6959 E P EERNISSE QUARTEX INC 1020 W ATHERTON DR BLDG C SALT LAKE CITY UT 84123	0543041 F 514-392-4231 B W FARNELL 3480 UNIVERSITY ST MCGILL UNIV MONTREAL QUE CANADA H3A 2A7
3253051 LF 317-264-4508 FRANCIS J FRY LABSONICS INC 236 E WASHINGTON ST MODRESVILLE IN 46158	1319375 F 021-47-26-70 FRED E GARDIOL ECOLE POLYTECH FEDERALE 16 CH DE BELLERIVE CH 1007 LAUSANNE SWITZERLAND	0466342 F 415-328-8855 FLOYD H GARDNER 1755 UNIVERSITY AVE PALO ALTO CA 94301	3573664 F 602-582-7792 E J GLENNER GTE NETWORK SYSTEMS 2500 W UTOPIA RD PHOENIX AZ 85027
1317791 F 201-530-6622 E HAFNER 881 SYCAMORE AVE TINTON FALLS NJ 07724	0843532 F 212-705-7910 ERIC HERZ 14 MAGNOLIA DR RYE TOWN NY 10573	0130856 LF 714-629-7524 CHARLES F HORNE JR 844 HILLCREST DR POMONA CA 91768	0160507 LF 03-448-2001 HASARU IBUKA SONY CORP 7-35 KITASHINAGAWA- 6 CHOME SHINAGAWA-KU TOKYO JAPAN
0148486 LF 02-881622 F H INGERSLEV THE ACOUSTICS LAB THE TECHNICAL UNIV OF DENMARK 2800 LYNGBY DENMARK	0307181 LF 609-924-5539 E O JOHNSON 231 SNOWDEN LANE PRINCETON NJ 08540	6957658 F 0764-41-1271 YUKIO KAGAWA NATIONAL UNIV OF TOYAMA DEPT OF ELEC ENG TOYAMA TOYAMA 930 JAPAN	0278366 F 602-963-3694 IRVING KAUFMAN ARIZONA STATE UNIV DEPT ELEC & COMP ENG TEMPE AZ 85281
3608890 LF 0425-91-5111 MISAO KIMURA 2-1-1 HODAKUBO HINO SHI TOKYO 191 JAPAN	0594747 F 415-497-0205 GORDON S KING STANFORD UNIV-GINZTON LAB 9 W M HANSEN LABS STANFORD CA 94305	5651922 F 319-353-5856 A KORPEL THE UNIVERSITY OF IOWA DIV OF ELEC & COMP ENG IOWA CITY IA 52242	0259499 F 516-351-4342 R LA ROSA 317 OAK ST SOUTH HEMPSTEAD NY 11550

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1021765 F 518-266-8031 JAMES D MEINDL PROVOST & VP FOR ACADEMIC AFF RENSSELAER POLYTECH INSTITUTE TROY NY 12181	IEG 4	0829119 F 313-32-31259 A N MEITZLER 3055 FOXCROFT ROAD ANN ARBOR MI 48104	IEG 4	5087911 F 03-201-0983 SHOTA MIYAIRI C/O DENKI GAKKAI 1-12-1 YURAKUCHO CHIODA-KU TOKYO JAPAN	IEG 4	0791202 F F R MORGENTHAUER M I T-RM 13-3102 A CAMBRIDGE MA 02139	IEG 4
0804500 F 215-895-2225 V L NEWHOUSE DREXEL UNIVERSITY BIOMEDICAL ENG INST PHILADELPHIA PA 19104	IEG 4	0131912 LF TATSUJI NOMURA 3 J SAKURADAI NERIMA KU TOKYO JAPAN	IEG 4	0855783 LF KANICHI OHASHI IMATSU ELECTRIC CO LTD 7-41 1-CHOME KUGAYAMA SUGINAM-KU TOKYO 168 JAPAN	IEG 4	0354308 LF 718-643-2111 A A OLIVER POLYTECHNIC INSTITUTE OF NY 333 JAY STREET BROOKLYN NY 11201	IEG 4
5017058 F BERNARD PICINBOND LAB SIGMAUX & SYS ESE PLATEAU DU MOULON 91190 GIF YVETTE FRANCE	IEG 4	5782446 F 516-345-4266 VELJKO RADEKA BROOKHAVEN NATL LAB UPTON NY 11973	IEG 4	0158188 LF J A RAJCHMAN 268 EDGERSTOUNE RD PRINCETON NJ 08540	IEG 4	0396192 F 215-895-2224 JOHN M REID BIOMEDICAL ENG & SCI INST DREXEL UNIV PHILADELPHIA PA 19104	IEG 4
0236869 LF 914-738-2266 PAUL ROSENBERG PO BOX 729 LARCHMONT NY 10538	IEG 4	6578827 F 617-681-6920 ROBERT L ROSENBERG AT&T BELL LABS ROOM 2F-29 1600 OSGOOD ST M ANDOVER MA 01845	IEG 4	0214841 LF M ROTM UNIVERSITY OF VERMONT DEPT OF EE BURLINGTON VT 05401	IEG 4	0224931 LF 301-953-7100 L J RUEGER 1415 GLENALLAN AVE SILVER SPRING MD 20902	IEG 4
5770334 F 040-5493710 K J SCHMIDT-TIEDENHANN PHILIPS FORSCHUNGS LABOR VOGT-KOLLN-STRASSE 30 2 HAMBURG 54 WEST GERMANY	IEG 4	0256503 LF 612-373-3345 O M SCHMITT 1912 CONDO AVE S E MINNEAPOLIS MN 55414	IEG 4	5996889 F 06151-162869 G M SESSLER TECH HOCHSCHULE DARMSTADT HERCKSTRASSE 25 61 DARMSTADT WEST GERMANY	IEG 4	0217042 LF GUSTAVE SHAPIRO 3704 MUNSEY ST SILVER SPRING MD 20906	IEG 4
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0753178 F 703-848-7559 C M STICKLEY THE BDM CORPORATION 7915 JONES BRANCH DRIVE MC LEAN VA 22102	IEG 4	5502737 F IKUO TANAKA 4-20-5 FUJISHIRO-DAI SUITA OSAKA 565 JAPAN	IEG 4	0200931 LF 315-456-2264 S W TEHOM 6056 PINE GROVE RD CLAY NY 13041	IEG 4	5991310 F 714-856-5144 CHEN S TSAI UNIV OF CALIFORNIA SCHOOL OF ENGINEERING IRVINE CA 92717	IEG 4
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0325589 F 201-932-3262 M MELKOWITZ 138 HIGHLAND AVE NETUCHEN NJ 08840	IEG 4	1309855 F 301-745-7264 LAWRENCE R WHICKER 1218 BALFOUR DR ARNOLD MD 21012	IEG 4	5073218 F R M WHITE EECS DEPT UNIV OF CALIFORNIA BERKELEY CA 94720	IEG 4	0897934 F 415-497-4949 BERNARD WIDROM 860 LATHROP DR STANFORD PALO ALTO CA 94305	IEG 4
RICHARD C WILLIAMSON MIT LINCOLN LAB RM C-317 PO BOX 73 LEXINGTON MA 02173	IEG 4	L T ZITELLI 770 NORTHAMPTON DR PALO ALTO CA 94303	IEG 4				

* * * * *



IEEE 1988 ULTRASONICS SYMPOSIUM



Monday-Wednesday, October 3-5, 1988
McCormick Center Hotel, Chicago, Illinois

Sponsored by The Ultrasonics, Ferroelectrics and Frequency Control Society

UFFC-S Society 1987-88 Distinguished Lecturer Report

The UFFC Society Distinguished Lecturer Mack A. Breazeale has had a successful tour during recent months. He was very well received not only in the United States, but also in China and Japan. Below is a list of places visited to date. In addition, he is making plans to visit Milwaukee, Kingston (Ontario), Tullahoma, Perugia, and Copenhagen. Plans for these visits, as well as visits to other places, are incomplete at the moment.

Professor Breazeale reports an exhilaration that comes from interacting with other scientists and with students at the universities visited, that the experience is valuable to the lecturer as well as the audience.

<u>Date</u>	<u>Place</u>	<u>Approximate Number in Attendance</u>
Nov. 9, 1987	Department of Physics University of Mississippi Oxford, MS	35
Nov. 23, 1987	Department of Physics Tong ji University Shanghai, PR China	20
	Department of Physics Suzhou University Suzhou, PR China	15
Nov. 27, 28, Dec. 1, 2	Department of Physics Institute of Acoustics Nanjing University Nanjing, PR China	Total of 6 lectures. ~ 30 attendees each time.
Dec. 5, 7	Acoustics Institute Academia Sinica Beijing, PR China	2 lectures ~ 20 each time. Representatives from University and Academy of Railway Sciences in addition.
Dec. 10	8th Symposium on Ultrasonic Electronics Tokyo, Japan (Invited lecture)	50
Dec. 11	Murata Company Kyoto, Japan	15
Dec. 12	Elastic Wave Technology Committee of Japan Society for Promotion of Science Osaka University Osaka, Japan	20
Dec. 14	Technical Group on Ultrasonics of IEICE Tokyo, Japan	30
Dec. 15	Tamagawa University Tokyo, Japan	2 lectures. First: ~ 200 undergraduates Second: ~ 12 faculty
Feb. 1, 1988	Long Island Chapter SUNY at Stonybrook Islip, Long Island, NY	15
Feb. 2	National Bureau of Standards Gaithersburg, MD	12
Feb. 2	Washington, Baltimore and N. Va. Chapter Calverton, MD	10
Feb. 3.	Boston Section Raytheon Research Division Lexington, MA	15
Feb. 4	Department of Physics Millersville State University Millersville, PA	25
Feb. 17	Santa Clara Chapter, IEEE Palo Alto, CA	
Feb. 19	Naval Postgraduate School Monterey, CA	

UFFC-S Distinguished Lecturer Mack Breazeale in Japan and China



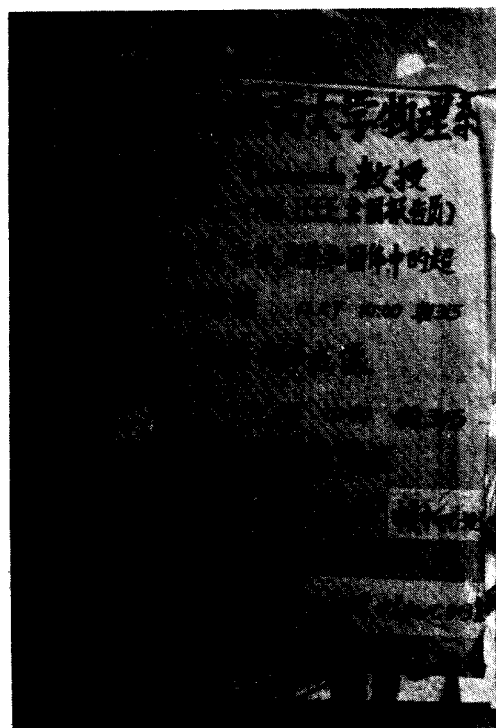
Professor and Mrs. Breazeale with hosts from the Tokyo Chapter in Japan.



Professor Breazeale ready to lecture in Nanjing.



The Breazeales with dinner guests in Japan.



Announcement of lecture series in Nanjing.

1987 Ultrasonics Symposium

The 1987 Ultrasonics Symposium was held at the Sheraton Denver Tech Center on 10/14-16 1987. The most important part of the conference is always the technical sessions and this year was one of the best. There were over 450 attendees with roughly one third from outside the continental United States demonstrating the vitality and broad international activity in the field of ultrasonics. In addition to the technical sessions, there was an outstanding exhibitors session bringing the latest in commercial technology to the Symposium for the attendees. As usual, the social atmosphere was an excellent backdrop for continuing technical discussions and catching up on the latest news.

The Symposium opened with the plenary session, followed by 41 technical sessions during which 236 papers were given. There were 206 oral papers and 30 papers were given in the poster sessions. Twenty papers were invited highlighting new developments, bringing visibility to a critical area, or reviewing important mature technology. 107 papers were from outside the United States pointing to the significance of this Symposium in the international sphere of ultrasonics.

The plenary session was opened by Jan Brown, Technical Program Chair and Bruce McAvoy presented the Awards and Recognitions to:

- Achievement Award - Thrygve R. Meeker, Consultant, retired from AT&T Bell Laboratories presented by Robert L. Rosenberg (Figure 1).
- Best Paper Award - "Optical Detection of Ultrasound" by Jean-Pierre Monchalain from the National Research Council of Canada presented by Roger Tancrrell to Jean Bussiere accepting on behalf of the author (Figure 2).
- Fellow Award - H.L. Bertoni from the Polytechnic Institute of New York presented by Bruce McAvoy (Figure 3).
- UFFC-S Distinguished Lecturer - Mack A. Breazeale from the University of Tennessee presented by Bruce McAvoy (Figure 4).

Following the awards, the Presidents Speaker, Professor Breazeale, gave a talk including demonstration on "The Ubiquitous Nonlinearity: Its Origin in Solids" (Figure 5). The presentation began with a visual demonstration of the diffraction of a laser beam by 4 MHz ultrasonic waves in water, followed by a review of where nonlinearity is today and where it may go in the future.

The first day ended with a traditional reception at the hotel to bring the diverse yet coupled attendees back together from the various technology disciplines. As an observer of human nature, I always delight at the ability of IEEE-UFFC people to both compress a years work into a short social session while also absorbing a years work from their discussion partner. As if that were not amazing enough, while that is happening they are absorbing about 2000 calories of refreshment!

The big social meeting of the Symposium was called "A Taste of Denver" at the Denver Art Museum. In addition to feasting our eyes on the outstanding permanent collections, we were able to see a special collection of Hollywood: Legend and Reality. A feast for the stomach was also provided at the Museum with gourmet chefs preparing your plate while you watched. Not to miss an opportunity, a feast for the ear was added with an excellent, elegant string quartet.

Some of the visitors had the fortunate opportunity to partake of the spouses program and see the natural grandeur of the Denver site, nestled in the Rocky Mountains as it is. We all wish we could have shared those memories. We all thank all those people with the 1987 Ultrasonics Symposium who donated so much of their time and energy to making the meeting such a success. We have a great society and plan to keep it vital; successful meetings and publications are our backbone.

Joe Heyman and Jan Brown

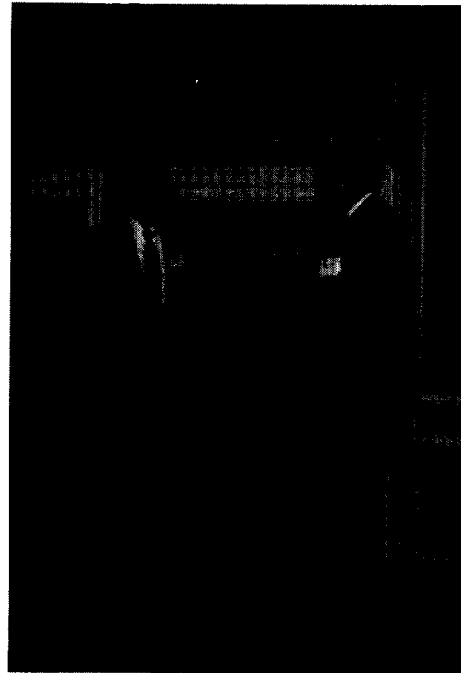


Fig.1 Thrygve Meeker receives UFFC-S Achievement Award from Bob Rosenberg.

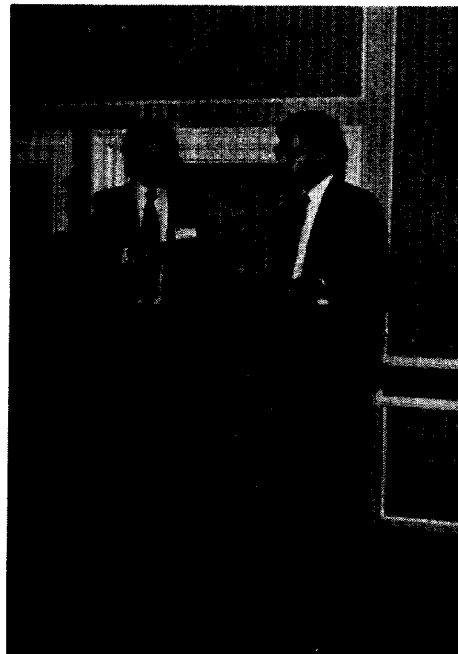


Fig. 2 Roger Tancrrell presents Best Paper Award - Jean Bussiere accepting for Jean -Pierre Monchalain.



Fig. 3 Henry Bertoni receives Fellow Award from Bruce McAvoy.



Fig. 4 Mack A Breazeale receives UFFC-S Distinguished Lecturer Award from Bruce McAvoy.



Fig. 5 The President's Speaker, Professor Mack A. Breazeale.



Fig. 6 Sheraton Denver Tech Center, site of the 1987 Ultrasonics Symposium.



Fig. 7 President Bruce McAvoy opens the 1987 Ultrasonics Symposium.

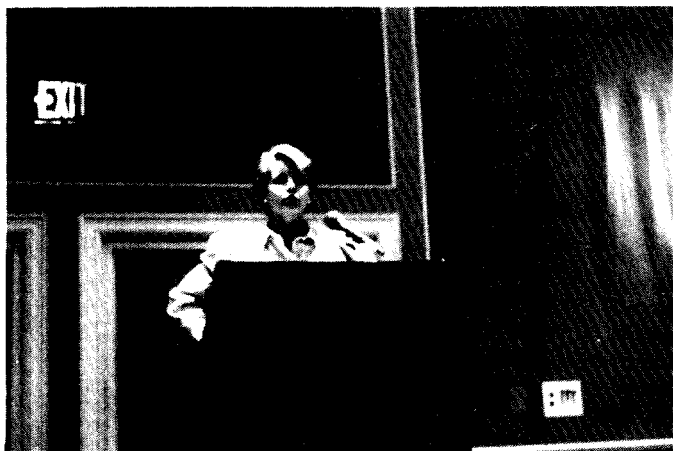


Fig. 8 Jan Brown, Chairperson of the Technical Program Committee.

Technical Program Committee Note

The members of the Technical Program Committee work very hard with little formal recognition. The 1987 Ultrasonics Symposium Committee consisted of 72 members with 15 from government laboratories, 34 from industry, and 23 from universities. Six of the members were from Europe and Japan. The Committee is divided into four working groups, each with a Vice Chair, roughly dividing the technical activities into Medical (Group 1), NDE and Sensors (Group 2), Physical Acoustics (Group 3), and SAW (Group 4). The following pictures show some of the members of the Committee hard at work during the second TPC meeting in Denver last July. Thank You to all of you for your time and dedication and for a job very well done.

Jan Brown



Art Ballato - Vice Chairman - Group 3.



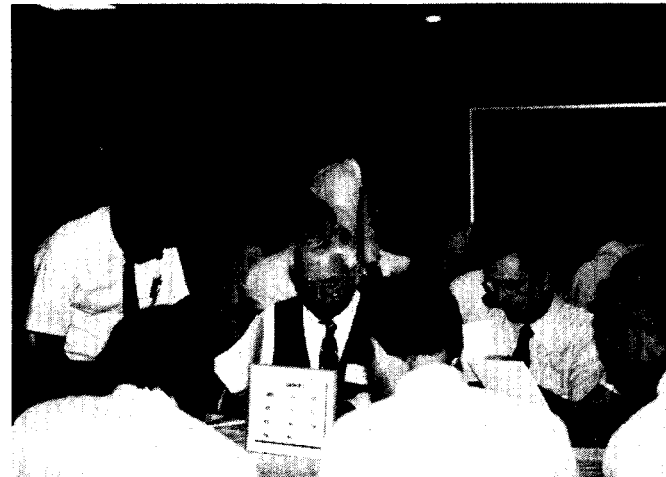
Roger Tancrell - Vice Chairman - Group 1.



Gary Montress - Vice Chairman - Group 4.

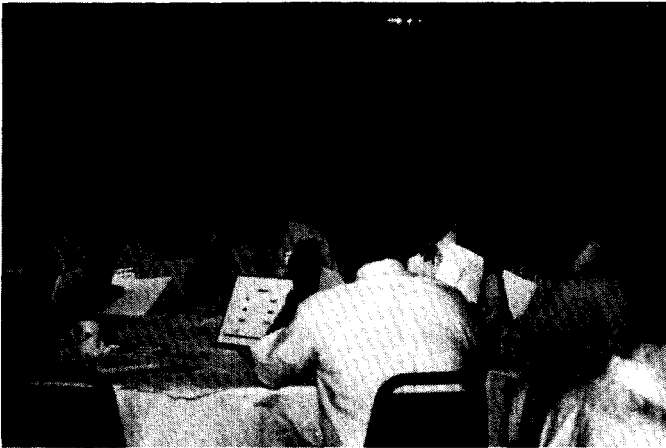


Bernie Tittman - Vice Chairman - Group 2.



Group 1 - Medical.

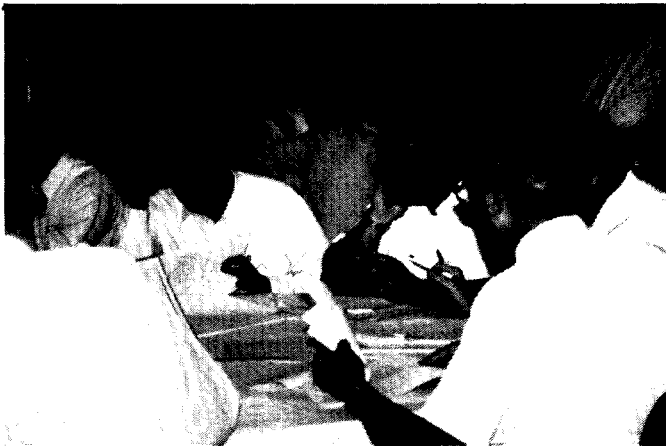
Technical Program Committee



Group 2 NDE and Sensors.



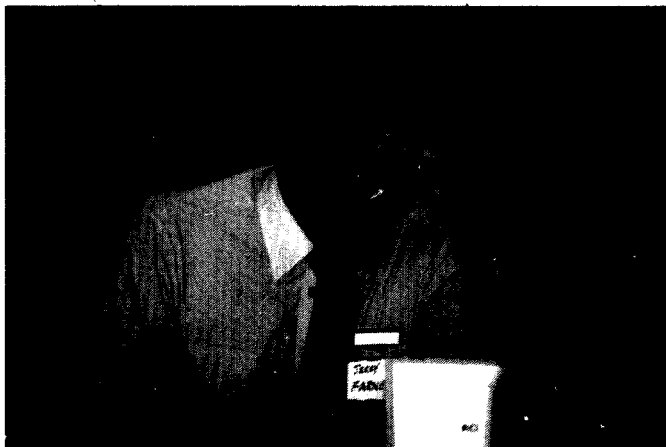
Group 3 Physical Acoustics.



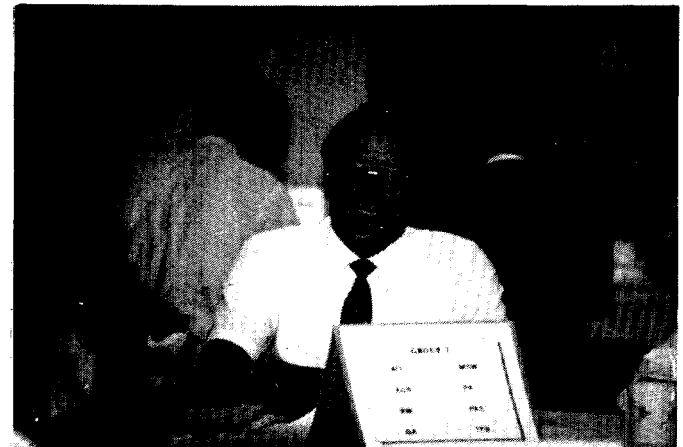
Group 3 Physical Acoustics.



Group 4 - Surface Acoustic Waves.



Jerry Farnell 1988 UFFC-S President.



M.A. Breazeale - UFFC-S Distinguished Lecturer.

Scenes From The 1987 Ultrasonics Symposium



Bruce McAvoy and Roger Tancrell review a schedule at start of AdCom Meeting.



John Larson, Herman Van de Vaart, Bill O'Brien and Wally Smith in discussion.



Do you think I should use this slide in my talk?



Members of AdCom enjoy a lighter moment.

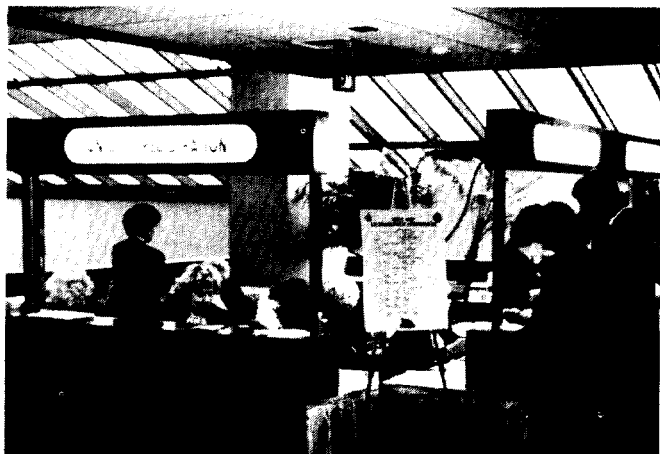


Newly elected President Farnell and Vice-President Brown.



Secretary Kagiwada packs up after AdCom Meeting.

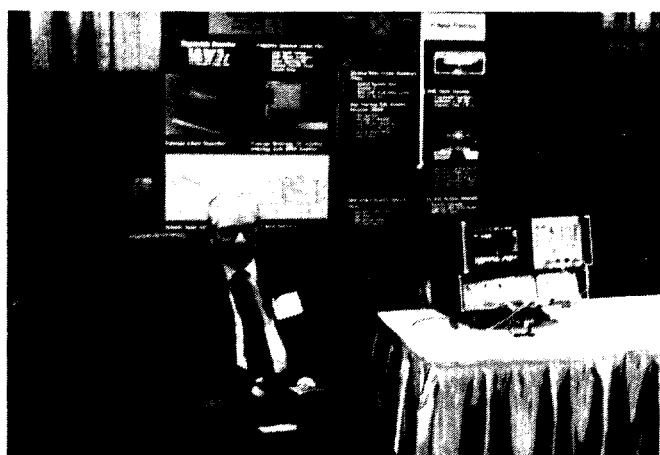
Scenes From The 1987 Ultrasonics Symposium



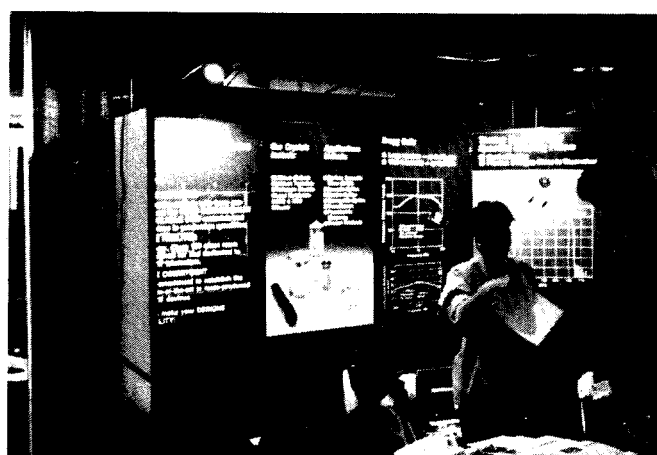
Registration



Refreshments



Relaxation



Repertee



Repast



Rememberance

Speakers Pool Directory

As a service to the local chapters to aid them in identifying speakers and topics for their regular meetings, the UFFCS has begun compiling a speakers pool. The list as it presently exists is printed here in the Newsletter. The information provided by these speakers in the returned questionnaires is periodically compiled and sent to all of the chapter chairmen to aid them in selecting their speakers. It will also be sent to other appropriate IEEE groups and academic institutions on request. We urge anyone who is interested in being included in this list to fill out the questionnaire and return it to me. The ADCOM has not reviewed the abstracts from these speakers. All those who so desire will be included in the list. We anticipate that as this list grows it will become an increasingly useful tool to those planning IEEE technical activities as well as academic seminars.

NAME	CITY	STATE	SUBJECT	ALTERNATE SUBJECT
Kimme-Smith, Carolyn	Los Angeles	CA	Medical Ultrasonics	
Schoenwald, Jeffrey S.	Thousand Oaks	CA	Sensors & Industrial Acoustics	
Latuszek, Antoni	02-524- Warszawa	Chodkiewicza 8	SAW Devices or Applications	
Evans, J.A.	Leeds IS1 3EX	England	Medical Ultrasonics	
Sampson, Milo	Tampa	FL	Medical Ultrasonics	
Malocha, Donald C.	Orlando	FL	SAW Devices or Applications	
Oravec, Michael G.	Bensenville	IL	Nondestructive Evaluation	
Hunt, William D.	Atlanta	GA	SAW Devices or Applications	
Panwar, B.S.	ITT New Delhi	India	SAW Devices or Applications	
Maeda, Kazuo	Yonago 683	Japan	Bioeffect	
Driscoll, Michael M.	Baltimore	MD	Bulk Wave Devices	Frequency Control
Blessing, Gerald V.	Gaithersburg	MD	Nondestructive Evaluation	
Vale, Christopher	Elk Ridge	MD	SAW Devices or Applications	Bulk Wave Devices
Harrison, George H.	Baltimore	MD	Medical Ultrasonics	
Fitting, Dale W.	Ann Arbor	MI	Nondestructive Evaluation	
Nikoonhad, Mehrdad	Briarcliff Manor	NY	Acoustic Microscopy	
Driller, Jack	New York City	NY	Medical Ultrasonics	
Cheung, John Y.	Norman	OK	Medical Ultrasonics	
Jen, Cheng-Kuei	Boucherville	P.Q. Canada	Nondestructive Evaluation	
Yanwu, Dong	Xian	P.R. China	Medical Ultrasonics	
Yongchen, Sun	Xian	P.R. China	Medical Ultrasonics	
Gururja, T.R.	University Park	PA	Medical Ultrasonics	Ferroelectrics
Shung, K. Kirk	University Park	PA	Medical Ultrasonics	
Danicki, Eugene	00-049 Warsaw	PL	SAW Devices or Applications	
Koymen, H.	Ankara	Turkey	Nondestructive Evaluation	
Owens, J.M.	Arlington	TX	Magnetostatic	
Yuan, Liu	Beijing	China	SAW Devices or Applications	
Kessler, Lawrence	Bensenville	IL	Nondestructive Evaluation	Acoustic Microscopy
Fliegel, Fred	Champaign	IL	SAW Devices or Applications	Acousto-Optic

International Symposium on Applications of Ferroelectrics

ISAF 88, The International Symposium on Applications of Ferroelectrics is being held in conjunction with The 1st European Conference on Applications of Polar Dielectrics (ECAPD-1) in Zurich Switzerland August 29 through September 1 of 1988. The conferences are devoted to all research activities dealing with polar dielectrics. In particular special sessions on the following topics will be included in the programs:

1. Materials research of organic and inorganic single crystals, thin films, ceramics, polymers, composites, high T_c superconductors and liquid crystals.
2. Basic research of device oriented physical properties.
 - Ferro-, piezo- and pyroelectric properties
 - Electro-optical and nonlinear optical effects
 - Photorefractive effects, optical phase conjugation and dynamic holography

3. Device research

- Piezoelectric transducers, actuators, films etc.
- Electro-optic modulators, displays
- Associative optical memories, spatial light modulators, optical signal processors, phase conjugate resonators.
- Thin film devices: transducers, integrated optics
- Pyroelectric detectors, arrays, vidicons.

The Conference will be held on the Honggerberg campus of the Swiss Federal Institute of Technology. Registration and accomodation information may be obtained by writing ECAPD-1/ISAF '88, c/o H. Arend, Institute of Quantum Electronics, Swiss Federal Institue of Technology, CH-8093 Zurich, Switzerland.

CALL FOR SPEAKERS POOL DIRECTORY

for the Ultrasonic, Ferroelectrics, and Frequency Control Society

If you would be willing to have your name included on a list of available speakers for UFFC chapter meetings, please provide us with the following information and return this form to Dr. Leland Solie, EDI, 1776 E. Washington Street, Urbana, IL 61801.

NAME: _____	CONDENSED RESUME: _____
ADDRESS: _____	_____
_____	_____
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BUS. PHONE: _____	_____
HOME PHONE: _____	_____
VISUAL AIDS REQUIRED: _____	_____
_____	_____
TRAVEL LIMITATIONS: _____	SUBJECT CLASSIFICATION (check one)
_____	() Medical Ultrasonics
TOPICS: _____	() SAW Devices or Applications
_____	() Nondestructive Evaluation
_____	() Acousto-Optic
_____	() Magnetostatic
_____	() Bulk Wave Devices
_____	() Ferroelectrics
_____	() Frequency Control
_____	() Other _____
_____	_____

* * * * *



IEEE 1988
ULTRASONICS SYMPOSIUM



Meetings Sponsored by the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society

42nd Annual Frequency Control Symposium

June 1-3, 1988
Venue: Baltimore, MD

J. R. Vig, *General Program Chair*
US Army LABCOM
SLCET-EQ
Fort Monmouth, NJ 07703
201/544-4275, 4805

1988 IEEE International Symposium on Applications of Ferroelectrics and First European Conference on Applications of Polar Dielectrics

August 29-September 2, 1988
Zurich, Switzerland

P. Gunter, *General Program Chair*
Swiss Federal Institute of Technology
Honggerberg
CH-8093 Zurich
Switzerland

1988 IEEE Ultrasonics Symposium

October 3-5, 1988
Chicago, IL

W. D. O'Brien, Jr., *General Program Chair*
Department of Electrical
and Computer Engineering

University of Illinois
1406 W. Green St.
Urbana, IL 61801
217/333-2407

J. Brown, *Technical Program chair*
Fisher Controls
1712 Centre Creek Drive
Austin, TX 78754

43rd Annual Frequency Control Symposium

May or June, 1989
Venue: To be announced

T. R. Meeker, *Technical Program Chair*
Bell Laboratories (Ret.)
2956 Lindberg Ave.
Allentown, PA 18103
215/437-3310

1989 IEEE Ultrasonics Symposium

October 4-6, 1989
Montreal, PQ Canada

H. van de Vaart, *General Program Chair*
Allied Signal Incorporated
P. O. Box 1021 R
Morristown, NJ 07960
201/455-2482

K. V. Montress, *Technical Program Chair*
Raytheon Research Division
131 Spring St.
Lexington, MA 02173

44th Annual Frequency Control Symposium

May or June, 1990
Venue: To be announced

1990 International Symposium on Applications of Ferroelectrics

June, 1990
Urbana, IL

D. A. Payne, *General Program Chair*
Department of Ceramic Engineering
University of Illinois
105 S. Goodwin Ave.
Urbana, IL 61801
217/333-1770

1990 IEEE Ultrasonics Symposium

Date: To be announced
Honolulu, Hawaii

R. S. Kagiwada, *General Program Co-Chair*
TRW-ESG, MS M5/1007
One Space Park
Redondo Beach, CA 90278
213/535-5515

N. Mikoshiba, *General Program Co-Chair*
Research Institute Electrical Communications
Tohoku University Katahira
Sendai 980, Japan
(0222) 27-6200

K. H. Yen, *Technical Program Chair*
TRW-ESG, MS R6/1164
One Space Park
Redondo Beach, CA 90278
213/535-0637

45th Annual Frequency Control Symposium

May or June, 1991
Venue: To be announced

1991 IEEE Ultrasonics Symposium

December, 1991
Orlando, FL

D. C. Malocha
Department of Electrical Engineering
University of Central Florida
Orlando, FL 32816

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