



IEEE ULTRASONICS, FERROELECTRICS, AND FREQUENCY CONTROL SOCIETY NEWSLETTER



Number 16: September 1993

Editor: Fred S. Hickernell



Fort McHenry

1993 IEEE ULTRASONICS SYMPOSIUM

Sunday, October 31, 1993 - Wednesday, November 3, 1993

Hyatt Regency - Baltimore

Baltimore, Maryland

SYMPOSIUM & SHORT COURSE INFORMATION

The IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society presents the 1993 Ultrasonics Symposium:

- Six Short Courses, Sunday, October 31, 1993.
- The Symposium Technical Program, from Monday, November 1, 1993 through Wednesday, November 3, 1993.

All symposium activities will take place in the Hyatt Regency Baltimore located at the Baltimore Inner Harbor.

IMPORTANT DEADLINES

- | | |
|--|-----------------|
| ☐ Hotel Reservations | October 1, 1993 |
| ☐ Advance Registration | October 1, 1993 |
| Symposium | |
| Short Courses | |
| Guest Program | |
| Evening Social Event | |
| ☐ Special Audio-Visual Requests | October 1, 1993 |

BALTIMORE AREA

Baltimore, birthplace of the Star Spangled Banner, is one of the great cities of America. Founded in 1729, it is today our nation's eighth largest city with a population of over two million in the greater metropolitan area. It is a fantastic convention and tradeshow market place by virtue of that fact that over 23 million people live within 200 miles. Baltimore is one of the world's most famous seaports and today it thrives with activity.

In the midst of downtown spectacular rebirth has occurred with new office towers virtually jumping up in every direction. The picturesque Inner Harbor has become the focal point of the revitalization. Sailing vessels and other pleasure craft leisurely more about in the shadows of the skyscrapers. The waters of the Chesapeake Bay gently lap against parks and promenades which lead to smart boutiques, outdoor cafes, theaters and treelined plazas where shoulders rub and good things happen. Fountains spring forth amid steel and glass towers of prize winning new architecture which blends with the masterpieces of an earlier day.

Perhaps Baltimore's most unique characteristic is its community of more than one hundred neighborhoods, each with its own identity, revealing a strong pride in ethnic origins. From the great restaurants of Little Italy to the charming shops and bistros of the Mount Vernon Square area, all visitors will be intrigued with the neighborhoods that once housed the legendary Edgar Allen Poe, H.L. Mencken, F. Scott Fitzgerald and Babe Ruth, just to mention a few.

SYMPOSIUM REGISTRATION FEES

All symposium participants and guests must register and wear badges. The symposium fee includes admittance to all technical sessions, the Monday evening reception, and the cost of one soft cover copy of the 1993 Ultrasonics Symposium Proceedings (except for full-time students, retirees, guests, and one day registrants. The guest fee includes a continental breakfast each morning and the Monday evening reception. A program of tours has been arranged for guests. These daytime activities provide non-symposium participants an opportunity to experience some of the history and culture of the Baltimore area. Details and fees are in the Guest Social Program section.

Registration fees are as follows:

	Advanced Registration	On-Site Registration
IEEE Members	\$ 275.00	\$ 305.00
Non-IEEE Members	\$ 350.00	\$ 385.00
Full-time Students	\$ 25.00	\$ 40.00
Retirees	\$ 25.00	\$ 40.00
Guests	\$ 25.00	\$ 35.00
Children (under 12)	\$ 10.00	\$ 15.00
One-Day Registration		\$ 175.00

The reduced rate for advance registration is available only by completing the form located at the center of the Advance Program book (for a copy send message to Harry L. Salvo, Jr. at E-mail "h.salvo@ieee.org" or FAX to (410) 765-4290), enclosing proper payment and mailing to:

1993 Ultrasonics Symposium
c/o LRW Associates
1218 Balfour Drive
Arnold, MD 21012-2150
U.S.A.

The Advance Registration Form must be received at LRW Associates by **October 1, 1993**. Postmarks do not apply. Each registrant must complete a separate Advance Registration Form. The remittance is payable, in U.S. Dollars only, by personal or company check drawn on a U.S. Bank, money orders, VISA, or MasterCard. Bank drafts, foreign currency, and purchase orders will not be accepted for either advance or on-site registration. For advance registration, the remittance must accompany the Advance Registration Form.

REFUND POLICY

There will be a \$25.00 service charge to process refunds for those who have pre-registered but who are unable, for whatever reason, to attend the symposium. A letter requesting the refund should state the registrant's name and to whom the refund check should be made payable. No refunds will be given for requests received after October 22, 1993.

PRESIDENT'S SPEAKER

The speaker for the Plenary Session at the 1993 Ultrasonics Symposium will be Professor Ansrea Prosperetti from The Johns Hopkins University. His talk is entitled "Bubbles and Sound".

WOMEN OF THE UFFC-S

There will be a meeting for the Women of the UFFC-S and other women attending the symposium on Monday, November 1, from 8:30 p.m. to 11:00 p.m. in the Pratt/Calvert rooms of the Hyatt Regency. Scheduled for this time is a short presentation about "networking" opportunities and strategies for women engineers and scientists. Following the presentation will be an open period to allow attenders to meet one another and to share common interests and ideas. Students are especially encouraged to attend this meeting. Light refreshments will be served at this meeting. If you plan to attend, please contact Susan C. Schneider via E-Mail: S.Schneider@IEEE.org.

TECHNICAL PROGRAM OVERVIEW

The Symposium's technical program will be held from Monday, November 1 through Wednesday, November 3, 1993. The technical program will commence with a Plenary Session on Monday morning, beginning at 8:00 AM. Paper

presentations have been separated into four parallel oral sessions and a single poster session. Contributed oral presentations have been allocated fifteen minute time slots, with approximately twelve minutes recommended for each presentation, and three minutes reserved at the end of each talk to respond to questions from the audience. Invited oral presentations have each been allocated thirty minute time slots, with twenty-five minutes suggested for presentation, and the last five minutes devoted to handling questions from the audience.

Poster sessions have been used for the last eighteen years at the IEEE Ultrasonics Symposium. They afford a unique and stimulating forum for technical exchanges and interactions between author and audience. Each author of a contributed poster paper is assigned a space with a 4 foot by 8 foot (1.2 meter x 2.4 meter) bulletin board provided by the Symposium on which the author may place graphs, diagrams, data, and a small amount of text to illustrate the main points of the presentation. For each invited poster paper, the author is assigned two (2) 4 foot by 8 foot (1.2 meter x 2.4 meter) bulletin boards. Authors should remain with their poster paper displays during the entire poster session time period. Symposium participants may wander through the entire area, or else go directly to those poster papers which most interest them. This year, the poster session will be held on Monday, November 1, 1993 from 3:30 PM to 5:00 PM. The set-up period for the poster session is 1:30 PM to 3:00 PM. No oral sessions will be held in parallel with the poster session. The break-down period for the poster session is 5:00 PM until 5:30 PM.

SHORT COURSES

The following six short courses are scheduled for Sunday, October 31, 1993. The short courses will be held in the Pratt/Calvert and the Camden/Lombard rooms on the third floor of the Hyatt Regency Baltimore.

Course 1: Piezoelectric Ceramics: Properties, Measurement Techniques, and Applications

Instructor: T. R. (Raj) Gururaja, *Hewlett-Packard Company*

Time: Sunday Morning, October 31, 1993
8:00 a.m. - 12:00 noon

Course 2: Low Noise Signal Generation Using Bulk Acoustic Wave Resonators

Instructor: Michael M. Driscoll, *Westinghouse Electric Systems Group*

Time: Sunday Morning, October 31, 1993
8:00 a.m. - 12:00 noon

Course 3: Therapeutic Ultrasound

Instructor: George H. Harrison, *University of Maryland School of Medicine*

Time: Sunday Afternoon, October 31, 1993
1:00 p.m. - 5:00 p.m.

Course 4: Application of Acousto-Optic Technology

Instructor: John N. Lee, *Optical Information Processing Section, Naval Research Laboratory*

Time: Sunday Afternoon, October 31, 1993
1:00 p.m. - 5:00 p.m.

Course 5: Medical Imaging

Instructor: Tom Shoup, *Imaging System Division, Hewlett-Packard*

Time: Sunday Evening, October 31, 1993
6:00 p.m. - 10:00 p.m.

Course 6: SAW Filters and System Applications

Instructor: Donald C. Malocha, *University of Central Florida*

Time: Sunday Evening, October 31, 1993
6:00 p.m. - 10:00 p.m.

INVITED PAPERS

The 1993 IEEE Ultrasonics Symposium's Technical Program Committee has invited the following individuals to highlight new, or emerging, and/or outstanding aspects of the Ultrasonics field:

Dr. Matthew O'Donnell, University of Michigan,
"Quantitative Elasticity Imaging"

Dr. Yukio Ito, Hitachi Ltd., *"High Frequency Ultrasonic Transducer Arrays Utilizing ZnO Thin Films"*

Dr. Karl Lubitz, Siemens AG, *"Microstructuring Technology"*

Peter N. Burns, Ph.D., University of Toronto,
"Harmonic Imaging and Doppler Using Microbubble Contrast Agents"

Dr. Paul McArthur, Blackstone Ultrasonics,
"Coronary and Peripheral Ultrasonic Angioplasty"

Dr. Kenneth Suslick, University of Illinois, *"The Chemical Effects of Ultrasound"*

Gregory C. Frye, Sandia National Laboratories,
"Velocity and Attenuation Effects in Acoustic Wave Chemical Sensors"

Dr. Andrew D. W. McKie, Rockwell International Corp., *"Laser Based Ultrasonics - Applications to NDE and Process Monitoring"*

Dr. Patrick H. Johnston, NASA Langley Research Center, *"Approaches Toward Advanced Ultrasonic Disbond Characterization for Aircraft Structures"*

Prof. Ronald A. Kline, University of Oklahoma,
"Ultrasonic Computed Tomography for Anisotropic Materials Characterization"

Dr. B. R. Tittmann, The Pennsylvania State University, *"Material Property Profiles from Inversion of Surface Wave Dispersion"*

Dr. Paul A. Johnson, Los Alamos National Laboratory, *"Nonlinear Acoustical Properties of Geological Samples"*

Dr. Moises Levy, University of Wisconsin - Milwaukee, *"Ultrasonic Determination of Superconducting Energy Gap in Domain Boundaries of Melt-Textured Y1Ba2Cu3O7"*

Dr. Henry F. Taylor, Texas A&M University,
"Fiber-Optic Fabry-Perot Sensors"

Dr. Robert B. Stokes, TRW, *"Monolithic Bulk Acoustic Filters to X-Band on GaAs"*

Dr. Bradley P. Barber, University of California - Los Angeles, *"Synchronous Picosecond Sonoluminescence"*

Dr. Dick Hopkins, Westinghouse Electric Corp.,
"Growth and Properties of Silicon Carbide Crystals"

Professor Khalil Najafi, University of Michigan,
"Solid State Microsensors and Smart Structures"

Dr. Mitsukata Hikita, Hitachi, *"Design Methodology and Synthesis Techniques for Ladder-Type SAW Resonator Coupled Filters"*

Yasushi Yamamoto, NEC, *"SAW Filters and Resonators for Public Communication Systems"*

Prof. Jun-ichi Kushibiki, Tohoku University,
"Line-Focus-Beam Acoustic Microscopy for the Evaluation of SAW Materials and Properties"

Dr. John C. B. Saw, Bell-Northern Research Ltd.,
"Impact of SAW Technology on the System Performance of High Capacity Digital Microwave Radios"

Darrell Ash, RF Monolithics, *"SAW Devices in Wireless Communication Systems"*

HOTEL RESERVATIONS

All Symposium activities will be located at, departing from, or returning to the Hyatt Regency Baltimore. Located in the heart of downtown area, the Hyatt Regency Baltimore is convenient for sightseeing, theater, and concerts. Connected by over-the-street walkways to Harborplace and the Baltimore Convention Center, near the National Aquarium and Maryland Science Center, the Hyatt Regency Baltimore, sheathed in mirror glass, reflects all the excitement of the new Baltimore. The 487 room hotel features a 6 story atrium, 22 suites, parking for 650 cars and a dazzling selection of guest services and amenities. A variety of food and beverage facilities are available to hotel guests, including a spectacular rooftop restaurant and lounge overlooking the Harbor, a specialty restaurant set amid its own lake, and an atrium lobby bar at the center of all the excitement and glamor of this beautiful hotel.

A block of rooms will be held for attendees and guests, at the symposium rate of \$134.00 (Single or Double) until October 1, 1993. For reservation contact the Hyatt Regency - Baltimore at (410) 528-1234. Be sure to mention the 1993 IEEE Ultrasonics Symposium.

AIR TRANSPORTATION

The Baltimore area is served by the Baltimore Washington International Airport (BWI). All Major airlines have service to BWI. British Airways, Icelandic, and KLM provide flights to BWI from locations in Europe.

USAir has been designated as the official carrier for attendees of the 1993 IEEE Ultrasonics Symposium. Together USAir, USAir Express, and USAir Shuttle offer more than 5,082 flights daily to more than 211 cities. For the 1993 IEEE Ultrasonics Symposium, USAir and USAir Express offer more than 180 flights daily. Each USAir Frequent Traveler member will earn a minimum of 750 Frequent Traveler miles when flying on USAir to the Symposium.

USAir is offering the following discount rate for travel from the Continental United States, Canada, and San Juan, PR.

- a) 5% off applicable first class and lowest applicable published fares following all rules and restrictions, or
- b) 10% off applicable unrestricted coach fares with 7 day advance reservations/ticketing required.

Valid travel dates are October 29 to November 5, 1993.

For the most current flight and fare information and personalized service, contact:

USAIR's Meeting and Convention Reservation Office
1-800-334-8644, 8:00 AM to 9:00 PM (Eastern Time)
REFER TO GOLD FILE NO. 95550076

Once your reservations are confirmed, USAir will mail the tickets to you or suggest several other convenient methods of purchase.

If you normally use the services of a travel agent or corporate travel department, please have them place the call for you.

AIRPORT TRANSPORTATION

The BWI Shuttle Express services the Hyatt Regency Baltimore from the Baltimore Washington International Airport. The current charge is \$8.00 one-way or \$14.00 round-trip. The Shuttle is currently running every one-half hour. The service is economical, professional, and reliable.

Taxi service is also available from BWI to the Hyatt Regency Baltimore. The cost is approximately \$ 15.00 and the trip takes about 20 minutes.

COMING BY CAR

From 95S (Philadelphia, New York, New Jersey)

Take 95 South to Fort McHenry Tunnel exit. After Toll, follow through tunnel to exit 53 (395 N) to DOWNTOWN. Follow signs to INNER HARBOR, to the end of expressway 395, and continue north to PRATT St. (approx. 3 blocks). Turn right on PRATT St., go 4 blocks to LIGHT St., turn right again. The Hyatt Regency Baltimore is 1/2 block down on the right.

From 95N (Washington, DC and Virginia)

Take 95 North to Baltimore. Follow signs to DOWNTOWN/INNER HARBOR (exit 53 - 395 N). At end of expressway 395, continue north to PRATT St. (approx. 3 blocks). Turn right on PRATT St., go 4 blocks to LIGHT St., turn right again. The Hyatt Regency Baltimore is 1/2 block down on the right.

From BW Expressway (Washington, DC and BWI Airport)

The Expressway (295 N) turns into Russell Street; follow 95S Directions at PRATT St.

GUEST SOCIAL PROGRAM

We encourage registered guests of the symposium to attend a continental breakfast which will be provided from 8:00 to 9:00 AM each morning of the symposium. Your guest badge will help you become acquainted and is necessary to attend the continental breakfast at the Hyatt Regency Baltimore. A variety of tours has been arranged for the enjoyment of guests and attendees. Advance registration for guest social program events should be made on the advanced registration form. Registration at the conference will be accepted on a space available basis. However, we may cancel some of the tours if there is insufficient advance registration.

BALTIMORE'S BEST

Monday, November 1, 1993

9:00 AM to 3:00 PM

Baltimore is a city with a rich historic past and an exciting present. We boast "The Star Spangled Banner," the first railroad station in the United States, the largest collection of Matisse paintings in the world, the most spectacular downtown renovation in the country. And, of course, steamed crabs.

The tour guide will relate the significance of Baltimore in the early days of the United States, and point out the major attractions which make Baltimore such a popular place to visit.

You will view the dazzling sights of the Inner Harbor including the National Aquarium, Maryland Science Center, Harborplace, and Baltimore's own World Trade Center. You'll see Camden Yards, new home of our baseball team, the Baltimore Orioles. And you'll tour the restored neighborhood, Otterbein, the largest and most successful \$1.00 homesteading project in the United States. You'll experience the panoramic view of the harbor and city skyline from the top of Federal Hill.

You'll get a chance to explore Fort McHenry, the world famous national landmark and see a fascinating film recounting the history of the Fort and Francis Scott Key's memorable writing of "The Star Spangled Banner". You'll be able to spend some time walking the ramparts of the bastions overlooking the two rivers which form the top of the Chesapeake Bay. History will come alive in the bomb-proof underground rooms and soldiers living quarters.

After an enjoyable lunch at one of the city's most charming restaurants, located in a beautifully restored 1861 townhouse, you'll continue on to the Evergreen House, a grand mansion perfectly restored to its original glory. Built in the 1850's in the classic revival style, Evergreen House is a testament to the unusual and the elegant lives of three generations of Garretts, scions of the Baltimore and Ohio Railroad. And, our private tour will include the gallery for Japanese and Chinese Arts, and the theater, decorated by the renowned Russian artist Leon Bakst.

A CAPITAL TREAT

Tuesday, November 2, 1993

9:00 AM to 4:00 PM

History comes alive in the charming city of Annapolis, Maryland's state capital. Our guide, dressed in colonial garb, meets us at St. John's College, Francis Scott Key's alma mater. Our group will divide into small groups for a leisurely walking tour of this historic area.

You'll pass authentically restored eighteenth century houses on the way to the State House where George Washington resigned his commission. Then it's off to the United States Naval Academy to view the Chapel, the crypt of John Paul Jones and Bancroft Hall, the home of all midshipmen at the Academy.

The walking tour continues along the quaint pathways to the harbor where you will lunch at a charming historic restaurant. After lunch, there will be some time to wander on your own along Maryland Avenue and the bustling waterfront area, a haven for those who love antiques, boutiques and art galleries.

GRACIOUS BALTIMORE

Wednesday, November 3, 1993

9:00 AM to 12:30 PM

This morning's tour returns you to Baltimore's most elegant era. Traveling via fashionable Charles Street, home to some of the most exciting shops, interesting galleries and important cultural institutions, The first stop on this tour is at Mount Vernon Place, site of the first monument to George Washington. Mount Vernon Place is where Baltimore's greatest philanthropists lived and where the original cobblestone streets and architecturally perfect mansions still exist. Next

you'll visit the Library of the Peabody Conservatory of Music, one of the leading music schools in the nation. With ornate cast iron balconies soaring six stories around a central Reading Room, the library presents one of the most dramatic interior spaces in town.

Continuing up Charles Street, you'll pass the campus of Johns Hopkins University. Adjacent to the university is the renowned Baltimore Museum of Art, one of this country's premier museums. You'll be guided on a private tour of the newly refurbished Cone Collection, the largest assemblage of Matisse paintings in the world. You will also have the privilege of visiting the Wurtzberger and Levi Sculpture Gardens. Given to the museum by two prominent local families, the gardens contain a fabulous collection of modern works by famous artists.

EVENING SOCIAL EVENTS

SOCIAL GATHERING

Monday, November 1, 1993

6:30 PM to 9:00 PM

Gather in the Constellation Ballroom for a relaxing get-together.

There will be ample hors d'oeuvres as you renew friendships and make new acquaintances. Each registration will be accompanied by tickets for either two soft drinks or one cocktail, beer, or glass of wine. A cash bar will be available for additional drinks throughout the evening. Take advantage of this opportunity to socialize.

ALL ABOARD

Tuesday, November 2, 1993

6:30 PM to 10:00 PM

"All aboard" for the B & O Railroad Museum. The B & O Railroad Museum is located on the site of the first American railroad terminal, established in 1829. Under the 123 foot high domed ceiling of the spectacular Mount Clare Station Roundhouse, you'll enjoy an evening of traditional Maryland food and fun in a truly unique setting.

You will be able to relive the romantic days of steam travel climbing aboard the magnificent engines and elaborate parlor cars. The B & O Museum is known worldwide for the size and scope of its collection - twenty-two of the oldest and most precious of the museum's restored steam and diesel locomotives are on display. Throughout the evening you can explore the famous "Tom Thumb", the "William Mason", which has appeared in many movies and television programs, and the "Freedom Train" of America's 1976 Bicentennial, to mention just a few.

Starting at 6:30 PM, transportation to the B & O Railroad Museum will be provided via deluxe motor coach. A festive reception has been arranged including a cash bar so you can purchase mixed drinks, beer, wine, and soft drinks. Hors d'oeuvres will be available. After you've spent some time going through the museum, you will dine on "Maryland Fried Chicken" served to you at your table. The motor coaches will return us to the Hotel as we are ready to leave.

1993 IEEE Ultrasonics Symposium

Short Courses

Sunday, October 31, 1993

A series of six courses will be offered in conjunction with the 1993 IEEE Ultrasonics Symposium. These courses will be held in two parallel sessions beginning on Sunday morning, October 31, 1993. Registration for the short courses is on a first-received, first-processed basis. Registration will be accepted with appropriate fee until the time of the short courses. However, available space for each course is limited, and registration for individual courses may be closed prior to the October 1, 1993 Advance Registration Deadline. We reserve the right to cancel any course due to insufficient preregistration. Short course fees for each course are as follows:

	Advance Registration	On-Site Registration
IEEE Members	\$ 110.00	\$ 120.00
Non-IEEE Members	\$ 140.00	\$ 150.00
Student	\$ 40.00	\$ 50.00
Retiree	\$ 40.00	\$ 50.00

An Advance Registration form can be found in the Advance Program Book (for a copy send message to Harry L. Salvo, Jr. at E-mail "h.salvo@ieee.org" or FAX to (410) 765-4290). The Advance Registration Form must be received at LRW Associates by October 1, 1993. Postmarks do not apply. Each registrant must complete a separate Advance Registration Form. The remittance is payable, in U.S. Dollars only, by personal or company check drawn on a U.S. Bank, money orders, VISA, or MasterCard. Bank drafts, foreign currency, and purchase orders will not be accepted for either advance or on-site registration. For advance registration, the remittance must accompany the Advance Registration Form.

SHORT COURSE ABSTRACTS

Course 1: Piezoelectric Ceramics: Properties, Measurement Techniques, and Applications

Instructor: T. R. (Raj) Gururaja, *Hewlett-Packard Company*

Time: Sunday Morning, October 31, 1993

8:00 a.m. - 12:00 noon, Pratt/Calvert Room

This introductory/intermediate level course will provide a basic knowledge of piezoelectric ceramic materials. The first part of the course will consist of definition of piezoelectric properties, symmetry consideration for the piezoelectric effect, anisotropy and tensor notation, matrices of elastic, piezoelectric, and dielectric properties. The course will then extend to reviewing structure property relations in piezoelectric materials. Where necessary, processing aspects will also be included. In the second part, measurement techniques to characterize electromechanical properties, both at low and high frequencies, will be considered. This will be based on procedures recommended by the IEEE standards. The third part includes applications; low and high frequency applications, and also low and high power applications. The course will conclude with a discussion on the development of new

piezoelectric material and their advantages. The course will be directed for practicing engineers and researchers in the field of electroceramic materials.

T. R. (Raj) Gururaja is a Project Leader in R&D at the Imaging Systems Division of Hewlett Packard Company in Andover, MA. He received his B.Sc. and M.Sc. degree in physics from the University of Mysore, India, 1974 and 1976, respectively. He received his M. Tech. degree in Materials Science from the Indian Institute of Technology, Kanpur in 1978 and Ph.D. degree in Solid State Science from the Pennsylvania State University in 1984. He worked as a research associate at the Pennsylvania State University from 1984 to 1987. He joined Hewlett-Packard in Andover, MA, as a Transducer Design Engineering in 1987. He received the 1985 best paper award for the papers "Piezoelectric Composite Materials for Ultrasonic Transducer Applications, Parts I & II" published in the IEEE Transactions on Sonics and Ultrasonics. His research activities have been in the area of dielectric and piezoelectric crystals, ceramics, and composite materials.

Course 2: Low Noise Signal Generation Using Bulk Acoustic Wave Resonators

Instructor: Michael M. Driscoll, *Westinghouse Electronic Systems Group*

Time: Sunday Morning, October 31, 1993

8:00 a.m. - 12:00 noon, Camden/Lombard Room

This short course will describe techniques for the design and evaluation of low-noise oscillators and signal generators using high Q, bulk acoustic resonators (BAWR) as oscillator frequency control elements. Topics to be covered include: (1) low-noise oscillator sustaining stage design using both 50-ohm modulator amplifiers and discrete transistors, oscillator transistor gain compression vs. diode limiting, the use of resonator impedance characteristics to improve oscillator noise floor performance, and methods for reducing active device flicker-of-phase noise; (2) high Q resonators including conventional quartz crystal resonators, non-quartz (i.e., lithium tantalate) piezoelectric resonators, and composite resonators employing sputtered piezoelectric films on non-piezoelectric crystals, methods for improving resonator short-term frequency stability and vibration immunity including the use of multiple resonators, and linear resonator frequency tuning; (3) sustaining stage/resonator/oscillator short-term phase/frequency stability and vibration sensitivity measurement methods; and (4) measured short-term frequency stability (phase noise) and vibration sensitivity performance for ultra-low noise, BAWR oscillator-based signal generators operating in the HF-through-microwave frequency range. Typically obtained VHF/UHF oscillator signal flicker-of-frequency noise and noise floor performance using the design techniques described is characterized by $Sy(f) = 1.5 \times 10^{-24}/f$ and -178 dBc/Hz, respectively.

Michael M. Driscoll received the BSEE degree from the University of Massachusetts, Amherst, 1965. He joined the Westinghouse Electric Corporation Defense Center in Baltimore, MD, in 1965, working primarily in the design and development of stable frequency sources and related signal processing equipment for radar applica-

tions. From 1974 to 1977 he was a Senior Engineer at the Iran-Westinghouse Programs Center assigned to the Communications Division of Iran Electronics Industries, Shirza, Iran, and was engaged as an instructor in the design of mobile communications equipment. Since 1977 he has worked at the Westinghouse Electronic Systems Group in Baltimore. He is currently an Advisory Engineer engaged primarily in R&D work aimed at the insertion of new technology into radar excitor subsystem hardware. Mr. Driscoll is a member of the IEEE Frequency Control Symposium Technical Program Committee. He holds eleven patents and has authored more than 40 technical papers dealing primarily with the subject of low-noise signal generation techniques.

Course 3: Therapeutic Ultrasound

Instructor: George H. Harrison, *University of Maryland School of Medicine*

Time: Sunday Afternoon, October 31, 1993

1:00 p.m. - 5:00 p.m., Pratt/Calvert Room

For 50 years, diverse applications and techniques have been developed to exploit the therapeutic possibilities of the noninvasive deposition of acoustic energy in tissue. In this course, applications in physical therapy, focal lesion production, hyperthermic tumor therapy, shock wave lithotripsy, and the potentiation of chemotherapy by low-level ultrasound will be reviewed. Each application will briefly be defined, including an attempt to identify likely acoustic mechanisms of therapeutic action, and consequently, likely medically relevant field descriptions (intensities, pressures). Typical values of the descriptors for these applications will be specified and compared. For each application, field generation, field measurement (including spatial distributions), and quality control will be outlined and compared. The comparative approach will highlight interesting similarities and overlaps, and also some marked disparities between the acoustic technology underlying each application, and should provide insight into the general topic.

George H. Harrison received his B.A. from Tufts University in 1965 and M.S. and Ph.D. degrees from the University of Maryland in 1969 and 1972, respectively. He then joined the Radiation Oncology Department at the University of Maryland, where he currently is Associate Professor. He has over 75 publications in areas including ionizing radiation physics, radiobiology, biomedical ultrasound including device development, laboratory studies on the therapeutic and carcinogenic effects of ionizing radiation, chemical agents, microwaves, ultrasound, and hyperthermia. Past studies have included neutron physics and radiobiology, including dosimetry and microdosimetry of neutron beams. Current research emphasis is on bioeffects experimentation and thermotherapy. In vitro endpoints such as cellular survival, thresholds for cavitation effects, and potentiation of chemotherapy are being measured to elucidate athermal ultrasonic bioeffects and relevant associated exposure parameters.

Course 4: Application of Acousto-Optic Technology

Instructor: John N. Lee, *Optical Information Processing Section, Naval Research Laboratory*

Time: Sunday Afternoon, October 31, 1993

1:00 p.m. - 5:00 p.m., Camden/Lombard Room

Major advances in optical devices and techniques can be coupled with acoustic devices in a large variety of applications. Potential application areas include emerging topics such as optical/fiber-optic communications, optical interconnects for computers, photonic switching, and remote sensing, in addition to more traditional areas such as RF spectrum analysis, correlation and linear signal processing. An overview of relevant optical developments will be given, including devices

such as optical amplifiers, technologies for wavelength-division multiplexing (WDM) for optical communication, and high-bandwidth data links for computers. A short review of basic acousto-optic devices and capabilities will be given. These will include high-speed modulators, high-bandwidth and large-aperture Bragg cells, two-dimensional acousto-optic devices, and acousto-optic tunable filters. This will be followed by discussion of how such devices might impact various application areas.

John N. Lee is Head of the Optical Information Processing Section at the U. S. Naval Research Laboratory. He received his B.S. Degree (1966) from Union College (NY), and the degrees of M.S. (1968) and Ph.D. (1971) in Physics from Johns Hopkins University. From 1971 to 1980, he was employed at the Harry Diamond Laboratory, where he worked on radiation effects and on the development of acousto-optic signal-processing techniques and devices. He has been at the Naval Research Laboratory since 1980. His research interests there include acousto-optical systems and techniques, optical-processing architectures, and spatial light modulators and materials. He is an author or co-author of over 100 papers and several book chapters, the editor of books on acousto-optical signal processing and optical-processor design, and is the inventor or co-inventor on 10 U. S. Patents. He serves on the Steering and Coordination Committees of the IEEE/OSA Journal of Lightwave Technology. Dr. Lee is a member of OSA and is a Senior Member of IEEE.

Course 5: Medical Imaging

Instructor: Tom Shoup, *Imaging System Division, Hewlett-Packard*

Time: Sunday Evening, October 31, 1993

6:00 p.m. - 10:00 p.m., Pratt/Calvert Room

This short course will introduce the principles used to create a real time, 2D, ultrasonic image of the human body. It will also include a description of pulsed Doppler, color flow mapping, phased array transducers, and more recent innovations. Videotape examples of these imaging modes will be included. Details of ultrasonic generation, detection, scan conversion, and signal processing for the various modes of operation will be presented. Applications of ferroelectric materials in transducers for medical imaging, which require low insertion loss, broad bandwidth, and short pulses, will be covered. The utility of various image processing techniques and specialized signal processors as applied to medical ultrasound will also be discussed.

Tom Shoup received the B.A. in Physics from Washington and Jefferson College and M.A. and Ph.D. in Physics from Washington University of St. Louis. He has been employed at Hewlett-Packard for eleven years, starting in the corporate labs in Palo Alto. Currently he is at the Imaging Systems Division in Andover, Massachusetts, where he is an R&D section manager responsible for piezoelectric sensor design.

Course 6: SAW Filters and System Applications

Instructor: Donald C. Malocha, *University of Central Florida*

Time: Sunday Evening, October 31, 1993

6:00 p.m. - 10:00 p.m., Camden/Lombard Room

This tutorial will discuss the design of SAW transducers and filters and their system applications. The approach will discuss fundamentals and the physical phenomenological approach to device operation. Topics will include finite impulse response (FIR) filter design principles, model development,

SAW transducer equivalent circuits, and electrical network interactions. In addition, second order effects on device performance, such as diffraction and triple transit, will be discussed. Various transducer embodiments and their basic operation will be presented, which include bidirectional and multiphase unidirectional transducers (UDT), dispersive transducers, single phase and natural single phase UDTs, and other types of filters. Several SAW system application examples will be presented showing low shape factor filters, low loss filters, and pulse shaping filters.

Don Malocha earned his B.S. degree in Electrical Engineering/Computer Science and his M.S. and Ph.D. degrees in Electrical Engineering from the University of Illinois, Urbana in 1972, 1974

and 1977, respectively. Presently, he is the Martin/St. Laurent Professor in the Electrical and Computer Engineering department and group leader of the Solid State Devices and Systems Laboratory at the University of Central Florida, Orlando. His research group is currently working on various SAW, thin film, and acoustic charge transport devices. He has previously worked as a member of the Corporate Research Laboratories at Texas Instruments, Dallas, and as the Manager of Advanced Product Development for Sawtek, Orlando. He was a visiting scholar at the Swiss Federal Institute of Technology, Zurich in 1989 and a visiting member of the technical staff at Motorola's Advanced Components Technology Group, Phoenix, in 1990. Don is currently an Associate Editor of the IEEE UFFC Transactions, and Secretary/Treasurer for the UFFC society. He is a professional engineer, State of Florida, holds six patents, several software copyrights and has over 50 publications.

1993 IEEE ULTRASONICS SYMPOSIUM TECHNICAL PROGRAM COMMITTEE

Technical Program Chair

Susan C. Schneider

Marquette University

Group 1: Medical Ultrasonics & Transducers

Mark Schafer

Vice Chair

Paul J. Benkeser

Gary H. Brandenburger

Lewis Brown

Charles A. Cain

L. Eric Cross

H. Ernert

Katherine W. Ferrara

James F. Greenleaf

Masao Ide

Reinhard Lerch

James G. Miller

William D. O'Brien, Jr.

Kevin J. Parker

Helen F. Routh

Thomas Shoup

K. Kirk Shung

Wallace A. Smith

Roger H. Tancrell

Kai Thomenius

Sonic Technologies, Inc.

Georgia Institute of Technology

Mallinckrodt Medical, Inc.

South Dakota State University

University of Michigan

The Pennsylvania State University

Ruhr-Universitaet-Bochum

California State Univ.-Sacramento

Mayo Clinic

Musashi Institute of Technology

University of Linz

Washington University

University of Illinois

University of Rochester

Advanced Technology Laboratories

Hewlett-Packard

The Pennsylvania State University

Office of Naval Research

Raytheon Company

Interspec, Inc.

Group 3: Physical Acoustics

Arthur Ballato U.S.

Vice Chair

John D. Adam

Mack A. Breazeale

Jan Brown

Gerald W. Farnell

Brage Golding

David L. Hecht

Kenneth Lakin

Moises Levy

Bruce R. McAvoy

Robert A. Moore

John M. Owens

Dennis R. Pape

Harry L. Salvo, Jr.

Bikash K. Sinha

Jan G. Smits

Joseph Trivisonno

Chen S. Tsai

John R. Vig

Yook-Kong Yong

Army Research Laboratory

Westinghouse Electric Corporation

University of Mississippi

Director Division IX

McGill University

Michigan State University

Xerox Corporation

TFR Technologies

University of Wisconsin - Milwaukee

Westinghouse Electric Corporation

Westinghouse Electric Corporation

Auburn University

Photonic Systems Incorporated

Westinghouse Electric Corporation

Schlumberger-Doll

Boston University

John Carroll University

University of California - Irvine

Army Research Laboratory

Rutgers University

Group 2: NDE & Sensors

Eric Furgason

Vice Chair

Richard L. Baer

Narendra K. Batra

Gerald V. Blessing

Purdue University

Hewlett-Packard Company

Naval Research Laboratory

National Institute of Standards & Technology

Concordia University

NASA

Sonoscan, Inc.

NASA

Rockwell International

Universite Paris 7

Illinois Institute of Technology

Rockwell International

University of Toronto

The Pennsylvania State University

Kanagawa University

Johns Hopkins University

IBM

IBM

Allied-Signal, Inc.

Group 4: Surface Acoustic Waves

Gary Montress

Vice Chair

Eric L. Adler

Tim L. Bagwell

Lawrence J. Castelli

Curt A. Flory

Edward M. Garber

Thomas W. Grudkowski

Brent Horine

Janpu Hou

William D. Hunt

Shen Jen

John A. Kosinski

Donald C. Malocha

Carl M. Panasik

David Penunuri

Bob R. Potter

Clemens C. W. Ruppel

Adrian Venema

Peter V. Wright

Kazuhiko Yamanouchi

Raytheon Company

McGill University

Hewlett-Packard Company

Crystal Technology, Inc.

Hewlett-Packard Company

TRW

United Technologies

SAWTEK, Inc.

Allied-Signal, Inc.

Georgia Institute of Technology

Hartmann Research Incorporated

U.S. Army Research Laboratory

University of Central Florida

Texas Instruments, Inc.

Motorola, Inc.

RF Monolithics

Siemens AG

Delft University of Technology

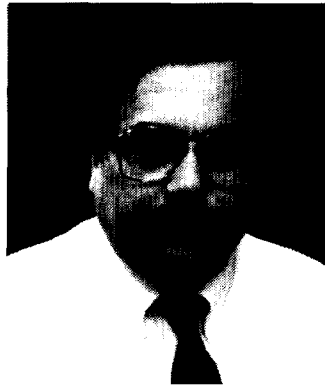
RF Monolithics

Tohoku University

1993 IEEE ULTRASONICS SYMPOSIUM ORGANIZING COMMITTEE

GENERAL CHAIR

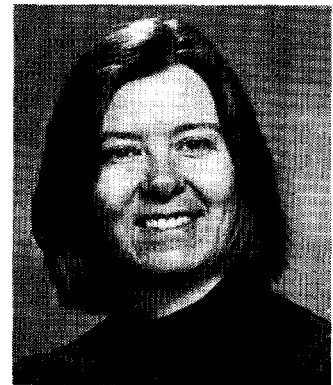
Harry L. Salvo, Jr.
Westinghouse ESG
Baltimore, MD



Harry L. Salvo, Jr.

TECHNICAL CHAIR

Susan C. Schneider
Marquette University
Milwaukee, WI



Susan C. Schneider

FINANCE

Narendra K. Batra
Naval Research Laboratory
Washington, DC

PUBLICITY

Keun-Jenn Sun
College of William and Mary
Hampton, VA

SHORT COURSES

Janpu Hou
Allied Signal, Inc.
Morristown, NJ

PROCEEDINGS

Bruce McAvoy
Westinghouse S&T Center
Pittsburgh, PA

CONFERENCE MANAGEMENT

Lawrence R. Whicker
LRW Associates
Arnold, MD

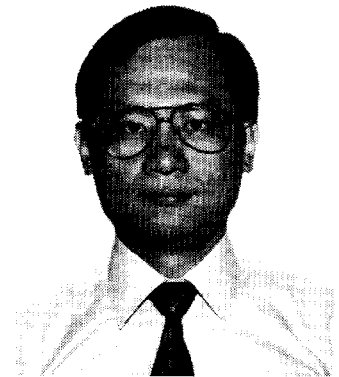
General Chair

Harry L. Salvo, Jr.

Harry L. Salvo, Jr. was born in Racine, Wisconsin. He received his B.S. degree in Applied Mathematics and Physics from the University of Wisconsin in 1969. He attended graduate school at the University of Wisconsin - Milwaukee where he received his M.S. and Ph.D. degrees in Physics in 1974 and 1979 respectively.

Since 1979 he has been with the Westinghouse Electronic Systems Group and is a member of the Advanced Technology Division located near Baltimore, Maryland. He is currently Acting Manager of the Microwave Acoustics and Magnetics Department. He is primarily involved in thin film bulk acoustic devices for use in signal processing and frequency control applications.

Harry was the Secretary - Treasurer of the UFFC-S Administrative Committee from 1987 to 1991. He has been a member of the Ultrasonics Symposium Technical Program Committee since 1985 and a past President of the Baltimore, Washington, and Northern Virginia Chapter of the UFFC-S. He was involved with the local arrangements for the 1974 Ultrasonics Symposium held in Milwaukee and was Finance Chair for the 1984 Ultrasonics Symposium in Atlanta. Harry is a member of the American Physical Society as well as the IEEE.

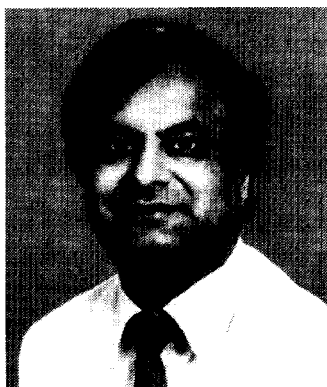


Janpu Hou

Technical Chair

Susan C. Schneider

Dr. Schneider received her B.S. in physics and mathematics from the University of Wisconsin-Stevens Point in 1972, followed with a Ph.D. in physics from the University of Wisconsin-Milwaukee in 1981. In 1981, she joined the Department of Electrical and Computer Engineering at Marquette University, and was promoted to Associate Professor in 1988. She has served as the Associate Chair of the department since 1988. Her teaching interests have been in electromagnetic fields and advanced analog and digital circuit design. Her research interests include theoretical studies of the SAW attenuation and velocity changes produced by electron-phonon, magneto-elastic and acousto-



Narendra K. Batra



Keun-Jenn Sun



Bruce McAvoy

electric interaction in conducting, and superconducting thin films; experimental studies to characterize charge transport mechanisms across the interface formed by the union of dissimilar materials; and developing semiconductive glaze compositions for use as high power, high stress resistors. In addition, she has been involved in developing and implementing signal processing algorithms for "near real time" time differentiation. Dr. Schneider is an active member of the Ultrasonics, Ferroelectrics, and Frequency Control Society of IEEE, and she has just recently been elected to a 3 year term on the UFFCs Administrative Committee. In addition, she has served on the technical program committee for the 1988-1993 IEEE Ultrasonics Symposia.

Finance

Narendra K. Batra

Narendra K. Batra received his Ph.D. degree in solid-state physics in 1972 from Wayne State University.

He is presently a Research Physicist at the Naval Research Laboratory, Washington, DC. His current research interests include NDE characterization of cracks, microstructural variations, thick composites, multilayered structures and Nuclear Magnetic Resonance (NMR). He has published and presented more than forty papers in the areas of Solid-State Physics, Nondestructive Evaluation, NMR and Instrumentation, including an Invited Talk on the NDE of Multilayered Adhesively Bonded Structures. He has also reviewed two books on NDE.

Dr. Batra is a life-time member of the American Physical Society. He is also a member of the American Society for Non-destructive Testing (ASNT) and has been certified by ASNT as an NDT Level III in Ultrasonics, Radiography, and Eddy Currents. He is a Technical Associate Editor of *Materials Evaluation*, the official journal of ASNT.

Dr. Batra has been a Member of the IEEE since 1982, and became a Senior Member in 1989. He is a past Chairman of the Baltimore-Washington-Northern Virginia Chapter of UFFCS. At the present time he is Co-Chairman of the UFFCS Chapters Committee and coordinates the local UFFCS Chapters. He

has been an active member of the IEEE Ultrasonics Symposium Technical Program Committee since 1986. He has also served on the Symposium Organizing Committees in 1986, 1987, and 1989. Finally, he has been Session Chairman for many NDE sessions at IEEE Ultrasonics Symposia.

Publicity

Keun J. Sun

Following his receiving Ph.D. in Physics from University of Wisconsin-Milwaukee in 1986, Keun Jenn Sun obtained a research associateship award from National Research Council, and did research at NASA-Langley Research Center on acoustic waveguide for monitoring curing process of epoxy. Since 1988, he has joined Physics Department, College of William and Mary as a research scientist, and continued working with Nondestructive Evaluation Science Branch, NASA-Langley on ultrasonic measurements on high temperature superconductors for two years, and involved in technology development for airframe structural integrity program recently. His interests in ultrasonics includes studying electron-phonon interaction, spin-phonon interaction in superconducting and magnetic materials, relaxation phenomenon, and application of plate waves to structural defects assessment. He is a member of UFFC, material Research Society, American Physical Society, and of American Association for the Advancement of Science.

Keun Jenn, his wife Doris, and two sons live in Virginia. They enjoyed watching NBA playoffs although were fans of different teams. At leisure time, he likes hiking, musics, playing tennis, and landscape.

Short Courses

Janpu Hou

Janpu Hou was born in Taipei, Taiwan. He received his B.S. degree from Cheng Kung University, and his M.S. and Ph.D. degree in Applied Mechanics from Princeton University, Princeton, New Jersey. His Ph.D. thesis work involved the development of a theoretical model to study the interaction between acoustic waves and electric fields in piezoelectric crystals.

Since joining Allied-Signal Inc. in Morristown, New Jersey in 1984 he has been involved in the design, fabrication and testing of acoustic wave devices and other RF/Microwave components. He also has been involved in the evaluation of new piezoelectric materials and their application to frequency control and signal processing devices. He is presently a Senior Research Physicist in the Solid State Devices Program and works in the areas of material research and sensor development. He has authored or co-authored sixteen technical publications, and he is a co-inventor on one U.S. patent. He has been a member of the Ultrasonics Symposium Technical Program Committee since 1987, and is a member of the American Society of Test Engineers.

Janpu, his wife Yumei and their sons Dennis and Raymond reside in Bridgewater, New Jersey. He is active in community programs and has been listed in American Leaders in Achievement for contributions to Asian American Community in U.S. by American Biographical Institute. He is the Vice President of the Chinese Institute of Engineers in USA, Greater New York Chapter.

Proceedings Editor Bruce R. McAvoy

(SM'68-F'88) received the B.S. degree in physics from the University of Rochester in 1954, with further studies and teaching experience at Carnegie-Mellon University.

He has had extensive experience at the Westinghouse Science and Technology Center in developing microwave components for radar applications, starting in 1957 with solid-state research and continuing to microwave acoustic devices for signal processing and frequency control. More recently, he has been involved with the development of high- T_c microwave filters and resonators. He has published extensively in these fields and holds 11 patents.

In 1983, Mr. McAvoy was awarded the Westinghouse Engineering Achievement Award and in 1990 a Westinghouse Signature Award of Excellence. He is a member of MTT-18,

1993 FREQUENCY CONTROL SYMPOSIUM AWARD WINNERS

Another successful Frequency Control Symposium took place, in Salt Lake City, June 2-4, 1993. Three hundred people registered; 116 papers were presented.

Awards were presented during the plenary session as follows:

Cady Award

The Cady Award was presented to Hirofumi Kawashima, Seiko Electronics Components, Ltd., "for outstanding contributions to photolithographic miniature quartz crystal units with excellent temperature stability." The award was presented by Gary R. Johnson, Sawyer Research Products, Inc.

Rabi Award

The Rabi Award was presented to Robert F. C. Vessot, Harvard-Smithsonian Center for Astrophysics, "for contributions to hydrogen maser technology and applications." The award was presented by Leonard S. Cutler, Hewlett Packard Co.

Sawyer Award

The Sawyer Award was presented to Jack L. Saunders, Saunders and Associates, "for leadership in the development and manufacture of quartz resonator measurement equipment used throughout the industry." The award was presented by Charles Adams, Hewlett Packard Co.



Robert F. C. Vessot, Rabi Award winner; Hirofumi Kawashima, Cady Award winner; and Jack L. Saunders, Sawyer Award winner.

Microwave Superconductor Applications, and chairman of MTT-2, Microwave Acoustics. He has served on the technical program committees for the International Microwave Symposium

and the Ultrasonics Symposium and is on the Editorial Board of the IEEE Microwave and Guided Wave Letters. He was the recipient of an IEEE Centennial Medal.

Distinguished Lecturer Award

Also presented during the Symposium award ceremony was the Distinguished Lecturer Award to John R. Vig, U.S. Army Research Laboratory. The award was presented by UFFC Society President James F. Greenleaf. Vig was elected by the UFFC-Soc Ad Com to be the Society's Distinguished Lecturer for 1992-93. The title of his lecture was "High-Accuracy Oscillators and Clocks."



Award winners and presenters: Back row, James F. Greenleaf, Leonard S. Cutler, Gary R. Johnson, and Charles Adams. Front Row: John R. Vig, Robert F. C. Vessot, Hirofumi Kawashima, Jack Saunders



Distinguished Lecturer Award: James F. Greenleaf, UFFC Society President presenting the award to John R. Vig.



Rabi Award: Leonard S. Cutler on left with Robert F. C. Vessot



Sawyer Award: Charles Adams on left with Jack Saunders.



Cady Award: Left to right: Gary R. Johnson and Hirofumi Kawashima

1994 FREQUENCY CONTROL SYMPOSIUM IN BOSTON

The 1994 IEEE International Frequency Control Symposium will be held at the Boston Westin Hotel, Boston, MA, on June 1-3. The deadline for submission of summaries is 14 January 1994. Summaries should be sent to the Technical Program Committee Chairman:

Dr. Lute Maleki
MS 298-100
Time and Frequency Systems
Research Group
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109
Tel: 818-354-3688
FAX: 818-393-6773
E-Mail: lmaleki @
voyager.jpl.nasa.gov

The General Chairman is Gary Johnson, Sawyer Research Products, and the local arrangements Chairman is Mike Garvey, Frequency and Time Systems, Inc.

50th ANNIVERSARY FREQUENCY CONTROL SYMPOSIUM BASH TO BE IN HAWAII IN 1996

The Frequency Control Symposium will celebrate its 50th anniversary in 1996 in Hawaii. The Symposium will be cochaired by Satoru Fujishima, Japan and John R. Vig, USA. Further details will be published in a future Newsletter.

1994 IEEE International Ultrasonics Symposium

**November 1-4, 1994
Hotel Martinez, Cannes, France**

The 1994 Ultrasonics Symposium will be a very special event. For the first time, this annual meeting is to be held outside the North American territory. Although, this congress welcomes, each year, a large number of overseas participants, a much larger participation from European countries is expected and we expect this symposium to be more international than ever. The location chosen by the ADCOM of UFFC corresponds to a proposal of the Acoustical Society of France. It is the town of Cannes located on the French Riviera. This town is well known all around the world because of the International Film Festival occurring here each month of May. By car, one needs only 30 minutes to go to Nice Airport, and 50 minutes to go to Monaco. The International Ultrasonics Symposium will take place in one of the most famous landmarks of the French Mediterranean seashore: Hotel Martinez. It is a jewel of Art Deco design with a commanding position on the famous La Croisette overlooking the sea. This hotel features 430 rooms and offers some of the most spacious accommodation on the Côte d'Azur. The hotel is the haunt of *la crème de la crème* of the movie world with frequent guests including Gina Lollobrigida, Robert Mitchum, Julie Andrews and Blake Edwards. For meeting purposes, the hotel features 2,000 square meters of space and scientific sessions, meetings and exhibition will be held inside the hotel. The organizing committee of this meeting wants to invite people from all around the world to actively participate in this meeting. The format of the meeting will be quite classical, but a European touch will be added and it will be an unforgettable occasion for many of you to discover or rediscover what is going on in Ultrasonics in Europe. In advance and on behalf of the organizing committee: "Bienvenue à Cannes".

**Gérard Quentin
General Co-Chair**

1995 IEEE International Ultrasonics Symposium

The 1995 International Ultrasonics Symposium will be held in Seattle WA the week of 6-11 November. The host hotel is the Westin conveniently located in downtown Seattle. Due to the Seattle location, there is expected to be an especially strong contribution from the medical ultrasound community. Helen Routh of the Advanced Technology Laboratories in Seattle has been helping with local arrangements. The Technical Chair will be George Alers from the National Institute of Standards and Technology (NIST) in Gaithersburg MD.

We are encouraging companies to consider renting booth space to exhibit their product line at the symposium which typically attracts 500 to 600 attendees. Interested parties are invited to contact the General Chair, Gerald Blessing, on 301-975-6627 at NIST in Gaithersburg for further information.

Top State Prize Awarded for SAW Device Developments

Russia's highest award was given to an eight person team of Russian scientists and engineers for creating the scientific basis for developing and introducing SAW devices into radio-



Russian Awardees: Vladimir Novikov, Igor Yakovkin and Pyotr Kandyba

electronics in the Former Soviet Union. The awardees were V. Gulayev, D. Karpeev, S. Kondratiev, V. Praporshokov, V. Pustovoi, V. Novikov, P. Kandyba, and I. Yakovkin. The decree for the state prize was signed by President Boris Yeltsin of Russia on June 8, 1993. The prize, presented in July, included a certificate, gold medal, and a monetary reward.

Shown in the accompanying photograph are three of the awardees in attendance at the Microsystems, Sensors, and Acoustoelectronics Conference in St. Petersburg, Russia, the 21st through the 23rd of June, 1993. Professor Vladimir Novikov is a Chief Scientist and Department Head with AVANGARD in St. Petersburg, Professor Igor Yakovkin is Head of the Acoustoelectronics and Acoustooptics Laboratory of the Institute of Semiconductor Physics in Novosibirsk, and Pyotr Kandyba is Director of the Scientific Research Institute of PHONON in Moscow. Professor Yakovkin is a member of the IEEE and of our Ultrasonics, Ferroelectrics and Frequency Control Society.

Our congratulations to Professor Yakovkin and the other award winners.

Everything's "rosy" with Distinguished Lecturer

As our Distinguished Lecturer, Eric Adler, continues to schedule his talks (sorry we don't have a listing), it was brought to the newsletter editor's attention that there was a typo error in his e-mail address at McGill. Please make a note that the e-mail address should read @rosy, (not @rssy). Be sure and contact Eric to let him know when you expect him to visit your area. Here is the complete list of ways to get in touch with Eric if you haven't already.

Address:

McGill University
3480 University Street
Montreal, PQ, H3A 2A7
Canada

Telephone: 514 398 7114

FAX: 514 398 4470

Telex: 05 268 510

E-mail:

adler@rosy.lan.mcgill.ca
or e.adler@ieee.org

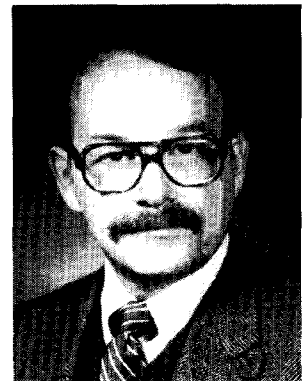
President's Message

The Ultrasonics, Ferroelectrics, and Frequency Control Society continues its mission of electro-technology information dissemination in good health. The *Frequency Control meeting in Salt Lake City* in early June was a great success, thanks to the meeting chair, Gary Johnson and his program committee. The meeting included 16 tutorials which were particularly well received, thanks to organizer, David Allan and all of the tutors. We all look forward to the 1993 Ultrasonics Symposium in Baltimore in early November. I hope it cools off by then!

IEEE continues to develop new publishing methods including CD-ROM and perhaps electronic publication of many products including transactions. The administrative committee is watching this closely for use by our Society. The applications issue of the UFFC Transactions is well on its way to publication. The special issue on correlation is now taking shape. We are open to any suggestions as to subject and editorship of future special issues of the Transactions. We are also open to suggestions as to subjects for CD-ROM publications and videotaped tutorials.

Please feel free to contact the chairs of our technical committees with any new ideas about products or services in their fields of interest. The chairs are L. E. Cross, Ferroelectrics; Tom Parker, Frequency Control; and Gerry Farnell, Ultrasonics.

If you want to become active in the Society and run for election to the ADCOM, contact Bernie Tittmann. All addresses are in the inside covers of the Transactions. We can look forward to an exciting time in the fields of interest to our Society over the next few years, and I look to many new (and old) faces in the cadre of volunteers that run this Society.



James Greenleaf
UFFC-S President

INTRODUCING . . .

KATHY FERRARA — CHAPTERS-MEMBERSHIP CHAIR

Katherine W. Ferrara was born in Pittsburgh, PA. She received the B.S. Degree in physical therapy from the University of Pittsburgh, Pittsburgh, PA in 1976, the B.S. and M.S. in electrical engineering from the California State University, Sacramento, in 1982 and 1983, respectively, and the Ph.D. in electrical engineering and computer science from the University of California, Davis, in 1989.

From 1976 to 1980, she practiced physical therapy at the Children's Hospital of Akron, and the Home for Crippled Children, Pittsburgh, PA. From 1983 to 1988, she worked for Sound Imaging, Inc., Folsom, CA and for General Electric Medical Systems, Rancho Cordova, CA, in the areas of magnetic resonance and ultrasound imaging. She is currently an Associate Professor in the Department of Electrical and Electronic Engineering at the California State University, Sacramento and a research associate with CIPIC, the Center for Image Processing and Integrated Computing, University of California, Davis. Her research interests are in the fields of signal and image processing, and biomedical engineering. Her current research involves the development of models and estimation techniques for the analysis of ultrasonic echoes from blood and tissue, and is supported by the National Science Foundation, the National Institutes of Health and the Whitaker Foundation.

Dr. Ferrara is a member of Tau Beta Pi and Sigma Xi, and the Ultrasonics Symposium Technical Program committee.

She and her husband Patrick live in Folsom, CA and enjoy jogging and gardening.



ANN SCRUPSKI — IEEE NEWSLETTER MANAGER

Ann Scrupski has been working at the IEEE since December 1990. She is the Newsletter Manager for the Magazines and Newsletters Department. She is responsible for the full production of the newsletters for 13 societies of the IEEE, including UFFC-S. Ann's job involves preparing text and graphic files from different sources to be used in the desk-top publishing program, designing and laying out the pages, and finally checking the page film negatives that are then shipped to the printer. Ann likens her job to doing a jigsaw puzzle of various layers, first piecing together elements of one page, then putting the pages together so that they fit properly and add up evenly in the final form. She also juggles the production of several newsletters at one time.

Ann holds a B.A. degree in Anthropology from Cook College, Rutgers University. She has worked in the production end of the publishing field for many years starting as a typesetter in Cambridge, MA. While working for a major book typographer, she helped set up a typesetting operation on the island of Barbados.

Ann's hobbies involve almost anything outdoors — especially bird watching, hiking, fishing and enjoying the New Jersey shore.

The IEEE Magazines and Newsletters Department is state-of-the-art in desk-top publishing, using softwares such as Ventura Publisher, Corel Draw, and PhotoShop for almost complete electronic publishing.



CALL FOR PAPERS

Special Issue on Thin-Films for Acoustoelectronics

(Submission Deadline May 1, 1994)

The IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control invites the submission of papers on thin-films used for acoustoelectronic applications. The papers should specifically describe results where thin-films are the major contributor to the acoustoelectronic application area of interest. Basic papers on the properties of thin-films and particularly new films which have acoustoelectronic application potential are also welcomed. The following are some suggested thin-film related topics for this special issue.

- SAW Devices
- BAW Devices
- Acousto-optic Devices
- Acoustoelectronic Sensors
- Acoustic Imaging
- Mechanical and Elastic Properties
- Piezoelectric and Transducer Properties
- Material Q and Propagation Loss

Contributed papers should be sent to the Editor-in-Chief

William D. O'Brien, Jr.
Department of Electrical and
Computer Engineering
University of Illinois
1406 West Green Street
Urbana, IL 61801

In the transmittal letter, identify that the contribution is being submitted for publication consideration in the Special Issue on Thin-Films for Acoustoelectronics. Consult the "Information for Contributors" which appears in the Transactions for manuscript preparation requirements. All papers will be subject to the normal peer-review process. Submission deadline is May 1, 1993 and the expected publication date is late 1994 or early 1995. The guest editors for this special issue are Fred Hickernell, Motorola, Noriyoshi Chubachi, Tohoku University and Adrian Venema, University of Delft.

THE IEEE IN THE 21st CENTURY

Since August 1992, the Strategic Planning Committee and selected volunteers and staff leaders have been preparing a long-range IEEE Strategic Plan. A preliminary draft version of the Plan has been published for the purpose of soliciting comments and recommendations for change. The IEEE publication *The Institute* will carry Part I of the Plan. Those mem-

bers of UFFC-S wishing to participate in the review of the Plan should contact Henry L. Bachman, Chairman, Strategic Planning Committee, IEEE Headquarters, 345 East 47th Street, New York, NY 10017. He may be reached at the following e-mail address: strategy@ieee.org.

Future UFFC-S Sponsored Symposia

INTERNATIONAL ULTRASONICS SYMPOSIA

1994 IEEE Ultrasonics Symposium

Cannes, FRANCE —
1-4 November 1994

For information contact:

Gerard J. Quentin, General Co-Chair
G. P. S. Tour 23
Universite Paris 7
2 Place Jussieu
75251 Paris CEDEX 05
FRANCE
(33) 1-43-29-51-22

or

Herman van de Vaart,
General Co-Chair
Allied-Signal, Inc.
Research & Technology
P. O. Box 1021
Morristown, NJ 07962
(201) 455-2482

Bernhard R. Tittmann,
Technical Program Chair
The Pennsylvania State University
Department of Engineering
Science & Mechanics
228B Hammond Building
University Park, PA 16802-1484
(814) 865-7827

1995 IEEE Ultrasonics Symposium

Seattle, WA — 7-10 November 1995
For information contact:
Gerald V. Blessing, General Chair
National Institute of Standards
and Technology
Building 233, Room A-147
Gaithersburg, MD 20899
(301) 975-6627

1996 IEEE Ultrasonics Symposium

Deep in the heart of Texas —
Fall 1996

INTERNATIONAL FREQUENCY CONTROL SYMPOSIA

1994 IEEE Frequency Control Symposium

Boston, MA — 1-3 June 1994

For information contact:

Gary Johnson, General Chair
Sawyer Research Products
35400 Lakeland Boulevard
Eastlake, OH 44095
(216) 951-8770

Lute Maleki, Technical Program Chair
Jet Propulsion Laboratory/CIT
Time & Frequency Systems
Research Group
4800 Oak Grove Drive
MS-298-100
Pasadena, CA 91109
(818) 354-3688

1995 IEEE Frequency Control Symposium

San Francisco, CA —
31 May - 2 June 1995
For information contact:
John Vig, General Chair
Army Research Laboratory
AMSRL-EP-ME
Fort Monmouth, NJ 07703-5601
(908) 544-4275

Lute Maleki, Technical Program Chair
Jet Propulsion Laboratory/CIT
Time & Frequency Systems
Research Group
4800 Oak Grove Drive
MS-298-100
Pasadena, CA 91109
(818) 354-3688

BROWN SAVES TREES

Did you catch the article in the May/June issue of *The Institute* entitled "First Almost Paperless Meeting A Success?" Credit was given to the past president of our society, Jan Brown, who pushed for the paperless meeting. Besides the elimination of most all paper, there were several other benefits noted. One very interesting comment was that if properly networked, the business meeting could be conducted in one-fifth of the time. How about a paperless newsletter, Jan, once we have all our members electronically networked?

1996 IEEE Frequency Control Symposium

Hawaii — June 1996
For information contact:
John Vig
Army Research Laboratory
AMSRL-EP-ME
Fort Monmouth, NJ 07703-5601
(908) 544-4275

FERROELECTRICS SYMPOSIUM

1994 IEEE International Symposium on Applications of Ferroelectrics

University Park, PA —
7-10 August 1994
For information contact:
A. S. Bhalla, General Chair
Materials Research Laboratory
Pennsylvania State University
University Park, PA 16802
(814) 865-9232
Fax: (814) 865-2326

Happy Fortieth UFFC-S

If life begins at forty, then the Ultrasonics, Ferroelectrics and Frequency Control Society is on the brink of a bright future. It was forty years ago our IEEE Society was born. The first Administrative Committee of the then IRE Professional Group on Ultrasonic Engineering (PGUE) was made up of the following:

Chairman:	Amor L. Lane		
Secretary:	Morris Kenny		
Members:	J. Bernstein	W. G. Cady	M. D. Fagen
	W. J. Fry	F. Massa	O. Mattiat
	W. J. Mayo-Wells		P. L. Smith

To recapture a historical perspective of the early thinking of the founders and membership information at the end of 1953, the following are excerpts from two articles appearing in the first Transactions issue published in June 1954, entitled "History, Plans, and Policies of the PGUE," by Chairman Amor L. Lane, and "Our Membership - Who We Are and Where," by Morton Fagen.

"History, Plans and Policies of the PGUE", A.L. Lane

This, the first issue of the IRE Transactions of the PGUE, justifies a type of report which traces the history of our group and which describes our present plans and policies.

During the IRE Convention in March 1953, an informal public meeting was held on a "grass roots" level to determine the need and feasibility of an IRE Professional Group on Ultrasonics Engineering (PGUE). The immediate enthusiastic response signified that not only was such a Group needed but that a rapid expansion was insured. The history of the Group today confirms these earlier beliefs.

Six weeks later, on May 6, 1953, the first Administrative Committee meeting was held in Washington, D.C. Officers were elected and committees were appointed. It was decided that the Group would be concerned primarily with ultrasonic application, devices, techniques, and associated circuitry. Emphasis is to be on engineering aspects of ultrasonics.

At this first Administrative Committee meeting, the PGUE also accepted an invitation to sponsor a session at the National Electronics Conference (NEC) in Chicago to be held in September. The chairman of this session was Dr. William J. Fry of the University of Illinois. "Standing Room Only" was the response to this, the first session ever sponsored by the PGUE.

One month later, in October 1953, the PGUE was to cosponsor two sessions on industrial ultrasonics in Cleveland with the Acoustical Society of America. These sessions included a round-table discussion with Dr. Frank Massa as moderator on various aspects of ultrasonics followed by a lively audience-panel discussion. This round-table discussion was probably one of the highlights of the entire Acoustical Society Symposium. The collaboration between the IRE and the Acoustical Society last October was the first of its kind between these two Societies.

The second Administrative Committee meeting held in Cleveland in October 1953, outlined the plans for the first issue of the Transactions. An annual assessment of \$2.00 was decided upon in order to help pay for the cost of publication of the Transactions. Plans were also made for the participation of the PGUE at the annual Convention in March 1954. The two ultrasonic panels arranged by the PGUE serve to illustrate once again the wide breadth of interest encompassed by ultrasonics.

It is interesting to note that eighty per cent of our members do not belong to any other society associated with the field of ultrasonics. Thus we have succeeded in organizing a large bloc of engineers and scientists who have heretofore had no official medium of their own through which they could express their views or describe results of their work.

"Our Membership — Who We Are and Where", M.D. Fagen

Examination of our membership at the close of 1953 gives us a feeling of satisfaction in the widespread interest in ultrasonics engineering from both the geographical and professional standpoints.

We have representation in every one of the IRE regional areas and in England, Switzerland, Sweden, Japan and India. The following sections have membership of four or more, a number of which might be considered a good nucleus for further expansion and ultimate establishment of Professional Group chapters:

Boston	Connecticut Valley	Long Island
New York	Northern New Jersey	Schenectady
Philadelphia	Washington	Baltimore
Princeton	Columbus	Detroit
Chicago	Los Angeles	San Francisco
San Diego	Seattle	

Of these, Boston, New York and Washington, with 23, 22 and 35 members respectively, are, even at this early date in the Group's history, ripe for Chapter formation.

Our members are concerned with research, development, design and manufacture of ultrasonic devices. Sixty-nine per cent are in industrial establishments, two-fifths in research and development, and three-fifths in manufacturing engineering. Sixteen per cent are in government laboratories, about half of them doing research. Ten per cent are in educational institutions equally divided between teaching and research as their major effort. The remaining five per cent do other things.

Looking at the members again to see what their responsibilities are, we find 75% are on the technical staffs of their organizations, 18% are managers, 1% own their businesses and 6% fall in other categories.

And with our final glance, we can certainly say that a lot of people are interested in ultrasonics engineering, working in it, confident in a future with new ideas, new applications, new problems and aware of the need for an active Professional Group in the I.R.E.

IEEE FELLOW NOMINATIONS

It is not too early to be thinking about Senior Members of the UFFC-Society that you would like to nominate for the Fellow grade. Nominations will be due in April of 1994 and forms will be ready by the end of 1993. To refresh your memory on the process it is described in the paragraphs that follow which focuses on the IEEE Fellow Committee and how it operates.

The IEEE Bylaws define the Fellow grade as one of unusual distinction in the profession, to be conferred only by initiation of the Board of Directors upon a person of outstanding and extraordinary qualifications and experience in the IEEE designated fields, who has made important individual contributions to one or more of those fields. A nominee must be a Senior Member of the Institute, and have been a member in any grade for at least five years prior to January 1 of the year of election.

The Fellow Committee, appointed by the Board of Directors, has the responsibility of making recommendations to the Board of Directors for nominees to be conferred the grade of Fellow.

The Fellow Committee acts as a guardian of IEEE Fellow grade standards and works carefully and faithfully to maintain

these standards uniformly throughout the IEEE. The committee is concerned with determining whether the applicants meet the requirements of the IEEE Bylaws and it seeks assistance from many sources in adjudicating the nominations.

The Fellow Committee depends upon the nominator of a candidate to furnish all of the basic necessary information requested on the nomination form, and to point out the unique contributions of the candidate in a concise and succinct statement.

The Fellow Committee depends upon the society evaluations of the technical contributions of the candidates, and their ranking of the candidates.

The Fellow Committee depends upon the Fellow grade references to comment on the candidate's specific achievements which they are qualified to judge.

The Fellow Committee will consider brief letters of endorsement from IEEE sections, chapters and committees.

In the processing by the Fellow Committee, the candidates' dossiers are evaluated on a basis of eight criteria:

1. Individual contributions as engineer, scientist, originator, technical leaders, or educator.

2. Evaluation by an IEEE society. Note that only one IEEE society evaluation is to be submitted for each candidate. The nominator is responsible for selecting the IEEE society that best reflects the candidate's field of technical accomplishments.
3. Tangible and verifiable evidence of technical accomplishments, such as technical publications, patents, reports, or published descriptions of products, facilities, and/or service.
4. Opinions of confidential Fellow references who are qualified to judge the work of the candidate (where possible, these should be associated with other than the candidate's own organization).
5. Service to IEEE and its predecessors, the AIEE or IRE.

6. Professional engineering service other than the IEEE.
7. Opinions of endorsers.
8. Total years in the profession.

Having considered all of the valuable information supplied from these many sources, a consensus of committee judgments is reached on the nominees to be recommended to the Board of Directors for evaluation to the IEEE Fellow grade, taking into account the maximum number of recommendations permitted by the IEEE Bylaws which can be submitted annually.

If you are interested in nominating one of our UFFC Society members you may obtain the necessary forms from Dolores Wright, IEEE Fellow Committee, 345 East 47th Street, New York, NY 10017, (212) 705-7750.

Chapter Activities

TOKYO CHAPTER

The Tokyo Chapter held the following five technical meetings during the first half of 1993, in conjunction with the Technical Group on Ultrasonics of the Institute of Electronics, Information and Communications Engineers of Japan.

Date	Papers	Place
1) January 27-28	17	Kyoto
2) February 24	7	Tokyo
3) April 23	6	Tokyo
4) May 26	5	Tokyo
5) June 18	6	Kawasaki

The 14th Symposium on Ultrasonic Electronics (USE93) will be held under the sponsorship of the UFFC-S

Tokyo Chapter on December 7-9, 1993, at the Tsurumi Kaikan in Yokohama. Most of the papers presented at the last year's Symposium (USE92) have recently been published in the special issue of Jpn. J. Appl. Phys., Vol. 32, No. 5B(1993).

We are inviting Prof. E. Adler, the UFFC-S 1993-1994 Distinguished Lecturer, to Japan. He kindly accepted our invitation to give some lectures at several meetings such as the USE93. Tokyo Chapter is now contacting him to arrange the schedule of his lectures.

Kiyoshi Nakamura
Vice Chairman
UFFC-S Tokyo Chapter

PHOENIX CHAPTER

A Phoenix Chapter of the Ultrasonics Ferroelectrics and Frequency Control (UFFC) Society was formed with its official status recognized by the IEEE earlier this year. The Phoenix Chapter is linked with the Phoenix IEEE Section through the Waves and Devices Chapter. This Chapter includes the Antenna and Propagation Society (APS), the Electron Device Society (EDS), Electromagnetic Compatibility (EMC), Lasers and Electro-Optics Society (LEOS), and Microwave Theory and Techniques (MTT). Waves and Devices has two seminars a month held at Arizona State University on late Thursday afternoons. A dinner for those interested follows the seminar.

The UFFC Society inaugurated its meeting schedule in the spring with a talk by the Distinguished Lecturer Dr.

John Vig of the Army Research Laboratory entitled "High-accuracy Oscillators and Clocks." There were thirty attendees and the presentation was very well received.

Plans are to have the Distinguished Lecturer for 1993-1994, Professor Eric Adler, visit Phoenix this winter to present his talk on "Surface Acoustic Wave Devices Fundamentals, Current Status, and Future Trends." If any of our UFFC members are planning on being in Phoenix between September 1993 and April 1994 and would consider giving a presentation of general interest to the IEEE Waves and Devices community, please contact Fred Hickernell (602) 441-2923.

Fred S. Hickernell
Chapter Representative

Request For Nominations

UFFCS ACHIEVEMENT AWARD

You are invited to nominate a member of UFFC Society for special recognition through the ACHIEVEMENT AWARD. The award is given in recognition of significant technical publications in Ultrasonics, Ferroelectrics, or Frequency Control, for presentation of lectures, and/or service to the Society. The award covers the entire society and includes all technical specialties. Selection is made by the Officers and Awards Committee.

Photocopy this section and send via FAX or mail:
(You may submit more than one if you wish.)

Here is my nomination for **Achievement Award**:

Nominee's Name & Main Contributions: _____

Your Name/Address: _____

Send by December 1 to: Roger H. Tancrell
Chair, UFFCS Awards Committee
Raytheon Research Division
131 Spring Street
Lexington, MA 02173
Tel: (617) 860-3072
FAX: (617) 860-3195

Call For Nominations

FOR THE NEXT DISTINGUISHED LECTURER AND/OR TOPIC

Every year UFFCS selects a Distinguished Lecturer to represent the Society at Colloquia around the world. Recent lecturers have spoken to local IEEE chapters, universities and companies throughout North America, Japan, Europe, China and South America. The Distinguished Lecturer represents our Society to the larger technical community, and stimulates interest in the Society's professional areas.

What topics would you like to hear, and who are speakers whom you think can represent our Society? Here's your chance to influence the next lecturer!

Photocopy this section and send via FAX or mail:
(You may submit more than one if you wish.)

Suggestions for the next **Distinguished Lecturer and/or Topic**:

Your Name/Address: _____

Send by December 1 to: Prof. Mack A. Breazeale
Chair, UFFCS Distinguished Lecturer
Subcommittee
The National Center for Physical Acoustics
University of Mississippi
University, MS 38677
Tel: (601) 232-7490
FAX: (601) 232-7494

CALL FOR PAPERS

1994 IEEE International Frequency Control Symposium

JUNE 1-3, 1994

The Westin Hotel, Copley Place
Boston, Massachusetts

GENERAL CHAIRMAN:

Mr. Gary Johnson
Sawyer Research Products, Inc.

TECHNICAL PROGRAM CHAIRMAN:

Dr. Lute Maleki
Jet Propulsion Laboratory

FINANCE CHAIRMAN:

Dr. Thomas E. Parker
Raytheon Research Division

On the first page of the summary, in the upper right hand corner, please indicate the topic from the list of "Symposium Topics" that best characterizes the paper and whether you prefer to present your paper at an oral or poster session.

Deadline for submission of summaries is 14 January 1994. Authors will be notified of acceptance of papers by 19 March 1994. Accepted papers will be published in the Proceedings of the 1994 IEEE International Frequency Control Symposium. Complete manuscripts are required by 24 June 1994.

Symposium Topics

The IEEE International Frequency Control Symposia has served as the leading technical conference addressing all aspects of frequency control and precision timekeeping. Authors are invited to submit papers dealing with recent progress in research, development and applications in areas represented by the following topics:

- Fundamental Properties of Piezoelectric Crystals
- Theory and Design of Piezoelectric Resonators
- Resonator Processing Techniques
- Filters
- Surface Acoustic Wave Devices
- Quartz Crystal Oscillators
- Microwave and Millimeter Wave Oscillators
- Synthesizers and Other Frequency Control Circuitry
- Atomic and Molecular Frequency Standards
- Noise Phenomena and Aging
- Frequency and Time Coordination and Distribution
- Sensors and Transducers
- Applications of Frequency Control
- Measurements and Specifications

Awards

Nominations for the Cady, Rabi and Sawyer Awards should be sent to Dr. Lute Maleki at the address in the Instructions for Authors section by 14 January 1994. Information about these awards and about the nominating procedure can be found on page 2 of the 1992 Proceedings and on the Index disk.

Exhibits

A centralized products, equipment and information exhibit area will be featured at the Symposium. For information on how to arrange for your exhibit please contact:

Michael R. Mirarchi
Synergistic Management Inc.
3100 Route 138
Wall Township, NJ 07719
Tel: 908-280-2024

Exhibit booths cost \$725.00 per booth.

The deadline for exhibit arrangements is 4 March 1994.

Instructions for Authors

Two copies of a summary in sufficient detail for evaluation of the proposed paper (at least 500 words), together with the author's name, address and telephone number should be sent to:

Dr. Lute Maleki — MS 298-100
Time & Frequency Systems Research Group
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109
Tel: 818-354-3688
Fax: 818-393-6773
E-Mail: lmaleki@voyager.jpl.nasa.gov

Travel Support

Presenters from Outside of the U.S.

Limited funds are available to support travel of presenters from outside of the USA. Requests for support must be included with the paper summary. It should identify the presenter, and the degree of support required, i.e., all expenses in the USA only, or a specific dollar amount for partial support. (All else being equal the smaller the request, the higher the probability of support.)

Student Authors/Coauthors

Limited funds are available to support the travel of student authors (from anywhere). Requests must be included with the summary.



A JOINT IEEE/OSA PUBLICATION



Journal of LIGHTWAVE TECHNOLOGY

THE JOURNAL OF LIGHTWAVE TECHNOLOGY is published by the Optical Society of America and the following seven societies of the IEEE:

Aerospace & Electronic Systems Society
Instrumentation & Measurement Society
Microwave Theory & Techniques Society
Ultrasonics, Ferroelectrics, and Frequency Control Society
Communications Society
Electron Devices Society
Lasers & Electrooptics Society

THE JOURNAL is published monthly, as a single source for engineers and scientists making use of new contributions to the general field of fiber and integrated optics. Some topics included are:

Optical Fibers & Fiber Components
Active & Passive Guided-Wave Components
Integrated Optics and Optoelectronics
Optical Systems & Subsystems
Networks & Switching
New Applications & Unique Field Trials
Optical Sensors

Journal of Lightwave Technology 1993 SUBSCRIPTION ORDER FORM

This JOURNAL is published monthly.

1993 Subscription Prices (Surface Delivery)	†Optional (additional) Air Freight Charge	
	*Area 1	**Area 2
OSA Member \$43.00	\$52.00	\$89.00
IEEE Member \$32.00	\$52.00	\$89.00
Nonmember \$386.00	\$52.00	\$89.00

Member rates are restricted to members of OSA and/or members of one or more of 8 IEEE Societies.

† Available to all countries outside the U.S.A., Canada, and Mexico.

* Area 1 includes the U.K. and Western and Eastern Europe.

** Area 2 includes the Mideast, Africa, Asia, Oceania, Australia, and Central and South America.

Contact the IEEE Service Center for the special rates for microfilm and microfiche editions, and other information.

Please enter my 1993 subscription. I hold the following Society membership(s):

☐ OSA, ☐ Aerospace and Electronic Systems, ☐ Communications, ☐ Electron Devices,
☐ Instrumentation and Measurement, ☐ Microwave Theory and Techniques, ☐ Lasers and Electrooptics,
☐ Ultrasonics, Ferroelectrics, and Frequency Control.

To claim member rate, enter member number below:

OSA Member No. _____ IEEE Member No. _____

Subscription Price \$ _____ Air Freight Charge \$ _____

Total Amount Enclosed \$ _____

Depending on your membership, make check payable to either OSA or IEEE in U.S. dollars drawn on a U.S. bank.

Name: _____

Street Address: _____

City: _____

State/Postal Code/Country: _____

Photocopy this form and return with payment to either:

IEEE Service Center
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331
U.S.A.

or

OSA
2010 Massachusetts Ave., NW
Washington, DC 20036, U.S.A.

Tracking Code											
Event Code						Brochure Code					
P	J	L	T	2	4	1					

Editor's Note

As I put these newsletters together I become ever more aware of all of the volunteer effort that goes into keeping our society a very technically relevant and dynamically active one in the IEEE. This was especially so with this issue in the year we celebrate our 40th anniversary. The founders of the Professional Group on Ultrasonic Engineering recognized a need for an ultrasonic society that was not being satisfied by the then existing scientific and engineering societies. Giving birth, even to a society, is painful in the early stages and requires considerable dedication, patience, persistence and a continued vision on the part of the officers and the membership. Although we only see a small number of those early participants still active in our society and in the IEEE, we have to be grateful for all the early work that they did.

It becomes mind boggling to attempt to count up all the volunteer hours that have gone into society work over the past 40 years. The names and a few photos of some of today's volunteers are in this newsletter. Harry Salvo and his Organizing Committee have planned a great Ultrasonics Symposium in Baltimore. Susan Schneider and all those Technical Program Committee members have an outstanding technical program in store. The Frequency Control Symposium Committee had a very successful meeting in Utah and are looking forward to meetings in Boston and Hawaii. The Ferroelectrics Committee is hard at work putting together next year's conference in Pennsylvania. Have you started saving your "francs" for the 1994 Ultrasonics Symposium in Cannes?

There were some introductions to be made in this issue. Kathy Ferrara is working hard to get the word out about

membership in our society. She recently prepared a very informative and eye pleasing brochure about the UFFC. Get some copies and recruit colleagues. We continue to draw new members from all over the world. I also wanted to introduce you to a very important person with the IEEE publishing services. I sat in a recent newsletter editors' meeting in Piscataway with Ann Scrupski and got better acquainted with this delightful and hard working newsletter manager. Ann continues to do a super job of turning out a polished newsletter from an envelope full of papers, disks, and photos.

There is the President's message, chapter activities, and other articles which I hope will be informative. There is even some work for you to do in sending in Fellow nominations and nominations for the Achievement Award and the Distinguished Lecturer.

Thresa and I were privileged to be in St. Petersburg, Russia and Dresden, Regensburg, and Ilmenau, Germany in June where we visited friends and new members of our society. It has been one of life's blessings to have become friends with so many people outside the United States through the UFFC and its symposia. I know many of our members have shared this same feeling.

In signing off I certainly need to thank all those who supplied articles and photos. I encourage others of our membership to share stories and photos which would be of interest to our membership. Please send copy for the next newsletter to the editor by March 15, 1994. My address is still Motorola GSTG, 8201 E. McDowell, Scottsdale AZ 85252, and the phone number is (602) 441 2923.

Fred S. Hickernell



The INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS, Inc.
445 Hoes Lane, P.O. Box 1331 • Piscataway, NJ 08855-1331, USA

**Non Profit Org.
U.S. Postage
PAID
IEEE
Permit #52**