



**IEEE
ULTRASONICS,
FERROELECTRICS,
AND
FREQUENCY CONTROL
SOCIETY
NEWSLETTER**



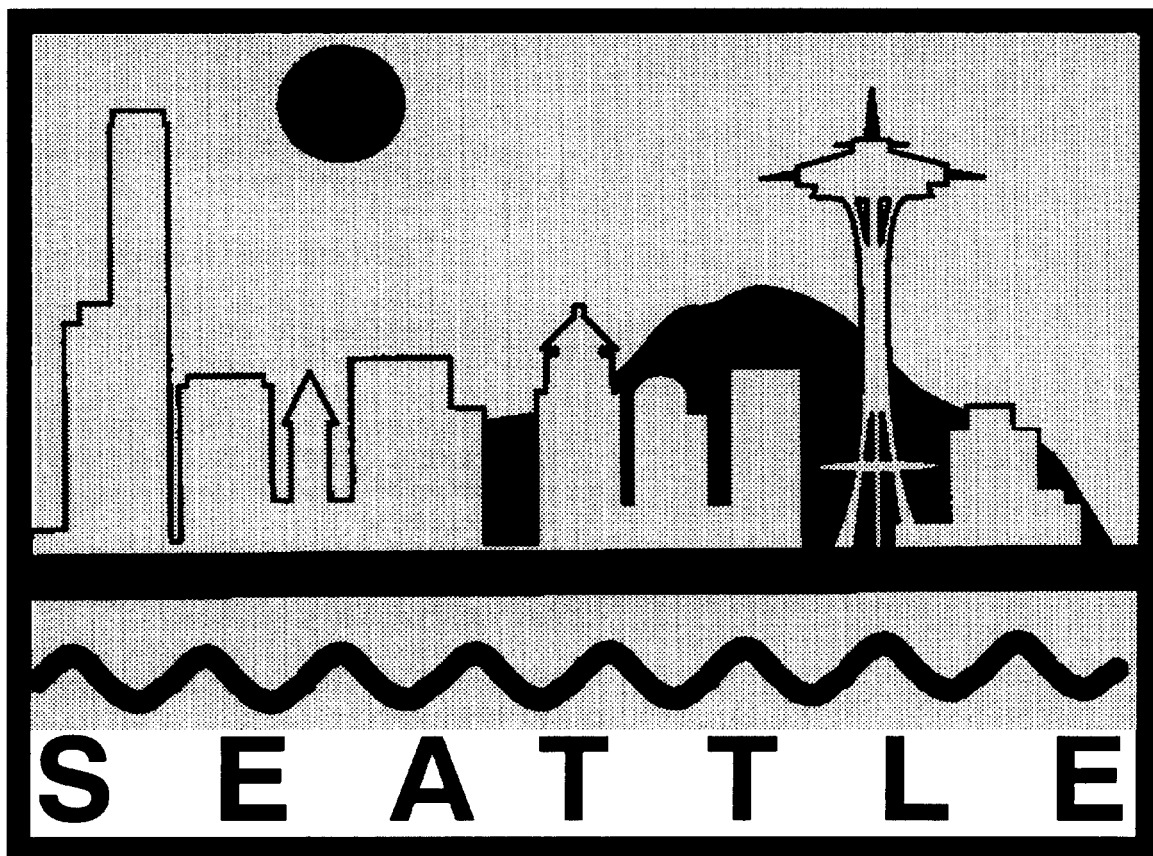
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Seattle, Washington

November 7-10, 1995



**1995 IEEE
International Ultrasonics Symposium**

1995 IEEE INTERNATIONAL ULTRASONICS SYMPOSIUM

Tuesday, November 7, 1995 – Friday, November 10, 1995
Westin Hotel – Seattle, Washington

INVITATION FROM THE GENERAL CHAIR

It is a privilege to welcome your participation in the 1995 IEEE International Ultrasonics Symposium. For the first time in our 37 year history, the symposium is being held in Seattle, Washington. This is timely and appropriate considering the significant medical ultrasound technology base that has developed in the area.

The extraordinary response to our Call for Papers promises to yield a program of significant depth and widespread interest. We encourage you to participate as much as possible both in the technical program and the social activities. A series of four-hour short courses on Tuesday will be followed by oral and poster sessions Wednesday through Friday. Social events are planned for Wednesday and Thursday evenings, and guest tours are planned each day.

With pride and pleasure, I recognize and thank each volunteer of the Symposium Organizing Committee: **George Alers, Doron Kishoni, Helen Routh, Peng Jiang, Gary Brandenburger, Janpu Hou, and Moises Levy.**

In turn, our committee appreciates the contribution of the Technical Program Committee which produces the Symposium's technical sessions; and the guidance provided by the Administrative Committee of The Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC-S), under whose auspices the Symposium is organized.

As we convene in Seattle, may we all both benefit from and contribute to the symposium by our participation.

Gerald V. Blessing
General Chair

1995 IEEE International Ultrasonics Symposium

SEATTLE AREA

Seattle is surrounded by splendid vistas. Snow-capped mountains, evergreen forests, and stretches of salt and fresh water give rise to Seattle's nickname: *The Emerald City*.

Flanked by the Cascade Range with stunning Mt. Rainier to the east and the Olympic Mountains to the west, Seattle occupies a slender isthmus between Puget Sound — a saltwater arm of the Pacific Ocean — and freshwater Lake Washington. With a population of over one-half million, it anchors a greater metropolitan region of more than two million.

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The mountains and water are responsible for Seattle's mild maritime climate. In November the average high temperature is 11°C (52°F) and the average low is 5°C (41°F). The average precipitation during this month is significant, falling in a mist that helps to produce the "emerald" surroundings. Therefore, light jackets and an umbrella are suggested for your comfort.

Seattle is built on seven hills, giving a gentle slope to its streets and providing for fine views of the harbor. The towering Space Needle has been Seattle's most visible landmark since it formed the centerpiece for the 1962 World's Fair and helped establish a cultural heart for the city. Seattle is indeed a "walking city", with the older Pike Place Market on the waterfront forming its soul.

The front doors of the Westin, located at 1900 Fifth Avenue, form a "gateway to the city". The Seattle Center Monorail, connecting the Space Needle to the downtown area, runs by the hotel. The new Seattle Art Museum is noted for its collection of Native American art.

Leaving the city, many of the area's leading attractions lie nearby. There is the Museum of Flight with its Great Gallery of historic aircraft at Boeing Field. Mountains are within an hour's drive of the city. Victoria — Canada's "English City", and Vancouver are convenient one-day trips.

Welcome to *The Emerald City* surrounded by blue waters and snow-capped mountains.

AIRLINE INFORMATION

United Airlines is offering special discount airfares to Symposium attendees: 10% off coach fares and 5% off the lowest available super saver fares. Travel arrangements with United Airlines, or the carrier of your choice, can be made through IEEE Travel Services within the U.S. by calling: **800-TRY-IEEE (800-879-4333)**. Outside the U.S., call collect 908-562-5389 between 8:30 am and 5:30 pm EST, Monday through Friday. Or you may FAX your requirements to 908-562-8815, indicating your travel dates, departure time, phone and your own FAX number. A travel counselor will then contact you as soon as possible.

Please indicate your affiliation with the *IEEE International Ultrasonics Symposium*, and you will receive a chance for a **free ticket voucher**.

AIRPORT TRANSPORTATION

The Gray Line Airport Express bus departs from two locations in the airport every 20 minutes and makes stops at all the major downtown hotels including the Westin. Current rates are \$7.50 one-way and \$13.00 round-trip with a travel time of approximately 40 minutes to the Westin Hotel. The taxi fare from the airport is approximately \$25 one-way.

CAR RENTAL

Special Symposium rates have been negotiated with Avis for unlimited mileage, available from one week before, through one week after the Symposium. There are Avis rental counters at the Seattle Tacoma (SeaTac) International Airport and in downtown Seattle. The airport is located 24 km (15 miles) from the Westin Hotel — about a 30 minute drive.

At the time of booking please quote reference number A606098 to assure the best available rates. Avis can be contacted directly at 1-800-331-1600, or through your travel agent, or through the same IEEE Travel Services as above for airline reservations.

The parking fee at the Westin is \$14 per day. Parking is also available across the street at the Westin Building Garage, with a convenient skywalk connection to the hotel, for \$9 per day.

HOTEL INFORMATION

The Westin Hotel in downtown Seattle is the site for this year's Symposium. Its circular twin towers provide outstanding views of the surrounding city, water, and mountains. Centrally located in this "walking city", its front doors open onto Fifth Avenue in downtown Seattle. The monorail adjacent to the hotel provides a convenient connection with major attractions including the Space Needle, surrounding parks and cultural sites.

RESERVATIONS: Special Symposium rates have been arranged with the Westin: \$115/single and \$130/double occupancy (plus 15.2 % tax). A block of rooms will be held for attendees until October 16. A hotel reservation form is provided in the Advance Program for your convenience. For reservations and information from within the U.S. and Canada, call **800-228-3000**. In France 059 08 567; Germany 0130 852662; United Kingdom 0800 282 565; Tokyo (3) 5275 1996 and elsewhere in Japan 0120 39 1671. Or call the Westin Hotel nearest you.

The reservations FAX number at the Westin/Seattle is 206-727-5829. In all cases, **please indicate your affiliation with the IEEE International Ultrasonics Symposium.**

DEADLINE

Hotel Reservations

October 16, 1995

REGISTRATION & FEES

The Symposium registration fee includes admittance to all technical sessions, the Wednesday evening reception, and a soft-cover copy of the Symposium Proceedings (except for students, retirees, one-day and guest registrants). The guest fee includes a continental breakfast each morning and the Wednesday evening reception.

Registration Fees:	On-Site
IEEE Members	\$330
Non-Members	\$400
Students & Retirees	\$40
Guests	\$35
Children Under 12	\$15
One-day Registration	\$150
Life Members	N/C

Short Course Fees:

IEEE Members	\$120
Non-Members	\$150
Students & Retirees	\$50

SOCIAL PROGRAM Evening Events

Wednesday, November 8, 1995

Social Gathering

6:00 pm to 8:30 pm

Gather for a relaxing get-together. We encourage and welcome all registrants to come enjoy the music as you renew friendships, make new acquaintances and sample plentiful hors d'oeuvres. Drinks and a cash bar will be available. Take advantage of this opportunity to socialize and enjoy the Northwest's foods — it is a part of your registration package.

Thursday, November 9, 1995

Salmon Bake at Tillicum Village on Blake Island

6:00 pm to 11:00 pm Price per person: \$45

Our major social event is an evening cruise to Tillicum Village on Blake Island Marine State Park. We will board buses at the Westin at 6:00 and travel to the dock. On the cruise over, you may enjoy snacks and tastes of the local microbreweries. On the island we will enjoy a buffet featuring alder-smoked salmon and Indian bread. As the meal ends, the lights dim and the story "Dance On The Wind" portrays the Native Indian land, customs and folklore through a series of costumed dances and narration. Bring a jacket or sweater for your comfort.

Guest Program

We encourage guests of symposium attendees to register. The registration fee permits you to attend our continental breakfast each morning as well as the Wednesday evening Social Gathering. Daytime tours, individually priced, have also been arranged for the enjoyment of the guests. **Advance guest registration for the symposium should be made on the Advance Registration Form.**

Detailed schedules for all activities including exact times, breakfast location, departure points, etc., will be available in the Symposium registration area, as well as at breakfast.

GUEST TOURS

Wednesday, November 8, 1995

Sample Seattle- A Deluxe City Tour

Come sample Seattle. This four hour tour in the afternoon provides an overview of the many attractions Seattle offers its visitors. We'll drive along the waterfront with its import shops and fresh seafood restaurants, into historic Pioneer Square. Next is our International District, the third largest on the west coast. We will continue along Lake Washington to the Arboretum and onto the University of Washington campus.

Continuing on, our first stop will be the Hiram Chittenden Locks and Salmon Ladder. The locks are an engineering feat

which connect saltwater Puget Sound with freshwater Lake Union. The salmon ladder features the seasonal migration of salmon returning to their parent streams to spawn. Your last stop is the world famous Pike Place Farmers Market. Vendors from all around our region come to the market to showcase their wares.

Price per person: \$21.00

Thursday, November 9, 1995

Whidbey Island - The Emerald Isle

Let us whisk you away for the day to Whidbey Island, the largest island in the contiguous United States. We will begin the adventure with a scenic ride north of Seattle to Mukilteo. From this small town we will take a beautiful ferry ride to Whidbey Island. Our first stop will be in the artist community of Langley. Besides its views and waterfront park, Langley has attractive shops with merchandise reflecting the artistic talents of the area's residents.

Following a lunch in Langley, which is included with the tour package, we will travel the island to Deception Pass. This scenic drive over rolling hills offers views of the countryside, historic sites and the water on both sides. Our last stop is Deception Pass. The bridge over Deception Pass offers a bird's-eye view of boats navigating the famous tidal rapids which boil through the narrow channel. This tour will last seven hours.

Price per person: \$46.00

Friday, November 10, 1995

Historic Pioneer Square

This three hour morning tour will begin with a short walk from the Westin Hotel to Westlake Center, the heart of Seattle's retail core. At Westlake Center, we will enter Seattle's new bus tunnel located beneath the city. The bus tunnel consists of five stations representing the diverse neighborhoods of downtown. At the Westlake Center station, the murals and decor are representative of the images one gets when strolling past shops and boutiques. We will board a bus at the Westlake Station and continue to Pioneer Square.

Once we have arrived in Pioneer Square, you will be escorted back above ground to where Seattle began. The history of the city unfolds and comes to life as you are guided through the streets of historic Pioneer Square. Learn about the historic architecture, plus Seattle's colorful heroes and villains. You can visit the Klondike Museum, the smallest National Park in Washington, and view Seattle's role in the Alaska Gold Rush. You will also have the opportunity to enjoy the Underground Tour of Seattle or continue to explore the many shops and galleries.

Price per person: \$15.00



MESSAGE FROM THE TECHNICAL CHAIR

Although this year's meeting is back in the United States, we will still enjoy the participation of many foreign colleagues. The meeting last year in Cannes encouraged participation from Europe, and that philosophy has carried over into 1995 with a record number of abstracts being submitted from both foreign and domestic sources. Thus, our meeting in Seattle will be the second largest to date with 510 papers contributed for the Technical Program Committee's consideration, and 25 papers invited.

Nearly a third of the papers concern Medical Ultrasonics which continues a growth trend that has been taking place over the past few years. Such a large turnout for medical applications may also reflect the fact that Seattle is a major center for this interest category. The other three interest groups, Surface Acoustic Waves, NDE & Industrial Applications, and Physical Acoustics, are not losing ground, however, because each had between 110 and 120 papers contributed.

Needless to say, this Seattle meeting promises to be a very exciting one and we encourage you to join us at the forefront of ultrasonic technology. See you there!

George A. Alers

Technical Program Chair

1995 IEEE International Ultrasonics Symposium

TECHNICAL PROGRAM OVERVIEW

By tradition and with guidance from the IEEE Administrative Committee, we are keeping the meeting confined to three days with a fourth day set aside for Short Courses. This restricts the available space for contributed and poster papers to approximately 300 time slots. With more than 500 papers submitted in each of the last two years, an expansion of the space available has been demanded. Adding a fifth, parallel session and expanding the poster sessions to space around the swimming pool worked in Cannes but not without objections from the attendees.

This year, in Seattle, we are meeting the demand by starting a half hour early (8:00 am!) and running a half hour longer (5:30 pm) in order to minimize parallel sessions within the four major interest groups. Furthermore, we are letting the poster sessions overlap with the "coffee breaks" in order to give us three sessions in that format during the meeting. By implementing this reorganization, over 400 papers are being accommodated. Unfortunately, the Technical Program Committee still had to reject some papers and combine others in order to fit into the space and time constraints required by a three day, no evening session meeting.

The results of all this organizational effort are laid out in the Session Schedule for the 1995 Ultrasonics Symposium. The three interest categories — Physical Acoustics, NDE & Industrial Applications and Surface Acoustic Waves — have ten non-conflicting sessions of oral papers spread throughout the three days. The popular Medical Ultrasonics Group fills fourteen oral paper sessions but three of these must, by necessity, overlap with another medically oriented session.

The Poster Sessions represent a radical departure from the

past in several respects. First, they will overlap with Refreshments to allow simultaneous browsing, discussing and refreshing. Second, the Posters will be available for quiet perusal all day. The authors will be on-hand for detailed interactions only during the hour and a half specified in the Session Schedule each day. Third, there will be a total of three Poster Sessions - one each day - and each will display about 55 posters. Please note that there are four **Invited Posters**. These special presentations will occupy two of the usual 4x8 foot panels so that

they can provide the extra coverage of their subjects that you expect from their Invited status.

On behalf of the Technical Program Committee, I hope you enjoy the meeting and derive many technical benefits from it. Although many volunteer hours have been spent optimizing the presentation of new results, the Committee welcomes constructive criticism that could help next year's planners and organizers.

George A. Alers

INVITED SPEAKERS and TOPICS

The IEEE 1995 Ultrasonics Symposium Technical Program Committee has invited the following individuals to highlight new, emerging and outstanding technical aspects of Ultrasonics phenomena:

1995 UFFC-S PLENARY SPEAKER

"Breast Ultrasound"

Dr. A. THOMAS STAVROS, M.D.

Medical Imaging of Colorado

MEDICAL ULTRASONICS

Geoff Lockwood, "*Design of Sparse Array Imaging Systems*", The Cleveland Clinic Foundation

Dennis Dietz, "*Ultrasound Technology for Laparoscopic Surgery*", Tetrad

Stuart Foster, "*Medical and Biological Imaging with High Frequency Ultrasound*", University of Toronto

Kenneth McLeod, "*Fracture Healing Using Ultrasound*", State University of New York

E. Strandness, "*Plaque Characterization*", University of Washington Hospital, Seattle

Stephen W. Smith, "*2-D Arrays for Diagnostic Ultrasound: Fabrication Techniques and Sensitivity*", Duke University

NDE & INDUSTRIAL APPLICATIONS

W. A. Grandia, "*NDE Applications of Air-Coupled Ultrasonic Transducers*", QMI Inc.

Jan D. Achenbach, "*Measuring Thin Film Elastic Constants by Line-Focus Acoustic Microscopy*", Northwestern University

John G. Vetelino, "*Acoustic Wave Biosensors*", University of Maine

Hassel M. Ledbetter, "*Microstructure and Elastic-Constant Measurements in Two-Phase Materials*", NIST

Joseph L. Rose, "*Recent Developments in Guided Wave NDE*", Pennsylvania State University

Jiromaru Tsujino, "*Recent Developments in Ultrasonic Welding*", Kanagawa University - Yokohama

Steven R. Doctor, "*Advanced Technology for the Inspection of Nuclear Reactor Components*", Pacific Northwest Laboratory

PHYSICAL ACOUSTICS

Oliver B. Wright, "*Local Acoustic Probing Using Mechanical and Ultrafast Optical Techniques*", Laboratoire de Physique et Metrologie des Oscillateurs

Steven L. Garrett, "*Thermoacoustic Refrigeration*", U. S. Naval Postgraduate School

Seth Putterman, "*Probing the Unknowns of Sonoluminescence*", Univ. of California at Los Angeles

Rahul Dixit, "*Automotive Electronics*", TRW - Transportation Electronics Division

Clark T. C. Nguyen, "*MEM Resonators for Oscillators, Filters and Sensors*", Univ. of Michigan - Ann Arbor

Voichita Bucur, "*Wood-Acoustic Characterization by Ultrasonics*", Laboratoire de Photochimie Applique

Yuri V. Gulyaev, "*Acoustothermography: Passive Sensing of the Human Body by Measurements of its Thermal Acoustic Fields*", Russian Academy of Sciences

SURFACE ACOUSTIC WAVES

Juergen Machui, "*SAW Devices in Cellular and Cordless Phones*", S+M Components

Toshio Tagami, "*Surface Mount Type SAW Filter for Hand-Held Telephones*", Oki Electric Industry Co.

John A. Kosinski, "*Acceleration Sensitivity of SAW and STW Devices*", U. S. Army Research Laboratory

Benjamin P. Abbott, "*A Coupling-of-Modes Formalism for Surface Transverse Wave Devices*", RF Monolithics,

J. M. Hode, "*SPUDT-Based SAW Filters: Design Principles and Optimization*", Thomson Microsonics

Yuri V. Gulyaev, "*Shear Surface Acoustic Waves in Solids*", Russian Academy of Sciences

Robert C. Peach, "*SAW-Based Systems for Communication Satellites*", COM DEV, Ltd.

Shin-ichi Shikata, "*SAW Devices on Diamond*", Sumitomo Electric

Takahiro Sato, "*Longitudinal Leaky Surface Waves for High Frequency Device Applications*", Acrotec Microelectronics

SHORT COURSES

Six short courses are scheduled in two parallel sessions for Tuesday, November 7, 1995. Registration for the short courses is on a first-received basis, and will be accepted 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 Advance Registration Deadline. We reserve the right to cancel a course due to insufficient registration. The fees for each short course registration are given above under "Registration & Fees".

All short courses will be held on the third floor of the North Tower, near the escalator, in the Orcas and Vashon II rooms.

Course 1: Composite Piezoelectric Materials for Acoustic Imaging Transducers

Instructor: Wallace Arden Smith
Office of Naval Research
Time: 8:00 am - 12:00 noon

Piezoelectric materials lie at the heart of most acoustic imaging transducers, performing the essential roles of converting an electric pulse into an acoustic wave and converting an incident acoustic wave into an electric signal. This tutorial begins with a brief summary of the properties of piezoelectric materials conventionally used in acoustic imaging transducers: crystals, ceramics, and polymers. The core of the course focuses on delineating the range of properties achievable with composite piezoelectrics made by combining a passive polymer with a piezoceramic to form a 'new' piezoelectric material.

For 1-3 piezocomposites, which have found fruitful acoustic imaging applications, a simple physical picture is presented which shows how to adjust the piezocomposites' properties by varying the piezoceramic and polymer constituents, their relative proportions, and the spatial scale of the structure. By looking into the composite's microstructure we will see: (i) how the piezocomposite's acoustic impedance can be adjusted to provide improved energy transmission between the transducer and the imaging medium; (ii) how the electrical impedance can be adjusted to facilitate coupling the transmit/receive electronics to the transducer; (iii) how the piezocomposite can have a higher electromechanical coupling than its constituent piezoceramic; (iv) how unwanted spurious resonances in the transducer can be suppressed; and (v) how inter-element crosstalk in transducer arrays can be minimized. Moreover, the analysis identifies the materials tradeoffs that must be made, as all advantages of piezocomposites cannot be achieved simultaneously.

Device applications are illustrated with commercial product descriptions — drawn from the field of medical ultrasonic diagnostics, acoustic non-destructive testing, and undersea acoustic imaging — as well as with research literature. This course concludes with a brief overview of recent piezoelectric material research: piezocomposite fabrication methods; new electroceramics — piezoelectrics and electrostrictors; piezoceramic processing techniques — green forming, injection molding, and multilayer structures; and new piezopolymers.

Wallace Arden Smith serves as a Scientific Officer with

the Materials Division of the Office of Naval Research where his responsibilities span electronic and optical materials for sonar transducers, adaptive control of structural acoustics, thermoelectric cooling, and electro-optics, as well as high-temperature super-conducting ceramics. He earned a B. A. in 1964 from Rutgers University and a M.A. in 1966 and a Ph.D. in 1970 from Princeton University - all in physics. Dr. Smith's personal research focuses on modeling composite piezoelectric materials and devices; he expends much effort to establish a commercial base for piezocomposites to speed their exploitation in naval sonar applications.

Course 2: SAW Devices for Public Communication Systems

Instructor: Gerd Riha
Siemens Matsushita Components
Time: 1:00 pm - 5:00 pm

The objective of this course is to provide insight into SAW filter techniques used for the public mobile communication. Starting with the SAW transversal filter for high precision filtering in digital radio relay systems, the tutorial will cover SAW components used for frequency control and will focus on SAW devices used in mobile and cordless phones. Emphasis will be put on the low-loss problem, its solutions and their practical aspects. Modeling simulation, design and performance of SAW devices, as well as their fabrication processes are reviewed. The discussion will also include the application aspects with their specific demands on SAW filters.

Gerd F. Riha, Ph. D., is Director for Development and Engineering of Surface Acoustic Wave Devices at Siemens Matsushita Components, Germany. He earned the M. S. and the Ph. D. in electrical engineering from the Technical University of Vienna where he worked as an Assistant Professor on the modeling and design of dispersive SAW devices and lectured on electrical engineering. He holds several patents and has published numerous paper in the field of SAW filters.

Course 3: Therapeutic Ultrasound

Instructor: George H. Harrison
University of Maryland School of Medicine
Time: 6:00 pm - 10:00 pm

For 50 years, diverse applications and techniques have been developed to exploit the therapeutic possibilities of the non-invasive deposition of acoustic energy in tissue. In this course, applications in physical therapy, focal lesion production, hypothermic tumor therapy, shock wave lithotripsy, and synergistic interactions of chemotherapy and ultrasound will be reviewed. Each application will be described, including an attempt to identify likely acoustic mechanisms of therapeutic action, and consequently, likely medically relevant field descriptors (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, which 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 is currently Associate Professor. His research projects have involved ionizing radiation physics, radiobiology, biomedical ultrasound including device development, laboratory studies on the therapeutic and carcinogenic effects on ionizing radiation, chemical agents, microwaves, ultrasound, and hyperthermia.

Course 4: Medical Ultrasonic Transducer Array Design and Applications

Instructor: Charles S. Desilets
UltraSound Solutions

Time: 8:00 am - 12:00 noon

Ultrasonic transducers have been employed in medical imaging systems for over twenty years and have become common place with the success of electronically scanned and focused imaging systems. This tutorial course will begin with a brief overview of the dominant medical imaging modalities and the types of transducer arrays employed in these applications. Basic transducer array requirements based on these applications will be discussed, as well as the tradeoffs made for many common clinical probe designs using linear, convex, phased or annular arrays. Achievement of the basic imaging system beamforming requirements depends on the detailed design of the transducer array element.

Transducer design will be initially discussed for the simple, large area piston transducer to introduce the basic design concepts. These concepts will then be extended to array element designs. The vibration modes of the piezoelectric ceramic array element commonly employed will be discussed in detail, as well as design issues with matching layers, backing blocks, kerf filters, elevation focusing, electrical interconnect, and electrical impedance matching. Several commonly used array architectures will be reviewed as well as the design tradeoffs made in choosing these design approaches. Finally, the additional array issues arising from the use of elevational or two-dimensional focusing will be reviewed.

Charles S. Desilets received his B.S. and M.S. degrees in Engineering Physics from the Ohio State University in 1969. He completed his Ph.D. in Electrical Engineering in 1978 at Stanford University after four years with Bell Telephone Laboratories. In 1993, he established a consulting practice, UltraSound Solutions, which provides expertise in the design, development, and manufacture of ultrasonic transducers and arrays for imaging, therapeutic, sonar, and Doppler applications.

Course 5: Medical Imaging

Instructor: Tom Shoup
Imaging Systems Division, Hewlett-Packard

Time: 1:00 pm - 5:00 pm

This short course will describe the operation of an ultrasonic imaging system, from the front face of the transducer to the power cord. Operation of the various subsystems and the engineering decisions that must be made in designing them will be described. The principal factors in the design and implementation of transducers, beamformers, Doppler and color flow detectors, and scan converters will be described. Videotape examples of the primary modes of operation will be shown. This course is intended for those who are new to the field of ultrasonic imaging, or desire an introduction to those portions of an imaging system with which they are not familiar.

Tom Shoup received the BA in physics from Washington and Jefferson College and MA and Ph.D. in physics from Washington University in St. Louis. He has been employed at Hewlett-Packard for thirteen years, starting in the corporate research labs in Palo Alto then moving to the Medical Products Group in Andover, Massachusetts, where he is a section manager within R&D.

Course 6: Doppler Ultrasound

Instructor: Peter N. Burns
Medical Biophysics, University of Toronto

Time: 6:00 pm - 10:00 pm

The use of Doppler ultrasound to detect blood flow in the human body has evolved in the last two decades from a relatively crude non-imaging method for sensing subsurface vessels, to an indispensable component of imaging to examine the heart, abdomen and peripheral vascular system. The aim of this short course is to provide an introduction to the Doppler technique from the perspective of the hemodynamic measurement which is its ultimate goal. The Doppler signal will be followed from its origin in the production of the ultrasound echo by flowing blood, through its extraction by the various forms of a moving target detector, to the frequency estimation employed in typical spectral and color systems. The relationship of the resulting velocity data to such basic hemodynamic parameters as pressure, flow and impedance will then be examined in the context of some representative diagnostic applications. This course is intended for those who are familiar with the principles of ultrasound imaging but may need an introduction to diagnostic Doppler techniques.

Peter Burns received a BSc in Mathematical Physics from the University of Sussex and a PhD in Medical Physics and Radiodiagnosis from the University of Bristol, on the Doppler detection of tumor blood flow. He continued this research in the US as an Assistant Professor of Radiology at Yale University. He then taught at Thomas Jefferson University in Philadelphia before moving to the University of Toronto, where he is currently Professor of Medical Biophysics.

IEEE 1995 INTERNATIONAL ULTRASONICS SYMPOSIUM ORGANIZING COMMITTEE

GENERAL CHAIR

Gerald V. Blessing
NIST, Gaithersburg, MD



Gerald V. Blessing



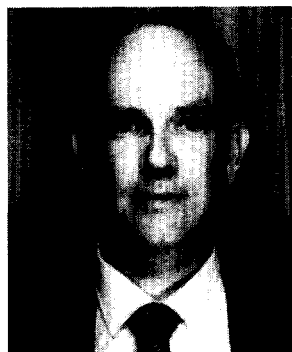
George A. Alers

TECHNICAL CHAIR

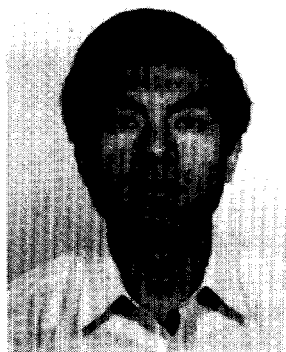
George A. Alers
NIST, Boulder, CO

FINANCE

Doron Kishoni
*College of William & Mary,
Williamsburg, VA*



Doron Kishoni



Peng Jiang



Helen F. Routh

LOCAL ARRANGEMENTS

Helen F. Routh
ATL, Bothell, WA

PUBLICITY

Peng Jiang
*Siemens Ultrasound,
Issaquah, WA*

EXHIBITS

Gary H. Brandenburger
*Mallinckrodt Medical Inc.,
St. Louis, MO*



Gary H. Brandenburger



Janpu Hou



Moisés Levy

SHORT COURSES

Janpu Hou
*AlliedSignal Inc.,
Morristown, NJ*

PROCEEDINGS

Moisés Levy
*University of Wisconsin-
Milwaukee, WI*

SYMPOSIUM MANAGEMENT

LRW Associates
Arnold, MD

Guest Tours provided through
Convention Services Northwest.

GENERAL CHAIR — Gerald V. Blessing

Gerry Blessing, born in Cincinnati, Ohio, received the B.S. degree in physics from Xavier University in Ohio, and the M.S. in physics from the College of William and Mary in Virginia. After two years as an Instructor of Physics at Randolph-Macon College in Virginia, he completed his doctoral work in physics at the Catholic University of America in 1973, with a thesis on the ultrasonic study of superconducting niobium.

After seven years as a research physicist with the Naval Surface Warfare Center, in 1980 he joined the National Bureau of Standards, now the National Institute of Standards and Technology (NIST), in Gaithersburg, Maryland. He is presently group leader of Ultrasonics in the Manufacturing Engineering Laboratory at NIST. His career has spanned the application of ultrasonic techniques to materials' nondestructive evaluation, dynamic modulus measurements, manufactured part dimension and surface roughness measurements, artifact calibrations, and sensor developments.

He has been active with the IEEE in a number of ways, serving as a local chair of the Baltimore-Washington-Virginia Chapter, on various symposia Technical Program Committees, and as an associate editor of the Ultrasonics, Ferroelectrics, and Frequency Control *Transactions*. He is general chair of the 1995 IEEE International Ultrasonics Symposium to be held November 7-10 in Seattle, Washington.

His personal interests include home gardening, "leisurely" sports activities, and civic and church affiliations.

TECHNICAL CHAIR — George A. Alers

George Alers got his PhD in physics at the State University of Iowa in Iowa City in 1954 with a thesis on ultrasonic attenuation in zinc single crystals. Those were the days when dislocation theory was in fashion and he joined several other metal physicists in expanding the Metallurgy Department of the Westinghouse Research Laboratories under Clarence Zener. Later, he worked at the Ford Motor Company Scientific Laboratory and the Science Center of Rockwell International applying ultrasonics to problems in physical acoustics and to NDE. As part of an NDE team at Rockwell, he became involved with noncontact, electromagnetic transducers (EMATs) and was a coauthor on several patents that applied these devices to industrial inspection problems. During the decade of the 80's, he was president of a small business that developed and sold EMATs based on these patents. Currently, he is developing various noncontact transducers for process control in the metals industry at NIST in Boulder, Colorado. His IEEE activities include being Technical Program Chairman for the Ultrasonics Symposia in Los Angeles (1976), New Orleans (1979) and Seattle (1995). He was President of the Administrative Committee of The Ultrasonics, Ferroelectrics, and Frequency Control Society in 1979-80 and the Distinguished Lecturer in 1981.

FINANCE — Doron Kishoni

Dr. Kishoni received his Ph.D. from the department of Theoretical and Applied Mechanics at Cornell University, Ithaca, NY, where he conducted research in ultrasonic NDE.

Prior to that he received his Practical Engineer degree in Mechanics and Electro-Optics from Ort Technicum Givataim; a B.Sc. from the department of Mechanical Engineering at the Technion, Haifa; and M.Sc. from the department of mechanics, materials, and structures, at Tel-Aviv University, where he worked on fatigue and residual stresses measurements, using destructive and nondestructive measurements methods.

Some of his professional career include founding and managing an electronics manufacturing company, serving as an officer in the military, and having an extensive industrial experience in diverse engineering fields.

As a recipient of National Research Council (NRC) awards three years consecutively ('84 - '87), he worked as a Resident Research Associate at NASA Langley, where he conducted research in advanced ultrasonic NDE and signal processing of composite materials, and received NASA group achievement awards.

Since then, he continued to work on developing advanced methods and techniques in NDE and signal processing for the Aging Aircraft and the Advanced Composites programs, through NASA grants and contracts as a Senior Research Scientist and a Research Professor in the department of Physics in the College of William and Mary. Since '92 he was also serving as an Adjunct Professor in the Applied Science Program in the College of William and Mary, teaching Data Acquisition and Signal Processing.

Among his current activities, he shares his time consulting to industrial companies; advising on organizational work flow analysis, process definitions and improvements, and quality improvements; advising on computer applications and networking, and developing customized computer programs.

Dr. Kishoni is holding ASNT level III certifications in several methods (UT, MT, PT, VT, AET). He is serving on the technical program committee of the IEEE Ultrasonics Symposium, as well as serving as the elected treasurer for the IEEE Hampton Roads Section.

LOCAL ARRANGEMENTS — Helen F. Routh

Helen Routh was born just outside London and educated at University College, Cardiff, University of Wales. There she earned a B.Sc. (Hons) in Physics and Music in 1983 and a Ph.D. in Physics in 1987. Whilst carrying out her Doctoral research on the ultrasonic scattering properties of blood she had the opportunity to spend a year as an exchange student at the University of Illinois in Champaign Urbana. Helen continued her research on the interaction between ultrasound and blood as a Postdoctoral Fellow at the University of Toronto from 1987 to 1988. In 1989 she joined BIR Inc. in Chicago as an Ultrasound Scientist doing research on both medical ultrasound and NDE. Since 1990, Helen has been with ATL, a manufacturer of medical ultrasound imaging systems, where she is currently a member of the Corporate Technical Staff. Her work continues to be predominantly in the measurement and characterization of blood flow with ultrasound.

In addition to serving as Local Arrangements Chairman for the 1995 Symposium, Helen has been a member of the Technical Program Committee since 1991. She is also serving on the Technical Standards Committee for the AIUM. She has

published over 20 papers, patents and patent disclosures in the area of Medical Ultrasound. Helen lives in Seattle with her husband and continues her lifelong association with music, playing the 'cello and piano when time permits.

PUBLICITY — Peng Jiang

Peng Jiang was born in Yantai, Shandong Province, China on May 5, 1961. He received the B.S. degree from Peking University, Beijing, China in 1982, the M.S. degree from Institute of Acoustics, Chinese Academy of Sciences, Beijing, China in 1985, and the Ph.D. from Yale University, New Haven, CT in 1993, respectively.

He joined the R&D Department of Siemens Medical Systems, Inc. Ultrasound Group in March 1993 as a Senior Acoustic Engineer working on development of a new ultrasound imaging system. He is responsible for probe characterization, probe integration, and system output measurement. His interests include transducer design and modeling, image analysis, and ultrasound tissue characterization.

Dr. Jiang is a member of the Acoustical Society of America and the IEEE. In his leisure time, he enjoys reading, hiking, camping, and playing badminton, tennis, and softball. He is married and has a son of three years old.

EXHIBITS — Gary Brandenburger

In 1981, Dr. Brandenburger obtained his doctorate in electrical engineering from Washington University, St. Louis, MO, with research at the School of Medicine on quantitative imaging and tissue characterization with ultrasound. He held research positions at the Biomedical Computer Laboratory, Washington University School of Medicine; NASA Langley Research Center; and ATL Ultrasound, Bothell, WA. In 1986 he joined Osteo-Technology Inc., a start-up company that developed the first, commercial, clinical device for measuring the apparent velocity of ultrasound in bone. He formed RDM, a consulting business in Maynard, MA. At Mallinckrodt Medical, Inc., St. Louis, MO, he established and now directs a research team pursuing 3rd generation ultrasound contrast media, and associated quantitative characterization, imaging and signal processing.

Dr. Brandenburger joined the IEEE in 1968 and served as Vice President and later as President of the local student chapter of IEEE. He has served on the IEEE Ultrasonics Symposium Program Committee since 1985.

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 AlliedSignal 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 the Asian American Community in the U.S. by American Biographical Institute. He is the Vice President of the Chinese Institute of Engineers in USA, Greater New York Chapter.

PROCEEDINGS — Moisés Levy

Moisés Levy was born in Concepcion, Cirriqui, Republic of Panama, on April 8, 1930. He received a B.S. in Chemistry and an M.S. in Chemical Engineering from Cal Tech in 1952 and 1955, a Ph.D. in Physics from UCLA in 1963. Following industrial, military and academic positions he joined the Physics Department at the University of Wisconsin-Milwaukee as an Associate Professor in 1971 and became a Professor in 1973. He was elected Chairman of the Physics Department from 1975 to 1978.

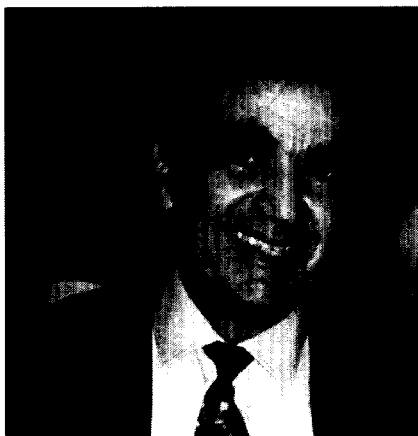
Moisés has engaged in the ultrasonic investigation of superconducting materials, most recently T_c superconductors. He has used bulk waves to investigate type I and type II superconductors, reentrant ternary compound superconductors, and heavy Fermion superconductors. He has used surface acoustic waves to study several types of superconducting films, such as beta structure films, rocksalt structure films, amorphous films, granular films, and high T_c superconducting films.

Moisés has been associated with the UFFC and its progenitor the Sonics and Ultrasonics Group since 1969. He was the General Chairman of the IEEE Ultrasonics Symposia in Milwaukee in 1974 and in Atlanta in 1983. He was the General Co-Chairman for the IEEE 1990 Ultrasonics Symposium which was held in Hawaii. He has served on the technical program committee of the IEEE Ultrasonics Symposium and as chairman of the nominations committee of the IEEE Group of Sonics and Ultrasonics. He was Associate Editor of the IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control. He is presently co-editor of the *IEEE Ultrasonics Symposium Proceedings*. He is a member of the Acoustical Society of America, a Fellow of the American Physical Society and a senior member of the IEEE. Recently he was one of the recipients of the UWM Foundation/Graduate School Awards for excellence in research.

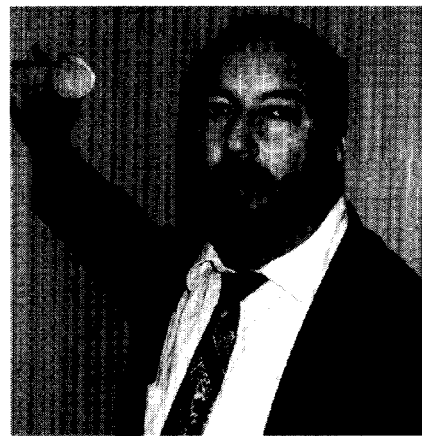
**The General Chairman has welcomed suggestions and comments
in preparation for the 1995 Ultrasonics Symposium**



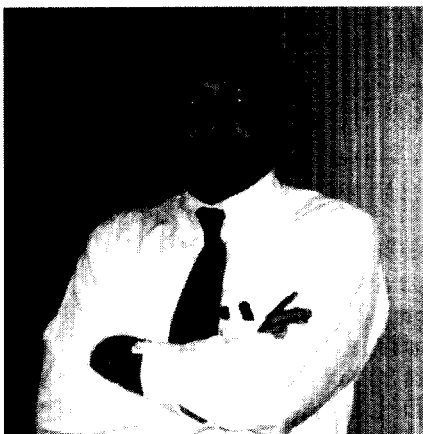
**"Gerry, if we eliminate lunch and coffee breaks and start at 6:00 a.m. we can hold to four parallel sessions."
—George Alers,
Technical Program Chairman**



**"Don't worry Gerry, we'll have the symposium proceedings out before the next symposium."
—Moisés Levy, Proceedings Editor**



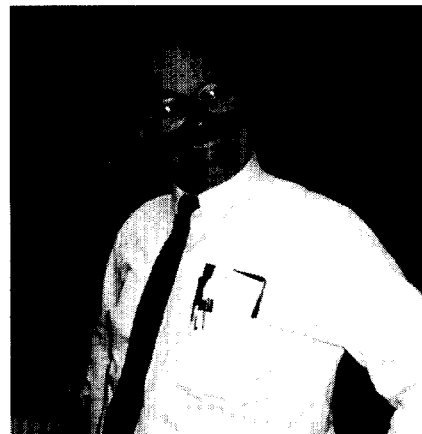
**"Don't overrun your budget."
—Madjid Belkerdid, Finances Chairman
1994 Symposium**



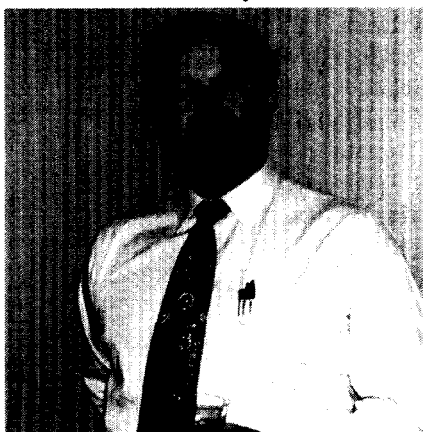
**"I refuse to come unless we have monster chocolate chip cookies at the afternoon break."
—Gary Montress,
UFFC-S Secretary/Treasurer**



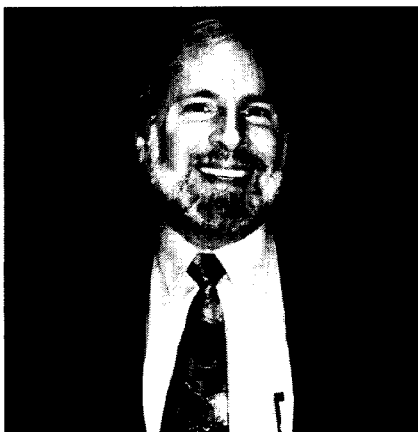
**"Gerry, can we count on you to have 100 new members sign up at the symposium?"
—Katherine Ferrara,
UFFC-S Membership**



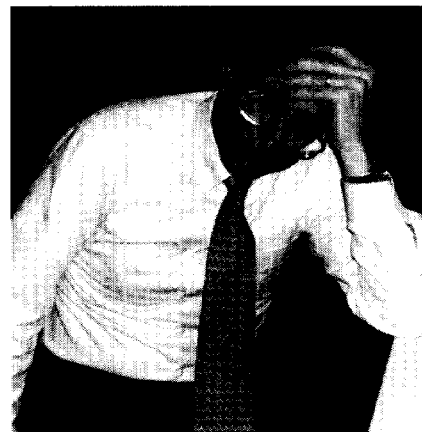
**"Gerry, wow them with a few magic tricks like I did at the 1992 symposium."
—Jim Greenleaf, Past President**



**"Gerry, will we have sunny skies and a beach just outside the hotel like we did in Cannes?"
—Bernie Tittmann,
TPC for the 1994 Symposium**



**"Look Gerry, we Symposium Chairmen should project this kind of a facial expression."
—Jeff Schoenwald, General Chairman
1996 Ultrasonics Symposium**



**"How did I get into this?"
—Gerry Blessing, General Chairman
1995 Symposium**

AWARDS AND RECOGNITIONS

Awards to be Presented at the 1995 Ultrasonics Symposium in Seattle, WA

1995 ACHIEVEMENT AWARD

Dr. Fred S. Hickernell

Motorola Government and Space Technology Group
Scottsdale, Arizona

OUTSTANDING PAPER AWARD FOR THE 1994 UFFC-S TRANSACTIONS

Richard L. Goldberg and Stephen W. Smith

Department of Biomedical Engineering
Duke University
Durham, North Carolina
"Multilayer Piezoelectric Ceramics for
Two-Dimensional Array Transducers"
September issue, 1994

UFFC-S DISTINGUISHED LECTURER, 1995-1996

Dr. F. Stuart Foster

Sunnybrook Health Science Centre and
Department of Medical Biophysics
University of Toronto
Toronto, Canada
"Medical and Biological Imaging with
High Frequency Ultrasound"

FELLOW AWARDS

Dr. Butrus T. Khuri-Yakub

Stanford University
Stanford, California

Dr. Moisés Levy

University of Wisconsin
Milwaukee, Wisconsin

Dr. Gary K. Montress

Raytheon Company
Lexington, Massachusetts

Dr. Kazuhiko Yamanouchi

Tohoku University
Sendai, JAPAN

Two additional members received their awards
at other IEEE events:

Dr. Kevin J. Parker

University of Rochester
Rochester, New York

Dr. Harry F. Tiersten

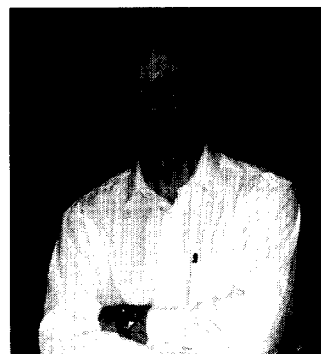
Rensselaer Polytechnic Institute
Troy, New York

Roger H. Tancrell
UFFC-S Awards Chair

Have you scheduled the UFFC-S Distinguished Lecturer?

The Administrative Committee of the Ultrasonics Ferroelectrics and Frequency Control Society announced Dr. F. Stuart Foster as the UFFC-S Distinguished Lecturer for 1995-1996. Dr. Foster will be available to speak before UFFC-S chapters, graduate and undergraduate student university seminars, IEEE groups, and other appropriate scientific and engineering associations. His topic is:

Medical and Biological Imaging with High Frequency Ultrasound



F. Stuart Foster
UFFC-S Distinguished Lecturer

The establishing of the Distinguished Lecturer program and providing a stipend to cover travel expense by the UFFC-S is indication of the interest of the AdCom in supporting the activities of groups interested in Ultrasonics, Ferroelectrics, and Frequency Control. In addition to present UFFC-S Chapters, groups which are considering chapter formation, university groups, and other IEEE groups which have an interest are encouraged to schedule the distinguished lecturer at as early a date as practical so that he can organize his talks and schedules to best accommodate the groups' needs. Please feel free to copy or extract from the abstract and biographical information given in the April newsletter.

Dr. Foster may be reached by mail at:

Sunnybrook Health Science Centre and
Department of Medical Biophysics
University of Toronto
2075 Bayview Avenue
Toronto, Ontario, M4N 3M5 CANADA

or by the following means:

Telephone: 416 480 5716;

Fax: 416 480 5714;

Email: stuart@srcl.sunnybrook.utoronto.ca

Please make arrangements with Dr. Foster early so he will be able to plan his schedule well in advance and conserve on transportation costs and time.

IEEE

Ultrasonics, Ferroelectrics, and Frequency Control Society

Administrative Committee

IEEE HEADQUARTERS

Director, Division IX	J. G. Ackenhusen*
Secretary, TAB	R. T. Wangemann*
General Manager, IEEE	R. Schwartz*

SOCIETY OFFICERS

President	H. L. Salvo, Jr.	<i>Westinghouse Electric Corporation, Electronic Systems Group</i>
Vice-President	D. C. Malocha	<i>University of Central Florida, Orlando</i>
Secretary-Treasurer	G. K. Montress	<i>Raytheon Company, Research Division</i>

ELECTED COMMITTEE MEMBERS

1993-1995	G. V. Blessing	<i>National Institute of Standards & Technology</i>
1993-1995	F. S. Foster	<i>University of Toronto</i>
1993-1995	T. W. Grudkowski	<i>United Technologies Research Center</i>
1993-1995	T. Shiosaki	<i>Kyoto University</i>
1994-1996	B. T. Khuri-Yakub	<i>Stanford University</i>
1994-1996	G. R. Johnson	<i>Sawyer Research Products Inc.</i>
1994-1996	R. E. Newnham	<i>The Pennsylvania State University</i>
1994-1996	R. Lerch	<i>University of Linz, Linz, Austria</i>
1995-1997	G. A. Alers	<i>National Institute of Standards & Technology</i>
1995-1997	J. Brown	<i>JB Consultants</i>
1995-1997	N. Chubachi	<i>Tohoku University</i>
1995-1997	J. R. Vig	<i>U.S. Army Research Laboratory, Fort Monmouth</i>

EX-OFFICIO COMMITTEE MEMBERS

Awards	R. H. Tancrell	<i>Tancrell Associates</i>
Chapters-Membership	K. W. Ferrara	<i>Riverside Research Institute</i>
Fellows	R. M. White	<i>University of California, Berkeley</i>
Ferroelectrics	L. E. Cross	<i>The Pennsylvania State University</i>
Finance	H. van de Vaart	<i>AlliedSignal, Inc.</i>
Frequency Control	T. E. Parker	<i>National Institute of Standards & Technology</i>
Long Range Planning	J. F. Greenleaf	<i>Mayo Clinic</i>
Newsletter	F. S. Hickernell	<i>Motorola, GSTG</i>
Nominations	B. R. Tittmann	<i>The Pennsylvania State University</i>
Standards	A. Ballato	<i>U.S. Army Research Laboratory, Ft. Monmouth</i>
Transactions	W. D. O'Brien, Jr.	<i>University of Illinois, Urbana</i>
Ultrasonics	G. W. Farnell	<i>McGill University, Montreal</i>
Past President (1994-1996)	J. F. Greenleaf	<i>Mayo Clinic</i>

*Non-voting Member

1995 IEEE Frequency Control Symposium and Tutorials

The 1995 IEEE International Frequency Control Symposium was held this year in San Francisco, California, atop Nob Hill at the historic Fairmont Hotel, from 31 May to 2 June. 358 scientists, engineers, and others in the business of time and frequency attended, presenting a total of 130 papers of which 37 were poster presentations. The conference attracted an international audience with 98 attendees travelling to San Francisco from more than 21 countries outside the USA. This annual IEEE sponsored 3 day meeting deals with all aspects of precision frequency sources from quartz crystal oscillators to the world's most stable atomic clocks. Between sessions 18 exhibitors showed a variety of commercial time and frequency products. The refreshment breaks were held in the exhibit area which afforded an additional opportunity for the exhibitors to interface with the symposium attendees and their guests.

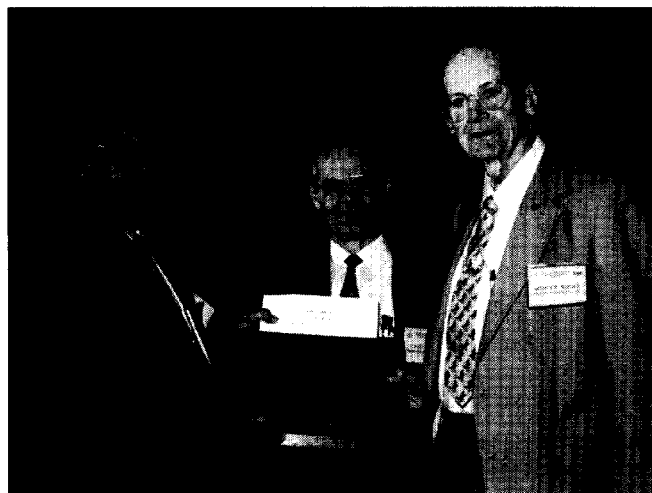


Art Warner receiving standing ovation while walking to the podium to receive his award.

The Frequency Control Symposium is also used as a forum to present the three IEEE awards to individuals who have made outstanding contributions to the art of frequency and timing. They are selected by the 44 member technical program committee. The W. G. Cady Award was given to Jean-Jacques Gagnepain from France, the I. I. Rabi Award was given to Fred L. Walls from the USA, and the C. B. Sawyer Memorial Award was given to Lidiya I. Zhourkina from Russia. This year in addition a special Lifetime Achievement Award was given to Arthur W. Warner Jr. The citations and presenters for the awards follows.

W. G. Cady Award — The Cady Award was presented to Jean-Jacques Gagnepain, LPMO-CNRS, France, "for major contributions to our understanding of nonlinear and environmental effects, and pioneering results on 1/f noise in piezoelectric resonators." The award was presented by Errol P. EerNisse, Quartzdyne.

I. I. Rabi Award — The Rabi Award was presented to Fred L. Walls, NIST, "...for major contributions to the charac-



UFFC-S President Harry Salvo and General Chairman John Vig with Art Warner upon receipt of the 1995 Lifetime Achievement Award.

terization of noise and other instabilities of local oscillators and their effects on atomic frequency standards." The award was presented by Samuel R. Stein, Timing Solutions.

C. B. Sawyer Award — The Sawyer Award was presented to Lidya I. Zhourkina, Scientific Res. Inst. Phonon, Russia, "for outstanding contributions to international standardization, and 30 years of leadership on the IEC Technical Committee No. 49, "Piezoelectric and Dielectric Devices for Frequency Control and Selection." The award was presented by Gary R. Johnson, Sawyer Research Products.

1995 Lifetime Achievement Award — The 1995 Lifetime Achievement Award was presented to Arthur W. Warner, Jr. "for his nearly 60 years of pioneering and wide-ranging contributions to the design and fabrication of high-stability quartz



The Cady Award being presented to Jean-Jacques Gagnepain (r) by Errol P. EerNisse (l).



Award recipients Gagnepain, Zhourkina, Walls and Warner (sitting) with presenters EerNisse, Johnson, Salvo and Vig (standing).



The Sawyer Award being presented to Lidya Zhourkina (l) by Gary Johnson (r).



The Rabi Award being presented to Fred Walls (r) by Samuel R. Stein (l).

resonators." The award was presented by John R. Vig, US Army Research Laboratory.

Several tutorial sessions, to disseminate knowledge of the wide ranging disciplines which comprise the frequency control field, followed the conference on Friday afternoon and Saturday morning. This year's tutorial session was the largest ever with 132 attendees. The tutorials were broken into four sessions. Three of the sessions had 4 concurrent presentations and the other had 2 panel sessions along with a lecture. A notebook containing hundreds of pages of notes were given to those attending.

Next year's meeting, the 50th Annual Frequency Control Symposium, will be held June 5-7, 1996, at the Hilton Hawaiian Village in Honolulu, Hawaii. To request more information, call 908-280-2024 or FAX 908-681-9314.



Jean-Jacques Gagnepain, Lidya I. Zhourkina, Fred L. Walls and Arthur W. Warner, Jr.

Internet Access to Frequency Control Symposium Abstracts

The abstracts of all the papers ever published in the Proceedings of the (now IEEE) Frequency Control Symposium, since 1956, is available for downloading via the Internet, as follows:

ftp 144.252.1.1 (or ftp Ftmon.ARL.mil)

login: anonymous

password: 06 (anything . . . usually people put their e-mail address)

cd ieee_fcs

cd abstracts

get 10 me

The file names are ABSTRACT.EXE, OTHER.EXE, which are self-extracting compressed files (for PCs), and a READ-ME.TXT, which is a text file explaining what is in the .EXE files. For those who cannot handle the .EXE files, uncompressed text (i.e., ASCII) files are available in the same directory.

ABSTRACT.TXT is a 3.9 MB text file containing all the abstracts.

AWARDS.TXT contains information about the Cady, Rabi and Sawyer awards, including the list of past winners and their citations.

CHAIRMEN.TXT — contains a listing of Symposium chairmen since 1956.

PROCDGS.TXT — contains ordering information for all the Frequency Control Symposium Proceedings since

1956, including document numbers and prices. It also includes ordering information for the Proceedings of the Precise Time and Time Interval (PTTI) Applications and Planning Meeting, and for the European Frequency and Time Forum (EFTF).

The abstract scanning was performed by a group of volunteers, under the leadership of John Vig, U.S. Army Research Lab.. The following volunteers contributed to scanning the abstracts: Vaughn Skidmore, GTS; Bob Smythe, Piezo Technology; Jerry Norton, Johns Hopkins APL; Jim Wright, Computer Sciences/Raytheon; Karen Blisnuk, Army Research Lab.; Charles Adams, Hewlett-Packard; Gwen Bennett, NIST; Roger Ward, Quartzdyne; Bill Riley, EG&G; Ron Roloff, Frequency & Time Systems; Lute Maleki, Jet Propulsion Lab's; and Bill Hanson, Piezo Crystal.

For those who do not have access to the Internet, an MS-DOS format 1.4 MB disk is available for \$5- from General Technical Services, 3100 Rt. 138, Wall Township NJ 07719, U.S.A.

John R. Vig

U. S. Army Research Laboratory

Attn: AMSRL-PS-ED

Ft. Monmouth, NJ 07703-5601, U.S.A.

Telephone: 908-427-4275; FAX: 908-427-4805

Internet: JVig@ARL.mil

ADCOM BRIEFS

The Administrative Committee (AdCom) meeting of the Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC-S) was called to order at 9:00 A.M., February 2nd, 1996, by H. L. Salvo, Jr. at the Harvey Hotel - DFW Airport, Dallas, Texas. Introductions of attending members were conducted.

G. V. Blessing moved to approve the minutes of the November 1st, 1994 UFFC-S AdCom meeting. The motion was seconded by D. C. Malocha. The motion passed.

H. L. Salvo, Jr. announced that the Canadian Society of Electrical and Computer Engineers has merged with IEEE.

New auditing rules for all IEEE conferences are in effect for 1995. Final financial reports for all conferences must be sent to IEEE headquarters for formal auditing. Special software packages, based upon Quicken, are available from IEEE headquarters. All UFFC-S conference organizing committees should take appropriate steps to comply with this new requirement.

Several UFFC-S Chapters are in trouble. They have not held at least two meetings per year during each of the last three years. At this time, the Santa Clara (CA) UFFC-S Chapter has been disbanded. The Long Island (NY) and Los Angeles (CA) UFFC-S Chapters are on warning status, and the Baltimore/

Washington/Northern Virginia UFFC-S Chapter is presently inactive.

H. L. Salvo, Jr. indicated that there is now an e-mail address at IEEE headquarters which will automatically re-route the material to all UFFC-S AdCom members. Using the alias uffc.adcom@ieee.org will also send additional UFFC-S/IEEE information to each recipient as well.

For several years now the UFFC-S has been unable to find anyone willing to serve as its representative on the IEEE's Solid State Circuits Council (SSCC), which is responsible for the IEEE Journal on Solid State Circuits (JSSC). A discussion of the UFFC-S's lack of common technical interests with the SSCC took place, with no clear basis for a strong (i.e., any) technical linkage presented. J. R. Vig introduced a motion to approve the UFFC-S dropping its participation in the SSCC. The motion was approved (10 votes in favor, 3 opposed).

The "mini-all periodicals package" which focuses on Medical Applications of Engineering and Technology is now available from IEEE. The UFFC-S Transactions is included as part of the package, as is the Transactions on Medical Imaging (UFFC-S co-sponsored).

There is now a Wide World Web (WWW) home page for

IEEE. R. Jobman is the IEEE contact. The UFFC-S will investigate adding UFFC-S information to the IEEE's homepage.

W. D. O'Brien, Jr., UFFC-S Transactions Editor-in-Chief, indicates that as of February 1995 there is still not a backlog of papers waiting to be published in the Transactions. Prospective authors are encouraged to submit manuscripts directly to the UFFC-S Transactions' Editor-in-Chief, W. D. O'Brien, Jr. Procedures for manuscript submission are described in detail on the back cover page of the January 1995 issue of the Transactions.

F. S. Hickernell, UFFC-S Newsletter Editor-in-Chief, submitted a written report. He encouraged the submission of materials for the Spring 1995 issue of the Newsletter, including photographs taken at various UFFC-S sponsored conferences. The deadline for submissions is March 17th, 1995.

M. A. Belkerdid, UFFC-S Finance Committee Member, indicated that because only three months had passed since the last UFFC-S AdCom meeting very little had changed as regards the UFFC-S's finances. The UFFC-S's reserves are still approximately \$500k.

T. E. Parker, UFFC-S Frequency Control Standing Committee Chair, presented oral and written reports. J. R. Vig described arrangements for the 1995 IEEE International Frequency Control Symposium. The conference will be held at the Fairmont Hotel, in San Francisco, CA, on 31 May through 3 June 1995. A record number of abstracts was received, approximately 175. J. R. Vig also described arrangements for the 1996 IEEE International Frequency Control Symposium. The conference will be held at the Hilton Hawaiian Village Hotel, in Honolulu, HI, on 5 - 7 June 1996. The 1997 and 1998 IEEE International Frequency Control Symposia will be held in Orlando, FL, and Los Angeles, CA, respectively. T. E. Parker indicated that a joint meeting of the Frequency Control Symposium with the European Frequency and Time Forum is under consideration for 1999.

G. W. Farnell, UFFC-S Ultrasonics Standing Committee Chair, introduced reports from the Ultrasonics Symposia representatives. H. L. Salvo, Jr. presented an oral report on the 1993 IEEE Ultrasonics Symposium. The Final Financial Report and audit have been submitted. The surplus was \$39,186.19. M. A. Belkerdid, Finance Chair, provided an oral report on the 1994 IEEE International Ultrasonics Symposium. Proceedings billings and book broker payments are not yet complete. The symposium was very successful, although there were cost overruns on several budget items. At this time a surplus of approximately \$20k is projected. Total attendance was 628, including 105 guests and 136 students. G. V. Blessing, General Chair, provided an oral report on the 1995 IEEE International Ultrasonics Symposium, which will be held in Seattle, WA, on 7 - 10 November 1995. G. A. Alers is Technical Program Chair, D. Kishoni is Finance Chair, H. F. Routh is Local Arrangements Chair, J. Hou is Short Courses Chair, G. H. Brandenburger is Exhibits Chair, P. Jiang is Publicity Chair, and M. Levy is Proceedings Editor. J. S. Schoenwald, General Chair, provided an oral report on the 1996 IEEE International Ultrasonics Symposium. B. T. Khuri-Yakub has agreed to serve as Technical Program Chair. B. R.

Potter has agreed to serve as Finance Chair. M. Levy will be Proceedings Editor. At this time arrangements for the symposium are proceeding nicely. G. W. Farnell introduced a motion to approve F. S. Foster as General Chair for the 1997 IEEE International Ultrasonics Symposium, which will be held in Toronto, Ontario, Canada. The motion was seconded by J. Brown. The motion was approved. F. S. Foster indicated that arrangements are underway to hold the symposium during early October. The Marriott Hotel is a leading candidate at this time. K. W. Ferrara has agreed to serve as Technical Program Chair. G. W. Farnell indicated that the preparation of a proposal is under consideration at this time to hold the 1998 IEEE International Ultrasonics Symposium in Sendai, Japan.

R. H. Tancrell, UFFC-S Awards Chair, submitted a written report. A request was made to expedite the awards selection process in order that the award could be presented at the most appropriate UFFC-S sponsored symposium. UFFC-S Committee Chairs should make arrangements directly with R. H. Tancrell for Certificates of Appreciation to recognize retiring volunteers from the various UFFC-S committees. F. S. Foster is the UFFC-S's 1995-1996 Distinguished Lecturer. His topic is: "Medical and Biological Imaging with High Frequency Ultrasound".

K. W. Ferrara, UFFC-S Chapters/Membership Chair, presented oral and written reports. The UFFC-S added twenty-eight new members at the 1994 IEEE International Ultrasonics Symposium, due to the Special IEEE/UFFC-S membership offer. Ten to twelve new UFFC-S members were added in a similar manner at the 1994 IEEE International Frequency Control Symposium. Efforts will be continued to add new UFFC-S members in this way at both 1995 UFFC-S sponsored symposia (Ultrasonics and Frequency Control)

H. L. Salvo, Jr. reported that six (6) UFFC-S members were recently elevated to IEEE Fellow grade, effective 1 January 1995, namely: B. T. Khuri-Yakub, M. Levy, G. K. Montress, K. J. Parker, H. F. Tiersten, and K. Yamanouchi.

B. R. Tittmann, UFFC-S Nominations Committee Chair, presented oral and written reports. The slate of nominees for the UFFC-S AdCom election, which will be held this summer, was presented. The slate of nominees from Regions 1-7 is: J. Hou, T. Shoup, K. W. Ferrara, E. S. Furgason, J. G. Smits, M. A. Belkerdid, D. R. Pape, and M. M. Driscoll. Nominees from Regions 8-10 are: D. A. Hutchins and G. Socino. Three new UFFC-S AdCom members will be elected from the Regions 1-7 candidates, while one new UFFC-S AdCom member will be elected from the Regions 8-10 candidates. B. R. Tittmann introduced a motion to approve the slate of candidates as presented. The motion was seconded by J. Brown. The motion was approved.

J. F. Greenleaf, UFFC-S Long Range Planning Committee Chair, presented an oral report. The committee plans to bring proposed UFFC-S constitution/bylaws revisions to the next UFFC-S AdCom meeting. The Long Range Planning Committee also plans to encourage IEEE/UFFC-S membership within the ferroelectrics community. This includes soliciting support for this effort from the Ferroelectrics Standing Committee.

P. J. Benkeser, UFFC-S representative to the Transactions

on Medical Imaging (TMI) Steering Committee, was elected Chair of the TMI Steering Committee at its 26 November 1994 meeting. The issue of TMI sponsorship is still unresolved. P. J. Benkeser will formulate and submit a proposal describing society sponsorship and participation in TMI's re-organization. For the time being, the UFFC-S will remain as a co-sponsor of the Transactions.

H. L. Salvo, Jr. reported that the UFFC-S's share of the *Journal of Lightwave Technology's* 1993 surplus was \$1500. The *Journal* remains very successful, with approximately 2500 subscribers.

M. Levy, UFFC-S representative on the Transactions on

Applied Superconductivity Steering Committee, presented oral and written reports. He indicated that the Transactions will end 1994 with a surplus, in spite of the fact that fiscal 1993 showed a deficit.

A motion was introduced that the next UFFC-S AdCom meeting be held at 9:00 A.M., on 7 November 1995, in conjunction with the 1995 IEEE International Ultrasonics Symposium in Seattle, Washington. The motion passed.

The UFFC-S AdCom meeting adjourned at 4:25 P.M.

Gary K. Montress

UFFC-S Secretary-Treasurer, 1994/1995

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 1996 and forms will be ready by the end of 1995. 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 judgements 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 Joann Kilyk, IEEE Fellow Committee, 445 Hoes Lane, Piscataway, NJ 08854, (908) 562-3843.

The following is a list of members of the UFFC-S who are Fellows of the IEEE.

IEEE Fellows in the UFFC Society

John D. Adam
E. L. Adler
Robert Adler
Akihiro Aketani
John Andrews
Bert Auld
A. Ballato
L. L. Beranek
D. A. Berlincourt
Henry L. Bertoni
Lief Bjorno
J. V. Bouyoucos
Mack A. Breazeale
C. B. Burckhardt
Charles A. Cain
C. K. Cambell
Paul H. Carr
S. D. Chatterjee
N. Chodorow
H. W. Cooper
James A. Cronvich
Leslie E. Cross
C. C. Cutler
Louis J. Cutrona
Eugene J. Dieulesaint
Michael M. Driscoll
Floyd Dunn
Lawrence N.
E. P. Eernisse
Irving Engelson
G. W. Farnell
Francis J. Fry
Fred E. Gardiol
R. Gerhard-Multhaupt
James F. Greenleaf
Thomas W. Grudkowski
Gene H. Haertling
E. Hafner
Gerald R. Harris
Helmut W. Hellwig
Eric Herz
F. S. Hickernell
Bill J. Hunsinger
Masaru Ieuka
F. H. Ingerslev
Robert A. Johnson
Yukio Kagawa
Reynold S. Kagiwada
Peter Kartaschoff
Irving Kaufman
Buturus T. Khuri-Yakub
R. La Rosa
C. E. Land
Pua Lee
Moisés Levy
Peter A. Lewin
H. C. Lin
M. S. F. Lucas
L. C. Lynnworth
J-A-M Lyon

R. S. Mackay
Albert Macovski
Charles Maerfeld
T. Makimoto
Donald C. Malocha
Bruce McAvoy
A. H. Meitzler
Nobuo Mikoshiba
Shota Miyairi
Gary K. Montress
R. A. Moore
Arye Nehorai
V. L. Newhouse
Tatsuji Nomura
William D. O'Brien, Jr.
Matthew O'Donnell
A. A. Oliner
John M. Owens
Emmanuel P. Papadakis
Kevin J. Parker
Thomas E. Parker
Bernard Picinbono
John M. Reid
Paul Rosenberg
Peter H. Russer
W. J. Sarjeant
O. P. Schmitt
G. M. Sessler
Gustave Shapiro
Yasutaka Shimizu
K. Kirk Shung
Bikash K. Sinha
Leland P. Solie
Ikuko Tanaka
Roger Tancrell
William J. Tanski
S. W. Tehon
Donald O. Thompson
R. E. Thompson
Harry F. Tiersten
Bernhard R. Tittmann
Chen S. Tsai
A. Uhler, Jr.
Sotirics J. Varaviolos
Herman van de Vaart
Jacques Vanier
John R. Vig
Robert C. Waag
G. Wade
Robert S. Wagers
Kikuo Wakino
Stephen Wanuga
Kiyotaka Wasa
W. Welkowitz
R. M. White
H. K. Wickramasinghe
Werner Wiesbeck
R. C. Williamson
Kazuhiko Yamanouchi
L. T. Zitelli

Chapter Activities

New Russian Chapter Formed

The IEEE approved the formation of a UFFC Society chapter in Russia earlier this year. On July, 11th the initial Chapter meeting was held in Moscow. The following officers were elected: the chairman, Georgi Mansfeld, the vice-chairman, Valentin Kuleshov and the secretary, Dimitry Tsarapkin. A treasurer will be elected later. Plans have been discussed for chapter activities. A meeting was held in August to finalize plans.

Valentin Kuleshov
Vice-Chairman

Tokyo Chapter

The Tokyo Chapter held five technical meetings during the first half of 1995, in conjunction with the Technical Group on Ultrasonics of the Institute of Electronics, Information and Communications Engineers of Japan:

Date	Papers	Place
1) January 26	15	Osaka
2) February 24	6	Tokyo
3) April 26	6	Tokyo
4) May 20	6	Tokyo
5) June 27	7	Chiba

The 16th Symposium on Ultrasonic Electronics (USE95) will be held under the sponsorship of the UFFC-S Tokyo Chapter on November 27-29, 1995, at the Tukuba University in Ibaraki prefecture. Most of the papers at the last year's Symposium (USE94) have recently published in the special issue of Jpn. J. Appl. Phys., Vol.34, No. 5B(1995). We plan to invite Prof. F. Stuart Foster, the UFFC-S 1995-1996 Distinguished Lecturer, to Japan. The Tokyo Chapter will soon contact him to arrange the schedule of his lectures.

Yasuhiko Nakagawa
Vice Chairman,
UFFC-S Tokyo Chapter

FUTURE UFFC-S SPONSORED SYMPOSIA

ULTRASONICS SYMPOSIA

1996 IEEE International Ultrasonics Symposia

San Antonio, TX — 3 - 6 November 1996

For information contact:

Jeffrey S. Schoenwald, *General Chair*
Rockwell International Science Center
Mail Code A9
1049 Camino dos Rios
Thousand Oaks, California 91358
(805) 373-4236 (Phone)
(805) 373-4810 (FAX)

Pierre B.T. Khuri-Yakub, *Technical Program Chair*
Stanford University
Department of Electrical Engineering
E.L. Ginzton Laboratory
Room 11
Stanford, California 94305-4085
(415) 723-0718 (Phone)
(415) 725-7509 (FAX)

1997 IEEE International Ultrasonics Symposium

Toronto, Canada

For information contact:

F. Stuart Foster, *General Chair*
University of Toronto
Sunnybrook Health Science Center
Department of Medical Physics
Reichmann Research Building
2075 Bay View Avenue
Toronto, Ontario
CANADA M4N 3M5
(416) 480-5716 (Phone)
(416) 480-5714 (FAX)

FREQUENCY CONTROL SYMPOSIA

1996 IEEE International Frequency Control Symposium

Honolulu, HI — 5 - 7 June 1996

For information contact:

John R. Vig, *General Co-Chair*
U.S. Army Research Laboratory
AMSRL-EP-ME
Fort Monmouth, New Jersey 07703-5601
(908) 427-4275 (Phone)
(908) 427-4223 (FAX)

or

Kazuhiko Yamanouchi, *General Co-Chair*
Research Institute of Electrical Communication
Tohoku University
Katahira, Aoba-ku
Sendai 980
JAPAN

(81) 22-266-5528 (Phone)

(81) 22-266-5528 (FAX)

Frederick L. Walls, *Technical Program Chair*
National Institute of Standards & Technology
Time & Frequency Division
325 Broadway
Boulder, Colorado 80303
(303) 497-3207 (Phone)
(303) 497-6461 (FAX)

1997 IEEE International Frequency Control Symposium

Orlando, FL

For information contact:

Thomas E. Parker, *General Chair*
National Institute of Standards & Technology
Time & Frequency Division
325 Broadway
Boulder, Colorado 80303
(303) 497-7881 (Phone)
(303) 497-6461 (FAX)

Frederick L. Walls, *Technical Program Chair*
National Institute of Standards & Technology
Time & Frequency Division
325 Broadway
Boulder, Colorado 80303
(303) 497-3207 (Phone)
(303) 497-6461 (FAX)

1998 IEEE International Frequency Control Symposium

Los Angeles, CA

For information contact:

Thomas E. Parker, *General Chair*
National Institute of Standards & Technology
Time & Frequency Division
325 Broadway
Boulder, Colorado 80303
(303) 497-7881 (Phone)
(303) 497-6461 (FAX)

FERROELECTRICS SYMPOSIUM

1996 IEEE International Symposium on Applications of Ferroelectrics

East Brunswick, NJ

For information contact:

Ahmad Safari, *General Chair*
Rutgers University
Center for Ceramics Research
Brett & Bowser Roads
P.O. Box 909
Piscataway, New Jersey 08855-0909
(908) 445-4367 (Phone)
(908) 445-3258 (FAX)



1996 IEEE International Frequency Control Symposium

June 5 to 7, 1996

Honolulu, Hawaii, U.S.A.



Sponsored by The IEEE Ultrasonics, Ferroelectrics, & Frequency Control Society

CALL FOR PAPERS

Deadline for Submissions: January 5, 1996

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Army Research Lab.
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prestage@fridge.jpl.nasa.gov

Awards Chairman
Roger Ward
Quartztronics, Inc.
1020 W. Atherton Dr.
Bldg. C
Salt Lake City UT 84123
801-266-6994
801-266-7985 (FAX)
75471.2321@compuserve.com

This will be the 50th consecutive meeting of the Frequency Control Symposium. The organizers are planning a special celebration in Hawaii. This Symposium has provided the leading international technical forum for research directed towards all aspects of frequency control and precision timekeeping.

Authors are invited to submit papers dealing with recent and original work of interest to the frequency control community in the following subject categories:

Group 1

- A. Fundamental Properties of Materials
- B. Theory and Design of Resonators and Filters
- C. Sensors and Transducers

Group 2

- A. Oscillators - BAW and SAW
- B. Oscillators - Microwave to Optical
- C. Synthesizers and Other Circuitry
- D. Noise Phenomena and Aging

Group 3

- A. Atomic and Molecular Frequency Standards
- B. Frequency and Time Coordination
- C. Measurements and Specifications
- D. Applications of Frequency Control

The following topics are of special current interest:

- Time scale algorithms for incorporating super clocks
- Sub-1ns time dissemination
- Resonant sensors, microresonators, and microwave resonators
- Review and historical papers

One copy of a summary (EMail preferred) in sufficient detail for evaluation of the proposed paper (at least 300 words, two pages maximum) should be sent to: the program chairman: **Dr. Fred L. Walls, c/o Wendy Ortega, NIST, Time & Frequency Div.; 325 Broadway, Boulder, CO 80303, USA; EMail: ortegaw@boulder.nist.gov** Each summary MUST include the responsible author's name, address, telephone and FAX numbers, and EMail address, if available. On the first page of the summary, indicate one of the subject categories listed above, and the type of presentation preferred, i.e., oral or poster session, or no preference. Authors will be notified of the Program Committee's decision by 18 March, 1996. Camera ready manuscripts for publication in the Proceedings are required by 23 June.

Award Nominations

Formal nominations for the Cady, Rabi and Sawyer Awards should be sent to the Program Chairman, Fred Walls. Informal suggestions of deserving nominees should be sent to the Awards Chairman, Roger Ward.

Exhibits

For information on arranging for exhibit space, please contact:

Mr. Michael R. Mirarchi
Synergistic Management, Inc.
3100 Route 138
Wall Township, NJ 07719, U.S.A.
Tel: 908-280-2024, Fax: 908-681-9314

The deadline for arrangements is 3 March, 1996.

1996 IEEE International Frequency Control Symposium 50th Anniversary Celebration in Honolulu, Hawaii

Travel Support

Presenters from outside the United States - Limited funds are available to help with the travel expenses of needy presenters from outside the United States. Requests for support, including the name of the presenter and the amount requested (in U.S. dollars) must be included with the paper summary. The Symposium will provide reimbursement up to an amount to be specified. Airline tickets and travel arrangements will no longer be provided.

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

YOU ARE INVITED . . .
to submit your ideas. We'd like to hear from you.

**Nominations for
UFFC-S ACHIEVEMENT AWARD**

The Achievement Award is the highest Society-wide award presented to a member in special recognition of outstanding contributions. You can participate by identifying members you feel deserve to be honored. The award is granted for significant technical publications in the field of ultrasonics, ferroelectrics, or frequency control; for presentation of lectures; and/or for service to the Society.

The award embraces the entire society and includes all technical specialties. Make your suggestions by filling out the attached forms.

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, UFFC-S Awards Committee
225 Walden Street, Suite 5C
Cambridge, MA 02140
Tel/FAX: (617) 547-6639
e-mail: r. tancrell@ieee.org

**Nominations for
DISTINGUISHED LECTURER AND/OR TOPIC**

Every year the UFFC-S selects a Distinguished Lecturer to represent the Society to the larger technical community and stimulate interest in one or more of the Society's professional areas. Recent lecturers have spoken to local chapters, universities and companies throughout North America, Japan, Europe, China, and South America.

Which topics should be discussed and who can best represent the Society? Please make suggestions of titles and/or speakers by filling out the attached nomination form.

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, UFFC-S Distinguished Lecturer
Subcommittee
The National Center for Physical Acoustics
University of Mississippi
University, MS 38677
Tel: (601) 232-7490
FAX: (601) 232-7494

WELCOME NEW UFFC-S MEMBERS

We welcome the following new members to the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society who have joined within the past 12 months.

ALABAMA

Sullivan Jr., James H.

ARKANSAS

Ross, Tom W.

ARIZONA

Jaeger, Paul

Schmid, Michael

Thomas, Bruce

Yellowhair, David W.

CALIFORNIA

Blalack, Tallis

Boyle, Rick

Brunnenmeyer, Dennis D.

Clark, Stewart A.

Demarta, Stan

Deng, John Z.

Devoe, Don L.

Felber, Franklin S.

Gordon, K.

Ho, James B.

Huynh, Son H.

Kasapi, Athos

Koll, Lance

Koyama, Daniel H.

Lee, Nam-Hung C.

Leonard, Gregory E.

Linsley, A. O.

Loggins, Chester D.

Maltbia, Maurice L.

Marple Jr., Stanley L.

Marple, Larry R.

Masters, Donald

Mayo, Herman L.

Prestage, John D.

Rachlin, Daniel J.

Salmi, E. V.

Schroeter, Randy K.

Sperling, Ted D.

Tran, Donald J.

COLORADO

Belanger, David J.

Fortunko, Christopher M.

Haun, Michael J.

Huth, Larry

Kamphorst, Everard J.

Lujan, Michael J.

Walls, Fred L.

CONNECTICUT

Falconer, Robert S.

Gu, Jun

DELAWARE

Parasher, Vinod K.

FLORIDA

Archibald, Gary W.

Higgins, Robert J.

Hofert, Andrew J.

Karr, Brian A.

Knapp, Scott M.

Koch, Michael J.

Vishwanathan, Annamalai

Zhou, Yansheng

GEORGIA

Janzou, Steven H.

Johnson, Thor M.

Myles III, William R.

Roberson, Steve W.

HAWAII

Ferreira, Joseph G.

IOWA

Ghorayeb, Solomon R.

Oswood, Jon W.

IDAHO

Schicht, Steven F

ILLINOIS

Achenbach, Jan D.

Czerwinski, Richard N.

Farcich, Nick J.

Gillig, Steven

Hajek, G. A.

Hillsley, Catherine A.

Johnson, Cheryl

Langridge, Robert A.

Mathes, Patrick C.

Poulson, T. E.

Trobaugh, Jason W.

Zierfuss, Bill

INDIANA

Bell, Mark R.

Chen, Eric

Havens, Gary L.

KENTUCKY

Chatterjee, Jyoti P.

MASSACHUSETTS

Andres, Donald

Callahan, Thomas F.

Flanzbaum, Mark I.

Kenschaft, Roland P.

Leblanc, Paul

Lucia, David M.

Milliren, Bryan T.

Serwatka, William J.

Takamizawa, Koichiro

Wur, Der-Rern

MARYLAND

Benson, Barry

Brooks III, Thurston L.

Carlson, Peter G.

Lasser, Marvin E.

Manley, Martin G.

Shamma, Mohammed A.

Spicer, James B

Winzer, Stephen R.

MICHIGAN

Clinthorne, Neal H.

Cohn, Abraham

Erdogan, Hakan

Jeffers, Russell J.

Krishnan, Sriram

Lubinski, Mark A.

Paulsen, David K.

Seip, Ralf

Shapo, Benjamin M.

Simon, Claudio

Watson, Will

MINNESOTA

Dutt, Vinayak

Farooqi, Neaz E.

Kadah, Yasser M.

Link, Michael J.

MISSOURI

Dilley, Brandon T.

Hall, Christopher S.

Horn, Craig E.

Vannier, Michael W.

Wickline, Samuel A.

MISSISSIPPI

Jamasbi, Khosrow J.

NORTH CAROLINA

Dreifus, David L.

Emery, Charles D.

Gronquist, Jim D.

NEW HAMPSHIRE

Reid, Alvin

NEW JERSEY

Mark, James T.

Nardelli, Norman N.

Salesky, Leonard

Stewart, James T.

Teal, Robert W.

NEW MEXICO

Bailey, Gregg F.

NEW YORK

Dimaggio, Joseph M.

Hughes, Declan C.

Leske, James A.

Martin, Joseph L.

Morrow, Richard E.

Thomas III, Lewis J.

Vukovic, Nada

OHIO

Johnson, David K.

Ko, Ray T.

Lee, Shan-Shan

Lockwood, Geoffrey R.

Radwanski, Janet M.

Servizzi, Anthony J.

Zohios, Jerasimos

OKLAHOMA

Toomey, Dan D.

Walker, David A.

OREGON

Kerr, Tiffany

PENNSYLVANIA

Barker Jr., Reuben R.

Cohen, Fernand S.

McHenry, Dean A.

Tian, Qi

TENNESSEE

Brackett, H. B.

Goodwin, William A.

Roach, Timothy S.

Valdes, Jose J.

TEXAS

Bell, Eddy Kent

Chandrasekaran,

Ramesh M.

Cofer, Christopher D.

Hammel Jr., Richard A.

Mandal, Batakrishna

Massey, Richard P.

Mc Quown Jr. A. N.

Mehovic, Farid

Prakash, Jaideep

Ratenski, Thomas M.

Rhine, John D.

Steinsiek, Roger R.

Ying, Hao

VIRGINIA

Donskoy, Boris

Stephens, Brad

VERMONT

Smith, Paul D.

WASHINGTON

Denney, Douglas, M.

Falk, Karl S.

Hsu, S. T.

Joshi, Sanjaya N.

Kelly, Brian M.

Lee, Albert A.

Pineiro, Sergio A.

Rosevold, Linda A.

WISCONSIN

Klomberg, P.

Rau, Kevin K.

Simon, Derrick J.

Xu, Xiao-Liang

ARGENTINA

Bobatto, Pablo
 Bornaio, Martin
 Calvet, Carlos A.
 Ciarlantini, Ricardo
 Cuello, Pablo F.
 Fambrini, Rodolfo J.
 Fischfeld, Geraldo J.
 Ganeau, Roberto C.
 Gonzalez, Manuel L.
 Silnik, Adolfo A.

AUSTRALIA

Chun, Miko
 Hampson, Grant A.
 Kovacich, Richard
 Martin, Gregory T.
 Webster, David J.

AUSTRIA

Zidek, Herbert P.

BELGIUM

Herne, R.
 Tilmans, Harrie A.

BRAZIL

Adamowski, Julio C.
 Medeiros, Jamilson
 Rodrigues, Cesar R.

BULGARIA

Hlevarov, Zdravko P.

CANADA

Bardyla, Roman
 Bolleman, Brent J.
 Campagna, Hugo
 Chui, Kenneth
 Crisostomo, Geraldine S.
 Forsyth, David S.
 Gosselin, Carl
 Lovely, Dennis F.
 Lowe, Nigel M.
 Lukacs, Marc E.
 Ma, Hong
 McLeod, Scott D.
 Melin, Staffan O.
 Roman, Maev
 Sadler, John B.

CHILE

Phillips, Pablo
 Vega, Hernan M.

CHINA

Fan, Yu
 Yuan, Zhong-Xuan
 Wang, Chuan-Pu
 Zheng, Dachun
 Zhong, Yi X.
 Zhu, Yi S.

COLOMBIA

Chavez, Manuel D.

CZECH REPUBLIC

Kadlek, Frantisek

DENMARK

Olesen, Oluf H.

Pedersen, Per D.
 Wolny, Wanda W.

ENGLAND

Deacon, John M.
 Evans, David H.
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Yuri Gulyaev Earns Popov Gold Medal

MOSCOW—Yuri Gulyaev, director of the Institute of Radioengineering and Electronics at the Russian Academy of Sciences, received the A.S. Popov Gold Medal from the Russian Academy of Sciences on May 4 during the International Conference, held here. Gulyaev was greeted by IEEE President Tom Cain — head of the IEEE delegation which took part in the Russian events.

The award is given once every five years to an individual in recognition of a contribution of far-reaching significance in the field of radioelectronics. Gulyaev, a well-known Russian scientist, was cited “for his outstanding contribution in developing the world and Russian radioengineering, electronics and communications.”

Gulyaev is a senior member of the IEEE, president of the Russian Popov Society for Radioengineering, Electronics and Communications and the chair of the IEEE Russia Section.

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Sound in a Vacuum

Whoever said that sound cannot propagate in a vacuum?!?! According to the movie *Apollo 13*, it sure can!

The New York Times on Monday July 24, 1995 had an article “13 Technical Mistakes in *Apollo 13*.” No. 13 is “A Silent Vacuum—Outside the capsule, the propulsion jets are roaring . . .”

submitted by John Vig

How much is your IEEE UFFC-Society membership worth?

A recent incident that occurred at the Frequency Control Symposium in San Francisco this past June startled me into thinking about the worth of my IEEE and UFFC-Society membership. As I was talking with a friend at the registration desk, two attendees from Eastern Europe approached to ask how they could extend their IEEE and UFFC-Society membership for two additional years. They had U.S. dollars in hand which had been given them for their personal expenses while attending the symposium as part of the symposiums' support of foreign attendees. Their U.S. dollars, in my estimation, were extremely more valuable assets for basic needs in their home country, so why would they want to use them for an IEEE membership. I certainly cannot second guess their reasons but it caused me to reflect on what membership in the IEEE has been worth to me as it relates to the UFFC Society. Let me share some of those thoughts with you.

We belong to a technically rich society. Our publication, IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, is highly valued by the technical community and reflects our involvement in leading edge technologies which continue to grow and diversify. We have three excellent well-attended symposia covering our three technical areas which reveal the latest in technical information. Even if we cannot attend the symposia, the proceedings are published and available. We have a strong history of technical achievement that reaches many years into the past with contributions still being made by UFFC-S members who pioneered in these areas. We have the honor of having percentage-wise more Fellows (~ 5%) than the overall IEEE membership (~1.4%).

We are a society which serves. Many of our technologies directly benefit human beings by providing security, assuring health, and enriching their lives. Some technologies which come to mind are, components for advanced communications, time and frequency control, environmental sensors, non-destructive

evaluation, and a multitude of ultrasonic applications for the medical industry. I'm sure you can name many others.

We are a society with a wonderful cultural and intergenerational diversity in our international membership. Each member brings their own unique focus of activities to our technical table. Our technical vision has been extended by the many new young members which the society attracts. Our membership outside the United States has grown steadily over the past years and within the last twelve months there have been more members join from outside the U.S. than from within. We have become better acquainted with the world and our lives have been enriched by these experiences. There is a higher degree of vitality and enthusiasm in our UFFC-Society because of growing international participation. Our perspective on the world broadens very quickly when we interface with those from other countries at symposia and when we have the opportunity to be at technical conferences in those countries.

The real essence of worth of the UFFC-S to me has been its people who have not only influenced my technical thinking but more importantly raised my consciousness of the inherent goodness, integrity, and responsibility of the people of this world. Their kindness, generosity, support, and their love has truly made me feel that our society is a rare and unique community. I have been truly blessed. I could talk about this aspect for a long time but I will spare the readership.

Let me close by saying that maybe some of the above were what my two Eastern European friends were anticipating when they put down their U.S. dollars. My hope is that they and the rest of our membership will be similarly blessed. May we continue to mine the technical riches of our society, apply our technologies to the service of others, and communicate with members to build a stronger UFFC-S worldwide community.

Fred Hickernell
Newsletter Editor

Zenith Veteran Doesn't Rue New Ownership

By Kevin Maney

"Look out, Gracie!" says a young George Burns, holding a clunky four-button box in a 1957 magazine ad. "With Zenith Space Command TV, I can change programs from across the room!"

Space Command TV — ya gotta love it. The Zenith invention was the first TV remote control on the market. "Obviously, I can be blamed for the couch potato," says Robert Adler, 81, the good-humored inventor who is still working at Zenith.

The remote control was one of a boatload of Zenith inventions, including the system that allows FM radio to be broadcast in stereo.

In all the hubbub this week about South Korea's L.G. Electronics buying a majority stake in Zenith, most people have focused on how Zenith was the last U.S.-controlled TV maker. Big deal. Making TVs is a lousy business. Let the Asians have it.

What's a tad more disconcerting is that the South Koreans have bought a great American invention company. In 1924, Zenith made the first portable radio, which was about as portable as a fully loaded suitcase.

Zenith also created Chromacolor, which was a big deal when introduced in 1969. The new kind of picture tube doubled the brightness of color TVs, and Chromacolor became one of those pseudo-technical terms that gets slapped all over advertising.

In the 1990s, Zenith — along with AT&T and General Instrument — has been a driving force behind the development of digital high-definition television, or HDTV, supposedly the next great advance in TV technology. The Japanese abandoned their version of HDTV because the U.S. version was so much better.

Adler, credited with 180 patents, has seen it all. Or most of it.

When he joined Zenith in December 1941, six days before Pearl Harbor, Zenith was already forging new technology. "I was very young and very impressed," Adler says in a warm accent from his native Austria. "I never quite lost that."

Through World War II, he and his Zenith colleagues mostly worked on wartime devices, such as radar. When the war was over, he worked on FM radio, then TV. One big problem with TV was the stability of the picture, which would start flipping

or shaking. "When a car came into the driveway, your picture might go," Adler says. He came up with a groundbreaking device that locked the picture.

Somewhat to his dismay, though, Adler is mostly remembered as the inventor of the remote control — the spiritual father of channel surfing.

Zenith started work on remote controls because its founder, Commander Eugene McDonald Jr., hated and opposed commercials. He wanted a device that would kill the sound when ads came on.

In the early 1950s, the first device was called Lazy Bones, and it was connected to the TV by a long wire.

"People didn't like it," Adler says. "It wasn't neat. People stumbled over it. Then the Commander, who really was a firebrand who never grew up, had this idea of putting photocells into the four corners of the screen and giving the customer a big, bulky flashlight to use to control the TV."

Called the Flashmatic, it worked by sensing light. Each corner controlled a different function, such as sound or channel changing, when the light hit it. But people couldn't remember which corner did what. And the cells were too sensitive. "If you had your TV set on the east wall of your apartment and the sun set in the west, the sun would hit the photocells and all hell would break loose," Adler says. It was on the market just a year.

"One fine day, the chief engineer called in everyone who was anybody and said orders from Commander were that we've got to come up with a new remote control," Adler says. "I suggested using inaudible sound. I went to work and did it." That was 1955. By 1956, Space Command TV — based on sound waves, not the infrared signals of today's remotes — was in production.

For the record, Adler says he'd rather be remembered for a highly sensitive amplifier he invented that has helped radio astronomers make breakthrough discoveries about the universe. As if that's more important than the remote control.

Adler welcomes Zenith's new owners. The company had been struggling. Adler says younger colleagues were worried about their futures, and research money was drying up. "I think (the LG purchase) is a very good thing," he says.

Hope he's remotely right.

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Notes from the Editor

After enjoying some vacation and conferences in cooler climes this summer, I have worked back into the daily rhythm and routine at Motorola. It is always fun to get away from work, but then again if you have technically interesting work, a good company to work for, and good people to work with, then being back home is a big plus, even if the afternoon temperature continues above 100°F.

There are within our UFFC-S fall newsletter the usual rhythms. The first part of the fall issue is devoted to the upcoming 1995 Ultrasonics Symposium in Seattle. Gerry Blessing and his symposium team together with the technical program committee have come up with an excellent meeting that you shouldn't miss. We also poked a little photographic fun at Gerry who is pretty serious when it comes to putting together a symposium. When you see Gerry tell him how much you appreciate his work and the work of his committee. Second, is the report of the annual June meeting of the Frequency Control Symposium. It was a great success and we congratulate all the award winners. John Vig did a great job as General Chairman, and now he is looking forward to our attendance at the 50th anniversary meeting in Hawaii. There is a call for papers in this issue. There is also a way to access FCS abstracts on the internet, thanks to John and his committee. Gary Montress has brought us the report from the minutes of the AdCom meeting. Chapters' news is slow. We welcome the new Russian Chapter which has just formed. We wish them well on the formation and growth of their new chapter.

There are three action items for members. The IEEE Fellow nomination process will soon be underway again. Please note where to get a nomination kit. Then there are the society nominations for the Achievement Award and for the Distinguished Lecturer. Take time to let Roger and Mack know who your choices are. A simple form is available to fill out and send in.

If you didn't catch the July article in USA Today about one of our distinguished members, Bob Adler, it has been reprinted with permission in this issue. We salute Bob for his long and distinguished career. We also congratulate another UFFC-S member, Yuri Gulyaev, on winning the Popov Society Gold medal. Your newsletter editor is anxious to publicize member activities and happenings, so don't hesitate to inform the newsletter editor. Your newsletter editor recently learned that Jan Smits had a mild stroke attack and will spend several weeks recuperating. We wish him a speedy recovery.

Finally, did you notice the list of new members, 179 from the United States and 195 from 42 countries outside the U. S. The list will include some names of those whose memberships have lapsed and were renewed. We welcome you all. The list brings out the important point, that we are an international society, and we need to come up with better ways of servicing our total membership, especially those in countries outside the U. S. Is it time for a member directory?

I trust you will enjoy this issue of the newsletter. The editor thanks all those who submitted articles and photographs and appreciates the work of Ann Scrupski and her coworkers at IEEE Magazines for layout and printing. The invitation is always there to any of our members to submit articles, photographs, and information which will be of interest to our readership. The next deadline falls around March 15, 1996, for the spring newsletter. The easiest way to communicate is email if you have it available. My address is f.hickernell@ieee.org. I have a fax- (602) 441-7714, a phone-(602) 441-2923, and an address-Motorola GSTG, 8201 E. McDowell, Scottsdale, AZ 85252. I look forward to hearing from you.

Fred Hickernell
Newsletter Editor



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