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2002 IEEE INTERNATIONAL FREQUENCY CONTROL SYMPOSIUM & PDA EXHIBITION 29-31 May 2002 and TUTORIALS 1 June 2002

New Orleans, Louisiana, USA

Symposium Site Information

This year's symposium will be held at The Hilton New Orleans Riverside Hotel in New Orleans, Louisiana, U.S.A., which is located in the center of it all, where distance is measured in feet, not cab fare. This is a prime downtown location with easy access to the excitement and variety only New Orleans has to offer. Immediately on the banks of the Mississippi River, this full-service luxury complex is actually a "city within itself," located in a city that's all about Mardi Gras and voodoo queens, crawfish gumbo and beignets, that particular architecture that blends bayou with Bonaparte.

The climate for New Orleans is semi-tropical. The average humidity for the year is around 76 percent. The average May-June temperature of New Orleans is 25 C (77.5F). Before you even leave home, pack an umbrella, comfortable shoes, and a camera. Even here in one of the sunniest cities in the USA, the occasional afternoon shower occurs; this is one of the walking-est towns around; and the need for a camera will be immediately apparent when you arrive.

New Orleans is all about its diverse, vibrant neighborhoods, each with its own special aromas to fill the air and sounds to punctuate the hustle and bustle of daily life. The easiest way to picture New Orleans is to divide it into its two main sections; uptown and downtown. The dividing line is Lee Circle, accessible from historic St. Charles Avenue. Below Lee Circle are the Warehouse Arts District, French Quarter, Faubourg Marigny, Bywater area and the Central Business District (CBD). Above Lee Circle are Uptown, The Garden District, The Irish Channel, Carrollton, and several colorful, distinct neighborhoods in-between.

Take a round-trip sightseeing tour on the St. Charles Avenue Streetcar. It's a great way to get an overview of the Garden District, Uptown, and the University areas of town, and you'll be aboard a movable historic landmark. It's the oldest continuously operating street railway system in the world! For a delightful introduction to Old Man River, take the ferry at the foot of Canal Street across the water to Algiers on the West Bank.

Located along the Mississippi, the Riverwalk Marketplace is a good place to shop while you visit New Orleans. You will enjoy an amazing river view while you browse through over 120 shops and cafes - ³/₄ km (half-mile) of the best shopping and dining this side of the Mississippi. If you're in the French Quarter, just take the riverfront streetcar directly to the Riverwalk a few blocks away. Take a carriage ride while you're in New Orleans, and enjoy a tour of the French Quarter (garden district tours available, too!) Quaint mule-drawn carriages can take you past many landmarks of New Orleans, including Bourbon Street, the mighty Mississippi, and Jackson Square.



President's Message

It is a great honor and distinct privilege to address you, for the first time, as the president of the Ultrasonics, Ferroelectrics and Frequency Control Society (UFFC) of IEEE.

I would like to take the opportunity to thank Past President F. Hickernell for his leadership during his tenure as president. Particularly, I would like to thank the Past Editor-in-Chief William D. O'Brien, Jr. for his most valuable services to the Transactions of UFFC. Meanwhile, I also would like to welcome our new Editor-in-Chief, Jian-yu Lu, and Associate Editor-in-Chief, Marjorie Passini Yuhas, with whom I will be working closely to further expand the scope of the Transac-



tions. In addition, I would like to welcome the new elected AdCom members as well.

UFFC is a special organization as it brings together scientists and engineers from a wide spectrum of backgrounds including electrical, acoustical, and materials engineering, and physics to name a few. This scientific diversity surely is our most remarkable strength, by which we shall forge our mark on the technological advances of the future. This scientific diversity, most importantly, gives us a unique opportunity to use the UFFC society as a platform where device and materials engineering can strongly interact and interfuse; and thereby pave the way for very important advances in fields such as solid state transducers, medical imaging, and frequency control devices.

While the aforementioned nature of the UFFC is, in principle, perfectly suited to a multidisciplinary and a multi-professional platform in the pertinent areas of science and engineering, I firmly do believe that we can further improve our society by having the Ultrasonics, Ferroelectrics, and Frequency Control communities intermingle ever more intensely. This should even be more so for the Ferroelectric community by virtue of the great diversity of materials-based societies involved. United and committed together, we could and we will resonate and grow.

It is my hope and wish that the Ferroelectrics community will eventually choose the UFFC as one of their major "scientific homes" and intensify their involvement in the Society's activities. It is also my belief that the Ferroelectrics community has much to offer to our friends and colleagues in the Ultrasonics and Frequency Control communities as it hosts many distinguished sci-

entists and engineers. Their intensified interactions with device people will, without any doubt, provide mutual benefit, and be in the best interest of our profession. After much discussion with members of the society, I envision the creation of a new scientific journal tentatively named IEEE-UFFC Journal of Ferroelectrics. Therefore, I have already called upon the incoming Vice President of Ferroelectrics Susan Trolier-McKinstry to institute the necessary groundwork and lay the foundation for this new journal.

Another matter of crucial importance is the UFFC's membership demographics. No professional society can sustain further growth without a steady flux of young and motivated individuals. We live in an era in which the competition is fierce in recruiting young individuals to our society. As such, we should spend our efforts on promoting UFFC to promising young scientists and engineers. This, I believe, is the utmost service we can do for our society. To accomplish this goal, we should encourage and support young scientists and engineers

UFFC Society Newsletter April 2002

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by having them take an active role in our society's various committees early on in their careers. We can thereby ensure the continuous growth of the Society.

The days of industrial age are long behind us, and we live in the information age where the internet has become an integral part of our lives. Thanks to Senior Past President Vig's leadership and extensive efforts, we are fortunate to have the many publications of the UFFC available online. These publications include but are not limited to the UFFC Transactions (1954-to present), UFFC Newsletter, UFFC Digital Archive, standards, and an array of UFFC Symposia proceedings, various lecture notes, and animated tutorials. However, there is room to improve the online services that we can provide to our members. As such, I will work with the Publication Vice President Jan Brown, Editor-in-Chief, Associate Editor-in-Chief, and the AdCom members in the implementation of the "Manuscript Central" concept whereby the manuscript submission process could be carried out electronically in an efficient, expedient and user-friendly manner. Our goal will be to reduce the submission, peer review and publication time to further promote submissions to the Transactions without sacrificing the scientific quality.

Many challenges lie ahead, I assure you that I am enthusiastically committed to serving the UFFC. With your feedback and support, I am certain that our society will reach its goals of success in the next two years.

Ahmad Safari UFFC-Society President

Around IEEE

John Vig Elected Division IX Director

John Vig was elected Director of Division IX. Division IX consists of the Aerospace and Electronic Systems Society, the Geoscience and Remote Sensing Society, the Oceanic Engineering Society, the Signal Processing Society, the Vehicular Technology Society, and UFFC. John is the Delegate from Division IX to the IEEE Assembly and sits on the Board of Directors of IEEE as a Director.



IEEE Division IX Director, John Vig

Congratulations John!

Virtual Museum

Thomas Edison didn't invent the lightbulb, so why does everyone think he did? How did the patterns in a Utah cornfield lead to the development of TV? What is ENIAC? What is the "X" in an X-ray? Why are Alvin and the Chipmunks part of a museum about technology?

The IEEE Virtual Museum (http://www.ieee.org/museum)

The Institute of Electrical and Electronics Engineers, Inc. (IEEE) founded in 1884, is a global scientific and educational association devoted to advancing the theory and practice of electronics and computing. As the world's largest technical professional society, the IEEE serves almost 400,000 members in over 150 countries. Creation of the IEEE Virtual Museum was

guided by some of the IEEE's most prestigious members including Nobel Laureates, academics, and business leaders.

Developed by engineers and historians, the IEEE VM is premised on the belief that examining what was increases our understanding of what is. Aimed at pre-college students and their teachers, the IEEE Virtual Museum explores the global social impact of electrical and information sciences and technologies and demonstrates the relevance of engineering and engineers to society. This unique approach to teaching technology means students will learn:

- How technology has evolved from simple early experiments to cutting-edge technological breakthroughs
- How different technologies work and how one idea or discovery sparks another
- How technology has shaped all aspects of society and culture
- Who the inventors and technologists are who have done so much to change our world

To make learning about science and technology stimulating and fun, the IEEE Virtual Museum illustrates technical material with engaging and interactive features while displaying unique historical artifacts from science and technology museums around the world. By integrating the vast collective expertise of the IEEE, resources from traditional museums, and interactive virtual techniques, the IEEE VM transcends the traditional museum experience.

As the IEEE Virtual Museum expands, educational modules will be provided for educators so the material can be effectively introduced into the classroom. We hope you check back with us often!

> Kim Breitfelder Project Manager, IEEE Virtual Museum

Frequency Control

2002 IEEE INTERNATIONAL FREQUENCY CONTROL SYMPOSIUM & PDA EXHIBITION 29-31 May 2002 and TUTORIALS

1 June 2002 New Orleans, Louisiana, USA

Symposium Sponsored by:

IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society *Exhibition Sponsored by:*

Piezoelectric Devices Association, Inc

General Chair

Errol P. EerNisse, Quartzdyne, Inc., e.eernisse@ieee.org Technical Program Chair

John R. Vig, US Army CECOM, j.vig@ieee.org

Tutorial Chair

John D. Prestage, Jet Propulsion Laboratory John.D.Prestage@jpl.nasa.gov

Exhibits Chair

Jack Kay, Kay, Inc., kayinc@accessus.net **Finance Chair**

Raymond L. Filler, U.S. Army CECOM RDEC raymond.filler@mail1.monmouth.army.mil

Editorial-Chair

John R. Vig, U.S. Army CECOM, j.vig@ieee.org Awards Co-Chairs

Thomas E. Parker, NIST, tparker@boulder.nist.gov Jack Kay, Kay, Inc., kayinc@accessus.net

SYMPOSIUM INFORMATION 2002 FCS PLENARY SESSION SPEAKER WILLIAM (BILL) ATWOOD, Ph.D. 'Frequency Control in Violins''

Abstract:

My research in violin acoustics is currently focused on controlling the eigenfrequencies of finished instruments through correlations with the eigenfrequencies of the component parts. In addition demonstrations of coupling of modes to channel energy from non-radiating ones to those that do produce sound in the far field can be done as live demo's.

Bill Atwood was raised in the greater Boston area where he began playing the piano when he was six and the violin at eight. Because his father was a part-time furniture maker who specialized in copies of French provincials, he also received early training in woodworking. These interests persisted through his years at the California Institute of Technology and then Stanford where he received a Ph.D. in the field of particle physics. From 1975 to 1999, he worked as an experimental physicist at SLAC (Stanford

University) and CERN (Switzerland) and co-authored over 130 scientific articles. In the 1990's, his interests turned to particle astrophysics and he is credited with originating the instrument concept for the GLAST Gamma Ray Satellite Project.

Bill began making violins in the early 1980's, essentially self-taught and largely focusing on a study of the acoustical properties of the instrument. In 1994, he began a collaboration with Thomas Croen, a well-respected traditional maker. Here classical techniques were learned by the physicist while acoustical science was learned by the luthier. The results are high-tech concepts realized in low-tech applications at the maker's bench. To date, Bill has completed close to sixty instruments and published several articles on both the acoustical aspects of violins as well as construction techniques. Currently, he continues to pursue his dual careers as a violinmaker and an adjunct professor in the Physics Department at the University of California, Santa Cruz.

The Invited Speakers this year will include:

- Bernard Dulmet "Finite Element Analysis of Activity-Dips in BAW Resonators and Sensors"
- Yury Pisarevsky "Growth and Electromechanical Properties of La3Ga5.25Ta0.25Si0.5O14 and La3Ga5Zr0.5Si0.5O14 Crystals" Ken Lakin "Bulk Acoustic Wave Coupled Resonator Filters"
- Errol Eernisse "The Role of Localized Rotational Imbalance in Drive level Dependence Phenomena"
- Art Ballato "Piezoelectric Resonators Loaded with Viscoelastic and Nonuniform Media"
- Victor Kalinin "Non-Contact Torque Sensors Based on SAW Resonators"
- Frank Kuzler "Worldwide Oscillator Markets: 2002-2007 markets, Trends and Opportunities
- Eugene Ivanov "Understanding Noise Mechanisms Limiting Frequency Stability of Microwave
- Signals Synthesised with Femtosecond Lasers"
- Jacques Vanier "Coherent Population Trapping for the Realisation of a Small Stable Atomic Clock"

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Hotel Reservations

The Hilton New Orleans Riverside Hotel is located at Two Poydras Street in New Orleans, Louisiana. For your convenience, the hotel reservation card below can be printed out and mailed to the address shown or faxed to: 1.504.584.3979. You may also call the hotel at 1.504.584.3999 directly or 1.800.HILTONS to make your reservation. Reservations must be made with the hotel directly in order to get the discounted group rate. Be sure to mention you are attending the 2002 IEEE International Frequency Control Symposium and PDA Exhibition. For non-government rooms, the conference code is: "IEF" and for government rooms the code is: "IEG". Arrangements have been made with the hotel to offer a limited number of rooms at a reduced rate to U.S. Government employees only. Government ID and/or government travel orders must be presented at time of check-in. These rooms are being offered on a first-come first-served basis.

All reservations must be made by 28 April 2002. Any reservations made after this cut-off date will only be honored on a space available basis. Check in time at the Hilton New Orleans Riverside is 3:00 p.m. and check out time is 12:00 Noon. Please note that the hotel requires a first night's pre-paid deposit on all rooms. Guest may use check, money order, or major credit card to establish prepayment. Confirmations are sent upon request only. Individual reservations must be cancelled at least 72 hours prior to arrival in order to receive a refund.

Parking at the Hotel

A private company manages parking at the Hilton New Orleans Riverside. Their current parking rates are \$20 per day for self-parking and \$25 per day for valet parking.

Air Transportation to New Orleans International Airport

Special discounted airfares for the 2002 International Frequency Control Symposium and PDA Exhibition on May 29-June 1, 2002 in New Orleans, Louisiana have been negotiated by IEEE Global Travel Services. Discounts are as high as 20% off the lowest published airfares with American, Continental, and United Airlines. If Saturday night stays or super-saver airfares are not applicable, deeply discounted airfares are available. Discount code A606098 entitles attendees to receive special rates that have also been negotiated with Avis Rental Car Company. Travel arrangements using the negotiated air carriers or the carriers of your choice can be made through IEEE Global Travel Services by calling between the hours of 8:30 a.m. and 5:30 p.m. EST. Monday through Friday. Within the US and Canada, call 1.800.TRY.IEEE, 1.800.879.4333); and outside of the US and Canada, call 1.732.562.5387. Or, if you wish, you may visit the on-line travel service web site at: http://www.ieeetravelonline.org This secure site offers simple and convenient service through which you can search, reserve, and ticket your travel anytime, anywhere.

You may also your fax requirements to the IEEE Global Travel Services at 1.732.562.8815. When faxing, please be sure to include your travel dates, departure, and return times, and phone and fax numbers. Or, if you wish, you may e-mail your request to the department's e-mail address at: travel-team@ieee.org. A travel counselor will contact you promptly.

Transportation from Airport to Hotel

The New Orleans International Airport is approximately 15 miles from the hotel - 20 minutes drive time. "Super Shuttle" provides 24-hour shuttle service between the airport and local hotels for a one-way charge of \$10 per person. Taxi service is also available for a minimum charge of approximately \$21 each way.

Car Rental

The IEEE Global Travel Services has negotiated special discounted car rental fees for attendees with Avis Rental Car Company. The discount code is #A606098. Call 1.800.331.1600 and be sure to mention this code in order to receive the discount.

Registration Fees

Each symposium participant must register and receive a badge. The badge must be worn to gain admission to the technical sessions and the exhibit area. You will save time and money by registering in advance.

IEEE/PDA Member Fees

The advanced registration fee for IEEE/PDA Members is \$375, with Proceedings on CD, and \$475, with paper Proceedings, for registrations received NO LATER THAN 10 MAY 2002. After 10 May, the registration fee for IEEE/PDA Members is \$425, with Proceedings on CD and \$525 with paper Proceedings.

Non-Member Fees

The advanced registration fee for Non-Members, received prior to 10 May 2002, is \$450, with Proceedings on CD, and \$550, with paper Proceedings. After 10 May, the registration fee for Non-Members with Proceedings on CD is \$500 and \$600 with paper Proceedings.

Please note: "member" is defined as any member of a sponsoring organization, either through individual membership in the IEEE or as derived membership as an employee of a PDA member company.

In order for attendees to receive the reduced rate for advanced registration, payment must be submitted with the advanced registration form. The registration fee entitles the registrant to admission to the technical sessions (but not the Tutorials), the exhibits, the refreshment breaks, one lunch, (Wednesday, 29 May) the Welcoming Reception, the Exhibitor's Reception and a CD containing the Proceedings of the symposium. There is an additional charge of \$100 for a paper copy of the Proceedings. Proceedings, whether on CD or paper, will be mailed to attendees a few months after the symposium.

Student, Retiree and IEEE Life Member Fees

The registration fee for FULL-TIME students and FULL-TIME retirees with Proceedings on CD is \$100 and \$50 without Proceedings. In addition, those individuals who wish to register for one day only may do so for a fee of \$225. There is also a special one-day registration fee of \$275 for Wednes-day, 29 May, which includes lunch on that day only. The registration fee for IEEE Life Members is \$50. The fee for one-day registrations and IEEE Life Members does not include Proceedings, which can be ordered at a cost of \$100 per copy. All registration fees MUST BE PAID IN US DOLLARS.

The advanced registration form for the symposium and tutorials is located below. You may photocopy this form for use by additional registrants. Visa, MasterCard and American Express will be accepted. Credit card registrations ONLY can be faxed to 1.732.681.9314 or e-mailed to: mcgivneyb2@aol.com. Registrations with payments by check can be mailed to the address shown on the form. Your badge, along with receipt for fees paid, can be picked up at the symposium registration desk. Confirmations will NOT be sent unless requested.

The registration fee is fully refundable up to five business days before the symposium/tutorials. After that date, there will be a service charge of \$50. Refunds will not, however, be issued once the Symposium and/or Tutorial begins. Attendee substitutions may be made at any time.

Guest Registration

There will also be a Guest Registration this year at the symposium. The guest registration fee includes continental breakfast each morning (Wednesday, Thursday and Friday) and admittance to the Welcoming Reception and the Exhibitor's Reception. A representative from the New Orleans Visitor and Convention Bureau will be on hand Wednesday morning to provide highlights and sightseeing tips for the area. The registration fee for the Guest Program is \$40 and it would be most helpful, for planning purposes, if you pre-registered using the enclosed registration form.

Registration Desk Hours

The registration desk for the Symposium will be open during the following hours:

> Tuesday, May 28th from 3-5PM and 7-9PM Wednesday, May 29th from 7:30AM - 5:00PM Thursday, May 30th from 7:30AM - 5:00PM Friday, May 31st from 7:30AM - 5:00PM

The registration desk hours for the Tutorial will be from 7:30AM - 5:00PM on Saturday, June 1st.

Messages

Messages may be left for symposium and tutorial attendees at the "IEEE Frequency Control Symposium Registration Desk" through the hotel's telephone number: 1.504.561.0500.

No Taping or Job Posting

Please note that it is symposium policy that there is to be NO video taping of any kind, at any time, in any of the tutorial or Symposium Sessions. It is IEEE/EIA policy that there be no job posting, of any kind, at the symposium. Your cooperation is appreciated.

All Proceedings Are Available in the UFFC Digital Archive

Full text of all the papers ever published in the Proceedings of the Frequency Control Symposium, i.e., since 1956, is available in the Digital Archive at: http://www.ieee-uffc.org/archive/fc/fcprcndx.htm. The Digital Archive is available for free to IEEE UFFC Society members only. Also available at this website are reference and tutorial information, nine books, historical information, and links to other web sites, including a directory of company web sites.

Digital Archive to be Available on CDs

The digital archive CD set is available if you are an IEEE UFFC-S member. The CD collection contains all material through the year 2000. Members can purchase the whole

~100,000 page collection (on 24 CDs) for 30. The digital archive is not available to non-members at any price. If you pre-register and order the CD set, we will be able to deliver the set to you at the FCS.

Speaker's Breakfast

Speakers and Session Chairmen for the Oral Sessions of the Symposium are requested to attend a complimentary Speaker's Breakfast on the morning of their presentation/session at 7:15AM. Please check with the symposium registration desk for the location.

Receptions

Exhibitor sponsored receptions will be held in the exhibit area on Wednesday and Thursday evening, 29 May and 30 May, from 5:00PM to 6:30PM. All registered participants and registered guests of the symposium are cordially invited to attend.

Award Nominations

Nominations are sought for the 2003 awards. Information will be available at the Registration Desk and is also available on the above-mentioned website.

Exhibition

Exhibit your products or services to hundreds of engineers and managers, the largest single exposure to customers available in the industry. A limited number of booths are still available. For information and an application contact Jack Kay either by telephone at 1.913.685.3685 or by e-mail at: kayinc@accessus.net.

Exhibitor sponsored receptions will be held in the exhibit area on Wednesday and Thursday evenings, May 29th and May 30th, from 5:00PM to 6:30PM. All registered participants and registered guests of the symposium are cordially invited to attend. Listed Below are companies with exhibit space reserved at the time of this printing:

> A.T. Wall Company Benchmark International, Inc. CCI/USA Datum Timing, Test & Measurement EFG International Femtosecond Systems Great Southern Marketing H.E.S. International, Inc. Hoffman Materials, Inc. KC Abrasives Legacy, Inc. Mackin Industries Corporation Micro Abrasives Corporation NorCom Systems, Inc. OE Waves, Inc. Polaris Electronics Corp. Saunders & Associates Sawyer Research Products Shure Manufacturing Tecan, Inc. **Timing Solutions Corporation** Transat Corporation

The PDA Exhibition hours will be as follows:

Wednesday,	10:00AM-12: 00 Noon	2:00PM - 6:00PM
29 May		
Thursday,	10:00AM-12:00 Noon	2:00PM - 6:00PM
30 May		
Friday,	9:00AM – 12 Noon	
31 May		

Soliciting on the Show Floor

IFCS& PDA reserve the right to escort any attendee from the Symposium and Exhibition if they are not an exhibitor and are reported to be soliciting on the exhibition floor or leaving product literature in the exhibit area or any other area of the hotel.

Coffee Break Sponsorships

Your company is invited to be a coffee break sponsor! The company name will be recognized in the final program and will be prominently displayed at the IFCS&PDA on a poster in the refreshment area. A table will be provided near the sign to display limited informational and promotional literature. To sponsor, please indicate on the registration form or contact Jack Kay either by telephone at 1.913.685.3685 or by e-mail at: kayinc@accessus.net. The prepaid fee is \$350 and must be received by May 1st in order to be acknowledged in the final program.

Tutorials

This year the Tutorials will be held on Saturday, June 1st from 8:00AM until 5:00PM. Our tutorial leaders have been selected from among the best experts in the world. The tutorial presentations are designed for newcomers to the field, as well as containing state-of-the-art material for experienced practitioners desiring to keep up-to-date. We look forward to your participation.

Dr. John Prestage Tutorials Chair Jet Propulsion Laboratory

A single registration fee will allow attendees to participate in the Tutorials, in all of the sessions, and includes morning and afternoon refreshment breaks, and a CD containing copies of the tutorial presentations. The advanced registration fee for IEEE/PDA members is \$175, if received no later than 10 May, and \$200 for on-site registration. The advanced registration fee for non-members is \$200, if received no later than 10 May and \$225 for on-site registration. All registration fees **MUST BE PAID IN US DOLLARS**. In order to receive the reduced rate, you must submit your payment with your registration form. The registration fee for FULL-TIME students and FULL-TIME retirees is \$50. A limited number of additional copies of the instructional material (CD only) will be available at a cost of \$75 at the registration desk.

Tutorials on the Web

The slides from last year's tutorial presentations may be viewed at http://www.ieee-uffc.org/fc. This year's tutorials are expected to be even better.

Visit Your UFFC Web Site! http://www.ieee-uffc.org/ ... over 164,000 visits

Procee	dings Or	dering Information	n	51	1997	97CH36016	IEEE
NO			EDOM	52	1998	98CH36165	IEEE
NO.	YEAR	DOCUMENT #	FROM	53	1999	99CH36313	IEEE
10	1056	AD 200222	NUTIO	54	2000	00CH37052	IEEE
10	1956	AD-298322	NTIS	55	2001	01CH37218	IEEE
11	1957	AD-298323	NTIS	56	2002	02CH37234	IEEE
12	1958	AD-298324	NTIS				
13	1959	AD-298325	NTIS	*IEE	E members	s may order Proce	edings at half price.
14	1960	AD-246500	NTIS	¹ Please 2 1000 J	check with	NTIS and/or IEE	EE for current pricing.
15	1961	AD-265455	NTIS	1999.	ionnt Meetin	ing with the EFIF	
16	1962	PB-162343	NTIS	** NTI	S		IEEE
17	1963	AD-423381	NTIS	5285 Pc	ort Royal Ro	ad	445 Hoes Lane
18	1964	AD-450341	NTIS	Springf	ield, VA 221	61	Piscataway, NJ 08854
19	1965	AD-471229	NTIS	Tel: 1./	03.487.4650		Tel: 1.800.678.4333
20	1966	AD-800523	NTIS	http://w	ww.fedwor	ld.gov/ntis/search	.htm
21	1967	AD-659792	NTIS	custome	er.services@	pieee.org	
22	1968	AD-844911	NTIS	http://w	ww.ieee.or	g/ieeestore/ordinf	o.html
23	1969	AD-746209	NTIS	Toohn	ical Drag	rom Committ	
24	1970	AD-746210	NTIS	Technie	cal Program	n Committee Ch	air: John R. Vig
25	1971	AD-746211	NTIS	J.Vig@	ieee.org		
26	1972	AD-771043	NTIS	Group	1 Vice- Ch	air: Gary Johnso	on
27	1973	AD-771042	NTIS	g.johnso	on@ieee.or	g anti-a of Motorial	Theory and Desiry of
28	1974	AD-A011113	NTIS	Resonat	ors and Fil	ters	s, Theory and Design of
29	1975	AD-A017466	NTIS	Group	2 Vice- Ch	air: Gary Montr	ress
30	1976	AD-A046089	NTIS	Gary_K	_Montress	@res.raytheon.co	m
31	1977	AD-A088221	NTIS	Oscillat	ors - BAW	and SAW, Micro	wave to Optical, Synthe-
32	1978	AD-A955718	NTIS	Group	a Other Cl 3 Vice- Ch	rcultry air: Chris Ekstro	om
33	1979	AD-A213544	NTIS	ekstrom	@atom.usr	no.navy.mil	
34	1980	AD-A213670	NTIS	Atomic	Frequency	Standards, Freque	ency and Time Coordina-
35	1981	AD-A110870	NTIS	tion, Op	tical Frequ	ency Standards	
36	1982	AD-A130811	NTIS	r.lec@c	oe.drexel.e	du	
37	1983	AD-A136673	NTIS	Resonar	nt Chemica	l & Biological Sei	nsors, Resonant Physical
38	1984	AD-A217381	NTIS	Sensors	, BAW, SA	W Sensors	
30	1985	AD-A217404	NTIS	Group	5 Vice- Ch	air: Butch Tysin	ger
40	1986	AD-A235435	NTIS	Manufa	cturing Tec	hnology	
40 41	1087	AD A216858	NTIS		8	61	
41	1000	AD-A210030	NTIS	Techn	ical Prog	ram Committ	ee Members
42	1900	AD-A217273	NTIS	Charles	S Adams	ion USA	
45	1989	AD-A253029	INTIS NTIS	Ivan Av	- Technolog v ramov	les, USA	
44	1990	AD-A272017	IN I IS	Institute	of Solid S	tate Physics, BUL	GARIA
45	1991	AD-A272274	N I IS	Arthur	Ballato	-	
46	1992	92CH30833	IEEE	U.S. Ar	my CECON	M RDEC	
47	1993	93CH32441	IEEE	Ewald Technis	che Univer	sität Wien AUST	RIA
48	1994	94CH34462	IEEE	Martin	Bloch		•
49	1995	95CH35752	IEEE	Frequer	cy Electroi	nics Inc., USA	
50	1996	96CH35935	IEEE	Jean-Si Nationa	mon Boula 1 Research	ingerr Council of Canad	a

Canon Bradley USA **Remi Brendel** ENSMM. FRANCE **Eric Burt** Jet Propulsion Laboratory, USA **Stephen Cantor** MITRE Corp., USA Shih S. Chuang Statek Corp., USA Leonard Cutler Agilent Laboratories, USA Andrea DeMarchi Politecnico di Torino, ITALY **Michael Driscoll** Northrop Grumman Corp., USA **Bernard Dulmet** Ecole Nationale Superieure de Mécanique et des Microtechniques, FRANCE **Errol Eernisse** Quartzdyne, Inc., USA **Christopher Ekstrom** U.S. Naval Observatory Jeremy K.A. Everard University of York, UNITED KINGDOM **Eva S. Ferre-Pikal** University of Wyoming, USA **Raymond Filler** US Army CECOM RDEC **Peter Fisk** National Measurement Laboratory, CSIRO, Physics, AUS-TRALIA **Marvin Frerking** Innovative Technology Products, USA **Michael Garvey** Datum, Beverly, USA George J. Giansanti, Jr. Micro Networks, Corp. (Andersen Labs), , USA William P. Hanson USA Ken-ya Hashimoto Chiba University, JAPAN **Jackie Hines** J.H. Hines Consulting, USA **Bernardo Jaduszliwer** The Aerospace Corporation, USA **Steven Jefferts** NIST, USA **Gary Johnson** Sawyer Research Products, USA Fabien J. Josse Marquette University, USA Vladimir A. Klipov Sawyer Research Products, USA **Alvin Kong** TRW, USA

Shigeru Kurosawa National Institute of Advanced Industrial Science and Technology (AIST), JAPAN Jack Kusters Agilent Technologies, USA **Ryszard Lec** Drexel University, USA **Ralf Lucklum** Otto-von-Guericke-Univ., GERMANY Lute Maleki Jet Propulsion Laboratory, USA **Donald Malocha** University of Central Florida, USA **George Mansfeld** Institute of Radioengineering and Electronics RAS, RUSSIA Eishi Momosaki Epson R&D, Inc., JAPAN **Gary Montress** Raytheon Research Division, USA **David Morgan** Impulse Consulting, UNITED KINGDOM Bernd Neubig GERMANY Shin-ichi Ohshima National Metrology Institute of Japan (NMIJ) **Thomas Parker** NIST. USA **Guy Portnoff** Quartz Pro AB, SWEDEN John Prestage Jet Propulsion Lab., USA Leo Reindl Institut für Elektrische Informationstechnik, GERMANY Victor Reinhardt Boeing Space Systems, USA **Enrico Rubiola** ESSTIN - LPMI - Universite Henri Poincare, FRANCE **Clemens Ruppel** EPCOS AG, GERMANY Jesse H Searls Poseidon Scientific Instruments, AUSTRALIA Marco Siccardi Datum, USA **Robert Smythe** Piezo Technology Inc., USA Samuel Stein Timing Solutions Corp., USA Dan Stevens Vectron International, USA **Donald Sullivan** NIST, USA **Pierre Thomann** Observatoire Cantonal, SWITZERLAND **Robert Tjoelker** Jet Propulsion Laboratory, USA **Michael Tobar** The University of Western Australia

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Barbara McGivney Conference Coordinator Synergistic Mgt. Inc., USA

Invitation to Symposium Proceedings Authors

The papers that appear in the *Proceedings of the IEEE Int'l Frequency Control Symposium* are not fully refereed publications because only the abstracts were refereed, and the abstracts were refereed only to determine if the paper was suitable for presentation at the Symposium. The papers submitted for the Proceedings are printed as submitted; they are not refereed. Therefore, please consider also submitting your paper to the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control. In many organizations, a conference paper counts for less than a refereed journal paper (e.g., during promotion considerations). Moreover, the Transactions have several times the circulation of the Proceedings. (Many libraries that subscribe to the Transactions do not purchase the Proceedings.) The Transactions are considered to be an "archival journal;" the Proceedings are not.

To submit your paper to the Transactions, please see the http://www.ieee-uffc.org/tr/contrib. Papers submitted to the Transactions undergo a rigorous peer review.

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Ferroelectrics

International Symposium on the Applications of Ferroelectrics (XIII ISAF 2002) May 28-June 1, 2002 Nara, Japan

The thirteenth International Symposium on the Applications of Ferroelectrics (XIII ISAF 2002) will be held in Nara, Japan, May 28-June 1, 2002. The meeting is sponsored by the Ultrasonics, Ferroelectrics and Frequency Control Society (UFFC-S) of the IEEE. This is the memorable occasion in which the world most important international symposia on the application of ferroelectrics, **ISAF** and **ISIF**, join together for the first time, and each of them is held in Japan for the first time. The **FMA**, Japan domestic meeting dedicated to the ferroelectric materials and their applications since 1977, also joins the other two symposia for this historic meeting.

The joint meeting, three meetings in one, will have a common registration fee, and will allow attendees to hear talks from all over the world on the applications of ferroelectrics.

The meeting will be known as the International Joint Conference on the Applications of Ferroelectrics 2002 (IFFF 2002).

The conference will have a scope similar to those of the individual meetings and will cover all topics related to the applications of ferroelectric, piezoelectric, dielectric and electro-optic single crystals, polycrystalline ceramics, and films.

Nara is one of the most historically important cities in Japan. It was the capital of Japan in ancient times, 710 - 784 AD Many important designated Cultural Assets and National Treasures can be found there, as well as temples, shrines, statues, carvings and paintings.

The Conference is held at Nara-ken New Public Hall in Nara city, Japan. The Hall is located in the center of Nara National Park, which is famous for its beauty and 1,200 tame deer. The Hall adjoins a world heritage area, and famous tourist spots such as Kofukuji Temple, Todaiji Temple, Kasugataisya Shrine are within walking distance from the hall. The Hall has an impressive Noh-theatre, two conference rooms, a reception hall and a spacious garden. Behind the spacious garden, you can enjoy the views of Mt. Mikasa, Kasuga and Wakakusa whose combined scenery is unique to Nara and provides a beautiful background. We invite you to participate in this exciting conference.

We look forward to seeing you at the conference in Nara.

Prof. Tadashi Shiosaki General Chair, IFFF 2002

IFFF2002 General Chair

Tadashi Shiosaki Nara Institute of Science and Technology, Japan Local Arrangement Committee (Japan)

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ISAF XIII 2002

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ISIF XIV 2002

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Y. Sakabe,	

Conference Scope

The Conference aims at serving as an international forum for scientists, researchers, engineers and manufacturers to exchange ideas and learn from each other.

The major goals of this conference are:

- To bridge between materials science & engineering, chemistry, physics and device engineering of ferroelectrics and related materials.
- To encourage interactions between basic and applied research.
- To offer a very complete overview of the activities in these fields.

• To serve as a meeting place, bringing in touch scientists and industrial partners.

Topics:

[A] Dielectrics

- [B] Ferroelectrics
- [C] Piezoelectrics and Electrostrictors
- [D] Pyroelectrics and Temperature Sensors
- [E] Optics and Display
- [F] High-K Thin Films for DRAMs and Gate Dielectrics
- [G] Ferroelectric Thin Films for Memory Applications
- [H] Testing and Characterization
- [,h] @Circuits, Devices and Integration
- [J] Fabrication Techniques (Single Crystals, Bulks and Thin Films)
- [K] Fundamental, Modeling and Theory
- [L] Others

Conference language

The official language of the conference is **English**; there will be no simultaneous translation.

Technical Program

The technical program will include plenary sessions, parallel sessions and poster sessions. A partial listing of invited and plenary speakers includes:

Plenary speakers

Hidetoshi Nishi, Fujitsu, Japan Ahmad Safari, Rutgers University, USA Nava Setter, EPFL, Switzerland

Invited speakers

Akira Ando, Murata Mfg. Co., Ltd., Japan Orlando Auciello, Argonne National Laboratory, U.S.A. Sunggi Baik, POSTECH, Korea Andrew Bell, University of Leeds, UK Helen M. Chan, Lehigh Univ., U. S. A. Yasuo Cho, Tohoku University, Japan Ilsub Chung, SungKyunKwan University, Korea Cheol Seong Hwang, Seoul National University, Korea Kazumi Kato, National Institute of Advanced Industrial Science and Technology, Japan Hiroshi Kishi, Taiyo Yuden Co., Ltd, Japan Kenji Kitamura, National Institute for Materials and Chemical Research, Japan Chung-Hsin Lu, National Taiwan University, Taiwan L. Manchanda, Agere Systems, USA Nicolas Nagel, Infineon Technologies, Japan Kiyoshi Nakamura, Tohoku Univ., Japan Keiichi Nashimoto, Fuji Xerox Lightwave Technologies Co., Ltd. Japan Yuji Noguchi, The University of Tokyo, Japan Takeshi NOMURA, TDK Corporation, Japan Young-Jin Park, Hynix Semiconductor Inc., Korea Robert W. Schwartz, Clemson University, USA James F. Scott, Cambridge University, UK Stephen Streiffer, Materials Science Division, Argonne National Laboratory, USA

Bruce Tuttle, Sandia National Laboratories, USA Orest G. Vendik, Elecrotechnical University, Russia Yao Xi, Tongi Univ., China Takeshi Yoshimura, The Pennsylvania State University, USA Marko Zgonik, Swiss Federal Institute of Technology,

Tutorials

Tutorial sessions, which will run consecutively and cover the basics of all fields relevant to the conference, are planned for Tuesday, 28 May, 2002. The speakers and topics will be announced on this site. The tutorial registration fees will be JPY25,000-(Advanced) or JPY35,000-.

Conference Information

For all conference information visit: http://www.ieee-uffc.org/ ferroelectrics/isaf2002/

11th International Symposium on Electrets (ISE11) 1-3 October 2002 Melbourne, Australia

The 11th International Symposium on Electrets (ISE11) will be held in Melbourne, Australia 1-3 October 2002, with a workshop following on 4 October. The ISE is held once every 2-3 years, and this is only the second time since its inception in 1967 that it is being hosted in the Southern Hemisphere. It is sponsored by the IEEE Dielectrics and Electrical Insulation Society, and in 2002 it is also technically co-sponsored by the UFFC Society. In order to emphasize this broadening of the scope of the Symposium, two of the invited speakers (Professor Susan Trolier-McKinstry and Professor Ahmad Safari) are distinguished active researchers in the UFFC area. UFFC members are therefore cordially invited to attend the Symposium. Further information, and copies of the Registration Form, will be found at http://ise11.spme.monash.edu.au.

Topics:

Scientists from industry, research institutes and universities are invited to attend the Symposium. In addition to the established electret topics discussed at previous meetings in the ISE series, topics of interest to members of the IEEE Ultrasonics Ferroelectrics and Frequency Control Society will also be included in the program, reflecting the technical co-sponsorship of ISE11 by the UFFC Society. The program will include sessions on

- Injection, transport and trapping of charge, polarization
- Thermally stimulated processes, radiation and field effects
- Non-linear optics and electrooptical effects
- Piezo-, pyro- and ferroelectric phenomena
- Ferroelectric ceramics and thin films
- Thin film ferroelectric memories
- Bioelectrets and photoelectrets
- Molecular electrets, especially those involving composite or novel materials
- Applications

Venue

The Symposium will be held 1-3 October 2002 in the Novotel Hotel, Glen Waverley. Glen Waverley is a suburb of Melbourne, about 20 km from its centre. Melbourne has a population around 3 million and is Australia's second largest city.

Workshop

A workshop entitled "Space charge profile measurements practice, problems and potential" will be held on Friday 4th October at the same venue.

Invited Lectures

Invited lectures at the Symposium will include the following:

- C. Lacabanne, Universite Paul Sabatier, France "Polymers with various chemical structures and chain architectures studied by TSC and broadband dynamic dielectric spectroscopy"
- J. vanTurnhout, Technical University of Delft, The Netherlands "New developments in the TSD-analysis of electrets"
- R. Gerhard-Multhaupt, University of Potsdam, Germany - "Porous polymer electrets ; new materials, new challenges, new chances"
- S. Trolier-McKinstry, Pennsylvania State University, USA "Piezoelectric films for MEMS applications"
- A. Safari, Rutgers State University of New Jersey, USA "Trends in multi-layer capacitors"

Robert Fleming Chairperson ISE11

Ultrasonics

2001 IEEE International Ultrasonics Symposium & World Congress on Ultrasonics

7-10 October 2001 Omni Hotel at CNN Center Atlanta, Georgia, USA

The 2001 IEEE International Ultrasonics Symposium & World Congress on Ultrasonics featured two new award events, the UFFC Ultrasonics Committee Rayleigh Award and the Student Paper Competition.

The IEEE UFFC Ultrasonics Committee 2001 Rayleigh Award

PROFESSOR GERALD W. Farnell (S'51-A'53-SM'58-F'70-LF'91) is the recipient of the IEEE Ultrasonics, Ferroelectrics and Frequency Control Ultrasonics Committee 2001 Rayleigh Award. The Rayleigh Award was created by AdCom in 2001 to recognize meritorious service to the UFFC society in the field of ultrasonics. The first award was presented to Professor Farnell at the 2001 IEEE International ultrasonic Symposium in Atlanta on Oct 8, 2001. The citation on the plaque reads: "for his devoted service and contributions to the IEEE UFFC Society in the field of Ultrasonics and for his original work in the areas of surface wave propagation in anisotropic materials."

Professor Farnell was born on August 31, 1925, in Toronto,ON, Canada. He received the B.A.Sc. from the University of Toronto (1948), the S. M. from the Massachusetts Institute of Technology (1950) and the Ph.D. from McGill university (1957) where he spent his full professional career. He rose through the ranks to become full professor (1962), Chair of the Electrical Engineering department (1967-1974) and Dean of the Faculty of Engineering (1974-1984).

Professor Farnell's research career has encompassed several areas, but most importantly that of surface acoustic waves



James Chomas receiving Prize Paper award Group 1 from Fred Hickernel.



Johann Hoffelner receiving Prize Paper Award Group 2 from Fred Hickernell.



IEEE UFFC Ultrasonics Rayleigh Award winner Gerry Farnell (center) with David Cheeke (left) and Fred Hickernell (right).

(SAW). His main results on SAW and pseudo SAW in anisotropic materials were summarized in two well known book chapters in the Physical Acoustics series, one co-authored with E. L. Adler. These seminal contributions underpin much of the subsequent growth of SAW into a major industry, particularly for the development of filters and signal processing devices for applications in communications. Professor Farnell is widely regarded as a pioneer and a leading expert in this field, and even thirty years later his publications are still widely cited in the literature.

A second major area was that of acoustic microscopy. With his then graduate student C. K. Jen, in the early 1980s



Ville Kaajakari receiving Prize Paper Award Group 3 from Fred Hickernell.



Nuri Emanetoglu receiving Prize Paper Award Group 4 from Ahmad Safari.



Kyutae Yoo receiving Prize Paper Award Groupt 5 from Fred Hickernell.



Dr. Sorah Rhee helping Ahmad Safari draw the door prizes.



Student Prize Paper Awardees with other paper finalists from left to right Ville Kaajakari, Raffi Kharchakdijian, Kyutae Yoo, Jim Chomas, Christine Norton, Nuri Emanetoglu, Abhijit Sathaye, Johann Hoffelner, Jomar Ochow, Chung Hoon Lee.



Hans-Jong Kutschera, Munich Germany, with Fred Hickernell.

he developed an original SAW based acoustic lens which could be fabricated using planar technology. This work rejoined his very first research interests in diffraction and phase effects in microwave lenses, for which he received



Tim Bigelow with Fred Hickernell.



Malene Schlakjer with Fred Hickernell.

the best paper award in the journal of the Optical Society of America in 1957. The phase anomalies observed in that early work were extended to the case of focused SAW. In later years, Professor Farnell also did significant work on the acoustic properties of multilayer systems.



Jeong Young Kwan with Fred and Ahmad.



Prof. Takao Chiba with Fred Hickernell and Ahmad Safari.





Ranu Nayak, University of Delhi



Oliver Kripfgans, University of Michigan. special thanks is due to Christine Norton for chairing the competition and keeping all the judges on track.

Abstracts submitted by students for the Student Paper Competition were reviewed IUS Technical Program Committee in the usual manner. Fifteen finalists were selected and asked to produce a poster of their papers to be displayed during a special student poster session. A panel of judges representing the papers technical group judged these posters.

The selection criteria was: 1) Student was first author, 2) Work was of high quality and done by the student, 3) The abstract clearly described the work and included results.

Prizes were given in each of the five technical areas. We are proud to salute the winners:

Group1 – Medical Ultrasonics

"Subharmonic Phase Inversion for Tumor Perfusion Estimation" James Chomast

Group 2 –Sensors, NDE, and Industrial Applications

"Numerical Simulation of Nonlinear Effects in High Power Ultrasound Applications"

Johann Hoffelner

Group 3 – Physical Acoustics

"Optimization of a Bulk-Driven Surface Micromachined Ultrasonic Micromotor"

Ville Kaajakari

Group 4 – Surface Acoustic Waves

" A New Piezoelectric Material MgxZN1-xO" Nuri Emanetoglu

Group 5 – Transducers and Transducer Materials

"Micromachined Direction-Sensitive Biomimetric Diaphragm for Ultrasonic Transducers"

Kyutae Yoo

In addition to the Student Paper Awards presented during the Reception in CNN Hall a number of Door Prize gift certificates were presented.

Presidential Student Breakfast

Another highlight of the symposium this year was the Presidential Student Breakfast. Congratulations to all those students who got up in time for the 7:00 am event. Please notice the morning time of 7:00 and students in the same sentence!

Gifts were given to the first female to arrive, Alexandra Clark from the University of Manchester Institute of Science and Technology, the first male to arrive, Oliver Kripfgans from the University of Michigan, and the student from the farthest away, Ranu Nayak from the University of Delhi, Delhi, India.

Alexandra Clark, University of Manchester Institute of Science and Technology.

Professor Farnell has a long and distinguished record of service with the UFFC society. He was elected for a three-year term to the Administrative Committee of the Group of Sonics and Ultrasonics in 1976. When that group formally became part of the UFFC he continued his multiple activities in the present society. All in all, he was a member of AdCom for 20 years, Head of the meetings committee for the symposia for 15 years, Vice-President for 4 years (1982-83, 1986-87) and President for two years (1988-89). During that time he initiated several policies which have become cornerstones of the society today. These include expansion of the meeting format to parallel and poster sessions, transformation of the society to an international one, manifested concretely by high international membership and the holding of off-shore symposia (Hawaii 1990, Cannes 1994, Sendai 1998, San Juan Puerto Rico 2000, Munich 2002, Hawii 2003...) and the program of student support which has lead to the rejuvenation of the society and a substantial increase in membership.

The sum total of these academic and professional activities with a rare degree of consistency in one principal research area and one society has lead to a multitude of honors for Professor Farnell. These include Fellow of the IEEE (1970), IEEE Centennial Medal (1984), UFFC Achievemnet Award (1991), Fellow of the Royal Society of Canada (1996) and Distinguished Service Award of the IEEE UFFC Society (1997).

Professor Farnell has now officially retired from academic and professional life. His sympathetic, effective and courteous demeanor will be missed in future symposia. He deserves much happiness and serenity in his retirement and I am sure that it is the wish of all members of the society that the measures that he initiated be continued and built upon in the UFFC community in the coming years.

J. David N. Cheeke

Student Paper Competition

2001 was the first year the Ultrasonics Committee of the IEEE International Ultrasonics Symposium presented a Student Paper Competition. The awards consisted of a certificate and, of course, a prestigious addition to the students resume. A

Scenes from the Presidential Student Breakfast

















Notes from the Guest Program

Remembrances of Atlanta's Old South Traditions

Guests of the 2001 IEEE International Ultrasonics Symposium enjoyed a continental breakfast each morning during the conference. We were treated to four tours in and around historic Atlanta, as well as joining the conferees Monday evening at the social reception and the symposium banquet on Tuesday evening held at the huge Atlanta History Center.

Traveling east of Atlanta on the first day, we arrived at charming Covington, Georgia, founded in 1822. It contains a wealth of old and new treasures. The first one we visited was Whitehall, a most splendid example of southern architecture. For Margaret Mitchell the magnificent mansion was her vision of Twelve Oaks. The present owners, K. C. and Vernon Bassham, being admirers of "Gone With the Wind," have collected "Scarlett's" memorabilia and enjoy educating the young about "Gone With the Wind."

Going next door to Whitehall, we visited Regency Hall, another southern home that is furnished in a flamboyant, yet sophisticated manner. Terry Thompson and Arvin Spell, III, are the present owners and shared the fascinating history behind the collections and antiques.

What wonderful Southern Cooking we had at the Blue Willow Inn! There were such a variety of salads, meats, vegetables, breads, and desserts. The sweetened ice tea is the "Champagne of the South." No one left hungry.

Atlanta is the home of the Civil Rights Movement and the place where the former Governor and President of the United States, Jimmy Carter's, memorabilia is housed. Our tour on Monday took us to the Martin Luther King, Jr. National Historic Site and the Jimmy Carter Center. How very, very interesting to have a talk by a member of the Ebenezer Baptist Church telling us about the founder and first pastor of the church (115 years ago), the second pastor, Martin Luther King, Jr.'s grandfather, the third pastor, MLK's father, and then the present day pastor. Martin Luther King, Jr. was a co-pastor



A view of Atlanta.



Martin Luther King Memorial and Tomb.

with his father after he returned from Mobile, Alabama. Our guide shared with us the love, caring, and concern that MLK's father had for his congregation and how very much the church meant to her and her husband over the past forty-two years. In front of the MLK, Jr. National Historic Site there is a reflecting pool that cascades from an upper level containing fountains to

> a lower level. Martin Luther King's tomb is in the middle of this reflecting pool. This historic site displays pictures of MLK Jr., his family, Mahatma Gandhi, and Harriet Tubman, all persons who believed in equality of persons.

Taking the elevator up seventy-two floors at the Westin Peachtree Plaza, we arrived at the Sun Dial Restaurant. It is a rotating restaurant and gave us spectacular views of the city as we enjoyed our special lunch.

A replica of the Oval Office as it was when President Carter was there highlighted our visit to the Jimmy Carter Center. The exhibits featured the American presidency, replicas of the gowns worn by Rosalynn Carter and previous first ladies, a table arrangement of a formal dinner at the White House, and a television interview with President Carter as he answered pertinent questions. Beautiful



Guests at Ultrasonics Symposium, Coca-Cola and underground.



High Art Museum featuring Monet.

formal gardens with cherry orchards, waterfalls, and wild-flowers surround the garden.

Tuesday found us at the World of Coca Cola. This attraction features the explanation of the bottling process, the history of Coca Cola, a film featuring the international appeal of this most popular drink, vintage television commercials, and a typical soda fountain showing how the drink was made in the middle of the twentieth century. On our last stop we were invited to sample the wide range of Coke's products, both domestically and internationally from soda fountains of the future with exotic flavors from around the world.

Next we crossed the street to Lower Alabama Street which was the original byway through the great city of Atlanta and is called "Underground Atlanta." There are interesting shops and vendor carts where we could explore on our own.

After lunch at Mary Mac's Tea Room with original Southern fare and charm, we had the opportunity to visit Atlanta's High Museum of Art. The museum was featuring the paintings and drawings of Homer and Monet. We could spend hours there with earphones to explain each piece. The museum building itself is quite a unique piece of architecture built in the 1980's and made up of stark white concrete, rounded edges, and plate glass windows.

Tuesday evening's banquet was very special with several buffet tables arranged throughout the history museum. Here again we had a variety of delicious southern food. The museum focused on the early history of the area from the Indian settlements to pioneer days and up to the present international city of today. It also had exhibitions of early transportation, industrialization, and communication. Of course, it highlighted the South and the struggles during the Civil War.

Our final day's tour took us to the Atlanta Botanical Gardens in Piedmont Park. The purpose of these gardens is for display, education, research, conservation, and enjoyment. There is the outdoor tranquility of the Japanese garden, the changes as the seasons change, and then the indoor tropical environment with its ninety different plant specimens and six species of birds. Desert plants and orchids were also a part of the indoor gardens.

It was hard to leave this beautiful place, but we had to make it down the street to Agnes and Muriel's where the featured food was the "kind you wish your Mother cooked," old-fashioned food served on Fifties/Sixties china.

The spouses and guests always enjoy the special tours where we learn, are entertained, and stimulated. We especially like to be with our friends, old and new, and share our lives with each other. It is truly a blessing to be a part of the Ultrasonic Symposium and their guests.

Thresa Hickernell

2002 IEEE International Ultrasonics Symposium October 8-11, 2002

Sponsored by the IEEE Ultrasonics, Ferroelectrics & Frequency Control Society in cooperation with VDE Association for Electrical, Electronic & Information Technologies, Germany

Special notes:

- Cutoff date for hotel room reservations is August 8, 2002 for the Forum Hotel. Please make early resevations. For the Hotel Prinz and the Max Emanuel Hotel the cutoff date is September 7, 2002 and August 27, 2002, respectively.
- If you wish to come to Munich for attending the famous October Fest, we recommend to make reservations immediately.

Invitation from the General Co-Chairs

On behalf of the Symposium Organizing Committee and the Administrative Committee of the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society, we would like to invite you to join us in Munich, Germany and participate in the 2002 IEEE International Ultrasonics Symposium that will be held October 8-11, 2002, at the Forum Hotel in Munich, Germany. This is the third time the Symposium has crossed major oceans, having been convened in Cannes, France in 1994 and Sendai, Japan in 1998. The site of the symposium is close to the beautiful downtown Munich, which preserves much of the medieval character of the city, while combining it with elegant modern stores. The Culture Center including the Philharmonic Hall and the remarkable Deutsches Museum are next door. Many points of interest, such as fountains, churches and traditional restaurants are within walking distance. Other sites such as the spectacular Royal Palace are easily accessible because Munich has an excellent public transportation system and our conference hotel is located on top of a subway station.

This year's Technical Program Committee, chaired by Robert Weigel and Reinhard Lerch, is working hard to put together another outstanding technical program. As before, there will be a mix of invited and contributed papers. Student paper awards will be given this year, the second time in the history of our Symposia.

The Social Committee has prepared an exciting program for participants and guests, which will allow attendees to explore the rich history of the city of Munich and surroundings. Munich was also the hosting city of the 1972 Olympic Game and the site is open for viewing. Thursday night we hold the banquet at the Hofbräukeller, which is located on right the bank of the river Isar between the Bavarian parliament and the Deutsches Museum. Entertainment will be provided by the Original Hofbräuhaus Show. Friday night is another opportunity for gathering at a charming Micro-Brewery.

We are looking forward to an excellent program, and to the opportunity of greeting you in Munich.

Note: In Germany the cut-off date for making hotel reservations is 6-8 weeks before the meeting. Please account for this and make your reservations in time.

Clemens Ruppel Bernhard Tittmann General Co-Chairs

Message From The Technical Co-Chairs

Ultrasonics is on the Move! We look forward to an increasing impact of Ultrasonics in numerous emerging technical disciplines. The research community, the industry, and the universities are challenged to invent and develop improved and innovative concepts to efficiently address and solve the many new problems associated with a growing number of novel applications.

We welcome you to the 2002 IEEE International Ultrasonics Symposium which will be held in Munich, Germany, October 8-11, 2002 to bring together experts in theory and techniques of Medical Ultrasonics, Sensors, NDE & Industrial Applications, Physical Acoustics, Surface Acoustic Waves, and Transducers & Transducer Materials from all over the world.

The IEEE International Ultrasonics Symposium has a tradition of fostering direct, personal contact among the attendees thanks to its unique format with educational short courses, a plenary opening session, open forum presentations, focused sessions, and five sets of parallel sessions. A special student paper competition will be held. The Technical Program Committee will choose about fifteen student paper finalists to join the final competition at the Symposium and to receive special accommodation during the Symposium at the Deutsches Museum. Five winners (one from each area of the Technical Program Committee) will be chosen to receive a cash award.

A social and guest program will allow attendees to explore the rich history and culture of the city of Munich which is located in one of the worldwide nicest areas, in Bavaria north of the Alps, not far away from Austria and Switzerland. The Forum hotel is located in central Munich, and the Symposium will be held right after the well-known Oktoberfest.

We hope you are as excited as we are and join us to attend this important international event of the Ultrasonics community. Enjoy every minute of the symposium and of Munich!

Reinhard Lerch Robert Weigel Technical Program Co-Chairs

First Call for Papers

ABSTRACT DEADLINE: May 16, 2002

Papers are solicited describing original work in the field of ultrasonics. Poster and oral presentation formats will be used at the Symposium. Prospective authors should note that poster sessions provide an alternative format which allows for greater flexibility and expanded audience interaction. The abstracts should be submitted in electronic form according to the specific information posted on the conference web page. Additional conference information can be found at the Symposium web site: http://www.ieee-uffc.org/2002 (add to favorites)

Each abstract will receive careful review and evaluation by the Symposium Technical Program Committee. Evaluation criteria will include originality of the work, contribution to the state-of-the-art, and overall interest to the ultrasonics community. Each abstract should be specific, contain clearly identified new material, and include quantitative information or data. A good abstract must clearly and concisely explain the hypothesis, methods and conclusion of the paper. Results of research should be clearly indicated in the abstracts.

Papers are solicited from the following subject classifications:

Group 1	Medical Ultrasonics
MBB	Medical Beamforming and Beam Steering
MBE	Biological Effects & Dosimetry
MBF	Blood Flow Measurement
MCA	Contrast Agents
MEL	Elastography
MIM	Medical Imaging
MSP	Medical Signal Processing
MTC	Medical Tissue Characteriztion
MTH	Therapeutics, Hyperthermia, Ultrasound in Surgery
Group 2	Sensors, NDE & Industrial Applications
NAM	Acoustic Microscopy & Imaging
NAS	Acoustic Sensors
NDE	General NDE Methods
NMC	Material & Defect Characterization
NPM	Wave Propagation
NSP	Signal Processing
NTD	Transducers: NDE and Industrial
Group 3	Physical Acoustics
PBW	Bulk Wave Effects & Devices
PGP	General Physical Acoustics
PMI	Magnetic Interactions
POI	Optical Interactions
PUM	Ultrasonic Motors & Actuators
Group 4	Surface Acoustic Waves
SAED	SAW Acoustoelectric Effects & Devices
SDO	SAW Devices & Oscillators
SFT	SAW Filters & Transducers
SMP	SAW Materials & Propagation
SSA	SAW System Applications
SSP	SAW Signal Processing
STD	SAW Thin-Films & Devices
Group 5	Transducers & Transducer Materials
TFA	Transducer Modeling (FEA and Analytical)
TFT	Transducer Fabrication Technology
TMC	Transducer Material Characterization and
	Modeling
TMM	Materials/Technology for Medical Transducers
TMT	Medical Transducers
TMU	Micromachined Ultrasound
TPF	Piezoelectric and Ferroelectric Transducer
	Materials

New this year: Proposals for Focused Sessions are invited and highly encouraged. To make suggestions for topics, or to volunteer to help organize/participate in a Focused Session contact the Technical Co-Chairs. The deadline for proposals is February 19, 2002.

Student Travel Support: Limited funds are available to support student attendees at 2002 symposium. Awards will be made on a competitive basis. Further information will be posted on the web page. The application deadline is July 7, 2002.

Student Paper Competition: Students who are submitting abstracts for presentation are invited to participate in a special student paper competition. Student paper finalists will be chosen by the Technical Program Committee (TPC) to join the final competition at the 2002 Symposium and to receive special accommodation during the Symposium in the Deutsches Museum. Five winners (one from each area of the TPC) will be chosen to receive a cash award. Students should indicate their interest by marking the appropriate box on the abstract submission form.

The Symposium will be held right after the well-known Oktoberfest. For your information, please browse through (http://www.muenchen-tourist.de/englisch/oktoberfest/ muenchen-oktoberfest-einleitung_e.htm).

Hotel Information

Hotel Max Emanuel **Forum Hotel** Hochstrasse 3 81669 Munich, Germany Tel: +49 89 4803 0 Fax: +49 89 4488 277 E-mail: munich@interconti.com http://forum-munich.interconti.com Reservation

Munich, the cosmopolitan city with a heart, offers visitors the best in culture, business and entertainment all year round. Our 580 rooms, including 12 suites and our FORUM plus floors which have been especially designed to meet the every need of today's business traveler, make the Forum Hotel the ideal place to stay.

Our 2100 square meters Conference Center is designed to meet the needs of up to 2000 guests. Whether for a banquet or meeting, the 16 conference rooms provide great flexibility, with the largest room able to accommodate up to 700 guests. Furthermore, our Conference Center boasts the latest in technology with most rooms featuring daylight.

The direct access within the same building complex to Munich's underground system at the "Rosenheimer Platz" station guarantees rapid and direct transit to the Munich International Airport and the new Trade Fair Grounds.

Room rates & Reservation

The price for a single room will be 151 and for a double room 169.

City Hilton

Rosenheimer Strasse 15, DE 81667 Munich, Germany Tel: 49-89-48040 Fax: 49-89-48044804 http://www.hilton.com

Reservation

The 481-room Munich City Hilton features nine meeting rooms that can cater for up to 550 guests, two restaurants serving fine German & regional specialities and a fully-equipped business centre. The hotel is perched above the riverbanks of the Isar in the new artists' quarter Haidhausen, next to the Gasteig Cultural Centre and a 10 minute walk from the city centre. Franz Josef Strauss Airport is just 35 minutes via a subway connection beneath the hotel.

Location

The City Hilton is just across the street from our conference hotel.

Room rates & Reservation

The price for a single room will be 220 $\,$ and for a double room 260 $\,$.

Hotel Prinz

Hochstr. 45 81541 München, Germany Phone: +49 89 441408 0 Fax +49 89 441408 333 e-mail: contact@hotel-prinz.de http://www.hotel-prinz.de Reservation...

Location

The Hotel Prinz is a small hotel (41 rooms) which is less than half a mile away from our conference hotel.

An individual touch and personal attention are best provided in the private atmosphere of the Hotel Prinz. And of course you will find all the service and comfort you are accustomed to. Our main purpose is to provide you the best service. At anytime and with all the details you need when you are travelling. This makes your stay with us so enjoyable. Good taste shapes the surroundings in which you feel at home. Our interiors have been designed to provide you with this atmosphere of well-being. Our guests enjoy the stimulation of artistic experience while having breakfast or simply sitting in the lobby area. In our rooms contemporary artists exhibit over one hundred paintings, sculptures and other works. Check 'exposition' page for current artist.

Room rates & Reservation

The room rates for single rooms are 105 and 115, for double rooms 135. Breakfast is available for 9.50.

Hotel Max Emanuel

Rablstr. 10 81669 München, Germany Phone: +49 (0)89-4 58 30-0 FAX: +49 (0)89-4 58 30-112 e-mail: maxemanuel@deraghotels.de http://www.deraghotels.de/english/muc/max.htm Reservation...

Custom Concepts for Living

Whether for a day, two weeks or months - whether for guests, employees or yourself - the DeragHotel Max Emanuel can offer you a tailor-made concept for your stay. Choose a ho-

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tel room, or for stays of 4 nights and more, an apartment. We have single, double or studio apartments, as well as suites with a variety of amenities.

Location

You'll find us on a quiet street parallel to Rosenheimerstrasse, a five-minute walk from the Rosenheimer Platz subway station. In the immediate neighbourhood are Munich's best public swimming pool (the Müller'sche Volksbad), the "Gasteig" convention centre, and any number of pubs and restaurants.

Apartment & Hotel Room Features

Our fully furnished apartments, whether a single or a studio apartment with roof terrace, all include private bath with shower, direct-dial phone, cable TV, kitchen or kitchenette. Many also have microwaves or conventional ovens. Every room has a spacious closet, generous work space and a dining table, so you can feel right at home during your stay in Munich. Some apartments also include a stereo system and CD player.

Room rates & Reservation

The price for a single room will be approximately 90-100 .

Social Gathering

Wednesday, October 9, 2002

On behalf of the Bavarian Minister-President, Dr. Edmund Stoiber, the Bavarian State Minister of Sciences, Research and the Arts, Hans Zehetmair, will invite you to a State Reception in a historic place, the Residence, in downtown Munich. Drinks and hors d'oeuvres will be served. A shuttle bus will be available starting at 18:30 in front of the Forum Hotel. All attendees and companions should wear their badges to gain entrance to the social gathering.

Description: The Munich Residence, located in the center of the city, is a magnificient complex of buildings constructed by the powerful Wittelsbach family who ruled Bavaria for about 800 years. Although originally dating from the 14th century, subsequent additions and alterations gave the Residence a variety of architectural styles, right up until the fall of the Wittelsbach dynasty in 1918. Renaissance features predominate but one of the most impressive rooms in the complex is the Baroque Golden Hall. The Antiquarium, built in 1571, is the oldest part of the palace and houses the family's collection of antiquities, whilst the Schatzkammer (treasury) holds an exquisite array of diamonds, rubies and other precious stones. Other rooms display porcelain, Italian portraits and vistas, and even Egyptian art. The Rococo Cuvilliés Theatre was once the private theatre of the Wittelbach court. Both the theatre and the Residence were destroyed during World War II but have been rebuilt in their original style.

Banquet on Thursday Evening

This year the banquet will be held at the Hofbräukeller, which is an excellent place for traditional Bavarian food. A typical Bavarian dinner will be served. Entertainment will be provided by the Original Hofbräuhaus Show.

History of the Hofbräukeller

At the end of the 18th century the breweries of Munich decided to relocate their beer deposits beyond the city walls. The new position would make it easier for them to supply the surrounding villages and to enlarge their depots. With its natural caverns, the bank on the right side of the Isar River was an ideal place to build cellars in which the ice, and consequently the beer, had a longer durability. New imported chestnut trees with big leaves gave shade to the beer cellars and cooled them in the summer. The brewers — who weren't innkeepers — sold the fresh beer on the spot. The king tolerated the sale and the world-famous Munich beer garden culture developed in a short time.

The Hofbräukeller at Wiener Platz was built in the years 1892-1894. It belongs to the historically remarkable buildings of the New Renaissance. In the 1930s the Hofbräukeller was very popular as a restaurant. In the war it was used as a field hospital; the American forces used it as their headquarters after the war. In spite of two big conflagrations, the Hofbräukeller has maintained its original designation as a refuge of Bavarian sociability. After the large-scale renovation of 1987, the Hofbräukeller was recognized by the city of Munich for its outstanding architectural with the Façade Prize.

Margot and Günter Steinberg offer their charming hospitality — for young and old alike — in the tradition of the Munich beer garden.

Show Program by the Authentic Festival Band from Munich's Hofbräuhaus

For more than 12 years, ever true to the motto "Only the authentic is original", the Hofbräuhaus Festival Band has thrilled a delighted public which throngs daily to Munich's world famous Hofbräuhaus with its fantastic repertoire of traditional melodies and jolly Bavarian dance music.



With frequent performances throughout Germany, Austria and Switzerland and many guest appearances in Japan, Spain, the USA and China, the band presents its diversity in a captivating spirit, bringing Bavarian culture to spellbound audiences and making the musical ballads and folk dances of Bavaria an unforgettable experience for every visitor.

The professional show package is an exciting program of the authentic Hofbräuhaus Band, a female yodeller, schuhplattler (thigh slapping) dancers in original Dirndl costume, whip crackers, bell ringers and alpine horn players.

Highlights of the show include regional dances (e.g. the Austrian Steierer dance, the timberjack dance, the bench dance), spoon percussion playing, whip cracking and last not least the delightful medleys of the band. Classical Bavarian musical "spectacles" are presented in a convincing, professionally arranged program. Impeccable references are provided by numerous leading hotels, for example, Intercontinental, Hyatt, Mariott, Hilton, Sheraton, Steigenberger, MS Europa, Kempinski, Hotel Peking and, it goes without saying really, the one and only Munich Oktoberfest. A bit folksy, a bit modern, from dance music to brass band music.

The success portfolio of these competent musicians is not only testified by performances in the Hofbräuhaus and at diverse events, but also by appearances in folk music shows of leading radio and TV stations, e.g. BR, ZDF, ARD, RTL and SAT 1. Recordings of the original Hofbräuhaus Band and its yodellers, alpine horn players and bell ringers are available on numerous sound carriers for enjoyment at home.

All musicians bring experience, commitment and routine with them on stage - factors indispensable for a smooth and polished performance.

Absolute command of their instruments and singing voices are natural attributes of the group and the solo performers. Audiences are always given a convincing performance by the musicians in all variations.

Nominations for IEEE UFFC-S Ultrasonics Committee 2002 Rayleigh Award

The Rayleigh Award was created by Adcom in 2001 to recognize meritorious service to the UFFC society in the field of ultrasonics. The first Award was presented at the IEEE International Ultrasonic Symposium in Atlanta in Oct., 2001. The achievement may be in technical innovations, research, education, publications and related professional endeavors. Typically, the recipient will have demonstrated these accomplishments over a sustained period of time. An Awards Committee consisting of the Technical Program Chair and Vice-Chairs in the spring of each year will make selection.



Meet the Ultrasonics Standing Committee. Back (L-R): Ahmad Safari, Jim Greenleaf, Bernie Tittmann, Mack Breazeale, Fred Hickernell, Pierre Khuri-Yakob. Front (L-R): Richard Chiao, Jackie Hines, John Vig, Mike Garvey, Herman van de Vaart, Gerry Blessing.

Nominations for UFFC-S RAYLEIGH AWARD

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

Here is my nomination for Rayleigh Award:

Nominee's Name & Main Contributions:

Your Name/Address:

Please send your suggestions for the next Rayleigh Award, together with your name and address ,by fax, mail or email at any time to:

> Prof. J. David N. Cheeke Chair, Rayleigh Award Committee Physics Department Concordia University de Maisonneuve Blvd West Montreal ,Qc Canada H3G 1M8 FAX: 514-848-2828 Email: cheeke@alcor.concordia.ca

Chapter Activities

Japan Chapter

The Japan Chapter held 6 technical meetings during the second half of 2001, in conjunction with the Technical Group on Ultrasonics of the Institute of Electronics, Information and Communication Engineers of Japan and the Acoustical Society of Japan:

<u>Date</u>	Papers	Venue
1) July 7	9	Tokyo
2) August 24	8	Yokohama
3) September 25-26	17	Sendai
4) October 22	7	Tokyo
5) November 2	6	Kanazawa
6) December 19	10	Tokyo



Prof. Payne giving an invited talk at the 22nd Symposium on Ultrasonic Electronics held in Kanagawa.



At the welcome party held in Sendai. Front row (left to right): Noriyoshi Chubachi, Prof. D. A. Payne, Kazuhiko Yamanouchi, Yasuhiko Nakagawa (Chair). Back row (left to right): Ken Yamada (Vice Chair), Hiroshi Kanai, Kiyoshi Nakamura, Jun-ichi Kushibiki, Kazushi Yamanaka.

UFFC-S 2000-2001 Distinguished Lecturer Program

Professor David A. Payne of University of Illinois at Urbana-Champaign, the UFFC-S 2001-2002 Distinguished Lecturer, was invited to Japan and stayed from Nov. 8 to Nov. 15. He favored us with impressive and instructive lectures on "Recent Developments and Understanding of Ferroelectric and Piezoelectric Materials and their Applications" at the USE 2001 Symposium in Kanagawa, at the meeting



Lecture at Tohoku University.

of the 150th Committee on Acoustic Wave Device Technology held at Tohoku University in Sendai, and at Murata Manufacturing. Co., Ltd. in Kyoto.

22nd Symposium on Ultrasonic Electronics (USE2001)

The 22nd Symposium on Ultrasonic Electronics (USE2001) was held in Kanagawa on Nov. 7-9, cosponsored by the UFFC Japan Chapter, and attended by 365 participants. There were three invited talks (one of them by Prof. Payne), and 194 contributed papers were presented. Most of the papers presented at the Symposium will be published in a special issue of the Japanese Journal of Applied Physics, Vol. 41, No. 5B (2002). Titles and abstracts of the articles in JJAP including back issues will be browsed by accessing the JJAP home page at http://www.jjap.or.jp/online/.

2002 Officers

The officers of the Japan Chapter for 2002 are:

Chair: Professor Yasuhiko Nakagawa, Faculty of Engineering, Yamanashi University, 4-3-11, Takeda, Kofu 400-8511

Vice Chair: Associate Professor Ken Yamada, Graduate School of Engineering, Tohoku University, 05 Aramaki-Aza-Aoba, Aoba-Ku, Sendai 980-8579

Secretary and Treasurer: Associate Professor Kentaro Nakamura, Precision and Intelligence Laboratory, Tokyo Institute of Technology, 4259 Nagatsuda, Midori-Ku, Yokohama 226-8503

> Ken Yamada Vice Chair UFFC-S Japan Chapter

Phoenix UFFC – Waves and Devices Chapter

The Phoenix UFFC Society is one of five IEEE Societies which joined together to form the Waves and Devices Chapter of the IEEE Phoenix Section. The other four cooperating IEEE Societies are Laser and Electrooptics (LEOS), Microwave Theory and Techniques (MTT-S), Antenna and Propagation (APS), and Electron Devices (EDS).

The WAD Chapter is planning fourteen lecture meetings for the 2002 calendar year. Two such meetings have already been held with speakers from APS and LEOS. April 23rd, Dr. David Penunuri, a member of the UFFC Society, is scheduled to speak on his work at Motorola with advanced high frequency BAW filter developments. The meetings take place at Arizona State University (ASU) with a social and refreshments prior to the lecture and a dinner of pizza and soda following. The WAD Chapter is using this schedule to especially attract students to the lectures. The WAD Chapter is also developing a web page where there is the meeting schedule, abstracts, and biographies of the speakers, links to the five IEEE Society Web Sites, and committee information. Dr. Bruce Kim of the EE Department of ASU is the WAD Chapter President, Dr. Chuck Weitzel of Motorola the Vice Chair, and Dr. Rashaunda Henderson, also of Motorola, is the Treasurer

On February 2nd, the Phoenix Section of the IEEE had its annual banquet and award presentations at Rawhide in Scottsdale. The dress was western, the dinner, ribs, steak, or chicken with traditional slaw and beans, and the entertainment a western band and vocalists. Five of the WAD Chapter members including the UFFC Society Representative received awards for service to the WAD Chapter and the Phoenix Section.

> Fred S. Hickernell UFFC Society Representative to the WAD Chapter

Editor's Comments

Appreciation to Fred Hickernell

While Fred Hickernell was the UFFC Newsletter Editor for over 22 years, he served as our President for the past two years. He represented the UFFC Society at venues around the world. His diplomatic manner, warm smile, and genuine interest in others brought people together and forged new alliances for UFFC. We would like to take this opportunity to thank Fred for his service and to let you



Fred Hickernell

know that he will continue to serve the Society as Past President and Historian. Try as we might, Fred has steadfastly refused to take up his old hat as Newsletter Editor. This brings us to ...

Newsletter Editor

We are still looking for someone who would like to increase their volunteer participation in UFFC and become our **new Newsletter Editor**.

The UFFC Newsletter is produced twice a year in print. We would like to have a "realtime" online newsletter with links to the most up to date information on our website in all areas of interest to our members including conference information, chapter activities, membership data and services, awards, standard activities, UFFC publications, other IEEE related publications, distinguished lecturer schedules, and news in our technical areas.

The Society supplies support for all the mechanics of production including composition, layout and design, printing and putting it on the web, and mailing and distribution. The Editor is responsible for the content by gathering the information from the UFFC community, committee chairs, and other interested contributors.

We are seeking a creative individual who would like to be the Newsletter Editor to join the publications team. If you are interested in the position, or know someone who is, please contact Jan Brown, UFFC VP Publications, jan.brown@ieee.org.

Thank you

Thank all of you who sent articles and photos in for this issue. Thank you to Thresa Hickernell for photos and the article on the guest program in Atlanta. Special appreciation to Andrea Watson, Jacqueline Parker and their colleagues at IEEE headquarters for the production work and for their patience as we diligently missed deadlines.

We are looking for contributions and articles for the Fall Newsletter. The deadline for contributions is July 11, 2002. Please continue to send me information and photos as events occur so that we may post them on the Web. My contact information is jan.brown@ieee.org, 3545C North Hills Drive, Austin, TX 78731, Phone/Fax 512 794-9372.

> Jan Brown Acting UFFC-S Newsletter Editor

UFFC AdCom

UFFC-Society AdCom Meeting Notes of 7 October 2001 [Subject to AdCom Approval for the 'Minutes']

The Administrative Committee (AdCom) meeting of the **Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC-S)** was called to order at 9:00 am, 7 October 2001, by Society President Fred S. Hickernell. The meeting was held in conjunction with the 2001 International Ultrasonics Symposium in Atlanta, Georgia.

Jan Brown made and Steve Pilgrim seconded a motion that passed To approve the 9 June 2001 AdCom minutes as corrected.

President's Report

Fred Hickernell reported his attendance at the June 2001 IEEE Technical Activities Board (TAB) meeting in New Brunswick; and the anticipated November TAB meeting in Mexico City where a prime agenda item will involve IEEE finances – specifically its rapidly dwindling reserves and the impact on the Societies.

Finance Report

Chair Herman van de Vaart provided written and oral reports of the Society's finances. Significant concern was expressed for the large decrease in the Society's reserves forecast for the end of 2001 – a decrease of about 60% in the last two years. This decrease has been due to IEEE infrastructural charges, a significant cost overrun in the archive project, unforeseen symposia expenses, reduced *Transactions* returns and a downturn in market investments. Much discussion was held regarding future IEEE infrastructural charges (triggered in part by the market downturn) being imposed in order to cover IEEE's dwindling reserves, and how our Society should respond in its budget.

Unfinished Business

John Vig made and Jackie Hines seconded a motion that passed which read Whereas the mailing and printing costs of the *Transactions* on UFFC are \$156.6k (approximately \$71 per member) for 2002, and whereas the IEEE and UFFC-S are experiencing significant financial difficulties, and whereas many members may not require paper copies of the *Transactions*, starting in 2003 paper copies of the *UFFC Transactions* shall be unbundled from the membership dues. Specifically:

1) UFFC membership dues shall continue to include free on-line access to the *UFFC Transactions* and the digital archive, but not the paper copies of the *Transactions*;

2) paper copies of the Transactions shall be made available to UFFC-S members for a price to be determined by the AdCom.

An analogous motion was made by John Vig and seconded by Steve Pilgrim which <u>passed</u> **To unbundle paper copies of** symposia proceedings from the symposia registration fees. Specifically:

1) UFFC membership dues shall continue to include free on-line access to all UFFC-S symposia proceedings and the digital archive,

2) symposia registration fees shall include the proceedings on a CD-ROM or other digital format, but not the paper copies of the proceedings;

3) the prices of paper copies of proceedings shall be set by the responsible standing committee.

Publications

Jan Brown, Publications V-P, provided an oral report noting that the IEEE would like all conference submissions to be electronic, with hyper-linking.

Bill O'Brien, *UFFC Transactions* Editor-in-Chief, provided a written and oral report noting that the *Transactions* will be published monthly (12 issues per year) starting with volume 49 (2002). In the past two years there have been five special issues on a variety of topics published. The publisher has begun its effort to decrease production time from the current 3.5 months to 2.5 months by more efficient scanning, editing and coding processes. The Transactions are now being indexed by the National Library of Medicine for *Index Medicus/MEDLINE*.

Jan Brown discussed the contents of the colorful Society Newsletter just recently published. As acting editor, she notes that *the Society seeks a volunteer for Newsletter editor*.

Ferroelectrics Committee

Tom Cutchen, Ferroelectrics V-P, provided an oral and written report on the committee's symposia accomplishments and plans for 2000, 2002, 2004, and 2006.

David Payne is General Co-chair for <u>ISAF 2002</u> (May 29-June 1) in Nara, Japan. He provided a written interim report that included on-going coordination efforts for a joint meeting of ISAF 2002 with both the International Symposium on Integrated Ferroelectrics (ISIF) and Ferroelectric Materials and Applications (FMA).

Mike Garvey, General Chair for the <u>2004 International</u> <u>UFFC 50th Anniversary Joint Conference</u>, provided a written and oral report on the status of the conference to be held 23-29 August, 2004, in Montreal, Canada.

Frequency Control Committee

Errol EerNisse, General Chair for FCS 2002 in New Orleans, Louisiana, provided an oral report including the budget for the Symposium. Herman van de Vaart moved and Tom Parker seconded a motion to accept the budget.

Mike Garvey, General Co-chair with R. Besson for FCS 2003 (4-9 May) in Tampa, Florida, provided a written and oral status report for the Symposium that will be held jointly with the 17th European Frequency and Time Forum.

Ultrasonics Committee

Jim Greenleaf, Ultrasonics V-P, led the committee's reports of its past, present and future symposia.

Jackie Hines, <u>IUS 2000</u> Finance Chair in Puerto Rico, presented the Symposium Financial Summary which showed a surplus.

Bill O'Brien, General Co-Chair for <u>IUS 2001</u> IUS (7-10 October) with Mack Breazeale in Atlanta, Georgia, indicated a healthy registration rate of nearly 600 to date. The Symposium was being held jointly with the World Congress on Ultrasonics (Chair Lawrence Crum).

Jim Greenleaf moved and Jan Brown seconded a motion to approve Clemens Ruppel as the new General Chair of <u>IUS</u> <u>2002</u> (8-11 October) in Munich, Germany. Clemens Ruppel then presented a budget and a status report for the Symposium. Herman van de Vaart moved and Jan Brown seconded a motion that passed **To approve the IUS 2002 budget**.

Awards

Awards Chair Reinhold Lerch provided a written and oral report announcing several major Society awards that would be presented at the plenary session of IUS 2001:

- **Prof. Eric L. Adler**, McGill University, to receive the 2001 Achievement Award.
- Dr. Arthur Ballator, U.S. Army Communications-Electronics Command, to receive the 2001 Distinguished Service Award.
- T. Ritter, X. Geng, K. Shung, P. Lopath, S-E Park, and T. Shrout, Pennsylvania State University, to receive the *Outstanding Paper Award for the 2000 Transactions on UFFC*.
- **Prof. David A. Payne**, University of Illinois, to be the **2001-2002 UFFC-S Distinguished Lecturer** for "Recent Developments and Understanding of Ferroelectric and Piezoelectric Materials and their Applications."
- Prof. K.Kirk Shung, Penn State University, to be the 2002-2003 UFFC-S Distinguished Lecturer for "Ul trasound: an unexplored tool for blood flow visual-ization and hemodynamic measurements."

Awards Vice-Chair Bernie Tittmann moved and John Vig seconded a motion that <u>passed</u> To approve the committee's nomination of Steve Jefferts, National Institute of Standards & Technology, to be the 2003-2004 UFFC-S Distinguished Lecturer for "Atomic Clocks: Past, Present and Future."

Membership Services

Chair Dennis Pape presented a written and oral report noting that the Society membership is about 2300 strong, and the total IEEE membership is nearly 400,000 strong.

Dennis Pape made and Bernie Tittmann seconded a motion That the UFFC-S approve a one-time exchange of mailing lists in the form of paper labels with the Acoustical Society of America for the dissemination of information about upcoming ASA sponsored biomedical conferences to UFFC-S members, and information about upcoming UFFC-S ultrasound conferences to ASA members. The mailing piece from each society will be approved by the other society prior to mailing. After some discussion that the Societies' respective symposia could be mutually and efficiently advertised by other means such as the WEB and newsletters, the motion was <u>withdrawn</u>.

Standards

Chair Art Ballato provided a written and oral report on the status of the Society's eight standards and one project.

Fellows

Chair Richard White provided a written report which recognized three newly elected *IEEE Fellows*:

Fred L. Walls – the National Institute of Standards & Technology,

Masatsune Yamaguchi - Chiba University,

Venceslav Kroupa – Academy of Sciences of the Czech Republic.

Nominations

Chair Stuart Foster provided a written report announcing the four newly elected UFFC-S members of AdCom for 2002-2004:

Mauricio Pereira da Cunha, University of Maine, representing *Ultrasonics*

Bruce A. Tuttle, Sandia National Laboratories, representing *Ferroelectrics*

John A. Kosinski, U.S. Army Communications-Electronics Command, representing *Frequency Control*

Kiyoshi Nakamura, Tohoku University, representing *Re*gions 8-10.

Upon Stuart Foster's recommendation, a motion was made and seconded that <u>passed</u> **To modify the recently established ByLaw procedures for the selection process of President-Elect. The first sentence in the second paragraph of By-Law Section 3.6 is to read 'In the event that no nominations are received prior to the meeting,...'' The modified statement replaces the phrase "***less than two***" with the word "***no***".**

Long Range Planning

Chair Don Malocha provided a written and oral report identifying a number of long-range goals from previous reports, accomplishments made toward those goals, and some recommended actions (and questions) for the future. One specific action is to review the Society's three principal technical areas for changes occurring in the professions.

UFFC-S Representatives

Student representatives Ryan Ong and Ray Brennan presented the content of an illustration that they have developed for poster presentation and postcard distribution to advertise and attract new student membership into IEEE and the UFFC Society.

John Vig, Sensors Council President, reported that paper submissions to the IEEE Sensors Journal have rapidly increased since the inception of the journal.

New Business

John Vig moved and Tom Cutchen seconded a motion that <u>failed</u> *To create a "chair of conferences" that would provide consistency in policies and procedures for all of the Society's conferences.*

Jan Brown made and Don Malocha seconded a motion that passed To provide a grant of \$2k in support of the 2002 European Frequency & Time Forum in St. Petersburg, Russia. The grant monies are to support the attendance of young researchers at the forum.

Don Malocha made and Clemens Ruppel seconded a motion that was withdrawn: Commitments over \$50k made by conference organizing committees for symposia sites shall be reviewed and signed off by the respective technical standing committee Vice-Presidents. Discussion led to the conclusion that the Long Range Planning committee should look into the matter and make its recommendation.

In response to a concern raised by Mike Driscoll, John Vig provided an overview of the restrictions that the International Traffic & Arms Regulation (ITAR) act threatens to impose on technical work that might be presented at conferences.

G. V. Blessing and J. H. Hines were nominated for the position of Society President-Elect, to serve a two-year term 1 Jan 2002 – 31 Dec 2003. Following brief statements by the two candidates, a secret ballot cast by the 23 voting members present resulted in the election of Gerry Blessing.

In-coming president Ahmad Safari accepted an offer by Jackie Hines to serve as Secretary/Treasurer for 2002-2003.

Fred Hickernell presented Certificates of Appreciation to the following individuals retiring from their respective service posts in AdCom: elected members Steve Pilgrim, Helen Routh, Masatsune Yamaguchi, and SusanTrolier-McKinstry; senior past president and Long Range Planning Chair Don Malocha; senior student representative Ryan Ong; Ferroelectrics vice-president Tom Cutchen, and Transactions on Medical imaging Representative, Paul Benkeser.

Ahmad Safari presented a Certificate of Appreciation to out-going president Fred Hickernell for his leadership and many years of service to AdCom and the Society.

The meeting was adjourned at approximately 5:00 pm, 7 October 2001.

THE NEXT UFFC-S ADCOM MEETING will be held Friday, June 7, in conjunction with and preceding the 2002 IUS Technical Program Committee meeting in Chicago, Illinois.

> G. V. Blessing **UFFC-S Sec/Treas**



Steve Pilgrim

Retiring AdCom Members



Helen Routh



Masatsune Yamagouchi



Don Malocha





Tom Cutchen

Retiring AdCom Members (cont'd.)



Paul Benkeser



Fred Hickernell

UFFC AdCom members and others

John Hossack



John Vig



Gerry Blessing President-Elect



Bikash Sinha



Reinhard Lerch



John Kosinski



Paul Benkeser



Ahmad Safari



David Cheeke

UFFC AdCom members and others (cont'd.)



Jerry Harris



(L-R) Tom Parker, Jim Greenleaf, Error EerNisse, Mike Garvey.



(L-R) Reinhard Lerch, John Vig, Clemens Ruppel.



Art Ballato, Steve Pilgrim.



Ryan Ong



Ahmad Safari with Jan Brown congratulating President-Elect Gerry Blessing with his wife Mary Lou.

IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society Administrative Committee & Associates

SOCIETY OFFICERS

PRESIDENT PRESIDENT-ELECT VP, FERROELECTRICS Vice-VP, Ferroelectrics VP, FREQUENCY CONTROL Vice-VP, Frequency Control VP, ULTRASONICS Vice-VP, Ultrasonics VP, PUBLICATIONS Vice-VP, Publications SECRETARY-TREASURER Ahmad Safari Gerald V. Blessing Susan Trolier-McKinstry (Vacant) Lute Maleki (Vacant) James F. Greenleaf Katherine W. Ferrara Jan Brown (Vacant) Jacqueline H. Hines Rutgers University Natl. Inst. of Standards & Tech. The Pennsylvania State University

Jet Propulsion Laboratory

Mayo Clinic The University of California JB Consulting

J. H. Hines Consulting

ELECTED ADMINISTRATIVE COMMITTEE MEMBERS

- 2000 2002 Lewis F. Brown, South Dakota State University
- 2000 2002 Michael M. Driscoll, Northrup Grumman Corp.
- 2000 2002 Thomas E. Parker, National Institute of Standards & Technology
- 2000 2002 C. C. W. Ruppel, EPCOS AG
- 2001 2003 Gordon Hayward, University of Strathclyde
- 2001 2003 Jacqueline H. Hines, J. H. Hines Consulting
- 2001 2003 John A. Hossack, University of Virginia
- 2001 2003 Walter A. Schulze, Alfred University
- 2002 2004 Mauricio Pereira da Cunha, University of Maine
- 2002 2004 Bruce A. Tuttle, Sandia National Laboraories
- 2002 2004 John A. Kosinski, U. S. Army Communications-Electronics Command
- 2002 2004 Kiyoshi Nakamura, Tohoku University

STANDING COMMITTEE CHAIRS & VICE-CHAIRS

AWARDS Awards Vice-Chair* FELLOWS* FINANCE Finance Vice-Chair* HISTORIAN* LONG RANGE PLANNING*

MEMBERSHIP SERVICES Chapters Vice-Chair* NOMINATIONS Nominations Vice-Chair* STANDARDS

Standards Vice-Chair*

PUBLICATIONS PUBLICITY AND EXHIBITION* TRANSACTIONS EDITOR* Trans. Associate Editor-in-Chief* NEWSLETTER EDITOR* Newsletter Vice-Editor* WEB EDITOR in CHIEF* Reinhard Lerch Bernhard R.Tittmann Richard M. White Herman van de Vaart Jacqueline H. Hines Fred S. Hickernell John R. Vig

Rajesh K. Panda Elizabeth M. Herrera F. Stuart Foster (Vacant) Arthur Ballato

John R. Vig

Jan Brown Sorah Rhee Jian-Yu Lu Marjorie P. Yuhas Jan Brown - acting (Vacant) John R. Vig University of Erlangen The Pennsylvania State University University of California, Berkeley VDV Associates J. H. Hines Consulting Motorola (retired)) U. S. Army Communications-Electronics Command Philips Medical Systems Diebold Incorporated University of Toronto

U. S. Army Communications-Electronics Command U. S. Army Communications-Electronics Command JB Consulting Pennsylvania State University University of Toledo Industrial Measurement Systems, Inc. JB Consulting

U. S. Army Communications-Electronics Command

Web Ed. for Ultrasound*
Web Ed. for Ferroelectrics*
Web Ed. for Freq. Control*

Sr. Past President (2000 - 2002)

Jr. Past President (2002 - 2004) Sr. Student Member* (2001 - 2002) Jr. Student Member* (2002 - 2003)

*Non-voting position

STANDARDS

Ferroelectrics Loss in Acoustic Materials Piezoelectric Crystals

Piezomagnetic Technology Sensors, Actuators & Transducers

Superconductivity

Surf. Acoustic Wave Devices Time & Frequency

Distinguished Lecturers

2002 New Orleans, LA 2003 Tampa Bay, FL

2004 Montreal, Canada

(Joint UFFC Symposium)

July 2001 - December 2002 July 2002 - December 2003 July 2003 - December 2004

Richard Y. Chiao Ahmad Safari John R. Vig

John R. Vig

Fred S. Hickernell Raymond Brennan Lisa Edge

GE Corporate R&D Rutgers University U. S. Army Communications-Electronics Command U. S. Army Communications-Electronics Command Motorola (retired) Rutgers University The Pennsylvania State University

SUB-COMMITTEE MEMBERS

Allen H. Meitzler Stewart Sherrit B. Hanson Thryg R. Meeker Stanley L. Ehrlich Ryszard Lec Stephen J. Martin Moises Levy Brage Golding Pierre Dufilie Eva Ferre-Pikal John R. Vig

David A. Payne

K. Kirk Shung

Steve Jefferts

AHM Consulting

Piezo Crystal Company

Stan Ehrlich Associates Drexel University Sandia National Laboratory

Michigan State University Thomson Components/Special Products University of Wyoming U. S. Army Comm.-Elec. Command

University of Illinois, Urbana The Pennsylvania State University National Institute of Standards & Technology

SYMPOSIA I FADERSHIP

ULTRASONICS SYMPOSIA	James F. Greenleaf - chair	Mayo Clinic
2002 Munich, Germany	Clemens C. W. Ruppel	EPCOS AG
2003 Honolulu, Hawaii	James F. Greenleaf	Mayo Clinic
	William D. O'Brien, Jr.	University of Illinois, Urbana
2004 Montreal, Canada	R. Michael Garvey	Frequency & Time Systems Inc.
(Joint UFFC Symposium)		
2005 Rotterdam, The Netherlands	Ton A. van der Steen	Thorax Centre
FERROELECTRICS SYMPOSIA	Susan Trolier-McKinstry - chair	The Pennsylvania State University
2002 Nara, Kansai, Japan	Tadashi Takenaka	Science University of Tokyo
_	David Payne	University of Illinois, Urbana
2004 Montreal, Canada	R. Michael Garvey	Frequency & Time Systems Inc.
(Joint UFFC Symposium)		
FREQUENCY CONTROL SYM.	Lute Maleki - chair	Jet Propulsion Laboratory
2002 New Orleans, LA	Errol P. EerNisse	Ouartzdvne. Inc.

Frequency & Time Systems Inc. Lab. De Chrono. Electr. Piezoelec. Frequency & Time Systems Inc.

Michael M. Driscoll

R. Michael Garvey

R. Michael Garvey

R. Besson

Northrup Grumman Corp.

2005 & 2006

UFFC-S REPRESENTATIVES

Committee on Man & Radiation Educational Activities Journal of Lightwave Technology

Sensors Council Superconductivity Council

Transactions on Medical Imaging IEEE Professional Activities Committee: 'PACE' Publications Board TAB New Technology Directions Paul J. Benkeser Vacant David L. Hecht John N. Lee Dragan Damjanovic Moises Levy Brage Golding Vacant Jan Brown

Jian-yu Lu John R. Vig Georgia Institute of Technology

Xerox Corporation, PARC Naval Research Laboratory EPFL

Michigan State University

JB Consulting

University of Toledo U. S. Army Communications-Electronics Command

UFFC Awards

The Chair of the UFFC Awards Committee, Reinhard Lerch, with the help of several committees makes recommendations to the AdCom for four major society wide awards, namely, the Achievement Award, the Distinguished Service Award, the Outstanding Paper Award, and the Distinguished Lecturer.

In 2001 all the awards were presented at the IEEE International Ultrasonics Symposium in Atlanta, Georgia, 8 October.

2001 UFFC Achievement Award

The Achievement Award is the highest Society-wide award presented to a member in special recognition of outstanding contributions. Selection criteria include significant technical publications in the field of ultrasonics, ferroelectrics, or frequency control, as well as contributions to these technical fields, and service to the Society. The winner is selected by the Officers and the Awards Committee from nominations submitted by the general membership. Presentation is usually at one of the Society's major symposia.

The 2001 Achievement Award was presented to **Professor Eric L. Adler** of the Electrical Engineering Department of McGill University in Montreal, Quebec, Canada. Dr. Don Malocha presented the award to Eric on behalf of the UFFC "For his extensive contributions to the understanding and analysis of bulk, surface and pseudo-surface acoustic waves in single crystals and layered structures, and his years of service to the Society".

The award consists of \$2000, a certificate, and a plaque. Professor Adler has donated his award money to the Students' Prize Paper Competition.



Professor Eric L. Adler (second from right) receiving the 2001 UFFC Achievement Award from (from left) Reinhard Lerch, Don Malocha, and Fred Hickernell.



Art Ballato (second from left) receiving the 2001 UFFC Distinguished Service Award from Reinhard Lerch, Fred Hickernell, and Roger Tancrell.

2001 UFFC Distinguished Service Award

The Distinguished Service Award recognizes long-term support of the Society's activities. Recognition is given to those who innovate new Society programs, administer major Committees, manage Society functions, or promote the Society's areas of technical interest to the larger community. The recipient usually has served for many years with sustained participation in the Society's management. Selection is made by the Officers and the Awards Committee from nominations submitted by the general membership. Presentation is usually at one of the Society's major symposia.

The award consists of an honorarium of \$2,000, a plaque and a certificate. The first award was presented in 1997.

The 2001UFFC Distinguished Service Award was presented to **Dr. Arthur Ballato** of the US Army Communications-Electronics Command in Ft, Monmouth, NJ, USA. The awards was presented on behalf of the Society by Dr. Roger H. Tancrell :For his insightful organizational leadership encompassing all fields of interest of the Society, with special appreciation for his diligent pursuit of IEEE Standards".

Outstanding Paper Award for the 2000 Transactions on UFFC

The Outstanding Paper Award is presented to the author(s) of a paper published in the UFFC-S Transactions which exemplifies excellent technical contributions and is clearly written. The winner is selected on the basis of: originality, interest to the membership, contributions to the field, clarity of writing, and timeliness. Selection is made by the Awards Committee. Nominations and comments from the Editor-in-Chief, Associate Editors and Guest Editors of the Transactions are solicited.

Papers are reviewed as a group for each Volume of the UFFC-S Transactions (January through December). In a given year, usually one paper is selected, but the Awards Committee may chose to give no award or multiple awards when circumstances warrant. Presentation is usually at one of the Society's major symposia.

The award consists of a plaque and a certificate. The award was first presented in 1956.

The 2000 UFFC Outstanding Paper Award was presented to **Timothy Ritter, Xuecang Geng, Kirk Shung, Patrick Lopath, Sueng-Eek Park, and Thomas R. Shrout** for their paper "Single Crystal PXN/PT-Polymer Composites for Ultrasound Transducer Applications," Vol. 47, No 4, pp. 792 -800, 2000.

The Awards Committee members recognized this paper as a very detailed and very well organized discussion on single crystal-polymer composite ultrasound transducers. The report results, e.g., the impressive bandwidth, represent a significant amount of work, especially the experimental construction and measurements. The paper also contains a comprehensive comparison to prior work as well as an excellent discussion relating improved performance to basic material properties.



2000 UFFC Outstanding Paper Award recipients with Fred Hickernell (left) and Reinhard Lerch (right).

Distinguished Lecturer Award

The Distinguished Lecturer represents the UFFC Society by giving lecturers worldwide to the larger technical community. The subject of the lecture must be of current interest and the lecturer must be a prominent contributor in the field of the lecture. The speaker is selected for speaking style, prominence in the topic, and willingness to commit significant time and energy to preparation, travel and lectures. The Lecturer is selected by the Distinguished Lecturer Subcommittee of the UFFC-S Awards Committee from nominations received from the general membership. Presentation is usually at one of the Society's major symposia.

The award consists of a certificate, and reimbursement for an international lecture tour.

Nominations may be submitted at any time. Any member may submit a nomination by sending the nominee's name and a description of that person's main contributions, along with the submitter's own name and address. Members are also encouraged to suggest topics which they feel would be of interest. Send nominations and topics to:

Professor Mack A. Breazeale

Chair, UFFC-S Distinguished Lecturer Subcommittee

The National Center for Physical Acoustics

University of Mississippi

University, MS 38677

e-mail: breazeal@olemiss.edu

You are encouraged to invite the Distinguished Lecturer to your Chapter or institution.

2003 – 2004 Distinguished Lecturer

Steve Jefferts

National Institute of Standards & Technology Atomic Clocks: Past, Present and Future

2002 - 2003 Distinguished Lecturer

Dr. K. Kirk Shung

Department of Bioengineering 231 Hallowell Bldg.

Nominations for UFFC-S DISTINGUISHED SERVICE AWARD

The Distinguished Service Award is a new award created by AdCom to recognize long-term support of the Society's activities. The first Award was presented in 1997. Recognition is given to those who innovate new Society programs, administer major Committees, manage Society functions, or promote the Society's areas of technical interest to the larger community. The recipient usually has served for many years with sustained participation in the Society's management. Selection is made by the Officers and the Awards Committee. Nominations may be submitted at any time. Who is the person you would like to honor in this way?

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

Suggestions for the next **Distinguished Service Award**:

Your Name/Address: ____

Send at anytime to:

Prof. Dr.-Ing Reinhard Lerch Chair, UFFC-S Awards Committee Department for Sensortechnology Paul-Gordan-Str. 3/5 D-91052 Erlangen Germany FAX: +49-9131/85-23133 Email: r.lerch@ieee.org

_____,

Nominations for UFFC-S ACHIEVEMENT AWARD

The Achievement Award is the highest Society-wide award presented to a member in special recognition of outstanding technical achievements. Take a moment to identify members whom you think 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 all technical fields in the society, and includes both technical and organizational achievements. Each nomination receives serious consideration by the Officers and the Awards Committee. Nominations may be submitted at any time during the year.

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 & Ma	Nominee's Name & Main Contributions:		
Your Name/Address:	Your Name/Address:		
Send at anytime to:	Prof. DrIng Reinhard Lerch		
	Chair, UFFC-S Awards Committee		
	Department for Sensortechnology		
	Paul-Gordan-Str. 3/5		
	D-91052 Erlangen		
	Germany		
	FAX: +49-9131/85-23133		
	Email: r.lerch@ieee.org		

Penn State University University Park, PA 16802 Kksbio@engr.psu.edu

Ultrasound: an unexplored tool for blood flow visualization and hemodynamic measurements

Ultrasonic scattering by blood has been studied both theoretically and experimentally for many years for the purpose of a better characterization of the performance of ultrasonic Doppler flow and



Dr. Kirk Shung 2002-2003 UFFC Distinguished Lecturer

imaging devices. In the course of these investigations it became clear that ultrasonic scattering from blood or or echogenicity of blood is critically related to the hematological and hemodynamic properties of blood. It can be affected by hematocrit, plasma protein concentration, flow rate and flow cycle duration, to name just a few parameters. The experimental efforts have been paralleled by theoretical developments that successfully predict many experimental observations.

An unexpected conclusion from this work is that ultrasound appears to be a totally unexplored and ignored tool for blood flow visualization and hemodynamic measurements. Two unique hemodynamic phenomena that have never been reported in the hemodynamic literature have been observed: the black hole, a low echogenic zone in the center stream of whole blood flowing in a blood vessel under steady flow and the collapsing ring, an echogenic ring appearing near the periphery of a vessel at the beginning of a flow cycle, converging toward the center, and eventually collapsing during pulsatile flow. They are believed to be resulted from the spatial and temporal variations of the shear rate in the blood stream. With the recent technical advances including standard B-mode, color Doppler, power Doppler, and B-flow imaging, clinical reports of observing similar phenomena in vivo on human patients begin to appear. These are exciting evidences to showcase the viability and effectiveness of ultrasound as a tool for blood flow visualization and quantitative measurements of hemodynamic parameters. Ultrasound is much superior than current technologies such as optical tracing of fluorescent particles in that it can penetrate light opaque structures. However, it must be realized that much effort for advocating the merits of ultrasound is needed before it will be recognized and accepted by the hemodyamics community.

In this talk, a historic discussion of these developments, results from recent studies, and a perspective of the future will be given.

Feel Free to contact Dr. Shung to schedule a visit to your area.

2001 Distinguished Lecturer

Prof. David A. Payne

Department of Materials Science and Engineering Materials Research Laboratory University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA d-payne@uiuc.edu

Recent Developments and Understanding of Ferroelectric and Piezoelectric Materials and their Applications

Exciting developments are taking place in the field of electroceramics in general, and for ferroelectric and piezoelectric materials in particular. This presentation documents some of the impressive gains in useful and enabling properties obtained from new and improved materials designed for specific applications.

Following a general introduction to ferroelectric and piezoelectric materials, with chronological developments, important milestones are high lighted where property limitations hindered future exploitation. The extent to which these problem areas have been solved or circumvented, by improvements in materials and processing, are outlined in the presentation.

Two extrema are considered: the growth of large single crystals, and the deposition and patterning of thin films. Their applicability to ultrasonics, ferroelectrics and frequency control (UFFC) will be illustrated.

For example, the crystal growth and properties of new piezoelectrics in the system Pb3MgNb2O9 (PMN)-PbTiO3 (PT) will be described with field-induced strains of 1-2%, piezoelectric coefficients over 4000 pC/N and electromechanical energy conversion efficiencies greater than 90%. The high signal-to-noise feature is of great interest for imaging devices, including medical micro-probes.

With respect to thin films and patterning, novel chemical-solution deposition methods are outlined for the fabrication of integrated ferroelectric and piezoelectric devices. The additive patterning technique of micro-contact printing with self-assembled monolayers is described for a lift-off process. A variety of materials and structures have been fabricated for potential ferroelectric and piezoelectric applications, including device integration on curved surfaces.



Retired Distinguished Lecturer Errol EerNisse receiving a certificate of appreciation from (left) Reinhard Lerch, Fred Hickernell, Errol, Bernie Tittmann

Concluding remarks address the future of ferroelectric and piezoelectric materials.

Feel Free to contact Dr. Payne to schedule a visit to your area.

2000 – 2001 Distinguished Lecturer

Errol EerNisse

Quartzdyne, Inc.

Quartz Crystals vs Their Environment: Time Bases or Sensors?

Errol just finished his service as Distinguished Lecturer. All the new lecturers should take heed of the outstanding job Errol did in documenting his tour of service for the UFFC members.

Other Honors

Dr. Chen Tsai was elected to the Russian Academy of Engineering Sciences as a foreign member in September of this year. This Academy is equivalent to the US National Academy of Engineering. Currently it has some 300 full members, some 300 corresponding members, and some 40 foreign members. The membership election is held biennially.

UFFC Fellows



Chen Tsai receiving the membership certificate from Academy President Alexander Prokhorov, co-winner of 1964 Nobel Prize in Physics, with Academician Yuri Gulyaev looking on.

Dr. Tsai was invited to attend the Assembly Meeting on November 29, 2001, in Moscow and delivered a lecture entitled, "Magnetic Film-Based Wideband Integrated Microwave and Optical Devices." The current President of the Academy is Alexander Prokhorov, the 1964 Nobel Laureate in Physics as a co-inventor of masers and lasers."

History of Fellows in the IEEE

The grade of Fellow first appeared in the AIEE constitution of 1912. In that year, the AIEE revised its membership structure and established the grade of Fellow for those engineers who had demonstrated outstanding proficiency and had achieved distinction in their profession. Potential Fellows had to be at least thirty-two years of age, with a minimum of ten years experience. When the IRE established its Fellow grade in 1914, the requirements were clearly modeled on those of the AIEE. Much of the wording in the relevant sections of the IRE constitution is identical to the corresponding wording in the AIEE constitution.

For the first several years after the establishment of the Fellow grade, both the AIEE and the IRE allowed Mem-

bers to make direct application for transfer to Fellow. In both cases, applications had to be accompanied by references from five existing Fellows, and required the approval of the Board of Directors. In 1939, the IRE modified its procedure to make admission or transfer to the Fellow grade possible only by direct invitation of the Board of Directors, a policy it maintained until the merger in 1963. In 1938, the AIEE modified its constitution to provide that "Applications to the grade of Fellow



MASATSUNE YAMAGUCHI (center) receiving his 2001 Fellow award at the IEEE International Ultrasonics Symposium in October 2001, "For contributions to highly piezoelectric leaky surface acoustic waves." Presenting the award are Reinhard Lerch (left) and Fred Hickernell (right).

shall result only from a proposal of five Members or Fellows." In 1951, the AIEE prohibited applications for Fellow grade altogether, and adopted a policy of direct invitation similar to that of the IRE.

As noted above, numerous electrical engineers were members of both the AIEE and the IRE, and many of these became Fellows of both organizations. When the two institutes merged in 1963, all AIEE and IRE Fellows automatically became Fellows of the IEEE. In 1942, the IRE had begun to issue citations to new Fellows, briefly describing their accomplishments. The AIEE followed suit in 1952, and the IEEE continued the practice after the merger.

As it stands today, the IEEE Grade of

Fellow is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. A brief citation is issued to new Fellows describing their accomplishments and the total number selected in any one year does not exceed one-tenth percent of the total voting Institute membership.

Nomination kits for IEEE Fellow may be obtained at http://www.ieee.org/about/awards/fellows/request.htm

UFFC Fellows

The UFFC Society has enjoyed an unusually high number of members who have become IEEE Fellows thanks to the UFFC Fellow Committee under the leadership of Richard M. White, University of California, Berkeley.

Congratulations to the newly elected UFFC IEEE Fellows:

- **NORIYOSHI CHUBACHI**, 2002, "For contributions to the field of piezoelectric materials, ultrasonic microscopy, materials characterization, and medical ultrasonics."
- NICO DE ROOIJ, 2002, "For contributions to microelectrical/mechanical systems and technology transfer to the marketplace."

Publications

UFFC Transactions

The UFFC Transactions has undergone a change in leadership as well as a change in frequency from 6 to 12 issues per year. Beginning in 2003, the UFFC Transactions will be available with your UFFC membership on-line only. You may still receive the print version for an additional cost to be determined by the AdCom.

Thank you to Bill O'Brien

William D. O'Brien Jr.
Editor in Chief *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*1985 – 2001

Bill O'Brien faithfully served as the Editor-in Chief for the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control from the November 1985 issue through the end of 2001. During that time period the annual number of printed pages doubled to over 1600. Under Bill's leadership there were substantial contributions to maintaining a low page cost and improving the timeliness of handling contributed papers. Over the past 8 years there have been 15 special issues. In collaboration with a dedicated group of Associate Editors and Guest Editors, significant contributions were made that improved the quality and widened the scope of the UFFC Transactions. The number of contributed papers increased substantially with papers from outside the United States now in the majority. The UFFC Transactions is a smooth running and highly respected publication. In recent years the Transactions has ranked 6th among 20 Acoustic Journals, and 18th among 144 Journals in the Electrical and Electronic Engineering category based upon reference indices. The UFFC Transactions have had only three editors since its inception in 1954, Oskar Mattiat, Steven Wanuga, and William D. O'Brien Jr.

Bill will be missed at the helm of the UFFC Transactions but will continue to make contributions to the IEEE, the UFFC Society, student education, and the technical world from his

- **AIME SYLVESTER DEREGGI**, 2002, "For contributions to the understanding of dielectric phenomena related to space charge and polarization."
- **MITSUTAKA HIKITA**, 2002, "For contributions to the development of surface-acoustic-wave devices for mobile communications."
- **TADASHI SHIOSAKI**, 2002, "For contributions to SAW devices and nonvolatile memories."
- **ROBERT WEIGEL**, 2002, "For contributions to microwave acoustic, radio frequency integrated circuits, and microwave circuits and their applications."

position as Professor and Director of the Bioacoustics Research Laboratory at the University of Illinois. As a long time member and contributor to the IEEE UFFC Society, Secretary-Treasurer (1972-80), Past President (1982-83), UFFC Society Distinguished Lecturer (1997-98), Chair of three Ultrasonic Symposia (1981,1988, and 2001), and award honoree of the IEEE1, we expect to see Bill with his characteristic handlebar moustache around for a long time to come.

We extend our congratulations to Bill on a job well done and wish him the very best in his future activities.

Fred S. Hickernell, President, UFFC Society, 2000-2001

1. For a biographical sketch of Bill's technical career activities see the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, vol. 46, no. 4, July 1999, page 765.

Meet the New Editors

It is with a great deal of pleasure I introduce to you the new Editor-in-Chief and Associate Editor-in-Chief of the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, Dr Jian-yu Lu and Dr. Marjorie Passini Yuhas.

Editor-in-Chief, Jian-yu Lu, Ph.D.

Dr. Jian-yu Lu received the B.S. degree in electrical engineering in February 1982 from Fudan University, Shanghai, China; the M.S. degree in Acoustics in 1985 from Tongji University, Shanghai, China; and the Ph.D. degree in Biomedical Engineering in 1988 from Southeast University, Nanjing, China.

He is currently a professor in the Department of Bioengineering at the University of Toledo, Toledo, OH, and an adjunct professor of medicine at the Medical College of Ohio, Toledo, OH. He has been the Graduate Director of the Department of Bioengineering at the University of Toledo since 1999. Before joining the University of Toledo as a professor in September 1997, he was an associate professor of biophysics at the Mayo Medical School and an associate consultant at the Department of Physiology and Biophysics, Mayo Clinic/Foundation, Rochester, MN. His research interests are in acoustic imaging and tissue identification, medical ultrasonic transducers, and ultrasonic beam forming and propagation.

Dr. Lu has published many papers in peer-reviewed journals. Two of his papers published in the IEEE Transactions on the Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) in 1992 have received the Outstanding Paper Award from the UFFC society for the discovery of X waves that, in theory, can propagate to an infinite distance without spreading (diffraction-free). These waves have potential applications in medical imaging (in both ultrasound and optics). Dr. Lu has received the Edward C. Kendall (a Nobel Laureate at Mayo Clinic) Award from the Mayo Alumni Association, Mayo Foundation, in 1992, for his meritorious research, the FIRST Award from the National Institutes of Health (NIH) in 1991, and the Biomedical Engineering Research Grant Award from the Whitaker Foundation in 1991, in addition to other long-term R01 type of NIH grant award.

Dr. Lu is active in the UFFC Society. He was the Technical Program Chair of the 2001 IEEE International Ultrasonics Symposium - A Joint Meeting with the World Congress on Ultrasonics held in Atlanta, Georgia, U.S.A., in October, 2001. He has been an Exhibition Chair of the IEEE Ultrasonics Symposiums for many years and is a member of the Technical Program Committee of Group I (Medical Ultrasonics). He serves in both the UFFC Web Committee and the UFFC Ultrasonics Committee. Dr. Lu is a senior member of the IEEE UFFC Society and a senior member of the American Institute of Ultrasound in Medicine (AIUM). He is also a managing editor of the online journal of Frontiers in Bioscience.

Dr. Lu has been married to his wife, Dr. Li Lin for 14 years. The couple has a son, Alex,10 and a daughter, Emily, 5.

Associate Editor-in-Chief, Marjorie Passini Yuhas, Ph.D.

Dr. Yuhas received the Ph.D., Physics, 1976 - Washington University, St. Louis, MO; the M.S., Physics, 1974 - Washington University, St. Louis, MO; and the B.A., Physics, 1970 - Northwestern University, Evanston, IL.

Dr. Yuhas's Ph.D. thesis involved the observation and verification of the quantum mechanical behaviors of dilute magnetic systems using low frequency non-resonant acoustic magnetic techniques. She worked with Drs. D.I.Bolef and J.G. Miller in the Laboratory for Ultrasonics at Washington University. Prior to that, Dr. Yuhas worked in the Laboratory for Space Sciences at Washington University. There she developed a radioactive inclusion dating process that adapted technology from 1) lunar science heat flow studies, 2) archeological quartz dating, and 3) radiation damage evaluation techniques.

Dr. Yuhas is currently associated with Industrial Measurements Systems in the capacity of vice president. In July 2001, Dr. Yuhas retired from Bell Laboratories, Lucent Technologies after twenty-three years. For nineteen years, she was in technical management. While at Lucent, Dr. Yuhas was an organizational and technological leader with extensive experience in planning and development of state-of-the-art technology-based solutions for problems in telecommunications. She was specifically involved in the creation of the Intelligent Network concept and the development and deployment of first generation of ISDN Wireline Services and first generation Wireless GSM, CDMA, TDMA services. While experienced in all phases of industrial software development, Dr. Yuhas made major contributions to quality management and software manufacturing. At the time of retirement, she was responsible for Wireline technologies trials in China and Japan for Lucent World Wide Services. From 1976 to 1978, Dr.Yuhas was Research Associate in the Physics Department at the University of Illinois, Champaign-Urbana. While working with Dr. David Lazarus, she developed a program that studied the basic electromagnetic properties of spin glasses at high pressures and low temperatures.

While at Lucent Technologies, Dr. Yuhas received the Harvey Fletcher Trophy, for inventions beneficial to the Network Services Business Unit specifically for co-inventing the process that is fundamental to the Intelligent Network (IN) and Advanced IN concepts. Dr. Yuhas was twice (1993 and 1999) recognized for her personal and professional contributions to the Asian American community of Lucent Technologies. Dr. Yuhas has had a long-standing involvement in Lucent Technologies College Summer Internship programs and minority and women programs.

I am humbled by the opportunity to rejoin the technology sphere of the UFFC. My last professional contributions to the UFFC were at the Ultrasonic Symposium in 1975. The world and I have changed considerably in the last 26 years; however, some things have not changed. In 1968, I started my study of Physics with a lab partner, named Donald Yuhas —-while we have been married for over thirty years; I am delighted to be able to spend my professional time once again in the same technical arena with Don. I look forward to partnering with Dr. Jian-yu Lu in the capacity of Associate Editor in Chief. I hope we can continue the support of strong technical contributions to the UFFC Transactions and move the society toward improved technology platforms for the Transactions.

Congratulations to you both and best wishes as you take over the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control.

> Fred S. Hickernell President, UFFC Society, 2000-2001

Message From the Editor-in-Chief and Associate Editor-in-Chief

I. Goals:

The IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) had a great success during the past 16 years under the leadership of the former Editor-in-Chief, Dr. William D. O'Brien. From January 2002, The Transactions has a new Editor-in-Chief (EIC) and a new Associate Editor-in-Chief (AEIC). Our goal for the Transactions in the coming year is to maintain and enhance the quality of current paper-based peer-review system of the Transactions while making a smooth transition to an electronic peer-review system called Manuscript Central (MC). Ultimately, by taking advantage of the trend of internet and the richness of the electronics era, we would like to establish an all-electronic process from manuscript submission to publication and add full color figures and multimedia such as audio, movie clips, and animations into the Transactions without additional costs to authors and members. This will be possible after the eventual elimination of the paper version of the Transactions. The elimination of paper version will not only provide obvious benefits to our members, but also reduce the costs of the production of Transactions dramatically.

The Manuscript Central is a peer-review system produced by a commercial company (ScholarOne). It is user-friendly, essentially eliminates the need for handling paper manuscripts and correspondence. All the correspondence and reminders to both authors and reviewers can be generated automatically. All the manuscripts are automatically tracked from the moment of submission until the decisions are made eliminating the need of a laborious separate tracking and reporting database and reducing potential errors. Authors, reviewers, Associate Editors (AEs), EIC, and AEIC are able to see the status of manuscripts on web anytime at their convenience. The new electronic peer-review system may stimulate manuscript submissions and shorten the current peer-review cycle, resulting in a higher quality for Transactions with a faster dissemination of research findings and an increased citation rate, which will be an important benefit to our members, authors, and readers. The new system will remove the burden for authors to copy and mail their manuscripts avoiding delay and lost of manuscripts. The reviewers can get all the necessary information from the web to review papers increasing their efficiency. AEs do not need to mail a large amount of manuscripts and correspondence and thus reduce the workload of themselves and their secretaries.

II. Accomplishments:

During the first month of operation, we have relocated and learned to use the existing database that tracks current paper-based manuscript submissions and the peer-review process. We have streamlined our procedure for handling new manuscript submissions and manuscripts under the peer-review process, and identified all routine tasks of the Transactions. We have updated and redesigned our Transactions web pages (see: http://www.ieee-uffc.org/tr/). We are working on making links from both the Front Cover Images and figures of individual PDF papers of all Transactions issues in 2002 and beyond to their original images that are available for users to download. This will increase the quality of images of our on-line Transactions and serve better our members especially medical ultrasound community. Various details and aspects of establishing our new Manuscript Central (MC) web site have been determined and sent to ScholarOne for production. The site is scheduled for testing after March 22, 2002. To shorten the time for Transactions production, we will soon start to use electronic author proofs and page charge/reprint order form. A 90-day paper publication schedule (from the day of acceptance of a manuscript for publication to subscribers' reception of a printed version) has been established with the Federation of Animal Science Societies (FASS).

III. Thanks for Help:

We would like to thank Dr. Jan Brown, the Vice President for Publications of the UFFC Society for her efforts during the transition. We would also like to thank Dr. John Vig and Dr. Gerry Blessing for their frequent inputs. The continued support from all AEs and their hard work are highly appreciated. Dr. O'Brien has orderly handed over all materials related to the Transactions to us and he and his secretary, Ms. Sue Clay, has trained our administrative staff for using the database. We appreciate Dr. O'Brien's help and the time for the transition.

The administrative assistant, Ms. Loretta Speidel, has helped us running the laborious database of the paper-based peer-review system. Her hard work has ensured the success of the transition. People in FASS, such as, Ms. Gayle Gleichman, Mr. Ron Keller, and Ms. Amy Kamp, have given us many suggestions to improve the quality of Transactions production, helped us to update the Transactions on the web, and worked hard for us to meet the 90-day production schedule. We express our sincere thanks to all of them.

Let us work together and looking forward to another year of the success of the IEEE UFFC Transactions.

Jian-yu Lu Editor-in-Chief The IEEE Transactions on UFFC And Marjorie Passini Yuhas Associate Editor-in-Chief The IEEE Transactions on UFFC

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You may subscribe to a free notification service at http:// www.ieee-uffc.org/tr.

Web Committee

Visit the UFFC Website for the latest in society activities at http://www.ieee-uffc.org. The richness of content is due to the website committee under the leadership of John Vig.



Meet the Web Committee. Back Row (L-R): Joergen Jenson, William Walker, Martin Anderson, Lewis Thomas. Front Row (L-R): Richard Chiao, Levent Degertekin, John Vig, Smaine Zerong.

New IEEE Publication

Call for Papers IEEE Transactions on Nanotechnology

(Starting first quarter, 2002)

IEEE Transactions on Nanotechnology, sponsored by the Council on Nanotechnology, is a new archival journal devoted to dissemination of new results and discussions on nanotechnology, i.e., understanding the physical basis and engineering applications of phenomena at the nanoscale across all areas of science and engineering. By emphasizing the multitudes of disciplines at which nanoscale effects become important and unique properties are observed, and by bringing together the engineering applications at the boundaries of disciplines, the Transactions will strive to be a forum for cross-fertilization of ideas of multi-disciplinary interest.

The transactions will be available in paper and electronic format, and will be subject to the standards of IEEE and with a thorough independent review process. Papers are solicited in the theory and practice of the broad range of disciplines where the nanoscale effects are increasingly important. Some examples:

- Electronics devices, circuits, architecture, and technology
- Magnetics
- Micromechanical systems
- Optics and optoelectronics

- Biological applications with electronics, micro-electro-mechanical systems, sensors, etc.
- Chemistry and applications to other disciplines
- · Proximity probing and manipulation techniques
- Microwaves and RF
- Materials and their properties

Manuscripts should conform to requirements for regular papers or briefs (similar to those outlined on the inside back cover of IEEE Transactions such as the Transactions on Electron Devices).

Manuscripts can be submitted electronically thorough Manuscript Central of IEEE starting Feb. 1, 2002 (http://www.ieee.org/ton/emanuscripts). Prior to Feb. 1, please submit manuscripts to

Prof. Sandip Tiwari Editor-in-Chief IEEE Transactions on Nanotechnology Department of Electrical and Computer Engineering Cornell University Ithaca, NY 14853

Last Issue of the UFFC Newsletter we introduced this History column with a letter from the Director of the IEEE History Museum, Michael N. Geselowitz and an Oral History with Warren P. Mason. This issue we will explain what an oral history is and present the Oral History with Eric A. Ash. Visit the IEEE History Center at http://www.ieee.org/organizations/history_center.

Oral History

You might be wondering why we call these documents "oral histories" rather than "interviews." An interview is a finished product that you might see in the newspaper, on TV, or in some other medium. It is meant to convey particular information.

An oral history, on the other hand, is considered by historians to be a "primary source," raw data from which they will, in combination with other raw data, create historical narratives. Although a historian might also use a magazine interview or a videotaped speech as a primary source, an oral history is a document created by themselves or another historian through the informal recording of a dialogue between interviewer and interviewee. Although edited by the interviewer for flow and consistency, and by the interviewee to confirm that his or her words have been appropriately captured, an oral history transcript is relatively unedited when compared to other forms of interview.

The IEEE History Center is determined to preserve as source material for the future historians of technology the personal memories of pioneering electrical and computer engineers, the technologists who transformed the world in the 20th century. When we first began collecting these interviews, we assumed that the only people who would see the results would be professional historians. With the advent of the Web, text recognition, and related technologies, it is suddenly possible for us to make these wonderful documents available to anyone, any time.

But as a result, there may be a misunderstanding about what these are. Since they are minimally edited, they may not "read" like other interviews you have seen. They may seem disorganized, reflecting the differences between a conversation and a printed story. Statements made by interviewees have not been checked for accuracy. We hope you will enjoy and find useful the stories of these fascinating men and women, but please take this disclaimer into account as you make use of them.

Finally, please note that the IEEE History Center holds the rights to these documents. We encourage use by historians,

teachers, and others within the accepted United States standards of Fair Use. For any other use, you **must** first obtain our express written permission: history@ieee.org

Eric A. Ash Oral History 25 August 1994

INTERVIEWEE:	Eric Ash
INTERVIEWER:	Frederik Nebeker
DATE:	25 Aug 1994
PLACE:	London

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It is recommended that this oral history be cited as follows:

Eric Ash, Electrical Engineer, an oral history conducted in 1994 by Frederik Nebeker, IEEE History Center, Rutgers University, New Brunswick, NJ, USA.

NEBEKER: This is the 25th of August, 1994. I'm talking with Dr. Ash at his office in London. This is Rik Nebeker. You were born in 1928.

ASH: Correct.

NEBEKER: Got that part right. In Germany?

ASH: Correct.

NEBEKER: Where?

ASH: In Berlin.

NEBEKER: I understand that it was in 1938 your family emigrated.

ASH: That is correct, yes.

NEBEKER: Can you tell me about that, briefly.

ASH: Well, really for some years it was evident that we were going to emigrate. My father was the head of the legal department in A.E.G., and he subsequently said that his colleagues almost killed him because he kept on saying, "For God's sake, don't worry about this chap Hitler. He is just a temporary phenomenon, it will all blow over." But by 1938 I think he decided it really wasn't safe, and so he took his family to England.

NEBEKER: Was your father a lawyer?

ASH: Yes.

NEBEKER: And not an engineer.

ASH: Not an engineer. Because he had the experience of changing countries as a lawyer, which is quite difficult —

NEBEKER: Yeah.

ASH: — because every word matters in legal language, he really encouraged me to take on a career which was transfer-

able. Actually I think it is one of the great joys of engineering that it really is a rather universal language.

NEBEKER: Were you interested in science as a youngster?

ASH: Yes, I was. Things like Meccano fascinated me, and I built a crystal radio set. This would have been around about 1943, or thereabouts. I made it work. So yes, I was quite fascinated by science.

NEBEKER: Was it clear to you that that was the direction of your education?

ASH: I wouldn't say absolutely clear. I think I could have gone into any branch of science, even medicine, but at that time my parents were quite hard up, and it didn't seem like a good time to embark on what was a very long study. But I was very happy to go into electrical engineering.

NEBEKER: Where did you live, in England at first? **ASH:** In London.

NEBEKER: And what was your educational course here?

ASH: When we first came to England my parents thought that total immersion was a good policy, so they put me into a boarding school. That really worked very well. I quite enjoyed that. Then I went to University College school, which actually has no connection now with University College where we are sitting at this moment, but it did in the last century. When I graduated from there I went to Imperial College.

NEBEKER: In engineering?

ASH: Electrical engineering, yes.

NEBEKER: Do you have brothers and sisters?

ASH: I have one sister, who is older.

NEBEKER: And how were the war years for you and your family?

ASH: University College school, oddly enough, was one of the few schools that was not evacuated from London. We stayed in London throughout the war. And so we did spend a certain amount of time, around 1940 and 1941, in shelters during the night.

NEBEKER: What sort of shelters?

ASH: We lived in a block of flats and stayed in what was basically the cellar. And, indeed, the building we were in was hit by a bomb, which knocked off a corner of the building. I remember seeing the great fire of London. I am vague on dates. I think it was 1941 when the city of London went up in smoke. And then I took what one would now call GCSE examinations (the examinations you take now at the age of 16), sitting in the crypt of University College school because that was the time of the V1 weapons. They were never terribly effective weapons. They never killed more than a few thousand people altogether, but they were embarrassing all the same, and slightly nerve-wracking.

NEBEKER: Yeah. Is the V1's coming in something you heard a number of times?

ASH: Absolutely, yes. The rule was that you don't worry as long as you hear them. When the engines stopped you knew they were coming down.

NEBEKER: You knew they were coasting down.

ASH: Yes.

NEBEKER: I see.

ASH: I always remember being at a bus stop once when this happened. The engine stopped, and there was a chap in a city

suit behind me who put his umbrella up! It didn't seem like a very obvious defence to whatever might have happened next.

NEBEKER: Were there any V2s that hit your part of London? **ASH:** Not terribly close to where we were, but yes.

NEBEKER: And you built the crystal radio you mentioned during the war?

ASH: Yes.

NEBEKER: Were you able to pick up any non-British stations?

ASH: No. I'm absolutely sure you couldn't. You could barely get the BBC. It wasn't even a good crystal, as crystals go. But of course on the normal radio we were avid listeners to what was going over to German broadcasts.

NEBEKER: I see, so you did receive those.

ASH: Oh, absolutely. I am nearly bilingual, so it was easy listening to the German broadcasts.

NEBEKER: Did they also broadcast in English for propaganda purposes?

ASH: Yes they did.

NEBEKER: I see. So you completed the engineering degree in 1948?

ASH: That's right.

NEBEKER: And then stayed on for graduate work?

ASH: Yes, to do some research. My first year was almost a false start. I was working with a particular lecturer on antenna problems, which didn't have enough ideas in it. But one year later, Denis Gabor, subsequently won the Nobel prize for invention of holography.

NEBEKER: Yes, I see.

ASH: — came from industry to Imperial College. I then became his student and I worked with him for the next three years.

NEBEKER: I see.

ASH: I did my Ph.D. under him.

NEBEKER: So it was clear to you after one year of work on this problem that was not a very good one, and —

ASH: Yes, yes.

NEBEKER: You saw the opportunity to work with —

ASH: Right, right. Yes. I can't remember exactly how the transfer happened. It was that sort of thing.

NEBEKER: How was Denis Gabor to work with as a thesis advisor?

ASH: He was one of the great influences on my life. He was one of only two or three people I have met that I would describe as a genius. He was warm, but he was an awful supervisor.

NEBEKER: Oh?

ASH: For a number of different reasons: First of all he didn't communicate well with people. He had difficulties, communicating on the same wavelength as ordinary mortals. Secondly, he was clearly a physicist, although he had been brought up as an engineer. He had the illusion that he was an engineer, which is the inverse of what one expects. You will find engineers who think they ought to discover a new relativity theory, but this was really the inverse.

NEBEKER: Do you mean that he wasn't terribly practical?

ASH: He was absolutely hopeless on experiments. His approach to any bit of experimental research was like this: He had a big drawing board in his office, and he used to spend a

week drawing out a complex bit of equipment. Then he would get a student to make the thing. And then he would switch it on. And, of course, anybody who has ever worked in a laboratory knows that life isn't like that. The right way to do things is to start off with the simplest possible thing and evolve from that. It took me a while before I discovered his advice on anything experimental should be ignored. He was quite difficult in other ways, too. One of my colleagues got close to having a nervous breakdown, and in fact left without his doctorate as a result. It is a long story. I don't know whether you want to hear about it, but he was put onto a project where the preceding experiments looked as though they were confirming what Gabor had foreseen. This chap had then discovered that it was actually a fallacy, that there was another reason why they were seeing the effect they were seeing. He failed to persuade Gabor that it wasn't working. Gabor was not an easy person. For many years I enjoyed the reputation of being the only chap who got a Ph.D. out of him.

NEBEKER: That was true for many years?

ASH: That was true for quite a few years. And sadly thereafter he got worse and worse students, and he really could no longer work with top-class students. So it was a bit of a tragedy in a way.

NEBEKER: Was he the sort of a supervisor who kept in constant touch with your work?

ASH: Yes, he was always interested. The worst experience was if he tried to stand in front of your equipment and twiddle the knobs. That was usually fatal!

NEBEKER: Can you briefly describe your thesis work?

ASH: It had a global title, called "Electron Interaction Effects", but it really divided, into two main themes. One was the use of electrons in electron optics. Electron optics work on the use of electrostatic lenses and magnetic lenses with a vacuum in between. And it was proved in the 1930s by a Scherzer, that you could never compensate for the spherical aberration of electron lenses in contrast to optical lenses, where you play games so that the positive spherical aberration of one lens cancels the negative spherical aberration of another. You can't do this with electron optics. At least you can't do it in a vacuum. If you put electrons in then you can. So one of the things that I was involved with was creating a lens which was in fact an electron lens which did its focusing by having a cloud of electrons in the right place. So we won that battle, but lost the war. The loss of the war was that I then did a calculation which showed that although this lens had the attributes of a negative lens with a negative spherical aberration, the individual scattering of the electrons was enough to create new defects in the thing. In other words, the electrons just weren't transparent enough.

NEBEKER: Where did the idea come from for this way of eliminating spherical aberration?

ASH: It came directly from Gabor. It was entirely his idea. He had tried to persuade industry earlier than this to do some research and to use lenses of this kind.

NEBEKER: But you actually implemented that idea?

ASH: I actually found a new way of doing it, and it was the first time that anybody demonstrated such lenses.

NEBEKER: I see.

ASH: The second theme was concerned with plasma, and particularly oscillations in the sheathes around the plasma. If you have a fluorescent tube, for example, you have a plasma in it, but there is a sheath where all sorts of exciting things happen just between the plasma and the glass wall. There are oscillations within this. This was in the very early days of plasma. Indeed, the external examiner for my thesis was Thoneman. I remember Gabor and Thoneman discussing over lunch, after the viva, and Gabor saying, "Well, I think really plasma has had its day." And Thoneman said, "It is just starting." This was when the idea of plasma fusion was still classified.

NEBEKER: Was that also an idea of Gabor's, to work on that?

ASH: The subject, was his idea. He was concerned about some phenomenon, which hadn't been fully explained: why, when you disturb a plasma which has a well-defined electron temperature, does it so rapidly re-established temperature again? He had written a paper in the 1930s on this, trying to explain it. It was not valid. I think he was trying to stretch something to explain this phenomenon, and didn't hold water. We got some of the explanations in this work. But at the same time, I did other things that were not anticipated. For example, I think I was the first person to measure the field distribution in a sheath.

NEBEKER: Was that a very difficult technical problem? **ASH:** It seemed to me to be so at the time. Yes, I think it still is.

NEBEKER: Did that correction create any conflict?

ASH: No, we didn't really refer to that. I mean, I think he was convinced it wasn't quite right either.

NEBEKER: What were your relations with him after you were finished?

ASH: Oh, very, very good. Subsequently I went to Stanford, and he also visited there. I saw a lot of him there, and in London [background noise - a police siren] Also I saw him a few times, during a subsequent time I spent a sabbatical year in the States, with IBM, whilst he was in Connecticut.

NEBEKER: What year was it you completed your doctor of science? 1952.

ASH: Right.

NEBEKER: That was also the year that you went to Stanford, as a research fellow?

ASH: Correct.

NEBEKER: How did that come about?

ASH: I wanted to get some experience in the United States. I wrote to about fifty universities, I think, and some of them replied positively. I then picked the ones that seemed to me were in an attractive part of the country. And Stanford won.

NEBEKER: Because of the non-academic attractions of that part of California?

ASH: Well, both. Stanford was one of the meccas in my field at that time, so it was tops on the academic side, but also I loved the idea of spending some time in California.

NEBEKER: I see. How would you have described your field at the time? Electron optics?

ASH: Well, _____ physical electronics ____

NEBEKER: Yes.

ASH: Applied physical electronics.

NEBEKER: I see. Who was at Stanford? Of course, I know of Terman.

ASH: Terman was still there.

NEBEKER: Who else was there at Stanford at the time in that general field.

ASH: Well, Dean Watkins, who subsequently started the firm Watkins-Johnson, and which is still thriving. And I think he is still active on the board, if that's the right word, of the University of California.

NEBEKER: Board of regents?

ASH: Yeah, something like that. Although, oddly enough I haven't met him since I left in 1954. But we wrote a paper together, which I think we were both fairly pleased with at the time.

NEBEKER: Was he the main person that you worked with there?

ASH: Yes, he was one of the people. One of the other people was Donald Dunn. He was there for many years working in this kind of field, and then subsequently switched over to — I'm not even sure how one would describe the field, but it is, sort of, engineering econometrics, or sociology, and really using engineering ideas in discussing much wider issues than engineering.

NEBEKER: How long were you at Stanford?

ASH: Two years.

NEBEKER: Was that planned from the beginning?

ASH: Yes. I got a Fulbright scholarship, and I think that was actually on a two year basis. I can't quite remember. I could have stayed on longer if I had wanted to, but in the meantime I had got myself involved with Clare Babb, as she then was, who claimed that the only reason that she wanted to marry me was to get to London. And so we went to London!

NEBEKER: How did you like your two years in California?

ASH: Enjoyed it enormously. I have remained in contact with Stanford in one way or another ever since.

NEBEKER: I see. So in 1954 you moved back to London? **ASH:** Right.

NEBEKER: What did you do then?

ASH: I spent one year, in which I was treading water. I was in part of the University of London, Queen Mary College, as it then was, in a laboratory working on linear accelerators, dielectric loaded linear accelerators. It was just a job that sort of came up, but after a year I then went into industry, and spent the next eight years in industry.

NEBEKER: How did that come about?

ASH: I think I applied for a sequence of jobs, and that particular one was the one that worked out best.

NEBEKER: Standard Telecommunications.

ASH: It was S.T.L., Standard Telecommunications Laboratories at the time, it was the main European laboratory for the I.T.T. In the meantime there has been a fair amount of shuffling around, corporate shuffling, and that lab became part of I.C.L., International Computers Limited, but is now part of BNR,

NEBEKER: I see.

ASH: It exists still in very much the same form, but is now part of the Bell Northern.

NEBEKER: What was the job description of the position you got?

ASH: It was entirely concerned with research on microwave tubes, initially, and then subsequently it went to more solid state kind of things.

NEBEKER: Microwave generators?

ASH: Amplifiers, oscillators, detectors, the lot.

NEBEKER: I see. Had you worked on that before?

ASH: Yes, at Stanford. That was the main theme of my work at Stanford.

NEBEKER: I see. And can you describe briefly the work at Stanford, in microwave tubes?

ASH: The work at Stanford was mainly concerned with the development of something called the back-wave oscillator. Does that mean anything to you? Well, it was actually a very important invention. I think there was some debate as to who got there first. Thomson C.S.F. was involved, and to some extent Bell Labs. But it turned out that a tube called the travelling wave tube, which persists to this day in certain applications, could be run in a rather different way so that it would produce oscillations. But, very importantly, these oscillations could be tuned in a very wide frequency range, and that was important for some civil applications, but most importantly, for some military applications.

NEBEKER: Communications applications?

ASH: Well, communications, countermeasures, a whole range of things. And, indeed, that was an interesting dimension to it, because I was actually working some of the time on defence projects. Being British I didn't have a security clearance. And so I found myself having to process tubes in a classified area, having to get special permission to go into that area, and then subsequently writing a report on this work which I was then not allowed to see!

NEBEKER: But you were able to publish?

ASH: Oh, yes. There was a scientific side to it, which was publishable. But this was the height of the McCarthy era and there was a certain degree of hysteria, which Stanford escaped more than, say, the University of California at Berkeley, but didn't wholly escape either. And, indeed, it was an unhappy period for the United States. You're obviously too young to remember it. I have subsequently come across situations in this country where people are concerned with academic freedom and where there has sometimes been a feeling, "Well, really we don't have to worry about that thing. After all, we are the West, and we don't have problems like that." It is, I think, worthwhile reading the history of the McCarthy era to see that it is quite possible for a civilized country to hit a rough patch and have problems of that kind. So, for example, that was the period when to continue to be employed by the University of California, people had to subscribe to a loyalty oath. Some people didn't want to do, not because they felt disloyal, but because they thought it was questioning something that really ought not to be questioned by government.

NEBEKER: So when you got the position at S.T.L., what did you start work on there?

ASH: Really very much the same kind of thing. You know, a straight continuation of the same kind of stuff that was going on in Stanford. There was at that time a quite considerable technology gap between the United States and the U.K. So I came back from the United States as the wise man who had seen the truth. And it was fairly easy to transfer some of the things I had learnt to

NEBEKER: Now, I don't know that laboratories. How different is that from an academic research lab?

ASH: It's devoted to supporting the manufacturing divisions of the company, then and to an even greater extent now. I feel that is what industry should be doing. I also think, and advocated this very strongly at the time, that in order to do the best job they can for the manufacturing divisions, they ought to be working at the frontier of the subject, to be publishing papers, and not to spend all of their time worrying that the competition would run away with the silver spoons. I feel that there is an awful lot to be said for a fairly open industrial laboratory. I don't think, on the whole, people lose on it.

NEBEKER: And was that the case there?

ASH: It was reasonably liberal, yes. We were encouraged to publish, for example.

NEBEKER: How was it for you, working of course for the first time in an industrial laboratory?

ASH: I didn't find the transition particularly difficult. I am convinced that academics work harder than people in industry. And industry doesn't believe it, but it is absolutely true. Anybody who has been on both sides of that frontier would confirm this. Now, it is possible, in a university, to work half time and get away with it. There are always a very small number of people that do this, but not in high grade universities. I have been fortunate in being associated with just three high grade places. One was Stanford, another was Imperial College, and the other was this place here, University College. In those places people on the whole over-work. Sometimes at the expense of families, or their own health. And so working in an industrial laboratory was not an additional strain in that sense.

NEBEKER: How long did you work at S.T.L.?

ASH: Eight years.

NEBEKER: Can you describe your work over that period, briefly?

ASH: I worked on microwave tubes, and then subsequently got involved with a number of solid state projects. But in particular I got very much involved with acousto-electrics. There was, for a while, a hope that one might be able to achieve things with acoustic amplifiers, ultrasonic amplifiers, which would be cheaper, simpler, easier than microwave tubes, or solid state devices. That turned out not to be the case. It was never really competitive as an amplifier, although the development of ultrasonic signal processing, which stemmed from that, has been, highly competitive and is very much used.

NEBEKER: What sort of an ultrasonic amplifier was that?

ASH: Well, the basic structure was one where you launched an ultrasonic wave in a crystal OP Cadmium sulphide, and applied a voltage. The electrons drift at velocity which is comparable to that of the acoustic wave. If you get things right the acoustic wave gets amplified.

NEBEKER: I see.

ASH: It is a tiny little thing and sounds very good. The only thing that was wrong with it was that transistors turned out to be better. And the law of the jungle in technology, you know, is always with us.

NEBEKER: You said that did have some application?

ASH: Well, I think the fact that quite a number of people started thinking about ultrasonics did have an impact on a much wider range of electronics. For example, there is now an acoustic surface wave filter in every T.V. set, sometimes two.

NEBEKER: What was S.T.L.'s interest in ultrasonic?

ASH: Well, they were interested in microwaves, for all sorts of reasons. Mainly telecommunications. This was a research lab. There was no intention of going into production in these at that time.

NEBEKER: And you had some freedom in choosing new topics?

ASH: Yes. That was actually quite a surprise to me. When I went into industry I thought I would have a boss, who would say what to work on. I found that does not tend to be true. The programme in an industrial research laboratory which has a lot of vitality tends to be created by the people who are in the lab, at the bench, and is not typically imposed from on high. In fact, in a really good research lab the opportunity that the top brass has is to choose between a number of viable options that are put up to them. So yes, there was considerable amount of freedom in choosing what I was going to work on.

NEBEKER: From the beginning in this case?

ASH: Almost from the beginning, yes.

NEBEKER: Did you change job titles in those eight years?

ASH: Yes I did. After three years in 1958, my boss at the time, Bill Beck, went off to Cambridge to become an academic. I took his job and I became the head of the high speed devices group, as we were called.

NEBEKER: How large a group was that ?

ASH: I think it was about thirty, or thirty-five people. I think I was most probably the youngest person at the time. I don't think that bothered anybody terribly much. It didn't bother me.

NEBEKER: And then in 1963 you left?

ASH: I left to go to University College.

NEBEKER: And how did that come about?

ASH: I got a phone call from the then head of department, Professor Harold Barlow, asking me whether I might be interested in a job. I replied immediately that I would not be interested because I was happy with what I was doing in industry. This was on the Friday. I thought about it over the weekend. I was thirty-five at the time, I think. I thought that if I tried the academic track and didn't like it I wouldn't really have any great difficulty getting back into industry. On the other hand, if I hit forty in industry it would probably be quite difficult to make an entry into the academic world. I thought I ought to give it a try. I rang him back on Monday and said maybe I would give it a try. The other less honourable reason for doing it is that we were then, as now, living in Islington. The S.T.L. research laboratories had in the meantime moved from London to Harlow, a new town about twenty-four miles away. My wife said she'd divorce me if I ever suggested moving to Harlow. Since we got on all right otherwise, I had to commute! On the other hand, University College was ten minutes on a bicycle. That played a role in my decision making.

NEBEKER: But it wasn't the case that you had your eye on an academic position before?

ASH: Not really, no. Obviously one kicks things around as to what one might do when one grows up. I'm still doing that. But I hadn't seriously applied for an academic position.

NEBEKER: How that transition to university?

ASH: It was odd. First, I was given an enormous amount of freedom, to spend some money. Universities actually had some money in those days. Second, I had freedom to decide what to teach. I also found that I think I was teaching a class of six people. Having spent some time in industry this didn't seem to me to be cost effective. I was told, "Not to worry about it, that is the way the world is." And indeed that is the way the world stayed for a few more years until the pressure was applied to universities, quite rightly in my opinion, around about 1970. The universities have been squeezed mercilessly ever since. I think something of the same sort went on the United States. I am suggesting that the squeeze from 1970 to maybe 1980 or thereabouts was justified. It then became a government habit to squeeze. The squeeze since that time has been damaging and not justified. You were asking how I got on. I found that very liberating, and very interesting to start off with a blank sheet of paper. It is the only time in my adult life that I can remember when I actually had some time. For some reason I have never quite recovered that situation since.

NEBEKER: How much teaching were you doing?

ASH: I think throughout my time there I taught something like sixty lectures a year, which was not very much.

NEBEKER: What does that come to in terms of courses?

ASH: Well, putting it in those terms is quite difficult. The idea of the course is quite difficult. The courses that we tend to teach tend to be in units of about thirty lectures, so it would be one full course and two half courses. But the system here is heavily based on tutorial teaching as well. And so a large part of the teaching was on a much smaller group basis.

NEBEKER: And how much did you deal with graduate students?

ASH: I worked up to having typically about five doctoral students working for me. It went up to eight one time, and just about killed me. My advice has been for people not to have probably more than four. But it depends very much on the subject.

NEBEKER: What research did you undertake when you started at the university?

ASH: I pursued further the work on ultrasonics. I got involved in work on acoustic surface waves. I think I was one of the first people to suggest the use of acoustic surface waves for signal processing. I also worked on filters, correlators, and, something which turned out to have a limited capability, acoustic surface wave guides. I spent a lot of time working on that. I also worked on ultrasonic imaging, a number of different modes. But the key invention in that field was made by Calvin Quate, at Stanford University, who invented the modern form of acoustic microscope. We did a lot of research on acoustic microscopy using the basic Quate idea.

NEBEKER: How were laboratory conditions here?

ASH: Primitive to start off with, but in fact it was quite possible to get the funding to make them competitive with other places. In fact, it has been one of my principles that if you cannot afford the equipment for a particular line of research, you shouldn't be doing this research. The competition in research is world-wide, and not just some other little university next door. It really is very unfair to get Ph.D. students to work with one arm tied behind their backs. So I think that in the work that

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we were doing we were well equipped. And not badly off for technicians either.

NEBEKER: Now, you were in a physics department? **ASH:** No, electrical engineering.

NEBEKER: Were any of the graduate students employed in industry while they were working on their degree?

ASH: Not part-time, but in fact there was a scheme, university-run, where people could do a Ph.D. while working in industry. I supervised several people like that. I personally do not believe it to be a good mode for doing it.

NEBEKER: How did it work out in the cases that you dealt with? The graduate student, I suppose, would be working on a project related to their research?

ASH: Yes, but that's precisely the problem because industry doesn't really work in three year time cycles. And if somebody is working on something at one moment, which he decides to develop for a Ph.D., he might not be able to continue that line for long enough. That's one of the problems. The other problem is that once people get into industry they tend to do silly things like getting married and having babies, which is a great distraction from writing Ph.D. theses in the evenings! But I remember one student that worked out extremely well. He was not quite in industry. He was working in a medical research centre, Mill Hill. He was interested in clinical measurement of ear drum movement as a diagnostic tool using optical techniques. He was a very bright student, as it happens. Other students didn't work out too well.

NEBEKER: I could imagine though that it might be stimulating for you to be in touch with industrial research?

ASH: Well, it is stimulating. One of the things, however, that tends to happen is that one gives free consultancy to the industry. One wouldn't mind giving free consultancy if it was matched by that company, let's say, sponsoring some research programmes in one's laboratory but quite often that didn't happen either. I might say that through the last dozen years that I was there, I was also a consultant to the General Electric Company in Schenectady.

NEBEKER: I see.

ASH: And that, for me, was a very helpful connection. In a number of different ways.

NEBEKER: Could you tell me about that consultancy?

ASH: Well, I suppose that the main mission was to keep Schenectady up with the more exciting things going on in Europe. And so it lead me to go to more conferences than I would otherwise have gone. More importantly, it kept me awake while I was there - as you know it is not always easy in a conference - because I knew that I had to write a report on it. I would visit laboratories in different parts of Europe, and I would go to the United States typically a couple of times a year. Some of those times I would spend a week in Schenectady or do specific work within Schenectady.

NEBEKER: What people were you working with there?

ASH: There are several thousand people there, so had contact with a lot of them. I had contact with the director of research for the laboratory at the time. For example, I was given the task of, making an audit of their work on medical ultrasonics. I talked to everyone who was working on medical ultrasonics there and tried to assess the thrust of what they were doing and pinpoint any weaknesses. It enabled me to buy shoes for my children, and that sort of thing. Academics in this country are not paid very well.

NEBEKER: When did this consulting work begin?

ASH: I was consulting, mainly for S.T.L., the firm I had left, from 1958 to I would say around about the mid-1960s. I started consulting for G.E. in 1970. I had not started when I spent a sabbatical year at IBM, which was 1969 to 1970. But I made contact with G.E. at that time.

NEBEKER: I was trying to get to the question of how international this research area was, and what the main centres of it were.

ASH: Oh, I think it is very international. It is a niche subject, ultrasonics, ultrasonic imaging, and some of the other things I got involved with, holographic elements, and opto-electronics. It's not like working on semiconductor memories. But I would say that the conferences, for example, the IEEE ultrasonics conference, got a very good window on what was going on in significant places all over the world. Not a very secretive part of industry.

NEBEKER: And it wasn't a case that Europe was behind the U.S.?

ASH: Not in this particular field, not in ultrasonic signal processing. There were centers in Plessey, in this country; Philips, Siemens in Germany; and very, very importantly in this country was (the R.S.R.E., as it was then known) the Royal Signals and RADAR establishment, in Malvern, a government laboratory which I don't quite know what one would compare it to. Maybe Cambridge air force centre, or something. They were a very important influence on us. Thomson C.S.F. were important.

NEBEKER: Were Japanese researchers active in this area? **ASH:** Yes. They got in a little later but they were, yes.

NEBEKER: How did this sabbatical at IBM come about?

ASH: Well, there is a sabbatical scheme in this country, which, oddly enough, an awful lot of people don't avail themselves of. It's not a sabbatical scheme by right. But I don't know of many cases of people who have asked for a sabbatical year after seven years and not got it. So I asked for it. Universities sometimes drive you mad, because nobody is in charge, and nobody knows what they are doing, or why they are doing it. It's all marvellous, but a bit disorganized. I find industry, in a sense, refreshing. At least they know what they are trying to do, which is to make money. So I thought, given a sabbatical I would like to spend it in industry. I thought I would like to go to the United States. I had some people I knew in the IBM research laboratories in Yorktown Heights, and they kindly invited me to spend a year out there.

NEBEKER: What work did you do there?

ASH: Again, I was working on ultrasonic signal processing. Entirely, in fact.

NEBEKER: Working on your own, or in a group?

ASH: In a group.

NEBEKER: Who was leading that group.

ASH: Well, I suppose the leader was Bob Pole, who was tragically killed a few years later. He flew his own aeroplane, and flew it into a mountain.

NEBEKER: In all of this research at University College, did you have applications in mind for most of your research efforts?

ASH: Yes. I thought that it was a mistake for universities to get too close to applications, because that really is the role of industry. On the whole when universities go in for developmental work they tend to do it badly. They don't have the discipline which is needed in order to get something out the door. I regard engineering as applied science, and to my mind applying science, rather than inventing new science. If there is no objective at the end of the day, it is an absurdity. Engineers ought to be concerned about applications.

NEBEKER: I imagine that interesting questions might arise about some phenomenon or device that a person operating in a scientific mode might want to investigate, but in an engineering mode might say, well that may be interesting, but it is not likely to be vital to getting something to work.

ASH: All I can say is that the record that people have for predicting what is going to be important, and what is not going to be important, is pretty poor. And so it isn't easy to know whether what you are working on is likely to have applications or not. There are examples where it is exceedingly unlikely, although it has been argued fiercely on the other side. And that is particle physics. I believe that whenever you start talking about energies of more than a few kilovolts you are rapidly getting yourself out of the range of materials and chemistry, which is what makes life work. It is extraordinarily unlikely that anything usable or sensible will come out of particle physics. Not impossible. There was even a glint at one time about this new catalysed fusion possibility, but that didn't work out. When you come to the kind of things we were doing, it really is very, very difficult to predict. Whenever I think I can predict things I always like to look back to the time when satellites first appeared as serious possibilities in 1962 or 1961. There were two types that were seriously considered for communications. One was basically large metallised balloons, which would be used as reflectors.

NEBEKER: Echo?

ASH: Yes, echo. And the other one was the active satellites. I went on record as saying that it would be at least another decade before the active ones were seriously considered. For the foreseeable future it would have to be the passive ones. The active ones were just too complicated to put up there. Well, that was totally and utterly wrong. I don't think my comment was stupid, it was just wrong. It is very difficult to predict how a technology is going to go. So, for example, in my latter years here in the department we worked on photo-thermal imaging, and I was particularly interested in possible clinical applications. I still think that there are opportunities in photo-thermal imaging that may come into their own. It really hasn't gelled yet, but I think it might. And I don't regret the time that we spent working on it.

NEBEKER: Are you saying though that in the case of your work on the ultrasonic acoustics, that questions didn't arise? If scientists and engineers might explore some area in different ways.

ASH: I would say that in deciding whether to undertake a project, I think there would be three things in my mind. One, was I really interested in knowing the answer. If one is not interested, or not interested enough, then one shouldn't be doing

it. The second thing, it gets to be a bit more logistic. Is it something which is likely to attract bright Ph.D. students and if it does attract them, is it likely to lead to them flourishing in their Ph.D. work? The third thing is, how much money does it need? If X is the amount of money, what are my chances of getting X from somebody or other for the purpose. I think those were the three considerations, and whether I could see a solid application within, let's say three years, or five years, or ten years, would not have been a factor in my thinking. But, if I couldn't see any applications, if it really seemed terribly abstract to me, then I would not personally have got involved in it.

NEBEKER: I see. You became head of the department in 1980?

ASH: That's right, yes.

NEBEKER: Did that involve much administrative work?

ASH: A fair amount. Before that there were three professors: Professor Alex Cullen, the head of the department; Professor Den Davis, who subsequently became the Vice-Chancellor of Loughborough and is now Chief Scientist to the Ministry of Defence; and myself. The years before that we ran the thing pretty much as a sort of a group, so becoming head of the department wasn't that dramatic a change. But yes, it does involve administration, and responsibility. I made the decision when I took it on that I would not cut back on either my teaching or my research. Which was a tough decision, but I am not sorry that I made that decision.

NEBEKER: It didn't lead to overwork and a nervous breakdown?

ASH: Not a nervous breakdown, no. There are some people who have nervous breakdowns out of overwork, and other people have nervous breakdowns out of boredom. I am more liable to suffer the latter. But, I mean, the way things are done is by delegation. So, for example, I delegated the finances of the department entirely to Den Davis. People asked me how on earth can you run a department if you don't have your hands on the purse strings? As far as I was concerned it wasn't a problem. Den Davis and I spoke shorthand to each other. We got on extremely well, and there was no problem. I did a lot of delegation but even so it is tough going. I think the department did rather well, and I think I left it in good shape when I left.

NEBEKER: Can you explain your connection with Imperial College?

ASH: After I left Imperial College in 1952 I had no connection with it. In fact I hardly ever remember even visiting the place. There was no alumni system there, so they didn't ever contact me. I didn't really have any serious contact with them until I went back there again in 1985 as the rector.

NEBEKER: I see. Well, that is really a step in the direction of management.

ASH: Sure.

NEBEKER: Why did you decide to do that?

ASH: Prior to that I had been asked, I think it was by five, or maybe six universities, whether I would want my name to go forward as Vice-Chancellor. In each case I wrote back rapidly saying "What an enormous honour, but actually not for me. Thanks for thinking of me though." Imperial College got slightly under my skin. First, I was a lad there. Second, I won a scholarship to the college in 1945 when I was seventeen years old. If not for that I don't think I would have gone to Imperial College. I don't think my family would have afforded it. So I had a sort of sentimental attraction to the place. There was a general feeling that Imperial College had been slipping academically. It was really a moment of megalomania. I saw a headline, you know, "Old Student Saves College," or something like that. The other thing was that I thought if I allowed my name to go forward the chances of them picking me were pretty remote. The risk in saying "Yes" at that stage was not too great. But it wasn't a well thought-out career plan.

NEBEKER: I know that you have recently retired from that position?

ASH: Yes.

NEBEKER: As you look back on all this eight years or so, how do you characterise that period?

ASH: Well, it was enormously fascinating. It was a good challenge for a workaholic. My marriage, which is now forty years old, has lasted only because my wife is also a workaholic. Otherwise we would have split up a long time ago. She threw herself into the job too. Now, this is one of the subtle things about taking on that kind of a job. Your wife doesn't actually get any of the perks, she doesn't get any money, but she is expected, or at least people hope, that she will do things. We did a vast amount of entertaining. There was a residence for the Rector there which leant itself to entertaining. She was fully involved in that. But as far as the college itself was concerned, my management style is bottom-up rather than top-down. That is what Imperial College needed at the time. By the time I left, Imperial College was by the official ratings equal with Cambridge in science, the top in engineering. It was in the black and had quite a good administrative team, which it didn't have when I arrived - to put it mildly. I felt reasonably happy after eight years. I think that the college as a whole thought that it had gone all right. I am not sorry I did it but it did actually cut me off almost completely from the researcher.

NEBEKER: I see.

ASH: I did take on one Ph.D. student whilst I was at Imperial College. I saw a number through that were still here [U.C.L.] when I went. I took one person on. That really went very well, mainly because he was a very bright student: Eric Yeatman. He was prepared to see me at eight o'clock in the morning, which not all students are prepared to do. But most importantly, I had an idea before I went to Imperial College that I wanted to work on. When he got his Ph.D. I wasn't going to take on another student, mainly because I hadn't had a new idea. You don't have new ideas if you don't go to conferences, and mope around in libraries, and chat to people over cups of coffee.

NEBEKER: Were you able to continue your own research program?

ASH: No, not at all. This would have been around about 1989 or 1990. After 1989 I really had no more hands-on contact with research or teaching.

NEBEKER: Can you briefly say what measures you took as Rector to improve the situation there, in terms of faculty management, advances?

ASH: First of all I do believe in delegation. In a university it is supremely important that one delegates to the head of a department, chairman of department as it is described in the US.

It is therefore vital that you pick the right chairman of department. At Imperial College the right to appoint the head of a department rests with the Rector. However, I also believe that you don't impose heads of departments. I adopted a scheme when we needed a head of department, where I would write to every single person in the department, including technicians and secretaries, to ask for their advice. I would have meetings with non-professorial staff, and individual meetings all throughout the process. So at the end, the person that I would come up with would not run counter to any serious opposition in the department. But the criterion for running a department in a place like Imperial College, to my mind, is first that the person must be an academic leader with a world-class reputation. Secondly, they must be able to count, including money-not just joules. In other words, they have got to have managerial skills. That combination is the toughest to find. But I am happy to say that I believe I found it in every single case in Imperial College. In one or two cases I went outside and picked people who were not in the college at all. But it is a very tough assignment these days. People have to be bilingual in their science, or engineering, and in management. That is the first thing. The second thing is all terribly obvious stuff, but, I mean, when I came there were no management accounts. There was no such thing as — as capital investment plans. Buildings were put up, and there was an overrun in one case of one million pounds before I was even told about it. So, if you like, that was the terribly straightforward stuff, at least it would seem terribly straightforward in commerce and industry. It was a little bit rarer in universities, but you simply had to tighten up. We had every reason to tighten up because places like Oxford and Cambridge are enormously rich, but Imperial College is enormously poor. So we had no reserves, very little endowment income. So when the government finance, were tightening progressively it was actually vital that we did tighten up. So I think we started doing all the obvious things in that way. Stopping people writing things with a pen. Believe it or not, that was the normal way of communication within administration of Imperial College when I came. Trying to find out what the vast army of maintenance people we had was actually doing. Straightforward management stuff. Oh, and the other thing was starting an alumnus organisation. When I came there was almost nothing, so we started doing things which to any American person would be screamingly obvious. Finding out who the alumni are, and making contact with them. Hoping that eventually they will actually help to sustain the place. But above all, finding out who they are. And that was a very major operation. In the end we ended up with seventy thousand names, and probably about fifty-thousand good addresses. Starting off with a few thousand names.

NEBEKER: So that was something that — that started under your Rectorship?

ASH: Yeah. I started that on day one.

NEBEKER: I wanted to ask about the journal "Electronics Letters" —

ASH: Right.

NEBEKER: — how that came about?

ASH: Well, that was not my invention. The person you ought to talk to about the history of that is Peter Clarricoats. Has that name crossed your —

NEBEKER: Yes.

ASH: Okay. I came on board as a — as an editor very shortly after he had launched it, I think again, looking at American experience, thought there was a real need for it. And managed to convince the council of the I.E.E. that it was worth doing. And that was quite an achievement. When I came on board it was not as yet a significant journal, and it was deeply in the red. And it's continuation at one time was very far from obvious. One of the things Peter Clarricoats and I tried to do in those days was to see whether we could form some alliances. For example, with the German V.D.I. Verein Deutsches Ingenieure. I'm forgetting my German. And with the French. And they all listened carefully. They all worried, I think, about take-over by Anglo-Saxons, and the English speaking countries, and they were particularly worried about the red ink that would have to be absorbed. There was one time, indeed, and I am afraid that I really - I don't think I would have been able to guess when it was, but it would have been, I think, probably the late 1960s, when there was an attempt to join up with the IEEE on it. And that nearly came off, and then in the end the IEEE went away from it. Anyway, the theme that Peter Clarricoats and I tried to pursue throughout is that the soul of the journal does not rest with the owners - it happens to be I.E.E. at the moment - but with the referees. They are really the people that have the main influence as to whether a journal is respected by the community and whether people want to entrust their best work to it or not. So we worked very hard on referee lists, and I remember at a time that we had - I think it was two thousand referees, or something. Carefully classified, and carefully vetted periodically. I found out that the IEEE at that time, in the Proceedings, was publishing a lot of letters. it had, I think, something like fifteen referees. And most of them were in Bell Labs. And if you asked me how come that the letters section in the Proceedings didn't survive, I believe it was that. If you accept bad letters, and God knows they did accept some bad ones, and reject some good ones, I mean, that is death. So we tried very hard to work on this, and that has been our main theme all the time. Plus speed. We aim to publish within six weeks of receipt. And now, of course, we have go the thing on-line as well. Did you know that?

NEBEKER: No, I didn't.

ASH: No. Well, we have a demo at the moment, I can show it to you —

NEBEKER: Full text?

ASH: The full text. I can say a few words about, if you are interested, later on. But people do like to get their stuff published quickly. At one time we monitored referees. We're not doing it the same way at the moment, but I'd still like to get back to it. And we normally have two, or usually three referees. Usually somebody from outside the U.K. We get the referees to score from one to five. You know, one is a breakthrough, two is a very good contribution, three is okay, just about worth publishing, four is just about not worth publishing, and five, well ... That's roughly it. We get the referees to score numerically, and give them seventy-two hours to do it,

and then you take — let's say you have two referees. Let's say one gives a score of two and the other one gives a score of one. You then mark the referee who gave a one with a minus one, let's say, the one who gave a score of two a plus one. Then when you have used them a lot you can find out whether they are particularly harsh —

NEBEKER: Yeah.

ASH: — or particularly lenient. And you can also add up the squares of their deviations, if you see what I mean, and that shows whether they are erratic or not.

NEBEKER: Right, right. It allows you to calibrate the referees

ASH: Yeah, that's right. And if you find somebody is very erratic, or always terribly negative about something then you can try to eliminate him. But that's really the battle, to do that. But — I mean, the result is, as you know, that in a number of fields, and particularly opto-electronics, it is the key journal in the world. The best work in the States, and in Japan, and the world gets published in Electronics Letters. And also it is embarrassingly in the black. I am embarrassed. The I.E.E. isn't! But — I don't think we ought to go into figures, except to say that the profits, if that is the right word, is about half of the turnover. And I might say, neither Peter Clarricoats or I share in all of this marvelous money that it gets. We get a very small, modest fee. But it is a fact that it has sustained a lot of I.E.E. publications.

NEBEKER: Yeah. Could I ask at this time about — about your connection with I.E.E.? When that started, and what activities you have been involved —

ASH: Oh, I joined the I.E.E. as a student. I think it is a very valuable organisation to belong to anyway, but particularly valuable if you happen to be in London. You were in the I.E.E. building yesterday, so you see it is really quite a nice building, with a very nice library. They do have lots of lectures, among them some that are scintillating. And even as a student you can go there and fill yourself with muffins, or whatever they serve for tea beforehand, and hear the great and good talk. And so even — I have always encouraged my students to — to join, too. I suppose I didn't actually have much to do with them whilst I was in industry, and that was partially because I was working out of town. When I came back to London in 1963, I - I got more involved with it. I can't remember the exact sequence, but I became a member of the electronics divisional board, eventually the chairman, and then I, at some stage, became a vice-president and then eventually the president. I --during that time I chaired a number of committees, the most important one as far as I was concerned was the publications committee. And that actually lead to the complete revamp of the I.E.E. Proceedings. I - I mean, it gradually evolved from that time, but - this was the early 1970s, I suppose. But I think that the present structure of the I.E.E. proceedings did take place at that time. I also at one time chaired the qualifications board. One of my main interests was to reduce the time it takes to join the place. And to give them more internationally minded - I always remember an occasion when we had an applicant from - an American, to become a corporate member of the I.E.E., and clearly he had all the right responsibilities and jobs, published a lot, and so on, and so forth. But they also hadn't assured themselves of his educational qualifications, and that really meant a degree in a university that was on their list. Well, this chap hadn't yet made it, and when I asked which university it was the answer was Harvard. So I suggested that it was really quite appropriate to be put on the list. It's not a bad university, as universities go! And that is an extreme example of how parochial at one time the I.E.E. was. I'm glad to say that they are really internationally minded now.

NEBEKER: I'll leave it to the I.E.E. historical effort to learn more about your — your presidency and other activities there, and move to your IEEE connection. I could see from —

ASH: Let me say one thing —

NEBEKER: Sure.

ASH: — about the presidency. I think the important thing one does in the I.E.E. is chair various committees before one becomes the president. When you become the president, the odds are that you will be making speeches and - and - at various dinners and hold forth, and you - you might like to have, except that I don't know if I can lay my hands on a copy at the moment, is a copy of my inaugural lecture. Because that actually says quite a lot about — I ought to have a copy somewhere or other. I'll see whether I can dig one out later on. The I.E.E. can certainly give you a copy of that. It was called "Higher education, industry and Government: New rules for a menage a trois; IEE Proceedings, vol. 135 (Pt A No.1, 1988) pages 1-12". And I sweated blood on that, and it is actually, I suppose, a fairly detailed account of how I saw the world at that time. But I think ----I think the only thing that happened during my year of presidency, which I worked on beforehand too, of course, was that we merged with the British IRE, the Institute of Radio Engineers. Well, that was one step in - in getting larger groups together, which has continued for fifteen years since. But other than that the president is turning up and reading speeches. Abroad, too. I spent a year - you do a trip abroad. My wife and I went to bits of Africa at the time.

NEBEKER: I do know that I.E.E. is quite international —

ASH: Yeah. It has got more so since, really. It is quite international. The present president, Alan Rudge is certainly pursuing that with great vigour.

NEBEKER: I could see from the IEEE directory that you joined in 1952, 1953, I've forgotten now. While you were at Stanford. Was that the IRE, or the AIEE that you — you joined? The Institute of Radio Engineers, or the —

ASH: It would have been IRE When did it become the IEEE?

NEBEKER: Well, they — they merged in 1963. 1963. ASH: Oh, as late as that? NEBEKER: Yeah. ASH: It would have been the IRE NEBEKER: The IRE ASH: Yeah, definitely, yeah. NEBEKER: And — do you recall why you joined? ASH: Oh, sum To get the journals. And that's the mage

ASH: Oh, sure. To get the journals. And that's the reason why I have recommended to most of my students to join. The IEEE journals are supreme. And — I mean, I honestly think, and this may sound arrogant, but I honestly think the only one where we do better is on Electronics Letters. But the Transactions, I mean, they — they really are the — the world repository of information in the electrical sciences.

NEBEKER: What about conferences?

ASH: And conferences, yes.

NEBEKER: That's a thing you —

ASH: I very regularly used to go to the ultrasonics conference, for example. No, I mean, I have the greatest respect for the IEEE And —

NEBEKER: And you remained a member?

ASH: I remained a member. I am a member now. As a matter of fact, when I hit sixty-five I got a letter from the then president saying "Having been a member so long, and been so eminent," or some flattery phrases, "we hope that you will stay so, and you don't have to pay your sub any more."

NEBEKER: Oh, so you're a life member?

ASH: I'm a life member, yes. That was very nice.

NEBEKER: Oh, you're probably a Life Fellow?

ASH: Life Fellow, yes, yes. I thought that was very nice of them. I'd like to encourage the I.E.E. to do as much for me!

NEBEKER: I wonder if I could ask you about books or articles, apart from those you've written yourself, that have been — meant a great deal to you in your career. Any textbooks, or handbooks, or particular articles that have really meant a lot to you.

ASH: Oh, that's a difficult one. But, I mean, just thinking aloud, in electromagnetics there was a book by Stratton, which was published around about the time I graduated which was — I thought it was a marvellous book, and very influential. And subsequently a book that I have used an enormous amount for lectures, and myself, is Ramo, Winnery —

NEBEKER: Ah, yes.

ASH: Ramo and Winnery. Do you know the book?

NEBEKER: Yes, I know the book.

ASH: Okay. That was extremely influential as far as I was concerned. And then, I have to say, Shockley's book on holes and electrons, which, I think, has not been superseded in some respects to this day. And I — I thought - still think - that that was a remarkable book, and a remarkable style, because — do you know the book at all?

NEBEKER: Yes, I just know of it. I haven't read the book.

ASH: Well, I mean, it was sort of first in the field, but what he did was he covered the subject three times. Once in a hand-waving argument kind of way, with some celebrated diagrams showing a garage analogy to holes and electrons in semiconductors. Showing one floor of the garage is absolutely full of cars, too many cars to move, that sort of thing, on that style. And on the second section, where he did it in what I would call good engineering style, mathematical. And then the third time around doing it as a high-falutin physicist, or in quantum mechanical — quantum mechanical calculations. I thought that was a marvellous book. Then — all right, since we're talking about quantum mechanics, there was a book by David Bohm, B-O-H-M, who died recently —

NEBEKER: Yes.

ASH: — on quantum mechanics, which I think — to my mind was the best book on quantum mechanics. I used to teach quantum mechanics, and it was a textbook that I encountered on the subject. His name is quite an interesting one at the moment because he was — well, he was a McCarthy victim as a matter of fact. He came to England at that time. But he was also really fairly isolated because he subsequent to writing that

book developed a new concept of quantum mechanics, which didn't find favour with the gurus at the time. And — I'm not really into the subject enough to know, but my impression is that his views are regarded as rather more respectable now that they ever were then. As a matter of fact, when I first came to University College he was giving lectures on solid state theory right next door at Birkbeck College. I used to go to those.

NEBEKER: Was he a good lecturer?

ASH: Competent. Not brilliant. Then I have to cite a book which was everybody's bible at the time in microwave tubes, and that was John Pierce's book on travelling wave tubes. That made an enormous impression. Yes, then I think — do you know — these are all American books, and there is a reason for that. I'll come to that in a moment. There's Goodman's book on Fourier Optics, which is another book which I think — twenty years old, or something like that —

NEBEKER: Yes.

ASH: — which I don't think has really been superseded.

NEBEKER: What is the first name? Goodman —

ASH: I ought to have it here somewhere.

NEBEKER: I just don't know that book.

ASH: Here we are. I know the bloke, I really ought to know his name. Joseph Goodman.

NEBEKER: Joseph Goodman?

ASH: Yes. Joseph Goodman.

NEBEKER: That's what you said.

ASH: Yes. Called, "An Introduction to Fourier Optics". That was extremely influential. When I left Imperial College I thought I would get rid of all my books. I didn't really think I'd be active in detail subsequently. I couldn't let myself do that. So I have kept the books that have really meant something to me. So all of these books are books that at one time or another, you know, have been important to me.

NEBEKER: Well, I've had engineers say things like Terman's radio engineers handbook was a bible for them, and —

ASH: That's true actually. And again that was when I was a Ph.D. student, and that was certainly a book that I - I used a lot at the time. Well, we could go on at this. I'll tell you one other - you asked about papers. Well, papers sort of tend to be, you know, articles, and — There's one that actually had quite a lot of influence on me, and that was by Shockley, and it was published in the "Proceedings of the IRE" I suspect it was called "The Statistics of Individual Creativity in Research". And he demonstrated that creativity in research had a log-normal distribution. It worked whether you took papers published, or patents published, or what-not. But if, let's say, in a research laboratory half the publications are attributable to ten percent of the people there, then half of that half, a quarter, would be attributable to one percent of the people there. And half of that to a tenth of a percent of the people there. And it only saturates when you get to the point where people have so many ideas coming so fast that the physical job of simply writing down their ideas is what limits them. And I believe that to be a true perception. But the other thing that was interesting to me, and again I think there might be a little truth in it, was that he had a theory as to how this comes about. And he said, if you want to invent something, you really need to be able to carry a number of ideas in your mind all at the same time. And he gave the example of the starter motor in a car. And I can't remember the set of ideas that he had, but, I mean, one - the internal combustion engine is not self-starting. Secondly that you could have an electric motor that would do it. Thirdly that you could put a battery in to drive the electric motor. Fourthly the alternator to charge the battery. Fifthly, a disengaging gear, so that having started it retracts. Anyway, so I think he said you need five or six ideas in your mind. You really do have those ideas in your mind more or less simultaneously. Let's say it was five ideas. So if you are a chap who can only carry four ideas in your mind at the same time, you have zero chance of inventing the starter motor. If you can carry five ideas you can - you have a chance. If you can carry six ideas, you may have five fruitful ones and one irrelevant, but you probably have six times the chance of doing it. If you can carry seven ideas, probably you have forty-two times the chance of doing it. Okay, I mean it a hand-waving kind of an argument ----

NEBEKER: Yeah.

ASH: — but I suspect there is a — an essence of truth in — in that. And I think it accounts for —

NEBEKER: People who are able to retain ideas and understand —

NEBEKER: Yeah.

ASH: — but I'm sure it applies to other things. And I happen to believe it applies very widely in music, you know. Over the last three centuries, I could live if we only had retained twenty of the composers who had ever lived, you know. I would be perfectly happy with that. Not because I'm a square, but I think most people would not find too great a loss —

NEBEKER: Right.

ASH: — if we only had twenty composers. Being a composer is difficult, and being a scientific genius is also very difficult.

NEBEKER: Yeah. I want to ask you about — you told me a little bit already — about your consulting to industry.

ASH: Yes?

NEBEKER: Have you had other connections, besides — **ASH:** Oh, yes.

NEBEKER: - G.E., S.T.L., and -

ASH: Yes. [Tape ends] I still consult for quite a number of places. I will say one thing, and that is that I have not usually consulted for more than one company at a time. I think it is perfectly possible to do. I mean, you can, you know, you can keep things separate and all that. I just found it more comfortable not to have to worry about it. And, indeed, one of the things I liked about consulting for G.E. was that I was not consulting to any companies in the U.K. at that time, which meant that when it came to discussing with my students where they might work when they leave, or where we might get support from, I didn't have a personal axe to grind.

NEBEKER: I see.

ASH: Yes, I have at different times consulted for a number of different companies.

NEBEKER: You've also been an advisor to government? **ASH:** Yes.

NEBEKER: Could you tell me about that?

ASH: Yes. Well, I suppose, really, there are three areas where — where I have been involved in an advisory role. One

was in defence. I sat on various defence committees for quite a number of years. Mainly concerned with microwave tubes and that sort of thing. Secondly, I was on committees of the S.E.R.C., as it was, the research council — Science and Engineering Research Council. And I was on that for a great number of years, and at one time Chairman of the solid-state committee. And this is concerned with selection of grants from proposals that have come from the universities. The third thing was something that started much more recently, I would say. I'm just trying to remember when it was, but - it probably started — I think actually it started in 1984. And that was a very specific thing. The government wanted to investigate particle physics, because historically a large part of our science budget had gone on particle physics, and people had woken up, in my opinion a decade or so too late, that this wasn't entirely appropriate. And there was a committee formed under Sir John Kendrew, to advise the government on future expenditure in particle physics, particularly at C.E.R.N. The qualification for sitting on this committee was that you should know nothing about particle physics, and I qualified. That was a very stimulating few months that we spent, and I think we came up with some fairly sensible proposals. Subsequently I was asked to join A.B.R.C., the Advisory Board for Research Councils, which has just ceased to exist in its present form. The government has changed its structure, since the 31st of December, in fact. A.B.R.C. was a body which sat over above the research councils. The research councils were the Science and Engineering Research Council, the Agricultural and Food Research Council, Economics and Social Research Council, and Medical Research Council. And the total amount of money that was spent by these organisations was of the order of a billion and a half pounds, a billion dollars, and the job of the A.B.R.C. was to advice the government on the expenditure, both total expenditure and the division of expenditure between the research councils. And we gave our advice on it to whichever minister it was that year, and they normally ignored everything we said about the quantity of money that was spent, but on the whole the advice on the division was rubber stamped. I mean, in other words, although it was notionally an advisory committee it was in practice executive.

NEBEKER: Yeah.

ASH: And that was demanding work, and very interesting work.

NEBEKER: Yeah. A lot of pressure was brought to bear, I imagine.

ASH: Oh, sure. Yes. And there were various sub-committees. I was Chairman of the supercomputer sub-committee, which had to advise government on expenditure on supercomputers. Things went on until the 31st of December, and — yes, that was a — a slightly hot seat, both in facing the academic community, and in facing the manufacturers.

NEBEKER: This would apply mainly to the defence advising you have done, but — one criticism I have heard in the United States is that there are too many physicists on these boards, rather than engineers.

ASH: I don't think that was true of the defence committees that I sat on. And we have a rather different process in this country. There aren't enough engineers who sit on the boards

of companies. Much less so than in the United States, and I think that is something that is being cured rather gradually at this _____.

NEBEKER: Besides you — your thesis advisor, have you, in your career, come across people who have greatly impressed you?

ASH: Yes.

NEBEKER: — in one way or another?

ASH: Yes, certainly. I mean, I think the person I would put at the top of that list is Calvin Quate at Stanford. He is a remarkably inventive person, and, you know, has a number of really quite sparkling firsts to his name. But above all, I mean — I mean, he is to my mind a supreme example of a lateral thinker. He is not a great analyst, but he simply looks at a situation and puzzles about it and comes up with, sometimes, remarkably simple answers. I would put him in the genius class. I'm talking entirely about people I have personally encountered, you know.

NEBEKER: Right, that's what I am asking you about, rather than —

ASH: You'll see a lot of books there [indicating his bookshelf?], and — all of which published in the last year. There is a science book prize given in the U.K., and I was one of the judges this year, so I have read a great deal. So, I mean, I have no doubt in my mind that Steven Weinberg is a genius, but I have never met the bloke.

NEBEKER: Well, I am interested in those —

ASH: Yeah.

NEBEKER: — that you have know —

ASH: Yeah.

NEBEKER: — personally.

ASH: Yeah. I think I — I would — the second person I would cite is Rudy Kompfner. I don't know if that is someone that you —

NEBEKER: Yes, I know the name. I —

ASH: Yeah. I mean, he died quite a few years ago.

NEBEKER: I can't think why I know the name —

ASH: Well, I mean, very briefly he was a refugee from Austria, trained as an architect. A radio ham, a sort of amateur radio chap in his spare time. He sat in the library when he came here to London and wrote a paper in a fairly lowly journal called "Wireless World" which the Admiralty picked up, and recruited him to work on defence during the war, and he invented the travelling wave tube. He also invented a great number of other things too.

NEBEKER: Yeah.

ASH: And he — again was a sort of inventive genius type.

NEBEKER: And how did you come to meet him?

ASH: I suppose I first met him — he left the U.K. and went to Bell Labs, and I first met him when I was working at S.T.L., and I visited Bell Labs. That was my first personal encounter with him. But I got to know him very well, and indeed socially later, and when he retired from Bell Labs he divided his time between Oxford and Stanford, and so I got to know him quite well during his Oxford times as well. So I think I would put him into this class. And — and a third person, without any question in my mind is George Porter. Do you know who he is at all?

NEBEKER: No, I don't.

ASH: Okay. Well, he was a Nobel Laureate. He is a chemist. I got to know him in detail because he was the Director of the Royal Institution in London, and I became a member, and was in fact the secretary of that institution for a number of years, so I got to know him well. And, indeed, whilst I was there I was told that being the secretary didn't involve much time. What they didn't tell me was that if you lose the Director you have got to find a new one, and George Porter became the President of the Royal Society, and so we had to find a new director. But at that time he said that he would be winding up his research work, which he was doing [while] in the Royal Institution - he was a photo-chemist - and become an elder statesman. I told him that I simply didn't believe it, and that what he really ought to do was take his team and bring it to Imperial College. And I eventually persuaded him to do that, and he is there to this day with a very viable team doing extremely good work in photosynthesis using laser techniques. But - I mean he is a — a genius in the sense that he invented a new branch of chemistry, high-speed photo-chemistry, which he got the Nobel prize for. But he is also a fantastic portrayer of science to the lay-public. What is now called the public understanding of science, which he, in fact evolved during his time of presidency of the Royal Society. It was very much his pitch. And, of course, he came from the long tradition of the Royal Institution, I mean, the first person that started there was Michael Faraday. He first started their discourses -

NEBEKER: Yeah.

ASH: — which were discourses given to the public at large. NEBEKER: Yeah.

ASH: I think that is my ration of geniuses.

NEBEKER: Yeah.

ASH: Right.

NEBEKER: That's very interesting. I think I have — have asked what I — what I intended to — to ask about. Are there any things you would care to comment on, or —

ASH: Well, one thing that perhaps might be worth touching on. You asked about my industrial consultancy. For the last six years, until last year, I was a — a member of the board of B.T. [British Telecom], and I found that absolutely enormously interesting. I mean, I don't know how much you know about B.T.?

NEBEKER: Not very much.

ASH: I mean, it was a public utility, and was privatised in about 1983, I think, and it is one of the privatisations which in — to my mind, has been a roaring success. I am not a very political animal, and I have voted for all three political parties at different elections, never very happily. But I think that what the Conservatives did in privatising B.T. was absolutely right, and — and from being a rather sleep government agency it has become a very dynamic company. It is a company with a — I think — I'm quite bad at numbers, but with a turnover of something like — getting on for twenty billion dollars a year, something of that sort. Embarking on a very exciting time in communications technology, being on the board of that company was — was, to me, absolutely fascinating. One normally doesn't serve for more than six years on — on the board in this country, the Stu-

dent Loan Company, which is — is responsible for student loans, and I sit on the national advisory board of the Amp Corporation in the States. Do you know about them at all?

NEBEKER: No.

ASH: Okay. That is a fascinating part of my life at the moment. The Amp Corporation is a three billion dollar a year company, mainly known for plugs and sockets, so the things on the back of that machine are probably Amp plugs and sockets. It is high technology of an old-fashioned kind, if you see what I mean, and making plugs and sockets that work is quite difficult, especially if you've got sixty-four contacts to make.

NEBEKER: Right.

ASH: It's not so easy. But, nevertheless, it is just a plug and socket. They have announced that they want to be a ten billion dollar a year company by the year two thousand, and the way they are doing it is with — with new high-technology products, specifically in opto-electronics, a very major part of their thrust. And they have an international advisory board. Well, it's not very international, I'm the only non-U.S. chap on it, but an advisory board anyway, which meets four times a year. There's various things we do, also in Europe. I find that very interesting. And I also sit on the international advisory board of the Bosch Company, in Germany.

NEBEKER: Oh, yes.

ASH: That really is international. There's one chap from each country. Incidentally the chap from the United States is Henry Kissinger, which is rather fascinating to meet him in the flesh and —

NEBEKER: Yes.

ASH: He is a — enormously impressive on this sort of thing. Probably _____. He gave his own lecture each time on the state of politics each time in the United States. Even if one reads, you know, the obvious journals fairly regularly you get a completely different insight such a direct contact. Anyway, those are the things I am doing with industry.

NEBEKER: I see. And — And you — you have enjoyed this, being on — on boards of directors?

ASH: Yes. I enjoy it enormously. The other thing is that I approve of making money. Now, academics don't make much money, and by the time they're pensioners the pension scheme doesn't tend to be terribly generous. Having been Rector of Imperial College I haven't done too badly, but actually I have found money is rather useful stuff! I mean, I have never gone out to get loads particularly, but being on boards is a help in that direction. I have five daughters, who are or will get married at one stage or another, which is an expensive form of fun, and — and they keep on having babies these days. But they are all, sort of well off my hands, except one of them has, sort of, decided that she needs to get an M.B.A. from the London Business School, and so the fees in that are fairly expensive. So there are reasons for having money —

NEBEKER: Yeah.

ASH: — rather than just gathering the stuff.

NEBEKER: Yeah, sure.

ASH: Do you have children?

NEBEKER: Two children?

ASH: That's a sane, sensible sort of family. We had two daughters and then we had a third that we didn't particularly re-

member inviting, and then my wife had this very odd idea that three is an odd number and really we ought to have a fourth.

NEBEKER: Yes.

ASH: And that's when we had girl twins! So at that point we decided that was it.

NEBEKER: Well, thank you very much.

ASH: Oh, not at all. As you know, academics like nothing more than talking about themselves. I suppose most people do actually. I'll always remember, once [tape pauses for a second] —

NEBEKER: Unless you'd rather not.

ASH: No, that's okay. But in industry — I can't remember the circumstances. When I was working in microwave tubes,

we were going to visit a competitor's laboratory. We had some reason to talk to them about this. And I said, "Surely they won't tell us anything?" And the person I was with, who was older and more experienced, said, "The real problem will be to get them to shut up! Engineers love talking about things."

NEBEKER: Yes.

(m.hoffman@ieee.org) URL: www.ieee.org/organizations/history_center/ oral_histories/ transcripts/ash.html (Modified:19-Jul-00 01:31 PM)

Future UFFC-S Symposia

2004 IEEE International Ultrasonics, Ferroelectrics, and Frequency Control 50th Anniversary Joint Conference

In 2004 the Ultrasonics, Ferroelectrics and Frequency Control Society will celebrate its 50th anniversary. To honor the occasion all three major UFFC-S sponsored symposia will join together for a single conference to be held in August in Montreal, Canada.

Location: Palais des Congres Montreal Convention Center, Montreal Canada

Dates: Tutorials/short courses: August 23 (Monday), 2004; Technical sessions: August 24-29 (Tues-Fri), 2004

General Chair: R. Michael Garvey Datum, 34 Tozer Road Beverly, MA 01915-5510, USA rmgarvey@datum.com

Technical Program Chairs: Ultrasonics Ton van der Steen Thorax centre Ee 23.02 Erasmus University Rotterdam P.O.Box 1738 3000 DR Rotterdam The Netherlands vandersteen@tch.fgg.eur.nl

Ferroelectrics Steve Pilgrim Alfred University NYS College of Ceramics 120 McMahon Building 2 Pine Street Alfred, NY 14802 pilgrim@alfred.edu

Walter Schulze Alfred University NYS College of Ceramics 120 McMahon Building 2 Pine Street Alfred, NY 14802 Schulze@alfred.edu

Frequency Control Christopher Ekstrom US Naval Observatory 34th and Massachusetts Ave. Washington, DC 20392-5100 ekstrom@atom.usno.navy.mil

FREQUENCY CONTROL SYMPOSIA

2002 Frequency Control Symposium

Location:	Hilton New Orleans Riverside, New Orleans, LA, USA
Dates:	29-31 May; Tutorials on 1 June 2002
General Chair:	Errol EerNisse Quartzdyne, Inc. 1020 Atherton Dr., Bldg. C Salt Lake City, UT 84123, USA
Program Chair:	John R. Vig US Army CECOM Attn: AMSEL-RD-C2-PT Ft. Monmouth, NJ 07703, USA J.Vig@ieee.org

2003 IEEE International Frequency Control Symposium and PDA Exhibition Jointly With the 17th European Frequency and Time Forum

Location:	Marriott Waterside Hotel, Tampa, Florida, USA
Dates:	Tutorials: May 4 (Sunday); Technical sessions: May 5-8 (Mon-Thur)
General Chairs:	R. Michael Garvey Datum, 34 Tozer Road Beverly, MA 01915-5510, USA rmgarvey@datum.com
	Raymond Besson Laboratoire de Chronometrie Electronique Piezoelectricite 26 chemin de l'Epitaphe 25030 Besancon Cedex France rbesson@ens2m.fr
Technical Progra	m Chair:
	Pierre Thomann Observatoire de Neuchatel rue de l'Observatoire 58 CH-2000 Neuchatel - Switzerland pierre.thomann@ne.ch
US Liaison for th	e Technical Program:
	Christopher Ekstrom US Naval Observatory 34th and Massachusetts Ave. Washington, DC 20392-5100 ekstrom@atom.usno.navy.mil
2004 IEEE Inter	national Frequency Control Symposium

- UFFC-S's 50th anniversary celebration; joint meeting with the two other UFFC-S symposia, the Ultrasonics

Symposium and the International Symposium on the Applications of Ferroelectrics

Location:	Palais des Congres Montreal Convention Center, Montreal, Canada
Dates:	23-29 August
General Chair:	R. Michael Garvey 34 Tozer Road Beverly, MA 01915-5510, USA rmgarvey@datum.com
Program Chair:	Chris Ekstrom US Naval Observatory 34th and Massachusetts Ave. Washington, DC 20392-5100 ekstrom@atom.usno.navy.mil

ULTRASONICS SYMPOSIA

2002 IEEE International Ultrasonics Symposium In cooperation with the Association for Electrical, Electronic & InformationTechnologies (VDE), Germany

Forum Hotel, Munich, Germany October 8-11, 2002

General Co-Chairs:

Helmut Ermert Ruhr-Universitaet Bochum Dept. of. Electrical Engineering Bldg. IC 6/132 D-44780 Bochum, Germany Phone: +49 (234) 3222842 FAX: +49 (234) 3214167 E-mail: h.ermert@ieee.org

Bernhard R. Tittmann 210 Hallowell Building Penn State University University Park, PA 16802 Phone (814) 865-7827 Fax (814) 863-7967 E-Mail BRTESM@ENGR.PSU.EDU

Technical Program Co-Chairs:

Reinhard Lerch, Universitaet Erlangen-Nuremberg Lehrstuhl fuer Sensorik Cauerstr. 9 D-91058 Erlangen, Germany Tel.:+49 (9131) 85 27223 Fax: +49 (9131) 302951 E-mail: krs@lse.e-technik.uni-erlangen.de Robert Weigel Universitaet Linz Institut fuer Nachrichtentechnik/

Informationstechnik.

Altenbergerstr. 69 A-4040 Linz, Austria Phone: +43-732-2468-9710 (-11) Fax: +43-732-2468-9712 E-mail: weigel@mechatronik. uni-linz.ac.at

2003 IEEE International Ultrasonics Symposium

October 5-8, 2003 Honolulu, Hawaii

General Co-Chairs:

William D. O'Brien, Jr. University of Illinois Department of Electrical & Computer Engineering Bioacoustics Research Laboratory 405 North Mathews Avenue Urbana, Illinois 61801-2991, USA Phone: (217) 333-2407 Fax: (217) 244-0105 Email: wdo@uiuc.edu

James F. Greenleaf Mayo Clinic Ultrasound Research 200 First Street SW Rochester, Minnesota 55905, USA Phone: (507) 284-8496 Fax: (507) 266-0631 Email: jfg@mayo.edu

2004 IEEE International Ultrasonics Symposium -UFFC-S's 50th anniversary celebration; joint meeting with the two other UFFC-S symposia, the Frequency Control Symposium and the IEEE International Symposium on the Applications of Ferroelectrics

Location:	Palais des Congres Montreal
	Convention Center,
	Montreal, Canada
Dates:	23-29 August
General Chair:	R. Michael Garvey
	34 Tozer Road
	Beverly, MA 01915-5510, USA
	rmgarvey@datum.com
Technical Progra	am Chair:

Ton van der Steen Thorax centre Ee 23.02 Erasmus University Rotterdam P.O. Box 1738 3000 DR Rotterdam The Netherlands vandersteen@tch.fgg.eur.nl

FERROELECTRICS SYMPOSIA

International Joint Conference On the Applications of Ferroelectrics 2002 (IFFF 2002)

	May 28 - June 1, 2002
	Nara, Japan
	http://fma.aist-nara.ac.jp.
General Chair:	Prof. Tadashi SHIOSAKI
	Nara Institute of Science and Technology
Contact Address:	Conference Secretary of IFFF2002
	Shiosaki Lab.,
	Graduate School of Materials Science,
	Nara Institute of Science and Technology
	8916-5 Takayama-cho, Ikoma,
	Nara 630-0101, Japan
	Fax +81-743-72-6069,
	e-mail: fma@ms.aist-nara.ac.jp

11th International Symposium on Electrets

1-3 October 2002 Melbourne - Australia Novotel Hotel, Glen Waverley

Organized by the School of Physics and Materials Engineering Monash University, Melbourne

Co-Sponsored by the Ultrasonics Ferroelectrics and Frequency Control Society and the IEEE Dielectrics and Electrical Insulation Society

Conference Secretary:

Dr. Keith Bambery ISE11 Conference Secretary School of Physics and Materials Engineering Monash University PO Box 27 Victoria 3800 Australia Telephone +61 3 9905 3672 Fax +61 3 9905 3637 ise11@spme.monash.edu.au

2004 IEEE International Symposium on the Applications of Ferroelectrics - UFFC-S's 50th anniversary celebration; joint meeting with the two other UFFC-S symposia, the Ultrasonics Symposium and the Frequency Control Symposium

Location:	Palais des Congres Montreal Convention Center Montreal, Canada
Dates:	23-29 August
General Chair:	R. Michael Garvey 34 Tozer Road Beverly, MA 01915-5510, USA rmgarvey@datum.com

Technical Program Chair:	
Steve Pilgrim	Walter Schulze
Alfred University	Alfred University
NYS College of Ceramics	NYS College of Ceramics
120 McMahon Building	120 McMahon Building
2 Pine Street	2 Pine Street
Alfred, NY 14802, USA	Alfred, NY 14802, USA
pilgrim@alfred.edu	Schulze@alfred.edu

11th International Symposium on Electrets - ISE11 1-3 October 2002 Melbourne – Australia

Sponsored by the IEEE DEIS and Technically Co-sponsored by IEEE UFFC

Topics

Injection, transport and trapping of charge, polarization ; Thermally stimulated processes, radiation and field effects ; Non-linear optics and electro-optical effects ; Piezo-, pyroand ferroelectric phenomena ; Ferroelectric ceramics and thin films ; Thin film ferroelectric memories ; Bioelectrets and photoelectrets ; Molecular electrets, especially those involving composite or novel materials ; Applications

Invited Speakers

Reimund Gerhard-Multhaupt, University of Potsdam, Germany Colette Lacabanne, Universite Paul Sabatier, France Ahmad Safari, Rutgers University, New Jersey, USA Susan Trolier-McKinstry, Pennsylvania State University, USA Jan vanTurnhout, Technical University of Delft, The Netherlands Venue

The venue is the Novotel Hotel, Glen Waverley. Glen Waverley is a suburb of Melbourne, about 20 km from its centre. Melbourne has a population around 3 million and is Australia's second largest city.

Workshop

A workshop entitled "Space charge profile measurements – practice, problems and potential" will be held on Friday 4 October at the same venue.

Manuscript Submission

Manuscripts should be submitted by email to the address given below, specifying the preferred topic area and presentation format (oral/poster), and underlining the name of the corresponding author. Detailed instructions on the preparation of manuscripts will be found on the Symposium website at the address given below. The deadline for receipt of manuscripts is 15 May 2002.

Registration Fees

If paid before 15 June 2002, registration fees (in \$US) will be as follows:

IEEE members \$300, IEEE non-members \$340, Retired persons/full-time students \$160.

Fees paid after 15 June 2002 will be \$40 higher.

Student Support

A limited amount of financial support will be available for full-time students attending the symposium. They must be directly involved in at least one paper being presented. They should submit a request for support to the Conference Secretary by 15 May 2002, enclosing a letter of recommendation from the appropriate supervisor.

Visas

Intending delegates are advised that, if they are not Australian citizens, they will need a visitor's visa. They should enquire at their nearest Australian Embassy or Chamber of Industry and Commerce, which is listed at http://www.immi.gov.au/wwi/index.htm. At least three months should be allowed for processing of an application.

Addresses

Email

ise11@spme.monash.edu.au

Internet

http://ise11.spme.monash.edu.au

Mail

Dr Keith Bambery, ISE11 Conference Secretary School of Physics and Materials Engineering Monash University, PO Box 27, Victoria 3800, Australia Telephone +61 3 9905 3672 Fax +61 3 9905 3637





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

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