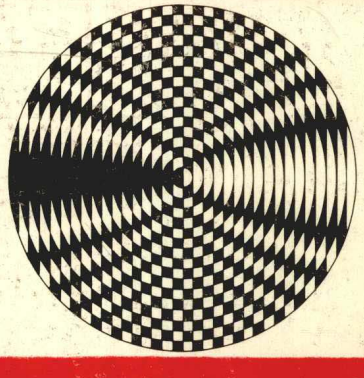
1980

ULTRASONICS SYMPOSIUM

PROCEEDINGS



Vol. 1

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1980 ULTRASONICS SYMPOSIUM

PROCEEDINGS

B. R. McAvoy
Editor

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Vol. 1

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EDITOR'S NOTE

This is the ninth regularly published edition of the Proceedings and the first to be issued in two volumes. The division of topics between volumes is somewhat arbitrary but some attempt has been made to provide for reader convenience. We hope that this division will enhance the usefulness of the Proceedings.

Of the 246 papers presented at the 1980 Ultrasonics Symposium, 207 or approximately 85% are reproduced in this record. An updated and corrected version of the Table of Contents will be included in the March 1981 issue of the IEEE Transactions on Sonics and Ultrasonics, Volume SU 28.

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Bruce R. McAvoy
Proceedings Editor
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December 3, 1980

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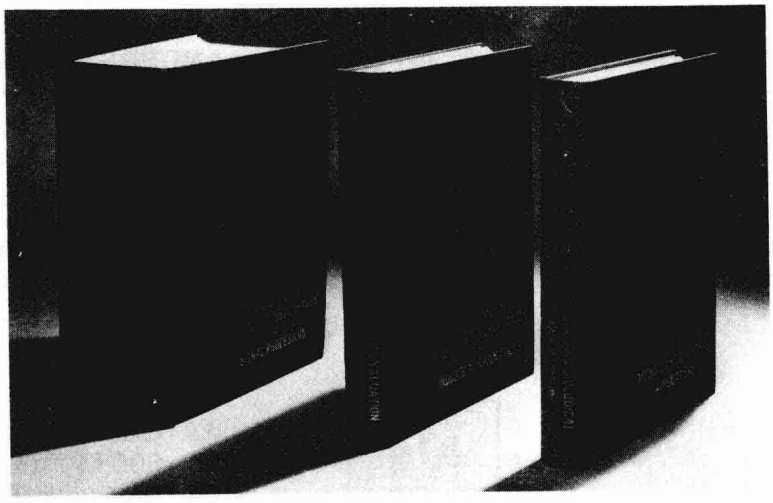

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Technical Program

WEDNESDAY, NOVEMBER 5, 1980

	SESSION A — GEORGIAN ROOM
8:30	**PLENARY** Opening Remarks: R.C. Williamson, General Chairman Opening Remarks: H. van de Vaart, Chairman, Technical Program Committee Harry Diamond Award – L.K. Anderson, Div. IV Director G-SU Achievement Award – G.A. Alers, President G-SU G-SU Best Paper Award – G.A.Alers, President G-SU G-SU National Lecturer – G.A. Alers, President G-SU **SONAR IN AIR – THE ELECTRONIC YARDSTICK** Dr. Conrad Biber Polaroid Corp., Cambridge, Massachusetts 02139
10:00	COFFEE BREAK — CORRIDOR

	SESSION B — GEORGIAN ROOM SIGNAL PROCESSING DEVICES CHAIRMAN: P. TOURNOIS Thomson – CSF	SESSION C — PARLOR A NOVEL LENSES AND TRANSDUCERS CHAIRMAN: B.R. THOMPSON Rockwell International	SESSION D — PARLOR B PHOTOACOUSTIC SPECTROSCOPY AND IMAGING (INVITED) CHAIRMAN: R. L. MELCHER IBM Watson Research Ctr.	SESSION E — PARLOR C MAGNETOSTATIC WAVE DEVICES CHAIRMAN: E. SCHLOEMAN Raytheon Research Div.
10:30	B1 **(INVITED)** **The Impact of Convolver Characteristics on System Performance** Ernest Stern Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	C1 **Electrostatic-Acoustic Transducers For Horizontal Polarized Shear Waves** Kazuhiko Yamanouchi and Wolfgang Sachse Cornell University Ithaca, New York 14853	D1 10:30 **(INVITED)** **Thermal-Wave Imaging and Microscopy** Allan Rosencwaig Lawrence Livermore Laboratory University of California Livermore, California 94550	E1 **(INVITED)** **Magnetostatic Wave Devices, Microwave SAW?** C.V. Smith, J.M. Owens, R.L. Carter The University of Texas at Arlington J.H. Collins University of Edinburgh Edinburgh, Scotland
10:45		C2 **Composite Piezoelectric Transducers** R.E. Newnham, K.A. Klicker, S.Y. Lynn, W.A. Schulze, T.R. Gururaja, T.R. Shrout and L.J. Bowen The Pennsylvania State Univ., University Park, PA 16802	D2 10:55 **(INVITED)** **Thermal-Wave Microscopy A New Application of the Scanning Electron Microscope** E.K. Brandix IBM, Hopewell Junction, NY 12533	
11:00	B2 **The Effect of Acoustic Dispersion and Attenuation On SAW Convolver Performance** E.L. Adler and J.H. Cafarella Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	C3 **Properties of a PVDF Hydrophone with 100 MHz Bandwidth for Studying Medical, Non-Linear and Other Fields** D.R. Bacon National Physical Laboratory Teddington, Middlesex, U.K.		E2 **New Configurations for Magnetostatic Wave Devices** J.P. Castera, G. Volluet, P. Hartemann Thomson-CSF 91401 Orsay, France
11:15	B3 **Hybrid Convolver/Binary Signal Processor Achieves High Processing Gain** R.P. Baker and J.H. Cafarella Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	C4 **A New Sound Focussing Lens – A Quasi Parallel-Sided Lens** Zhao Hengyuan, Zhang Fucheng, Guo Xiaowu Applied Acoustics Institute Shaanxi Teacher's University Xian, China	D3 11:20 **(INVITED)** **Condensed Matter Photoacoustic Spectroscopy and Detection Using Gas Phase Signal Generation and Detection** J.F. McClelland Iowa State University, Ames, Iowa 50011	E3 **MSW Time Delays** J.C. Sethares Rome Air Development Center Hanscom AFB, MA C.V. Smith and J.M. Owens University of Texas at Arlington Arlington, Texas 76019
11:30	B4 **Doppler Insensitive Time Integrating Correlator Using SAW Convolver and CCD** D. Shklarasky and P. Das Rensselaer Polytechnic Institute Troy, NY 12181 L.B. Milstein University of California San Diego, CA 92037	C5 **Acoustic Lens with Electrically Controlled Refractive Index** M. Pappalardo CNR Institute of Acoustics Rome, Italy		E4 **Magnetostatic Wave Delay Line With Four Biphase Switchable Taps Operating At X-Band** T.W. O'Keeffe, J.D. Adam and Michael R. Daniel Westinghouse R&D Center Pittsburgh, Pennsylvania 15235
11:45	B5 **An Improved SAW Time-Integrating Correlator With CCD Readout** D.L. Smythe and R.W. Raiston Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173	C6 **High Resolution Acoustic Probe** W. Durr, D.A. Sinclair and E.A. Ash University College London, U.K.	D4 11:45 **(INVITED)** **Opto-Acoustic Spectroscopy of Condensed Matter** C.K.N. Patel Bell Laboratories, Murray Hill, NJ 07974	E5 **Dispersion Control in Magnetostatic Delay Lines By Means of Multiple Magnetic Layer Structures** L.R. Adkins and H.L. Glass Rockwell International, ERC, Anaheim, California 92803
12:00				E6 **Synthesis of Magnetostatic Waves and Modes Using Nonuniform Bias Fields** F.R. Morgenthaler Massachusetts Institute of Technology Cambridge, MA 02139
12:15	LUNCH			

	SESSION F — GEORGIAN ROOM ELASTIC CONVOLVERS I CHAIRMAN: T.A. Martin Andersen Laboratories	SESSION G — PARLOR A SAW RESONATOR FILTERS CHAIRMAN: W.R. Shreve Hewlett-Packard Co.	SESSION H — PARLOR B PHOTOACOUSTIC SPECTROSCOPY CHAIRMAN: A.C. Tam IBM Research Laboratory
1:30	F1 **(INVITED)** **Wideband Elastic Convolvers** H. Gautier and C. Maerfeld Thomson–CSF Cagnes/Mer – France	G1 **Satellite Application of a SAW Resonator Filter** William J. Tanski Sperry Research Center, Sudbury, MA 01776 Martin Block Frequency Electronics Inc. Hyde Park, NY 11042	H1 **Fourier-Transformed Infrared Photoacoustic Spectroscopy The Techniques and Its Applications** M.G. Rockley, H.H. Richardson and D.M. Davis Oklahoma State University Stillwater, Oklahoma 74078
1:45		G2 **Non-Linear Characteristics of SAW Grooved Resonators** M. Planat, J.J. Gagnepain LPMO-CNRS-Besancon 25000 C. Lardat, L. Penavaire Thomson-CSF, DASM, Cagnes-sur-Mer 06802 France	H2 **Fourier Transform Infra Red Photoacoustic Spectroscopy Of Solids** B.S.H. Royce, Y.C. Teng and J. Enns Princeton University Princeton, NJ 08544
2:00	F2 **High Performance Elastic Convolver With Parabolic Horns** I. Yao Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	G3 **Suppression of Reflective Coefficient Sidelobes of SAW Reflective Arrays by Means of Withdrawal Weighting** Shui Yong-An, Jiang Wen-Hwa, Zhang De and Wu Wen-Qiu Acoustic Institute, Nanjing University Nanjing, China	H3 **Photoacoustic Measurements of Nonradiative States and Defects In Semiconductors With ZnO Transducer** N. Mikoshiba, K. Wasa and K. Tsubouchi Research Institute of Electrical Communication, Tohoku Univ. Sendai 980, Japan

2:15	F3 **Low Cost SAW Convolver With High Spurious Suppression** Pierre Dufilie Anderson Laboratories, Inc. Bloomfield, Connecticut 06002	G4 **Microwave SAW Resonators Fabricated With Direct-Writing Electron Beam Lithography** P. Cross, P. Rissman and W. Shreve Hewlett-Packard Laboratories Palo Alto, California 94304	H4 **Thermoacoustic Detection of EPR** R. L. Melcher IBM Thomas J. Watson Research Center Yorktown, NY 10598
2:30	F4 **Dispersion and Multimoding in Monolithic Elastic Convolvers** R.S. Wagers Texas Instruments Incorporated Dallas, Texas 75265	G5 **Broader-Band SAW Resonator Filters With A Single Critical Masking Step** R.L. Rosenberg and L.A. Coldren Bell Laboratories Holmdel, NJ 07733	H5 **Chemical Effects In Optoacoustic Spectroscopy** G. Diebold and J. Hayden Brown University Providence, Rhode Island 02912
2:45	F5 **The Design and Performance of a Small Efficient SAW Convolver** B. Darby, D. Gunton and M.F. Lewis Royal Signals and Radar Establishment Malvern, Worcestershire, U.K.	G6 **A SAW Ring Filter With A Phase Matching Electrode** N. Furuya, H. Miyama, Y. Nakayama and Y. Kino Matsushita Research Institute Tokyo Ikuta, Kawasaki 214, Japan	H6 **Photoacoustic Detection Of A Chain Reaction** M.L. Shand and R.R. Chance Corporate Research Center Allied Chemical Corporation Morristown, NJ 07960

1:30 – 3:30 — **POSTER SESSION: P** — **STANBRO HALL**

BULK WAVES
MAGNETO STATIC WAVES
ACOUSTO OPTIC DEVICES

CHAIRMAN: B.R. McAvoy
Westinghouse Research Laboratories

P1 **Driven Thickness-Extensional Trapped Energy Vibrations of Piezoelectric Plates** B.K. Sinha, H.F. Tiersten and D.V. Shick Rensselaer Polytechnic Inst., Troy, New York 12181	P7 **Diffraction and Beam Steering of Magnetostatic Surface Waves** H.S. Tuan and J.P. Parekh Dept. of Electrical Eng., State Univ. of NY at Stony Brook Stony Brook, New York 11794	P13 **Tunable Acousto-Optic Filter Using Crystal Tellurium** I.C. Chang, P. Katzka and S. Estrin Itek Corporation Sunnyvale, California 94086
P2 **Observation of Piezoelectricity in Thin Films formed by Anodization** J.J. Bernstein and R.M. White Dept. of Electrical Eng. and Comp. Sciences and Electronics Research Laboratory Univ. of California, Berkeley, California 94720	P8 **A 3-Port Model for Magnetostatic Wave Transducers** J.M. Owens, C.V. Smith, Jr., G. Hasnian and R.L. Carter The University of Texas at Arlington	P14 **Application of Tl_3AsSe_3 for Long Wavelength Acousto-Optic Beam Steering Devices** M. Khoshnevisan, R.L. Hall and E.Z. Sovero Rockwell International Science Center Thousand Oaks, California 01360 E. Skurnick and W. Davidian, Riverside Research Institute New York, New York 10023
P3 **Growth and Characterization of ZnO Epitaxial Films** K.M. Lakin, C.K. Lau and S. Tiku University of Southern California Los Angeles, California 90007	P9 **MSW Terminations** C.V. Smith, University of Texas at Arlington, TX J.C. Sethares, RADC, Hanscom AFB, MA 01731 L.V. Taylor, SCEE/RADC Post Doctoral Program Hanscom AFB, MA 01731	P15 **A Generalized Method for Designing Acousto-Optic Tunable Filters** E.A. Sovero and M. Khoshnevisan Rockwell International Science Center Thousand Oaks, California 91360
P4 **The Effects of Nonuniform In-Plane Fields on the Propagation Characteristics of Magnetostatic Surface Waves** D.D. Stancil and F.R. Morgenthaler, Dept. of Electrical Eng. and Comp. Science and the Research Lab. of Electronics Massachusetts Institute of Technology, Cambridge, MA 02139	P10 **Acousto Optic Position Sensor** E. Dieulesaint, D. Royer and G. Sitbon Lab. Acoustoelectricite Universite P'& M. Curie 75231 Paris Cedex 05 France	P16 **Decay Time Constants of Photoinduced Stored SAW Patterns** H. Dropkin, J.N. Lee and N.J. Berg US Army Electronics Research and Development Command Harry Diamond Laboratories, Adelphi, MD 20783
P5 **Dispersion Relations for Magnetostatic Waves** I.J. Weinberg University of Lowell, Lowell, Massachusetts 01854	P11 **The Fabrication of an Opto-Acoustic Transducer for Real-Time Diagnostic Imaging** K.Y. Su and G. Wade, Dept. of Electrical & Comp. Engineering University of California, Santa Barbara, California 93106	
P6 **Effects of Directional Coupling on the Magnetostatic Surface Wave Propagation** Takuro Koike, Dept. of Electronics Tamagawa Univ., Machida, Tokyo 194, Japan	P12 **Finite Beamwidth Effects in Bulk Acousto-Optic Interactions** David G. Hawkins, Andersen Laboratories, Inc. Bloomfield, Connecticut 06002	

3:00 — **COFFEE BREAK** — **STANBRO HALL**

	SESSION I — GEORGIAN ROOM **ELASTIC CONVOLVERS II** CHAIRMAN: C. Maerfeld Thomson-CSF	SESSION J — PARLOR A **SAW RESONATOR FILTERS AND AGING** CHAIRMAN: W.J. Tanski Sperry Research Center	SESSION K — PARLOR B **PHOTOACOUSTIC IMAGING** CHAIRMAN: R.L. Thomas Wayne State University
3:30	I1 **Broadband, Phase-Compensating Transducers For Monolithic Convolvers** W.R. Smith, Hughes Aircraft Company Fullerton, California 92634	J1 **(INVITED)** **What SAW Can Learn From BAW: Implications For Future Frequency Control, Selection, & Signal Processing** T. Lukaszek and A. Ballato US Army Electronics Technology and Devices Laboratory (ERADCOM) Fort Monmouth, NJ 07703	K1 **Photoacoustic and Photothermal Imaging At Low Modulation Frequencies** T. Pousi, M. Jokinen, M. Luukkala and A. Lehto Physics Department, University of Helsinki Helsinki, Finland
3:45	I2 **Dispersion In Acoustoelectric Convolvers: A Time Domain Model** J.H. Goll Texas Instruments Incorporated Dallas, Texas 75265		K2 **Applications Of Optoacoustic Imaging and Microscopy** G. Busse ZWE Physik Hochschule der Bundeswehr Munchen 8014 Neubiberg, Germany F. R.
4:00	I3 **Focused Surface Wave Transducers On Anisotropic Substrates: A Theory Developed For The Waveguided Storage Correlator** J.B. Green, G.S. Kino and B.T. Khuri-Yakub E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	J2 **Long-Term Aging and Mechanical Stability Of 1.4 GHz SAW Oscillators** M. Gilden, G.K. Montress and R.A. Wagner United Technologies Research Center East Hartford, Connecticut 06108	K3 **Two Dimensional Photoacousting Mapping Of Ion Implanted and Laser Annealed Semiconductors** R.A. McFarlane, L.D. Hess and G.L. Olson Hughes Research Laboratories Malibu, California 90265
4:15	I4 **Elastic Convolver Using Planar Prism Waveguide Couplers** K.L. Davis and J.F. Weller Naval Research Laboratory Washington, D.C. 20375	J3 **Active Aging of SAW Resonators** W.R. Shreve Hewlett-Packard Laboratories Palo Alto, California 94304	K4 **Phase and Amplitude Of Photoacoustically-Generated Signals In Thermal-Wave Imaging Geometry** F.A. McDonald and G.C. Wetsel Physics Department, Southern Methodist University Dallas, Texas 75275
4:30	I5 **Characterization of SAW Metal Strip Waveguides** H. Engan, K.A. Ingebrigtsen and A. Rønnekleiv Norwegian Institute of Technology N-7034 Trondheim, Norway	J4 **Surface Chemistry Related To SAW Resonator Aging** J.S. Schoenwald, A.B. Harker, J. Wise and E.J. Staples Electronics Research Center Rockwell International Corporation Thousand Oaks, California 91360	K5 **Photoacoustic Microscopy—A New Technique In Biology and Non-Destructive Testing** C.R. Petts and H.K. Wickramasinghe Department of Electrical Engineering University College, London

WEDNESDAY, NOVEMBER 5, 1980

4:45	I6 **Electromagnetic Long-Line Effects In SAW Convolvers** E.L. Adler Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	J5 **Impedance Characterization and Design Of 2-Pole Hybrid SAW Resonator Filters** J. Wise, J.S. Schoenwald and E.J. Staples Electronics Research Center Rockwell International Corporation Thousand Oaks, California 91360	K6 **Quantitative Determination Of Laser-Generated Ultrasonic Waves In A Solid** J.R.M. Viertl Corporate Research and Development General Electric Company Schenectady, NY 12301
5:00			K7 **Thermoelastic Wave Generation By The Heated Interface Between Two Media** G.C. Wetsel, Jr. Physics Department, Southern Methodist University Dallas, Texas 75275

THURSDAY, NOVEMBER 6, 1980

	SESSION L — GEORGIAN ROOM **ACOUSTO-ELECTRIC DEVICES I** CHAIRMAN: E. Stern MIT – Lincoln Laboratory	SESSION M — PARLOR A **NDE-MEASUREMENTS, SYSTEMS AND TECHNIQUES I** CHAIRMAN: E.P. Papadakis Ford Motor Company	SESSION N — PARLOR B **BULK WAVE SIGNAL PROCESSING** CHAIRMAN: E.K. Kirchner Teledyne-MEC	SESSION O — PARLOR C **PHYSICAL ACOUSTICS I – NONLINEAR AND VISCOELASTIC PHENOMENA** CHAIRMAN: M.A. Breazeale University of Tennessee
8:30	L1 **(INVITED)** **GaAs Monolithic SAW Devices for Signal Processing and Frequency Control** T.W. Grudkowski, G.K. Montress, M. Gilden and J.F. Black United Technologies Research Center East Hartford, Connecticut 06108	M1 **Ultrasonic Imaging for Nondestructive Evaluation of Composite Material with Digital Image Enhancement** R.T. Webster and P. Das Rensselaer Polytechnic Institute Troy, NY 12181	N1 **Stress Induced Frequency Shifts in Thickness-Mode Quartz Resonators** B.K. Sinha Schlumberger-Doll Research Ridgefield, Connecticut 06877	O1 **(INVITED)** **Nonlinear Elastic Behavior and Instabilities in Crystals** M. Fischer, A. Zarembowitch Universite Paris VI, Paris, France M.A. Breazeale Univ. of Tennessee, Knoxville, TN 37916
8:45		M2 **High Temperature, High Pressure Water Level Sensor** L.C. Lynnworth, W.B. Studley and W.R. Wade Panametrics, Inc., Waltham, Massachusetts 02154 G.N. Miller and R.L. Anderson Union Carbide Corp., Oak Ridge Nat'l Laboratory Oak Ridge, Tennessee 37830	N2 **Ceramic Flatpack Enclosed AT and SC-Cut Resonators** R.L. Filler and J.R. Vig US Army Electronics Technology and Devices Laboratory, Ft. Monmouth, NJ 07703 L.J. Keres, T.M. Snowden General Electric Neutron Devices Dept. St. Petersburg, FL 33733	
9:00	L2 **GaAs SAW Diode Storage Correlator** K.W. Loh, D.K. Schroder and R.C. Clarke Westinghouse R&D Center Pittsburgh, Pennsylvania 15235	M3 **Use of a Two-Dimensional Filter for the Imaging of Near Front Surface Flaw** N. Hamano, F. Ream and R. Katz Ultrasonic Imaging Laboratory The University of Michigan, Ann Arbor, Michigan 48109	N3 **Fine Structure in the Thickness-Shear Mode Spectrum of Quartz Resonators** Len A. Tyler, Consultant Chicago, Illinois 60610	O2 **Measurement of Ultrasonically Induced Static Strain In A Solid** William P. Winfree and John H. Cantrell, Jr. NASA Langley Research Center Hampton, Virginia 23665
9:15	L3 **SAW Programmable Matched Filter Signal Processor** F.S. Hickernell, M.D. Adamo, R.V. Delong and J.G. Hinsdale Motorola, Inc., Government Electronics Div. Scottsdale, Arizona 85252 H.J. Bush Rome Air Development Center (DCID) Griffiss AFB, NY 13441	M4 **Ultrasound Imaging Through Highly Reverberant Thin Layers** J. Saniie, V.L. Newhouse and E.S. Furgason Electrical Engineering Department Purdue University W. Lafayette, Indiana 47907	N4 **A New-Type Energy Trapping Caused by Contributions from the Complex Branches Dispersion Curves** H. Watanabe, K. Nakamura and H. Shimizu Department of Electrical Communications Faculty of Engineering Tohoku University, Sendai, Japan	O3 **Ultrasonic Nonlinearity Parameters of Silicon Between 300 and 4 °K** Jacob Philip and M.A. Breazeale Department of Physics The University of Tennessee Knoxville, Tennessee 37916
9:30	L4 **Monolithic ZnO-GaAs Acoustoelectric Devices** G.R. Adams, J.D. Jackson and J.S. Heeks Standard Telecommunication Laboratories Ltd. Harlow, Essex CM17 9NA, England	M5 **In-Process Ultrasonic Thickness Measurement of Electroplated Chrome** J. Frankel, W. Korman and G. Capsimalis Benet Weapons Lab., LCWSL, U.S. ARRADCOM Watervliet Arsenal, Watervliet, NY 12189	N5 **Fundamental Mode VHF/UHF Bulk Acoustic Wave Resonators and Filters on Silicon** T.W. Grudkowski, J.F. Black, T.M. Reeder, D.E. Cullen and R.A. Wagner United Technologies Research Center East Hartford, Connecticut 06108	O4 **Dynamic Polarization Echoes in Metallic Powders** K. Kajimura and F. Tsuruoka Electrotechnical Laboratory Sakura-mura, Ibaraki 305, Japan
9:45	L5 **High Q ZnO-on-Silicon SAW Resonators** S.J. Martin, R.L. Gunshor and R.F. Pierret School of Electrical Eng., Purdue University West Lafayette, Indiana 47907	M6 **Acoustic Imaging by a Sonic Phase Locked Loop** Robert J. Redding Design Automation (London) Ltd., Cox Green Lane Maidenhead, Berkshire, England	N6 **Monolithic Matching for Broadband Microwave Delay Lines** R.A. Moore, R.N. Sunderlin Baltimore, Maryland 21203 S. Liberman Harry Diamond Lab., Washington, DC	O5 **Low Frequency Shear Elastic Properties of Smectic A Liquid Crystals** M.R. Fisch, L.B. Sorensen, P.S. Pershan Harvard Univ., Cambridge, Massachusetts 02138
10:00				O6 **Transient Pressure Field of US-Phased Arrays** U. Aulenbacher and K.J. Langenberg Fachrichtung 12.2, Theoretische Elektrotechnik Universitat des Saarlandes D-6600 Saarbrucken, FRG
10:00	COFFEE BREAK — CORRIDOR			

	SESSION R — GEORGIAN ROOM **ACOUSTO-ELECTRIC DEVICES II** CHAIRMAN: R.W. Ralston M.I.T. – Lincoln Laboratory	SESSION S — PARLOR A **NDE-MEASUREMENTS, SYSTEMS AND TECHNIQUES II** CHAIRMAN: B.R. Tittman Rockwell International-Science Center	SESSION T — PARLOR B **ACOUSTO-OPTIC SIGNAL PROCESSING** CHAIRMAN: E.G. Lean IBM Watson Research Center	SESSION U — PARLOR C **PHYSICAL ACOUSTICS II – ATTENUATION** CHAIRMAN: M. Levy University of Wisconsin – Milwaukee
10:30	R1 **Monolithic Sezawa Wave Storage Correlators and Convolvers** J.E. Bowers, B.T. Khuri-Yakub and G.S. Kino E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	S1 **Ultrasonic Chacterization of the Thermal Protection Tiles for the Space Shuttle** G.A. Alers University of New Mexico R.M. Zimmerman Sandia Laboratories, Albuquerque, NM 87131	T1 **(INVITED)** **Acousto-Optic Time Integrating Correlators** Terry M. Turpin Department of Defense Fort, Meade, Maryland 20755	U1 **Acoustic and Dielectric Loss Processes In PVF_2** P. Ravinet, J. Hue, G. Volluet P. Hartemann, D. Broussoux and F. Micheron Thomson-CSF – Research Center Domaine de Corbeville, 91401 Orsay, France
10:45	R2 **Monolithic Schottky Diode Storage Correlator** R.L. Thornton and G.S. Kino E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	S2 **Nonlinear FM Coded SAW EMAT's for Nondestructive Testing of Materials** V.M.Ristic, F. Hauser, G. Dubois Department of Electrical Engineering Univ. of Toronto, Toronto, Canada M5S 1A4 H. Light Atomic Energy of Canada Ltd. Chalk River, Canada K0J 1J0		U2 **Ultrasonic Attenuation in the Carrier Hopping Regime in p InSb at Low Temperature** J.D.N. Cheeke and G. Madore Dept de Physique, Univ. de Sherbrooke Sherbrooke, Quebec, Canada J1K 2R1
11:00	R3 **MZOS-FET Type Convolver** Kazuhiko Matsumoto, Toyosaka Moriizumi and Tsutomu Yasuda Department of Electrical and Electronics Eng. Tokyo Inst. of Technology, Meguroku, Japan	S3 **An On-Line Method for Measuring the Physical Properties of Rigid Materials** M.F. Leach Laurentian University Sudbury, Ontario, Canada, P3E 2C6	T2 **Acousto-Optic Diffraction from Acoustic Anisotropic Shear Modes in Gallium Phosphide** D.L. Hecht and G.W. Petrie Itek Corporation Sunnyvale, California 94086	U3 **Phenomenological Theory of Attenuation and Propagation Velocity of Elastic Waves in Rocks** J.M. Richardson and B.R. Tittmann Rockwell International Science Center Thousand Oaks, California 91360

11:15	R4 **An Acoustoelectric Burst-Waveform Processor** S.A. Reible and I. Yao Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173	S4 **(INVITED)** **Mechanism Noise** S. Dubowsky and T. Morris University of California Los Angeles, California 90024	T3 **Acousto-Optic Time-Integrating Correlation Using Guided-Wave Anisotropic Bragg Diffraction** C.C. Lee, K.Y. Liao, C.L. Chang and C.S. Tsai School of Engineering, Univ. of California Irvine, California 92717	U4 **Lattice Attenuations in CdS Measured by Acoustic Domains** Y. Tokunaga Kanazawa Technical College, Nonoichi, Ishikawa T. Hata and T. Hada Kanazawa Univ., Kotasuno, Kanazawa 920, Japan
11:30	R5 **Acoustoelectric Mobility Measurements on Films with Negligible Acoustic Loss** R. Adler, D. Janes, S. Datta and B.J. Hunsinger University of Illinois Urbana, Illinois 61801		T4 **Interferometric Surface-Wave Acousto-Optic Time-Integrating Correlator** I.J. Abramovitz and N.J. Berg Harry Diamond Laboratories Adelphi, Maryland 20783	U5 **Acoustic Properties of Amorphous SiH_x Films** M. von Haumeder, K.L. Bhatia and S. Hunklinger Max-Planck-Institut fur Festkorperforschung Heisenbergstr. 1, D-7 Stuttgart W.-Germany
11:45	R6 **Electron Transport by Line Acoustic Waves in GaAs:Cr** M. Hoskins, F. Fliegel, S. Mahon, S. Datta and B.J. Hunsinger University of Illinois Urbana, Illinois 61801	S5 **Optimum Processing of Broadband Ultrasonic Data** Dick Elsley, John M. Richardson, Bob Addison, Jr. Rockwell International Science Center Thousand Oaks, California 91360	T5 **High-Speed Adaptive Filtering and Reconstruction of Broadband Signals Using Acousto-Optic Techniques** John N. Lee, N.J. Berg and P.S. Brody Harry Diamond Laboratories Adelphi, Maryland 20783	U6 **Ultrasonic Surface Wave Investigation of Superfluidity in Thin Helium Films** P. Morisseau and J.D.N. Cheeke Dept. de Physique, Univ. de Sherbrooke Sherbrooke, Quebec, Canada J1K 2R1
12:00		S6 **Analysis of Lamb Wave Diffraction by a Finite Crack Using the Method of Generalized Scattering Matrices** S. Rokhlin Department of Materials Engineering Ben-Gurion University of the Negev Beer-Sheva, P.O.B. 653, Israel		U7 **Ultrasonic Attenuation in Sodium, Potassium and Copper at Low Temperature** O.N. Awasthi Physics Dept., Regional College of Education Mysore – 570 006 India
12:15	LUNCH			

	SESSION V GEORGIAN ROOM **SAW FREQUENCY ANALYZERS** CHAIRMAN: J.H. Cafarella MIT – Lincoln Laboratory	SESSION W PARLOR A **NDE-MEASUREMENTS, SYSTEMS AND TECHNIQUES III** CHAIRMAN: G.S. Kino Stanford University	SESSION X PARLOR B **SAW PROPAGATION** CHAIRMAN: G.W. Farnell McGill University
1:30	V1 **(INVITED)** **A Review of Current and Future Components for Electronic Warfare Receivers** J.H. Collins and P.M. Grant Dept. of Electrical Engineering University of Edinburgh, Mayfield Road Edinburgh EH9 3JL, UK	W1 **Measurement Techniques in Elastic Wave Scattering Experiments** B.R. Tittmann and L.A. Ahlberg Rockwell International Science Center Thousand Oaks, California 91360	X1 **Visualization of SAW Propagation with the Scanning Electron Microscope** R. Veith, G. Eberharter, H.P. Feuerbaum and U. Knauer Siemens AG, Forschungslaboratorien Munchen, W-Germany
1:45		W2 **Semi-Adaptive Approach to the Extraction of Low Frequency Properties from Scattering Measurements** J.M. Richardson and R.K. Elsley Rockwell International Science Center Thousand Oaks, California 91360	X2 **Phase Contrast Optical Filtering for Mapping SAW Second Harmonic Fields** A. Alippi, A. Palma, L. Palmieri, G. Socino and E. Verona Istituto di Acustica "O.M. Corbino CNR, Roma, Italy
2:00	V2 **A 1 GHz Bandwidth SAW Compressive Receiver** G.L. Moule and R.A. Bale Royal Signals and Radar Establishment Malvern, England	W3 **Perturbation Method for Analyzing the Effect on Ultrasonic Echo Returns on Rough Surfaces in Material Cracks and Voids** B.A. Auld and S. Ayter E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	X3 **Nonlinearly Coupled Modes of Surface Acoustic Waves** N.P. Vlannes and A. Bers Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173
2:15	V3 **Self-Aligning SAW Chirp-Fourier-Transform System** D.R. Arsenault and V.S. Dolat Lincoln Laboratory Massachusetts Institute of Technology Lexington, Massachusetts 02173	W4 **Normal Mode Variational Method for Two- and Three-Dimensional Acoustic Scattering in an Isotropic Plate** B.A. Auld and M. Tan E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	X4 **An Approximate GTD Technique for Computing SAW Diffraction for General Anisotropic Media** W.A. Radasky and G.L. Matthaei Dept. of Elec. and Comp. Engin. Univ. of California, Santa Barbara, California 93106
2:30	V4 **Wideband Instantaneous Frequency Measurements (IFM) Using SAW Devices** Y. Bar-Ness Dept. of Systems Eng., Univ. of Pennsylvania Philadelphia, Pennsylvania 19104 H. Messer, School of Engineering Tel-Aviv University, Israel	W5 **Ultrasonic Detection and Sizing of Planar Weld Flaws in the Long Wavelength Limit** C.M. Fortunko Fracture and Deformation Division National Bureau of Standards Boulder, Colorado 80303	X5 **Influence of an External Electric Field on SAW Properties** R. Lec, D.S. Bailey, F. Rose and J.F. Vetelino Electrical Engineering Department University of Maine, Orono, Maine 04469
2:45	V5 **A UHF Fast Frequency Synthesizer Using SAW Filters** M. Ben Zaken, N. Zilbermann, E. Kogan, P. Romik and E. Sofer Tadiran, Israel Electronics Industries Ltd. Tel Aviv 61000, Israel	W6 **Experimental Study of the Two Bulk Compressional Modes in Water-Saturated Porous Structures** T.J. Plona Schlumberger-Doll Research Ridgefield, Connecticut 06877	X6 **SAW Propagation on GaAs and InP** F. Fliegel, S. Mahon and B.J. Hunsinger Coordinated Science Laboratory University of Illinois, Urbana, Illinois 61801

3:00	COFFEE BREAK	STANBRO HALL

1:30 – 3:30	POSTER SESSION: Q **SAW FILTERS** **SIGNAL PROCESSING** **PHYSICAL ACOUSTICS** CHAIRMAN: R.A. Moore Westinghouse Defense and Electronics Systems Center	STANBRO HALL
Q1 **Field Induced Effects on Surface Acoustic Waves in a Semiconductor Coupled Piezoelectric Substrate and Electronic Control of SAW Transducer** S.K. Lahiri, Dept. of Electronics and Electrical Comm. Eng., I.I.T., Kharagpur 721302, India and A. Chaki, Jhargram Raj College Jhargram, Dist. Midnapur, West Bengal, India	Q6 **Automatic Time Domain Testing of SAW Devices** K. Langecker and R. Veith, Siemens AG Forschungslaboratorien, Munchen W-Germany	Q11 **A SAW Multiple-Channel Filter for Underwater Acoustic Signals** P.H. Schottler Sperry Research Center, Sudbury, MA 01776
Q2 **The Application of Electrostatic Analysis to Generalized SAW Transducers** R.C. Peach, GEC Hirst Research Centre Wembley, Middlesex, England	Q7 **Effect of Static Electric Field on Propagation of Surface Acoustic Waves in Piezoelectric Media** Shrinivas G. Joshi Marquette University, Milwaukee, Wisconsin 53233	Q12 **A Technique for Increasing the Number of Transform Points in SAW Chirp-Fourier-Transform Processors** P. Tortoli, G.F. Manes, Instituto di Elettronica, Florence C. Atzeni, IREO, Consiglio Nazionale Ricerche, Florence, Italy
Q3 **New Theory of SSBW Devices** E. Danicki, Military Academy of Technology 00-908 Warsaw 49, Poland	Q8 **A Surface Acoustic Wave Application for a PAM-FM Communication Modem** S. Nanayakkara, Wayne State Univ., Detroit, Michigan C.K. Campbell, McMaster Univ., Hamilton, Ontario, Canada	Q13 **Charge Distribution and Memory Effect of Piezoelectric Gates** M.E. Motamedi, A.F. Tasrhati, E.J. Staples and T.C. Lim Electronics Research Center, Rockwell International Corp. Thousand Oaks, California 91360

THURSDAY, NOVEMBER 6, 1980

Q4 **SAW-LAW Multistrip Mode Converter** S. Datta, M. Hoskins, R. Adler and B.J. Hunsinger Coordinated Science Lab., Univ. of Illinois Urbana, Illinois 61801	Q9 **Analog Encoded Signal Transmission Using Position-Modulated Linear Chirps** M. Kowatsch, J. Lafferl and F.J. Seifert A-1040 Vienna, Austria	Q14 **An Ultrasonic Method for the Evaluation of Multiphase Binary Diffusion** Z. Ronen and S. Rokhlin, Dept. of Materials Eng. Ben-Gurion University of the Negev M.P. Dariel, Nuclear Research Center-Negev, Beer-Sheva Israel
Q5 **Use of Apodized Metal Gratings in Fabricating Low Cost Quartz RAC Filters** G.W. Judd and J.L. Thoss, Hughes Aircraft Company Fullerton, California 92634	Q10 **Transverse Acoustoelectric Voltage Inversion in a Simple Model Semiconductor** I.J. Fritz, Sandia National Laboratories Albuquerque, New Mexico 87185	Q15 **A New Ultrasonic Method for Measuring the Shear Modulus of Thin Interface Films** S. Rokhlin and M. Rosen, Dept. of Materials Engineering Ben-Burion University of the Negev, Beer-Sheva Israel
		Q16 **Electrically Tunable Narrow-Bandwidth SAW Filter** Jeannine Henaff and Michel Feldmann, CNET PAB, Department DTS/MAE 92220 Bagneux – France

	SESSION Y — GEORGIAN ROOM **SSBW AND SAW OSCILLATORS** CHAIRMAN: M.F. Lewis Royal Signals and Radar Establishment	SESSION Z — PARLOR A **NDE-ARRAY TRANSDUCERS AND PROBE TRANSDUCERS** CHAIRMAN: J. Larson Hewlett-Packard Co.	SESSION AA — PARLOR B **ACOUSTIC MICROSCOPY** CHAIRMAN: R.C. Addison Rockwell International Science Center
3:30	Y1 **High Frequency Temperature Stable SAW Oscillators** K.F. Lau, K.H. Yen, R.S. Kagiwada and A.M. Kong TRW Defense and Space Systems Group Redondo Beach, California 90278	Z1 (INVITED) **PVF$_2$ Transducers** H.J. Shaw, D. Weinstein, L.T. Zitelli, C.W. Frank and R.C. Demattei Stanford University, Stanford, California 94305	AA1 **Acoustic Microscopy in High Pressure Gases** H.K. Wickramasinghe and C.R. Petts Department of Electrical Engineering University College, London
3:45	Y2 **S-Band SSBW Delay Lines for Oscillator Applications** D.L. Lee Raytheon Research Division, Waltham, MA 02254		AA2 **Microscope Lens Using Conversion of Rayleigh to Compressional Waves** G.W. Farnell and C.K. Jen Department of Electrical Engineering McGill University, Montreal, Canada
4:00	Y3 **Suppression of Reflection Effects in Surface Skimming Bulk Wave Devices** P.D. Bloch, E.G.S. Paige and M.W. Wagg Dept. of Eng. Science, Univ. of Oxford Parks Road, Oxford, England	Z2 **Acoustical Arrays with Non-Uniform Element Spacing and/or Elevation** J.M. Richardson and R.C. Addison, Jr. Rockwell International Science Center Thousand Oaks, California 91360	AA3 **Acoustic Micrography of Elastic Constants** I.R. Smith and D.A. Sinclair University College London, UK
4:15	Y4 **A 120 MHz SAW Resonator Stabilized Oscillator with High Spectral Purity** L. Penavaire, D. Seguignes, C. Lardat Thomson-CSF, Cagnes/Mer 06802, France J.J. Bonnier, J.Y. Chevalier, Y. Besson Thomson-CSF, 92240 Malakoff, France	Z3 **Pseudo-Random Codes for Multi-Mode Operation of Phased Arrays** B.B. Lee and E.S. Furgason Electrical Engineering Bldg, Purdue University West Lafayette, Indiana 47907	AA4 **Measurement of Acoustic Transmission Through Air Cavity Using Acoustic Microscopy** J.K. Wang, C.S. Tsai, and C.C. Lee School of Engineering Univ. of California, Irvine, California 92717
4:30	Y5 **Observations on the Short Term Stability of a SAW Delay Line Oscillator** C.K. Campbell Communications Research Laboratory McMaster Univ., Hamilton, Ontario, L8S 4L7, Canada	Z4 **Thin Film ZnO-MOS Transducers with Virtually DC Response** P.L. Chen, R.S. Muller, R.M. White and R. Jolly Dept. of Electrical Eng. and Comp. Sciences University of California, Berkeley, California 94720	AA5 **Quantitative Flaw Size Determinations with the Scanning Laser Acoustic Microscope (SLAM)** D.E. Yuhas, C.L. Vorres and L.W. Kessler Sonoscan Inc., 530 E. Green Street Bensenville, Illinois 60106
4:45	Y6 **Dynamic Thermal Sensitivity of SAW Quartz Oscillators** D. Hauden Rome Air Dev. Ctr/EEA, Hanscom AFB, MA 01731 G. Theobald Besancon, France		AA6 **Dark Field Imaging with the Scanning Laser Acoustic Microscope (SLAM)** L.W. Kessler and D.E. Yuhas Sonoscan Inc., 530 E. Green Street Bensenville, Illinois 60106
5:00	Y7 **Injection Locked SAW Oscillators** D.J. Dodson, M.D. Brunsman, R.W. Kerr TRW DSSG, Redondo Beach, California 90278		
6:00	COCKTAIL PARTY AND NEW ENGLAND FEAST		KENNEDY LIBRARY

FRIDAY, NOVEMBER 7, 1980

	SESSION BB — GEORGIAN ROOM **MULTISTRIP AND GRATING DEVICES** CHAIRMAN: L.P. Solie Sperry Research Center	SESSION CC — PARLOR A **IMAGING – I** CHAIRMAN: S. Lees Forsyth Dental Center	SESSION DD — PARLOR B **THIN FILMS** CHAIRMAN: A.J. Slobodnik RADC-Electromagnetic Sciences Division	SESSION EE — PARLOR C **ACOUSTIC SENSORS** CHAIRMAN: C.S. Tsai University of California at Irvine
8:30	BB1 **Temperature-Stable RAC** D.E. Oates and D.M. Boroson Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173	CC1 (INVITED) **Real-Time Synthetic Aperture Imaging System** G.S. Kino, D. Corl, S. Bennett and K. Peterson E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	DD1 **Attenuating Thin Films for SAW Devices** A.C. Anderson and V.S. Dolat Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173	EE1 **Gyroscope Effect in Surface Acoustic Waves** B.Y. Lao, Bendix Corporation Southfield, Michigan 48076
8:45	BB2 **The Analysis of Grating Structures by Coupling-of-Modes Theory** H.A. Haus and P.V. Wright Dept. of EECS and RLE – M.I.T. Cambridge, Massachusetts 02139		DD2 **High-Frequency and Low-Dispersion SAW Devices on AlN/Al_2O_3 and AlN/Si for Signal Processing** K. Tsubouchi, K. Sugai and N. Mikoshiba Research Inst. of Elec. Communications Tohoku Univ., Sendai 980, Japan	EE2 **Acoustic Surface Wave Accelerometer and Rotation Rate Sensor** H.F. Tiersten, D.S. Stevens and P.K. Das Rensselaer Polytechnic Institute Troy, New York 12181
9:00	BB3 **A Closed-Form Analysis of Reflective-Array Gratings** P.B. Wright Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173 H.A. Haus Massachusetts Institute of Technology Cambridge, Massachusetts 02139	CC2 **A Three-Dimensional Synthetic Focusing System** K. Liang, B.T. Khuri-Yakub and G.S. Kino E.L. Ginzton Laboratory, Stanford University Stanford, California 94305	DD3 **Low Temperature Growth of Piezoelectric AlN Film for Surface and Bulk Wave Transducers by RF Reactive Planar Magnetron Sputtering** T. Shiosaki, T. Yamamoto, T. Oda and A. Kawabata Faculty of Engineering Kyoto University, Kyoto, Japan	EE3 **Progress in the Development of SAW Resonator Pressure Transducers** D.E. Cullen and G.K. Montress United Technologies Research Center East Hartford, Connecticut 06108

9:15	BB4 **The Use of Frequency-Selective Multistrip Couplers in Surface Acoustic Wave Transversal Filters** R.J. Murray Philips Research Lab., Redhill, Surrey RH1 5HA, UK J. Schofield Mullard Central Materials Lab., Surrey, UK	CC3 **Acoustic Imaging with Two-Dimensional Arrays** K.M. Lakin, Wm. Sheppard and K. Tam University of Southern California	DD4 **SAW and Boundary Wave Properties for SiO_2/$LiTaO_3$ Structure Fabricated by Plasma-CVD** K. Shibayama, K. Yamanouchi and W. Chujo Research Institute of Electrical Communication Tohoku University, Sendai, Japan	EE4 **(INVITED)** **Fiber Optical Sensor Development** T.G. Giallorenzi Optical Sciences Division Naval Research Lab., Washington, DC 20375
9:30	BB5 **Diffraction in TV-IF Filters Using Multistrip Couplers** W. Mader Institut fur Physikalische Elektronik TU Wien A-1040 Vienna, Austria H. Stocker and G. Tobolka Siemens AG, Research Laboratories D-8000 Munich, West Germany	CC4 **A SAW-Based Programmable Transversal Filter with Application to Ultrasound Imaging** G.F. Manes, D. Gerli, P. Mattera Instituto di Elettronica C. Atzeni IROE, Consiglio Nazionale Ricerche Fiorence, Italy	DD5 **PVF_2 Elastic Constant Evaluation** R.S. Wagers Texas Instruments Inc., Dallas Texas 75265	
9:45	BB6 **Reflection-Mode Multiplexing of SAW Filters Using 3 dB Quadrature Couplers** S.L. March E-Systems, Inc., Garland, Texas 75042	CC5 **Acoustical Imaging Via Coherent Reception of Spatially Coloured Transmissions** P. Tournois Thomson-CSF, ASM Division 06802 Cagnes-sur-Mer, France	DD6 **Low Frequency Acoustic Propagation in Anisotropic Thin Polymer Films** E. Balizer, P. Kornreich and S. Kowel Dept. of Electrical and Computer Engineering Syracuse University, Syracuse, NY 13210	EE5 **PVF_2 Phase Shifters and Modulators for Fiber Optic Sensor Systems** E.F. Caroma and K.P. Koo Physics Department John Carroll University, Cleveland, Ohio 44118
10:00				EE6 **Detection of Ultrasonic Waves in Solids by An Optical Fiber Interferometer** R.O. Claus and John H. Cantrell, Jr. NASA Langley Research Ctr., Hampton, VA
10:00	COFFEE BREAK			CORRIDOR

	SESSION FF — GEORGIAN ROOM **SAW TRANSDUCERS** CHAIRMAN: W.R. Smith Hughes Aircraft Co.	SESSION GG — PARLOR A **IMAGING – II** CHAIRMAN: K.M. Lakin University of Southern California	SESSION HH — PARLOR B **SPUTTERED ZnO FILMS** CHAIRMAN: J.S. Schoenwald Rockwell International Science Center
10:30	FF1 **An Optimal SAW Filter Design Using FIR Design Technique** M. Morimoto, K. Kobayashi and M. Hibino Nippon Electric Co., Ltd. Kawasaki, Japan	GG1 **An Acoustic Imaging System for Medical Use** H.E. Karrer, F. Dias, J.D. Larson, R. Pering Hewlett-Packard Lab., Palo Alto, CA 94304 S. Maslak, Palo Alto, California 94304 D. A. Wilson, SRI International Menlo Park, California	HH1 **(INVITED)** **ZnO Processing for Bulk- and Surface-Wave Devices** Fred S. Hickernell Motorola Inc., Government Electronics Division Scottsdale, Arizona 85252
10:45	FF2 **SAW Bandpass Filters with Withdrawal Weighted Transducers** E. Kogan and P. Romik Tadiran, Israel Electronics Industries Ltd. Tel Aviv, 6100 Israel	GG2 **An Image Display Algorithm for Use in Real-Time Sector Scanners with Digital Scan Converters** H.G. Larsen and S.C. Leavitt Hewlett-Packard Corp., Andover, MA 01810	
11:00	FF3 **Phase Weighting for Low Loss SAW Filters** M. Hikita, Y. Kinoshita, H. Kojima and T. Tabuchi Central Research Lab. Hitachi, Ltd. Kokubunji, Tokyo, 185 Japan	GG3 **A Fast Electronically Scanned Two Dimansional Array for Acoustic Imaging** F. Gelly, C. Maerfeld – Thomson-CSF DASM – BP 53 – 06802 Cagnes/Mer – France	HH2 **Sputter Deposition of ZnO Thin Films Using Glow Discharge Mass Spectroscopy** C. R. Aita Gould Laboratories, Rolling Meadows, Illinois 60008
11:15	FF4 **Acoustic Surface Wave Filters Using New Distance Weighting Techniques** K. Yamanouchi, T. Meguro and K. Shibayama Research Inst. of Electrical Communication Tohoku University, Sendai, Japan	GG4 **Spectral Analysis of Doppler Flowmeter Signals in Atherosclerotic Disease** P.J. Bendick, J.L. Glover and R.S. Dilley Indiana Univ. School of Medicine and Regenstrief Inst. Indianapolis, Indiana 46202	HH3 **Reactive Magnetron Sputtering of ZnO** B.T. Khuri-Yakub and J. Smits E.L. Ginzton Laboratory, Stanford University Stanford, California 94305
11:30	FF5 **Charge-Superposition Analysis of Multiphase SAW Transducers** D.P. Morgan, B. Lewis and R.G. Arnold Plessey Research (Caswell) Ltd. Caswell, Towcester, Northants. NN12 8EQ, U.K.	GG5 **A Linear Stepped Doppler Ultrasound Array for Real-Time Two-Dimensional Blood Flow Imaging** J.W. Arenson, R.S.C. Cobbold and K. W. Johnston Inst. of Biomedical Eng., Univ. of Toronto Toronto, Ontario, Canada, M5S 1A4	HH4 **ZnO Transducers for Microwave Bulk-Wave Devices** E.K. Kirchner and D.K. Gill Teledyne MEC, Palo Alto, California 94304 B.T. Khuri-Yakub, Stanford University Stanford, California 94305
11:45	FF6 **A SAW Step-Type Delay Line for Efficient High Order Harmonic Mode Excitation** P. Naraine, C.K. Campbell, Y. Ye Communications Research Lab., McMaster University Hamilton, Ontario, L8S 4L7, Canada	GG6 **Directional CW Doppler Ultrasound Using a Double-Heterodyne Demodulator** M.S. Kassam, C.W. Lau, R.S.C. Cobbold and K.W. Johnston Inst. of Biomedical Eng., Univ. of Toronto Toronto, Ontario, Canada, M5S 1A4	HH5 **ZnO Film Analysis** B.R. McAvoy, Westinghouse R&D Center Pittsburgh, Pennsylvania 15235
12:00			HH6 **UHF Composite Bulk Wave Resonators** K.M. Lakin and J.S. Wang, Univ. of Southern California Los Angeles, California 90007
12:15	LUNCH		

	SESSION II — GEORGIAN ROOM **SAW FILTERS** CHAIRMAN: R.S. Kagiwada TRW Defense and Space Systems	SESSION JJ — PARLOR A **NDE-MEASUREMENTS, SYSTEMS AND TECHNIQUES IV** CHAIRMAN: H.M. Frost The Pennsylvania State University	SESSION KK — PARLOR B **BIOPHYSICS I** CHAIRMAN: J.G. Miller Washington University
1:30	II1 **$LiNbO_3$-Surface-Acoustic-Wave-Edge-Bonded Transducers On ST Quartz and <001> -Cut GaAs** D.E. Oates and R.A. Becker Lincoln Laboratory – M.I.T. Lexington, Massachusetts 02173	JJ1 **Improved Correction for Continuous Wave Ultrasonic Phase Velocity Measurements in Solids Using Two Bonded Transducers** E.J. Chern, J.H. Cantrell, Jr., J.S. Heyman and W.P. Winfree NASA Langley Research Center Hampton, Virginia 23665	KK1 **(INVITED)** **Non-Linear Acoustic Phenomena at Biomedical Frequencies and Intensities** Edwin L. Carstensen Department of Electrical Engineering Univ. of Rochester, Rochester, NY 14627
1:45	II2 **Low Loss 0.9-1.9 GHz SAW Filters with Submicron Finger Period Electrodes** K. Asakawa, M. Itoh, H. Gokan, S. Esho, K. Nishikawa and T. Nishihara, Nippon Electric Co., Ltd. Kawasaki, 213 Japan S. Urabe, Yokosuka E.C.L., N.T.T. Yokosuka, 238-03 Japan	JJ2 **Radiation Damage to Conventional Transducers and the Consideration of Using Non-Conventional Transducers for a High Radiation Environment Application** James N.C. Chen, Ontario Hydro Research Laboratory Toronto, Ontario, M8Z 5S4, Canada	
2:00	II3 **SAW Comb Filter for TV Frequency Synthesizing Tuning System** K. Kishimoto, M. Ishigaki, K. Hazama and S. Matsuura Consumer Products Research Center, Hitachi, Ltd. Yokohama, Japan 244	JJ3 **Multiparameter Characterization of Fatigue Damage in Graphite/Epoxy Composites from Ultrasonic Transmission Power Spectra** J.H. Cantrell, Jr., W.P. Winfree, J.S. Heyman and J.D. Whitcomb NASA Langley Research Ctr., Hampton, Virginia 23665	KK2 **A Computer Analysis System for Ultrasonic Backscatter from Liver and Kidney** F.L. Lizzi, E. Feleppa, N. Jaremko Riverside Research Institute, New York, NY 10023 D.L. King, P. Wei Columbia Univ., New York, NY 10032

2:15	II4 **Highly Reliable ZnO Thin Film SAW Nyquist Filters for TV** O. Yamazaki, K. Wasa and S. Hayakawa Materials Research Lab., Matsushita Elec. Industrial Co., Ltd. Moriguchi, Osaka, 570, Japan	JJ4 **Ultrasonic Velocity Characterization of Fatigue and Impact Damage in Graphite/Epoxy Composites** H.I. Ringermacher NASA Langley Research Ctr., Hampton, Virginia 23665	KK3 **Hyperthermia Induction and Its Measurement *Using Ultrasound*** M. Fabri, O. Prakash, J.M. Escanye, M. Drocourd, M.L. Gaulard and J. Robert – Div. de Technologie Medicale-Service de Medecine Nucleaire-18, rue Lionnois 54000-Nancy, France
2:30	II5 **Octave Bandwidth High Performance SAW Delay Lines** H.R. Stocker, W.E. Bulst, G. Eberharter and R. Veith Siemens AG, Forschungslaboratorien, Munchen, W-Germany	JJ5 **(INVITED)** ***Recent Material Property Measurements by Acoustic Techniques*** J.R. Quinn, Electric Power Research Institute Palo Alto, California 94303 *P.B. Hildebrand, Spectron Development Laboratory* Costa Mesa, California 92626	KK4 **Is Bone a Cosserat Solid?** Hyo Sub Yoon and J. Lawrence Katz Rensselaer Polytechnic Institute, Troy, NY 12181
2:45	II6 **Compensation of Diffraction Effects on Group Delay Time and Stop-Band Rejection** *W. Mader, Institut fur Physikalische Elektronik, TU Wien* A-1040 Vienna, Austria H. Stocker and R. Veith, Siemens AG, Research Lab., FL FES 11 D-8000 Munich, West Germany		KK5 **Clinical Application of Acoustic Emission Techniques To Bone Abnormalities** *H.S. Yoon, B. Caraco, H. Kaur and J.L. Katz* Rensselaer Polytechnic Inst., Troy, NY 12181
3:00	**COFFEE BREAK**		**CORRIDOR**

	SESSION LL — GEORGIAN ROOM **TEMPERATURE COMPENSATED MATERIALS** CHAIRMAN: P.H. Carr RADC-Electromagnetic Sciences Division	SESSION MM — PARLOR A **NDE-MEASUREMENTS, SYSTEMS AND TECHNIQUES V** CHAIRMAN: L.W. Kessler SONOSCAN	SESSION NN — PARLOR B **BIOPHYSICS II** CHAIRMAN: W.D. O'Brien, Jr. University of Illinois
3:30	LL1 **(INVITED)** **New Piezoelectric Ceramics with Zero Temperature Coefficients for Acoustic Wave Applications** H. Takeuchi, Y. Ito, S. Jyomura, K. Nagatuma and S. Ashida, Central Research Laboratory Hitachi Ltd., Tokyo, Japan	MM1 **Signal Processing Methods for Transmission Ultrasonic Computerized Tomography** *J.F. Greenleaf and R.C. Bahn, Mayo Foundation* Rochester, Minnesota 55901	NN1 **(INVITED)** **Acoustic Medical Imaging Through Aberrating Media** J.W. Hunt, F.S. Foster and M. Arditi The Ontario Cancer Inst. and Department of Medical Biophysics University of Toronto, Toronto, Ontario, M4X 1K9, Canada
3:45		MM2 **Spatial Moments of the Ultrasonic Intensity Distribution for the Purpose of Quantitative Imaging in Inhomogeneous Media** T.A. Shoup, G.H. Brandenburger and J.G. Miller Washington Univ., St. Louis, Missouri 63130	
4:00	LL2 **Crystal Chemistry for Ferroelectric Materials for Surface Acoustic Wave Devices** R.R. Neugaonkar, T.C. Lim, and E.J. Staples Rockwell International, Thousand Oaks, CA 91360 E.L. Cross, Materials Research Laboratory Pennsylvania State Univ., University Park, PA 16802	MM3 **A New Approach to Transmission and Emission CT** A.J. Devaney *Schlumberger-Doll Research* Ridgefield, Connecticut 06877	NN2 **Degradation of Acoustic Images in Mammalian Tissue** K.N. Bates *Hewlett-Packard Laboratories* Palo Alto, California 94304
4:15	LL3 **A Phenomenological Theory for Predicting the Temperature Dependence of Elastic Dielectric and Piezoelectric Properties in Simple Proper Ferroelectric Crystals** T.R. Shrout, L.E. Cross, P. Moses, H.A. McKinstry The Pennsylvania State Univ., University Park, PA 16802 R.R. Neurgaonkar, Electronics Research Center Rockwell International, Thousand Oaks, California 91360	MM4 **The Design of Broadband and Efficient Bulk Wave Transducers** C.H. Chou, J.E. Bowers, A.R. Selfridge, B.T. Khuri-Yakub G.S. Kino, E.L. Ginzton Lab., Stanford University Stanford, California 94305	NN3 **Parallel-Focusing and Speckle Reduction in Medical Ultrasonic Imaging** H.E. Melton, Jr., Dept. of Pathology Medical College of Wisconsin, Milwaukee, Wisconsin 53226
4:30	LL4 **SAW Propagation Characteristics of Complete Cut of Quartz and New Cuts with Zero Temperature Coefficient of Delay** Y. Shimizu and Y. Yamamoto Tokyo Inst. of Technology, Tokyo, 152 Japan	MM5 **Multimodal Excitation for Improved Angular Response in Photolithographed Ultrasonic Arrays** M.D. Fox, University of Connecticut Storrs, Connecticut 06268	NN4 **The Speed of Sound as a Function of Temperature in Mammalian Tissue** R.L. Nasoni, T. Bowen, M. Dewhirst, H. Roth, and R. Premovich Div. of Radiation Oncology, Univ. of Arizona Health Sciences Center Tuscon, Arizona 85724
4:45	LL5 **High Temperature Stable Overlay Configuration on 46° X-Rotated Quartz** R. Lec, J.F. Vetelino, F. Josse, D.S. Bailey and M. Ehsasi Univ. of Maine, Orono, Maine 04469 W. Soluch, Tele and Radio Research Institute Ratuzowa 11 03-450 Warsaw, Poland	MM6 **Fundamental Concepts in Acoustic Transducer Array Design** A.R. Selfridge, G.S. Kino and B.T. Khuri-Yakub E.L. Ginzton Lab., Stanford University Stanford, California 94305	NN5 **Echo Enhancement Techniques Similar to Optical Staining** J. Abramson, A. Dybbs, I. Greber and C. Hazony Case Institute of Technology (CWRU) Cleveland, Ohio 44106
5:00	LL6 **Temperature Stable SAW Devices Using Doubly Rotated Cut of Quartz** D.F. Williams and F.Y. Cho Motorola Government Electronics Division Scottsdale, Arizona 85252	MM7 **Basic Pitfalls in Numerical Reconstruction of Flaws with *Acoustic Holography*** D. Brock and K.J. Langenberg, Fachrichtung 12.2 Theoretische Elektrotechnik, Universitat des Saarlandes D-6600 Saarbrucken, FRG	NN6 **Differentiation of Abdominal Organs and Pathologies by the *Analysis of A-Mode Ultrasound Waveforms*** J.P. Jones, V. Gonzalez and R. Kovack, Dept. of Radiological Sciences Univ. of California Irvine, Irvine, California 92717

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