

all or some of the formatter functions could be put on the satellite. By using TDRSS, it would be possible to cover oceanic or meteorological events selectively over more than 95% of the earth's surface. (The exact amount of coverage would depend on the satellite's altitude.)

For the present, the high-speed tape recorder, the formatter, and portions of the simulator have found a potential application in medical electronics. Some ultrasonic equipment used in ophthalmology has a bandwidth and a pulse repetition rate very similar to those of the SEASAT SAR. One set of ground equipment that was returned from a tracking station after the satellite stopped working has been used to convert the analog data from ultrasonic ophthalmic equipment into digital form for

recording so that the data can be played back into a computer in order to develop sophisticated, digital data-processing techniques for the field of ophthalmology.

Acknowledgments

The support of C. G. Dudley, C. A. Schroeder, T. C. Underwood, and P. E. Wren at NASA/GSFC, the sponsoring agency, is acknowledged. APL staff members who made technical inputs to the article are E. A. Beck, J. D. Colson, B. M. Elder, G. P. Gafke, P. J. Grunberger, C. T. Pardo, V. I. Seneca, and G. G. Whitworth. Specific written contributions by D. E. Buchholz, S. C. Jones, and S. F. Oden are gratefully acknowledged.

PUBLICATIONS

Principal books and technical articles published by APL staff members
January–August 1979

- F. J. Adrian and A. N. Jette, "Valence Bond Study of Hyperfine Interactions and Structure of Kr_2F ," *Chem. Phys. Lett.* **64**, No. 3, pp. 555–559.
- R. H. Bauer, "A Wind-Effects Model and Ocean Current Determination for a Satellite Updated Dead Reckoning System," *Proc. Annual Meeting, Institute of Navigation*.
- R. C. Benson and R. A. Meyer (APL) and M. E. Zaruba and G. M. McKhann (JHMI), "Cellular Auto-fluorescence—Is it Due to Flavins?" *J. Histochem. Cytochem.* **27**, No. 1, pp. 44–48.
- F. S. Billig, L. J. Crawford, and C. J. Gundersdorf, "Advanced Oceanographic Instrumentation Systems and Measurements at St. Croix, U.S.V.I.," *J. Hydronaut.* **13**, No. 3, pp. 77–84.
- J. F. Bird, "Hydromagnetic Perturbations Due to Localized Flows: An Eddy Theorem," *Phys. Fluids* **22**, No. 3, pp. 585–586.
- P. R. Briggs and T. P. Armstrong (Univ. Kansas) and S. M. Krimigis (APL), "Hydrogen over Helium Enhancement in Successive Solar Flare Particle Events from the Same Active Region," *Astrophys. J.* **228**, pp. L83–L87.
- F. R. Castella, "Heading and Speed Errors for x,y Tracking Filters," *IEEE Trans. Aerosp. Electron. Syst.* **AES-15**, No. 2, pp. 284–287.
- H. Y. Chiu, R. M. Somers, and R. C. Benson, "Decomposition of Solid NaN_3 by CO_2 Laser Radiation," *Chem. Phys. Lett.* **61**, No. 1, pp. 203–208.
- L. L. Cronvich, "Aerodynamic Development of Fleet Guided Missiles in Navy's Bumblebee Program," *Proc. AIAA Aerospace Sciences Meeting*, January.
- A. J. Dessler (APL) and V. M. Vasyliunas (Max-Planck Inst. für Aeronomie), "The Magnetic Anomaly Model of the Jovian Magnetosphere: Predictions for Voyager," *Geophys. Res. Lett.* **6**, No. 1, pp. 37–40.
- L. W. Ehrlich, "A Marching Technique for Nonseparable Equations," *Math. Computation* **33**, No. 147, pp. 881–890.
- A. R. Elcrat (Wichita State Univ.) and V. G. Sigillito (APL), "A Spatial Decay Estimate for the Navier-Stokes Equations," *ZAMP* **30**, pp. 449–455.
- R. A. Farrell and S. Favin (APL) and J. T. Sullivan, S. Vimolvanich, and P. H. E. Meijer (The Catholic Univ. America), "Coexistence Curves for Fourth-Neighbor Ising Models on the Face-Centered-Cubic Lattice," *Phys. Rev. B* **19**, No. 9, pp. 4703–4710.
- R. M. Fristrom (APL) and P. Van Tiggelen (Univ. Louvain, France), "An Interpretation of the Inhibition of C—H—O Flames by C—H—X Compounds," *Proc. 17th Combustion Inst. Symp.*
- J. Goldhirsh, "Predictive Methods for Rain Attenuation Using Radar and In-Situ Measurements Tested Against the 28-GHz Comstar Beacon Signal," *IEEE Trans. Antennas Propag.* **AP-27**, No. 3, pp. 398–406.
- J. Goldhirsh and I. Katz, "Useful Experimental Results for Earth-Satellite Rain Attenuation Modeling," *IEEE Trans. Antennas Propag.* **AP-27**, No. 3, pp. 413–415.
- L. W. Hunter, "Models of Horizontal Electric Cables and Cable Trays Exposed to a Fire Plume," *Combust. Flame* **35**, pp. 311–329.
- L. W. Hunter and C. Grunfelder, "Heat-Transfer Measurements in the Moving-Wire Technique for Studying Polymer Flammability," *Combust. Flame* **34**, pp. 265–274.

PUBLICATIONS *(continued)*

- L. W. Hunter, C. Grunfelder, C. H. Hoshall, and R. M. Fristrom, "Combustion of Polyvinyl Chloride Studied by a Low-Pressure Moving-Wire Technique," *Combust. Flame* **35**, pp. 169-177.
- R. E. Jenkins (APL) and C. F. Leroy (Defense Mapping Agency), "'Broadcast' versus 'Precise' Ephemeris—Apples and Oranges," *Proc. International Geodetic Symp. on Satellite Doppler Positioning*, January.
- S. Koslov, "Radio-Frequency Radiation: The Buildup of Knowledge against the Background of Concern," *Proc. IEEE International Conf. on Communications*, June, pp. 31.2.1-31.2.8.
- S. M. Krimigis (APL), T. P. Armstrong (Univ. Kansas), W. I. Axford (Max-Planck Inst. für Aeronomie), C. O. Bostrom (APL), C. Y. Fan (Univ. Arizona), G. Gloeckler (Univ. Maryland), L. J. Lanzerotti (Bell Labs.), E. P. Keath, R. D. Zwickl, and J. F. Carbary (APL), and D. C. Hamilton (Univ. Maryland), "Low-Energy Charged Particle Environment at Jupiter: A First Look," *Science* **204**, pp. 998-1003.
- J. R. Kuttler, "Dirichlet Eigenvalues," *SIAM J. Numer. Anal.* **16**, No. 2, pp. 332-338.
- M. S. Levine and E. P. Radford, "Fire Victims: Medical Outcomes and Demographic Characteristics," *Am. J. Public Health* **67**, 1977, pp. 1077-1080.
- R. A. Meyer, "Light Scattering from Biological Cells: Dependence of Backscatter Radiation on Membrane Thickness and Refractive Index," *Appl. Opt.* **18**, No. 5, pp. 585-588.
- G. E. Mitzel (APL) and S. J. Clancy and W. J. Rugh (The Johns Hopkins Univ.), "On Transfer Function Representations for Homogeneous Nonlinear Systems," *IEEE Trans. Autom. Control* **AC-24**, No. 2, pp. 242-249.
- L. Monchick, "Differential scattering of polarized molecules: Computations for He + CO," *J. Chem. Phys.* **71**, No. 2, pp. 578-581.
- L. Monchick, "On the Theory of Chemically Induced Electron Polarization (CIDEP). II. Potential Forced Diffusion," *J. Chem. Phys.* **70**, No. 11, pp. 4887-4892.
- J. R. Morton, K. F. Preston, and S. J. Strach (National Research Council of Canada) and F. J. Adrian and A. N. Jette (APL), "Anisotropic Hyperfine Interactions of Rare-Gas Nuclei near Trapped Hydrogen Atoms," *J. Chem. Phys.* **70**, No. 6, pp. 2889-2893.
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- V. L. Pisacane, "Filtering of Satellite-to-Satellite Observations," *Acta Astronaut.* **6**, pp. 685-696.
- R. S. Potember and T. O. Poehler (APL) and D. O. Cowan (The Johns Hopkins Univ.), "Electrical Switching and Memory Phenomena in Cu-TCNQ Thin Films," *Appl. Phys. Lett.* **34**, No. 6, pp. 405-407.
- A. J. Pue, "Implementation Trade-Offs for a Short-Headway Vehicle-Follower Automated Transit System," *IEEE Trans. Veh. Technol.* **VT28**, No. 1, pp. 46-54.
- J. P. Reilly, "Short-Term Effects on People," Chapter 4, *The Electrostatic and Electromagnetic Effects of AC Transmission Lines*, IEEE Course Text No. 79, EHO145-3-PWR.
- N. Rubinstein and W. C. Caywood, "Flight Vibration Environments Defined from Mk 12 Booster Static Tests," *J. Spacecr. Rockets* **16**, No. 4, pp. 214-217.
- N. A. Saffekos and T. A. Potemra (APL), P. M. Kintner, Jr. (Cornell Univ.), and J. L. Green (Univ. Iowa), "Field-Aligned Currents, Convection Electric Fields and ULF-ELF Waves in the Cusp," *J. Geophys. Res.* **84**, No. A4, pp. 1391-1401.
- J. A. Schetz and S. Favin, "Numerical Solution of a Body-Propeller Combination Flow Including Swirl and Comparisons with Data," *J. Hydronaut.* **13**, No. 2, pp. 46-51.
- D. M. Silver (APL), S. Wilson (Science Research Council), and C. F. Bunge (Univ. Nacional Autónoma México), "Comparison within the Algebraic Approximation of Configuration Interaction and Many-Body Perturbation Theory for the Be Ground State," *Phys. Rev. A.* **19**, No. 4, pp. 1375-1382.
- W. D. Stanbro and W. D. Smith, "Kinetics and Mechanism of the Decomposition of N-Chloroalanine in Aqueous Solution," *Environ. Sci. Tech.* **13**, pp. 446-451.
- B. E. Tossman, D. L. Thayer, and W. A. Swartz, "An Underwater Towed Electromagnetic Source for Geophysical Exploration," *IEEE J. Oceanic Eng.* **OE-4**, No. 3, pp. 84-89.
- W. J. Toth, "Overview of Geothermal Energy Markets in the East," *Proc. Geothermal Resources Council Symp. on Geothermal Energy and Its Direct Uses in the Eastern United States*, April.
- W. J. Toth and F. C. Paddison, "Geothermal Energy Markets on the Atlantic Coastal Plain," *Proc. Sixth Energy Technology Conf.*, February. Also, *Proc. Geothermal Resources Council Symp. on Geothermal Energy and Its Direct Uses in the Eastern United States*, April.
- P. J. Waltrup, F. S. Billig, and R. D. Stockbridge, "Procedure for Optimizing the Design of Scramjet Engines," *J. Spacecr. Rockets* **16**, No. 3, pp. 163-171.
- D. C. Wenstrand, "Measurements of Vertical Profiles of Oceanic Current and Richardson Number near St. Croix, U.S.V.I.," *J. Hydronaut.* **13**, No. 3, pp. 69-76.
- S. Wilson (Science Research Council) and D. M. Silver (APL), "Universal Basis Sets in Molecular Calculations," *Chem. Phys. Lett.* **63**, No. 2, pp. 367-369.

ADDRESSES

Principal recent addresses made by APL staff members to groups and organizations outside the Laboratory
January–August 1979

- R. Bauer, "Improved Dead Reckoning Considering Wind and Current," Inst. of Navigation Meeting, Springfield, Va., 6–8 March.
- W. Ebert and M. Feen, "Ionosphere Refraction Correction," Inst. of Navigation Meeting, Springfield, Va., 6–8 March.
- G. Gücer (JHMI) and L. J. Viernstein (APL), "Continuous Recording of ICP in the Normal Monkey," American Association of Neurological Surgeons Conf., Los Angeles, April. Also presented at International Symp. on Intracranial Pressure, Williamsburg, Va., June.
- G. Gücer (JHMI) and L. J. Viernstein (APL), "New Developments in Continuous ICP Measurements," JHH Medical and Chirurgical Society Meeting, Baltimore, February.
- G. E. Mitzel (APL) and S. J. Clancy and W. J. Rugh (The Johns Hopkins Univ.), "On Transfer Function Representations for Homogeneous Nonlinear Systems," IEEE Conf. on Decision and Control, San Diego, 10–12 January.
- E. Prozeller, "Spread-Spectrum from NOVA Satellites," Inst. of Navigation Meeting, Springfield, Va., 6–8 March.
- J. P. Reilly, "An Approach to the Realistic-Case Analysis of Electric Field Induction from AC Transmission Lines," Third International Symp. on High Voltage Engineering, Milan, August.
- J. P. Reilly, "Electric Field Induction on Long Objects—A Methodology for Transmission Line Impact Studies," IEEE Winter Power Engineering Society Meeting, New York, February.
- L. J. Rueger, "Navy Navigation Satellite System (NAVSAT)," Baltimore Section, IEEE Aerospace and Electronics Systems Group, Baltimore, 27 March.
- The following papers were presented at the Spring Meeting of the American Geophysical Union, Washington, D.C., 28 May–1 June:
- W. Baumjohann and H. Sulzbacher (Univ. Münster) and T. A. Potemra (APL), "Simultaneous Observations of a Westward Electrojet with Triad and the Scandinavian Magnetometer Array;"
- J. F. Carbarry, "Periodicities in the Jovian Magnetosphere as Seen by the Voyager-1 Spacecraft;"
- R. E. Gold and E. C. Roelof, "Energetic Particle Recurrence and Escape During Solar Cycle 20;"
- R. A. Greenwald (Max-Planck Inst. für Aeronomie) and T. A. Potemra and N. A. Saflekos (APL), "Comparison of Ionospheric Electric Fields and Field-Aligned Currents Near the Harang Discontinuity;"
- G. Gustafsson, T. A. Potemra, and N. A. Saflekos, "Correction of Variations in the Triad Magnetic Field Data Due to Attitude Uncertainties;"
- E. Kirsch (Max-Planck Inst. für Aeronomie), and S. M. Krimigis, J. W. Kohl, and E. P. Keath (APL), "Search for Jupiter X Rays;"
- A. T. Y. Lui and C.-I. Meng, "Relevance of Southward Magnetic Fields in the Neutral Sheet to Anisotropic Distribution of Energetic Electrons and Substorm Activity;"
- C.-I. Meng, "Simultaneous Auroral and Electron Precipitation Observations Over the Dayside Oval;"
- D. G. Mitchell and E. C. Roelof, "Latitude Dependence of ~1 MeV Proton Flux Measured 1-5 AU;"
- T. A. Potemra, N. A. Saflekos, and G. Gustafsson, "Evaluation of Distant Magnetic Field Effects Associated with Field-Aligned Currents;"
- E. C. Roelof, "Interpretation of Energetic Particle Flux Anisotropies;"
- E. C. Roelof, "Superthermal Ions Near the Earth;"
- E. C. Roelof and R. E. Gold, "Enhancement of the Diffusive Walled Cavity Model for Interplanetary Propagation of Jovian Electrons;"
- N. A. Saflekos, T. A. Potemra, G. Gustafsson, and C.-I. Meng, "Simultaneous High- and Low-Altitude Cusp Boundary Observations;"
- L. J. Zanetti and T. A. Potemra (APL), J. P. Doering (The Johns Hopkins Univ.), R. L. Arnoldy (Univ. New Hampshire), and R. A. Hoffman (NASA/Goddard Space Flight Center), "Coincident Particle Observations from AE-C and ATS-6 During the Oct. 28, 1977 Geomagnetic Storm;"
- R. D. Zwickl, "Anisotropic Transport Properties of Low Energy Particles Observed During Energetic Particle Events;" and
- R. D. Zwickl and S. M. Krimigis (APL), L. J. Lanzerotti (Bell Telephone Labs.), and G. Gloeckler (Univ. Maryland), "Jovian (?) Proton and Electron Bursts Observed by Voyager 1."

APL COLLOQUIA

- Jan. 5—"Update on Metro—The Public Transportation Revolution," by C. Pfanstiehl, JHU Metro Center.
- Jan. 12—"Decision Aids for Command and Control," by M. A. Tolcott, Office of Naval Research.
- Jan. 19—"Neutron Stars, Black Holes, and the Shape of the Universe," by H. Friedman, Naval Research Lab.
- Jan. 26—"The Carbon Dioxide Problem," by L. Machta, NOAA Air Resources Lab.
- Feb. 2—"Photovoltaic Electricity from Concentrated Sunlight," by R. S. Alben, General Electric Research Lab.
- Feb. 9—"Man-Powered Flight: The Gossamer Condor," by P. B. MacCready, Aerovironment, Inc.
- Feb. 16—"Some Aspects of the Wind Wave Spectrum," by S. Kitaigorodorskii, The Johns Hopkins Univ.

APL COLLOQUIA (continued)

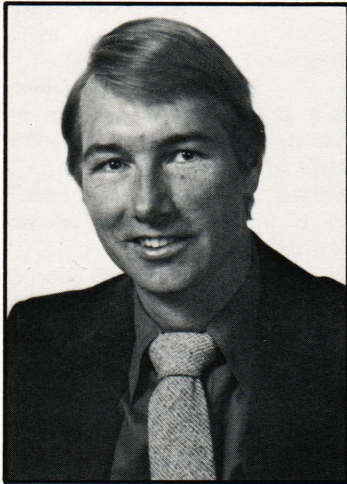
- Feb. 23*—"Human Response to Inertial Forces," by C. L. Ewing, Naval Aerospace Medical Research Lab.
- Mar. 2*—"Interactive Communication—Some Findings from Laboratory Studies," by A. Chapanis, The Johns Hopkins Univ.
- Mar. 9*—"Some Recent Advances in Computer Algorithms," by H. T. Kung, Carnegie-Mellon Univ.
- Mar. 16*—"From Determinism to Probability," by I. Prigogine, Univ. Libre de Bruxelles and Univ. of Texas.
- Mar. 23*—"Evidence for the Earliest Man in North America," by D. J. Stanford, Smithsonian Inst.
- Mar. 30*—"Science and Technology in Environmental Medicine," by G. M. Green, The Johns Hopkins Univ.
- Apr. 6*—"Scientific Results from SEASAT," by J. R. Apel, NOAA Pacific Marine Environmental Lab.
- Apr. 13*—"Albert Einstein—The Scientist and the Man," by B. Hoffmann, Queens College, City Univ. of New York.
- Apr. 20*—"Thermodynamics of Black Holes," by M. Dresden, State Univ. of New York (Stony Brook).
- Apr. 27*—"Alternative Fuels for Transportation—Economic and Technical Factors," by J. R. Maroni, Ford Motor Co.
- May 4*—"Reflections on the Energy Wars," by A. M. Weinberg, Inst. for Energy Analysis.
- May 11*—"Problems of Immunization in the Developing World," by D. A. Henderson, The Johns Hopkins Univ.
- May 18*—"The Magnetosphere of Jupiter—A View from Voyager I," by S. M. Krimigis, APL.
- May 25*—"No Risk Is the Highest Risk of All," by A. Wildavsky, Inst. for Policy and Management Research.
- Jun. 1*—"Future Technology Alternatives in Warship Design," by R. Leopold, Pratt & Whitney Co.
- Jun. 15*—"Rendezvous with a Giant: The Jupiter System as Seen by Voyager Cameras," by B. A. Smith, Univ. of Arizona.
- Sep. 12*—"A Vision of Information," by E. Skellings, Florida International Univ.
- Oct. 5*—"Ocean Thermal Energy Conversion," by G. L. Dugger, APL.
- Oct. 12*—"An Overview of System Dynamics and Some Applications," by R. C. Shreckengost, Central Intelligence Agency.
- Oct. 19*—"What Does the 1975 Reactor Safety Study Predict Concerning the Accident at Three Mile Island?" by N. C. Rasmussen, Massachusetts Inst. of Technology.
- Oct. 26*—"A Navigational Compass in Magnetic Bacteria," by R. B. Frankel, Francis Bitter National Magnet Lab.

PATENTS

July 1978–June 1979

- C. B. Barger, O. J. Deters—*Three Dimensional Laser Doppler Velocimeter*, No. 4,148,585.
- R. T. Cusick, W. J. Fleagle—*Pressure Responsive Switch*, No. 4,110,576.
- R. E. Fischell, W. R. Powell—*Epidural Lead Electrode and Insertion Needle*, No. 4,141,365.
- R. E. Fischell—*Human Tissue Stimulation Electrode Structure*, No. 4,125,116.
- M. L. Hill, T. R. Whyte—*Ionic Air Speed Indicator*, No. 4,131,013.
- R. P. Hockensmith, E. E. Skelton, D. L. Thomas—*Process for Making a Plastic Antenna Reflector*, No. 4,154,788.
- R. H. Lapp, J. D. Schneider—*Radar Sector Scan Reversal Apparatus*, No. 4,123,757.
- P. J. Luke, J. L. Machamer, W. A. Becraft—*Error Correction Encoder and Decoder*, No. 4,107,650.
- L. Schwerdtfeger, L. E. Stillman, W. E. Frain—*Deployable Ground Plane Antenna*, No. 4,115,784.
- W. Seamone—*Low Axial Force Servo Valve Spool*, No. 4,155,535.
- G. R. Seylar—*Monitoring Apparatus for Resonant Circuit Intracranial Pressure Implants*, No. 4,114,606.

WITH THE AUTHORS



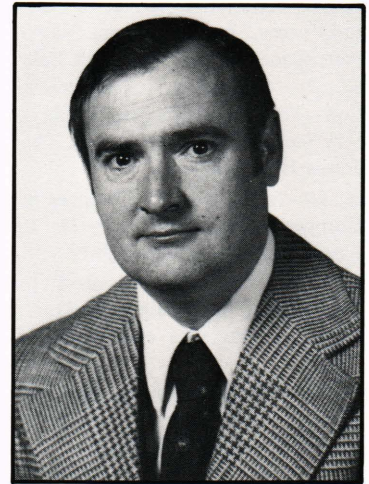
R. C. Beal was born in Boston. He received a B.S.E.E. from the Massachusetts Institute of Technology in 1961 and the M.S. in astronomy from the University of Maryland in 1968. Mr. Beal was employed by APL from 1961 through 1968, during which period he was involved with satellite applications of imaging systems. In 1968 he joined the Itek Corporation where he helped design the Mars Viking Lander Camera. After rejoining APL in 1973, he performed a systems analysis of the proposed SEASAT SAR. From 1976 to 1977, while on temporary assignment at the Jet Propulsion Laboratory, Mr. Beal led several systems analysis and applications studies of future SAR missions, including the Venus Orbiter Imaging Radar. He is currently a principal investigator on the SEASAT SAR, analyzing oceanographic imagery as a precursor for defining future radio oceanography satellites.

E. F. Prozeller, a native of Buffalo, received the B.E.E. degree from the University of Detroit in 1964 and the M.S.E.E. degree from the University of Illinois in 1965. Upon joining APL in 1965, he was assigned to the Space Department where he has worked primarily in the areas of radio navigation systems, analog and digital signal processing, and the design and analysis of communication systems. In 1971 he was appointed Project Scientist with responsibility for the



design, development, and evaluation of an experimental ranging system for the improved Transit (TIP) satellites. He was coauthor of an article on that subject in the April 1974 issue of the Digest (Vol. 13, No. 2). In 1975 he was made System Engineer, responsible for technical direction of the SEASAT SAR data-link design and development team. Mr. Prozeller is presently Supervisor of the Communications Systems Section in the Space Department and is engaged in developing a facility for tracking the Global Positioning System (GPS) satellites in support of the Navy's TRIDENT missile program. He has been awarded several patents and is a member of Tau Beta Pi, Eta Kappa Nu, and the Institute of Electrical and Electronics Engineers.

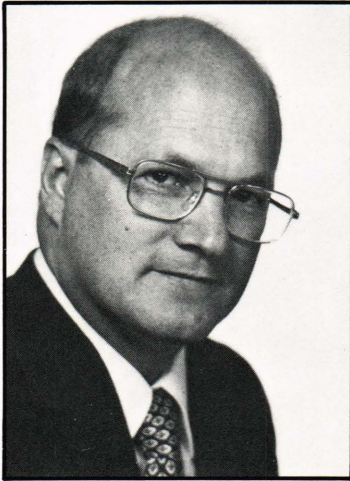
R. J. Heins was born in Syracuse and received the B.S. and M.S. degrees in electrical engineering from Syracuse University (1964) and the University of Maryland (1971), respectively. Since joining APL in 1964, he has been involved mainly in the design of electronic flight and ground equipment for space satellite systems. In his early days at the Laboratory, he was a power systems specialist who designed a number of power converter and power control equipments installed aboard the SAS, DODGE, Doppler Beacon, and TIP-I satellites. Mr. Heins later became in-



involved in adding PRN code ranging/time recovery capability to the Transit Improvement Program Satellite series. Specific accomplishments include the design of the PRN code generator placed aboard the TIP-II/III satellites and of the TIP SRN-9/PRN ground station (PRN tracking, precision time measurement, compact channel data recovery, data processing and recording equipment design). In the SEASAT program, his responsibilities included the design of those portions of the SAR data link that provided precision recovery of the clock signals used to record the video data output. At present, Mr. Heins is designing a minicomputer-based data display system for the Global Positioning System tracking facility.

W. C. Trimble was born in Kansas City, Missouri. He received the B.E.E. degree from Vanderbilt University (1961) and the Master of Electrophysics degree from the Polytechnic Institute of Brooklyn (1967). He joined APL in 1966 and has contributed circuit designs for hybrid microelectronic, analog, RF, and digital systems. His development of design and production techniques for the microelectronics facility resulted in the first successful hybrid microelectronics circuit built at the Laboratory. Mr. Trimble has made significant contributions in the design of components for navigation and tracking receiver systems and in devising

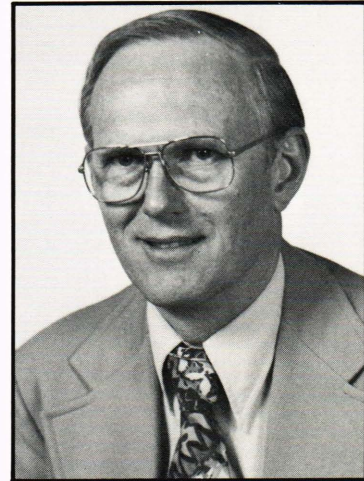
WITH THE AUTHORS *(continued)*



special testing techniques and instrumentation. He has also contributed to design studies for implementing the navigation and tracking receivers in Navy standard hardware and has performed analyses of pseudorandom-noise tracking systems. Mr.

Trimble is a member of Tau Beta Pi and the Institute of Electrical and Electronics Engineers.

Charles May was born in Wooster, Ohio. He received a B.S.E.E. degree from the University of Maryland in 1951 and M.E. and Doctor of Engineering degrees in electrical engineering from Yale University in 1953 and 1957, respectively. Employed by APL in 1957, he designed and developed electronic and electro-optical analog and digital computing systems used in tracking radar. Since 1965, Dr. May has been Supervisor of the Space Communications Group with responsibility for theoretical and experimental analysis of portions of the NASA Spaceflight Tracking and Data Network (STDN). He is also responsible for developing ground station equipment and for assessing radio frequency interference and system reliability for the STDN. Dr. May has taught evening courses at the New



Haven Junior College (1954) and the JHU Evening College at APL (1966–1973, 1978). He is a member of Phi Kappa Phi, Sigma Xi, Tau Beta Pi, Omicron Delta Kappa, and the Institute of Electrical and Electronics Engineers.

