

PUBLICATIONS

- B. I. Blum, "An Approach to Computer Maintained Software Documentation," *Proc. NBS/FIPS Software Documentation Workshop*, (3 Mar 1982).
- B. I. Blum, "A Methodology for Information System Production," *Proc. 26th Annual Meeting, Society for General Systems Research on Systems Methodology*, (5-9 Jan 1982).
- B. I. Blum, "Review of the Established Benefits of Automated Information Systems in Patient Care," in *Applications of Computers in Medicine*, IEEE TH 0095-0, pp. 1-7 (Mar 1982).
- B. I. Blum, "A Tool for Developing Information Systems," in *Automated Tools for Information System Design and Development*, H. H. Schneider and A. I. Wasserman, eds., North Holland Pub. Co. (1982).
- C. A. Boyles and G. W. Joice, "Comparison of Three Acoustic Transmission Loss Models with Experimental Data," *Johns Hopkins APL Tech. Dig. 3*, 67-76 (1982).
- A. Brandt and D. A. Hurdis, "Simulation of Oceanographic Processes in the Hydrodynamics Research Laboratory," *Johns Hopkins APL Tech. Dig. 3*, 43-48 (1982).
- P. F. Bythrow and T. A. Potemra (APL) and R. A. Hoffman (NASA/Goddard), "Observations of Field-Aligned Currents, Particles, and Plasma Drift in the Polar Cusps Near Solstice," *J. Geophys. Res.* **87**, 5131-5139 (1982).
- J. F. Carbary, P. F. Bythrow, and D. G. Mitchell, "The Spokes in Saturn's Rings: A New Approach," *Geophys. Res. Lett.* **9**, 420-422 (1982).
- L. J. Crawford, D. P. Vasholz, J. W. Giles, Jr., and C. J. Gundersdorf, "Evolution of a Vertically Distributed Passive Scalar in the Seasonal Thermocline," *Johns Hopkins APL Tech. Dig. 3*, 36-41 (1982).
- C. Feldman, F. G. Satkiewicz, and N. A. Blum, "Vacuum Deposited Polycrystalline Silicon Solar Cells on Foreign Substrates," *Thin Solid Films* **90**, 461-471 (1982).
- R. E. Fischell, W. E. Rádford, and J. R. Champion, "A Computerized Implantable Medication System," *Proc. 14th IEEE Southeastern Symp. on System Theory*, 15 Apr 1982, pp. 30-33 (1982).
- R. W. Flower (APL), A. E. Maumenee (JHMI), and E. A. Michelson (APL), "Long Term Continuous Monitoring of Intraocular Pressure in Conscious Primates," *Ophthalmic Res.* **14**, 98-106 (1982).
- R. F. Gasparovic, K. Peacock, and L. D. Tubbs, "Airborne Radiometric Measurements of Sea Surface Temperature," *Johns Hopkins APL Tech. Dig. 3*, 4-11 (1982).
- R. E. Gibson, "Richard Brandon Kershner," *Johns Hopkins APL Tech. Dig. 3*, 97-101 (1982).
- L. W. Hall, Jr. and D. T. Burton (APL) and L. H. Liden (JHU), "Power Plant Chlorination Effects on Estuarine and Marine Organisms," *CRC Crit. Rev. Toxicol.* **10**, 27-47 (1982).
- S. Hess (Univ. Erlangen-Nürnberg) and L. Monchick (APL), "Diffusion Controlled Reactions of Gases with Surfaces and State Dependent Reactivity," *J. Chem. Phys.* **77**, 307-313 (1982).
- M. L. Hill, "World Endurance Record for Radio-Controlled Aeromodels," *Johns Hopkins APL Tech. Dig. 3*, 81-89 (1982).
- L. W. Hunter, "Transient Thermal Expansion of Solids during Inert Heating, Phase Change, and Surface Gasification," *J. Heat Transfer* **103**, 601-602 (1982).
- T. Iijima (Univ. Tokyo) and T. A. Potemra (APL), "The Relationship between Interplanetary Quantities and Birkeland Current Densities," *Geophys. Res. Lett.* **9**, 442-445 (1982).
- G. B. Irani and B. L. Gotwols, "WAV-DYN: Measurements of the Independence of Ocean Wind Waves," *Johns Hopkins APL Tech. Dig. 3*, 49-58 (1982).
- S. Ismail and C.-I. Meng, "A Classification of Polar Cap Auroral Arcs," *Planet. Space Sci.* **30**, 319-330 (1982).
- A. N. Jette and F. J. Adrian (APL) and J. M. Spaeth (Univ.-GH-Paderborn), "Contributions of Hydrogen Zero-Point Vibration to Fluorine Transferred Hyperfine Constants Nearest Neighbour to the H⁰ Centre in CaF₃," *J. Geophys. C: Solid State Phys.* **30**, L345-L348 (1982).
- S. A. Kahn, S. G. Tolchin, R. L. Stewart, G. P. Gayle, and E. S. Bergan, "Design and Implementation of a Fiber Optic Contention Bus Network," *Proc. 15th Hawaii International Conf. on System Sciences*, pp. 430-434 (1982).
- S. M. Kane (JHU), W. F. Barron (Oak Ridge Nat. Lab.), F. C. Paddison (APL), and P. Kroll (JHU), "GRITS — A Computer Program for Economic Evaluation of Geothermal Energy," *ASHRAE Trans.* **88**, 1323-1336 (1982).
- H. W. Ko, J. A. Giannini, and P. A. Herchenroeder, "Oceanographic ELF Electromagnetic Investigations at APL," *Johns Hopkins APL Tech. Dig. 3*, 59-66 (1982).
- S. M. Krimigis, "Voyager Encounters with Jupiter's Magnetosphere: Results of the Low Energy Charged Particle (LECP) Experiment," in *Compendium in Astronomy*, E. G. Mariopolis *et al.*, eds, D. Reidel Pub. Co., New York, pp. 191-200 (1982).
- B. W. Kuvshinoff, "U.S. USSR Cooperative Agreement on Housing and Other Construction: Building Fire Safety," *Johns Hopkins APL Tech. Dig. 3*, 90-96 (1982).
- K. Lerstrup and D. Talham (JHU), A. N. Bloch (EXXON), T. O. Poehler (APL), and D. O. Cowan (JHU), "Dibenzotetra-tellurafulvalene (DBTTeF)," *J. Chem. Soc. Chem. Commun.*, pp. 336-337 (1982).
- A. T. Y. Lui, C.-I. Meng, and S. Ismail, "Large Amplitude Undulations on the Equatorward Boundary of the Diffuse Aurora," *J. Geophys. Res.* **87**, 2385-2400 (1982).
- S. A. Mack, D. C. Wenstrand, J. Calman, and R. C. Burkhardt, "Characteristics of Thermal Microstructure in the Ocean," *Johns Hopkins APL Tech. Dig. 3*, 28-35 (1982).
- R. R. Newton, "Astronomy, Astrology, Ptolemy, and Us," *Johns Hopkins APL Tech. Dig. 3*, 77-80 (1982).
- J. H. Nonnast and T. P. Armstrong (Univ. Kansas) and J. W. Kohl (APL), "A Study of Solar Flare Soft X Rays and Their Relation to Particle Events Observed with IMP 8," *J. Geophys. Res.* **87**, 4327-4337 (1982).
- H.-P. Pao, R. Y. Lai, and C. E. Schemm, "Vortex Trails in Stratified Fluids," *Johns Hopkins APL Tech. Dig. 3*, 12-18 (1982).
- J. G. Parker and W. D. Stanbro, "Optical Determination of the Collisional Lifetime of Singlet Molecular Oxygen [O₂(¹Δ_g)] in Acetone and Deuterated Acetone," *J. Am. Chem. Soc.* **104**, 2067-2069 (1982).
- K. Peacock, R. F. Gasparovic, and L. D. Tubbs, "High Precision Radiometric Temperature Measurements of the Ocean Surface," *Proc. 15th International Symp. on Remote Sensing of Environment*, pp. 793-802 (1981).
- T. E. Phillips, K. Moorjani, J. C. Murphy, and T. O. Poehler, "TiO-VO Alloys — Reduced Bandgap Effects in the Photoelectrolysis of Water," *J. Electrochem. Soc.* **129**, 1210-1215 (1982).
- E. M. Poulter and E. Nielsen (Max-Planck Inst. Aeronomie) and T. A. Potemra (APL), "Field-Aligned Currents Associated with Pc 5 Pulsations: STARE and TRIAD Observations," *J. Geophys. Res.* **87**, 2331-2336 (1982).
- W. R. Powell, "Alternate Expressions for the Average Output Power of a Wind Machine," *Solar Energy* **28**, 551-552 (1982).
- D. Richards and J. F. George (APL) and J. S. Seward (Seward Assoc.), "Design of 40-MW Grazing and Moored OTEC Pilot/Demonstration Plants," *J. Energy* **5**, pp. 224-230 (1982).
- M. W. Roth, "The Separation of Oceanic Temperature Finestructure and Internal

- Motion," *Johns Hopkins APL Tech. Dig.* **3**, 19-27 (1982).
- D. W. Simborg and Q. E. Whiting-O'Keefe (Univ. Calif./S.F.) and S. G. Tolchin (APL), "Early Experience with the First Use of a Local Area Communications Network Technology in a Hospital," *Proc. American Medical Informatics Assoc. Congress* (1982).
- G. L. Smith, "Guest Editor's Introduction," *Johns Hopkins APL Tech. Dig.* **3**, 2-3 (1982).
- D. L. Thayer, L. Scheer, and B. E. Tossman, "A Triaxial Coil Receiver System for the Study of Subsurface Electromagnetic Propagation," *IEEE J. Oceanic Eng.* **OE-7**, 75-82 (1982).
- M. E. Thomas (APL) and R. J. Nordstrom (Battelle), "The N₂-Broadened Water Vapor Absorption Line Shape and Infrared Continuum Absorption — II. Implementation of the Line Shape," *J. Quant. Spectrosc. Radiat. Transfer* **28**, 103-112 (1982).
- J. E. Tillman (APL), A. Poosti (Atomic Energy Organization, Iran), S. Rossello (Canastota), and A. Eckert (Dames & Moore), "Structural Evolution of Sanandaj-Sirjan Ranges near Esfahan, Iran," *Am. Assoc. Pet. Geol. Bull.* **65**, 674-687 (1981).
- S. G. Tolchin, R. L. Stewart, S. A. Kahn, G. P. Gafke, E. S. Bergan (APL) and D. W. Simborg, M. G. Chadwick, and Q. E. Whiting-O'Keefe (Univ. Calif./S.F.) "A Prototype Generalized Network Technology for Hospitals: Initial Implementation," *Proc. 15th Hawaii International Conf. on System Sciences*, pp. 591-600 (1982).
- L. J. Zanetti and T. A. Potemra, "Correlated Birkeland Current Signatures from the TRIAD and MAGSAT Magnetic Field Data," *Geophys. Res. Lett.* **9**, 349-352 (1982).
- L. J. Zanetti and T. A. Potemra (APL) and M. Sugiura (NASA/Goddard), "Evaluation of High Latitude Disturbances with MAGSAT (The Importance of the MAGSAT Geomagnetic Field Model)," *Geophys. Res. Lett.* **9**, 365-368 (1982).

PRESENTATIONS

- R. H. Andreo, "Discrete Methods and Schwinger Variational Principles for Random Scattering: The Coherent Field for Scattering," 1982 CSL Scientific Conf. on Obscuration and Aerosol Research, Aberdeen Proving Ground, Md. (26 Jun 1982).
- C. B. Barger, R. L. McCally, W. R. Green, and R. A. Farrell, "Stromal Damage from Corneal Exposure to Infrared Radiation," Spring Meeting, Association for Research in Vision and Ophthalmology, Sarasota (2-7 May 1982).
- R. A. Farrell, R. H. Andreo, and R. L. McCally, "Calculated Small Angle Light Scattering Patterns: Wavy Lamella Model," Army Research Office, Raleigh (9 Mar 1982) and American Physical Society, Dallas (11 Mar 1982).
- C. Feldman, "Antimony Doping in Vacuum Deposited Thin Film Silicon Photovoltaic Cells," 4th European Communities Photovoltaic Solar Energy Conf., Stresa, Italy (10-14 May 1982).
- M. H. Friedman, O. J. Deters, F. F. Mark, C. B. Barger, and G. M. Hutchins, "Geometric Effects on the Hemodynamic Environment of the Arterial Wall: A Basis for Geometric Risk Factors," Symp. on Fluid Dynamics as a Localizing Factor for Atherosclerosis, Heidelberg (19-20 Jun 1982).
- J. A. Krill, J. F. Bird, and R. A. Farrell, "Trial Functions for Variational Calculations," 1982 CSL Scientific Conf. on Obscuration and Aerosol Research, Aberdeen Proving Ground, Md. (26 Jun 1982).
- C. S. Leffel and C. A. Wingate, "Sterling Cycle Cryogenic Refrigerators for Satellite Gamma Ray Experiment," 8th DARPA Strategic Space Symp., Naval Postgraduate School, Monterey, (22-25 Jun 1982).
- R. L. McCally and R. A. Farrell, "Corneal Light Scattering Calculations Based on Electron Micrographs," Spring Meeting, Association for Research in Vision and Ophthalmology, Sarasota (2-7 May 1982).
- J. C. Murphy, "Photothermal Imaging Applied to Materials Characterization," Workshop on Nondestructive Microstructure Characterization, DARPA 1982 Materials Research Council Meeting, La Jolla, Calif. (6-7 Jul 1982).
- V. O'Brien, "Classifying 2-D Separation," 9th U.S. National Congress of Applied Mechanics, Cornell Univ. (23 Jun 1982).
- J. G. Parker, "Energy Transfer Processes Involving Hematoporphyrin in Various Solvents," ONR-Sponsored Conf. on Laser-Induced Processes in Biological Molecules, Stanford Univ. (6-9 Jul 1981).
- J. G. Parker, "Optical Monitoring of Energy Transfer Processes Accompanying Pulsed Laser Excitation of Hematoporphyrin in Solution," Gordon Research Conf. on Lasers in Medicine and Biology, Meriden, N.H. (29 Jun 1982).
- R. S. Potember, "Optical and Electrical Switching in Semiconductor Organic Thin Films," Colloq., Allied Chemical Co., Morristown, N.J. (12 May 1982).
- R. S. Potember and T. O. Poehler, "Electrical Switching and Memory Phenomena in Semiconducting Organic Thin Films," Colloq., Northwestern Univ. (17 Dec 1981).
- J. T. Stadter, "An Approximate Method for Predicting Rain Erosion of Slip-Cast Fused Silica Radomes," 16th Symp. on Electromagnetic Windows, Georgia Inst. of Tech. (11 Jun 1982).

THE AUTHORS

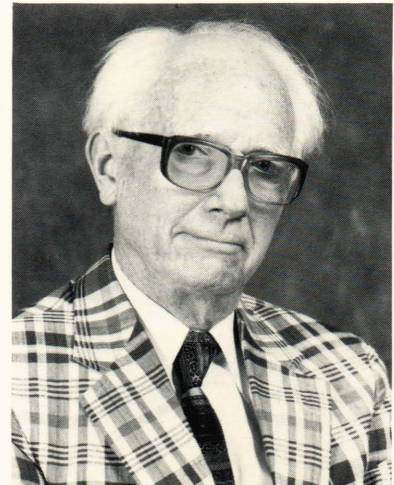


FRANK A. DEAN has an M.S. degree in electrical engineering from The Johns Hopkins University. He started his career at APL in 1946, working on problems associated with the development of ramjet propulsion such as test and evaluation of rocket blast, diffuser performance, and fuel metering. In 1955, he became assistant supervisor of a group that designed, fabricated, and flight-tested a series of developmental Terrier missiles. Later, the group built and flight-tested early versions of a semiactive homing system. In 1958, as group supervisor, he conducted weapon system tests and provided technical support for shipboard checkout of early tactical Terrier systems. Mr. Dean later supervised another group that flight-tested Talos and Typhon missiles. During the Vietnam conflict, he was involved in testing and evaluating electronic countermeasure techniques. He is now a member of the special assignments staff of the Fleet Systems Department.



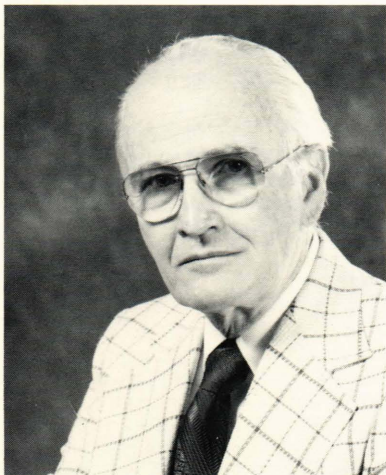
WILBUR H. GOSS received the Ph.D. degree in physics from the University of Washington in 1939. After teaching at the University of British Columbia and New Mexico State University, he joined APL in 1942. He remained with the Laboratory until his retirement in 1967 from his position as Assistant Director.

While at APL, Dr. Goss was active in the proximity fuze, torpedo exploder, and missile programs, most notably as head of the ramjet propulsion group and of the Talos program from their beginnings. He is the recipient of the Potts Medal of The Franklin Institute, the Distinguished Public Service Medal of the U.S. Navy, and the Presidential Certificate of Merit.



WILLIAM H. AVERY received the Ph.D. degree in physical chemistry from Harvard in 1937, after which he joined the Shell Oil Co. to do research in combustion kinetics. During World War II, he worked for the National Defense Research Council in rocket propellant development. In 1947, he joined APL where he has engaged in combustion research, rocket and ramjet development, urban transportation studies, and, most recently, development of ocean thermal energy.

Dr. Avery is a Fellow of the AIAA and a director of The Combustion Institute, and has received the Hickman medal of the American Rocket Society and the Sir Alfred C. Edgerton Gold Medal of The Combustion Institute.



LESTER L. CRONVICH received his Ph.D. in applied mathematics at the University of Wisconsin in 1942. He then worked as a stress analyst and air loads group leader at McDonnell Aircraft Corp. He joined APL in 1945 as a mathematician assigned to the aerodynamics group, and became its group supervisor in 1958. Dr. Cronvich has been involved in the aerodynamic development connected with all the major missile programs at the Laboratory, in the research programs in aerodynamics and hydrodynamics, and in the production of the multivolume BuOrd Handbook on Supersonic Aerodynamics.

He has also chaired or been a member of several APL, Navy, AIAA, and NASA committees on aerodynamics. In 1974, he became assistant supervisor of the Aeronautics Division and supervisor of the Fluid Dynamics Group.



WALTER G. BERL (left) has rejoined the Milton S. Eisenhower Research Center and currently chairs the Editorial Board of the *Johns Hopkins APL Technical Digest*. After graduate studies in physical chemistry at Harvard, he received the Ph.D. from the Carnegie Institute of Technology for his work on the oxygen electrode. Since he came to APL in 1946, he has been engaged in studies of combustion and propulsion, and in fire research. Most recently, as a member of the National Research Council Committee on Maritime Hazardous Materials, he was involved with a report on the safety aspects of liquefied natural gas.

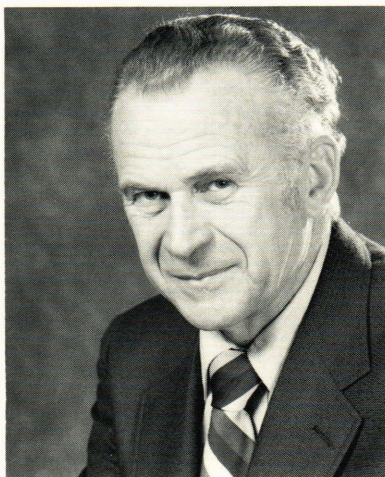
WILLIAM B. SHIPPEN (second from left) received the B.S. in mechanical engineering from the University of Virginia. After eight years with The Martin Co. performing research and analysis in fluid dynamics and heat transfer, he joined APL's Bumblebee Launching and Pro-

pulsion Group in 1948. Mr. Shippen was involved in development of airbreathing propulsion systems such as the Talos, Triton, and Typhon LR ramjets, the Augmented Thrust Propulsion ducted rocket, and the Dual Combustion Hypersonic Ramjet. He was group supervisor of the Propulsion Group and program manager, Augmented Thrust Propulsion, at the time of his retirement in 1982.

EVERETT J. HARDGRAVE, JR. (second from right) received the M.S. degree in chemical engineering from the University of Texas and a Certificate in Meteorology from the University of Chicago. After four years in the Army, he was employed by Convair at the Ordnance Aerophysics Laboratory for four years during which he worked with aerodynamic and engine data from Bumblebee programs tests. Since joining APL in 1950, he has worked on digital computer methods for analysis of airbreathing pro-

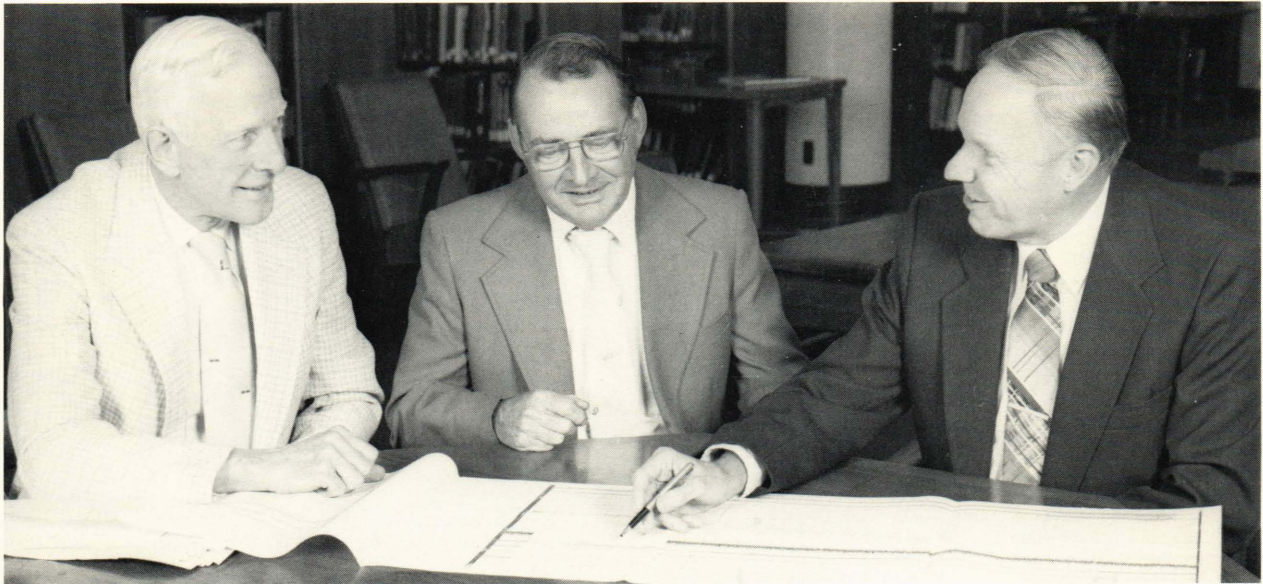
pulsion and missile performance. Those methods were used in the Talos and Typhon LR development programs and in continuing studies for future Navy missiles.

WILLIAM GARTEN, JR. (right) received the Ph.D. degree in physics from The Johns Hopkins University in 1942, after which he was with the Geophysical Laboratory of the Carnegie Institution of Washington. He joined APL in 1946 to work on ramjet engine design, including the development of fuel controls and flight testing of experimental test vehicles. As a member of the Talos staff during 1950-60, Dr. Garten supervised the Talos W and Extended Range Talos development programs and the configuration development of Unified Talos and of the Typhon LR missile. In the early 1960's, he conducted plasma research and special Talos studies. Since joining the Assessment Division in 1967, he has conducted a variety of missile system studies.



FLETCHER C. PADDISON received his B.S. (1955, physics) at The Catholic University of America. Joining APL in 1942, he designed the power servomechanism for the prototype Terrier and Talos missiles. He was project engineer for the Typhon LR missile, and program manager for many DARPA programs. Mr. Paddison has directed ballistic missile defense programs, studies of the radar cross

sections of complex shapes, and analyses of instrumentation and applications of surface effect ships. He headed the APL program for developing modest-temperature geothermal energy resources in the eastern United States, and is contributing to the analysis of geothermally enhanced ocean thermal energy conversion. Mr. Paddison is a member of APL's Pershing Program staff.



OSCAR M. MARTIN, JR. (left) received the B.S. degree in electrical engineering from Texas A&M College in 1941. His early radar experience began with operational units of the British Air Defense in early 1942 and continued through World War II with the installation and operation of U.S. radars around the world.

Since joining APL in 1951, he has worked on the Talos, Typhon, Pershing, Phoenix, and Sparrow missile programs. As group supervisor and project engineer, he was involved with missile guidance systems, airborne radar development, electronic counter-countermeasures, helicopter landing systems, and millimeter wave radar. He is currently a member of the Special Assignments Staff of the Fleet Systems Department.

JOSEPH F. GULICK (center) joined APL as a summer student while attending the University of Maryland. After receiving a B.S. degree in electrical engineering, he returned to APL full time in 1951. While at APL, he participated in the development of Talos, Aegis, and Standard Missile, among others. He provided the concept and directed the development of the A-6 aircraft Passive Angle Track system and the Rolling Airframe Missile guidance system. Mr. Gulick was assistant group supervisor of a missile electronics design group (1966-68) and then group supervisor from 1968 until his retirement in 1978. He is now a consultant to Technology Service Corp. of Silver Spring, where he teaches short courses in missile guidance and participates in missile contracts.

W. COLEMAN HYATT (right) served in the Navy during 1944-46, following which he attended the University of Maryland. He joined APL in 1956, was a section supervisor from 1964 until 1980, and is currently on the staff of the Fleet Systems Department's countermeasures group.

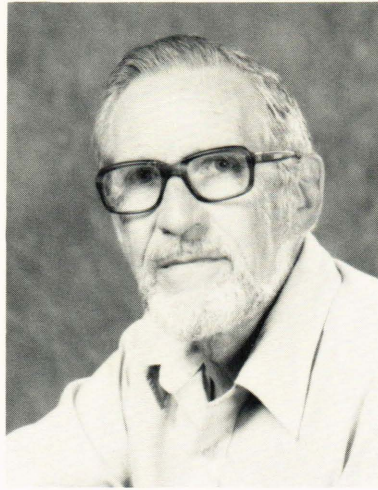
Mr. Hyatt was active in the design, test, and evaluation of Talos guidance and had technical responsibility for the monopulse homing system. During 1962-63, he also had technical responsibility for solving a Terrier fire control radar problem. In 1971, he helped define the Standard Missile-2 monopulse homing system. He has recently been involved with the NATO Sea Sparrow and with air-to-air missiles including the Sparrow, Phoenix, and the Advanced Medium Range Air-to-Air missile.



CHARLES R. BROWN received the M.S. degree in numerical science from The Johns Hopkins University. After three years of teaching, he joined APL in 1953. He has worked on numerous ordnance projects that involved applied research, effectiveness analysis, and hardware development for surface-to-air guided missiles; in particular, he has participated in the development of the Talos 6c1 warhead. Mr. Brown has also worked on various problems in underwater acoustics in the SSBN Technology Program and has developed methods for predicting the noise level from surface-effect ships.

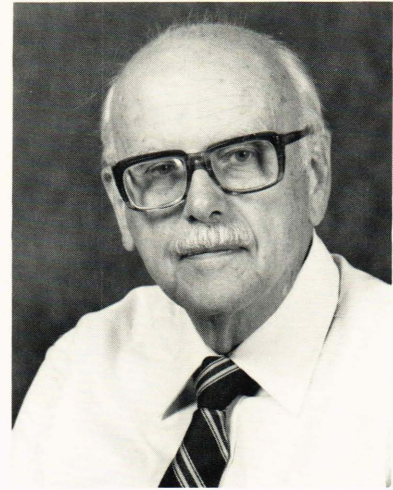


CHARLES F. MEYER received the Ph.D. degree in theoretical physics from The George Washington University (1942). During 1938-44, he was assistant professor of physics at Wayne University. From 1946 until 1948, he was part-time assistant professor in the Institute for Co-operative Research at Johns Hopkins, teaching atomic physics. He joined APL in 1944. In 1947, Dr. Meyer helped form the Warhead Analysis Group and served with various government groups interested in that subject. From 1950 to 1981, he headed what was to become the Central Laboratory Assessment Division, which conducted analyses of naval warfare and continental air defense, with the active participation of various outside agencies. In 1981, Dr. Meyer was assigned to the Director's office.



ELMER D. ROBINSON left the U.S. Navy in 1945 to join APL. His activities at APL included the packaging of the first interferometer homing receiver for Talos. He also participated in the transistorization of the homing system, in missile tests at White Sands, and in development assist tests in Talos ships.

Mr. Robinson's more recent efforts have included definition of the LAMPS helicopter system, packaging and tests of a guidance receiver for the Dual Mode Redeye missile, data collection for a terrain contour-matching system for cruise missiles, evaluation of a passive receiver for Harpoon missiles, and studies of high-resolution radio altimeters and of remotely controlled high-power jammers at radar frequencies.



DONALD D. A. GRAY received the B.S. degree in mechanical engineering from Purdue University in 1941. Following service in the Naval Reserve, he was employed by RCA Victor and later by the Bendix Aviation Corp., where his work was mainly concerned with the design of flight control and electrical power systems.

After joining APL in 1958, Mr. Gray became responsible for planning and conducting shipboard tests of the Talos missile and system until the end of the test program. Since 1970, he has worked on Aegis system test planning, on a number of Tomahawk missile projects, and (most recently) on over-the-horizon targeting and command, control, and communication engineering studies.



REAR ADMIRAL WAYNE E. MEYER is Project Manager, Aegis Shipbuilding Project, of the Naval Sea Systems Command. His career began in 1943 and includes duty in USS *Goodrich* (DDR-831), USS *Springfield* (CL-66), USS *Sierra* (AD-18), USS *Strickland* (DER-33), and USS *Galveston* (CLG-3) and on the staff of the Commander, Destroyer Force, Atlantic. Ashore, he has served as director of engineering at the Naval Ship Weapons System Engineering Station, Port Hueneme, Calif., and in ordnance posts within the Naval Material, Ordnance Systems, and Sea Systems Commands. As Fire Control and Weapons Officer in *Galveston*, he led and participated in many early Talos firings and evaluations.

Admiral Meyer holds an M. S. in astronautics and aeronautics from M.I.T. His awards include the Distinguished Service Medal, the Meritorious Service Medal, and the American Society of Naval Engineers Gold Medal.

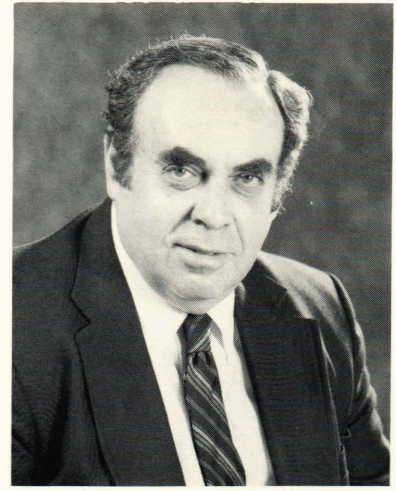


CAPT. RICHARD W. ANDERSON (Ret.) graduated from the U.S. Naval Academy in 1947. He received M.S. degrees in electrical engineering and in aeronautics and astronautics from the U.S. Naval Postgraduate School and M.I.T. Captain Anderson served on numerous ships and shore billets associated with Naval tactical missilery. Since his retirement in 1973, he has been self-employed as a consultant in the field of Naval ordnance and missile systems.



STAMATIOS M. KRIMIGIS received the Ph.D. in physics from the University of Iowa in 1965. He remained as research associate (1965-66) and assistant professor of physics (1966-68) before joining APL in 1968. He is currently chief scientist of the Space Department.

Dr. Krimigis' research interests include the sun, the interplanetary medium, and the magnetospheres of the earth and the planets. He has been the principal investigator or co-investigator on several NASA spacecraft. Most recently he has served as the principal investigator of the Low Energy Charged Particle experiment on Voyagers 1 and 2, designed and built at APL, and has been awarded the NASA Medal for Exceptional Scientific Achievement.



SAMUEL KOSLOV received the Ph.D. (1957, nuclear physics) from Columbia University. During 1954-64, four years of which he spent as associate professor of physics at Stevens Institute of Technology, his primary research areas were controlled fusion, plasmas, and nuclear weapons effects. He joined the DoD in 1964 and was Special Assistant for National Intelligence when he left in 1967 to join the Rand Corp. Research Council. He became special assistant for science to the Assistant Secretary of the Navy in 1972, receiving the Navy Superior Civilian Service Award in 1977.

Dr. Koslov joined APL in 1978. As assistant to the Director for technical assessment, he advises on the technical performance of various programs, and develops and encourages interaction of the various laboratory departments in developing new interdisciplinary approaches to problems of national interest. He is executive secretary of the Program Review Board.