Contributors to This Issue

Dietrich A. Alsberg, B.S.E.E., 1938, Techniche Hochschule, Stuttgart, Germany; graduate school 1939–1940, Case School of Applied Science; development engineer with several companies in Ohio, 1940–1942; U. S. Army, 1942–1945; Bell Laboratories, 1945—. While with Bell Labs he has been active in precision high-frequency and microwave transmission measurements, early transistor characterization, Thor and Titan ballistic missile radio-inertial guidance systems for military and space missions, Nike-X, Sentinel, and Safeguard phased-array radars, nuclear hardening, Electromagnetic effects of nuclear weapons, and millimeter waveguide transmission. He currently is head of the Microwave Transmission Department where, in addition to the millimeter waveguide system, he is responsible for microwave radio remote surveillance systems and small satellite antennas. Senior member, IEEE.

Janis C. Anderson, B.S. (mathematics), 1967, Carnegie Institute of Technology; M.S. (mathematics), 1971, and M.S. (electrical engineering), 1976, Stevens Institute of Technology; Bell Laboratories 1967—. Ms. Anderson has been engaged in the development of the WT4 waveguide system, doing measurement analysis, route engineering, and statistical and system studies. Currently, she is involved in designing the system architecture for a computer-based remote microprocessor measurement system for the AR6A radio system.

Jon C. Bankert, B.S.M.E., 1958, Duke University; M. Engr., 1962, Yale University; Bell Laboratories, 1963—. At Bell Laboratories, Mr. Bankert was first engaged in the development of ocean cables and other equipment for sonar systems. He was later concerned with the design of automotive and construction equipment for outside plant craftpersons. He participated in the development of installation and maintenance techniques for the millimeter waveguide system. Currently, he is head, L-Carrier Systems Department. Member, Tau Beta Pi, Pi Tau Sigma.

C. E. Barnes, was born in Tuscola County, Michigan on October 24, 1929. He received his B.S. (physics), 1956, Michigan State University;

Bell Laboratories, 1956—. Mr. Barnes became a technical group supervisor in 1965. He has been involved in the development of microwave and millimeter-wave ferrite devices and circuits, phased-array radar receivers, and lightwave transmitters for fiber optic systems. He is currently supervisor of the Millimeter-Wave and Fiber Optics Group at Bell Labs in Allentown, Pennsylvania.

H. A. Baxter, B.S.M.E., Iowa State University, 1937. At Bell Telephone Laboratories from 1937 to 1950, he worked principally on mechanical design of radar antennas, servomechanisms, and electromechanical components. From 1950 to 1965, Mr. Baxter worked for Hughes Aircraft Company, American Machine and Foundry Company, Norma Hoffman Bearings Company, and Regent Controls, Inc. He returned to Bell Laboratories in 1965, working principally on development and field evaluation of ocean bottom survey systems and Sea Plows I, II, and III and on development of waveguide installation machinery. He is presently supervisor, Feeder Distribution Interface Design Group.

Marco J. Bonomi, B.E.E., 1960, Polytechnic Institute of Brooklyn, M.E.E., 1961, New York University, Bell Laboratories, 1960—. Mr. Bonomi worked on the design of digital and analog microwave transmission systems, and also satellite transmission systems including the Telstar experiment. He worked on both the system design and the span terminating equipment design for the WT4 project. He is currently working on the design of a Time Assignment Speech Interpolation (TASI) terminal for international use.

R. J. Boyd, Jr., B.S., 1954, U.S. Coast Guard Academy, M.S. (engineering mechanics), 1960, New York University; Bell Laboratories 1958—. He has been primarily involved in the manufacture of steel tubes for waveguide use. Prior to working on waveguide, he was in the Outside Plant Development Laboratory working on cable gas pressure systems and the underground installation of cables.

P. Brostrup-Jensen, M.S.E.E., 1956, New York University; Bell Laboratories 1956—. Mr. Brostrup-Jensen has developed test equipment for laboratory use and locating of failures in submarine cables, including diver-operated probes and corona investigations. He has also developed protection switching equipment and other maintenance equipment for digital systems, and developed the IF circuits and equalization techniques

for the WT4 millimeter waveguide system. He is presently supervisor of the Satellite Applications Group.

R. J. Brown, B.S.E.E., 1968, M.S.E.E., 1969, Ph.D.E.E. 1971 Georgia Institute of Technology; Bell Laboratories, 1971—. Mr. Brown has been engaged in time-domain test set development for equalization for the WT4 millimeter waveguide system. More recently he has been doing systems studies for advanced satellite communications. He is presently supervisor of the Satellite Technology Group.

James W. Carlin, B.S.E.E., 1962, Illinois Institute of Technology; M.S. 1964, Ph.D., 1967, electrical engineering, University of Illinois; Bell Laboratories, 1968—. From 1968 to 1969 Mr. Carlin was involved with work on electromagnetic pulse effects on Bell System facilities. During the WT4 development he participated in analytical and experimental studies of coupling in multimode media, normal mode characteristics for circular waveguide, helix mode filter design and manufacturing methods, and electrical and mechanical measurements on installed waveguide. Mr. Carlin is presently supervisor of a group responsible for L5/L5E office circuits.

Steven Shui-uh Cheng, B.S., 1963, National Taiwan University; M.S., 1967, Tufts University; Ph.D., 1970 California Institute of Technology, all in fields of physics. Between 1970–1971, Mr. Cheng participated in the first U.S. electron-positron colliding-beam experiment at Harvard University. Since joining Bell Laboratories in 1971, he has worked on the millimeter waveguide system and recently on the fiber-optic transmission system. His main interest is in reliability theory, filter design, communication system simulation, microwave transient behavior measurement, and transmission system evaluation. Member, IEEE, American Physical Society, and Sigma Xi.

W. E. Cohen, B.M.E., 1961, College of the City of New York; Western Electric Co., 1968—. Prior to working on waveguide he was involved in designing numerical control machinery at Kearny. As a member of the waveguide manufacturing group at Forsgate, Mr. Cohen was responsible for the design and manufacture of helix waveguide. Presently he is a senior engineer at Kearny and is involved in the production of metal printed wiring boards. Member, ASME, Numerical Control Society.

W. P. Doran, B.S. in M.E., 1956, Newark College of Engineering; M.S. in I.E., 1964, Stevens Institute of Technology; Western Electric Co., 1956—. He has been engaged in manufacturing engineering for key equipment, power coils, miniature relays, and power equipment. While at Western Electric's Forsgate Laboratory he was responsible for tubing development, waveguide coupling and mechanical processing, mechanical measuring and electrical testing. He is currently responsible for product line planning for energy systems. Member, National Society of Professional Engineers.

Charles N. Dunn, B.S., 1958, M.S., 1960, Ph.D., 1964, University of Minnesota; Bell Laboratories, 1964—. Mr. Dunn was first involved in developmental studies on backward and tunnel diodes. Later he worked on microwave and millimeter wave diodes for solid-state oscillator sources. Now he is involved in the design and development of integrated circuits. Member, IEEE, American Physical Society, Sigma Xi, Eta Kappa Nu, Tau Beta Pi.

Michael P. Eleftherion, A.S., 1955, Wyomissing Polytechnic Institute; B.S.M.E., 1958, Pennsylvania State University; M.S.I.E., 1965, Lehigh University; Bell Laboratories 1958–1959; Western Electric 1959–. Mr. Eleftherion worked as a development and senior engineer on transistor and sealed contact facility and product engineering. From 1965 to 1968, he was the department chief responsible for new product manufacturing development at the Allentown Plant. Since 1968, Mr. Eleftherion has been assistant director, research and development at the Western Electric Engineering Research Center. A past resident head of the Forsgate Laboratory, his current responsibilities include thermal energy, integrated circuit, and PWB interconnection manufacturing research. Member, IEEE, Tau Beta Pi, and Pi Tau Sigma.

Paul E. Fox, B.S.E.E., 1963, Newark College of Engineering; Bell Laboratories 1957—. Since joining Bell Laboratories Mr. Fox has worked mostly in the design of control and measuring circuits. He is presently working on automatic remote test equipment for use in the single sideband radio project.

Milton A. Gerdine, B.S., 1961, M.S., 1962, Ph.D. (E.E.), 1965, University of Colorado, Bell Laboratories, 1965—. Mr. Gerdine has worked on microwave radio and millimeter waveguide transmission systems.

He now heads the Measuring Systems Design Department. Member, Eta Kappa Nu, Tau Beta Pi, and Sigma Tau.

R. W. Gretter, S.B. in M.E., 1950, S.M. in M.E., 1951, Mech. E., 1953, and Sc.D. in M.E., 1956, Massachusetts Institute of Technology; Bell Telephone Laboratories 1955—. Initially Mr. Gretter did analytical work in cable mechanics. This was followed by participation in the development of cable machinery for C.S. Long lines. From 1964 to 1971 he led a group responsible for physical design of digital transmission equipment including the D2 channel bank, the M12 multiplex, and the voiceband interface frame for No. 4 ESS. He then joined the WT4 project and supervised the design of the coupling and the support and protection system for the sheathed-waveguide medium. His group also developed techniques and machinery for waveguide installation by the insertion method as well as methods of designing sheath profiles for economical, low-curvature installation. Since May 1977 he has supervised a group responsible for physical design of VF facility terminals. He is a licensed professional engineer and a member of Pi Tau Sigma, Tau Beta Pi, and Sigma Xi.

R. P. Guenther, B.S.M.E., 1960, State University of Iowa; M.M.E., 1962 New York University; U. S. Army 1962–1964; Bell Laboratories 1960–62, 1964–70, 1973—. At Bell Labs, Mr. Guenther worked on paired cable development, outside plant maintenance and cable upkeep survey, and the WT4 feasibility study. In 1970 he was appointed AT&T assistant engineering manager, outside plant upkeep. Since 1973, he has been supervisor of a group developing the maintenance systems and special hardware for the WT4 medium. This group is developing radio transmission surveillance systems.

E. T. Harkless, B.S.E.E., 1947, M.S. (physics), 1949, Case Institute of Technology; Bell Laboratories, 1949—. He has designed filters for use in various microwave radio relay systems and equalizers for the L3 coaxial cable system. Mr. Harkless developed the array of systems combining networks used to feed the microwave radio systems through the horn reflector antenna. He designed the Telstar satellite communication antennas and has most recently been supervising a group developing millimeter wave circuits for the WT4 repeater.

Smith Harris, B.A., 1938, Emory University; Bell Laboratories, 1952—. Mr. Harris has worked on various loop and transmission projects,

including test sets, armored and armorless submarine cable, and millimeter waveguide. He was a member of the development team for the MAC-4 microprocessor. He is currently a member of the Transmission Surveillance Group.

William M. Hauser, B.S.M.E., 1967, Swarthmore College; M.S. and Ph.D., 1968 and 1973, respectively, Massachusetts Institute of Technology. Western Electric Company 1968–1970; Bell Laboratories 1972—. Mr. Hauser has worked on installation mechanics and maintenance systems for millimeter waveguide. He is currently engaged in engineering for digital systems outside plant. Member, Phi Beta Kappa, Tau Beta Pi, ASME.

Larry W. Hinderks, B.S. (physics), 1966, University of Kansas; Ph.D. (physics), 1970, University of Kansas. Bell Laboratories, 1970–1977. Mr. Hinderks was involved in test set design and fabrication for millimeter wave measurements using minicomputers. This work included hardware design and software data manipulation algorithms. He also worked on microprocessor controlled test sets for the evaluation of the surface properties of copper at millimeter wave frequencies.

P. T. Hutchison, B.S. (E.E.), 1944, Mississippi State College; M.S. (E.E.), 1947, California Institute of Technology; Ph.D. (E.E.), 1960, Georgia Institute of Technology. Mr. Hutchison taught at Mississippi State and Georgia Tech and worked for Raytheon Mfg. Co. before coming to Bell Laboratories in 1960. His experience at Bell Labs includes work on satellite communications, terrestrial microwave repeaters, and the WT4 millimeter waveguide system. He is now head of the TASI-C and Undersea Network Department, working on TASI-C development and studying suitability of lightwave systems for undersea cables.

William J. Liss, Jr., B.S.M.E., 1969, Lehigh University; M.S.M.E., 1971, Rutgers University; Bell Laboratories 1969—. In addition to work on WT4 waveguide, Mr. Liss has recently been involved in developing fire and smoke control methods for central offices and the economic evaluation of engineering projects. He is currently working in the area of energy conservation and solar energy utilization in telephone buildings. Member Tau Beta Pi, Pi Tau Sigma.

Milton Lutchansky, B.S., 1960, Michigan State University; M.S., 1962, and Ph.D, 1973, New York University; Bell Laboratories, 1960—. Mr. Lutchansky participated in design studies for radar antenna structures and was involved in analyses of the effects of nuclear weapons on communications facilities. On the WT4 project, he was concerned with characterization of the waveguide installation environment and design of the mechanical filtering. Member Tau Beta Pi, Pi Tau Sigma, Phi Kappa Phi, and ASME.

Donald R. Marcotte, A.A.S. (industrial electronics), 1969, New Hampshire Technical College; A.A.S. (electronics eingineering) 1974, Lowell Technological Institute; B.S. (electronics engineering) 1977, University of Lowell; Bell Laboratories, 1969—. Mr. Marcotte has worked on the design of high-frequency analog circuits and has done systems engineering on protection switching for digital communications systems. More recently he has worked on the design of solid state switches and amplifiers for single sideband radio applications.

S. C. Moorthy, B.S., 1961, Kerala university, India; M.S., 1963, and Ph.D., 1966, University of Pennsylvania; Bell Laboratories 1967—. He has worked on phased-array antennas, electromagnetic pulse effects and the millimeter waveguide transmission (WT4) system. His work on the WT4 system included design of special components, development of automated test sets, and analysis of multimode waveguide propagation. He is currently working on problems concerning the Iranian domestic satellite system. Member, IEEE, American Physical Society, Sigma Xi.

Richard W. Muise, B.S.(E.E.), 1966, Northeastern University; M.S.(E.E), 1968, Ph.D.(E.E.), 1972, Polytechnic Institute of Brooklyn; MITRE Corporation 1962–1966; Bell Laboratories 1966—. Mr. Muise has been involved in WT4 waveguide system performance studies and in the development of high-speed decision and timing recovery circuits. Currently, he is supervisor of a group developing a Time Assignment Speech Interpolation (TASI) system for international applications. He is a member of Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi, and Sigma Xi.

Armand J. Nardi, B.S.M.E., 1959, Polytechnic Institute of Brooklyn; M.M.E. 1961, New York University; Bell Laboratories 1959—. Mr. Nardi

engaged initially in physical design work associated with missile guidance systems and the *TELSTAR*™ telemetry antenna. He later supervised the physical design of the WT4 system. He is currently supervisor of the Coaxial System Physical Design Group responsible for the design of long-haul carrier systems.

Daniel Olasin, B.S.M.E., Newark College of Engineering; Bell Laboratories, 1957—. In addition to work on the WT4 waveguide, Mr. Olasin's previous experience includes antenna design for the military and mechanisms design for the ocean cable plow. He is presently working on international satellite earth station engineering.

J. W. Osmun, B.S.E.E., 1953, University of Nevada; Bell Laboratories, 1953—. Mr. Osmun is a power systems engineer in the Energy Systems Engineering Department at the Whippany, New Jersey location of Bell Laboratories. He is presently responsible for systems engineering of small dc-dc converters for communications equipment. His early work was in ringing, tone and cadence systems and transistorized dc-dc power converter design. Member, of Phi Kappa Phi, Sigma Tau, and IEEE.

Owe G. Petersen, B.S.E.E., 1963, University of Wisconsin; M.S.E.E., 1965, Ph.D., 1971, University of Pennsylvania; Bell Laboratories, 1963—. Mr. Petersen was engaged in high-frequency semiconductor device development, including PIN, varactor, step-recovery, and Schottky diodes. Since 1976 he has been involved in integrated circuit process and circuit development. Member, Tau Beta Pi, Eta Kappa Nu.

Duane C. Redline, A.S. Assoc., 1954, Milwaukee School of Engineering; Bell Laboratories, 1954—. Mr, Redline has worked on the development and design of germanium, silicon, and gallium arsenide microwave semiconductor diodes used in Bell System radio systems.

Donald R. Rutledge, P.E.; B.S.C.E., 1966, Texas Technological College; M.S.C.E., 1968, Lehigh University; Bell Laboratories, 1968—. In 1966 he worked for Pan American Research Center investigating pipeline laying techniques in deep water and drill stem failures in deep wells. At Lehigh University, Mr. Rutledge was a research associate in the Fritz Engineering Laboratory specializing in failure mechanisms of built-up plate structures. He joined Bell Laboratories as a member of

the Outside Plant Installation Department, where he was concerned with the design of a standard series of prefabricated reinforced concrete manholes. Currently, he is a member of the Facility Terminal Systems Engineering Department.

John J. Schottle, B.S.E.E., 1962, Illinois Institute of Technology; M.S.E.E., 1964, New York University; Bell Laboratories, 1962—. Mr. Schottle has worked on the design of mode couplers for the *TELSTAR*™ project, on networks for use in a digital radio system, and, on equalization of the WT4 system. He is presently engaged in the development of a TASI system for use on the overseas cable network. Member, Eta Kappa Nu, Tau Beta Pi.

S. Shapiro, B.M.E., 1969, City College of New York; M.S.(M.E.), 1971, Columbia University; Bell Laboratories, 1969—. Mr. Shapiro's initial work was conducting studies on heat transfer and hardening aspects of underground repeater buildings for the WT4 system. Subsequent work on WT4 included the design of band diplexer assemblies, repeater frames and waveguide pressure windows. In 1975, he was involved with designing waterproof repeater and apparatus housings for use with filled cable on T-carrier systems. His current work, began in 1976, is the physical design of multiplex equipment for the new L5E cable system.

William E. Studdiford, Bell Laboratories, 1956—. Mr. Studdiford has worked on the development of TH radio, TH radio protection switching, Telstar ground station and cryogenic apparatus, TM klystron replacement, and the WT4 regenerator and timing recovery loop. He is currently working on L5 coaxial line equipment.

David J. Thomson, B.S., 1965, Acadia University; MS, 1967, Ph.D., 1971, Polytechnic Institute of Brooklyn; Bell Laboratories, 1965—. In the past Mr. Thomson has been involved in multipair and coaxial cable. He also worked on WT4 in measurement, analysis, and specification of geometric imperfections in addition to time series analysis and spectrum estimation techniques. Currently Mr. Thomson is working on the high-capacity mobile telephone system. Member, IEEE, IMS, SIAM.

Peter J. Tu, B.S.E.E., 1960, National Taiwan University; M.S.E.E., 1963, Ph.D., 1966, University of Denver; Bell Laboratories 1966—. Mr.

Tu has worked on the FM feedback transmitter, the development of millimeter waveguide system, and the systems aspects of domestic satellite system. Currently, he is responsible for the multiplexer of the L5E coaxial cable system. Member, Eta Kappa Nu.

R. D. Tuminaro, B.S., 1957, M.F., 1959, New York University; Bell Laboratories, 1966—. Mr. Tuminaro's first assignment involved studying the coupling of nuclear-generated electromagnetic pulses into telephone networks. Later he joined the Millimeter Wave Medium Department working on the design of millimeter waveguides. More recently he has been working on long-haul coaxial cable telecommunications systems. Member of Tau Beta Pi, Eta Kappa Nu, IEEE.

H. C. Wang, B.S.E.E., 1955, Cheng-Kung University, Taiwan, China; M.S.E.E. 1960, University of Notre Dame; Ph.D. 1965, Polytechnic Institute of Brooklyn; Bell Laboratories, 1965—. mr. Wang has worked on microwave and millimeter wave networks for various systems. Since 1969, he has supervised a microwave network group responsible for the development of many passive and active components for radio systems.

William D. Warters, A.B., 1949, Harvard University; M.S., 1950, Ph.D., 1953, California Institute of Technology; Bell Laboratories, 1953—. Did research in multimode waveguide transmission and millimeter-wave repeaters; later was director of a laboratory responsible for transmission performance standards and objectives. In 1969–70, responsible for technical staff employment, education, and salary administration. In 1970 became director of laboratory responsible for development of the WT4 waveguide system. Presently director of Toll Transmission Laboratory with responsibility for development of coaxial cable and satellite transmission systems. Member, American Physical Society, Phi Beta Kappa, Sigma Xi. Fellow, IEEE.

Albert B. Watrous, B.M.E., 1943, The Cooper Union; Bell Laboratories, 1936—. Mr. Watrous was concerned with the design and development of gear trains and servomechanisms on several military projects between 1943 and 1961. He also had design responsibility for plotting boards, safety and arming mechanisms, and a boresight motion picture camera. Since 1961 he has worked on Bell System projects including Telstar, TD2/TH radio and the WT4 millimeter waveguide system. Mr. Watrous was concerned with the WT4 waveguide installation, coupling

design and the application of the electron-beam welding process for attaching flanges to waveguide tubing. Since late 1975 his assignment has been with the Loop Plant Laboratory.

Thomas J. West, B.E.E., 1954, Clarkson College of Technology; M.S.E.E., 1957, Michigan State University; W. L. Maxson Corporation, 1954–1956; Bell Laboratories, 1957—. Mr. West participated in the development of a number of transmission media, including paired cable, armorless ocean cable, and millimeter waveguide. He has also worked on the development of apparatus and test sets for the maintenance of paired cable. Member, IEEE, Eta Kappa Nu.

Stuart D. Williams, B.S.E.E., 1957, University of Virginia; M.S.E.E., 1959, New York University; Bell Laboratories 1957—. Mr. Williams since 1969 has worked on automated measurements for millimeter waveguide and single sideband radio transmission systems. Earlier Bell Laboratories experience included work in the fields of inertial stabilization and control of magnetic tape transports.

D. T. Young, B.S., 1956, M.E.E. 1960, Ph.D. 1966, University of Oklahoma. Mr. Young joined the Guided-Wave Research Department of Bell Laboratories in 1960. He initially worked on millimeter solid-state devices. Later he was involved in optical-fiber transmission research. He is presently working in the toll transmission laboratory on satellite transmission systems. Member IEEE, Sigma Xi, Tau Beta Pi, and Eta Kappa Nu.

Douglas N. Zuckerman, B.S. (E.E.), 1969, M.S. (E.E.), 1971, Eng. Sc.D. (E.E.), 1976, Columbia University; Bell Laboratories, 1969—. Mr. Zuckerman has been involved in WT4 waveguide system performance studies and the development of frequency multiplexing networks. He has participated in exploratory satellite antenna work and is presently engaged in the design of specialized antennas for satellite communications. Member, IEEE, Eta Kappa Nu, Tau Beta Pi, Sigma Xi.