

## Contributors to This Issue

**Jacques A. Arnaud**, Dipl. Ing., 1953, Ecole Supérieure d'Electricité, Paris, France; Docteur Ing., 1963, University of Paris; Docteur es Science, 1972, University of Paris; Assistant at E.S.E., 1953-1955; CSF, Centre de Recherche de Corbeville, Orsay, France, 1955-1966; Warnecke Elec. Tubes, Des Plaines, Illinois, 1966-1967; Bell Laboratories, 1967—. At CSF, Mr. Arnaud was engaged in research on high-power traveling-wave tubes and supervised a group working on noise generators. He is a supervisor of a group currently studying microwave quasi-optical devices and the theory of optical wave propagation. Senior Member, IEEE; Member, Optical Society of America.

**Thomas T. Butler**, B.S. (E.E.), 1958, Auburn University; M.E.E., 1962, New York University; Bell Laboratories, 1958—. Mr. Butler has been concerned with the design and development of electronic switching systems. Member, Tau Beta Pi, Eta Kappa Nu, Phi Kappa Phi.

**J. C. Candy**, B.Sc., 1951, Ph.D., 1954, University of Wales, Bangor; British Atomic Energy Authority, 1956-1959; Research Associate, University of Minnesota, 1959-1960; Bell Laboratories, 1960—. Mr. Candy has worked on digital circuits and pulse transmission systems. He is studying methods for processing video signals and designing digital coders. Member, IEEE.

**Herbert Y. Chang**, B.S.E.E., 1960, M.S.E.E., 1962, and Ph.D., E.E., 1964, University of Illinois; Bell Laboratories, 1964—. Mr. Chang has worked primarily on maintenance techniques for electronic switching systems, design techniques for self-checking processors, digital-fault-simulation methods, and computer-aided-design techniques. He currently supervises a group responsible for the development of advanced design automation systems. Member, Eta Kappa Nu, Tau Beta Pi, Pi Mu Epsilon, Sigma Xi; Senior Member, IEEE.

**Stephen G. Chappell**, B.E.E., 1969, Georgia Institute of Technology; M.S. (Electrical Engineering), 1971, and Ph.D. (Computer Science), 1973, Northwestern University; Bell Laboratories, 1969—. Since joining Bell Laboratories, Mr. Chappell has been concerned with

problems of logic-design automation, particularly logic simulation and automatic test generation. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

**Ta-Shing Chu**, B.S., 1955, The National Taiwan University; M.S., 1957, and Ph.D., 1960, Ohio State University; Bell Laboratories, 1963—. Mr. Chu has been engaged in research on tropospheric wave propagation and microwave antennas. He is currently concerned with electromagnetic problems in the area of satellite communications. Member, IEEE, Commission II of URSI, Sigma Xi, Pi Mu Epsilon.

**Charles H. Elmendorf**, B.S. (Engineering Physics), 1969, Cornell University; M.S. (Electrical Engineering), 1971, Northwestern University; Bell Laboratories, 1969—. Since 1971 Mr. Elmendorf has been involved in different aspects of machine-aided design including logic simulation. Member, Tau Beta Pi.

**Thomas G. Hallin**, B.S., 1968, Oregon State University; M.S., 1970, Northwestern University; Bell Laboratories, 1968—. Mr. Hallin has been working on fault diagnosis for large digital systems. Member, IEEE, Tau Beta Pi, Eta Kappa Nu, Sigma Xi.

**Gary W. Heimbigner**, B.S.E.E., 1969, University of Washington; M.S.E.E., 1971, Northwestern University; Bell Laboratories, 1969—1974. Mr. Heimbigner has worked on maintenance techniques for a small exploratory processor; he was more recently involved with the development of advanced design automation techniques. Member, IEEE, Tau Beta Pi.

**Keith W. Johnson**, B.S.E.E., 1966, and M.S.E.E., 1971, Northwestern University; Bell Laboratories, 1966—. Mr. Johnson has worked in circuit design and diagnostic programming areas of No. 1 ESS and No. 4 ESS developments. His main interest is in the design and testing of easily diagnosable logic circuits. Member, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon, Phi Eta Sigma.

**John J. Kulzer**, B.S.E.E., 1964, M.S.E.E., 1965, and Ph.D., 1969, Illinois Institute of Technology; Bell Laboratories, 1969—. Mr. Kulzer has worked on diagnostic design for large digital circuits and has car-

ried out fault simulation studies using the LAMP simulator. His other work has included the modification of scheduling routines for the IBM TSS 360/67 to tailor the system to LAMP simulation job mixes. Member, IEEE.

**Dietrich Marcuse**, Diplom Vorpruefung, 1952, Dipl. Phys., 1954, Berlin Free University; D.E.E., 1962, Technische Hochschule, Karlsruhe, Germany; Siemens and Halske (Germany), 1954–1957; Bell Laboratories, 1957—. At Siemens and Halske, Mr. Marcuse was engaged in transmission research, and studying coaxial cable and circular waveguide transmission. At Bell Laboratories, he has been engaged in studies of circular electric waveguides and work on gaseous masers. He spent one year (1966–1967) on leave of absence from Bell Laboratories at the University of Utah. He is presently working on the transmission aspect of a light communications system. Mr. Marcuse is the author of three books. Fellow, IEEE; member, Optical Society of America.

**James McKenna**, B.Sc. (Mathematics), 1951, Massachusetts Institute of Technology; Ph.D. (Mathematics), 1961, Princeton University; Bell Laboratories, 1960—. Mr. McKenna has done research in quantum mechanics, electromagnetic theory, and statistical mechanics. He has recently been engaged in the study of nonlinear partial differential equations that arise in solid-state device work and in the theory of stochastic differential equations.

**Edward A. Ohm**, B.S. (E.E.), 1950, M.S. (E.E.), 1951, and Ph.D. (E.E.), 1953, University of Wisconsin; Bell Laboratories, 1953—. Mr. Ohm has worked on low-loss waveguide components and two experiments demonstrating the feasibility of low-noise satellite communication systems: the measurement of background sky temperature and the reception of very small signals from a passive satellite (Echo I). He is currently working on a dual-polarized polarization-tracking feed for the earth-station antennas of the 4- and 6-GHz domestic satellite system.

**Lonnie D. Schmidt**, B.S. (Computer Science), 1969, University of Missouri at Rolla; M.S. (Computer Science), 1971, Northwestern University; Bell Laboratories, 1968–1973. While at Bell Laboratories, Mr. Schmidt worked on design automation and logic-circuit simulation. Member, ACM, Kappa Mu Epsilon, Tau Beta Pi.

**N. L. Schryer**, B.S., 1965, M.S., 1966, and Ph.D., 1969, University of Michigan; Bell Laboratories, 1969—. Mr. Schryer has worked on the numerical solution of parabolic and elliptic partial differential equations. He is currently studying problems of this type that arise in semiconductor device theory.

**George W. Smith, Jr.**, B.E.E., 1952, North Carolina State College; M.S.E.E., 1958, Stevens Institute of Technology; M.A., 1961, Princeton University; Ph.D., 1963, Princeton University; Bell Laboratories, 1952—. Mr. Smith's early work included military missile projects and military telephone switching systems. He later worked on the development of Bell System message switching systems and automated telephone directory assistance service. Since 1971, he has been head of the Design Automation Department which is engaged in providing computer programs for aiding the design of electronic switching systems, automatic drafting, automatic logic verification, and automatic trouble location. Member, IEEE, Eta Kappa Nu, Sigma Xi, Tau Beta Pi.

**R. H. Walden**, B.E.S., 1962, M.E.E., 1963, and Ph.D., 1966, New York University; Bell Laboratories, 1966—. Mr. Walden's initial activities in the Semiconductor Device Laboratory were concerned with switching properties of  $\text{VO}_2$ , followed by work on the conduction properties of  $\text{Al}_2\text{O}_3$  films. He was also involved in a study of the properties of charge-transfer devices and is presently working on the design of integrated circuits using CMOS technology.

**Robert B. Walford**, B.S.E.E., 1961, Illinois Institute of Technology; M.S.E.E., 1963, and Ph.D., E.E., 1967, University of Southern California; Bell Laboratories, 1967—. Mr. Walford has worked on a variety of projects including real-time information processing, computer-aided design, and ESS software support. He is currently supervisor of a group working on new methods of software development. Member, NSPE, IEEE, Eta Kappa Nu, Tau Beta Pi.