

## Contributors to This Issue

CLEO D. ANDERSON, B.S.E.E. 1960, University of Idaho; M.E.E., 1962, New York University; Bell Telephone Laboratories 1960—. Mr. Anderson has been mainly concerned with system analysis of submarine cable systems. He is now supervisor of the High Frequency Radio Group. Member, IEEE, Sigma Tau, Phi Kappa Phi, and Eta Kappa Nu.

WILLIAM F. BODTMANN, Monmouth College, 1957-61; Bell Telephone Laboratories 1941—. Mr. Bodtmann has been engaged in research on long- and short-haul microwave radio systems, frequency feedback receivers, and FM multiplex systems. He is working with communication systems operating at millimeter wavelengths.

SOO YOUNG CHAI, B.S.E.E., 1961, and M.S.E.E., 1962, Ohio State University; Ph.D., 1966, University of California at Berkeley; acting assistant professor of electrical engineering, University of California at Berkeley, 1966-1967; Bell Telephone Laboratories, 1967—. Mr. Chai was originally engaged in opto-electronics research with emphasis on optical devices using a color-selective spatial low-pass filter. Now he is doing exploratory development of a color video telephone system. Member, Eta Kappa Nu, Tau Beta Pi, Sigma Xi.

HERBERT YU-PANG CHANG, B.S., 1960; M.S., 1962, and Ph.D. (E.E.), 1964, University of Illinois; Bell Telephone Laboratories, 1964—. Mr. Chang has been engaged in the exploratory studies of fault diagnosis techniques for electronic switching systems, including the development of fault dictionary techniques for No. 1 ESS and exploratory development of a digital fault simulator for large processors. He is currently involved in studies of the techniques for the design of self-diagnosable digital machines and the reliability and maintainability studies for digital systems. Member, Sigma Xi, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon, IEEE, Association for Computing Machinery.

ARTHUR B. CRAWFORD, B.S. in E.E., 1928, Ohio State University; Bell Telephone Laboratories, 1928—. Mr. Crawford has specialized in radio research in the ultrashort wave and microwave regions. He has been concerned with measurement techniques, propagation, and

antenna studies. He designed the horn-reflector antenna used at Crawford Hill in the Project Echo and Project *Telstar*<sup>®</sup> communication satellite experiments and for radio astronomy studies. As Head of the Radio Techniques Research Department, he is in charge of a group concerned with antennas for short-hop microwave systems and satellite communications, radio astronomy, and certain devices for use in coherent optics. Fellow, IEEE; member, Pi Mu Epsilon, Eta Kappa Nu, Tau Beta Pi, Sigma Xi.

JAMES C. DALY, B.S., 1960, University of Connecticut; M.E.E., 1962, Ph.D. 1967, Rensselaer Polytechnic Institute; member of the faculty of the Electrical Engineering Department at Rensselaer, 1962-1966; Bell Telephone Laboratories, 1966-1969. At Rensselaer, he did research on bulk semiconductor microwave interactions. At Bell Laboratories he has been concerned with optical wave guidance. Currently on leave of absence from Bell Telephone Laboratories, Mr. Daly is a visiting member of the faculty of the Electrical Engineering Department of the University of Rhode Island. Member, IEEE, Tau Beta Pi, Eta Kappa Nu, Sigma Xi.

CORRADO DRAGONE, Laurea in E.E., 1961, Padua University (Italy); Libera Docenza, 1968, Ministero della Pubblica Istruzione (Italy); Bell Telephone Laboratories, 1961—. Mr. Dragone has been engaged in experimental and theoretical work on microwave antennas and solid-state power sources. He is currently involved in solid-state radio systems experiments.

JOHN D. GABBE, B.A. 1950, New York University; M.S. 1951, University of Illinois; Ph.D., 1957, New York University; Bell Telephone Laboratories, 1956—. Mr. Gabbe was first associated with the *Picturephone*<sup>®</sup> visual telephone project, then with studies of the earth's magnetosphere. At present, he is engaged in research concerning the methodology of data analysis. Member, American Physical Society.

MRS. ANNE E. FREENY, B.A., 1957, University of Connecticut; M.S., 1959, Cornell University; Bell Telephone Laboratories, 1959—. Mrs. Freeny has worked in data analysis, concentrating primarily on the development of programs which would apply new statistical techniques to various large bodies of data. She has also worked on the organization of the results of the analyses. Member, Phi Beta Kappa, Phi Kappa Phi; associate member, Sigma Xi.

**BERNARD GLANCE**, Dipl. Ing., Ecole Spéciale de Mécanique et Electricité, 1958, Dipl. Ing., 1960, Ecole Supérieure d'Electricité, Paris, France); C.S.F., Research Center of Corbeville, Orsay, France, 1960–1966; Dipl. Docteur (Ing.), Sorbonne, Paris, 1964; Bell Telephone Laboratories, 1968—. At C.S.F., Mr. Glance had been engaged in research on microwave tubes. At S.F.D. Laboratories, he had worked on high power microwave amplifiers. Mr. Glance is presently working on microwave solid-state integrated circuits.

**F. E. GUILFOYLE**, Newark College of Engineering; Bell Telephone Laboratories, 1955—. His work with the Radio Research Group has been concerned with components for the Echo and Telstar communication experiments, and laser communication measurements and techniques.

**HARRY E. KELLER**, Bell Telephone Laboratories, 1942—. Mr. Keller's work has included microwave branching filters, microwave radio systems, multiplex for radio systems, frequency modulation with feedback receiver for Echo and Holmdel *Telstar*<sup>®</sup> communication satellite receiver. His most recent project is the rainfall measuring network data recording system.

**L. U. KIBLER**, B.S., 1950, U. S. Coast Guard Academy; M.S.E.E., 1956, Massachusetts Institute of Technology; Ph.D., 1968, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1956—. Mr. Kibler has been concerned with experimental research in parametric amplifiers, tunnel diodes, lasers, microwave photo diodes, and Schottky-barrier diode converters. He participated in the design and operation of the receivers for the Echo and *Telstar*<sup>®</sup> projects. He is engaged in millimeter wave antenna investigations. Member, IEEE, Eta Kappa Nu, Sigma Xi.

**KANEYUKI KUROKAWA**, B.S., 1951, and Ph.D., (Engineering), 1958, University of Tokyo; Assistant Professor, University of Tokyo, 1957–1963; Bell Telephone Laboratories, 1963—. Mr. Kurokawa has been concerned mainly with microwave solid-state circuits, including amplifiers, oscillators, and switches. He supervises a group responsible for the exploratory development of solid-state functional devices and circuits. Member, Institute of Electronics and Communications Engineers of Japan, IEEE.

S. C. LIU, B.S. in C.E., 1960, National Taiwan University; M.S., 1964, and Ph.D., 1967, University of California at Berkeley; Bell Telephone Laboratories, 1967—. Mr. Liu has been doing research in applied mechanics, structural dynamics, random vibrations, and earthquake engineering. Member, American Society of Civil Engineers, Seismological Society of America.

DEAN E. McCUMBER, B.E., 1952, and M.E., 1955, Yale University; A.M., 1956, and Ph.D., 1960, Harvard University; Engineering Division Officer, U.S.S. Tripoli, 1952-54; National Science Foundation Postdoctoral Fellow, 1959-61; Bell Telephone Laboratories, 1961—. Since joining Bell Laboratories, Mr. McCumber has been concerned with the physical theory of optical impurities in solids, of lasers, of electron bulk-effect devices, and, currently, of superconductor tunneling and weak-link devices. He is Head of the Crystal Electronics Research Department. Fellow, American Physical Society; Member, Tau Beta Pi.

THOMAS L. OSBORNE, B.S.E.E., 1961, M.S.E.E., 1963, Auburn University; Bell Telephone Laboratories, 1963—. Mr. Osborne has been involved in research on solid-state microwave radio systems and associated circuits. Member, IEEE, Sigma Xi, Phi Kappa Phi, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon.

HARRY RUDIN, JR., B.E., 1958, M. Eng., 1960, and D. Eng., 1964, Yale University; Bell Telephone Laboratories, 1964-1968; IBM Research Laboratory (Zurich, Switzerland), 1968—. Mr. Rudin was Instructor in Electrical Engineering at Yale University from 1961 until 1964. At Bell Telephone Laboratories he worked in the data communication area, concentrating on automatic equalization. At IBM he is a full-time consultant working in the general area of computer-related communications. He is a former executive of the IEEE Connecticut Section and is a member of the Yale Engineering Association executive board.

CLYDE L. RUTHROFF, B.S.E.E., 1950, and M.A., 1952, University of Nebraska; Bell Telephone Laboratories, 1952—. Mr. Ruthroff has published contributions on the subjects of FM distortion theory, broadband transformers, FM limiters, threshold extension by feedback, and microwave radio systems for satellite and terrestrial use.

He is interested in the extension of radio communication into the millimeter and optical wavelengths. Member, A.A.A.S., I.E.E.E., Sigma Xi.

IRWIN W. SANDBERG, B.E.E., 1955, M.E.E., 1956, and D.E.E., 1958, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1958—. Mr. Sandberg has been concerned with analysis of military systems, synthesis and analysis of active and time-varying networks, studies of properties of nonlinear systems, and some problems in communication theory and numerical analysis. He is head of the Systems Theory Research Department. Member, IEEE, Eta Kappa Nu, Sigma Xi, Tau Beta Pi.

M. V. SCHNEIDER, M.S., 1956, and Ph.D., 1959, Swiss Federal Institute of Technology, Zurich, Switzerland; Bell Telephone Laboratories, 1962—. Mr. Schneider has been engaged in experimental work on thin-film solid-state devices, optical detectors, and microwave integrated circuits. Member, IEEE, American Vacuum Society.

R. A. SEMPLAK, B.S. (Physics), 1961, Monmouth College; Bell Telephone Laboratories, 1955—. Mr. Semplak has been engaged in research on microwave antennas and propagation. He participated in Project Echo and Project *Telstar*® Communication satellite experiments. He currently is concerned with the attenuation effects of rain on propagation at 18.5 and 30.9 GHz. Member, Sigma Xi, American Association for the Advancement of Science.

WILLIAM W. SNELL, JR., 1951, Williamsport Technical Institute; Bell Telephone Laboratories, 1955—. His early work for the radio research department centered around waveguide components in the 4, 6, and 11 GHz common carrier bands. This included ferrite devices, microwave mixers, and polarization couplers. He later participated in the Shotput experiment, a suborbital proving test for Project Echo. During Project Echo he designed, built, and patented several components of the Crawford Hill receiving terminal. More recently he has been concerned with high order varactor frequency multipliers and varactor diode fabrication. He is presently interested in making hybrid integrated circuits for RF systems above 10 GHz.

LEROY C. TILLOTSON, B.S.E.E., 1938, University of Idaho; M.S.E.E., 1940, University of Missouri; D.Sc. (Hon.), 1966, University of

Idaho; Bell Telephone Laboratories, 1941—. Mr. Tillotson initially worked on the design of filters and networks. In 1954 he was appointed head of a group working on radio relay systems. Beginning in July 1958, he spent more than a year on a leave of absence with the Institute for Defense Analysis, Washington D. C., where he was concerned with communication satellites and other space-related activities. He was appointed Director of Radio Research in 1963.

RICHARD H. TURRIN, B.S.E.E., 1956, Newark College of Engineering; M.E.E., 1960, New York University; Bell Telephone Laboratories, 1956—. Mr. Turrin has been involved in antenna research and development using microwaves and millimeter waves. He has also been involved in propagation studies related to atmospheric and environmental effects and is concerned with satellite antenna problems. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

JACOB ZIV, B.Sc. 1954, Engineering Diploma 1955, and M.Sc. 1957, Technion-Israel Institute of Technology, Haifa, Israel; D.Sc., 1962, Massachusetts Institute of Technology; Scientific Department, Israel Ministry of Defence, 1955-1959, 1962-1968; Bell Telephone Laboratories, 1968—. (On leave of absence from Israel Ministry of Defence.) Mr. Ziv has been engaged in research in information theory and statistical communication theory. Member, IEEE.