

## Contributors to This Issue

M. R. AARON, B.S.E.E., 1949, M.S., 1951, University of Pennsylvania; Bell Telephone Laboratories, 1951—. His work was initially concerned with the design of networks for various transmission systems including the first transatlantic submarine cable system. Since 1956 he has been involved in analytical work on various PCM systems. Fellow, IEEE, American Association for the Advancement of Science.

R. T. AIKEN, B.S., 1957, M.S., 1959, and Ph.D., 1962, Carnegie-Mellon University; U. S. Army, 1961-1963; Bell Telephone Laboratories, 1963—. Mr. Aiken has been concerned with problems in radar, sonar, and communication theory, with emphasis on the effects of random media. He is a supervisor in the Outside Plant Engineering Department. Member, IEEE, Sigma Xi, Tau Beta Pi, Eta Kappa Nu.

RAYMOND H. BOSWORTH, graduate, Air Force Radio Technical School, 1950; attended Union Junior College, 1952-56; R.C.A. Institutes 1962-64; Bell Telephone Laboratories, 1952—. Mr. Bosworth has worked on negative impedance repeaters, repertory dial telephones, and PCM coders, and now is investigating color television. He holds a patent on a universal printed circuit card.

EARL F. BROWN, RCA Institutes, Inc., 1955; Bell Telephone Laboratories, 1955—. Since joining Bell Telephone Laboratories Mr. Brown has been engaged in developing techniques for enhancing the quality of television pictures, subjectively evaluating television pictures, and discovering means to compress the bandwidth of television pictures.

MORGAN M. BUCHNER, JR., B.E.S., 1961, Ph.D., 1965, The Johns Hopkins University; Bell Telephone Laboratories, 1965—. Mr. Buchner has been interested in problems related to data transmission. Member, IEEE, Tau Beta Pi, Sigma Xi, Eta Kappa Nu.

CHRISTOPH B. BURCKHARDT, Dipl.-Ing., 1959, Dr. sc. techn., 1963, Swiss Federal Institute of Technology; Bell Telephone Laboratories 1963—. Initially Mr. Burekhardt was engaged in the analysis of

varactor frequency multipliers. Since 1965, he has been working in holography. Member IEEE, Optical Society of America.

J. C. CANDY, B.Sc., 1951, Ph.D., 1954, University of Wales Bangor; Bell Telephone Laboratories, 1960—. Mr. Candy has worked on digital circuits and pulse transmission schemes. He is concerned with video signal processing methods.

MERTON H. CROWELL, B.S.(E.E.), 1956, Pennsylvania State University; M.S.(E.E.), 1960, New York University; Ph.D. (Electrophysics), 1966, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1956—. Mr. Crowell initially worked on the development of the high-speed pulse code modulation coding tube. He later studied optical modulators and detectors in relation to optical maser communication systems, and recently has investigated the interaction of electron beams with semiconductor devices. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

HANS G. DANIELMEYER, Dipl. Phys., 1962, Dr. rer. nat., 1965, Stuttgart University, Stuttgart, Germany, Research Staff, Stuttgart University, 1962-1966; Bell Telephone Laboratories, 1966—. In Stuttgart, Mr. Danielmeyer did research in ultrasonics on molecular liquids and solids. At Bell Telephone Laboratories he is doing research on light scattering and developing suitable lasers.

LOUIS H. ENLOE, B.S.E.E., 1955, M.S.E.E., 1956, and Ph.D.(E.E.), 1959, University of Arizona; instructor in electrical engineering and a member of the technical staff of the Applied Research Laboratory of the University of Arizona, 1956-1959; Bell Telephone Laboratories, 1959—. Mr. Enloe's early work was in modulation and noise theory in connection with space communications. Later work has been with lasers, coherent light, and holography, with emphasis on communication and display. He is Head of the Opto-Electronics Research Department. Member, IEEE, Phi Kappa Phi, Sigma Xi, Tau Beta Pi, Pi Mu Epsilon, Sigma Pi Sigma.

JAMES G. EVANS, B.E.E., 1963, M.E., 1964, Cornell University; Bell Telephone Laboratories, 1963—. Mr. Evans has been designing laboratory instrumentation to support transmission systems development. Now he is working on computer-operated instrumentation for auto-

matically measuring network characteristics in the 1 to 12 GHz range. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

JEROME S. FLEISCHMAN, B.E.E., 1963, Cooper Union; M.S.E.E., 1964, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1963—. His work has concerned the design of various circuits for high speed PCM and differential PCM encoding terminals. He has taught the Transmission Systems Design course given in the GSP program. Member, IEEE, Tau Beta Pi, Eta Kappa Nu.

WALTER J. GELDART, B.Eng. in E.E., 1958, McGill University; M.Eng. in E.E., 1962, McMaster University; Bell Telephone Laboratories, 1962—. Mr. Geldart has been engaged in the design and development of computer controlled transmission measuring systems. He is a supervisor in the Measuring Systems Design Department. Member, IEEE.

DETLEF GLOGE, Dipl. Ing., 1961, D.E.E., 1964, Braunschweig Technische Hochschule (Germany); research staff, Braunschweig Technische Hochschule 1961–1965; Bell Telephone Laboratories, 1965—. In Braunschweig, Mr. Gloge was engaged in research on lasers and optical components. At Bell Telephone Laboratories, he has concentrated in the study of optical transmission techniques. Member, VDE, IEEE.

DAVID J. GOODMAN, B.E.E., 1960, Rensselaer Polytechnic Institute; M.E.E., 1962, New York University; Ph.D., 1967, University of London; Bell Telephone Laboratories 1960–62, 1967—. Mr. Goodman has performed analytic studies of digital communication systems and digital signal processing techniques. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

B. GOPINATH, M.S. (mathematical physics), 1964, University of Bombay, India; M.S.(E.E.) and Ph.D.(E.E.), 1968, Stanford University; postdoctoral research associate at Stanford from November 1967 to April 1968; Bell Telephone Laboratories, 1968—. Mr. Gopinath's primary interest, as a member of the Systems Theory Research Group, is in the applications of mathematical methods to physical problems.

GERALD D. HAYNIE, B.S.E.E., 1956, Virginia Polytechnic Institute; M.E.E., 1961, New York University; Bell Telephone Laboratories, 1956—. Mr. Haynie has been engaged in the development of precision measuring systems used in transmission systems development. Recent emphasis has been in computer operated systems. He is head of the Measuring Systems Design Department. Member, IEEE, Eta Kappa Nu, Tau Beta Pi.

EDWARD F. LABUDA, B.S. (Physics), 1959, Case Western Reserve University; M.S.E.E., 1961, New York University; Ph.D. (Electrophysics), 1967, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1959—. Mr. Labuda was initially concerned with the development of low noise microwave tubes and later became involved in research and development of gas lasers. Recently he has participated in the development of the silicon diode array camera tube for *Picturephone*<sup>®</sup> video telephone systems. He now supervises a group concerned with semiconductor device physics. Member, AAAS.

RICHARD A. McDONALD, B.E. (E.E.), 1956, M.E. (E.E.), 1957, and D.E. (E.E.), 1961, Yale University; Assistant Professor of Engineering and Applied Science, Yale University, 1961-1964; Bell Telephone Laboratories, 1964—. Mr. McDonald has been concerned with aspects of the development of digital communication systems such as PCM, differential PCM, and delta modulation for speech and video systems. More recently he has been in charge of a group engaged in system engineering studies of video network service, metropolitan telephone service, maintenance systems, and network interconnections. Member, IEEE, Sigma Xi, Tau Beta Pi, American Society for Engineering Education.

E. N. PROTONOTARIOS, Electrical Engineer, 1963, National Technical University of Athens, Greece; Eng. Sc.D., 1966, Columbia University; Bell Telephone Laboratories, 1966-1968. Mr. Protonotarios was engaged in analytical studies of digital communications systems. He is presently on leave of absence from the Laboratories to teach at Columbia University. Member, Sigma Xi, IEEE, American Association for the Advancement of Science.

LAWRENCE R. RABINER, S.B. and S.M., 1964, Ph.D. (E.E.) 1967, Massachusetts Institute of Technology. From 1962 through 1964 he participated in the cooperative plan in electrical engineering at Bell

Telephone Laboratories, Whippany and Murray Hill, New Jersey. He worked on digital circuitry, military communications problems, and problems in binaural hearing. He joined the staff of Bell Laboratories in 1967 and has been engaged in research on speech communication, signal analysis, and techniques for waveform processing. Member, Eta Kappa Nu, Sigma Xi, Tau Beta Pi, IEEE, Acoustical Society of America.

CHARLES M. RADER, B.E.E., 1960, M.E.E., 1961, Brooklyn Polytechnic Institute. He joined the staff of Lincoln Laboratory, Massachusetts Institute of Technology, in 1961. He has worked in the areas of speech compression, system simulation, and digital signal processing. He is coauthor of a book on modern techniques for signal processing. Member, Eta Kappa Nu, Sigma Xi, Tau Beta Pi, Acoustical Society of America, IEEE.

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.

RONALD W. SCHAFER, B.S.(E.E.), 1961, M.S.(E.E.), 1962, University of Nebraska; Ph.D., 1968, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1968—. Mr. Schafer has been concerned with nonlinear digital waveform processing techniques for deconvolution. He is doing research on signal processing techniques for speech communication systems. Member, Phi Eta Sigma, Eta Kappa Nu, Sigma Xi, IEEE, Acoustical Society of America.

R. G. SCHLEICH, A.A.S., 1959, Mohawk Valley Community College; Bell Telephone Laboratories, 1959—. Mr. Schleich has been engaged in the development of laboratory transmission measuring systems. His work has included a video frequency distortion measuring set and an automated 20 Hz to 20 KHz transmission measuring set. He is engaged in Holmdel Measurement Center development.

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.

PETER W. SMITH, B.S., 1958, M.S., 1961, Ph.D., 1964, McGill University (Canada); Bell Telephone Laboratories, 1963—. Mr. Smith has done research on gas laser output power and stability problems; he has also investigated a number of systems for obtaining single-frequency laser operation. Now he is studying pulse propagation in gas laser amplifiers. Member, Canadian Association of Physicists, American Physical Society, IEEE.

WILLIAM H. STEIER, B.S.E.E., 1955, Evansville College; M.S.E.E., 1957, and Ph.D.(E.E.), 1960, University of Illinois; Bell Telephone Laboratories, 1962-1968. Mr. Steier first worked on the millimeter wave circular waveguide transmission system. More recently he had worked on optical transmission lines and gas lenses. He is now with the Department of Electrical Engineering at the University of Southern California. Member, IEEE, Sigma Xi.

JEFFREY D. ULLMAN, B.S., 1963, Columbia University; Ph.D.(E.E.), 1966, Princeton University; Bell Telephone Laboratories, 1966—. Dr. Ullman has worked in research in computer science, principally language theory and switching theory. Member, Tau Beta Pi, Sigma Xi, Association for Computing Machinery, IEEE.

PETER WEINER, B.E.E., 1963, City College of New York; M.S., 1964, and Ph.D., 1967, Polytechnic Institute of Brooklyn. Since 1966 he has been an assistant professor of electrical engineering at Princeton University, Princeton, N.J., and has served as a consultant to Bell Laboratories since April 1968. Member, Association for Computing Machinery, Eta Kappa Nu, Sigma Xi, IEEE.

ALAN N. WILLSON, JR., B.E.E., 1961, Georgia Institute of Technology; M.S.E.E., 1965, Ph.D., 1967, Syracuse University; International Business Machines Corporation, 1961-1964; Bell Telephone Laboratories, 1967—. Mr. Willson is interested in network and systems theory. Member, IEEE, Eta Kappa Nu, Tau Beta Pi, Sigma Xi.

ROBERT W. WILSON, B.A., (Physics), 1957, Rice University; Ph.D. (Physics), 1962, California Institute of Technology, Bell Telephone

Laboratories, 1963—. At Bell Laboratories Mr. Wilson has made radio astronomical and propagation measurements. In radio astronomy his work includes measurements of: absolute fluxes of radio sources, the cosmic background temperature, the disk component of the galaxy, and intergalactic hydrogen. His propagation measurements include measurements of  $10\mu$  and the short centimeter region. He continues to work in both fields. Member, American Astronomical Society, International Scientific Radio Union, Sigma Xi, Phi Beta Kappa.

