

## Contributors to This Issue

JOHN W. BALDE, B.S.E.E., 1943, Rensselaer Polytechnic Institute; Western Electric Company, 1943—. Mr. Balde's early work at Western Electric and at Bell Laboratories was in the development of airborne radar and computer systems and auxiliary test equipment. From 1957-1959, he served as a member of the teaching staff of the Western Electric Graduate Engineering Training School. Since 1959, he has been engaged in thin film process research at the Western Electric Engineering Research Center at Princeton, where he is currently a research leader in thin film evaluation. Member, Sigma Xi.

R. D. BARNARD, B.E.E., 1952, and M.E.E., 1955, Polytechnic Institute of Brooklyn; Ph.D., 1959, Case Institute of Technology; Bell Telephone Laboratories, 1959-61; faculty, Wayne State University, 1961-62; Bell Telephone Laboratories, 1962—. Presently, he is primarily concerned with theoretical problems in signal theory and control. Member, IEEE, American Physical Society, Sigma Xi, Eta Kappa Nu and Tau Beta Pi.

SIDNEY S. CHARSCAN, B.S.M.E., 1949, Columbia University; Western Electric Company, 1951—. Mr. Charschan's early work was in plastics development, where he was associated with the first cast resin and glass reinforced plastics designs. In 1958, he transferred to the Western Electric Engineering Research Center, Princeton, N. J., where, at present, he is a research leader for a group working on the development of special vacuum systems. He is a registered professional engineer of the State of New York.

L. A. D'ASARO, B.S., 1949, and M.S., 1950, Northwestern University, Ph.D., 1955, Cornell University, Bell Telephone Laboratories, 1955—. Mr. D'Asaro's work at Bell Laboratories has been mainly concerned with exploratory development of semiconductor devices. These have included PNP switches, the stepping transistor, Esaki diodes and gallium arsenide lasers. He is at present supervising work on high-speed diodes.

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JOHN J. DINEEN, B.S.E.E., 1957, Northeastern University; Bell Telephone Laboratories, 1957-1958; Western Electric Company, 1958—. Mr. Dineen was first engaged in closed-circuit television systems studies and later in the development of a microwave radar receiver for the Nike Zeus system. He went to Western Electric's Engineering Research Center at Princeton, N. J., in 1960, where he conducted manufacturing process systems studies. More recently he has engaged in the evaluation and analysis of thin film manufacturing processing systems. He is currently attending the Western Electric Company-Lehigh University Masters Degree Program and is majoring in operations research. Member, IEEE, Tau Beta Pi and Eta Kappa Nu.

ALEXANDER FEINER, M.S. (Electrical Engineering), 1952, Columbia University; Bell Telephone Laboratories, 1953—. He has been engaged in the application of electronic techniques to switching. He presently heads a department responsible for development of switching networks, trunks and scanners, and for transmission aspects of No. 1 ESS. Member, Sigma Xi.

DAWON KAHNG, B.Sc., 1955, Seoul University (Korea); M.Sc., 1956 and Ph.D., 1959, Ohio State University; Bell Telephone Laboratories, 1959—. He has been engaged in exploratory studies of surface field effect transistors and epitaxial film doping profiles. More recently, he has been engaged in hot electron device research and development of surface barrier microwave diodes. Member, IEEE, Sigma Xi, and Pi Mu Epsilon.

ARTHUR C. KELLER, B.S., Cooper Union, 1923; M.S., Yale University, 1925; E.E., Cooper Union, 1926, Columbia University, 1926-1930; Western Electric Company, 1917-1925; Bell Telephone Laboratories, 1925—. He is at present Director, Switching Apparatus Laboratory, having previously been Director of Component Development, Director, Switching Systems Development, and Director of Switching Apparatus Development. Mr. Keller's experience in the Bell System includes development and design of electromechanical devices, sound recording and reproducing apparatus, electronic heating and sputtering equipment, telephone switching apparatus and systems, and, during World War II, sonar equipment and systems; he holds patents in all of these fields. The

division which he heads is responsible for exploratory studies of and the development, design, and preparation for manufacture of electromechanical switching apparatus for telephone systems.

Member, American Physical Society, Yale Engineering Association, SMPTE, and Society for Experimental Stress Analysis; Fellow, IEEE and Acoustical Society of America. For his contributions to sonar, he received two U.S. Navy citations. In 1962 he received the Emile Berliner Award of the Audio Engineering Society. In 1963 he was elected to the Board of Directors of the Waukesha Motor Co.

PETER LINHART, B.A., 1948, Princeton University; M.A., 1950, University of California, Berkeley; Ph.D., 1963, Columbia University; Bell Telephone Laboratories, 1956—. Mr. Linhart was first engaged in systems engineering work relating to electronic switching. He later did mathematical studies of various remote line concentrators compatible with various switching systems — e.g., a concentrator switch consisting of a random slip with common overflow group. His present work concerns patterns of test calls for a specific distributed remote line concentrator.

SAMUEL P. MORGAN, B.S., 1943, M.S., 1944, and Ph.D., 1947, California Institute of Technology; Bell Telephone Laboratories, 1947—. A research mathematician, Mr. Morgan has been particularly concerned with the applications of electromagnetic theory to microwave and other problems. As Head, Mathematical Physics Department, he now supervises a research group in various fields of mathematical physics. Fellow, IEEE; member, American Physical Society, Sigma Xi, Tau Beta Pi and A.A.A.S.

D. J. NEWMAN, B.A., 1951, New York University; Ph.D., 1958, Harvard University. Dr. Newman worked as an industrial mathematician from 1953 to 1957. Instructor and lecturer, Massachusetts Institute of Technology, 1957–59; Assistant Professor of Mathematics, Brown University, 1959–60; Associate Professor of Mathematics, Yeshiva University, 1960—. He has been a mathematical consultant to Bell Laboratories since January, 1961. Member, Mathematical Association of America and American Mathematical Society.

HARRISON E. ROWE, B.S., 1948, M.S., 1950, and Sc.D., 1952, M.I.T.; Bell Telephone Laboratories, 1952—. He was initially associated with a group engaged in systems research. He later worked on mode conver-

sion problems arising in multimode waveguides. Presently, he is concerned with problems relating to optical systems. Member, IEEE, Sigma Xi, Tau Beta Pi, and Eta Kappa Nu.

IRWIN W. SANDBERG, B.E.E., 1955, M.E.E., 1956, and D.E.E., 1958, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1958—. He has been concerned with analysis of military systems, particularly radar systems, and with synthesis and analysis of active and time-varying networks. He is currently involved in a study of the signal-theoretic properties of nonlinear systems. Member, IEEE, Society for Industrial and Applied Mathematics, Eta Kappa Nu, Sigma Xi and Tau Beta Pi.

ERLING D. SUNDE, Dipl. Ing., 1926, Technische Hochschule, Darmstadt, Germany; American Telephone and Telegraph Co., 1927–1934; Bell Telephone Laboratories, 1934—. He has made theoretical and experimental studies of inductive interference from railway and power systems, lightning protection of the telephone plant, and fundamental transmission studies in connection with the use of pulse modulation systems. He is the author of *Earth Conduction Effects in Transmission Systems*, a Bell Laboratories Series book. Fellow, IEEE; member, A.A.A.S., American Mathematical Society.