

## Contributors to this Issue

WILLIAM E. ADAMS, B.S.I.E., University of Florida, 1949; Southern Bell Telephone Co., 1949–1953; Bell Telephone Laboratories, 1953—. Mr. Adams first worked with the cable methods development group. He has since worked with carrier systems development and is presently with the transmission circuits group for L-carrier terminals. Presently attending Graduate School at Northeastern University, evenings. Registered Professional Engineer, Massachusetts.

W. G. ALBERT, Bell Telephone Laboratories, 1951—. Since his association with the Laboratories, Mr. Albert has worked on equipment development engineering for carrier telephone terminals and carrier supplies for broadband coaxial and microwave transmission systems. Member, IEEE.

E. G. ANDREWS, B.A., 1922, William Jewell College; W. E. Co., 1922–25; Bell Telephone Laboratories, 1925–1959. At Bell Laboratories Mr. Andrews was first concerned with engineering and maintenance specifications for central office equipment. During World War II he was engaged in the development of radar training devices and relay digital computers, and later was concerned with various phases of planning and programming for computers used in military systems. After retiring from Bell Telephone Laboratories in 1959, Mr. Andrews joined Sanders Associates, Inc., where he is presently Manager of Preliminary Design. Member, IEEE, American Association for Computing Machinery, American Ordnance Association; Professional Engineer, State of New Hampshire.

F. R. BIES, B.S.E.E., Cooper Union, 1930; Bell Telephone Laboratories, 1925—. Mr. Bies has worked on the development of quartz crystals and electrical filters for long and short-haul carrier systems. He is presently concerned with the development of filters and equalizers for broadband carrier terminal equipment.

OMER P. CLARK, B.S.E.E., 1941, State University of Iowa; Western Electric Co., 1941–43; Bell Telephone Laboratories, 1943—. Mr. Clark's

assignments at the Laboratories have included circuit design for a wide variety of radar equipment, both airborne and ground-based, and design of circuits for the digital computer for the Nike Zeus system. He is presently working on primary frequency supplies and transmission amplifiers for broadband carrier equipment. Senior member, IEEE, member Eta Kappa Nu.

THEODORE V. CRATER, B.S.E.E., 1947, Montana State College; M.S.E.E., 1949, California Institute of Technology; Ph.D., 1953, Northwestern University; faculty, Michigan College of Mining and Technology, 1949-50; Bell Telephone Laboratories 1953—. Mr. Crater has been engaged in studies of problems in pulse transmission over telephone cable pairs. At present, he is in charge of a group studying experimental video communication. Member, IEEE, Eta Kappa Nu.

HOWARD CRAVIS, M.A., Harvard University, 1949; Bell Telephone Laboratories 1953—; Communications Development Training Fellowship, 1956-1960. He has made transmission systems studies related to speech interpolation, video communication, and short-haul trunk carrier systems. Member, IEEE.

A. DESCLOUX, Math. Dipl., École Polytechnique Fédérale (Swiss Federal Institute of Technology), 1948; Ph.D., Mathematical Statistics, University of North Carolina, 1961. After spending 1955-56 on the staff of the University of Washington where he taught mathematics and statistics, Dr. Descloux joined Bell Telephone Laboratories in 1956. At the Laboratories, he has been concerned chiefly with the application of probability theory to traffic problems. Member, Institute of Mathematical Statistics, American Mathematical Society, and Society for Industrial and Applied Mathematics.

ELBERT J. DRAZY, B.S. in E.E., 1942, Purdue University; Bell Telephone Laboratories, 1942—. During World War II he was concerned with the development of test equipment for microwave radar. Between 1951 and 1962 he was engaged in the development of test equipment for microwave radio relay systems and video transmission systems and of carrier supply equipment for the L-type multiplex. At present he is concerned with the development of FM terminals for the TD3 radio relay system. Member, Eta Kappa Nu, Tau Beta Pi, Sigma Xi.

JAMES B. EVANS, JR., Sc.B., Brown University, 1947; M.S.E.E.,

Worcester Polytechnic Institute, 1949; Bell Telephone Laboratories, 1949—. Mr. Evans' first assignment was the development of filters for coaxial carrier systems; he later worked on the design of thermistors and on development of short-haul carrier systems. He is presently supervisor of a group working on development of carrier frequency supplies for frequency-division multiplex terminals.

JOHN J. GINTY, B.S., 1950, and M.S., 1951, Boston College; M.B.A., 1962, Northeastern University; Bell Telephone Laboratories, 1956—. Mr. Ginty was first engaged in improvement program work for long-haul coaxial carrier systems. More recently he has been involved in the design and development of solid-state circuits for carrier and carrier terminal systems.

R. SHIELDS GRAHAM, B.S.E.E., University of Pennsylvania, 1937; Bell Telephone Laboratories, 1937—. Mr. Graham did graduate work at Columbia University and Polytechnic Institute of Brooklyn. He first worked with the design of equalizers and filters for use in broadband transmission systems. During World War II, he designed circuits for electronic fire control computers. Since then he has headed groups working on network design, computer analysis of systems, pulse transmission systems, multiplex terminals, and presently heads a group working on transistor feedback amplifiers. Mr. Graham is a senior member of IEEE and a member of Tau Beta Pi and Pi Mu Epsilon.

HERMANN K. GUMMEL, Dipl. Phys., 1952, Philipps University (Germany); M.S., 1952, and Ph.D., 1957, Syracuse University; Bell Telephone Laboratories, 1956—. His work has been in research and development of semiconductor devices. Member, American Physical Society, Sigma Xi.

F. J. HALLENBECK, E.E., 1936, Polytechnic Institute of Brooklyn; Western Electric Co., 1923-25; Bell Telephone Laboratories, 1925—. For many years he was involved in the development of transmission networks for Bell System and military communication facilities. He later supervised a group engaged in the development of broadband carrier systems. In 1958 he assumed responsibility for L-carrier terminal development. Senior member, IEEE; member, Tau Beta Pi, Eta Kappa Nu.

JOHN B. HARLEY, B.S.E.E., Brooklyn Polytechnic Institute, 1936; Western Electric Co., 1924-25; Bell Telephone Laboratories, 1925-26, 1928—. Mr. Harley's early work was in the field of carrier transmission

of radio broadcasts and the design of audio amplifiers and radio receivers. He later worked on sound recording and on systems development of mobile radiotelephone equipment. More recently he has been engaged in systems development of broadband microwave transmission facilities and is presently engaged in the design of carrier supplies for multiplex systems. Senior member, IEEE, member, Eta Kappa Nu and Tau Beta Pi.

J. J. MAHONEY, JR., A.T.&T.Co., 1926-34; Bell Telephone Laboratories, 1934—. At the Laboratories, Mr. Mahoney has worked on studies of protection systems for outside plant, the design of cathode-ray oscilloscopes used in radar test equipment, and systems engineering studies for carrier and wideband data transmission systems. He presently supervises a group responsible for transmission engineering of long-haul carrier systems. Member, IEEE.

DIETRICH MARCUSE, Diplom. Vorpruefung, 1952, and Dipl. Phys., 1954, Berlin Free University; D.E.E., 1962, Technische Hochschule, Karlsruhe, Germany; Siemens and Halske (Germany), 1954-1957; Bell Telephone Laboratories, 1957—. At Siemens and Halske Mr. Marcuse was engaged in transmission research, 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. Member, IEEE.

R. E. POWERS, Bell Telephone Laboratories, 1953—. Mr. Powers' early work at the Laboratories was in the systems engineering area, where he was concerned with telephone signaling problems. In 1955, he was assigned to transmission development at the Merrimack Valley Laboratory, where, initially, he participated in developments concerning short-haul carrier telephone systems. Later, he was associated with the development of a wideband data transmission system. At present, he has responsibility for a number of the systems aspects of the L Multiplex development, including the regulator circuits described in the present article. He is attending the Graduate School at Northeastern University, evenings. Member, IEEE.

W. ROSENZWEIG, B.S., 1950, Rutgers University; M.S., 1952, University of Rochester; Ph.D., 1960, Columbia University. Brookhaven National Laboratory, 1951-53; Radiological Research Laboratory, Columbia University, 1953-1960; Bell Telephone Laboratories, 1960—. At Bell Laboratories, Mr. Rosenzweig has been mainly engaged in

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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. Member, IEEE, Eta Kappa Nu, Sigma Xi, Tau Beta Pi.

FRIEDOLF M. SMITS, Dipl. Phys., 1950, Dr. rer. nat., 1950, University of Freiburg, Germany; research associate, Physikalisches Institut, University of Freiburg, 1950–54; Bell Telephone Laboratories, 1954–62. Mr. Smits went to the Sandia Corporation in May 1962. His work at Bell Telephone Laboratories included studies of solid-state diffusion in germanium and silicon, device feasibility, and process studies, as well as the development of UHF semiconductor devices. He supervised a group that conducted radiation damage studies on components, particularly solar cells, used in the Telstar experimental satellite. Member of the American Physical Society and the German Physical Society.

LAJOS F. TAKÁCS, Doctor's Degree, 1948, University of Technical and Economical Sciences, Budapest; Doctor of Mathematical Sciences, 1957, Hungarian Academy of Sciences; Tungsram Research Laboratory (Telecommunications Research Institute), Budapest, 1945–55; Research Institute for Mathematics of the Hungarian Academy of Sciences, 1950–58; Roland Eötvös University, Budapest, 1953–58; Columbia University, 1959—; consultant, Bell Telephone Laboratories, 1959—. At present he is teaching probability theory and stochastic processes, and he is engaged in research in the mathematical theory of telephone traffic. Fellow, Institute of Mathematical Statistics. Member, American Mathematical Society, Mathematical Association of America, Society for Industrial and Applied Mathematics, American Statistical Association, Sigma Xi.

D. C. WELLER, A.B., 1946, Kenyon College; M.S.E.E., 1948, University of Illinois; Bell Telephone Laboratories, 1948—. His early work at the Laboratories included development of telephone carrier systems and exploratory development of a PCM carrier system. More recently he has engaged in computer development and is presently head of a group working on design of portions of the broadband carrier terminal equipment. Member, IEEE and Eta Kappa Nu.

