

Contributors to This Issue

CYRUS F. AULT, B.E.E.E., 1950, University of Southern California; M.S., 1955, Stevens Institute of Technology; Bell Telephone Laboratories, 1955—. He first worked on the electronic switching of the Morris, Illinois, trial installation. He is now working on the program store (twistor) of No. 1 ESS. Member, IEEE.

RULON BIDDULPH, B.S., 1925, Brigham Young University; Bell Telephone Laboratories, 1929—. Mr. Biddulph has engaged successively in investigations of the physiological acoustics of the hearing process, optical recording and reproduction of stereophonic sound, magnetic recording, antisubmarine subsurface ordnance, acoustic torpedoes, the structure and specification of speech, and the automatic recognition of spoken digits. He is currently concerned with transmission aspects of No. 1 ESS. Member, Acoustical Society of America.

ALBERT H. BUDLONG, B.N.S., 1945, B.E.E., 1948, M.S. (Physics), 1950, faculty, 1950–1953, Marquette University; Bell Telephone Laboratories, 1953—. He was initially associated with a group engaged in switching training and later supervised a group conducting switching training courses. He currently supervises a group engaged in the design of trunk and service circuits for No. 1 ESS. Member, Sigma Pi Sigma and Pi Mu Epsilon. Visiting Lecturer in Electrical Engineering at Stevens Institute of Technology.

WILLIAM B. CAGLE, B.S.E.E., 1953, University of Oklahoma; Bell Telephone Laboratories, 1953—. Mr. Cagle was first engaged in the design of semiconductor logic circuits for the Morris, Illinois, experimental electronic switching system. He subsequently supervised the characterization of the semiconductor devices, design of the logic circuits, and logic design of the central control and signal processor for No. 1 ESS. At present he heads a department responsible for development of the PICTUREPHONE set, mobile telephones, and exploratory development of lineless telephones. Member, IEEE, Tau Beta Pi, Eta Kappa Nu and Sigma Tau.

DAVID H. CARBAUGH, B.S.E.E., 1959, University of Pittsburgh; M.E.E., 1961, New York University; Bell Telephone Laboratories, 1959—. At the Laboratories he has been chiefly concerned with the system program development of No. 1 ESS.

R. C. CASTERLINE, B.S.E.E., 1956, Newark College of Engineering; Western Electric Co., 1941–1951; Bell Telephone Laboratories, 1951—. With Western Electric, Mr. Casterline was engaged in the inspection and testing of radio and radar equipment. With Bell Laboratories he was until 1956 a member of the component development department, where he was engaged in testing and evaluating ferroelectric devices and analog computer networks. In 1956 he transferred to the electronic switching department and has been concerned with circuit design for the Morris, Illinois, field trial and with trunk and service circuit development for No. 1 ESS.

J. G. CHEVALIER, B.E.E., 1951, Ohio State University; Bell Telephone Laboratories, 1956—. He has been engaged in various phases of printed wiring processes and applications for military projects and No. 1 ESS. More recently he has worked on the design and packaging of electronic equipment and the study of contact finishes.

JOSEPH B. CONNELL, B.S., 1958, University of Rhode Island; M.E.E., 1960, New York University; Bell Telephone Laboratories, 1958—. Mr. Connell worked on the maintenance planning aspects of the No. 1 ESS system design and served as an instructor in the communications development training program. He presently supervises a group responsible for generating systems engineering requirements dealing with new applications and new services for No. 1 ESS. Member, IEEE, Tau Beta Pi and Phi Kappa Phi.

DANIEL DANIELSEN, Ing. (Electrical Engineering), 1949, Stockholm Technical Institute; Bell Telephone Laboratories, 1953—. He was engaged in the circuit design and systems development of several phases of electronic switching systems. He has worked on the recording of AMA data on magnetic tape, data transmission over voice-frequency channels, and switching network design for No. 1 ESS. At present, he is concerned with the problem of interchange of data between No. 1 ESS and remotely located data recording systems.

H. J. DOUGHERTY, B.S.E.E., 1955, M.S.E.E., 1956, University of Maine; New England Telephone and Telegraph Co., 1941–1956; Bell

Telephone Laboratories, 1956—. He was first engaged in the design and development of circuits for the experimental electronic switching system. More recently he has been concerned with formulating systems engineering requirements for electronic switching systems. He presently supervises a group responsible for ESS operating requirements and maintenance. Member, IEEE and Tau Beta Pi.

RANDALL W. DOWNING, B.S.E.E., 1959, University of Washington; M.E.E., 1961, New York University; Bell Telephone Laboratories, 1959—. He has been concerned primarily with the problems of providing automatic maintenance facilities for electronic switching systems. He presently supervises a group responsible for the maintenance planning and programming for the control units of No. 1 ESS. Member, ACM, IEEE, Phi Beta Kappa, Tau Beta Pi and Eta Kappa Nu. Associate Member, Sigma Xi.

GLEN G. DREW, B.S.E.E., 1936, Rutgers University; Bell Telephone Laboratories, 1946—. After assisting in the development of automatic message accounting and crossbar tandem circuits, he worked with an exploratory development group studying the introduction of electronic techniques to telephone switching. Since then he has been engaged in various aspects of electronic switching developments. He currently supervises a group responsible for the introduction of metropolitan office features in No. 1 ESS. Member, Tau Beta Pi, Phi Beta Kappa and IEEE.

KERMIT S. DUNLAP, B.S. (Eng. Physics), Lehigh University, 1937; Bell Telephone Laboratories, 1937—. He first joined an acoustics research group, where he was concerned with tone generators for customer key pulsing systems. During World War II, he worked on antiaircraft fire-control analog computers. In 1946, he joined the newly formed electronic switching research group, where he was engaged in the first electronic switching experimental projects. In 1954, he transferred to the No. 1 ESS development department, where he now supervises the group on switching network design. Member, IEEE and Phi Beta Kappa.

R. K. EISENHART, B.S.M.E., 1957, Pennsylvania State University; M.E.E., 1959, New York University; Bell Telephone Laboratories, 1957—. Mr. Eisenhart was first engaged in the development of the automatic photographic processor used in conjunction with the flying-spot store of the Morris electronic switching system. At present he supervises

a group responsible for the design of apparatus and equipment used in No. 1 ESS. Member, Pi Tau Sigma and Tau Beta Pi.

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. At present he heads a department responsible for the development of switching networks, trunks and scanners, and for transmission aspects of No. 1 ESS. Member, Sigma Xi.

JAMES G. FERGUSON, B.S.E.E., 1923, Queen's University (Canada); Northern Electric Co., 1923–1926; Bell Telephone Laboratories, 1926—. Prior to World War II he developed equipment for step-by-step central offices, community dial offices, private branch exchanges, and station systems. Through the war, he supervised the equipment development of a variety of radio and radar projects. From 1945 to 1958 he was responsible for the equipment development of the No. 5 crossbar, and since that time he has made equipment studies for No. 1 ESS. Life member, IEEE.

LAIMONS FREIMANIS, Technische Hochschule, Munich; B.S.E.E., 1951, M.S.E.E., 1952, Michigan State University; Bell Telephone Laboratories, 1952—. He first worked on development of signaling systems for Civil Aeronautics Administration networks. Since completing the communications development training program he has been engaged in exploratory and development work on electronic switching systems. Member, Tau Beta Pi, Eta Kappa Nu and Sigma Pi Sigma.

DOLIVE L. FUNK, B.E.E., 1956 and M.S.E. (E.E.), 1957, University of Florida; Bell Telephone Laboratories, 1957—. He prepared the switching network controller automatic maintenance for the ESS trials at Morris, Ill. On No. 1 ESS he worked on the duplication, switching, and maintenance of the central pulse distributor and was also responsible for designing the automatic maintenance of trunk and service circuits. He is currently planning the operational testing of No. 1 ESS. Member, IEEE.

LEE E. GALLAHER, B.S.E.E., 1951, M.S.E.E., 1956, Case Institute of Technology; Bell Telephone Laboratories, 1955—. He first worked on the design of the flying-spot store for the Morris experimental central

office, and later worked on the design of the program stores for No. 1 ESS. Member, Sigma Xi and Tau Beta Pi.

RICHARD M. GENKE, B.S.E.E., 1954, University of Wisconsin; M.S.E.E., 1961, Columbia University; Bell Telephone Laboratories, 1954—. Since 1954 Mr. Genke has been engaged in memory system development for electronic switching systems, including the barrier grid store for the Morris electronic central office and the No. 1 ESS call store. Member, Tau Beta Pi and Eta Kappa Nu.

H. GHIRON, B.S., 1952, M.S., 1954, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1955—. He has been engaged in systems development work, first for the Morris ESS experiment and currently for the No. 1 ESS. Member, A.C.M., IEEE and Sigma Xi.

L. F. GOELLER, JR., B.E.E., 1953, M.E.E., 1954, University of Virginia; Bell Telephone Laboratories, 1954—. Since coming to Bell Laboratories he has worked on circuits for electronic switching systems. Member, IEEE.

T. SPENCER GREENWOOD, B.S.E.E, 1951, Northeastern University; M.S.E.E, 1953, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1953—. Since starting at the Laboratories, Mr. Greenwood has been associated with the development of memory systems for electronic switching. These included the barrier grid store and flying-spot store used in the Morris experimental electronic switching system, and the permanent magnet twistor store for No. 1 ESS. Member, Eta Kappa Nu, Tau Beta Pi, Sigma Xi and IEEE.

W. E. GRUTZNER, B.S.E.E, 1935, Cooper Union; Bell Telephone Laboratories, 1925—. He first worked for the Laboratories as an office boy, draftsman, and instructor. Since 1935 he has worked in various equipment development organizations, including trial installations; panel, step-by-step, and toll analyzation; radar development; and No. 1 and No. 5 crossbar. He also worked in the systems engineering department, where he supervised a group responsible for the establishment of requirements for audio recording and announcement systems. At present, he is in charge of a group responsible for the equipment development of No. 1 ESS switching networks and associated peripheral equipment.

ANTHONY M. GUERCIO, B.S.E.E., 1955, Mississippi State University;

M.S.E.E., 1960, New York University; Bell Telephone Laboratories, 1955—. He was initially associated with a group developing the flying-spot store. After completing the communications development training program, he worked on scanners until recently. He is now a member of a common systems circuit group. Member, Tau Beta Pi and Phi Kappa Phi.

PHILIP A. HARDING, B.E.E., 1954, Cooper Union; M.S.E.E., 1960, Columbia University; Bell Telephone Laboratories, 1954—. He has been primarily concerned with the development of No. 1 ESS call stores. He presently supervises a group concerned with development of memories, design of logic circuits, and evaluation of semiconductor devices for application in No. 1 ESS and the DAC systems. Member, Tau Beta Pi.

J. A. HARR, B.S., 1940, Roanoke College; M.S. (Applied Science), 1951, Harvard University; Bell Telephone Laboratories, 1955—. Mr. Harr worked in the Harvard Computation Center from 1947 to 1955. His work involved both design and programming of computers developed by the staff of the computation center. Since 1955 he has been engaged in both the design of central control equipment and programming of the electronic switching system. He is now Head, Electronic Switching Programs Department. Member, Harvard Engineering Society.

G. HAUGK, B.S.E.E., 1952, Newark College of Engineering; New York University; Western Electric Company, 1947–1948; Bell Telephone Laboratories, 1952—. After completing the communications development training program course, Mr. Haugk worked on design of circuits for electronic switching systems for three years. Following this he supervised a group responsible for field trial and testing of electronic switching systems. He presently heads a department responsible for No. 1 ESS evaluation, personnel training, and information activities. Member, IEEE.

W. S. HAYWARD, JR., A.B., 1943, S.M., 1947, Harvard University; Bell Telephone Laboratories, 1947—. He was first engaged in traffic studies of telephone switching systems. Since 1958 he has been working on the systems engineering of the No. 1 ESS. Member, IEEE, Operations Research Society of America, Association for Computing Machinery and Society of Harvard Engineers and Scientists.

H. ROBERT HOFMANN, B.E.E., 1957, University of Florida; M.E.E.,

1962, New York University; Bell Telephone Laboratories, 1957—. Mr. Hofmann first worked on the experimental ESS remote line concentrator, followed by work on the ferreed switch. Later he was involved in the design of the ferrod used in the No. 1 ESS scanner. More recently he was concerned with circuits for the No. 1 ESS switching network control. At present, he is working on the addition of centrex to No. 1 ESS. Member, Sigma Tau.

ERNA S. HOOVER, B. A., 1948, Wellesley College; Ph.D., 1951, Yale University; Bell Telephone Laboratories, 1954—. Mrs. Hoover has been engaged in systems engineering studies, including the formulation and evaluation of the system plans for the No. 1 ESS data processor and its program. Member, Association for Computing Machinery, Association for Symbolic Logic, American Philosophical Association and Phi Beta Kappa.

LUTHER W. HUSSEY, A. B., 1923, Dartmouth College; A.M., 1924, Harvard University; B.S.E.E., 1930, Union College; Bell Telephone Laboratories, 1930—. Mr. Hussey's major activities have been in the development and application of semiconductor devices, starting with studies of copper-oxide and similar devices for modulators in carrier systems, and magnetic materials such as permalloy for amplifiers and pulse generators. He was active in the early development of transistors and in exploratory work on their applications. At present he is supervising a group working in the control area of No. 1 ESS. Senior member, IEEE.

WILLIAM KEISTER, B.S.E.E., 1930, Alabama Polytechnic Institute; Bell Telephone Laboratories, 1934—. His early work with Bell Laboratories was on switching and signaling systems. During World War II, he instructed Army and Navy personnel on the operation and maintenance of fire-control radar equipment. He organized and taught courses on switching circuit design to Laboratories personnel and is co-author with A. E. Ritchie and S. H. Washburn of the book *The Design of Switching Circuits*. In 1958 he was appointed Director, Electronic Switching Systems Engineering Center, with responsibility for the engineering planning of electronic telephone switching systems. Member, IEEE, Eta Kappa Nu, Tau Beta Pi and Phi Kappa Phi.

RAYMOND W. KETCHLEDGE, B.S. and M.S., 1942, M.I.T.; Bell Telephone Laboratories, 1942—. Until 1946 he was associated with military

developments in the fields of infrared detection and underwater sound. During the next six years, Mr. Ketchledge participated in the development of a submarine cable system and a broadband coaxial carrier system. In 1953 he became responsible for gas tube and storage tube development as an electron tube development engineer. The next year he was appointed a switching system development engineer, responsible for electronic memories and switching networks for electronic switching systems. Mr. Ketchledge was made Assistant Director of Switching Systems Development in 1956. He became Director, Electronic Switching Laboratory at Holmdel in 1959. He has had 51 U.S. patents issued and 5 are pending. Member, Sigma Xi; Senior Member, IEEE.

D. C. KOEHLER, B.S.E., 1941, University of Illinois; M.S.E.E., 1950, Stevens Institute of Technology; Bell Telephone Laboratories, 1941—. He first participated in the mechanical design of the M9 gun data computer, various bombsight and antiaircraft radar equipment, the M13 depth-charge mechanism, and switching relays. Since 1954 he has supervised the mechanical design of the memory systems for both the Morris trial and No. 1 ESS. These systems have included the barrier grid store, the flying-spot store, the ferrite sheet call store, the twistor program store, and related equipment for handling and writing the twistor memory cards. He is also responsible for the No. 1 ESS frameworks, cable racks and end guards. Member, Tau Beta Pi and Phi Kappa Phi.

N. A. MARTELLOTTO, B.E.E., B.S. (Applied Mathematics), 1957, Georgia Institute of Technology; M.S.E.E., New York University, 1959; Bell Telephone Laboratories, 1957—. Mr. Martellotto was initially associated with the Bell System data processing project, where he did some preliminary logic design work and also contributed to a machine aids to design program system. Using a general-purpose computer as a tool, he later did exploratory work on the analysis of logic circuits and also completed an interpretive simulation program for the No. 101 electronic switching system. He currently supervises the compiler program group in No. 1 ESS with the responsibility for developing several utility system programs. Member, IEEE, Tau Beta Pi and Eta Kappa Nu.

HAROLD F. MAY, B.S.E.E., Cooper Union, 1927; graduate studies at New York University and Polytechnic Institute of Brooklyn; P.E., New York State; New York Telephone Company, 1922–1929; Tele-register Corporation, 1929–1954; Bell Telephone Laboratories, 1954—. He has been associated with special customer service developments,

stock quotation services, air traffic control, military digital and analog computer simulators, magnetic drum applications to crossbar systems, and electronic switching systems. At present, he is supervising a group which is concerned with peripheral sensing and control functions and transmission in No. 1 ESS. Member, IEEE, Communications Switching Committee and Communications Division.

ROBERT S. MENNE, B.E.E., 1953, Clarkson College of Technology; M.S.E.E., 1959, Newark College of Engineering; Bell Telephone Laboratories, 1953—. After completing the communications development training program, he worked on transmission system terminal equipment. Since 1958 he has been engaged in the logic design of circuits for the No. 1 ESS central control. Member, Eta Kappa Nu.

J. S. NOWAK, Bell Telephone Laboratories, 1955—. Mr. Nowak has worked in the system planning area on the Morris experimental electronic telephone central office. He is currently concerned with the system planning and maintenance requirements for No. 1 ESS.

H. OEHRING, B.S. (Mathematics), Lafayette College, 1958; M.S. (Mathematics), Ohio University, 1960; Bell Telephone Laboratories, 1960—. He has assisted in the assembler and macro language design of PROCESS III, written utility routines for computers, and engaged in military systems probability studies. Currently, he is engaged in real-time programming and debugging of the No. 1 ESS stored program. Member, Sigma Pi Sigma.

MARVIN C. PAULL, B.E.E., 1952, Clarkson College of Technology; Bell Telephone Laboratories, 1953—. At Bell Laboratories his work has included studies in the use of magnetic cores in computer design, research and development in the logical design of computer circuitry, and computer programs. Member, IEEE, Eta Kappa Nu and Tau Beta Pi.

HELMO RAAG, B.S.E.E., 1953, Oklahoma State University; M.S.E.E., 1959, New York University; Bell Telephone Laboratories, 1953—. He completed the communications development training program in 1956. He was first engaged in the development of the flying-spot store and permanent magnet twistor memory systems for electronic switching systems, and later supervised a group concerned with the development of the ferreed crosspoint. Since 1962 he has been supervisor of the group developing the master control center for the No. 1 ESS project. Member, Eta Kappa Nu, Phi Kappa Phi and Pi Mu Epsilon.

PHILIP G. RIDINGER, B.S.E.E., 1950, Lehigh University; M.S.E.E., 1960, Stevens Institute of Technology; Bell Telephone Laboratories, 1950—. He has been engaged in the exploratory development of remote line concentrators, ferreed crosspoints, and space division switching networks. More recently he worked on the design of the master control center for No. 1 ESS, and is presently in charge of a group responsible for the design of common systems circuits and the remote switching unit. Member, Eta Kappa Nu and Tau Beta Pi.

ROBERT S. SKINNER, B.S.E.E., 1939, University of Kansas; Southwestern Bell Telephone Company, 1939–1942; Bell Telephone Laboratories, 1942—. Mr. Skinner has been engaged in the development of military radar systems, the Nike-Ajax system, and the civil emergency reporting system, as well as a variety of telephone switching systems. He presently supervises a group responsible for control equipment design for electronic switching systems. Senior member, IEEE.

MICHAEL T. SKUBIAK, B.S.M.E., 1959, University of Akron; M.S.E.M., 1963, Ohio State University; Bell Telephone Laboratories, 1959—. He has been engaged in the development of the printed wire board connector, four-wire ferreed switch, and the distributing frames for No. 1 ESS. He currently is a supervisor of an equipment design group for UNICOM. Member, Sigma Tau, Pi Mu Epsilon and Sigma Xi.

ROBERT B. SMITH, A.B., 1950, M.A., 1951, Ph.D., 1957, Yale University; Bell Telephone Laboratories, 1956—. Mr. Smith has been engaged in programming development for electronic switching systems. He is at present in charge of a group preparing call processing programs for No. 1 ESS. Member, Association for Computing Machinery, American Mathematical Society and Phi Beta Kappa.

ROBERT E. STAEBLER, B.S.E.E., 1947, The College of the City of New York; M.S.E.E., 1948; further graduate studies, Polytechnic Institute of Brooklyn; Bell Telephone Laboratories, 1948—. His early work was on local signaling systems, voice-frequency toll signaling systems, and early Nike missile trainer studies. Since 1953 he has been engaged in development work on electronic switching systems. He headed the department responsible for the development of the memory systems for the experimental field trial of the electronic central office in Morris, Illinois, and the central control and temporary memory circuits for No. 1 ESS. Currently, as Director, Electronic Switching Projects Labora-

tory, he has responsibility for the development of electronic voice, message, and data switching projects. Member, IEEE, Eta Kappa Nu, Tau Beta Pi and Sigma Xi.

A. A. STOCKERT, B.S.E.E., 1957, University of Dayton; M.S.E.E., 1959, New York University; Bell Laboratories, 1957—. He was first engaged in the design of aircraft control data links. He is currently engaged in maintenance program planning for No. 1 ESS.

FRANK F. TAYLOR, B.S.E.E., 1955, University of Kentucky; Bell Telephone Laboratories, 1955—. His work at Bell Laboratories has included circuit and logic design in the development of electronic telephone switching systems. He has also taught courses in electronic switching as part of the Laboratories sponsored operating engineers training program. Member, Eta Kappa Nu and Tau Beta Pi.

S. H. TSIANG, B.S., 1947, University of Nanking; M.S., 1949, Carnegie Institute of Technology; Union Switch and Signal, 1949-1956; Bell Telephone Laboratories, 1956—. Mr. Tsiang has worked on maintenance and administration circuits and requirements for an experimental electronic central office. Currently he is engaged in test planning, programming and field testing for the No. 1 electronic switching system.

LEE S. TUOMENOKSA, B.S., 1952, Worcester Polytechnic Institute; S.M., 1954, Massachusetts Institute of Technology; Bell Telephone Laboratories, 1954—. Mr. Tuomenoksa first worked on operational program design for the Morris experimental switching system. Since then he has supervised a group responsible for No. 1 ESS maintenance planning and programming. Member, IEEE, ACM, Tau Beta Pi, Sigma Xi and Eta Kappa Nu.

W. ULRICH, B.S., 1952, M.S., 1953, Dr. Eng. Science, 1957, Columbia University School of Engineering; Bell Telephone Laboratories, 1953—. Mr. Ulrich was first engaged in the design of automatic maintenance circuits and programs for the experimental electronic central office installed in Morris, Illinois. In 1959, he started working on the No. 1 ESS; on this project, he worked on over-all systems coordination, central control organization, control of the network, translations, and the equipment numbering and addressing plan. Since February, 1964, he has headed a department developing programs for UNICOM, a military communications system.

M. DEAN UNDERWOOD, B.S., 1952, Pennsylvania State University; Bell Telephone Laboratories, 1952—. Mr. Underwood's early work was concerned with improving the properties of point contact diodes. Since graduating from the communications development training program, he has been engaged in the design of semiconductor circuits for applications in electronic switching systems.

H. EARLE VAUGHAN, B.S. (in C.E.), 1933, Cooper Union; Bell Telephone Laboratories, 1928—. Mr. Vaughan joined the transmission research department in 1928. He was first engaged in work on voice-operated devices and studies of the effects of speech and noise on voice frequency signaling systems. During World War II he worked on anti-aircraft computers, fire-control radar, and other military projects. He was later concerned with digital techniques and systems, data transmission, and electronic switching systems. He holds many patents and has written several papers in technical journals. He was appointed switching systems research engineer in 1955, and Director of Systems Research in 1958, in charge of research on television, mobile radio, switching and integrated communication systems. He was appointed Director, Electronic Switching System Center in 1962, with responsibility for system design and programming of a new electronic switching system. Fellow, IEEE.

HILDEGARD M. VELLENER, M.S. (mathematics), 1939, Johann Wolfgang Goethe University, Frankfurt; Bell Telephone Laboratories, 1957—. Her entire career at Bell Laboratories has been in the area of electronic switching.

D. H. WETHERELL, B.S.E., 1923, Lafayette College; Western Electric Company, 1923; Bell Telephone Laboratories, 1925—. Mr. Wetherell worked on development of equipment for all types of telephone switching systems until World War II, when he was supervisor of a group responsible for the design of airborne radar systems for the armed forces. After the war, he supervised a group working on the development of equipment for toll telephone switching systems and later headed a group responsible for the development of circuits and equipment for nationwide dialing. At present, he is in charge of a department engaged in the design and development of equipment for No. 1 ESS.

L. ZIMMERMAN, B.E.E., 1952, Brooklyn Polytechnic Institute; Bell

Telephone Laboratories, 1952—. After completing the communications development training program course, Mr. Zimmerman worked in a telephone switching exploratory development group. Since 1956 he has been engaged in various aspects of testing electronic switching systems. Member, Eta Kappa Nu, Tau Beta Pi and Sigma Xi.

