

Abstracts

The Regeneration of Binary Microwave Pulses by O. E. DeLange, Bell Telephone Laboratories.

The chief advantage of binary pulse systems resides in the possibility of regenerating such pulses at intervals along the transmission route to prevent the accumulation of distortions due to noise, bandwidth limitations, and other disturbing effects. A very important part of any such transmission system is the regenerative repeater employed. This paper reports the results of experiments performed to determine the possibilities of such a repeater operating in the microwave frequency range.

With maximum economy in mind, a simple device was developed for producing partial regeneration directly at microwave frequencies. To determine the capabilities of such a regenerator, one of them was included in a circulating test loop in which pulse groups were passed through the device a large number of times. Results indicate that even in the presence of serious noise and bandwidth limitations pulses can be regenerated many times without noticeable deterioration.

It was found that for "errorless" transmission through a long chain of such repeaters, the required signal-to-noise ratio is approximately 5 db higher than

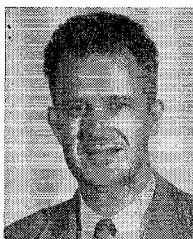
the theoretical value for an ideal system. Part of this difference is attributable to the fact that only partial regeneration was used and part to other imperfections in the system.

Noise Measurements in the UHF Range by E. Maxwell and B. J. Leon, Massachusetts Institute of Technology.

Comparative noise figure measurements in the 400 mc frequency range have been made using commercial noise diode sources, thermal noise sources, and fluorescent lamps as noise generators. The thermal sources were of two kinds, a high temperature source at about 1,000°K and a low temperature source at 4°K. Measurements made with noise diodes yielded results about 1.0 db higher than those made with the thermal noise sources, from which it is inferred that the diodes are not satisfactory primary standards of noise in this frequency range. The effective noise temperature of a standard 6 w fluorescent tube (coupled to a helical line) was determined to be approximately 12,000°K by comparing its noise output with that of the hot thermal source. This is consistent with the figure of 11,400°K reported by Mumford at 4,000 mc.

Contributors

Frederick J. Altman (S'36-A'40-M'47) was born on March 7, 1915, in New York, N. Y. He received the B.S. and M.S. degrees



F. J. ALTMAN

on doppler radar and other projects. Mr. Altman is currently a senior project engineer in the Radio Communication Laboratory.

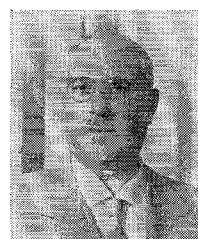
from Massachusetts Institute of Technology in 1938. From 1940 to 1946 he served as a radar officer with the Army Air Force.

In 1946 he joined the Federal Telecommunications Laboratories, a division of International Telephone and Telegraph Corporation, working

degree in physics from Turin University.

From 1923 to 1925 he was Experimental Physics Assistant at the Turin Polytechnic, and from 1925 to 1931 taught Experimental Physics and later Electrical Engineering and Electrical Measurements at the Istituto Industriale Nazionale, Fermo. In 1931 he joined the Specialized Engineering Group of the Italian Ministry of Posts and Telecommunications. Later in the Italian Signal Corps. In 1947 he was appointed Inspector General of Telecommunications. Since 1950 he has been Superior Inspector General of Telecommunications.

Mr. Antinori is a member of the Board of Directors of the P.T.T. Administration, of its Superior Technical Council and of the National Research Council. He is a senior member of the Italian Electrotechnical Association and the author of many articles on telephony, telegraphy and radio.



A. ANTINORI

Albino Antinori was born at Canicatti, in Sicily, in 1899. He graduated in mechanical industrial engineering at the Turin Polytechnic in 1921; in 1923 he received a diploma from the Scuola Superiore di Elettrotecnica G. Ferraris, Turin, and in 1925 a

Alfred C. Beck (A'30-SM'46) was born in Granville, N. Y., on July 26, 1905. He received the E.E. degree from Rensselaer Polytechnic Institute in 1927.

After two summers in the test department of the New York Edison Company, and a year as instructor in mathematics at Rensselaer, during which he did some graduate work in communications, he became a member of the Technical Staff of Bell Telephone Laboratories in 1928.

Since then he has been in the radio research department, working on antennas, waveguides, and various short-wave, radar, and microwave projects.

At present Mr. Beck is concerned with broad-band communication by means of radio relay and circular electric waveguide systems.

He is a New York state licensed professional engineer, and a member of Sigma Xi.



A. C. BECK

J. M. Clara was born in Zaragoza, Spain, in 1892. He entered the State telegraph services in 1908 while still a student. He received the degrees of Licenciado en Ciencias Quimicas in 1914, Licenciado en Ciencias Fisicas in 1916, Ingeniero de Telecomunicacion in 1920, and Ingeniero Radiotelegrafista ESE Paris in 1923.

In 1924, he joined the National Telephone Co. of Spain as a district engineer, and later became assistant chief engineer, chief engineer, and technical director. He is presently executive operating vice-president. Since 1930, he has represented the National Telephone Co. on the International Telephone Consultative Committee.

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Franklin S. Coale received the B.S. degree in engineering physics from Lehigh University in 1952, subsequently taking post graduate work in applied mathematics at New York University. In 1953 he joined the Sperry Gyroscope Co. as an associate engineer in microwave components and antennas engineering. In September, 1955, Mr. Coale joined Stanford Research Institute as a research engineer in microwave group of antenna systems laboratory, where he is engaged in development of filters and related components in strip transmission line.



F. S. COALE

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Ronald E. Davis (S'46-A'50) attended the University of Western Ontario, receiving the B.Sc. degree in radio physics in June, 1948, and the M.Sc. degree in physics in October, 1949. As assistant to the engineer in charge of electronic maintenance and operational research, he was employed at the National Research Council Atomic Energy Project, Chalk River, Ontario, from October, 1949, until



R. E. DAVIS

July, 1951. He was later made assistant research officer in the electronic design and development section.

Dr. Davis returned to the physics department at the University of Western Ontario in July, 1951, as a research associate. He received the Ph.D. degree in physics in July, 1954, and since that time has been in the physics department, as senior research associate. He was recently appointed to the Bell Laboratories.

Raymond C. Dearle (SM'44) was born in Simcol, Ontario, on August 24, 1890. He was graduated from the University of Toronto in 1914 with the B.A. in physics; in 1915 he received the M.A. degree, and in 1919, the Ph.D., both from the same institution. He was then appointed professor of physics and head of the department at the University of Western Ontario. He resigned to become research professor of physics in 1949. Dr. Dearle organized and directed a research group working with the National Research Council of Canada on radar development during World War II, and was awarded the M.B.E.

Dr. Dearle has been a Member of the Board of Governors of the Ontario Research Foundation since 1928. He is also a Fellow, Royal Society of Canada; Charter Member, Canadian Association of Physicists.

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A. G. Fox (A'40-SM'45) was born in Syracuse, N. Y. in 1912. He received the B.S. and M.S. degrees from M.I.T. in 1935. After a short time with the General Electric Co., he joined the technical staff of Bell Laboratories in 1936, and engaged in development work on mobile radio transmitters and on an early radar project. Since 1939, he has been with the Radio Research Department at Holmdel. He has been concerned with general waveguide research and has made contributions on microwave antennas, filters, phase changers and ferrite devices. Mr. Fox is currently in charge of a microwave physics group doing research in the millimeter wavelength range.

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Harold B. Goldberg (S'48-A'53) was born in Portland, Maine, on September 13, 1926. He was graduated from the University of Maine in 1939 with the B.S. in E.E., and obtained the M.S.E.E. from Northeastern University in 1955.

From 1949 to 1951 he was an electronic engineer at the Wright Air Development Center, in Dayton, Ohio. Since 1951 he has been employed at the Laboratory for Electronics in Boston, Mass., engaged in the development of microwave components and systems.

Mr. Goldberg is a member of Tau Beta Pi and Phi Kappa Phi.

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Richard E. Gray (A'26-VA'39) was born in England in 1902. He joined Standard Telephones and Cables, London, in 1924 and was engaged in the propagation tests connected with the first transatlantic radio telephone circuit. From 1927 to 1939 he was with Le Materiel Telephonique, Paris, working on high-frequency and microwave communication links.

R. E. GRAY In 1940 Mr. Gray joined The Royal Aircraft Establishment where he worked on instrument approach and landing systems. In 1943 he was transferred to the Telecommunication Research Establishment to work on radar approach and navigation systems. He has been with Federal Telecommunication Laboratories at Nutley, N. J., since 1946.

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W. K. Kahn (S'50-A'51) was born on March 24, 1929, in Mannheim, Germany, and came to this country in 1938. He completed his undergraduate studies at the Cooper Union School of Engineering, receiving the B.E.E. in 1951.

Mr. Kahn was employed at the Wheeler Laboratories, Inc., New York, N. Y., where he worked on microwave radar system development. Currently he engaged in graduate study at the Polytechnic Institute of Brooklyn, receiving the M.E.E. degree in 1954. At that time Mr. Kahn joined the staff of the Microwave Research Institute of the Polytechnic Institute of Brooklyn, where he is presently studying propagation in multimode waveguides. He is an associate of Sigma Xi.

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Armig G. Kandoian (S'35-A'36-SM'44-F'51) was born on November 28, 1911, in Van, Armenia. He attended Harvard University, where he received the B.S. degree in 1934 and the M.S. in 1935.

He has been associated with the International Telephone and Telegraph System since 1935 working on antennas, transmission lines, measurements and on various problems connected with radar, communication, and navigation systems. He is Director of the Radio Communication Laboratory of the Federal Telecommunication Laboratories.

Mr. Kandoian received the honorable mention award of Eta Kappa Nu in 1943. He is a member of the Harvard Engineering Society.



A. G. KANDOIAN

D. D. King (M'46) was born on August 7, 1919, in Rochester, N. Y. He received the A.B. degree in engineering sciences from Harvard College in 1942 and the Ph.D. degree in physics from Harvard University in 1946. He was a teaching fellow in physics and communication engineering in 1943, serving as a staff member of the pre-radar Officer's Training School at Crut Laboratory, Harvard University.

During 1945 he was a research associate at Crut Laboratory. In 1946 he was appointed research fellow in electronics, and in 1947, assistant professor of applied physics in Harvard University.

In 1948, Dr. King was appointed associate professor of physics in the Institute for Cooperative Research of Johns Hopkins University, in 1950, assistant director, and in 1955, Director of the Radiation Laboratory.

Dr. King is a member of Sigma Xi and the American Physical Society.

G. D. Mandeville was born in Rahway, N. J., on June 27, 1916. He studied electrical engineering at Monmouth Junior College, and also at Rutgers University. From 1939 to 1949 he was associated with Western Electric Company, at Kearny, N. J. Here he worked on early radar until 1941, when he transferred to shop test equipment. He headed the test equipment prove-in section from

1946 until 1949, when he joined the Bell Telephone Laboratories, Inc., in Holmdel, N. J. Mr. Mandeville has been associated with the waveguide communications research group to the present time.

M. A. Meyer (A'48) was born in New York, N. Y., on March 15, 1918. He received the B.S. degree in electrical engineering from the Massachusetts Institute of Technology in 1939, the M.S. in 1947, also from M.I.T. and the Ph.D. degree from Harvard University in 1952.

Dr. Meyer was an engineer for the Columbia Broadcasting System and at A.R.L., Wright Field, previous to World War II. From 1942 until 1946 he was a radar officer with the Signal Corps in the Carib-

bean area, and later at the Naval Research Laboratory.

From 1947 to the present date Dr. Meyer has been at the Laboratory for Electronics, Inc., in Boston, Mass., where he has been engaged in ground and airborne radar design problems. At present he is associate chief engineer of the Laboratory.



D. D. KING

William W. Mumford (A'30-SM'46-F'52) was born at Vancouver, Washington, on June 17, 1905. Mr. Mumford majored

in physics and mathematics at Williamette University, Salem, Ore., receiving the B.A. degree in 1930. He then joined the Technical Staff of the Bell Telephone Laboratories with the Radio Research Department at Holmdel, N. J. He has worked on ultra-short-wave propagation

and microwave components for radio relay systems and radars. Mr. Mumford's contributions in the microwave field include the directional coupler, wideband coaxial to waveguide transducers, helix to waveguide transitions as used in the traveling-wave tube and the gas-discharge noise generator. He served in the United States Coast Guard as a radio operator on the Cutter Algonquin in 1923 and 1924, and as a telegraph operator, clerk and manager with the Western Union Telegraph Company during the next two years.

Currently he is engaged in microwave problems associated with development of military electronic equipment at the Bell Telephone Laboratories, Whippny, N. J.

Sloan D. Robertson (S'37-A'41-SM'45) was born in Aurora, Mo., on August 8, 1915. He has been with the Bell Telephone Laboratories since 1940, during which time he has engaged in research on microwave circuits, waveguides, radar, and electronics. Dr. Robertson is employed at the Holmdel, N. J. site of the Laboratories as a member of its research in high frequency and electronics department.

He received the B.E.E. degree in 1936 from the University of Dayton. Ohio State University awarded him the M.Sc. degree in 1938, and the Ph.D. in 1941.

Dr. Robertson has received awards from Sigma Xi, Tau Beta Pi, Eta Kappa Nu, Pi Mu Epsilon, Sigma Pi Sigma, Alpha Sigma Tau, and he was a Stillman W. Robinson Fellow at Ohio State University from 1937 to 1939.

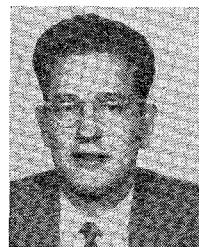


W. W. MUMFORD

R. L. Schaefersman (A'54) was born in Overton, Mo., on February 2, 1928. In 1952 he received the B.S. degree in electrical engineering from Kansas State College.

He joined the technical staff of the Bell Telephone Laboratories in 1952 and participated in the communications development program. He is now engaged in research studies in the development of radar systems.

Mr. Schaefersman is a member of Phi Kappa Phi.

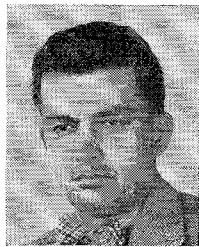


R. L. SCHAFERSMAN

William Sichak (M'46) was born on January 7, 1916, in Lyndora, Penn. He received the B.A. degree in physics from Allegheny College in 1942.

From 1942 to 1945, he was engaged in developing microwave radar antennas at the Radiation Laboratory of Massachusetts Institute of Technology. Since then, he has been with Federal Telecommunication Laboratories, working on microwave antennas and allied equipment.

Mr. Sichak is an Associate Director of the Radio Communication Laboratory. He is a member of the American Physical Society.



W. SICHAK

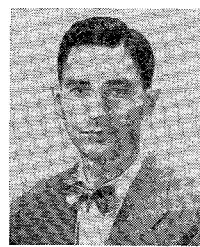
Alan J. Simmons (A'47) was born in New York, N. Y., on October 14, 1924. He received the B.S. degree in physics and chemistry from Harvard University in 1945, and the M.S. degree in electrical engineering from the Massachusetts Institute of Technology in 1948. While in the U. S. Navy during 1944-1945, he attended the radar schools at Harvard and the Massachusetts Institute of Technology.

From 1946 to 1948 Mr. Simmons was a research assistant at the Research Laboratory for Electronics, M.I.T. Since that time he has been working on microwave antennas and allied problems in Microwave Antennas and Components Branch at Naval Research Laboratory, Washington, D. C.



M. A. MEYER

II. From 1942 until 1946 he was a radar officer with the Signal Corps in the Carib-



A. J. SIMMONS