

Microwave

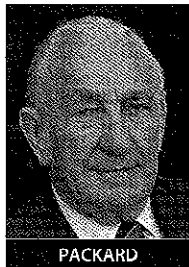


Through innovation and invention, these 45 people, places, and things have shaped the microwave industry.

NANCY FRIEDRICH
Editor



HEWLETT



PACKARD

BILL HEWLETT and DAVE PACKARD – In 1938, these friends and Stanford University alumnae set up their first workspace in a garage in Palo Alto, CA. Their initial capital was reportedly \$538. They created the first Hewlett-Packard product—a resistance-capacitance audio oscillator. The HP Model 200A was used to test sound equipment. Sixty years later, they had a \$25-billion company that was central to propelling technology forward (and would spin off their test and measurement business as a separate public company, Agilent Technologies). Aside from technology innovation, these famous founders are known for the work atmosphere that they created, dubbed “The HP Way.”

BARRIE GILBERT—This circuit designer, who holds more than 60 patents, created the Translinear Principle that is used in so many of today’s ICs. He also is credited with uniting waveform sampling techniques and real-time oscillography in one instrument. Modern communications largely rely on his Gilbert cell, which is used as a mixer and frequency translator. Gilbert, an Analog Devices Fellow, started ADP’s Northwest Labs design center in Oregon. There, he continues to work on RF products crafted with high-speed nonlinear circuit techniques.



GILBERT

JAMES CLERK MAXWELL – The “father of modern physics,” as he is often called, discovered the theory of electromagnetism. His equations, which were proven correct by Heinrich Hertz, are at the root of computational electromagnetics. Maxwell put forth the idea that energies reside in fields as well as bodies. His work has impacted and spawned the fields of communications, thermodynamics, engineering, mathe-

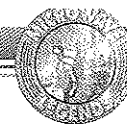
matics, and more. Surprisingly, the genius of his electromagnetic theory was not realized until after his death.

GUGLIELMO MARCONI - This Nobel Prize winner did an immense amount of work to prove that wireless communications was viable. Some of his major accomplishments include receiving the world’s first patent for a wireless-telegraphy system in 1896. In July 1897, Marconi demonstrated wireless signals being sent over 12 miles for the Italian government. That year, he also formed the Wireless Telegraph & Signal Co. Ltd. (later re-named



MARCONI

Marconi’s Wireless Telegraph Co. Ltd.). Marconi transmitted the first wireless signals across the Atlantic between Poldhu, Cornwall, and St. John’s, Newfoundland in December of 1901 (a total of 2100 miles). He also patented a magnetic detector, which long served as a standard wireless receiver. His work in short waves is credited with the creation of the beam system for long-distance communication.



News Report

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ington, D.C. to get help making microwave radar work. MIT was chosen as the site of the resulting independent laboratory. The “Rad Lab” designed almost half of the radar deployed in World War II. The lab, which was operational until 1945, employed 3900 people. Their contributions to theory and technology, operational radar, systems engineering, navigation, and control equipment are still impacting current technologies.

LESTER EASTMAN – Many semiconductor students and designers attribute their knowledge to this Cornell University professor. He has been doing research on compound semiconductor materials, high-speed devices, and circuits since 1965. Eastman also has won numerous awards and held many distinguished posts in both engineering education and the microwave industry.

ARTHUR OLINER – Dr. Oliner is one of the three founders of Merrimac Industries, Inc. Over roughly 60 years in the industry, he has performed many firsts. For example, Oliner provided radiating-slot analysis in a rectangular waveguide that included both reactive and resistive effects. Engineers are still using his theory of Wood’s anomalies on optical grating, which focuses on a guided-wave approach. In addition, Oliner’s analysis of phased-array antennas was the first to accurately account for mutual coupling effects.

ARSEL KLISS – One of the seven founding members of MITEQ (see “Charting The Course For 45 Years of Microwaves”), Kiiss became the company’s second (and most influential) president in 1971—three years after helping to start the company. He fostered an entrepreneurial spirit (inspired by his earlier years at AIL) among his engineers. Anyone at the company who had an idea for a new business was given funding and a chance to succeed or fail. That formula resulted in the extensive amplifier, oscillator, synthesizer, and subsystem product lines that make up the company today.

Although he passed away in 1999, Kiiss’ love and respect for his co-workers is kept alive at MITEQ, which is regularly named as one of the most desirable places to work in Long Island, NY.

LES BESSER – Known as the founder of microwave computer-aided design (CAD), Besser wrote the SPEEDY program that offered a transistor database with high-frequency device parameters. He later authored COMPACT—the microwave-circuit optimization routine that became the industry standard. A prolific author, Besser has written many technical articles and contributed to or co-authored numerous textbooks. Besser founded Compact Software, which is now part of Ansoft. His company, Besser Associates, is dedicated to continuing education.



BESSER

WILLIAM WEBSTER HANSEN – This physicist is regarded by some as the founder of microwave technology. As a Stanford University physics undergraduate student, he became close friends with Russell Varian. The klystron actually was inspired by the two friends’ interest in X-rays. Hansen and the Varian brothers partnered on many ideas, inventions, and projects in the 1920s-1940s. In 1937, Hansen began trying to solve the problem of detecting approaching aircraft. Together with the Varian brothers, he developed the klystron. In 1941, Hansen and his research group moved to the Sperry Gyroscope Co. in Garden City, NY. There, Hansen contributed to developments in Doppler radar, aircraft blind-landing systems, electron acceleration, and nuclear magnetic resonance.

HAROLD ISAACSON – World War II pilot and hero Harold Isaacson enjoyed developing new products and put that love into the creation of one of the industry’s longest-running and least-known success stories—ARRA (Bayshore, NY). Isaacson developed the firm’s lines of passive

components—including its continuously variable attenuators—that are still widely used in military systems and commercial test equipment. Today, his wife Florence and son Roby run the company with the same family-oriented care (resulting in one of the lowest personnel turnover rates in the industry) that Isaacson established.

DR. M. FUKUTA – In 1963, Fukuta joined Kobe Industries Co., which later merged with Fujitsu Ltd. He began working in the field of semiconductor devices including Si RF power transistors, Si ICs, and Si MOSFETs. In 1967, Fukuta invented “the mesh emitter transistor.” At ISSCC ’73, he presented the first paper on power GaAs FETs titled, “Mesh Source Type Microwave Power FET.” In 1992, Fukuta became President of the Compound Semiconductor Group at Fujitsu and later helped to form Eudyna Devices.

HP MICROWAVE SEMICONDUCTOR – HP Associates, an affiliate of Hewlett-Packard Co., supplied specialized silicon, germanium, and gallium-arsenide diodes for HP test systems. In 1964, it was renamed HP Microwave Semiconductor Operation (MSO) and began marketing components to customers outside of HP. In 1978, HP MSO introduced the first fiber-optic transmitters and receivers for data communications. The next year, it announced the first integrated microprocessor development system to combine all of the tools that were needed by hardware and software engineers. In 2005, it became Avago Technologies.

THOMAS RUSSELL – Russell, a brilliant microwave designer specializing in directional couplers, founded Krytar in the early 1980s as a way to pursue his love of engineering. His management style was based on the trust and respect of his employees and in placing value on their opinions. Russell developed one of the first proprietary computer-aided-engineering (CAE) tools for the creation of microwave couplers, which he used for the design and development of many of the company’s standard product lines.