Channel Surfing Redux

A brief history of the TV remote control and a tribute to its coinventors

By Wayne C. Luplow and John I. Taylor

AS THE CONSUMER ELECTRONICS INDUSTRY MOURNS the passing of the last of the coinventors of the wireless remote control for television, IEEE hits the pause button to review the colorful history behind the remote control to reflect on the impact of this innovation that has transformed the lives of generations of TV viewers and to celebrate the lives and contributions of these consumer electronic industry pioneers.

Eugene J. Polley, 2009 recipient of the IEEE Masaru Ibuka Consumer Electronics Award, died at age 96 on 20 May 2012, in Downers Grove, Illinois. His Zenith Flash-Matic was the world's first wireless TV remote introduced in 1955. IEEE Fellow Robert Adler, whose 1956 ultrasonic Zenith Space Command became the industry standard for a quarter century, died at age 93 on 15 February 2007, in Boise, Idaho.

Together, they are credited as the fathers of the modern remote control. Both had long and storied careers at Zenith Radio Corporation (now Zenith Electronics LLC, a subsidiary of LG Electronics, Inc.)—lifelong Chicagoan Polley started at Zenith in 1935, and Adler joined Zenith in 1941 after emigrating from his native Austria. While their careers took different paths, their individual contributions played major roles in the colorful history of consumer electronics in the 20th century.

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Adler, who earned his Ph.D. degree in physics, was widely known as one of the world's leading innovators in electronics, earning more than 180 patents in literally dozens of core technology areas. For his part, Polley, a self-made man who attended a local Chicago college, was a mechanical engineer who, at times, admittedly felt somewhat overshadowed by Adler. Their career paths crossed many times over the years, but the most noteworthy convergence was in the 1950s with the remote control.

TV REMOTE LORE

Few would dispute the enormous impact of this invention, devised in an era of three or four VHF broadcast TV stations in most markets. Today, the remote control is not a luxury but a necessity in navigating 500-plus digital cable or digital satellite channels or controlling a high-definition television, Blu-Ray Disc player, digital video recorder, or home theater audio system—all at the touch of a button.

Channel surfing was actually born more than six decades ago. The first TV remote control, called the Lazy Bones, was developed in 1950 by Zenith although the names of the actual inventors are long lost.

The Lazy Bones used a cord that ran from the TV set to the viewer. A motor in the TV set operated the mechanical tuner through the "remote control." By pushing buttons on this wired remote control, viewers rotated the tuner clockwise or counterclockwise, depending on whether they wanted to change the channel to a higher or lower number. This Lazy Bones remote control included buttons that turned the TV on and off. Although customers liked having remote control of their television, not

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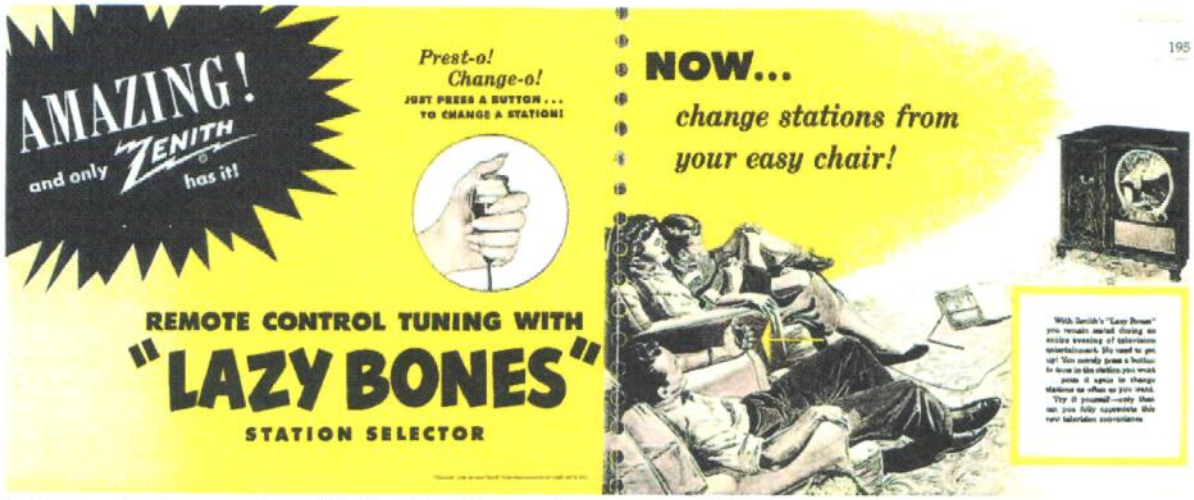

Zenith trumpeted the convenience of its "Lazy Bones" remote. (Image courtesy of Zenith.)

surprisingly they complained that people tripped over the unsightly cable that meandered across the living room floor.

Commander Eugene F. McDonald, Jr. (1886–1958), Zenith's founder-president, believed TV viewers would not tolerate commercials and was convinced that sooner or later commercial television would collapse. While developing and promoting the concept of commercial-free subscription television, McDonald yearned for a way to mute the sound of commercials.

FLASH-MATIC: THE FIRST WIRELESS TV REMOTE

Zenith engineer Polley invented the Flash-Matic, introduced in 1955. As a young Zenith engineer, he created the first wireless remote by using light to control the television.

Tinkering with spare parts lying around his laboratory, he created a souped-up flashlight fashioned to look like a raygun "so people could shoot out the commercial," Polley is quoted as saying. The viewer used the highly directional flashlight to activate the four control functions: TV on/off, audio mute, and channel change (turning the tuner dial clockwise or counterclockwise). Polley liked to tell the story of how he delivered the first prototype of the Flash-Matic TV, a blonde-cabinet black-and-white console, to McDonald's home in the spring of 1955. McDonald loved the capability to mute the sound on those annoying commercials and ordered the new remote control TV into production.

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DEVELOPMENT CHALLENGES

Flash-Matic pioneered the concept of wireless TV remote control, yet it had limitations. It was a simple device that had no protection circuits, and if the TV sat in an area in which the sun shone directly on it, the tuner might start rotating.

McDonald directed his engineers to explore other technologies for the next generation. First thoughts pointed to radio. But because they travel through walls, radio frequency waves could inadvertently control a TV set in an adjacent apartment or room.

Using distinctive audible sound signals was discussed, but Zenith engineers believed people might not like hearing a certain sound that would become characteristic of operating the TV set through a remote control. It would also be difficult to find a sound that would not accidentally be duplicated by either household noises or by the sound coming from TV programming.

Regardless of the specific system chosen, Zenith sales people were against using batteries in the remote control. In those days, batteries were used primarily in flashlights. If the battery went dead, the sales staff said, the customer might think something was wrong with the TV. If the remote control did not emit light or show any other visible sign of functioning, people would think it was broken once the batteries died.

NEXT GENERATIONS: SPACE COMMAND

Zenith's Adler suggested using ultrasonics, i.e., high-frequency sound, beyond the range of human hearing. He was assigned to lead a team of engineers to work on the first use of ultrasonics technology in the home as a new approach for a remote control.

The transmitter used no batteries; it was built around aluminum rods that were light in weight and, when struck

at one end, emitted distinctive high-frequency sounds. The first such remote control used four rods, each approximately 2-1/2 in. long: one for channel up, one for channel down, one for toggling the sound on and off, and one for on and off.

These rods were very carefully cut to lengths that would generate four slightly different frequencies. They were excited by a trigger mechanism that stretched a spring and then released it so that a small hammer would strike the end of the aluminum rod. This became widely known in the industry as "The Clicker." Internally, Zenith people called this "The Bonger."

Remote control coinventors Bob Adler (left) with the Zenith Space Command Gene Polley with the Flash-Matic.

QUARTER CENTURY OF ULTRASONIC REMOTES

The original Space Command remote control was expensive because an elaborate receiver in the TV set, using six additional vacuum tubes, was needed to pick up and process the signals. Although adding the remote control system increased the price of the TV set by about 30%, it was a technical and commercial success and subsequently adopted in later years by other manufacturers.

The ultrasonic device was developed quickly, with the design phase beginning in late 1955. Called Zenith Space Command, the remote went into production in the fall of 1956.

In the early 1960s, solid-state circuitry (i.e., transistors) began to replace vacuum tubes. Handheld, battery-powered control units could now be designed to generate the inaudible sound electronically. In this modified form, Adler's ultrasonic remote control invention lasted through the early 1980s, a quarter century from its inception. More than 9 million ultrasonic remote control TVs were sold by the industry during the 25-year reign of this Zenith innovation.

TODAY'S INFRARED REMOTE CONTROLS

By the early 1980s, the industry moved to infrared, or IR, remote technology. The IR remote works by using a low-frequency light beam, so low that the human eye cannot see it but which can be detected by a receiver in the TV. Zenith's development of cable-compatible tuning and teletext technologies in the 1980s greatly enhanced the capability and utility for infrared TV remotes.

The first wireless TV remote, Zenith Flash-Matic, is demonstrated in this campy 1955 publicity photo. (Image courtesy of Zenith.)

GENE POLLEY

Polley's inventions, primarily in the field of television, earned 18 U.S. patents, with his best-known invention being the world's first wireless TV remote. Starting in 1955, Polley worked his way up from the stockroom to the parts department, where he produced Zenith's first catalog, and then on to his long career in the engineering department.

In his 47-year Zenith career, Polley held various engineering positions, including product engineer, mechanical engineer, head of video recording group, advanced mechanical design group, and assistant division chief for the Mechanical Engineering Group.

During World War II, as part of Zenith's commitment to the war effort, Polley worked on radar advances for the U.S. Department of Defense. He also worked on the push-button radio for automobiles and on the development of the video disk, predecessor of today's DVD.

Polley was born in Chicago on 29 November 1915. He attended the City Colleges of Chicago and Armour Institute. He retired from Zenith in 1982. In later years, adding to the lore of the remote control, Polley was quoted as saying: "We didn't envision the couch potato. The original reason for the remote control was to help people who were handicapped."

Polley was particularly proud of his 2009 Ibuka Award from the IEEE Consumer Electronics Society, as it served to validate his important contributions to the industry. Polley considered his role in the development of the remote control his most significant contribution, while Adler considered the remote control developments more pedestrian than many of his other inventions.

ROBERT ADLER

Remote control coinventor Adler was born in Vienna, Austria, on 4 December 1913. Adler's six-decade career with Zenith began in 1941 when he joined Zenith's research division after receiving his Ph.D. degree in physics from the University of Vienna in 1937. He was named associate director in 1952, vice president in 1959, and vice president and director of research in 1963.

An advertisement featuring the Zenith Flash-Matic remote. (Image courtesy of Zenith.)

He retired as research vice president in 1979 and served Zenith as a technical consultant until 1999, when Zenith merged with LG Electronics.

A prolific inventor with a seemingly never-ending thirst for knowledge, his pioneering developments spanned from the golden age of television into the high-definition era, earning him more than 180 U.S. patents. Thirty-nine of his U.S. patents were granted on inventions he made during this twilight phase of his career. In fact, the U.S. Patent and Trademark Office published his latest patent application, for advances in touch-screen technology, in early February 2007, just days before his passing.

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IEEE HONORS

In 1951, Adler became a Fellow of the IEEE, a professional honor, which is conferred by the Institute's Board of Directors on the basis of eminence and distinguished service. He was cited for his developments of transmission and detection devices for frequency-modulated signals and of electromechanical filter systems.

He received the IEEE Consumer Electronics Outstanding Achievement Award in 1970. He also received the IEEE 1974 Outstanding Technical Paper Award for his report "An Optical Video Disc Player," representing early work in what was to become the DVD. His other IEEE awards include the Edison Medal in 1980 and the Sonics and Ultrasonics Achievement Award in 1981.

Adler received the 1967 Inventor of the Year Award from George Washington University's Patent, Trademark, and Copyright Research Institute for his inventions in the field of electronic products, devices, and systems used in aircraft communications, radar, TV receivers, and FM broadcasting.

In the consumer electronics field, Adler has been widely recognized as the coinventor (with Polley) of the wireless TV remote. He received the 1958 Outstanding Technical Achievement Award of the Institute of Radio Engineers (now the IEEE) for his original work on ultrasonic remote controls for television.

CONSUMER ELECTRONICS INNOVATIONS

Among Adler's earlier work was the gated-beam tube that, at the time of its introduction, represented an entirely new concept in the field of vacuum tubes. The use of this tube greatly simplified the sound system in television receivers, markedly improving reception by screening out certain types of sound interference while lowering the cost of the sound

channel. Adler also was instrumental in originating and developing a synchronizing circuit, which permitted demonstrably greater stability in fringe areas of the television reception. This invention was in wide use for many years.

The electron beam parametric amplifier, developed in 1958 by Adler jointly with Glen Wade, then of Stanford University, was at the time the most sensitive practical amplifier for ultrahigh frequency (UHF) signals. It was used by radio astronomers in the United States and abroad and by the U.S. Air Force for long-range missile detection.

SURFACE ACOUSTIC WAVE FILTERS

Adler's original work in the field of acoustooptical interaction was instrumental in the 1966 public demonstration, by a team of Zenith engineers, of an experimental television display using ultrasonic deflection and modulation of a laser beam to produce a wall-size TV picture without a cathode ray tube.

During World War II, Adler worked on high-frequency magnetostrictive oscillators for use in armed forces communications equipment. His early work on electromechanical filters paved the way for the development of the highly compact filters widely used in aircraft receivers after the war. In the mid-1960s, he suggested the use of surface acoustic waves (SAWs) in intermediate frequency filters for color television sets, a technology that has since become universal, not only in television but also as an essential building block of cellular telephone handsets.

Adler also pioneered the use of SAW technology for touch screens. Touch screens employing principles he originated are now in widespread use in airport kiosks and in museums such as the U.S. Holocaust Memorial Museum in Washington, D.C., the Rock and Roll Hall of Fame in Cleveland, the Milwaukee Art Museum, and the San Jose Technology Museum. In the early 1990s, as a consultant to Elo TouchSystems, Dr. Adler actively contributed to the commercialization and further innovation of his SAW touch screen invention.

"Bob Adler was an unparalleled technical contributor, leader, adviser, and teacher," said Jerry K. Pearlman, retired Zenith chairman and CEO, who knew Adler for 35 years. "His gifts and passions were many, his mentoring matchless, and his ego totally nonexistent."

JOINT RECOGNITION

In recognition for their visionary work, remote control coinventors Adler and Polley jointly received Zenith's Emmy from the National Academy of Television Arts and Sciences in 1997 for "Pioneering Development of Wireless Remote Controls for Consumer Television." *Broadcasting & Cable* magazine recognized "their groundbreaking contribution to television viewing—indeed, to the use of so many electronic devices" with the Technology Leadership Award in 2006.

"Their pioneering work and subsequent numerous patents in the development and commercialization of remote control devices has been one of the most notable of all of the features and advantages the consumer electronics

George Burns hawked the Zenith Space Command remote. (Image courtesy of Zenith.)

industry, and a number of additional industries as well, have benefited from during the past half century. From TV sets to garage door openers, consumers worldwide have experienced the greatest convenience feature ever invented as a result of the great work of these two men," said Gerald McCarthy, retired president of the Zenith Sales Company.

The consumer electronics industry we know today has been built largely by engineers standing on the shoulders of giants. As coinventors of the wireless remote control for television, Adler and Polley will always be among the industry's and Zenith's shining stars, and their entrepreneurial spirit and creativity continue to serve as a model for today's young engineers.

ABOUT THE AUTHORS

Wayne C. Luplow, editor emeritus of *IEEE Transactions on Consumer Electronics* and IEEE Life Fellow, started his Zenith career in 1964. Currently vice president for the LG Electronics' Zenith R&D Lab, he had the privilege to have worked with both Adler and Polley over the years.

John I. Taylor is the third head of Zenith public relations in the company's 94-year history. He joined Zenith in 1981 and, following the merger of Zenith and LG in 1999, he has been vice president of Public Affairs and Communications for LG Electronics USA since 2000. He worked with both Polley and Adler. CE