“A Collector of Many Sorts”
Douglas M. Perham and his Cavalcade of Electronics

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Perham Collection of Early Electronics
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“It is worth commenting on the role of gifted mechanics and ham radio enthusiasts in the development of the Bay Area’s early electronics industry. It seems that the best results were achieved when such practical mechanical brilliance was wedded to advanced technical training and theoretical knowledge.”

Timothy Spurgeon

Understanding Silicon Valley: 
The Anatomy of An Entrepreneurial Region (2000)
Introduction

Douglas McDonald Perham (1885-1967), early wireless experimenter, talented craftsman, and radio broadcaster, began his career in electronics in Palo Alto at the turn of the 20th century while still a teen. Electronic communications, once tied to wires and cables, had moved beyond telegraph and telephone into an “Empire of the Air,” allowing transmission not only of Morse code but of voices, music, news and entertainment. Electronics similarly changed as the home consumer became a driving market force, along with commercial and military needs.

California was deeply involved in this wireless revolution, and San Francisco Bay Area, the heart of West Coast maritime and transportation industries and location of key U.S. Navy and Army installations, fostered many innovative electronics businesses. Perham would work for many of the region’s emerging electronics firms, among them Federal Telegraph Company, Heintz & Kaufman, Dalmo-Victor, Ampex, and Varian Associates. Although always in the background, and absent from the electronics industry’s many egocentric autobiographies, Perham was there at the beginning of more than one pivotal development.

Like many young men and women who became involved in the wireless revolution of the first half of the 20th century, he was self-taught in electronics and radio engineering, and was an early amateur (ham) radio operator. And like many, he had checkered success as an entrepreneur. “Perhaps because I have been ignored and never had a competing reputation to be jealous of,” Perham later told his wife Connie, he could stand back from the personality clashes among inventors, engineers, businessmen, and even later-day historians, over profits as well as reputations.¹

Doug Perham also was an avid and life-long collector, “a collector of many sorts” as he described himself. His extensive collection of electronics apparatus, ephemeral publications, and
photographs mirrors his remarkable career from early wireless transmission systems and the advent of commercial radio broadcasting to giant klystron. He often was aided in his collecting by friends and acquaintances, among them Lee de Forest, Charles “Doc” Herrold, Ralph Heintz, Leonard Fuller, and Russell Varian, whose work he later featured in the 1950s and 1960s in his ever growing “Cavalcade of Electronics” exhibits and his private museum.

What little has been written about Perham is superficial at best, sadly often filled with inaccuracies and unsubstantiated rumors that even he did not bother to correct. This biography seeks to illuminate the life and times of the often-ignored machinist and self-taught radio engineer, whose legacy, the Perham Collection of Early Electronics, is now preserved at History San Jose.
California Boy

Doug Perham was born on May 22, 1885, in the orchard town of Duarte, California, tucked into the north-central San Gabriel Valley of Los Angeles County. He was the second oldest of four children of Franklin Eugene Perham (1857-1953) and Henrietta deBlois Cleaveland Perham (1858-1940), New Englanders with an unusual connection to California.²

Franklin, whose roots were deep in Maine, had attended Bates and then Bowdoin College, and had begun his teaching career as headmaster at Whitman High School. He was teaching on Martha’s Vineyard when he met Henrietta, a school teacher and the descendant of generations of New England whaling captains with ties to the California Gold Rush. She was the daughter of Captain James F. Cleaveland and Mary Carlin, and had been born in Peru while her parents were on a whaling voyage aboard the Seconet. Her grandfather was Captain Henry Cleaveland, who had brought the legendary whaling ship Niantic to San Francisco in 1849, with his son James as first mate.³

Franklin and Henrietta had been married on Martha’s Vineyard in June 1883, in the Cleavelands’ home town of Tisbury.⁴ Less than a year later, in the midst of heavy winter snows, the young couple left New England and arrived in Los Angeles after 12 eventful days traveling on five different train lines. Although Franklin had to work in a Pasadena orange grove that summer to make ends meet, by that fall he was teaching in Duarte, where he later became school principal.³

The promising little town of Duarte was located amid the booming San Gabriel Valley’s rich orchards, a new Southern California agricultural heartland with fertile soil and a pleasant climate. Former cattle ranches, like that of Don Andres Duarte’s Rancho Azusa de Duarte, could not produce the cash needed to keep up with legal fees and property taxes. Duarte, like many others, had begun selling off portions of his rancho, and by the 1880s, the area was well-known for the quality of its oranges and limes. California’s thriving agricultural economy, touted by the railroad advertising, attracted families from across the country, whose children needed schools.

The Perham family followed Franklin’s career, as a teacher and school principal, up and down California. From Duarte they moved on to neighboring Monrovia, then to Santa Paula (Santa Barbara County), Santa Ana (Orange County), Berkeley (Alameda County), and Stockton (San Joaquin County). In 1900-01, Franklin and Henrietta Perham made one last move with their family, this time to the college
town of Palo Alto and neighboring Stanford University.6

The Perham family initially lived on the Stanford University campus, at No. 2 Lasuen, a little yellow house near the campus post office and within close walking distance of the main quadrangle buildings, then undergoing a major expansion. Stanford, opened only a decade before in October 1891, had been under nearly continual construction since 1887. A small residential community, largely faculty family homes and several boarding houses for single faculty and staff, was taking shape along Lasuen, Salvatierra, and Alvarado Row.

Henrietta and Franklin each briefly enrolled as students at Stanford University — she as a special student in English in 1901-02, he in 1902-03, also in English (both are listed as undergraduates, not graduate students).7 Their intentions are unclear, but the Stanford sojourn proved a refreshing new start. Franklin won appointment as head of the English Department at Lowell High School in San Francisco. After 14 years at Lowell, he would spend another 15 as head of the English department at Polytechnic High. After his retirement, in 1927, he taught Latin at Menlo College and English at the University of California’s School of Dentistry.8

Rather than move to San Francisco, the Perham family had settled down off-campus in their own house at 335 Melville Street, in Palo Alto’s “Professorville,” by the 1902-03 academic year.9 Franklin and Henrietta quickly became part of the young college town’s bustling community life. They were early members of Palo Alto’s First Congregational Church (joining the church in 1901 just after the charter member list of 1900 closed) and members of Stanford’s Saturday Morning Club. Franklin also remained active with his fraternity, Zeta Psi.10

Franklin was among Palo Alto’s early commuters, taking the train some thirty miles north to San Francisco until his retirement from teaching in 1927. Although they never moved to the City, Franklin Perham had a special fondness for San Franciscans. When San Francisco suffered from the devastation of both earthquake and fire in 1906, he was active in the work of the Palo Alto Relief Committee, helping supervise housing for refugees coming south that April.11

Counter to popular belief, Doug Perham never enrolled at Stanford, although he seems to have completed his high school education, at 16, in 1901 before moving from Stockton to Palo Alto. His two younger brothers were Palo Alto High School and Stanford graduates, however: Philip Doss-Bradley Perham (AB, Greek, 1915; MA Education, 1916) and Don de Blois Perham (AB in English, 1924, MA, 1926). Philip became an English teacher, college registrar, and administrator, and Don a professor of English.12

Long before his younger brothers took up the academic life, Doug had set off on his own as an electrician and skilled craftsman, opening an electrical shop, in 1901. Doug later credited Cyrus G. Baldwin, Pomona College’s first president and a Southern California family neighbor, with igniting his childhood interest in electronics.13 Baldwin had attempted to bring hydroelectric power to Pomona, Claremont, and San Bernardino by way of San Antonio Canyon, with equipment manufactured by Westinghouse Company. The effort failed within a few years due to several years of drought.

In 1893, Baldwin had given the boy a letter of introduction to business associate George Westinghouse, and to inventor and engineer Nicolas Tesla.14 That year, while visiting Chicago’s Columbian Exposition with his grandfather, eight-year-old Doug was able to spend several days there watching the set-up and electrical demonstrations of Westinghouse and Tesla. The electric light was the centerpiece of the great Exposition, turning it into a “City of Lights.” Westinghouse gave the lad a burnt-out “stopper” light bulb, used on the Fair’s famous Ferris wheel, an item that would take pride of place in Doug’s future collection. (This Westinghouse stopper lamp is preserved at History San Jose.)15

Doug’s interest with both wired and wireless technology paralleled that of many young men of his generation. Experiments in electromagnetic, or “wireless,” currents had been well underway since the 1880s. Gugliermo
Marconi put such experiments to work, using a spark-generated damped electromagnetic wave to send Morse code dots and dashes across increasingly longer distances between transmitter and receiver. By 1895, Californians were replicating Marconi’s “wireless telegraphy” experiments, and in 1899, a month after Marconi successfully transmitted a signal across the English Channel, the world’s first wireless message from ship to shore was sent off San Francisco’s Golden Gate through the fog from a lightship stationed seven miles off shore. While in high school, Doug would have heard of the well-publicized event, since the message was meant to announce the arrival of the U.S. Army transport ship bringing home California troops from the Philippines and war with Spain, and set off home-coming celebrations throughout the state. It also created considerable excitement about the practical use of the new wireless technology.

Legend has it that in 1898, young Doug had constructed a working spark gap for a Marconi transmitter using brass bicycle pedal ball bearings. (Perham told some interviewers that he made the apparatus using the decorative knobs from his mother’s brass bed.)

Soon after the family’s move to Stanford, 17-year old Doug set up his shop at 345 High Street, at the corner of Forest Avenue, where he made and sold electrical apparatus. A year later, he provided a local dentist, Dr. Nathalie Selling (whose office was in the Stanford Building, on University Avenue) with the first x-ray machine to be installed in Palo Alto. By 1905, he was working for E. Shrewsbury and A. Smith, Electricians and Electrical Goods, whose Palo Alto branch was at 521 Emerson.

In 1905, 20-year old Doug moved to Santa Barbara. Working as a “wireman” (electrician) for Loveday Electric Company, he installed the first electrical wiring in Santa Barbara Mission and in many local adobe homes.

At some point in 1904-05, he had married Canadian-born Margaret Ann Forbes (1871-1956), some 14 years his senior, who had come to the U.S. in 1896. They were listed as living in Palo Alto at 326 Middlefield in December 1904 and subsequently in Santa Barbara directories in 1905-1909, but by late 1906, Doug and Margaret
apparently had returned to Palo Alto. Their daughter Barbara was born there in 1907. The little family was living on Alma Street when Doug bought the little white cottage at 913 Emerson, at the corner of Emerson and Channing, around early 1908, that would play a part in Palo Alto history.19

Doug later recalled that while living on Alma, he and Joe Baker had the first wireless transmission sets in Palo Alto. They were joined over the next few years by James A. Miller, who had the first 75-foot antenna (Doug’s was second), and Roland Marx and George Branner, sons of Stanford professors. (All three were Stanford students: Marx received his AB in civil engineering in 1911 and his engineer’s degree in 1915, Branner, his AB in electrical engineering in 1911, and Miller, his AB in electrical engineering in 1913). By 1908, Cyril Elwell, recently graduated from Stanford with degrees in electrical engineering, had joined the group.20

Experiments in electromagnetic wave transmission continued to catch the imagination of many young amateurs or “hams” (that is, someone unattached to an academic or commercial laboratory). In 1900, Reginald Fessendon had used a spark transmitter to transmit voice, but background noise proved too loud. By 1906, he had succeeded in transmitting a clearer signal but his high speed alternator was too expensive to market and impractical for either home use or at sea, where wireless filled a great need for safety and navigational purposes. In the San Francisco Bay Area, the interest in wireless transmission was keen. Wireless promised improved ship-to-ship and ship-to-shore communications, vital for rescue and safety as well as navigation and business. Young Francis McCarty already had demonstrated his own technology with a clear transmission at San Francisco’s Cliff House but died tragically in 1906 in a road accident.
As Doug Perham was settling on Emerson, 15 miles away in San Jose a former Stanford student named Charles Herrold (ex ’98) started his Herrold College of Engineering and Wireless (1909). Herrold trained some of the many wireless operators needed to install, operate, and repair the growing number of wireless stations on ships and dotted around the Bay Area. He began his own wireless (radio) broadcasting station. Herrold and his students transmitted a rattling voice with a 15-watt spark transmitter, large antenna, and microphone, that could be heard 20 miles away. Amateur radio operators like those at Palo Alto were shocked to hear not just the dots and dashes of Morse code, but human voices and music broadcast across numerous receivers rather than point to point. Herrold was also busy developing an improved microphone and other apparatus, and would later work with investors to resurrect McCarty’s National Radio Company.

**Early Days at Federal Telegraph**

Intrigued with wireless transmission, Doug built a 2 ½-watt spark set along with an experimental transmission station and a 75-ft radio tower in his yard at Emerson Street. Doug also built spark-set radio transmitters for sale. Cyril Elwell bought one, but it was Doug’s tall tower, a Palo Alto landmark at the time, that really caught Elwell’s eye. These first transactions with Elwell turned out to be life-changing. In 1909, Doug rented the daytime use of his Emerson Street cottage and backyard shack to Elwell and his new company, the Poulsen Wireless Telephone and Telegraph Company. “I owned the equipment and building,” Doug later wrote, “which I leased to C. F. Elwell for day time operations, reserving the right to do any work which I wanted to do at night.” Perham would not be the only one to point out this important distinction. (By 1910, Perham and his family were living back living over his electrical shop on High Street; the company purchased the Emerson cottage in 1912.)

Doug Perham also became the first American staff employee of Elwell’s Poulsen Wireless Telegraph and Telephone Company (later that year renamed Federal Telephone and Telegraph Company). Here, he made long-standing friendships with a wide array of forceful personalities.

Elwell may have used Doug’s help with his summer 1908 tests of the McCarty spark system, an analysis Elwell undertook for Oakland bankers and brothers William and Tyler Henshaw at the suggestion of his electrical engineering mentor, Stanford professor Harris J. Ryan. In his autobiography, Elwell writes of making his first test with an anonymous assistant, sending a signal by way of a 75 ft. tower to a receiver set up the road at the base of Palo Alto’s water tower, which supported the receiving antenna. Doug may appear more than once in the role of “anonymous assistant” in
Elwell’s autobiography and other accounts by Elwell, while Stanford friends such as Roland Marx and Carl Breer are specifically named. (Both later became successful engineers.)

Elwell believed that the McCarty spark system was unworkable on a large scale commercial basis. (The system was later used by the National Wireless Telegraph and Telephone Company, along with apparatus developed by Charles Herrold.) He was drawn instead to a wireless transmitting device newly patented by Danish inventor Valdemar Poulsen. The Poulsen arc’s continuous wave system was a dramatic improvement over the Marconi spark system since it could be modulated with a telegraph key (wireless telegraphy) or with a microphone (to transmit speech). The arc system also provided the first wireless transmitter that was nearly silent in operation. Backed by Stanford President David Starr Jordan and several Stanford professors, Elwell traveled to Denmark and obtained a license from Poulsen to manufacture the Poulsen system in the United States. Later in the summer of 1909, Elwell brought back from Denmark a small demonstration 100-watt arc converter. (Elwell also bought back a 5kw and a 12kw arc transmitter, but the 100-watt arc, with 50-watt output, was considered “the first”). In October 1909, the Poulsen Wireless Telephone & Telegraph Company was organized.

The original company was very much a Stanford-Palo Alto affair, with Elwell as president and chief engineer, and Stanford mechanical engineering professor Charles D. Marx as vice-president. R.W. Barrett of San Francisco and F.A. Wise (both graduates of Stanford’s law department) and M.A. Thomas helped set up the organization. Math Professor L. M. Hoskins and other Stanford faculty living in Palo Alto helped finance. Other early employees included Marx’s son Roland. The modest funds contributed by President Jordan and Professor Marx encouraged others to
support the fledgling company and initially kept the company out of debt. (According to Leonard Fuller, the professors who bought stock lost all of their investment). J. Jerome Smith of Stockton and Valdemar Poulsen were added to the board when the company was reorganized in January 1910.27

Although the company’s official address was at 68 Post Street, San Francisco, the real operation was set up in Palo Alto. In addition to Elwell’s house at 1451 Cowper and Perham’s white cottage at 913 Emerson, the company acquired a smaller green cottage next door at 218 Channing. The 15 by 30 foot corrugated iron shed behind Doug Perham’s house on Emerson was doubled in size and equipped with more machine tools, and as Elwell described it, “became the first factory in the U.S.A. to build Poulsen arc generators of continuous waves.”28

During Poulsen’s busy initial year of 1909-1910, Perham worked with three Danes, already familiar with working with Poulsen arcs, who had accompanied Elwell on his return to California: engineers Peter Jensen and P. Christensen, and mechanic F. Albertus. Jensen, as one of Valdemar Poulsen’s staff, already had discovered how to transmit voice with the Poulsen arc in 1906; Albertus was a skilled mechanic. (Both expected to return soon to Denmark.) Doug’s inaugural assignment was to build the first complete 250-watt Poulsen arc transmitter and receiver sets to be made in the United States.29 Perham, Jensen, Christensen, and Albertus were then joined by recent Stanford graduate, electrical engineer Edwin S. Pridham (technically, the first American “engineer,” other than Elwell, employed by Federal) to build the Company’s first four water-cooled 5kw arcs. These arcs, designed by Elwell, improved the inadequate cooling and insulation of the original Danish design, making them more rugged and efficient, thus making them easier to operate at isolated stations, on land or at sea. Jensen, Albertus and Perham built the first complete (250-watt) Poulsen arc transmitter and receiver sets made in the United States, and designed and constructed auxiliary apparatus. They thus could turn out a fully equipped station.30

By 1909, Doug became an “installation engineer” as well, since experimental stations were needed to demonstrate the company’s Poulsen transmitters to potential stockholders. Late in 1909, Doug was dispatched with Jensen and Albertus to install four 5kw arcs in a transmitting station in Stockton. A duplicate station was then set up fifty miles north in Sacramento. During a headline-grabbing Stockton-Sacramento transmission on February 19, 1910, Stanford President David Starr Jordan, in Sacramento, spoke with the mayor of Stockton while
reporters and businessmen looked on. Despite the headlines, investors remained skeptical.\(^3\)

Elwell planned another demonstration in July 1910 to show that, due to the sharp tuning possible with continuous wave transmission of the arc-system, two or more arc transmitters could operate simultaneously without interfering with each other. That summer, Doug set up a 12 kw Poulsen arc set and backup at Federal’s third station, built amid sand dunes along San Francisco’s Ocean Beach. (Elwell described the Beach station site as being between 47\(^{th}\) and 48\(^{th}\) Avenues and Noriega and Ortega, contemporary photographs suggest it to be two blocks north, between Lawton and Moraga.) The “Beach Station” tests showed that the Poulsen receiver was selective enough to tune into Sacramento or Stockton, and, equally important, that it was strong enough to anchor a San Francisco-Los Angeles transmission. It also put to rest the impression among radio engineers that efficient antennas depended on altitude, thus the first stations had been built atop Mt. Tamalpais and tall San Francisco buildings. The Poulsen engineers countered that a good ground connection for the antenna was more important. (The Beach Station towers were brought down in 1927 to make way for residential development.)\(^3\)

The Beach Station quickly turned into more than a demonstration station. With its two 300-foot wooden lattice towers designed by Stanford civil engineering professor Charles B. Wing, it became the first successful continuous wave commercial wireless installation as KFS radio station. Its original arc system and antennas were rapidly improved and upgraded.

The station played an important role in ship to shore wireless communication, and was key to several dramatic sea rescues off the Golden Gate.\(^3\)

Although the Beach Station successfully showed the promise of voice transmission, businessmen remained leery of the lack of privacy of long distance telephony or the future radio “broadcasting.” Far more interest was
shown in its possibilities for point-to-point long distance wireless telegraphy, which could immediately compete with the older technology of cable-based telegraphy. Among those interested in telegraphy was another Stanford graduate, San Francisco businessman Beach Thompson (MA, geology, ’92), who had joined the Poulsen company board in late 1909.

Thompson had been successful in bringing long distance hydro-electric power to San Francisco from the Stanislaus River, but had recently lost control of the Stanislaus company. Thompson, now a banker, took over control as president of the Poulsen company in 1910, with his brother-in-law Howard P. Veeder as treasurer-secretary; the demoted Elwell was retained as “chief engineer.” Thompson’s vision of the company’s future would soon clash dramatically with Elwell’s plans.

Much of Poulsen’s early experimental staff already had moved on. Peter Jensen and E. S. Pridholm left the company in 1910—some say because the first early reorganizations left little room for them, but others note that they wished to avoid confrontation with management (Elwell in particular) over time spent working on their own moving coil loudspeaker, which they would later develop, patent, and manufacturer as the Magnavox.

“The first crude prototype of the Magnavox was made in the laboratory at the rear of 913 Emerson, sometime in the later part of 1909 or 1910,” Doug Perham wrote to Jane Morgan decades later. “I was approached by Pridham and Jensen who at the time were working for Elwell, asking me if I would do some experimental work for them at night. Pridham, Jensen, Albertus, and I worked nights for some time on the prototype of the Magnavox. Pridham and Jensen furnished the designs, which Albertus and I built.”

It was easy to see, Doug later recounted, why Pridham and Jensen established the founding date for the Magnavox as after the time they were employed by Poulsen. The three had signed “a patent waiver, agreeing to assign all designs or patents they might conceive or devise while in the employ of Elwell, whether on their own or Company’s time,” he recounted.

*Federal Station, Los Angeles, 1911*
“It was due to friction over this matter between Elwell and Pridham which caused Elwell to terminate Pridham’s employment.”

While the company’s directors reorganized and fought for control, Doug headed south for the installation of a fourth station, in the outskirts of Los Angeles. Perham installed the equipment in both the Los Angeles and San Francisco stations; de Forest operated the Los Angeles transmission, while Perham operated at the San Francisco station. On October 11, 1911, Federal’s Los Angeles station went on the air, the first radio system built for solely commercial purposes, in this case for E. F. Hutton and Company, which used the San Francisco–Los Angeles connection to transmit brokerage transactions. This successful communication with San Francisco put Federal in direct competition with two existing wire telegraph companies. A larger station was also built in South San Francisco and one in Honolulu, beating out a competitor to establish a 2,400 mile communication line, the longest up to that time. Honolulu and San Francisco newspapers quickly went from 120 to 1,500 words a day of outside news coverage.

Doug worked only briefly in Palo Alto at this time, but came to know the three men—Lee de Forest, Herbert Van Etten, and Charles W. Logwood—brought together there by Elwell to improve wireless reception through vacuum tube technology. Perham already met de Forest earlier, during the 1910 Beach Station set-up, and found him easier to work with than the equally headstrong Elwell. While the eccentric and egocentric de Forest would have many detractors, Perham thought him not only talented but a fair man to work for, and remained on good terms with him throughout their lives.

De Forest had first developed a three-element (triode) radio vacuum tube (which he called the “Audion”) as a detector in 1906, but his Radio Telephone Company of New York had quickly gone bankrupt. De Forest came to San Francisco in 1910 to install his wireless telegraph sets on two U.S. Army transport ships. He set up a small lab and organized a radiotelephone company for a San Francisco–Los Angeles transmission, but that too failed.

Federal bought some of de Forest’s equipment at auction, and de Forest approached Cyril Elwell for a job. Elwell hired him at $300 a month, hoping de Forest would develop a
vacuum tube detector for arc reception to take the place of the inefficient “ticker” mechanism then in use.  

Interestingly, a 1918 financial review of the company by Francis Farquhar suggests that the purpose of hiring de Forest, a “keen inventor,” was as much to keep an eye on him as it was to benefit from his knowledge (de Forest’s assumption) or the practical result of his experiments. With wireless “in such a state that new inventions might cause irreparable loss in the value of patents already existing,” it was better “to have him inside the door, looking out, than outside the door looking in.”

Elwell had purposefully teamed de Forest with Logwood, a San Luis Obispo, California, native who had first met Elwell in New York in the summer of 1909. Logwood was a “damped wave spark wireless enthusiast” interested in improving the Poulsen “ticker” or continuous wave detector needed for transmission. He had joined Federal in late 1909. Though de Forest initially distrusted Logwood’s lack of formal training, he quickly came to respect Logwood’s inventiveness and creativity. The Logwood Rotary Ticker of 1912 (1915 patent) was adopted as standard equipment in all Federal stations. Van Etten, a graduate of Stevens Institute of Technology, was a New York telephone engineer who joined Federal to work on the Audion as a telephone “repeater.” His parents had moved to Palo Alto in 1906, and his brother (H. P. Van Etten) had recently graduated from Stanford (1909).

From the summer of 1911 to April 1913, de Forest, Logwood, and Van Etten developed two devices that made large scale radio transmission possible, the Audion amplifier and the vacuum tube oscillator. Their first successful demonstration took place August 3, 1912, after Perham had departed for Texas.

Later that year, Elwell would use the three-stage amplifier—the Audion Oscillator, or Oscillion—in important U.S. Navy tests in Washington. Ironically, while this landmark development in radio technology was a coup for Federal, leading to important contracts with the U.S. Navy, it would make the Poulsen arc obsolete within a few years as tubes replaced arc and spark transmitters.

Doug Perham also came to know several other talented young Federal engineers, most notably Leonard Fuller, who would become Federal’s expert on the larger transmitters. Fuller joined the company in September 1912 to improve Elwell’s failed 60 kw transmitters and to supervise the engineering group. Fuller had first met

De Forest, Logwood, Mrs. Logwood, and Van Etten, Palo Alto, 1911
Elwell in 1910, and had heard the promotional wireless transmission between San Francisco, Stockton, and Palo Alto. Fuller not only significantly improved more powerful arc designs, but set up a developmental laboratory, and improved the engineering group’s design and testing programs.45

**Transition at Federal Telegraph Company**

The early years of Poulsen Wireless were ones of experimentation, both scientific and financial. While Elwell-the-engineer, and the technical staff he hired, explored various improvements in power transmission and reception, Elwell-the-president and his successors were continually handicapped by inadequate funding. New president Beach Thompson restructured the company again in January 1911. A new company, Poulsen Wireless Corporation, now oversaw The Federal Telegraph Company, its manufacturing arm. “The controlling element” represented in decisions by Beach Thompson and his successors had become “not what was most practicable but what was most profitable,” wrote Farquhar in his 1918 financial analysis of the company.46

While Thompson focused on spreading the Poulsen arc system as an inland point-to-point wireless telegraphy operation in competition with cable-based systems, the company’s San Francisco board attempted increasingly complex stock and bond schemes, and property transfers. Their “colossal financial schemes,” however, did little to support the company’s experimental potential or its production efforts. As Farquhar concluded, Thompson “tried to overcome early losses by funding some gigantic proposition that would make them appear incidental and would provide a sufficiently imposing prospect for converting the stock of the Poulsen Wireless Corporation into a saleable commodity.”

The Midwestern stations, prematurely constructed to support a promised contract with the Publishers Press Corporation, never made it past the experimental stage due to meteorological problems. By the summer of 1913, all of the stations east of California were closed down because atmospheric static produced too much interference for commercial quality service (the experimental stations at Sacramento and Stockton had already shut down).

Off on their own tangent, the engineering staff hoped to develop strong wireless telegraphy and telephony stations along the Pacific Coast, and with select Pacific Island stations, to demonstrate the efficiency of the Poulsen system for transpacific and ship-to-shore communication. In September 1912, Elwell confidently took the Poulsen arc system, with de Forest’s audio oscillator, to the Bureau of Steam Engineering in Washington D.C. to prove its superiority, in both power and range, over the lower-powered Marconi spark transmitters then widely in use.

After an impressive U.S. Navy Department test, Federal won important Navy contracts to install radio stations at coastal sites and on ship board to facilitate communications between U.S. Naval bases and the fleet at sea. Contracted to build stations in Panama, the Phillipines, and Pearl Harbor, Federal devoted most of its manufacturing efforts to producing radio equipment for the Navy until the end of World War I.47

This success was in the future, however. On his return to California, Elwell had been chagrined to find that, in a “him or me” show down with Beach Thompson, Federal’s board of directors considered Thompson the more indispensable. In May 1913, Elwell accepted the position of chief engineer for the English company, University Radio Syndicate, to set up stations for a proposed British Commonwealth system. (He later founded the Mullard Radio Valve (tube) Company in England, which he directed for the next 28 years.) It had become obvious, he later asserted, “that financial troubles were brewing for the company and since Cy had had no part in brewing them and wanted no part in them when they brewed, he
got out.” He did not return to the United States until World War II.48

Fuller took over, at age 23, as Chief Engineer.

Lee de Forest and Charles Logwood continued their work on the Audion. By October 1913, they were demonstrating the Audion oscillator to Bell Telephone engineers, and by the end of the year, they had set up a New York company to manufacture amplifiers and Audion oscillators. (Many of these de Forest patents would be bought by RCA.) Van Etten also left Federal in 1913, joining the Pacific Telephone and Telegraph Company.49

By 1913, Doug Perham, too, had moved on, leaving both his family and his company behind. By 1912, there would have been little room for the Perhams in the Emerson Street cottage, where Federal employees were working. Palo Alto directories list the Perhams as living on High Street in 1910 as well as 1912; but the family probably had been squeezed out as early as 1910. Margaret and Barbara may already have moved across the bay to Alameda, where Margaret’s sister and brother-in-law resided. (Margaret Forbes Perham lived the rest of her life in Alameda, with her sister and brothers, and later, with her daughter and son-in-law. It is unclear if they were already divorced by the time Doug left.). Perham sold the cottage to Federal in 1912, when he left to install stations in Texas.50

While in El Paso, Doug met and married Pearl Heinz (1886-1970). Their daughter Gwendolyn Fern Perham was born in Texas in 1913. Perham resigned from Federal Telegraph Company, and moved his new family to Pearl’s home town of Cedar Rapids, Iowa, where Pearl’s brother, Earl F. Heinz, had an electronics business on First Avenue. Their daughter Virginia B. was born in 1915.51

Doug continued working with electronics, including experiments on x-ray equipment for Dr. Arthur Erskin, then president of the International Society of Radiographers and the one of the first physicians to use x-ray technology to diagnose and treat breast cancer and ulcers. By 1918, he was working as an electrician for W. L. Fowler.52

Perham at the Mike

While working as an electrician for Fowler, he may have been involved with setting up radio broadcasting equipment with the Cedar Rapids Electrical Equipment and Repair Company, or the Seronado Radio Company. His long-standing interest in wireless (radio) made him well suited for this growing market.

Doug’s early interest in radio “broadcasting” probably predated Cyril Elwell’s first transmission of music from his wireless station in Palo Alto when his wobbly version of “The Blue Danube” could be heard as far away as Los Altos and Mountain View. Like many of his wireless compatriots, Perham’s imagination was stirred by Charles “Doc” Herrold of nearby San Jose. Using a spark transmitter, Herrold broadcast voice and musical programming as early as 1909. By 1912, with his wife announcing, Herrold began regularly scheduled programs as “San Jose Calling.” His first San Jose station, FN, became KQW (and subsequently KCBS, San Francisco).53

Doug—known in Iowa as “Tex” Perham—turned radio broadcaster in July 1922. That year, he built and began operating radio station WJAM, one of the first licensed broadcasting stations in Iowa and the first station to be affiliated with a newspaper (The Cedar Rapids Evening Gazette), which provided an important source of income in the days before advertising.54

First located at 322 Third Avenue SW, in Cedar Rapids’ south side, the broadcasting station took over three rooms of the Perham house. One room was devoted to a studio, another to the transmitter. The 20 watt-station was equipped, not coincidentally, by the Cedar Rapids Electrical Equipment and Repair Company. The studio, designed by Helen Kacena Stark, was draped in burlap.

While some local sources said the station began in the Perham’s garage, Doug corrected
that notion, explaining in a 1962 letter that the original building was not a converted garage but a specially built site with a 40-ton block of concrete supporting the generators.

The station’s 115 ft. tower, a local wonder, was anchored next to the house. “Bystanders stopped in open-mouthed wonder and gazed at it, speculating on its purpose. Some thought it was a windmill,” reported a local newspaper. “Others said it was to be a signal for airplanes. Still others, more advised, explained that it was to be a radio aerial tower.”

Backing by the Cedar Rapids Gazette and the Seronado Radio Company was crucial in these early months of the “Radio Craze.” Smaller, self-supporting stations, like WIAE of Vinton, Iowa, soon fell by the wayside. Although WIAE was issued its license more than a week before WJAM (July 21) and could boast broadcasting’s first female owner, Marie Zimmerman, it couldn’t compete against the more powerful and better funded stations. WJAM not only had a stronger signal, but could offer listeners free radios as prizes—and even $100 in cash contests.

They first tried out their signal on July 19, Doug later reported. Formally licensed on July 29, their first “program,” that is, a general broadcast for a group rather than to individual listeners with headphones and crystal sets, went on the air on July 30 as an evening broadcast. Having offered a $5 prize to the furthest listener, they soon heard of their success from people throughout Cedar Rapids and the surrounding area. The first program included the music of Max Sturges and his Manhattan Dance Orchestra, and popular favorites like “Kitten on the Keys,” “Sapphire Sea,” and “Deedle Deedle Dum.” Perham operated the station, experimented with improvements, and served as announcer as well as engineer, while Pearl broadcast market reports. (By 1924, Harvey N.
Meisenheimer joined them as “chief operator” and announcer.

By August 9, 1922, they were announcing baseball scores, and by August 12, a police bulletin about a stolen Cadillac. By mid-August, WJAM could be heard in three states, and by November it had been heard in Brooklyn.

Radio broadcasting changed rapidly through the 1920s, as broadcasters, operators, performers, unions, lawyers, and the government, struggled to keep up with technological improvements. Doug was not always patient with the results. In 1923, WJAM broadcast the following announcement: “We regret to announce that there will be no program from this station tonight due to an eleventh hour ruling of the musicians union which forbids the appears of a union musician at a broadcasting station. This ruling is very much in keeping with the near sighted and narrow minded policies of such organizations in general. Between the unions and the Society of Composers, Authors and Publishers, the path of the broadcaster is lined with numerous vicissitudes.”

Perham continued to broadcast live programming, particularly local country-western musicians, and by 1924, jazz. But by 1928, he’d had enough.

Life as a radio broadcaster had lost its appeal and, to the native Californian, apparently so did Iowa. That year, Doug headed back to California with Pearl and their two daughters.

He sold his interest in WJAM to Harry Shaw, who owned the Waterloo Morning Tribune. Shaw had been close on Perham’s heels with his own, smaller station, located in a barn on the east side of town, known as WKAA. (Shaw moved WJAM to Waterloo, Iowa, and renamed it WMT. Today the station is still operated as WMT.)

**Back on the Peninsula**

Back in the Palo Alto area, Doug Perham rejoined Federal Telegraph Company in Palo Alto as an electrical and radio engineer specializing in installation.57

Now largely a production company, Federal Telegraph had relocated in 1917 to a new long, green corrugated building slotted between Alma and El Camino, not far from its original buildings. The Navy acquired Federal’s transmitting facilities for use during the war and production was ramped up.58

According to Leonard Fuller, the three buildings on the corner of Emerson and Channing had been abandoned. Used as a junk yard, the lab building and the green shingled cottage may both have burned down sometime later. (The white cottage still stands, and was listed as a California State historical resource in 1970).

Much had happened to the company since Perham had left in 1912. As Elwell had foreseen, the Navy contracts were a significant success while the point-to-point stations were short-
lived. “Because of the superior performance of their transmitters and their ability to design progressively larger units,” writes Thorn Mayes, “Federal built a major part of the long distance wireless equipment used by our Navy just before and during WWI, ending with the 1000 KW transmitter installed by the Navy in France at the end of WWI.” (The U.S. government took over all privately-owned stations during U.S. intervention in World War I, but throughout the war years Federal continued to provide the equipment). At its late war-time height, Federal employed some 300 people. By the end of the war, however, Federal’s peak production years were over.

While in Iowa, Doug Perham had followed the growing financial scandal surrounding the company. He carefully cut out news-clippings from San Francisco’s newspapers (preserved today with his papers at History San Jose) telling of accusations of stock jobbing and fraud. Beach Thompson had died unexpectedly in 1915. His successor, Washington Dodge, a former vice-president of the Anglo-American Bank of San Francisco, resigned in 1919 under a cloud when he was sued for misrepresenting the value of Poulson stock and for fostering special deals favoring his brother and several San Francisco backers. Facing a $450,000 suit and serious charges of fraud, Dodge committed suicide in June 1919.

Under new management, the company, backed by the U.S. State Department, attempted a large Trans-Pacific project, including four Chinese cities of Shanghai, Peking, Canton, and Harbin. This effort came to a standstill in 1926 due to the instability of the Chinese government, international competition, the beginning of short wave radio, and conflicts between Federal and RCA. (Ten years later, RCA established a short wave circuit to Shanghai.)

In 1927, Federal merged with the Mackay system to produce tubes and to continue production of the Kolster directional antenna;
both Federal and Mackay became part of International Telephone and Telegraph Company (ITT) in 1928. (Ironically, Mackay had its start as a cable telegraph company.)

On returning to Palo Alto, Perham had turned to his old acquaintance, chief engineer Leonard Fuller. Fuller had left the company in 1919, and had himself just returned. Like Elwell, Fuller had felt strongly that Federal’s system was best suited for ship to shore and overseas transmission, and less suited for land. Fuller had been responsible for the design of ever more powerful arcs that enabled Federal to design stations for France, Hawaii, and later China (the trans-Pacific project that never came to fruition). He also had made all of the electrical, magnetic, and cooling designs for Federal’s large arcs, and in 1917-18, designed the antenna system for the 500 and 1000 KW sets. His work on the improved design of Poulsen arcs earned him a Ph.D. in electrical engineering from Stanford in 1919, by which time he had 23 patents on the design of arc transmitters and related apparatus.

Fuller had left Federal when the company’s board of directors was rocked with scandal. A long-time radio man himself, he joined Colin B. Kennedy, a Los Altos radio engineer and former Federal employee, to form the Colin B. Kennedy Company of San Francisco to produce radio-broadcast receivers. After the Kennedy Company was bought out and moved east, Fuller went on to pioneer telephone transmission over high-voltage (220,000v) power lines via RF carrier currents, linking major electronic power substations in the Bay Area with hydroelectric power plants 200 miles away on the Pitt and Feather River.

In 1928, Fuller agreed to return to oversee the transition of Federal Telegraph Company when it was acquired by Mackay. Fuller served as Executive Vice President of Federal, responsible for manufacture of early short wave vacuum tube transmitters and receivers for Mackay Radio and Telegraph Company. In

*Fuller, Elliott, and other Federal engineers, with original 5kw Poulsen arc transmitter in front of them and the first of six new Navy 500kw arc behind, 1917*
1930, he accepted appointment as professor and chair of the Department of Electrical Engineering at the University of California, Berkeley, but he would continue to shepherd the company until its move, in 1931, to New Jersey.63

To reduce operating costs, IT&T had determined to consolidate several of its manufacturing operations at one location in Newark, New Jersey, and to cut staff. In 1931, Doug was among the many Federal employees laid off “due to no fault of your own,” due to the poor business conditions of the ongoing financial downturn.

It is doubtful that he would have been any more interested than Fuller in moving to New Jersey (the move was completed during the summer of 1931), but being laid off just as the Depression hit hardest was a blow. At the very least, he had in hand a glowing recommendation from Fuller for his ability “to handle a wide variety of electric power and radio construction problems.”64

The ever-resourceful Perham took various jobs to make ends meet, including, it is said, bricklaying, but he regained a foothold with his ongoing work on electronics projects. He and Pearl moved northward to Redwood City, the county seat of San Mateo County and closer to many local electronics firms. By 1932, he was working on short wave wireless experiments for Ralph Heintz, Sr., and on other development work with Heintz and Kaufmann in South San Francisco while he developed his sub-contracting business. His shop, in Redwood City (1933-1946) and then later a few miles north in San Carlos (1946-1953), specialized in creating dies and other machine work for various electronics firms.65

Perham built parts for various electronics firms establishing themselves along the
Peninsula’s “Electronics Alley,” including Dalmo-Victor (1941-45), where he also served as a consultant on radar parts. Doug’s workshop also produced parts (1944-46) for Ampex products during and after the war.66

In 1940, at the behest of Stanford professor William W. Hansen and his colleagues, Russell and Sigurd Varian, Perham’s company made parts for early experimental klystrons for one of their first Sperry Gyroscope contracts. After the war, in 1948, Perham joined the newly established Varian Associates as staff member and “expeditor.” He remained with Varian until his retirement in 1953.

Equally important, he also was Varians’ landlord—in 1948, Varian, in serious need of expansion room, leased Perham’s machine shop next door to their facility on Washington Street in San Carlos, using it until their move to Stanford University’s industrial park in 1954.

A talented craftsman, Doug also established a business in his home workshop making working scale models, many with complex electrical parts, for demonstrations, store windows, and state fairs. Working from photographs more often than drawings, Doug constructed notable dioramas for the Hall of Western States at the 1939 World’s Fair on Treasure Island. Especially popular were his working miniature of the Pike’s Peak railroad and an erupting “Old Faithful” geyser. He later told an interviewer that he found this work more fun than his lab and factory work for Federal or the stressful job of radio broadcaster.67

**Perham the Collector**

Doug Perham was rather proud to have “no degrees from colleges, no memberships in societies, no special awards of merit.” Yet, seemingly always in the background, his friendships and associations in the field of electronics and electrical engineering were many and wide-spread.68

In 1957, Perham was recognized as one of three “Pioneers of Western Electronics” by the directors of the Western Electronic Show and Convention (WesCon), where he was honored, beside former Federal Telegraph colleagues Dr. Leonard Fuller and Cyril F. Elwell. Naturally, these “veterans of fifty years in electrical engineering” shared the stage with several historical pieces of electrical equipment from the Perham Collection, including a lamp bulb originally installed aboard the steamship Columbia in 1880 in San Francisco Bay, the first vessel to have incandescent illumination, and the original 100-watt Poulsen arc brought from Denmark to the United States by Elwell in 1909.69

In 1953, Doug Perham retired, in a fashion. A long-time collector, he enjoyed using his spare time refurbishing early electronics equipment as well as making electronic toys for his grandchildren, but he remained determined to develop his electronics collection. Doug’s father, Franklin, had also been an avid collector, of books and pictures of California, and an extensive collection of Robert Louis Stevenson works.

“Being a collector of many sorts, it has brought me to many interesting places,” Doug later wrote. Eventually it brought him to the old mining town of New Almaden, south of San Jose, where in 1952 his eye was caught by a small “Museum” sign on one of the adobe cottages. There he met its curator, Constance Healy Broner Kambish (1908-2001), an avid collector in her own right.70

Connie Kambish was the creator and curator of the New Almaden Quicksilver Mining Museum, and postmistress of the tiny mining town of New Almaden. In March 1953, Doug and Connie founded and operated The New Almaden Historic Properties, expanding her museum from two to five rooms and gradually merging his collection, which showcased the history of electronics, with her own extensive historical mining collection. Ultimately, Doug left Redwood City, and Pearl, behind altogether. In 1958, Doug and Connie were married.71

Connie, a great-great granddaughter of Mariano Sobranes, an early Californio rancho
owner, had been familiar with New Almaden since childhood. Connie’s mother, Adelaide Broner, was the daughter of Constantino Broner and Fabian Sobranes. Connie often visited with her Sobranes grandmother, who told her about life in early California. Constance was named for her grandfather, Constantino.

In 1926, her parents, James E. and Adelaide Broner Healy, purchased the Carson House adobe at New Almaden as a vacation home. Nearby, the Casa Grande, originally home to mine managers, was used as a summer club for swimming and picnicking. Connie soon began collecting artifacts from the historic New Almaden quicksilver mines. Her New Almaden Museum opened to the public in 1949, and became a noted hard rock mining museum. When she retired from its operation in 1984, Connie sold the museum to the County of Santa Clara. Her original and very special collection remains the heart of the New Almaden Museum, now on display in the historic Casa Grande at New Almaden Quicksilver State Park. In 1982, the 1854 Carson House was commemorated by E. Clampus Vitus (plaque no. 1850).

Doug began showing portions of his collection at New Almaden in the early 1950s. He proudly displayed the burned out light bulb given to him by George Westinghouse in 1893. According to Perham, Westinghouse advised him: “If you keep this until you are an old man, it will be very valuable.” He cherished that advice, and throughout his career he had hung on to, and collected from others, pieces of gear that had outlived their initial purpose. Friends in the field knew of his interest and sent him more, among them Leonard Fuller, Charles “Doc” Herrold, Lee de Forest, Ralph Heintz Sr., and Russell Varian.

The resulting collection, Doug’s “Cavalcade of Electronics,” was meant to display the

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*Connie Kambish and Doug Perham, New Almaden (HSJ)*

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*The New Almaden Museum, ca.1959 (HSJ)*

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evolution of electronics from Tesla to Varian, by way of Federal, “Doc” Herrold, Heinz and Kaufman. The collection could not help but parallel his career. Exhibits ranged from a variety of early Lee de Forest’s Audions, early Federal Telegraph arc transmitters, Philo Farnsworth’s first hand-made television tube (made from a chemist’s beaker), and three of the first ten centimeter klystrons. It included a General Electric engine of the same type used by Doug in building early radio stations, and an early radio receiver built by Colin B. Kennedy Company of Los Altos. A much-simplified reconstruction of the first regularly scheduled radio broadcast station, Charles “Doc” Herrold’s 1909 Radio FN (later KQW), “San Jose Calling,” was a popular exhibit.

In 1959, as a cap piece, Varian Associates donated a huge VA842 klystron tube to complete Doug’s display of klystron tubes, and radio pioneer Ralph Heinz, Sr., donated his extensive vacuum tube exhibits that Heinz and Kaufman had used in their successful litigation against RCA in the 1930s.74

When New Almaden’s “fabulous collection of radio and electrical equipment” was formally opened in 1960 by the San Francisco section of the Institute of Electrical Engineers, one reporter noted that Dr. Vic Corey, IRE president, said the place reminded him of the Grand Canyon. “When you stand on the rim and look down into the canyon you see a record of the past ages of the earth in the strata,” he said. “So it is here. As I walk through this museum I see the different eras in the development of electronics.”75
Doug’s collection brought “a very active retirement, as I’ve done all the construction and displaying work myself,” he wrote proudly, but is availing untold pleasure and education to many in our community.”

Doug and Connie enjoyed giving on-site guided tours, and they both served as guest lectures for local school children under the auspices of the Santa Clara County Office of Education. Doug’s exhibits were a centerpiece of celebrations at the 1957 WestCon San Francisco conference, and other special occasions, such as the 50th anniversary of Lee de Forest’s triode in 1956.

Heavy rains and flooding in December 1955, however, had in fact destroyed valuable pieces of the collection and badly damaged part of the adobe museum building and outbuildings. A flash flood caused further significant structural damage. Repairs were costly, threatening the Perhams’ financial security. In February 1959, Ralph Heintz Sr. and Earl Goddard (then chairman of the San Francisco section of the Institute of Radio Engineers) helped formulate an IRE historical committee to find a way to help the Perhams preserve their remarkable collection intact.

Temporary building repairs were made, but the future of the collection in safer, larger and more accessible conditions was the ultimate goal.

The Perham Foundation Builds a Museum

“The monumental task of getting the museum established was turned over to members of the IRE’s historical committee who also shared Perham’s desired to preserve the priceless artifacts and documents that were the beginnings of electronics in the Bay Area.”

In July 1959, the Perham Foundation was founded to “own, manage, operate and control a museum and educational facility for the collection, development and preservation of educational and historical materials and for the dissemination of the same.” Founding board members were Doug and Connie Perham, Ralph Heintz, Sr., William Eitel, Leonard Fuller, and Austen Warburton. They were later joined by Jo Emmett Jennings of Jennings Radio Manufacturing Company of San Jose.

In early 1963, with Doug in failing health, a newly reorganized Perham Foundation took title of the collection and recommended that it be moved from New Almaden. Transferring much of the collection into storage in San Jose that summer, the Perham Foundation board looked for a centrally located site, investigating options from Palo Alto to the Santa Clara County Fairgrounds. Foothill Community College was selected in 1964. Located in Los Altos, the college offered a prominent site in the northwest corner of the campus, where it would be an integral part of a proposed Space Science Center. Backed by the strong support of Foothill
President Dr. Calvin Flint, the location also offered academic integrity of the operation, and the cooperation of college staff and trustees, to maintain and develop the collection intact as a community cultural resource. The Perham Foundation immediately began fundraising for a substantial building to house and exhibit the collections. In addition, volunteers conducted interviews with Doug, Leonard Fuller and others involved in early electronics.

Local author Jane Morgan began research at this time for her book, *Electronics in the West*. Originally intended as a popular history aimed at high school and college students, Morgan produced a carefully researched as well as readable history. Its lack of footnotes tricks scholars into thinking it derivative, but Morgan interviewed many of those involved in the history she recounts, and was meticulous in her fact-checking. Harradin Pratt, an early wireless pioneer with an esteemed career as electrical engineer and manager with Mackay/ITT, served as an advisor. Their correspondence, along with her extensive research files and many interviews, including a rare interview with Doug Perham about his collection, is preserved at History San Jose. The Perham Foundation also embarked on a documentary on Lee de Forest, and encouraged interest in the work of Charles “Doc” Herrold and early radio broadcasting in San Jose.

Sadly, less than a year before ground was broken for the Foothills Electronics Museum, Doug Perham, aged 82, died August 14, 1967 in San Jose. He is buried at Oak Hill Memorial Park.

Connie Perham took an energetic role in the creation of the Perham Foundation, and remained active in the Foundation’s work to establish and build the Foothill Electronics Museum and, later, to facilitate the preservation of the Perham Collection of Early Electronics at History San Jose. She died January 28, 2001.

The Perham Collection Lives On

Although the Foothill Electronics Museum building was completed in 1969, its opening was delayed by a badly leaking roof, a change in IRS rulings regarding non-profit organizations, and staff changes. When the Foothill Electronics Museum opened in January 1973, its program was ambitious: to grow to 18,000 square feet of displays tracing the development of electronics from the earliest experiments to current day applications, and to promote broad ranging public programs. It also sponsored a ham radio station.

Severe budget cuts in 1978, however, following passage of California’s Proposition 13 tax-limitation measure, forced Foothill College to end its support of the Museum’s operation and administration when the Museum was deemed not integral to the teaching mission of the community college. The Foothill Electronics Museum continued to operate at limited hours with private funding and volunteer staffing until 1990, when Foothill College’s administration decided to turn the space into classrooms and laboratory space.

The Perham Foundation, which had paid for construction of the building, successfully sued the College for compensation, but permanently lost its toe-hold on the campus. The collections went into storage at a number of venues, including 32 cargo storage containers, for more than a decade while the Foundation explored possibilities for a new museum site.
Unfortunately, the collections, although lovingly tended by volunteers, suffered from multiple moves, break-ins, and rain damage. With the new century, and the “Dot-Com Bust,” it was clear that finding adequate funding to build and operate its own museum building was no longer possible.86

In November 2002, History San Jose accepted what remained of the collections of the Perham Foundation by special contract. The Perham Collection was welcomed as a separate special collection that augments existing HSJ collections documenting the evolution of the electronics industry in Silicon Valley and, more generally, the intersection of technology and society in this region. Given the specialization of the nearby Tech Interactive museum of San Jose and the Computer History Museum of Mountain View, at HSJ the “Perham Collection in Early Electronics” once again focuses on the first fifty years of the development of the electronics industry in the West, particularly Santa Clara Valley and the South Bay region.

In 2006, HSJ Staff and volunteers began a long term project to review, restore and rehouse this extensive collection of objects, photographs, manuscripts and printed material. More than 1,025 artifacts and 1,200 photographs have been cataloged into HSJ’s online catalog, along with books, catalogs, manuals, and other ephemera. By 2019, more than 300 linear feet of manuscript collections, including the papers of Lee de Forest and records of the Federal Telegraph Company, also had been cataloged, the result of a special project funded by the Council on Library and Information Resources “Hidden Collections” program.

Today, the collections are a featured element of HSJ, with special exhibits at Kelley Park and sites around Silicon Valley, and have been featured in academic publications, popular histories and local news coverage.

*Doug Perham and a young visitor, New Almaden, 1959*
Roxanne Nilan earned her Ph.D. in American history from Stanford University. Formerly Curator of Stanford’s University Archives, she currently is honorary curator at History San Jose.

Douglas M. Perham Papers, Box 1, History San Jose, San Jose, California (hereafter DMP Papers)

Doug’s birth in Duarte, not neighboring Monrovia as some claim, is documented on his August 14, 1967 death certificate, numerous Perham resumes, and a letter, Douglas M. Perham to T. E. Lyons, October 7, 1956, in which he notes that he was born “in one of the early houses in Duarte, California.” DMP Papers, Box 1. An older brother, James Cleaveland Perham (March 1884), is listed in Frank E. Perham’s entry in George C. Purington, *History of the State Normal School, Farmington, Maine, with Sketches of the Teachers and Graduates* (Farmington, Maine: Knowlton, McLeary & Co., 1889). Franklin Perham’s obituary, however, lists only the three surviving sons: Douglas, Don, and Philip.


23 June 1883. Tisbury’s marriage records are available in Massachusetts Town and Vital Records, 1620-1988 [database online, accessed October 21, 2013.]

“Veteran Teacher, Spry at 90 Years of Age,” *Palo Alto Times*, July 30, 1948, details the trip and Franklin’s career. See also *Bowdoin Alumni Magazine* (February 1953).

Ibid. Franklin became head of Santa Paula Academy, superintendent of schools at Santa Ana in 1891, and subsequently superintendent in Berkeley and Stockton.

Both are listed not as “ex-05” (that is, did not graduate with this undergraduate class). *Stanford Alumni Directory and Ten-Year Book IV, 1891-1931* (Stanford, 1932), 567, and *Stanford Annual Register and Directories*, published annually.


*Palo Alto city directories*, 1902-, and U.S. Federal Census records, 1910, 1920 and 1930. Doug also states that they moved to Palo Alto in 1902, although some articles about his parents in the *Palo Alto Times* report that the family made the move in 1903 (“Palo Alto church and family,” op.cit) or 1904 (“Veteran Teacher,” op.cit.). The 1903 *Stanford Register* gives Palo Alto as their residence. Doug may have moved on his own to Palo Alto in 1901. After Henrietta’s death in 1940, Franklin moved to Menlo Park.

“Palo Alto Church and Family,” op.cit.

Franklin’s obituary, “F.E. Perham, Palo Alto Old-timer,” op.cit., calls him “one of Palo Alto’s best known pioneer residents.”


Douglas Perham to Allen Goldberg, April 11, 1966, DMP Papers, box 1, folder 1. The Baldwin and Perham families were neighbors and fellow New England Congregationalists.

“Cutting Ribbon at Museum” [unidentified San Jose news clipping] 1958, DMP Papers, box 1. Perham told the Westinghouse story often, with slight variations.

Douglas M. Perham to T. E. Lyons, October 7, 1956; Douglas Perham, “Biographical Information for Westcon Publicity,” 1957; and Palo Alto Times, “Fifty Years Ago,” October 6, 1952, in DMP Papers, box 1, folder 7; Morgan, 42.

Doug later said he moved to Santa Barbara in 1906, but the 1905 Santa Barbara city directory lists him living at 605 Pico Avenue. He moved often: 1014 Anacapa in 1906, and WS Oak Avenue 1 N of W Mission, 1908 and 1909. It is unclear why he and Margaret were listed in both Santa Barbara and Palo Alto directories at this time. On his Santa Barbara work, see “Douglas M. Perham: RC man, radio pioneer, attends today’s dedication,” Palo Alto Times December 15, 1958, and Douglas M. Perham, Career Chronology; and various resumes, in DMP Papers, box 1.

Margaret was 14 years older than Doug, not the three years they reported to the census taker in 1910. See California Death Index, 1940-1997 [database online]. Barbara E. Perham Camisa (1907-1988) California Death Index, 1940-1997. Morgan says they moved to Emerson Street in late 1906, while Doug says 1907 in his interview for “Douglas M. Perham: RC man...” In a letter to Hugh Enoch (21 February 1958, DMP Papers, Box 1), Doug says he bought the house at 913 Emerson from Ed and Bridgett Cashell in 1908.


Perham to Jane Morgan, September 5, 1966, DMP Papers, and 1910 US Federal Census, Palo Alto, Santa Clara County, California, Roll T624_105; page 8A; enumeration district 79; image 869.

Perham Career Chronology, DMP Papers.


27 Dr. Leonard Fuller interview, January 7, 1964, Jane Morgan Papers, History San Jose, 2003-35-76.

28 Elwell, Autobiography, 45, and Morgan, 42. Mann, 383 says Elwell “bought” the house & shed after the Stockton-Sacramento demonstration, needing a place to manufacture their own arcs for the subsequent San Francisco station (1910), but Doug consistently states that he rented the house to Elwell between 1909 and 1912.


30 Perham “Career Chronology”; Mann, 384.

31 Morgan, Electronics in the West, 42, Mann, 382-83; Sacramento Sunday News, February 20, 1910.


34 Morgan, 42. Thorn Mayes, “Federal Telegraph Company,” Early Wireless, 139: Federal introduced the first commercially successful system of continuous wave wireless telegraphy in the US, a major improvement over Marconi’s spark system.


36 In addition to his own memory, Doug cites a lecture by Elwell around 1953-54 that he attended, in which Elwell outlined these events and stated his reason for terminating Pridham. Perham to Jane Morgan, September 5, 1966. DMP Papers, box 1, folder 1.

37 Perham set up a circuit of high speed wireless telegraph between the Poulsen station in Los Angeles, and the Poulson station in San Francisco, personally installing equipment in both cases.

38 Perham at the Mike, 21.

39 Olsen, 18, provides a list. Before the Radio Act of 1912, these stations had their own call number designations starting with “P,” such as PLA for Los Angeles.

40 Will Jensby, “Federal Telegraph,” Miracles in Trust, 3:3 (third quarter 1991), 6. The Poulsen stations showed that they could handle telegraph traffic at 180 words per minute, reaching nearly 300 words per minutes in some tests.

41 De Forest’s widow, Marie de Forest, later donated a large collection of her husband’s papers, photographs and electrical equipment to the Perham Foundation (Lee and Marie de Forest Papers, 2003-34).

42 Who suggested these approaches, and just how much de Forest understood, remains debatable. Mayes, 146, says that it was Elwell who suggested that de Forest look at his audion as a transmitter, and Leonard Fuller who suggested that the audion could be adapted for use as an oscillator. See


45 Fuller’s work on the design of Poulsen arcs earned him a PhD in Electrical Engineering from Stanford in 1919, by which time he had 23 patents on the design of arc transmitters and related apparatus and had delivered 11 papers, several presented to the IRE and AIEE. Thorn Mayes notes that Fuller “personally made all of the electrical, magnetic and cooling designs for the large arcs.” Fuller also designed the antenna system for Federal 500 and 1000 KW sets (1917-1918). Mayes, “Federal Telegraph Company,” p. 149. Leonard Fuller, An Interview Conducted by George T. Royden, IEEE History Center May 29, 1976, for the IEEE History Center, Rutgers University, New Brunswick, New Jersey.


47 Fuller notes that Beach Thompson and his successors only broke even when Federal sold important patents to the US Navy. Comments, 1972.


50 Information regarding Margaret can be found in the 1920 and 1930 Federal Census records and local city directories, in which she listed herself as a widow (see 1930 Oakland-Alameda city directory), as well as the California Death Index. Leonard Fuller confirms that Perham was “not around much” in 1912. Fuller, interviews, December 10, 1963, January 7 and October 28, 1964, Morgan Papers, 2003-35-76.

51 Janette Murray and Frederick Murray, *The Story of Cedar Rapids* (NY: Stratford House, 1950), 203. Federal Census, 1920, 1930; His September 12, 1918 (World War I) Draft Registration Card shows that Doug registered in Cedar Rapids, Linn County, Iowa. At the time of the 1920 census, Doug’s brother Don, 21, was living with them, whereas in January 1925 Iowa Census, Pearl’s mother, Jennie S. Heinze, 65, is also listed as living with them.

52 Perham “Chronology.”


Palo Alto City Directories: 1929 and 1930 list him as living in “Menlo Park,” but by 1932 they are living at 518 Hamilton, Palo Alto.


Thorn Mayes, “Federal Telegraph,” 139


D. Perham, January 18, 1919, note with news clippings; “Dodge out as Wire Co. Head,” San Francisco Examiner January 18, 1919; “Dodge Denies Fraud Charge; Former President of Poulsen Co. Says He did not Sell Stock Above the Value,” San Francisco Examiner, January 25, 1919; Death Hovering Over Dr. Dodge; End is Expected, San Francisco Examiner June 20, 1919. “Dodge was not charged with having appropriated to his own use all of the $450,000 but it is alleged that he was the prime mover in a conspiracy thereby that sum was taken from the treasury of the Federal Telegraph Company, of which corporation he was at that time president,” reports “Fraud Laid to Dodge by Telegraph Co.” San Francisco Examiner, May 22, 1920. Thompson had died in 1915. Douglas Perham Clippings Collection, 2003-46.

Mayes, “Federal Telegraph Company,” 149. See also Fuller IEEE interview by Royden, op cit.

In addition to previously cited works on Fuller, see “Early Radio Work of Leonard F. Fuller,” with his CV, in 2003-37-55 (box 5, folder 4). Fuller is also mentioned in Richard Russack, “$1 Billion Industry Seen in Pioneer Palo Alto Area,” (unidentified newspaper clipping), DMP Papers, box 1, folder 7.

“No fault,” A. S. Brown to Perham, February 16, 1931. Although he was first informed of his layoff as of August 19, 1930, he was kept on until at least the spring of 1931. “Poor business conditions,” Leonard Fuller to Perham, July 10, 1930. DMP Papers. Doug was employed by Federal from September 11, 1928 to February 28, 1931.

Redwood City Directory, 1933, 496 Vera Avenue, RC “El. Eng.”

Perham Chronology, DMP Papers, box 1; Morgan, 148, 159.

“Douglas M. Perham: RC Man...”


Perham, “Collector of Many Sorts,” DMP Papers, box 1, folder 4; Constance B. Perham to the Members of the Historical Group of the San Francisco Group of IRE, March 17, 1960, DMP Papers, box 1, folder 1.

California Marriage index notes the marriage of Doug and Constance Healy May 21, 1958; Directories are oblique resources at best, since they print what they know until corrected but Doug and Pearl were listed as living at 839 Arlington Road, in Redwood City, in 1955. She continued to live there until her death in the 1970s.


The quote varies, but the idea remains the same. Another version: Young man, get your hands on some of these things and save them. They will have a valuable historical significance someday.” Morgan, 23
Varian Associates, December 1959. Perham’s New Almaden display included an original spark transmitter and other equipment given to him by Doc Herrold.


[Douglas Perham], “A Collector of Sorts,” p.3

Guide to the Foothill Electronics Museum of the Perham Foundation, Miracles in Trust (1974), p.[4] The IRE’s charter prevented it from fundraising directly to support the Perham collection. The Perham Foundation was established, but reorganized in 1962 as recommended by the IRS. In early 1963, Doug Perham transferred title to the collection to the Perham Foundation, which took over his financial obligations. See also Constance Perham to the Historical group, 1960, op.cit.


“Articles of Incorporation, July 28, 1959.” First directors were Doug Perham, president; Ralph Heintz Sr., vice president; Connie Perham, secretary; and William Eitel and Leonard Fuller, directors, with Austen Warburton as legal council. Doug stepped down from the board in 1963. Tax exempt status was slow in coming (five years).

A new board was also named: Earl Goddard, president; Ralph Heintz, vice president; Charles Stephens Jr. secretary, and William Maxwell, treasurer; members Fred Barry, Fred Du Bridge, John Shaw, and Robert Smithwick, with Morton MacLeod, council. The senior officers remained roughly the same until 1971.

Between 1964 and February 1970, collections were stored at James Transfer and Storage, San Jose. Miracles in Trust (Perham Foundation) 1:1. Not all of Doug Perham’s original collection was saved, however. There is evidence that significant artifacts, ephemera and manuscripts had been given or sold to individuals and other institutions (including the Smithsonian) before its transfer to History San Jose in 2003.

“Douglas M. Perham Dies; Pioneer in Radio, Electronics,” San Jose Mercury, August 16, 1967. Perham was survived by his wife Constance; three daughters, two brothers, Phillip Perham and Don Perham, both of Atherton, and stepsons Frank A. and John Kambish of New Almaden, and Gregory L. Kambish. California Death Certificate #2456, states that he died of “arteriosclerotic cardiovascular disease.” DMP Papers, box 1, folder 2.


Due to changes in California tax laws, public taxation directed at community colleges was strictly confined to the use of facilities for teaching purposes.

March 1991, Judge Jeremy Fogel crafted a compromise between the college and the foundation. On the grounds that the collection was a unique historical resource, he granted the Perham Foundation ownership of the collection. The College agreed to pay $775,000 for the building, and the Foundation agreed to move.