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# Philo T. Farnsworth

## The Father of Television

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Donald G. Godfrey

Foreword by  
Christopher H. Sterling



## Foreword

# Rescuing a Television Pioneer

IT WAS WHILE BEGINNING GRADUATE SCHOOL AT THE UNIVERSITY OF WISCONSIN—Madison more than three decades ago that I became fascinated with the development of American broadcasting and its audio and video technologies. Back then the relatively sparse published record of the pioneering days of television was dominated by accounts of John Logie Baird and Charles Francis Jenkins and their work with mechanical systems, as well as the work of Vladimir Zworykin's team at RCA. If Philo T. Farnsworth was mentioned at all, he was merely a footnote—one of many electronic media innovators who seemed only marginal to the main story.

Although the image of an Idaho farm boy conjuring up a workable electronic system of television in the 1920s could easily grab one's imagination, over the years Farnsworth's work faded into the background. Important to this disappearance was the lack of any corporate support to balance decades of steady propaganda from RCA praising Zworykin (on whose work RCA held the patents) as the real—and sole—father of television. About a year before Farnsworth died, I unfortunately passed up a chance to meet him when one of my graduate students interviewed him at his Salt Lake City home and obtained his shaky signature on the flyleaf of my copy of George Everson's *The Story of Television* (the 1949 biography that for 40 years was the only book-length study of the inventor's life).

As described in the pages that follow, Farnsworth's quest for success in electronic television was to be plagued by bad luck, sometimes poor timing, often impatient financial backers (who wanted vast and quick returns), and inadequate staff and research funding. Products using his name disappeared from catalogs and shelves years before he died. What remained was scattered and lacked any single sponsor interested in preserving and promoting what he had accomplished. Photos of Zworykin holding an old cathode ray tube became near icons of television's pioneering days, but pictures of Farnsworth were so rare he

stumped a television quiz show panel in 1957. He died in 1971, worn out and ignored by the very industry he helped to create.

Luckily Philo Farnsworth was not doomed to permanent obscurity. Growing awareness of his vital role in the technical development of electronic television began in the 1970s. What had been forgotten over the years turns out to be a fascinating story, central to understanding the progress of electronic television. In 1977 a television magazine published a four-part biography of Farnsworth. He was also one of four electronics inventors featured in a set of U.S. postage stamps in 1983. The efforts of his devoted wife and family culminated in 1989 with publication of an informal memoir that helped revive our sense of who he was as well as what he accomplished. A statue of the young Farnsworth holding his pioneering television tube was added to the collection in the United States Capitol in 1990 after a statewide effort from Utah to recognize a favorite son.

A number of dedicated researchers have aided the effort to rescue the inventor's record and reputation from dusty records and archives so that Farnsworth is now more widely recognized than at any time since his exciting, innovative work in the 1930s. Descriptions and analyses of his role appear more prominently in the many published histories of television. A solid technical survey of Farnsworth's work graced the pages of the prestigious *SMPTE Journal* in the early 1990s. In a 1999 feature on the major American inventors of the 20th century, *American Heritage* included only two telecommunications pioneers—Edwin Howard Armstrong and Philo Farnsworth.

With this first scholarly biography of Farnsworth's life and times, Donald G. Godfrey has done the inventor and all historians (let alone watchers) of television a considerable service, by providing an appealing, balanced, and well-researched study of Farnsworth's life and work. Godfrey emphasizes the all-important context of the times—in terms of television developments elsewhere as well as, after 1929, in the investment-killing Depression years—to provide insight to what Farnsworth managed to accomplish against considerable odds.

Three decades after his death, the television and other achievements of Philo Farnsworth are finally plain for all to appreciate.

Christopher H. Sterling  
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Philo T. Farnsworth

The Father of Television

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Caricature of Philo Taylor Farnsworth (1906-1971). Courtesy ITT.



"Beetle Bailey" July 17, 1981. Reprinted with special permission of King Features Syndicate.

# 1

## Youthful Genius

### 1906-1926

#### Chronology

#### Farnsworth

#### Electronic Media

- 1837 - Samuel F.B. Morse applied for first patent on telegraph system (received 1840).
- 1873 - James Clerk Maxwell puts forth modern concept of electromagnetic energy.
- 1876 - Alexander Graham Bell applies for first telephone patent.
- 1887 - Heinrich Hertz discovers he can project a magnetic field into the air.
- 1892 - Nathan B. Stubblefield begins broadcasting speech and music.
- 1894 - Charles F. Jenkins begins mosaic television system experimentation.
- 1895 - Guglielmo Marconi begins experimenting on his father's farm.
- 1897 - Marconi forms the Wireless Telegraphy and Signal Company in England.  
Cathode ray oscilloscope is developed by Braun.
- 1899 - Marconi Wireless Company of America is formed.
- 1900 - British Marconi Company is founded.
  - U.S. Weather Bureau hires Reginald A. Fessenden.
- 1901 - Marconi sends signal across Atlantic, from St. John's,

**Farnsworth**

1906 - Born the son of Lewis Edwin Farnsworth and Serena Amanda (Bastian) Farnsworth. Philo's grandfather, Philo T. Farnsworth Sr., was a prominent Utah settler.

1914 - Moved to father's farm near Vernal, Utah, and again to Washington, Utah, near mother's family.

**Electronic Media**

Newfoundland, to Cornwall, England.

1902 - Fessenden forms his own company, National Electric Signaling Company.

- Lee de Forest creates the De Forest Wireless Telephone Company.

1903 - First world Radio Conference conducted in Berlin to discuss control of broadcasting.

1906 - Fessenden transmits the human voice.

- Lee de Forest patents the audion tube.
- Second world Radio Conference conducted in London.
- David Sarnoff hired as office boy working in Marconi stations.
- Farnsworth born.

1907 - De Forest begins radio broadcasting in New York.

1908 - De Forest broadcasts music from Eiffel Tower in Paris.

1910 - First *Wireless Ship Act* passed; requires passenger vessels to carry radio equipment.

1911 - Marconi contracted with Wanamaker in New York and Philadelphia to install wireless.

1912 - *S.S. Titanic* sinks, and the value of wireless is proven.

- *Radio Act of 1912* passes; places Secretary of Commerce in charge of regulating radio; station licenses now required; Secretary to assign wavelengths.

1913 - De Forest sells patents to AT&T.

- Feedback circuit developed by Edwin H. Armstrong.

1915 - San Francisco World's Fair features demonstrations of de Forest's radio.

**Farnsworth**

1918 - Philo at age twelve drives one of the family's covered wagons in their move from central Utah to southern Idaho.

1920-21 - Family purchases farmland near Rigby, Idaho. Philo's teenage years combine farm work and scientific curiosity as the "chief engineer" on the farm.

1922 - At age fifteen, Philo describes his ideas for television to his high school teacher, Justin Tolman (Tolman's oral testimony of these experiences would later be instrumental in Farnsworth's legal

**Electronic Media**

- Charles D. Herrold's radio broadcasts received from San José.
- 1916 - De Forest radio broadcasts the first presidential election returns in New York.
- 1917 - The United States enters World War I; the Navy takes over all wireless installations.
- 1919 - Following the war the Navy returns control of radio to private sector.
- General Electric (GE) forms the Radio Corporation of America (RCA) to protect against a foreign monopoly in radio (Marconi).
  - RCA acquires the rights/assets of American Marconi; enters into cross-license agreements with GE.
- 1920 - Westinghouse radio KDKA, the first commercially licensed radio station in the United States, broadcasts Cox-Harding election returns.
- CFCF radio, Canadian Marconi station, broadcasts historic program.
  - AT&T goes into a cross-licensing radio group.
  - American Marconi corporation dissolved.
- 1921 - Westinghouse joins patent pool group. In cross-licensing agreements, GE and Westinghouse have the exclusive right to manufacture radio receiving; RCA, the right to sell the sets; AT&T, the right to make and lease transmitters.
- 1922 - Herbert Hoover conducts first Radio Conference.
- The AT&T radio station WEAf broadcasts first commercial program called a toll broadcast.

**Farnsworth**

struggles with RCA). Earned his electrician's license certificate through National Radio Institute correspondence course.

1923 - The Farnsworths moved to Provo to enhance their children's educational opportunities, and Lewis, their father, dies.

1924-26 - Farnsworth meets Elma Gardner. The family struggles for employment and education.

1926 - Philo meets George Everson and Leslie Gorrell. His description of electrical television captivates these promoters.  
 • Philo and Pem are married.

**Electronic Media**

- Inventor Edwin H. Armstrong demonstrates superheterodyne receiver.
- ASCAP (American Society of Composers, Authors and Publishers) wants music royalties for music used on the air.

1923 - Hoover conducts second Radio Conference.  
 • National Association of Broadcasters (NAB) formed.  
 • First radio network experiment links AT&T stations.  
 • Federal Trade Commission (FTC) begins radio patent and monopoly investigations.  
 • Wallace H. White drafts first radio bill.  
 • Everready (batteries) launches radio program, *Everready Hour*.  
 • Jenkins performs a shadowgraph demonstration.  
 • Zworykin files for patents on iconoscope camera tube.

1924 - AT&T experiments with first national radio network hookup.  
 • Competition between AT&T stations and the Radio Group (RCA, GE, and Westinghouse) stations becomes heated.  
 • Hoover conducts third Radio Conference.  
 • FTC issues report critical of radio monopoly.  
 • AT&T experiments with facsimile by wire.

1925 - Hoover conducts fourth Radio Conference.  
 • Scopes trial broadcast by WGN-AM.  
 • Zworykin works with mosaic screens in color system.  
 • Baird demonstrates mechanical system.  
 • Jenkins demonstrates "mechanical system."

1926 - Congress begins serious debate on radio legislation.  
 • Zenith Radio Corporation challenges Hoover's regulatory authority; U.S. Attorney

### Farnsworth

- Farnsworth receives first underwriting from Everson and Gorrell, experimentation begins in Hollywood and later San Francisco.

### Electronic Media

- Donovan suggests Hoover seek new legislation.
- AT&T withdraws from the business of broadcasting, and RCA purchases radio interests.
  - RCA forms two radio networks: NBC Blue and NBC Red.
  - NBC inaugural radio broadcast conducted.
  - WEAJ carries Jack Dempsey-Gene Tunney fight.
  - Father Charles Coughlin begins his radio career.
  - Baird demonstrates mechanical system for the press; licenses first British experimental stations.



**P**HILO TAYLOR FARNSWORTH IS EASILY CAST AND TOO OFTEN DISMISSED AS ONE OF THE last of America's independent electronic media inventors. He struggled against the growing corporate communications empires and was a fascinating character in American history. He was a man whose life and character were indivisible from his work. He was not just a scientist working in the laboratories of various East Coast manufacturers. He was a Utah farm boy with a creative mind and will to work who saw his creations as both landmarks and profitable to humankind. His dream of "capturing light in a bottle"—the phrase he first used to describe his idea to his family—we now call television. *Media History Digest* called him the "forgotten father of television." "One of the great minds of the century," *Time* magazine said, "he was an American original, brilliant, idealistic, undaunted by obstacles."<sup>1</sup>

Farnsworth was described as a genius from birth by those who knew him. At age fifteen he drew a rough schematic for electronic television on a blackboard for his high school teacher. In 1929 he demonstrated publicly the first electronic television pictures, leading to San Francisco's claim as the birthplace of television. Three years later he had an experimental television station on the air for the Philco Corporation and shortly thereafter created a second station for the Farnsworth Television Corporation. It would be Farnsworth's inventions that were "so important [to television] that they blocked RCA's efforts to obtain patents on a completely electronic system."<sup>2</sup> Farnsworth achieved an extraordinary victory in winning his patent interference case over RCA.<sup>3</sup> Four corporations bearing his name conducted groundbreaking research, manufactured television and radio sets, and contributed significantly to the world around us.

ITT Aerospace/Optical Industries, Fort Wayne, Indiana, is built upon the Farnsworth foundation. Farnsworth was an inventor who imagined a world based upon his discoveries. But all of this came much later.

#### FARNSWORTH HERITAGE

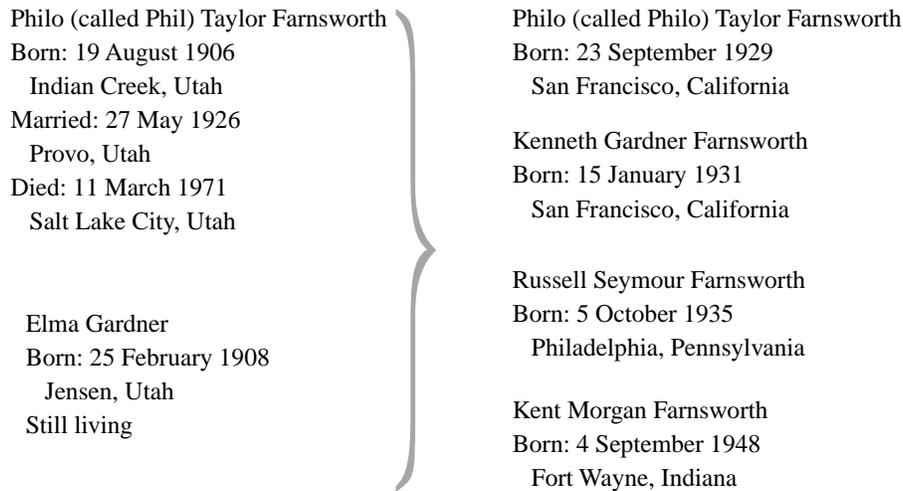
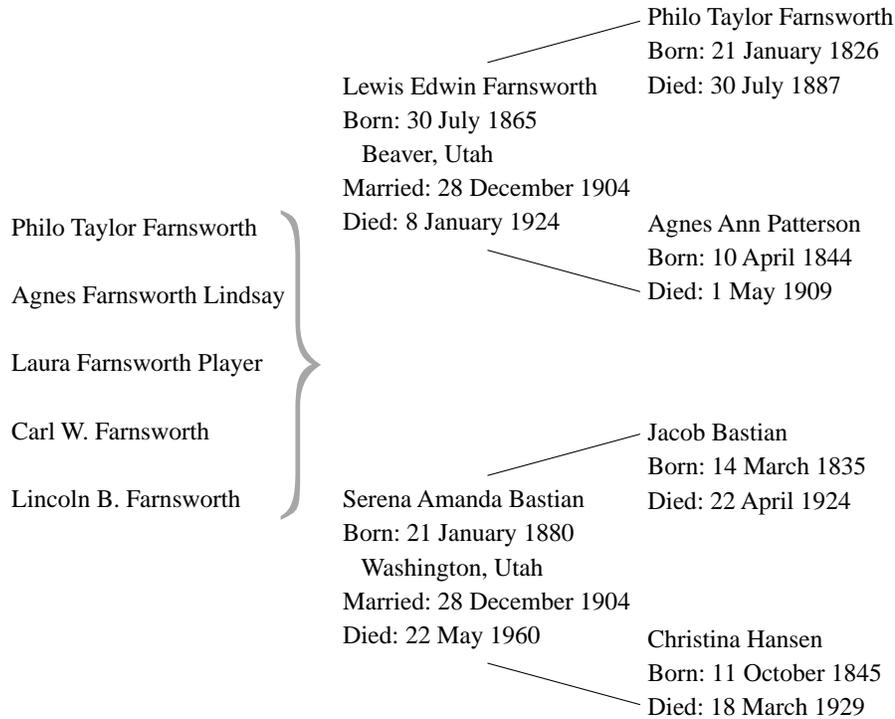
The story of Farnsworth's heritage and his youthful genius has been the focus of considerable attention. He was a Utah farm boy whose formal education was limited to high school and a little college training. But he possessed a humanitarian spirit and an enthusiasm for constant learning, work, and invention. These characteristics motivated his life.<sup>4</sup>

Philo Taylor Farnsworth was born August 19, 1906, at Indian Creek, Utah (today known as Manderfield) on the family farm in central Utah, seven miles west of Beaver.

Philo's family history includes a rich religious heritage. Philo's grandfather, Philo T. Farnsworth Sr., was a native of Burlington, Ohio, and joined the Church of Jesus Christ of Latter-day Saints when he was seventeen.<sup>5</sup> These were turbulent times in church history as the church's members, including the Farnsworths, were driven from settlement to settlement and exposed to mobs and persecution.<sup>6</sup> Philo Sr. endured these experiences and was among the earliest pioneers to migrate to Utah; he arrived in 1848, one year after the first settlers entered the Salt Lake Valley.<sup>7</sup>

In Utah Philo Taylor Farnsworth Sr. (the grandfather) helped establish the settlement of Pleasant Grove. He also lived in Filmore (later Utah's first capital) and, in 1856, was asked by church leadership to take some families and establish a town on the sagebrush flats, later called Beaver. There he served as a church bishop, a member of the Utah territorial legislature, and a probate judge. He also acted as an interpreter between the Native Americans and the new central Utah settlers. His family included four wives and 30 children—20 boys and 10 girls.<sup>8</sup>

Philo's father, Lewis Edwin Farnsworth, was the son of Philo, Sr. and Agnes Ann (Patterson) Farnsworth, third in a family of ten children. Life was not easy on a farm subject to drought and famine; at times, they dug sego bulbs for food.<sup>9</sup> Restlessness seemed to be a part of the Farnsworth heritage. Lewis and his family were always on the move, searching for more productive land. Lewis married Serena Amanda Bastian, December 28, 1904, and they moved their family no fewer than eight times, finally ending up in Provo, Utah.<sup>10</sup> Each move was meant to be the last in their search for family prosperity, and each of the children was born at a different location.<sup>11</sup> Philo described his mother as of "sturdy build [and] golden brown hair, which was naturally wavy and blue eyes." She had, "known nothing but hard work." His father he described as,



Lewis Edwin and Serena Amanda Farnsworth family. From the family records of Elma G. Farnsworth. See also the Church of Jesus Christ of Latter-day Saints, Family Group Records, Ancestral File, AFN: 6B4X-K3.

“stern, yet kind and sensitive. He was a rather larger than average build, and had sandy-brown hair and blue eyes. He had the sensitive soul of dreamer,” a characteristic he passed on to his son.<sup>12</sup>

During the Indian Creek venture, which lasted four years, Philo was born. Here, according to the family records, he exhibited his first genius at age three when he sketched in detail a locomotive he had seen while with his father.

Indian Creek was to have been the center of the family, and Lewis, along with his wife’s brothers, had invested in 1,000 acres of land there. The soil was good, but the winters were too long and harsh. The family had to raise all their own food, including enough to survive through the winters. Crops consisted largely of hay, grain, some potatoes, and vegetables; the season was too short for fruit or much else.

#### GROWING UP ON THE FARM

In spring of 1918 Lewis decided to move his family to Idaho. They had relatives near Blackfoot, Idaho, and farming was more successful there. It took three covered wagons and five weeks to travel the more than 500 miles. Philo, at age eleven, drove the third wagon.<sup>13</sup> When they arrived in Idaho, Lewis took a job with the Utah-Idaho Sugar Company near Ucon, and all the family helped support the farm. Philo worked in the fields thinning and topping sugar beets for



The log cabin where Philo was born. This photo was taken in Indian Creek, Utah, near Beaver about 1907. From left: Ronald Farnsworth, about ten years old; Lewis Edwin Farnsworth (father) holding Philo, age one; Serena Farnsworth (mother), age approximately twenty-seven; Lewis Franklin Farnsworth, about age sixteen; man in doorway is unidentified. Photo courtesy of Agnes Farnsworth Lindsay.

harvesting. He trapped muskrats and sold their fur for extra cash.<sup>14</sup> In 1919 they moved to the Bungalow Ranch owned by their uncle Albert Farnsworth, which was a few miles north of Ucon and not far from Rigby.<sup>15</sup> The Bungalow Ranch was different than other ranches in the area because it had electricity—powered by its own generator. When 40 acres became available in Bybee, west of the Bungalow Ranch, the Farnsworths bought it and worked it to pay off their debts before making one final move.<sup>16</sup>

These were difficult years for the family. Agriculture in eastern Idaho was suffering a severe depression following World War I. Sugar beets that had sold for \$12.03 in 1919 were selling for half that only two years later. Potatoes once at \$1.51 were selling at \$0.23.<sup>17</sup> Oblivious to the family difficulties, Philo began to explore a world far from agriculture. Here in the attic of the Rigby farmhouse, he found and studied the electrical magazines of the era and learned about “pictures that could fly through the air.”<sup>18</sup> The magazines aroused his imagination,<sup>19</sup> a fact not always appreciated by his mother as she worried that his boyhood enthusiasm for electricity “interfered with his violin practice.”<sup>20</sup> The young Philo confided to the family that “he would one day be an inventor.”<sup>21</sup>

The subject of radio and “radio vision” was a popular science magazine topic. Many writers described John Logie Baird’s and Charles Francis Jenkins’s ongoing experiments with mechanical television systems.<sup>22</sup> This material was likely a part of what young Farnsworth was digesting. As his knowledge grew he developed a special interest in Albert Einstein’s theory of relativity.

At the age of twelve, Philo was repairing the electrical machinery around the ranch. One day, as his father and others were trying to figure out what had gone wrong with the power generator, Philo stepped in and repaired it. From that time forward at the Rigby farm, Philo was the chief engineer of the Delco generator that provided light and energy to the houses, barn, granary, and automatic elevator. Philo’s imaginative use of electricity amazed his family. “He was always occupied with the problems of more interest to him than farming.”<sup>23</sup> “Always fixing things,” recalled a close high school friend, Vernal T. Sorensen.<sup>24</sup> Philo even constructed an electric washing machine for his mother with parts he found around the ranch. He wound the motor’s electrical coils himself.<sup>25</sup>

Farnsworth later wrote that the “solitude of the open country was most conducive to thought and reflection.”<sup>26</sup> One day Lewis found Philo relaxing from his assigned farmwork, with one of the reins of a three-horse harrow team dragging in the dirt field where Philo was supposed to be plowing. The three horses were just plodding along in what was a dangerous situation. His father was angry at first, but dared not shout at Philo before he or Philo had control of the team. As Lewis approached the team, the daydreaming Philo shouted, “I’ve got it. I really think it will work.”<sup>27</sup> This incident, depicted in the film

documentary *Big Dream Small Screen*, implies the conception of electrical image scanning. His father recognized an inspirational moment in his son's life and did not reproach him. Philo had been thinking about television and the challenge of an engineering contest offered in one of the science magazines. Shortly thereafter, Philo sent in a plan for a "thief-proof ignition switch for automobiles" to Hugo Gernsback's *Science and Invention* and was awarded \$25 and first prize for his work.<sup>28</sup> With his winnings, Philo purchased his first pair of long pants.<sup>29</sup> According to Philo's younger brother, Lincoln, Philo was "obsessed with the invisible force" of electricity and was known to "read a book in a night."<sup>30</sup> He remained an avid reader throughout his life.

Farnsworth was not only an inquisitive inventor but also an accomplished musician; he was a member of his high school dance orchestra and later the Brigham Young University chamber music orchestra. He loved music, and later in life music was one of the few ways he could relax. But science was his overriding youthful motivation. He was an impatient student, wanting his science education all at once. He took the regular courseloads at school and then supplemented his learning with reading material borrowed from his teachers and the work in his attic laboratory. But there were not many people to whom he could talk about his inventions. A younger sister, Laura, remembers Philo gathering his brothers and sisters around to show them his experiments: "He'd put us in a line and start electricity down the line to show us how it traveled."<sup>31</sup> Philo's father apparently discouraged his son from sharing his ideas with too many people, feeling someone might steal them. In the 1920s, his father felt Philo's ideas were "too valuable and fragile, and could be pirated easily."<sup>32</sup> Farnsworth's wife wrote later that "father Farnsworth . . . [taught Philo] the lessons of self-reliance."<sup>33</sup> His father even tried to help his son patent a fine-tuning radio dial. He sent \$200 to an attorney who had advertised in *Science and Invention*, but the family never heard from him.<sup>34</sup>

#### HIGH SCHOOL WITH AN INSPIRATIONAL TEACHER

It was a Rigby, Idaho, high school chemistry teacher, Justin Tolman, who made the greatest early impression on Philo—and vice versa. Tolman was someone Philo could talk to about science and inventions. Their relationship started when Philo, at fourteen, asked if he could sit in on Tolman's senior high chemistry class. "I looked at him and laughed," Tolman reported.<sup>35</sup> However, Farnsworth was persistent and kept coming back day after day with the same request. Finally he asked that if he could not get the class for credit, could he just "come to class and absorb? Under these conditions I gave him permission to come in."<sup>36</sup> Tolman was reluctant, but Farnsworth wasn't interested in the credit, he wanted the education, and Tolman introduced him to a wide variety

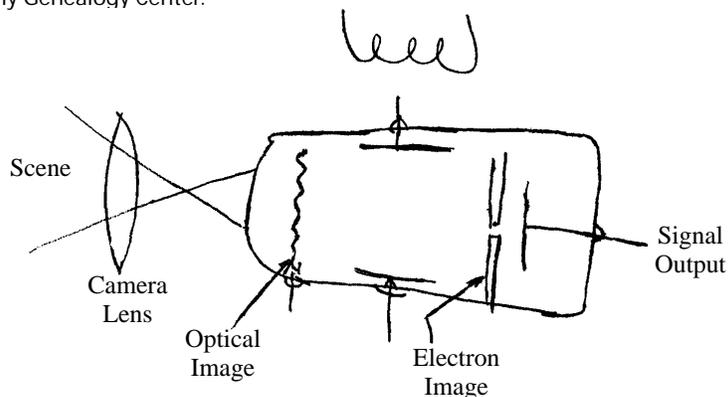
of scientific literature. "I do not think a day ever passed that he did not come to me with from one to a dozen questions on science," Tolman commented. "We would make drawings on the blackboard, scraps of paper, or anything we had handy as we tried to explain to each other what we meant."<sup>37</sup>

Tolman notes that "the custodian of the [school] building called Farnsworth the laboratory pest. He complained that I let him stay so late at night that they never had a chance to clean it up, and if they did, he came so early the next morning the place never looked clean. Philo's questions were apt to come at any time and any place."<sup>38</sup>



Justin Tolman, Rigby High School teacher. Courtesy Thomas Tolman Family Genealogy Center.

Farnsworth and Tolman became good friends, and the young student was given access to the teacher's own library, and, according to Tolman, "he devoured electrical encyclopedias like other students wolfed down popcorn."<sup>39</sup> Lincoln described his older brother as having "a photographic memory . . . what he didn't know, he learned quickly."<sup>40</sup> As a result of Farnsworth and Tolman's close association, Tolman put Philo in charge of one of the school's study halls. One day when Tolman passed by, he reported finding Philo lecturing to the students on Einstein's theory of relativity.



Graphic based on a photo of a drawing made by Farnsworth in 1922 for his high school teacher Justin Tolman. Tolman later reproduced the original drawings he had kept to be used in the Farnsworth/RCA patent infringement hearing. Photo courtesy ITT, Fort Wayne Div., reorder number M4 4 14.

An afterschool session in 1922 has historical significance. Tolman entered his classroom one day to find fifteen-year-old Philo at the blackboard. “What’s that?” he asked. “It’s an electrical system for projecting an image,” responded Philo. “But what does it have to do with our chemistry assignment?” “Oh, nothing,” Philo said. “It’s my new invention.”<sup>41</sup> Philo then went on to explain how his invention could create electrical pictures. It was Tolman’s detailed recollection of the conversation that later played a part in the patent interference hearings between the Farnsworth Corporation and RCA (see Chapter 4).

During one year at Rigby High School, Farnsworth completed two years of algebra and a year of chemistry, as well as National Radio Institute correspondence courses.<sup>42</sup> The next year, while working as an electrician’s assistant in Idaho, he took an additional four correspondence courses from the University of Utah. At the end of the school year, Philo borrowed a few more books from Tolman. As the two parted, Tolman gave him advice that underscored his father’s early teaching. “He [Philo] asked if I could not give him a suggestion that would help him realize his ambition of television. Looking him in the eyes, I replied, ‘Study like the devil and keep mum.’”<sup>43</sup>

Rigby High was a memorable experience not only for Philo but also for Tolman, who captivated his later students with stories of young Farnsworth. He told them about young Philo’s drawing diagrams for his image dissector on the blackboard and about his own 1934 testimony before the patent hearings.<sup>44</sup>

#### FARNSWORTH AT BRIGHAM YOUNG UNIVERSITY

In 1923 the Farnsworth family moved from Rigby, Idaho, to Provo, Utah, hoping to take advantage of the educational opportunities they felt a university town had to offer their children. They purchased a large home near Brigham Young University and rented the upstairs to eight students. The rent money supplemented the income Farnsworth’s father made from working the Idaho farm and in road construction.<sup>45</sup> Farnsworth attended Brigham Young High School, 1923–1924, and enrolled in Brigham Young University in 1924.<sup>46</sup> He was still in a hurry and, according to Everson, acquired “the run of the [Brigham Young] university research laboratory.”<sup>47</sup> However, BYU science professors were unimpressed with the youthful farmboy and, when he asked to attend advanced classes, he was told an exception could not be made (the class he wanted was actually a physics course that his cousin, Arthur Crawford, was taking).<sup>48</sup>

Being told “no” was motivation for Philo: He studied science on his own and earned his Junior Radio-Trician in 1924 and his Certified Radio-Trician in 1925 from the National Radio Institute.<sup>49</sup> He also took part in the school plays, learned to play the piano, and was first violinist in the BYU chamber music

orchestra. It was during his days at BYU that Philo met the woman who would play a central role in his life—Elma “Pem” Gardner, then attending Provo High School. Their courtship included dances and going to radio parties at BYU.<sup>50</sup>

Living in Provo also provided work opportunities. Farnsworth asked to hang around the local power plant. According to the *Deseret News*, the plant foreman approved as long as

he didn’t meddle with anything. One day a mysterious trouble stopped the plant’s operations. Experts were unable to solve the trouble. Philo stepped forward, asked permission to fix the machinery, and set to work. Soon everything was running smoothly, and the offer of a job followed immediately.<sup>51</sup>

The year 1923 was important to another television pioneer—the man who would become Philo’s chief competitor. While Philo was still in high school drawing his schematics on the blackboard, Vladimir Zworykin was well into his career in electricity and television.<sup>52</sup>

#### DEATH SETS A NEW COURSE

Tragedy struck in January 1924. Philo’s father caught a cold while returning home to Provo from a construction job in Idaho. The cold turned to pneumonia and he died at the age of fifty-eight on January 8, 1924.<sup>53</sup> His father’s death was catastrophic for Philo. He felt that the obligation for sustaining his family had fallen upon his shoulders because he was the oldest son, yet he still had six months of high school left before graduating. According to Laura, he felt “responsible for his brothers and sisters . . . he had such a paternal feeling about us that sometimes it felt like he wasn’t letting us make up our own minds.”<sup>54</sup>

Farnsworth’s anguish was understandable. He and his family had left a supportive family and teacher in Rigby. When tragedy struck, it evoked a spectrum of emotions and unanswered questions—why would God take a father when he was needed most? Philo did not understand, and he would not return to the church of his heritage until the final years of his life. The death of Philo’s father challenged his faith yet at the same time strengthened his independent spirit. He later said, “My father’s death was a great shock to me . . . I was extremely unsettled.”<sup>55</sup>

After graduating from high school, Philo had a difficult time finding work, so he and a friend signed up to attend the U.S. Naval Academy in Annapolis, Maryland. Here, Philo reasoned, he could continue his work in electronics and support his family. Hofer claims that on his entrance test Philo “ranked second in the nation.”<sup>56</sup> It was here too that Philo became Phil—the name all his friends and associates called him—dropping the “o” from Philo because he didn’t want to be called Fido.<sup>57</sup> However, his Navy experience did not last long.

According to the family records, a chaplain encouraged him to get out of the Navy: "You don't want the U.S. government to own your patents, do you? That's not the education you want."<sup>58</sup> Farnsworth realized he was in the unexpected position of turning over his ideas to the Navy or developing them himself. He decided upon the latter. He was honorably released after only a few months of attending classes based on his mother's request made through a U.S. Senator that he needed to return to his family as the chief breadwinner.<sup>59</sup> They needed his help after his father's death.<sup>60</sup>

Farnsworth moved back to Provo and enrolled at BYU for another year. BYU seemed more receptive after his short stay in the Navy, and Farnsworth took several science classes.<sup>61</sup> However, finances were still a problem, and he worked odd jobs to stay in school. During the semester he worked as a custodian at BYU and, in the summer, with his brother in a lumber mill in Payson Canyon, southeast of Provo. He worked as long as he could to keep himself in school, hoping that the profits from the sales of his television system would someday support the family. Finally, however, he was forced to leave BYU and seek full-time employment in Salt Lake City.

After moving to Salt Lake City in 1926, he set up a radio repair shop, making small radios with Cliff Gardner, who later became his brother-in-law. There were only twelve radio stations in Salt Lake City at the time, and radio repair was not demanding, so Philo registered with the University of Utah employment agency and continued his research work at the university library. The shift to a larger city proved beneficial.