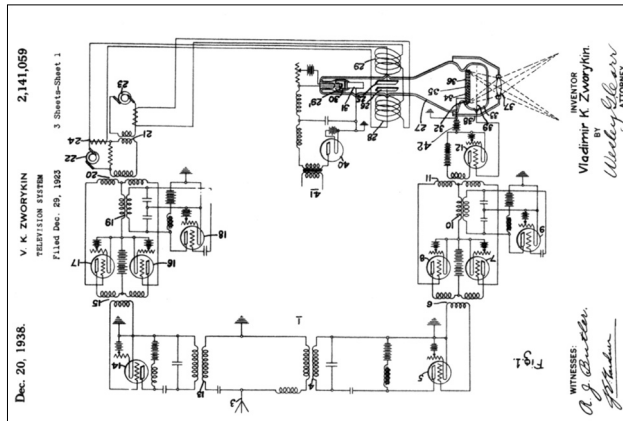


APPENDIX A

Who Invented Television?



Zworykin's 1938 Iconoscope patent, with the 1923 application date

“I know that God exists. I know that I have never invented anything. I have been a medium by which these things were given to the culture as fast as the culture could earn them. I give all the credit to God.”

—Philo T. Farnsworth

As compelling as the story of Philo T. Farnsworth may be, the historical record with regard to “who invented television” remains fuzzy at best, deliberately distorted at worst. The debate often comes down to a simple question: Does any single individual deserve to be remembered as the sole inventor of television? Can we create for television the kind of mythology of individual, creative genius that history has bestowed on Morse, Edison, Bell, or the Wright Brothers?

The question may be simple, but clearly the answer is not. Before Uncle Milty, before Walter Cronkite, before Lucy and Desi and Ethel and Fred, literally hundreds of scientists and engineers

contributed to the development of the appliance that now dominates “our living room dreams.” How can we single out any single individual and say, “it all started here”?

The historical record is sadly devoid of references to Farnsworth. Though the oversight has begun to improve in recent years, it is still entirely possible to open an encyclopedia and read that electronic television began when “Vladimir Zworykin invented the Iconoscope for RCA in 1923...”—a sentence that manages to express no less than three historical inaccuracies. The most conspicuous error—the “1923” date—fixes Zworykin’s name chronologically before Farnsworth’s 1927 patent filing, and often renders Farnsworth to the status of “another contributor” in the field.

Some historians have gone so far as to suggest that Farnsworth and Zworykin should be regarded as “co-inventors.” But that conclusion ignores Zworykin’s 1930 visit to Farnsworth’s lab, where many witnesses heard Zworykin say “I wish that I might have invented it.” Moreover, it ignores the conclusion of the patent office, in its 1935 decision in Interference #64,027, which states quite clearly “priority of invention awarded to Farnsworth.”

These misinterpretations of the historical record are precisely what more than sixty years of corporate public relations wants us to believe—that television was “too complex to be invented by a single individual.” But close examination of the stories beneath the written record reveals a far more compelling story: In fact, there *was* one inventor of electronic television. Video as we now know it first took root in the mind of Philo T. Farnsworth when he was fourteen years old, and he was the first to successfully demonstrate the principle, in his lab in San Francisco on September 7, 1927. If you need to fix a date on which television was invented, that’s the date.

Before that date, television was the province of Newtonian electro-mechanical engineers who employed spinning disks and mirrors in their crude attempts to scan, transmit, and reassemble a moving image. The inventions of Jenkins, Ives, Alexanderson, Baird, and others are all similar in their reliance on the spiral-

perforated, spinning disk first proposed in the 1880s by the German Paul Nipkow. These contraptions were engineering marvels in their own quaint way, but they were not the sort of breakthrough that Farnsworth introduced, nor is anything left of their technology in the system of television that is in use around the world today.

On September 7, 1927, Philo T. Farnsworth demonstrated for the first time that it was possible to transmit an “electrical image” without the use of *any* mechanical contrivances whatsoever. In one of the first triumphs of Relativistic science, Farnsworth replaced the spinning disks and mirrors with the electron itself, an object so small and light that it could be deflected back and forth within a vacuum tube tens of thousands of times per second. Farnsworth was the first to form and manipulate an electron beam, and that accomplishment represents a quantum leap in human knowledge that is still in use today.

After September 7, 1927, every new contribution to the art—including Zworykin’s—was an improvement on Farnsworth’s simple, elegant, and profound invention.

What is so often overlooked cannot be overstated: In 1923, Vladimir Zworykin—recently emigrated from Russia, and employed at the time by the Westinghouse Corporation in Pittsburgh, Pennsylvania—*applied* for a patent for an approach to television that he first encountered in the classroom of Boris Rosing, his former teacher in Russia. In 1927, Farnsworth also applied for a patent. Later that year, Farnsworth produced the first successful transmission of a television image by wholly electronic means—an event that is thoroughly documented in Farnsworth’s journals—while Zworykin’s application was still pending. Farnsworth’s patent #1,773,980—with the critical Claim 15 regarding the “electrical image”—was issued in August 1930—and Zworykin’s application was *still* pending.

The 1923 Zworykin application would be forgotten—except that a patent for the Iconoscope was finally issued in 1938 bearing a 1923 application date. This patent (#2,141,059) was issued an extraordinary *fifteen years* after the application date, and then

only after extensive revisions had been made to the original application.

Furthermore, the eventual patent granted pursuant to the 1923 application was issued over the objection of the patent office, and even then not until the case was adjudicated by a court of appeals. That the Iconoscope patent was issued at all hinged on a technicality, and it served no practical purpose other than substantiating the dates that RCA would eventually use in its public relations campaign.

RCA's obtaining the patent in 1938 has served as the cornerstone of its efforts to influence the historical record, since the patent effectively fixes 1923 as the date that Zworykin first disclosed electronic television. Decades later, historians and scholars are still including this dubious 1923 date in their chronologies.

What's wrong with the Zworykin patent? What's wrong with it is that the original application—the system that Zworykin disclosed in 1923—simply could not work. The idea was on the right track, but the application fell far short of disclosing a device that would pave the way to electronic video and ultimately put a television in every living room or a computer monitor on every desktop.

There is scant evidence that Zworykin ever built and tested a system like the one disclosed in his 1923 application. One story does exist about Zworykin's attempt to demonstrate his concept for executives of Westinghouse, where he was employed at the time, in hopes of obtaining more funding for his research. The demonstration was so dismal that instead of providing him with further funding, Zworykin's superiors ordered him to find something "more useful" to work on.¹³⁵

The usual retelling of this story is cast in such a way that we are supposed to believe that the Westinghouse executives who witnessed and dismissed this demonstration were too shortsighted to appreciate its promise. It seems more plausible to conclude that what they saw showed little promise because it simply didn't work. Some historians suggest that witnesses observed some sort of blurry smudge. Zworykin would claim years later

that the image of a cross was transmitted. But during the critical 1934 interference proceedings there was no evidence submitted to support even these modest contentions.

It's hard to imagine anyone in 1923 or 1924 seeing even an incoherent transmitted image on the bottom of a bottle and telling its creator to find something "more useful" to work on. But that's what we're supposed to believe.

The most recent accounts of Zworykin's debatable patent history are often traced to *The History of Television: 1884–1941* by Albert Abramson. A careful examination of Abramson's book only serves to further illustrate the flimsiness of this account.

The actual evidence that such a demonstration ever took place is sketchy at best, considering its potential historical significance. There are no lab notes, no direct eyewitness testimony. There are only Zworykin's own accounts, and a *single* document on page 80 of Abramson's book that he claims to have found buried in some archives fifty years after the purported event. This document describes a device "using a modified Braun type cathode ray tube for transmitter and receiver...the receiving tube...gave quite satisfactory results...[but] the transmitting part of the scheme caused more difficulties...."¹³⁶

That's it; that's all it says about the transmitter, that it "caused more difficulties." It's hard to imagine how the receiver could be "quite satisfactory" if the transmitter was not equally satisfactory, but this is the document that compels Abramson to conclude—in his footnotes—that "Zworykin did build and operate the first camera tubes in the world sometime between the middle of 1924 and late 1925."¹³⁷ This is the feeble foundation on which historians build RCA's claim that Zworykin should be regarded as the "inventor of television."

Zworykin may indeed have built some tubes. And he may have applied current to them. But it should take more than a statement that "the transmitter caused more difficulties" to convince students of this history that he successfully "operated" such a device prior to September 7, 1927, or that Zworykin even deserves to be considered a "co-inventor" as a result of this experiment.

Historians should focus more carefully on the decision of the U.S. Patent Office in its historic 1935 ruling in Patent Interference Number 64,027. This is the litigation in which Zworykin challenged Claim 15 in Farnsworth's patent #1,773,980, which describes the "electrical image." An electrical image is the electrical counterpart to an optical image. When an optical image is focused on a photoelectric surface, the light-sensitive chemicals emit an array of electrons—the "electrical image"—which can then be scanned to form a fluctuating current. That is the very essence of how an electronic television signal is created, and so it is understandable that Zworykin and RCA would attempt to appropriate the language in this claim. There is simply no getting around it—you can't create an electronic television signal without first creating an "electrical image."

The whole of RCA's research effort—at an expense that David Sarnoff joked with Zworykin years later cost RCA more than \$50 million—was intended to circumvent Farnsworth's patents, in particular Claim 15. When the electrical image in Claim 15 proved essential, Sarnoff, Zworykin, and RCA's attorneys went to great lengths in the 1934 interference to prove that the 1923 application would have created such an electrical image, and that Zworykin was therefore entitled to "make the count" embodied in Claim 15.

But when it was time for RCA to produce material evidence that Zworykin had constructed and operated his system in 1923, there was no evidence submitted. No tubes were displayed, no laboratory journals entered into the record. There were only confusing and contradictory verbal accounts from two Zworykin colleagues.

After considering all the testimony, the patents examiners ruled in Interference #64,027 that "Zworykin has no right to make the count because it is not apparent that the device would operate to produce a scanned electrical image unless it has discrete globules capable of producing discrete space charges and the Zworykin application as filed does not disclose such a device."¹³⁸

The patent examiners were unequivocal in their decision to award the indispensable Claim 15 to Farnsworth. The case was

appealed and RCA lost all the appeals. This pattern went on, over this and other patents, until RCA capitulated in 1939 and accepted a license from Farnsworth for the use of his patents—the first such license in the history of a company that was determined to “collect patent royalties, not pay them.”

Yet, here we are nearly seventy years later, still debating the merits of a patent that was awarded by a court of appeals in 1938 that validated a patent applied for in 1923 that was ruled inoperative in 1934.

The contradictions are clear: What we have is an application for a patent in 1923, an unsuccessful demonstration in “1924 or 25” with no conclusive documentation, and a patent interference ruling in 1934 that says the device was inoperative. Nevertheless, a patent was obtained in 1938 which compels otherwise scholarly reporters to conclude that Zworykin and Farnsworth must be considered co-inventors.

A more discerning examination of the record reveals that Zworykin believed in electronic television but was still struggling for a viable solution until he visited Farnsworth’s lab in 1930. As soon as he saw what Farnsworth had achieved, he got busy, duplicating Farnsworth’s equipment at the Westinghouse lab in Pittsburgh before moving on to RCA in Camden. He then built on Farnsworth’s work, as well as the work of other contributors, to produce the Iconoscope.

Zworykin’s corporate benefactor, David Sarnoff, believed the Iconoscope gave him the leverage he needed to bring all the legal might of RCA to bear on claiming Farnsworth’s achievement as RCA’s own. Sarnoff ultimately failed in that effort, and RCA was left with no choice but to accept a patent license from Farnsworth. Still we read time and again that Zworykin made modern television possible when he “invented the Iconoscope for RCA in 1923.” The facts are that Zworykin was not working for RCA in 1923, the Iconoscope did not exist at that time, and it is questionable whether Zworykin truly invented it at all.

Zworykin got some momentum going with the Iconoscope, but it was not until the Image Orthicon tube was introduced that

the industry had the tool it really needed to bring the world into our living rooms. But the Image Orthicon—originally thought to be an RCA development—was in fact descended from Farnsworth's patent #2,087,683, which was the first to disclose a “low velocity” method of electron scanning. This lends further credence to the notion that everything that came after September 7, 1927 was an improvement on the concept proven that day—including Farnsworth's own subsequent inventions.

That said, there is no question that much credit for refining all aspects of television technology goes to RCA engineers. There were hundreds, maybe thousands, of individuals who contributed to the development of electronic video before television broadcasting reached the general public in the 1950s, and thousands more who have contributed to its advancement in the decades since. But refinement is not invention, though that is precisely what the proponents of the “co-inventor” theory of the origins of television would like us to accept.

Why is any of this important? Who really cares who invented television? What difference does it make whether electronic television was first developed by a Russian émigré or a Mormon farm boy? And should it still matter seventy years after the fact?

It matters because the suppression of the true story deprives us of some important knowledge of the human character. It tempts us to believe that progress is the product of institutions, not individuals. It tempts us to place our faith in those institutions, rather than in ourselves.

Invention is one of the most unique and compelling aspects of the human experience. From the moment the first ape picked up a bone and swung it like a club, the history of civilization has followed the path of invention.

Szent-Gyorgi put it best when he said, “Discovery is seeing what everybody else has seen, and thinking what nobody else has thought.” Therein lies the operative definition of genius. In Zworykin, we find a capable engineer, one who could see what others were doing and improve upon it. But in Farnsworth, we

encounter the rarest breed of all, the true visionary who could see the obvious—and think up something entirely different. Obscuring his story and denying his contribution deprives us of our understanding of this critically important facet of the human character.

Television is our blessing and our curse. The ancient dream of a unified planet came true with the moonwalk in 1969, as hundreds of millions of people around the world tuned in to witness the event through the medium of Philo T. Farnsworth's potato-field inspiration. At the other extreme there are the routine daily programs that cater to "the lowest common denominators" of our society. But even these daily panderings to common culture are somehow elevated when reconsidered with the knowledge that the medium itself is a consequence of individual genius rather than corporate engineering.

The belief that television—the most pervasive mass communications system of the past millennium, and perhaps the next—was "too complex to be invented by a single individual" deprives us of the knowledge of the noble individual whose unique intellect made it all possible. There are only a few such souls in each century, men like Tesla, Armstrong, and Einstein whose lives are an enduring expression of Szent-Gyorgi's axiom.

Philo T. Farnsworth was as noble a spirit as has ever graced this planet. From his earliest declaration of his hope that he, too, had been "born an inventor" it is clear that this earthly soul was an instrument of providence. When he saw how the mad scientists of the 19th century tried to send pictures through the air with spinning disks and mirrors, he alone replaced all the moving parts with the invisible electron. Recalling that contribution makes even the most ordinary moments of television programming an expression of divine inspiration.