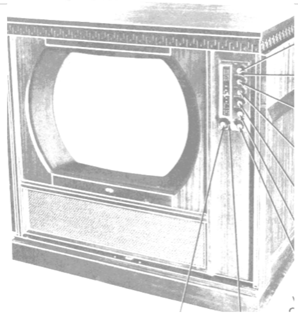
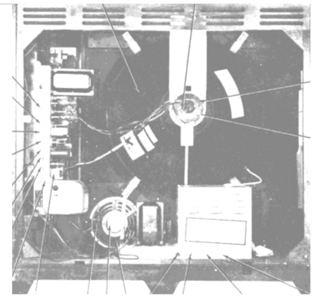
March, 2025

Volume 2 Number 3





WHAT'S NEW IN OLD TVS

The Newsletter of the Early Television Foundation

Greetings Early Television Fans,

This is Volume 2, Number 3 of the Early Television Foundation Newsletter. **The March Zoom meeting will be on Saturday, March 29th at 8 PM and The Early Television Foundation 2025 Convention is set for May 2,3,4** at the museum in Hilliard, Ohio.

Steve McVoy opened the February Zoom meeting with his report reminding us that the all of the convention will take place at the museum and that 100 chairs have been acquired and will be delivered soon. That is welcome news to anyone that used some of the old chairs. He reported that membership is at 212 with 35 being new or rejoining members, but 45 still to renew. This month Steve and Larry gave us a tour of the CRT collection, which is a history of a key element of the television story. It brought up the topic of color television using 2 or 3 colors. More about this on the next page.

We Want to hear from you !

newsletter@earlytelevision.org

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In this issue:

Renew your 2025 Membership

We are always looking for:

- **Letters** from members
- **Tech Tips** from service experiences
- **My first TV** (family stories?)
- **My favorite TV** (and why)
- **Stories** of working in the business.
- **Articles** that can be added in whole or in parts.
- **Biographies** of members

Discussion during the February Zoom meeting included Field Sequential Color TV using three color versus two color. These examples come from a display produced by Cliff Benham. The right side shows three color using Red, Green and Blue. The left side shows the two color system using an orangish/red and a greenish/blue.

As was explained, there are some conditions where the two color system can produce images with acceptable or believable color and was used to reduce cost in low budget color movies and some special television uses.

Of course the Yellow Brick Road presented a problem.

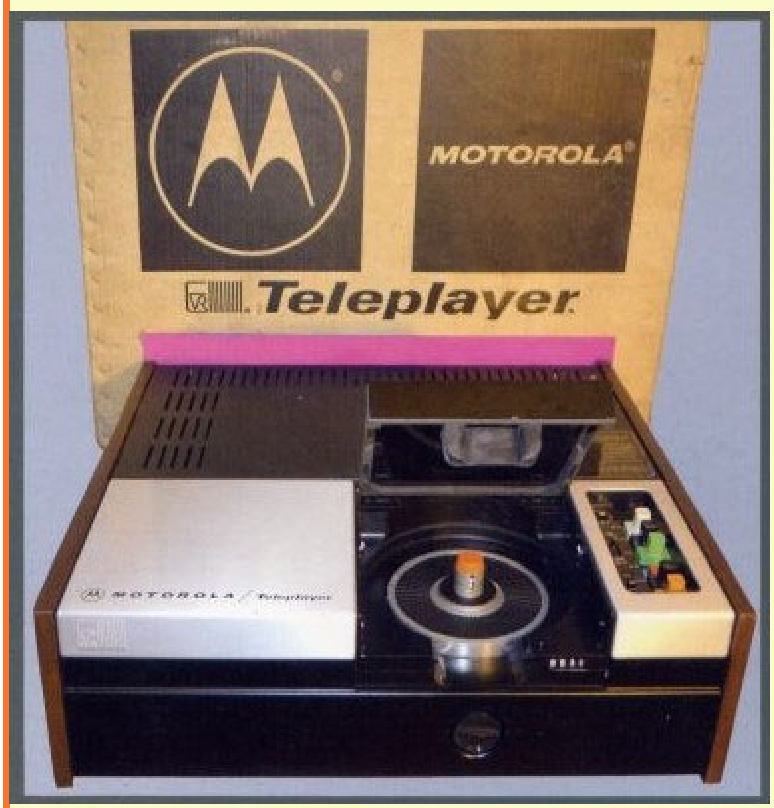
In my family, my wife, son and grandson are what I call spectrally challenged. I knew there was a problem when I first met my wife and she struggled to describe the color of an object. She finally called it a “reddish shade of green”.

This month the Member Spotlight shines on ...

Wayne Bretl

Wayne's fascination with television started with the RCA "see yourself" television exhibit at the Museum of Science and Industry in Chicago (black and white at first, but WOW! Color! a few years later).

After getting a BSEE from Illinois Institute of Technology, he was hired by Motorola in the monochrome engineering lab. His baptism in real electronics was reviving a very kludgy 12 volt powered transistor TV prototype left by a previous employee that used a cut-down milk bottle as a cheap CRT and had IF stages with no emitter degeneration whatsoever. The only value in that assignment was in finding a lot of things that wouldn't work reliably.



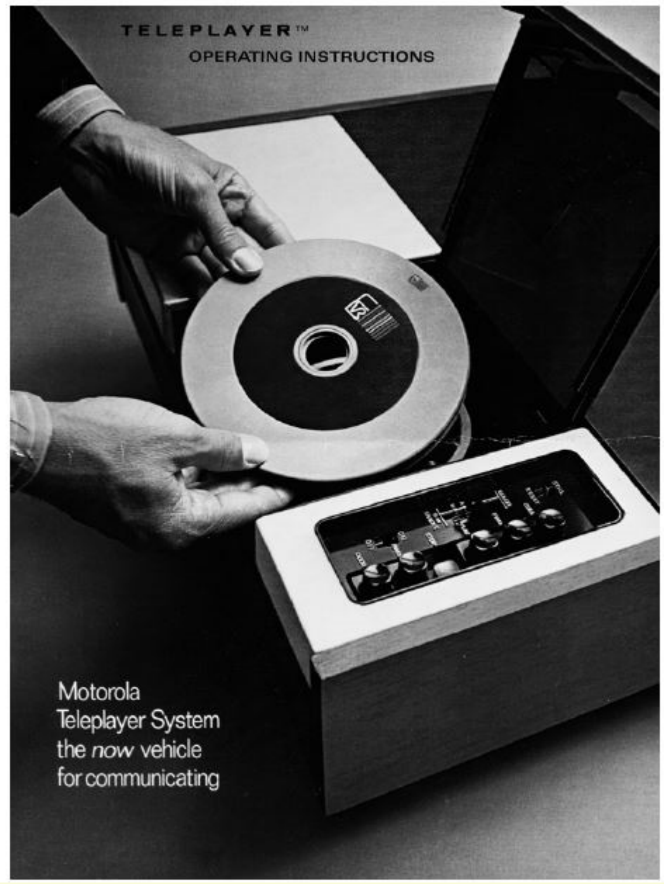
The Teleplayer, a "fun project" from early days in Wayne' s career

After some random projects, like de signing their first video jeep circuit to turn inexpensive small consumer sets into CCTV monitors, he became the video circuit engineer for the brand-new EVR (Electronic Video Recording) player project in cooperation with CBS Labs and Peter Goldmark.

This was great fun as he had a blank slate to optimize the performance with entirely new circuits and a blank check for the highest-end HP test gear playthings that he could convince the boss to sign for.

Unfortunately, the project folded after four years, at which point he moved to the advanced development department, where he was told he would design analog bipolar ICs. "Who, me?" he asked. "Yes, you'll like it, and will learn from the resident experts," said the manager.

Somewhere in there, Wayne got involved with the IEEE Conference on TV Receivers and served as chairman in 1980. By this point he was also writing papers for the conference. He became a self-taught expert on color reproduction in video systems, following Motorola's Corporate Scientist Norm Parker.



After nine years at Motorola, as its TV business was sold to Matsushita, Wayne was hired by Zenith specifically for IC design, later working on experimental video and chroma processing techniques, and eventually digital TV. He became a fixture in the ATSC standards development process, and same-day round trips from Chicago to DC became routine.

Wayne retired in November 2015, after 9 years at Motorola and 40 at Zenith, and was inventor or co-inventor of about 25 patents (he has lost the list and can't recall the exact number), as well as author of one or two award-winning papers. He is a member of AES, Life Member of IEEE, and a Life Fellow of SMPTE, where he still participates on the Board of Editors.

Members will recognize Wayne from the Zoom Meetings where he can be found in front of his colorful backgrounds.

If you look at images of past conventions on the ETF website, you will find many collections of Wayne's Pictures

Don’t tell us you’re waiting for 3D TV to be perfected !!

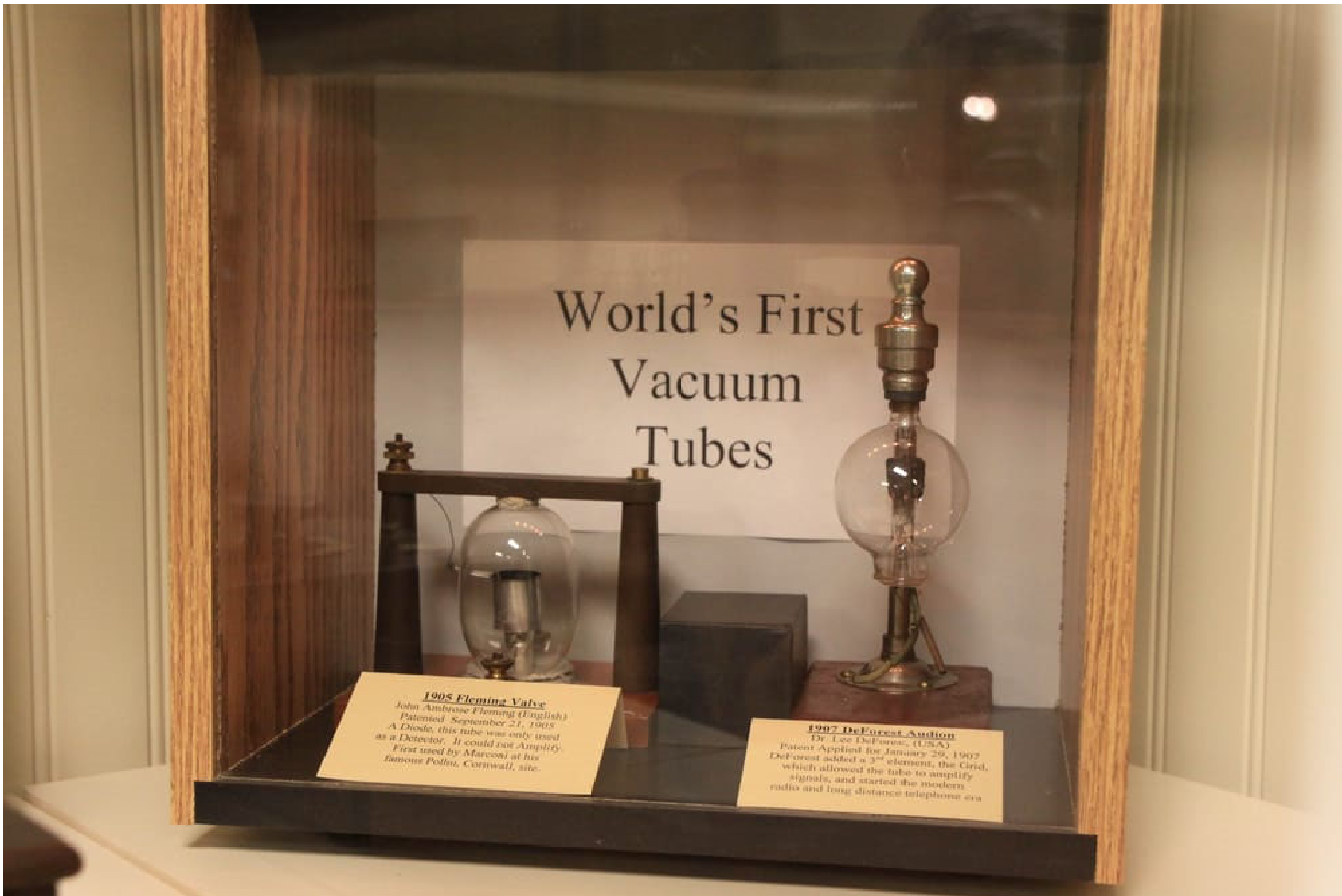
Renew your 2025 Membership Now !!

This month, we are back at the Antique Wireless Museum in Bloomfield, NY. Visitors are greeted here in the reception area where the guestbook has been signed by visitors from all around the world. This is a small part of the crew of volunteers that come every week to help the visitors, care for the artifacts and new donations.

Many members are ham radio operators and many events are held in the museums new Ham Shack addition.

Near the entrance is a room with plaques honoring the great inventors and scientists and their work on electronic communications and (below) this area honors one of the greatest, Howard Armstrong, whose inventions still impact communications today. On the glass case is his regenerative set and early FM modules are in the cabinet.

These early vacuum tubes include a Fleming two element tube (left) from 1905 and (right) from 1907 a De Forest Audion three element tube. It was tubes like these that got radio and electronics started.



From the first tubes to one of the first television cameras that was used at Rochester's first TV station, WROC in 1949

Educating young and old in electronic communication is a primary job of the museum. Here AWA president Bob Hobday gives personal attention to a school group. These classes may range from radio repair to a class about how guitar amplifiers work.

The Museum houses the archives of other groups like the Radio Club of America, which dates back to 1909. The Library has received many donations of the books, and papers of inventors, scientists and engineers. Much of this documentation has been preserved for study, rescuing important pieces of history.

Telegraphy came before radio. In the display above is early telegraph equipment and a notebook that belonged to Samuel F.B. Morse with plans for an 1844 telegraph line. Below is a replica of an early Western Union telegraph office.

Well, you can't say ETF members aren't observant.

In the last newsletter one of the AWA museum pictures was described as being the Main Control Room of the Voice of America. In realty it is A Main Control Room but not THE Main Control Room.

Thanks to James O'Neal for pointing out that what is depicted is the control room of the VOA's Delano, California shortwave relay station (transmitter plant).

Let's hope this error isn't being held against us.

SO GET THE VOA BACK ON THE AIR!!!

To learn more about the AWA go to

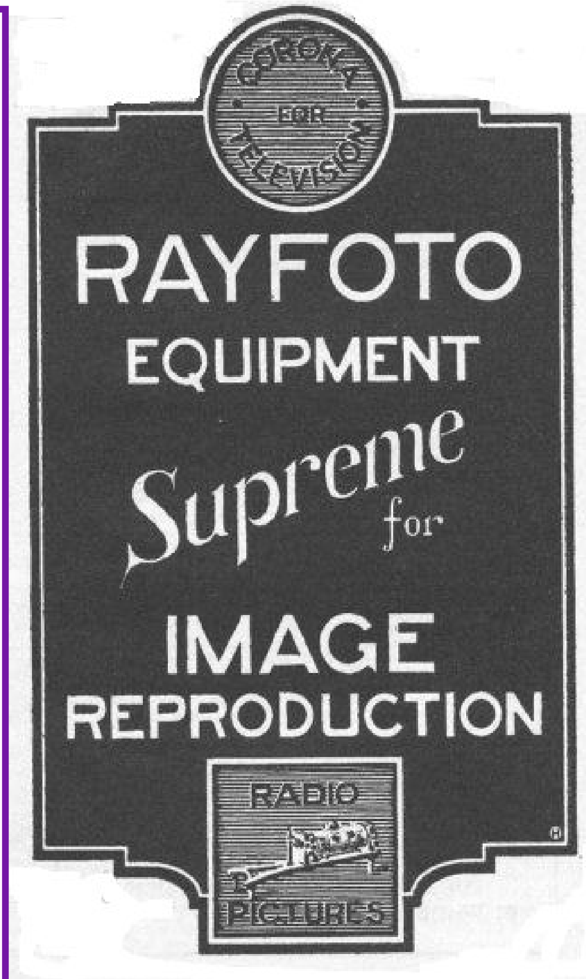
antiquewirelessassociation.org

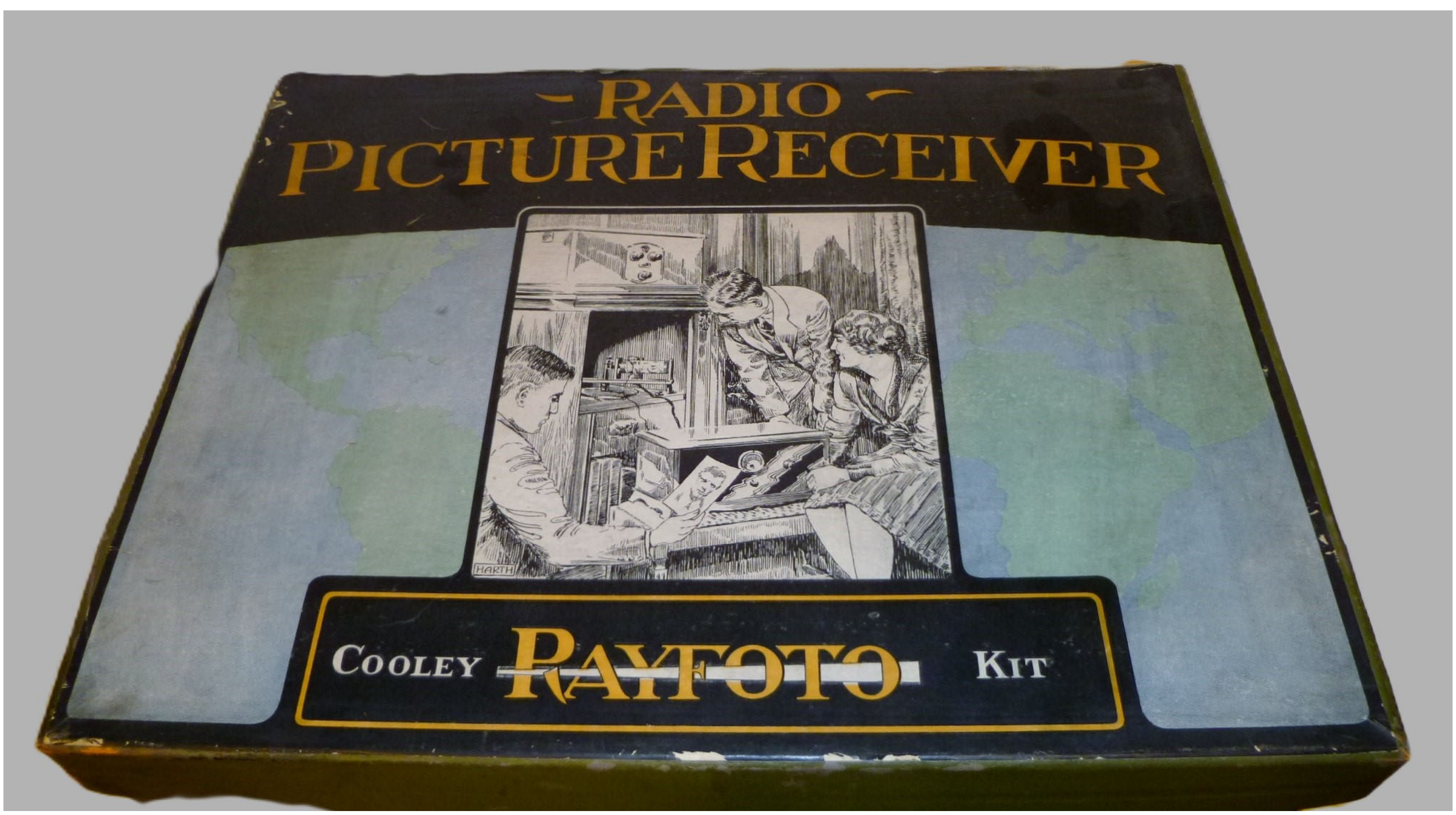
This month we start a new article that began when a collector offered to sell the author something that was in the back of his closet.

This began a hunt to learn more about the Cooley Rayfoto Kit

Were the claims that the owner could tune his late 1920s radio to a program that would pause the entertainment to send out a still picture of the program?

Was there really a musical group called "The Visionettes" that would stop the singing to send a picture?





Pictures by Radio for the Home

The development of radio and television is not a story of some inventor's eureka moment, but rather a chain of small steps that progressed to the point of a service and products accepted by the public. Sometimes a small link in the chain and the work of an individual inventor is forgotten. The author uncovered a small, lost link in the chain between broadcast radio and television by finding a complete kit for a "Cooley Rayfoto System of Radio Pictures for the Home," in near mint condition. Its inventor, Austin G. Cooley, scarcely gets a mention in the literature nor does his system of radio pictures. This kit became the impetus for this article, which covers not only Cooley's system of still pictures for the home delivered by radio, but also similar systems of facsimile transmission made by others using the technique known at the time as "phototelegraphy." Systems developed by other early experiments are also summarized—those developed by N. S. Amstutz of Valparaiso, Indiana, circa 1891, Professor Arthur Korn of Berlin circa 1902, American inventor C. Francis Jenkins in the early 1920s, American inventor William Finch in the 1920s, and noted radio engineer and entrepreneur John V. L. Hogan circa 1937.

The Artifact is found

I was visiting the home of a collector to examine several items he had for sale. As we were finishing, he asked me to wait because he remembered one more item that might be of interest. After digging around a dusty closet, he pulled out an equally dusty box that was labeled with the curious name "Cooley Rayfoto System of Radio Pictures for the Home" (see Fig 1). It was a kit of parts to build this receiver. The kit had never been used and apparently had been opened only a few times. After taking it home, opening the box, and examining the components, I had more questions than I had components. When were these made? How was it used? What did you get to see? Who was this man, Cooley? And most of all, why had I never even heard of this kit?

Some research revealed that the Cooley Rayfoto System of Radio Pictures was introduced to the radio public in a series of five articles in *Radio Broadcast* magazine. The first article appeared in the September 1927 issue, which was an introduction to the concept of still images being broadcast to home receivers.[1] In the second article, published in October 1927, "Now—You Can Receive Radio Pictures!," the director of the Radio Broadcast Laboratory, Keith Henney, explains how the Cooley System works and how an experimenter can build one for less than $100.[2] In the November 1927 and December 1927

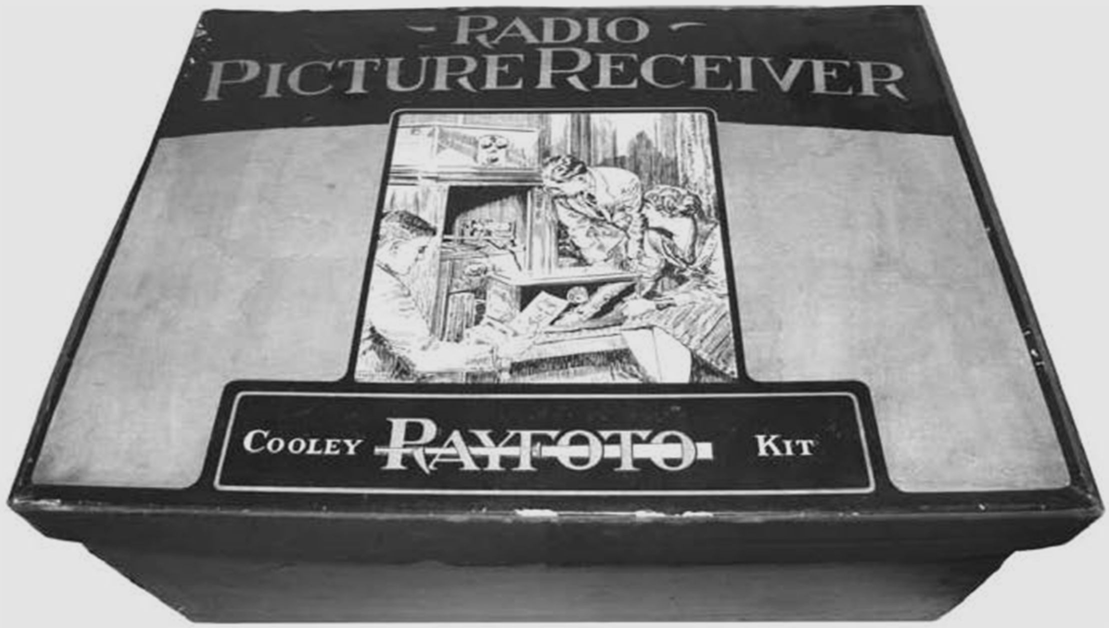


Fig. 1. Cooley Rayfoto Kit, like new in the box. (Author's collection)

issues,[3] Cooley takes over writing the articles, and he tells the readers more about how the system works and how to build a Rayfoto System from the kit. Finally, in the January 1928 issue, author Edgar H. Felix goes on to tell owners how to optimize the operation and enjoy their Rayfoto receiver.[4] The *Radio Broadcast* articles herald the Rayfoto System as a great advance in the art of pictures by radio. This raises two questions—what was the state of the art of radio pictures in 1928, and what came before this development by Mr. Cooley?

Early Transmission of Pictures by Wire and Radio

There is a long history of inventors attempting, with some success, to transmit images, first by wire and later by radio. The most basic plans utilized the telegraph lines to send a coded image. The sender would work from an agreed code to break down the image into small pieces, decide on a code to describe that small piece, send that to the receiver, and move on to the next piece of the picture. The person at the receiver would then decode each piece and finally assemble an image. Inventors went to work to improve this tedious, impractical system with an electrical device. This electrical process would have to include converting an image to an electric signal, sending the signal to another location, and reassembling the image. This work was known by a few different names, but an early title for images sent by wire is "phototelegraphy." The earliest references are for a method patented in 1842 by an English physicist named Alexander Bain.[5] A conceptual drawing for Bain's facsimile communication system from this early date is reproduced in Fig 2. Although a working system was never constructed, Bain's proposed method

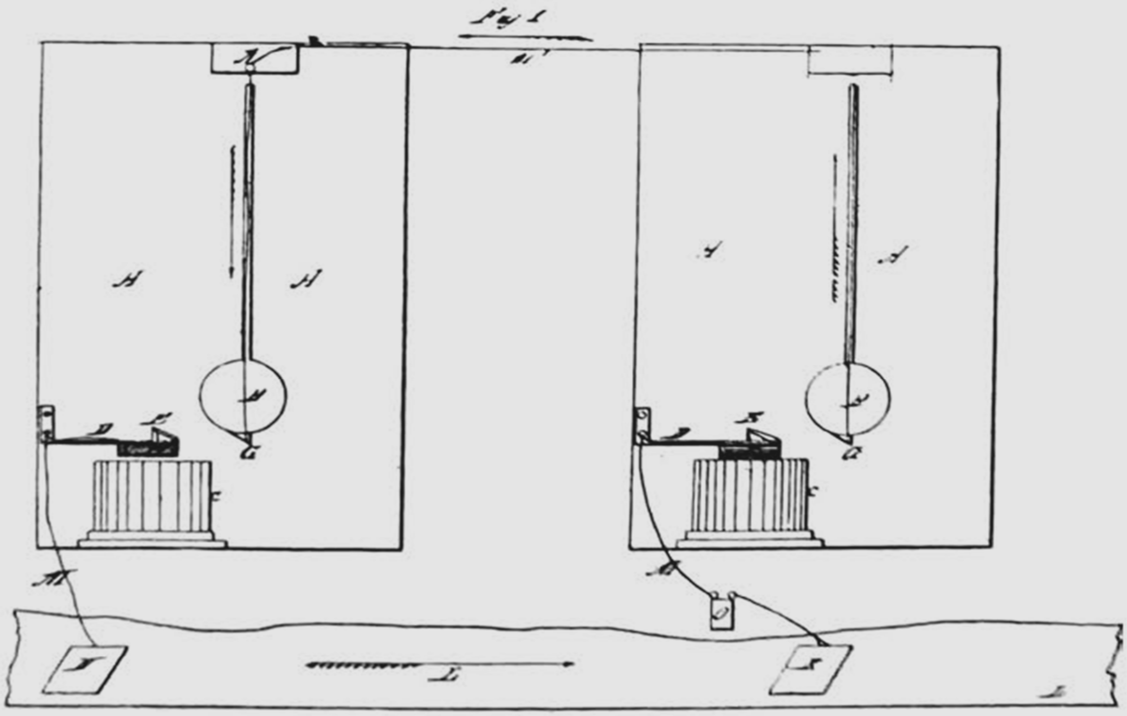


Fig. 2. Alexander Bain system patented in 1842. (*Radio Facsimile*, Vol. 1, 1938, p. 2)

was as follows: An image was painted on tinfoil using a nonconductive paint. An electrical contact was moved over the image and produced an electrical signal proportional to the conductivity at an individual point in the image. At the receiver, the signal was sent to a printer, where the current would discolor a chemically treated paper over the tinfoil. The last component was to synchronize the transmitter and receiver. This was accomplished by a signal line to synchronize a pendulum at the transmitter that controlled contact motion with a pendulum at the receiver controlling the printer motion. Many systems were later put into practice, some for experimental purposes and some to provide a commercial service. A few of the most significant systems under development at the time are described next to provide an understanding of the concepts.

A system devised by N. S. Amstutz of Valparaiso, Indiana, was demonstrated in May of 1891. His clever plan is shown in a simplified diagram of Fig. 3. The first step in this process required that the

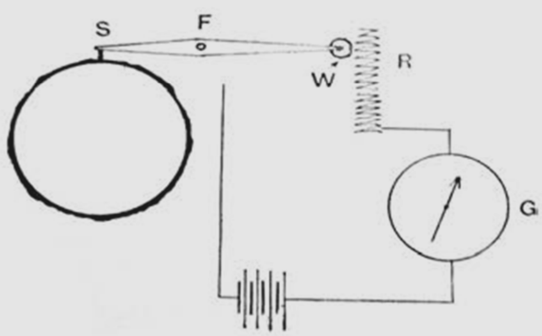


Fig. 3. Simplified diagram of Amstutz and Belin systems. (T. Thorne Baker, *Wireless Pictures and Television*, p. 100)

image to be transmitted be produced as a relief photograph. There was technology at the time to produce such an image using a gelatin-like substance. The image was placed on a cylinder that advanced on a lead screw turned by a motor. Referring to Fig 3, the roller S appearing in the diagram traveled over the highs and lows in the image, and this motion was transferred by the arm F that moves the roller W. This roller varied the current passing through rheostat R that was sent by wire to a receiver. The receiver would print on a similar cylinder using a chemically treated paper that varied the print intensity in proportion to the current applied.[6] This method was also used by Edouard Belin,[7] who improved the process yielding impressive images such as Fig. 4. His device shown in Fig. 5 was called the Belinograph, also known as the Telestereograph.

"Professor Korn's Compensated Selenium System" is not the name of some quack medical product but rather a clever picture system developed by Arthur Korn in Germany. He produced a number of devices over several years and offered a commercial wired transmission service between cities, including Paris and London. One of his later systems, characterized by the schematic in Fig. 6, made use of the discovery that selenium has electrical properties that change in response to light. Although selenium devices were crude at the time, Korn devised a system using two closely-matched selenium cells, one at the transmitter and a second at

Fig. 4. Sample image from the Belin system. (T. Thorne Baker, *Wireless Pictures and Television*, p. 111)

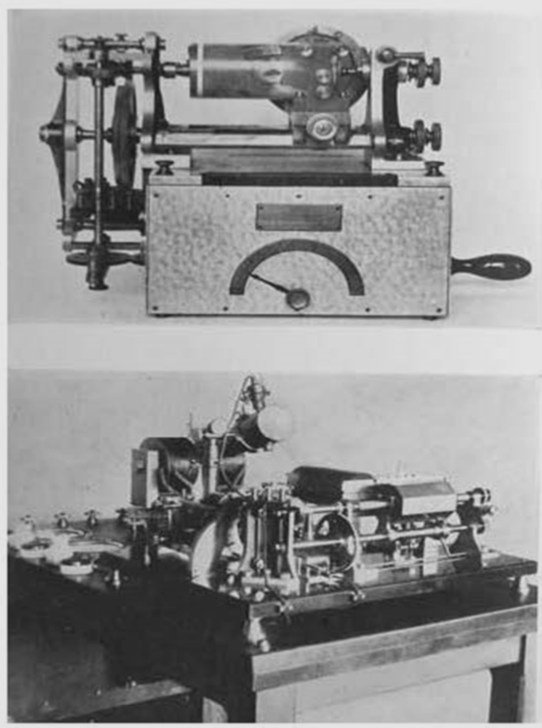


Fig. 5. Belin receiver (top) and transmitter (bottom). (C. Francis Jenkins, *Vision by Radio*, p. 82)

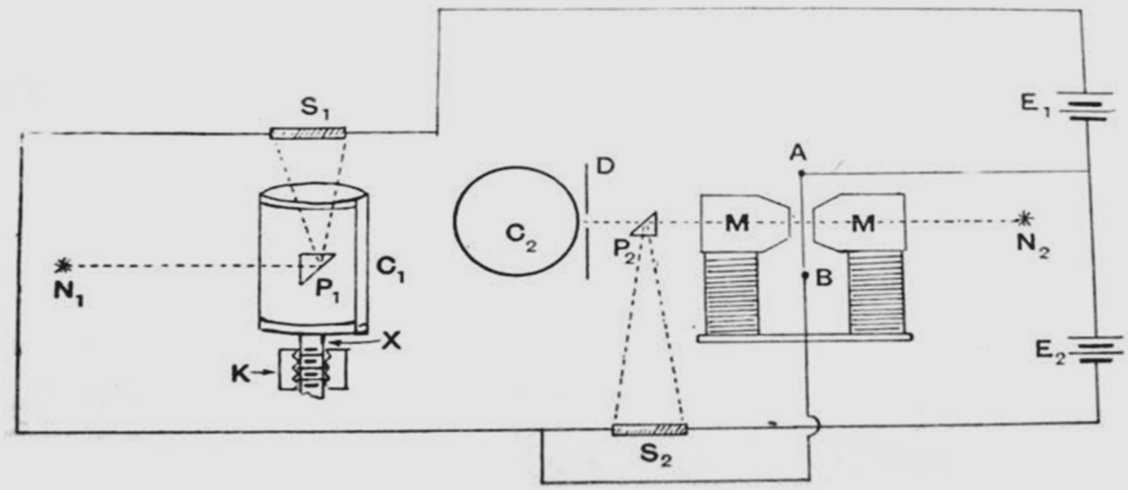


Fig. 6. Simplified diagram of the Korn system. (T. Thorne Baker, *Wireless Pictures and Television*, p. 72)

the receiver. His circuit used the second cell to cut off and thus sharpen the pulse from the transmitter.[8] This resulted in a sharper printed image, such as the one shown in Fig. 7. Professor Korn can be seen in Fig. 8 on the telephone in 1907 performing what may be called "manual synchronization," and we can imagine him shouting to his associate, "hit start NOW."

American inventor C. Francis Jenkins was already well-known for his inventions in motion pictures when he began work on picture transmission and later on mechanical television. Jenkins's system utilized his own inventions, one called the Prismatic Disc and another an electrically powered tuning fork. The Prismatic Disc, shown in Fig. 9, was an optical device used to bend the light coming from the projected image that was to be transmitted. By grinding the outer ring of a glass disc at a gradually changing angle, light passing through would be bent. As the disc rotated, the angle of the light bending would shift

Fig. 7. Sample image of King Edward VII from the Korn system in 1907. (T. Thorne Baker, *Wireless Pictures and Television*, p. 82)

so that the light would scan back and forth. He used a system of four of these

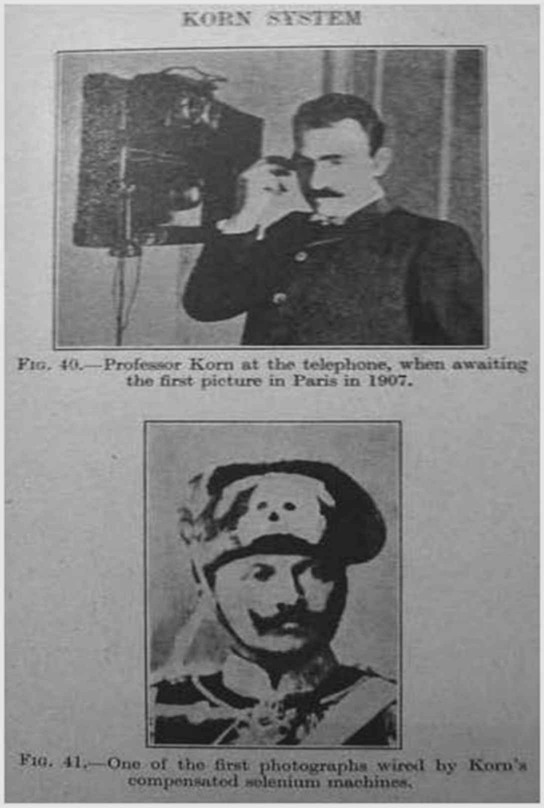


Fig. 8. Image of Professor Korn (top) and a sample image from his system (bottom). (T. Thorne Baker, *Wireless Pictures and Television*, p. 81)

discs, which allowed him to fully scan an image in both the vertical and horizontal directions. The transparency image to be scanned was projected onto the center of the four rotating discs. The set of discs then shifted the image vertically and horizontally over the aperture to a photocell. The motor spinning the discs was controlled by a Jenkins electric tuning fork.[9]

On the receiving side, a light source modulated by the received signal was passed through four identical Prismatic Discs rotated by a synchronized motor controlled by another Jenkins tuning fork. The image was then passed over a photographic plate that was photographically developed for the final picture. From 1922 onward, Jenkins was able to demonstrate better and better images, such as the one shown in Fig. 10, but it appears that he never went beyond the experimental stages. He also developed a system for sending radio movies, but

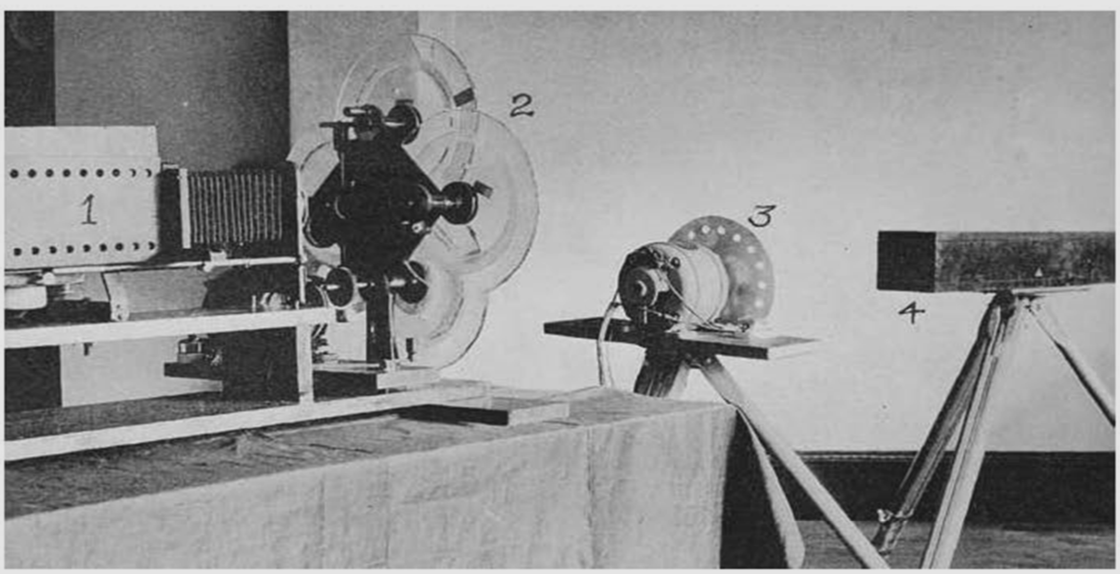


Fig. 9. Jenkins prismatic lens transmitter. (C. Francis Jenkins, *Vision by Radio*, p. 94)

Fig. 10. Sample image from Jenkins system. (C. Francis Jenkins, *Vision by Radio*, p. 19)

within a few years he turned his attention to mechanical television.[10]

In 1924, both RCA and American Telephone and Telegraph (AT&T) gave impressive demonstrations of the results of their research. The AT&T system was designed to send pictures over their telephone lines. The picture to be transmitted was placed on a transparent cylinder and an intense light passed through the picture onto a photocell. The receiver used a similar cylinder, and a focused and modulated light exposed a photographic film. A separate synchronizing signal advanced both cylinders. Two lines were needed, one for sync and one for the signal. In 1924, a picture was sent from Cleveland, Ohio, to New York. Although the picture was impressive, for example see Fig. 11, the transmission required use of the two lines for

Fig. 11. AT&T demonstration image from a 1924 test. (C. Francis Jenkins, *Vision by Radio*, p. 84)

44 minutes.[11] The financial return for a picture service over long distance lines was deemed insufficient when compared to the return for long distance telephone and telegraph service.

In 1924, RCA gave a different type of demonstration. Engineers transmitted a photo like the one shown in Fig. 12 from New York to London, and London sent the same picture, now called a PhotoRadioGram, back to RCA in New York. The research team at RCA, led at the time by engineer Richard H. Ranger, was working toward the establishment of a commercial service to send pictures and documents for newspapers and businesses. RCA chairman Owen D. Young encouraged this research, telling his engineers he was tired of seeing rooms full of people copying code to be typed as radiograms when they should be able to transmit entire pages of printed messages.[12]

The Cooley System

The young inventor Austin G. Cooley, pictured in Fig. 13, developed the Rayfoto system that was introduced to the radio public in the October 1927 issue of *Radio Broadcast*. The idea for this system of transmitting images came to him while he was an engineering student at MIT. Apparently he became so driven to take his invention from conception to reality that he had no time left for his required studies, and he soon left MIT. Soon after he was introduced in the *Radio Broadcast* article in October

Fig. 12. First transatlantic Photoradiogram by RCA in 1924. (*Radio Facsimile*, Vol.1, 1938, p.18)

Fig. 13. Photograph of Austin G. Cooley. (Rayfoto Owner's Manual, p. 3)