

The First Electronic Television Receiver

Abstract: During the 1920s the development of television was being pursued by many groups. With rare exception, the means explored was by mechanical mechanisms. Vladimir Zworykin was one exception. Since joining Westinghouse, he had worked almost continually on a completely electronic system. By the time he left that company in 1930, he had achieved a partial success.

During my years with Westinghouse, I was at one time assigned to a quality assurance team with offices in the Forest Hills facility of East Pittsburgh. Turns out that was the location of Westinghouse research labs in the late 20s. And it was where the first fully electronic television receiver was born.

The official photograph taken in one of the hallways of the old building is famous. (Fig. 1) It depicts a 40 year-old Zworykin standing beside a typical radio cabinet of the era. The lid is raised and a mirror under the lid reflects the image of a seven-inch cathode ray tube face displaying the symbol of Westinghouse Electric, a W. Seated on the opposite side of this electronic miracle machine is a young woman by the name of Mildred Bert. But what was inside the cabinet?

For some years, I had been hoping to discover just that. In 1996, I was delighted to meet and get to know the television historian, Albert Abramson. He received the AWA 1996 Taylor Television award at the annual convention that year. Sometime later, he sent a letter thanking me for my assistance during the convention. Years passed. Late last year, I came across that letter. This time I carefully re-read it and examined the attached schematic. (Fig. 2) It was hand-drawn and was black-on-white. It certainly did not look at all significant. But the letter explained that he had enclosed a copy of the original diagram of the very first electronic television receiver. It had been copied in white on black and as a result was hard to interpret.

I 'inverted' and enhanced the image. Now, I could see just how amazing it was. The 'subject' at the top of the lab notebook page was written, "Wiring of the first cabinet television receiver". Beneath that was the signature of Harvey Iams and it was dated October 10, 1929. The hand-drawn schematic definitely depicted the circuit for a crude electronic television receiver.

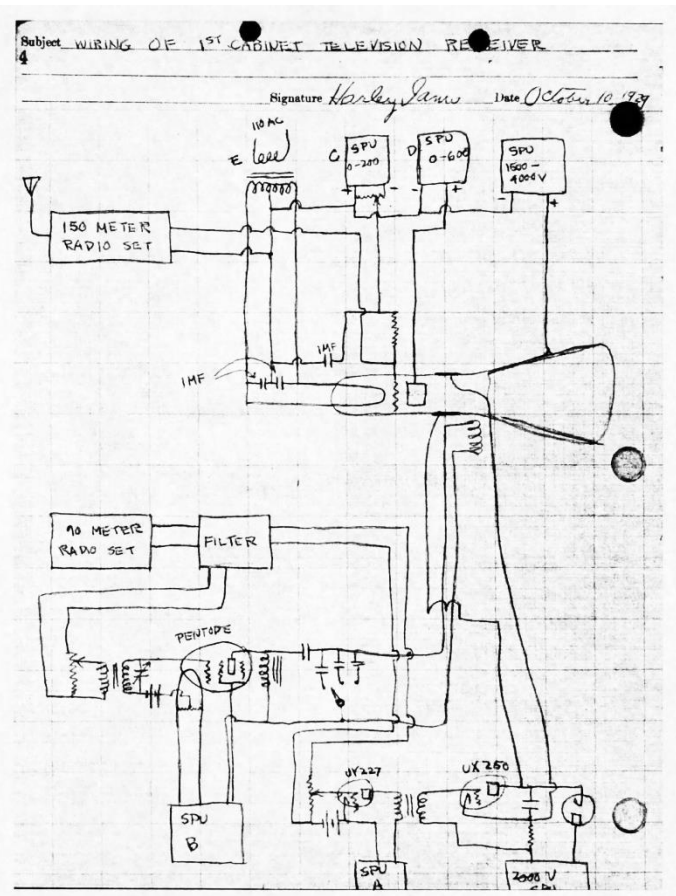
Note: Since an iconoscope camera was not yet available, a mechanical scanning system was developed which would generate an electronic image with a modified motion picture projector. The film is scanned by a light beam reflected by a sinusoidally controlled mirror. A framing signal is generated by a commutator triggered at the end of each film image. A photocell provides the video signal. These three signals were carried by land-line to the Westinghouse transmitter at the 'hill station' in Forest Hills. They were then broadcast; the video by a 150-meter transmitter and the vertical and horizontal sync signals by a 90-meter transmitter.

A few miles away at the Forest Hills site, the receiver is described by the Iams schematic. It can be seen that the circuit drawing is a composite of block items as well as component details. On page 50 of the *Radio Engineering* article, it is explained that horizontal scanning is accomplished by a mechanically derived 480 CPS sinusoidal signal. The diagram shows this signal being received by a 90-meter radio set and subsequently filtered, pentode-amplified, tuned and fed to deflection coils mounted on the neck of the CRT.

The vertical scanning signal is derived from the same 90-meter radio set and filter unit. It is amplified by a UV227 triode and transformer coupled to a UX250 power triode. According to the RE article, 'a condenser is charged at a constant current through a current limiting device...' This condenser is connected to the vertical deflection plates and provides a linear sweep. Note that the deflection plates are shown external to the CRT. The 'video' signal is received by a separate 150-meter radio set and fed directly to the CRT grid. The first anode is supplied with up to 600 volts and the second anode with up to 4000 volts. SPU refers to 'socket power unit' as opposed to battery power. The Radio Engineering article indicates that the video and sync signals were transmitted together. This suggests that the Iams circuit diagram was surely an earlier iteration.

A subsequent letter from Abramson explained that when visiting Iams in San Diego while researching for his books, Iams remarked that, "how happy he was that finally someone had come to see him and ask about his work in television." Abramson's letter went on to explain that Iams worked with Zworykin from 1928 to 1948 and was in charge of iconoscope production at Harrison, NJ. According to Abramson, Iams had been working with Zworykin on facsimile and began work on the TV deflection circuits around November 1928. Finally, with his newly-developed picture tube, Zworykin was able to demonstrate his electronic television receiver to a group of RCA and GE engineers on August 17, 1929.

No doubt that there were a few others were experimenting with electronic television, but every indication is that their experiments were confined to a laboratory and were not 'broadcast' to a self-contained receiver. This would suggest that Zworykin's 1929 demonstration was unique.



References:

The History of Television, 1880 to 1941 by Albert Abramson

Zworykin, Pioneer of Television by Albert Abramson

Radio Engineering, December 1929

Radio News, November 1928

Westinghouse Centennial, 1886-1986, Westinghouse Baltimore Division

Abramson's letters, dated September 17 and November 7, 1996.