TELEVISION

Edited by Richard Brewster
145 Little Peconic Bay Rd.
Cutchogue, NY 11935
Please include SASE for reply.

EARLY CHICAGO TELEVISION

The following paper was written by William N. Parker in 1984 and was published by Peter Yanczer in the July 2000 issue of Electric Pictures Quarterly. It has been edited for this column. Peter is President of The Experimental Television Society; Bill was Chief Engineer, Transmitters, Western Television Co. We are indebted to Peter for his efforts in locating and preserving this important document covering Bill's recollection of his personal experiences in the development of early television. See the TV Column of the February, 2001 issue of The OTB, for article about educational tv in the 30's that ties in with his work.--rb

In the summer of 1984 I came across the obituary of Marcella Lally, who regularly performed on Chicago television during 1930 and 1931. This sparked my interest in recording my own early experiences with mechanical television. Television experiments began in Chicago in October of 1925, four months after Francis Jenkins demonstrated televised silhouettes in the Washington DC area. Nineteen year old Ulysses Sanabria, with [financial?] help from William Randolph Hurst, had set up a laboratory in the Hurst building in downtown Chicago.

It seems that in a forward to an album of his songs, Sanabria wrote "Stories about John Baird preceding either Jenkins or myself are incorrect as to date for we have abundant proof to the contrary. Both Jenkins and myself developed television independently and television is truly an American invention and do not let anyone ever tell you that the Europeans ought to share in the credit."

I had the good fortune to witness Sanabria's work in June of 1926. The images were in silhouette and blurred. and it was barely possible to distinguish between the image of a person's hand and that of a wrench. I had then just completed my sophomore year at University of Illinois in Urbana, studying electrical engineering, and was working part time for the GM Scientific Co., a small enterprise run by two graduate students, A .J. McMaster and Lloyd P. Garner. The company supplied photoelectric cells and other devices to experimenters such a Sanabria and Dr. Lee Deforest. I spent the summer of 1927 at the General Electric Co. in Schenectady, NY., which gave me the chance to make occasional visits to Dr. Alexanderson's laboratory, where Ray D. Kell and others were experimenting with television. They demonstrated for the press, a mechanical system using a disc having a spiral of 24 holes.

A plate-type neon lamp was behind the disc and the picture was about an inch square. The half tones of the faces were quite good. GE also had a short wave

transmitter which they sometimes used to broadcast television pictures. Later the following year, I was in Schenectady when Kell was experimenting with Kodak lenticular lenses for color television.

My next contact with Chicago television came in the spring of 1928, when a quick trip was made to Sanabria's laboratory to borrow a pair of synchronous motors for use in the demonstration of television at the University of Illinois biannual Electrical Engineering Show. Under my direction, as EE Society President, students had worked during the year to build an amplifier and a pair of cardboard scanning discs. The synchronous motors would cause the discs to rotate in step.

But the day before the show was to open, the motors which we had ordered had not arrived! Sanabria had his motors built into his scanners with perforated leather belts driving the discs at 900 rpm. He told me to take the complete units for the duration of the show. I drove back to Urbana in the rain, arriving at our laboratory at daybreak, where the other students had been working all night. The television demonstration was ready when the show opened later that day!

The general public was extremely interested in the display and hundreds of people waited in line to enjoy watching their friends in the little receiver as they posed before the flying spot transmitting scanner. Typical "entertainment" consisted of winking each eye or using a handkerchief. This was very likely the first time that most of the visitors had been able to witness such a demonstration.

A vital part of the television system was the bank of four large photoelectric cells that picked up the light reflected from the flying spot on the subject's face. These cells were made by Lloyd Garner at night when no one else was in the physics lab. A crucial step in the processing of the cells consisted of heating the "window" of an evacuated 22 liter glass flask while cooling the remainder of the flask with ice water! Adding to the danger was the fact that inside the flask was a handful of potassium metal--quite explosive if exposed to water! After the show, some of the cells were sold to television experimenters in the Boston area. [Possibly one of them was Hollis Baird who was beginning his work at this time.]

In Chicago that summer (1928) Sanabria was working with radio station WCFL, experimentally sending his television signals out over the broadcast channel. He invited me to witness the operation, located at the end of Navy Pier. The television images were quite good, having excellent half-tones and good definition.

During the summer, after graduation from the University of Illinois and going to work for Stewart Warner, I constructed a shortwave receiver and scanner which we used to receive television pictures broadcast by Jenkins from Washington D. C. Although it was difficult to obtain synchronization, we could recognize someone bouncing a ball and other silhouettes.

Meanwhile, Sanabria had teamed up with Clem F. Wade to form a new television laboratory for developing a receiver to show stock market reports. They convinced me to join them in Louisville, where the new laboratory was to be located in one of the U. S. Foil Co. buildings (where aluminum foil wrappers were made for Eskimo Pies). Wade had started the Eskimo Pie Corp. and U. S. Foil belonged to Reynolds Metal Co., owned by R. S. Reynolds.

Photo cells, special scanners and other equipment was assembled and taken to New York for a demonstration for Reynolds. The demonstration was such a

success that Western Union heard about the new way of broadcasting stock market reports and promptly put a stop to the development. Plans were then made to move the laboratory to Chicago to broadcast television for educational and entertainment purposes.

I arrived in Chicago about the middle of May with my first assignment; that of modifying Crosley three-dial, metal box, trf receivers for operation at 2100 kc. The 171 output tube passed sufficient current to operate a plate-type neon lamp. Sanabria was already building the W9XAO television transmitter at 6312 Broadway, where the WIBO studios were located.

Initially, a small television studio was built near the main WIBO studio on the second floor. A bank of photocells was mounted in the wall of the studio with a hole in the middle for the entrance of the flying spot scanning beam. The light source was a Peerless reflector arc lamp such as was used in movie houses.

The scanning disc had 45 tiny holes arranged in three interlaced spirals, and was mounted directly on the shaft of a 900 rpm synchronous motor so as to scan at 15 frames a second. A similar interlacing scheme was later used in electronic tv to allow slower scanning without flicker. A projection lens in front of the disc magnified the approximately one inch square field at the disc to about two feet square at the location of the performer in the studio. Lenses of different focal lengths could be used to produce scan fields up to 10 feet square.

As the flying spot moved rapidly across the performer, light was reflected back to the photo cells and converted into corresponding electrical signals. A row of automobile storage batteries was connected across the dc supply for the arc lamp to smooth out fluctuations at the light source. The transmitter, located on the top floor, consisted of a pair of UV204, 250 watt tubes as oscillators, which were isolated from electrical ground. The antenna was on the roof.

An unusual modulation scheme known as "series modulation" consisted of several UV204 tubes connected in parallel. Their cathodes were at ground potential and their anodes were connected to the cathodes of the oscillator tubes. A motor generator supplied the necessary 2000 vdc.

Experimental television broadcasts from this small studio were mostly head-and-shoulders shots. Some of the programs used the audio channel of WIBO. Several movie stars posed including Don Ameche. The number of television receivers was very limited.

We were now operating as Western Television Corp. with Clem F. Wade as President and Martin J. Wade as Secretary. (I still have several thousand dollars in stock issued to me in lieu of salary.) In the fall of 1929, the televising equipment was moved to the main WIBO studio for more regular broadcasting. Larger scanning fields were tried here, such as for a boxing match and a golf lesson.

One of my early jobs was finding a supplier of 900-rpm synchronous motors. We received samples from GE, Holtzer Cabot, and Emerson with the best price of $11 per motor, in lots of 1000, from GE. This meant a projected price of the complete receiver would be $250.

Manufacturing was started by the Hedman Mfg. Co. in Chicago. My assignment in the fall of 1929 was to design and build the television equipment for use at W9XAP, the companion station for the Chicago Daily News station, WMAQ. It was to be

located on the 25th floor of the Chicago Daily News Building, on 400 West Madison St. Multiple cameras were to be used to facilitate the instantaneous scene changes required for smooth programming.

Two flying-spot scanners were provided, each with a turret of four projection lenses and a steerable surface-reflecting mirror to properly position the scanned field. The low scanner was used for seated persons seated behind a bank of photo-cells built into the wall. The other scanner projected its beam at eye height into the studio. The light sources for the scanners were 30 volt, 30 amp incandescent projection lamps.

Light pickup for the long shots was by means of two large photo-cells suspended from ceiling tracks on either side of the studio. Each one had a separate preamplifier and cable to the main amplifier rack adjacent to the scanners. The main amplifier boosted the picture signal and sent it over a special low capacitance cable to the W9XAP transmitter over 100 feet away. A viewing monitor mounted in the rack permitted convenient checking of the picture. Switching between pickups employed relays, pushbuttons and signal lamps. A special feature automatically blanked out the picture briefly during lens turret operation.

The W9XAP transmitter was designed like a commercial broadcast transmitter with a temperature-controlled quartz crystal to maintain the 2150 kc carrier. Several RF buffer stages amplified the carrier to drive a 1 KW water-cooled output tube. A similar tube was used as a series modulator, but this was later changed to a system using a linear amplifier after the modulator.

A large storage battery on an insulated platform supplied the RF output tube filament. The 4000 vdc supply consisted of two double commutator generators connected in series and mounted on either side of a large dc motor. The antenna was strung between the two flag poles on the roof of the building, just above the transmitter room.

The first official telecast of W9XAP was on August 27, 1930. Receivers were distributed to stores in the Chicago area, including Sears Roebuck. Large crowds assembled to see and hear WMAQ artists perform. The signal was strong but the "ghost images" caused disappointment. It seems that ionized layers 50 to 100 miles up caused the delayed signals, resulting in ghosts. Later, images from W9XAP were received up to 400 miles away.

One interesting sight-only program consisted of election returns on the evening of November 4, 1930. Television programs from W9XAO were regular enough to be listed in the Daily News. In fact, here was a two column photo of Marcella Lally in front of the photo cell bank in the May 7, 1930 issue. She may have been the first tv performer to be seen and heard simultaneously. The play, "The Maker of Dreams," was broadcast on the evening of January 7, 1931, possibly the first sight and sound dramatization broadcast. [On September 11, 1938, GE broadcast "The Queen's Messenger," but it did not include sound.

The transmission of fingerprints for the police commissioner was also considered a success. Even ticker-tape stock quotations, delayed 15 minutes were broadcast. Several programs consisting of cartoons drawn on tape were pulled past the scanner.

At the Western Television Laboratory, a search was on for a cheaper motor that

could drive a disc with lenses. Finally, Barber Coleman was able to supply one for about a dollar! Since the synchronous speed of this motor was 1200 rpm, a pair of gears was used to reduce the speed to the required 900 rpm.

A slip clutch and helical spring arrangement was employed to enable the high-inertia lens disc to come up to speed. The spring connected two conical sleeves so as to allow slippage only in the rotational direction which tended to unwind it. A small friction disc prevented undesirable torsional oscillations in the spring-disc system and allowed the picture to smoothly pull into synchronism.

The scanning disc used with the new motor was aluminum and about 8 inches in diameter with 45, one-inch focal length, one cm. lenses arranged in 3 interlaced spirals. It was important that the optical centers of the lenses be accurately located to provide a uniform scanning field without dark lines or overlapping lines. Careful hand-sorting enabled the use of relatively inexpensive commercially produced lenses, made by Simpson Instrument and Lens Co. of Chicago.

The lenses were seated in counterbored holes in the disc and carefully staked using a drill press. The counterbored holes were accurately located using a precision-made jig made on a Swiss boring mill. The cones and other parts were made on a small bench-lathe. It was determined that the set could be manufactured to be sold for $50 dollars.

The scanner was used in two new Western Television receiver models: a table model and a tall floor version called the "Empire State." In both models the picture was viewed on a translucent screen and could be seen by a number of viewers at once. The lenses projected the light from a special "crater" lamp developed by Garner. The tiny but intense light source produced a fairly bright picture on the screen, which was several inches square.

The brightness of the projected picture may be appreciated by the fact that life-sized images of faces were successfully shown (on larger screens) to audiences of several hundred people in an auditorium! Although the pictures were hardly brilliant, they were recognizable.

The radio receivers used in these sets were made by the Echophone Radio Mfg. Co. in Waukegan, Ill. A couple hundred of the new sets were made. In February 1932, Garner and I delivered a dozen table models to First National Television run by Jerry Taylor. They were operating a television station using Western Television scanners.

In the spring of 1932, I helped install Western Television equipment at the state university of Iowa where the Electrical Engineering Dept., under the direction of Prof. E. B. Kurtz, operated television station W9XK. Prof. Kurtz discusses the W9XK operation in considerable detail in his book, "Pioneering in Educational Television" published in 1959 by the Ford Foundation. The equipment used at W9XK is now at the Smithsonian Institution. Sanabria demonstrated his television techniques at the 1933-1934 Chicago Worlds Fair using a large screen. Western equipment was also sold to CKAC in Toronto and a number of other stations. Experimental Television using Western Television equipment was broadcast by The Milwaukee Journal on W9XK from 1930 to April 1938. At that time, they converted to electronic television. W9XAP (Chicago Daily News) stopped broadcasting mechanical television on March 31, 1933. In the summer of 1934, I

switched to the development of electronic television, accepting a position with Philco in Philadelphia.