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"Other" Televisions at the New York World's Fair

by
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When we radio/TV collectors think of television at the 1939 New York World's Fair, we naturally recall David Sarnoff's dramatic unveiling of RCA's finest engineering triumph, their TV sets, cameras, and broadcasting equipment. But there were other TV displays, far less flashy, representing other U.S. manufacturers, and, then, of course, there were the British and Germans exhibiting TV systems having three years maturity over these American upstarts.

RCA was not the only manufacturer exhibiting television at the 1939 New York World's Fair. Westinghouse also had a small television display in their "Hall of Science." But most, if not all, of the receivers and cameras in the Westinghouse display were designed and built by RCA. The camera distinctly resembled an RCA, minus the meatball logo. Sears, Roebuck may also have had a television display in their "Store of Tomorrow." The small quantity of televisions RCA made for Sears and Westinghouse in 1939 may have been for display at the World's Fair.

There was at least one manufacturer at the fair that was displaying television receivers not designed or built by RCA. Before the fair opened General Electric thought it had designed and built a comprehensive television exhibit. At one end of the exhibit was a complete television studio. Here people were chosen at random and interviewed on television. A handful of receivers were located on the other side of the exhibit. A picture of the display (Fig. 1), taken in May 1939, shows an experimental 1938 12" mirror-in-the-lid model, a 5" console prototype, and lots of people. The 1940

H-line was likely not ready for exhibit at the fair.

General Electric greatly underestimated the attraction people would have for television. The television exhibit at the General Electric pavilion quickly became a bottleneck as visitors were stopping, wanting more time to gaze at the television receivers. In July of 1939 the exhibit was greatly expanded with more television receivers in viewing booths. In the new exhibit, visitors were allowed several minutes to watch the demonstration on television. The booths were being filled and emptied regularly. As many as 15,000 persons daily got their first glimpse of television here.

We now believe General Electric put twelve of their model HM-226-7A (12" direct view) receivers on display in the GE pavilion. GE was the first U.S. manufacturer to show a television with a 12" direct view screen, although Allen Dumont did have a rather long and bulbous 14-inch electrostatic tube. Until this time, the 12-inch electrostatic focus cathode ray tubes had been extremely long. To keep the cabinet size

reasonable, the tube was mounted vertically and a mirror was placed in the lid for viewing. The cathode ray tube in the GE is a very short, magnetically focused, type MW-31-3. This tube was designed and manufactured by Philips in Holland.

The HM-226-7A is very interesting from a design standpoint. The radio chassis and the television chassis are completely separate. The television chassis of the 226 has 22 tubes, hence the "22" part of the model number. The AM shortwave radio has 7 additional tubes, hence the "7A." Each operates nearly independently of the other. The TV chassis provides ac power to the radio and switches over the loudspeaker and antenna connections. In fact the pilot jewel in front has two light bulbs mounted behind it, one for the radio and one for the television.

It is possible that the radio was added at the last minute, perhaps the quickest way to complete the product. The small, but talented design group in Bridgeport, Connecticut, did manage to turn out quite a few interesting radio and television receivers. They may have anticipated the small production quantities and did not see the benefit of integrating the radio into the design. The same 22-tube TV chassis was also put into the HM-225, a 9" direct-view receiver without a radio. In a 1940 World's Fair pamphlet, the HM-225 was advertised as a "medium priced" large screen television.

The 5-station channel selector in the HM-226 television chassis has a very nice pushbutton arrangement. Located directly behind the channel selector is one of the many 6F8-G twin triodes, this one configured as a mixer and oscillator. The picture IF contains two 1852s and two 1853s with a 6H6 video detector. Some AGC is provided for both of the 1852s. The video amplifier is made up of one half of a 6F8-G and a 6F6-G. The sound channel contains two IF stages, a 6SK7 and the pentode section of a 6B8. The diodes of the 6B8 served as the detector and AVC source. The audio amplifier has a 6SC7 twin triode phase inverter with push-pull 6F6s, producing an impressive 10 watts. The speaker is a 12" permanent magnet type. It is interesting that the audio amplifier of the radio has only a 6J5-G and single 6Y6-G, not even a real pentode. The radio chassis, except for the antenna coil, is identical to the popular model J-74. Unfortunately the sound channels in all early

television receivers were designed for AM. When the audio modulation was changed to FM in 1941, these sets were re-aligned for slope detection. In these early receivers, it is not uncommon to find many modifications to the audio detector circuit to better demodulate the FM signal. The sync clipper function is performed by the remaining half of the 6F8-G video amplifier. This is followed by a third 6F8-G, one half used as a sync amplifier and the other a vertical sync clipper. The fourth and last 6F8-G is used for the vertical sweep oscillator driving a 6V6-G vertical output. The horizontal sweep circuit uses a 6N7-G oscillator and a very special horizontal output tube.

It appears that GE, with their unique sync circuit design, was not concerned that users would have to adjust the horizontal and vertical hold controls. Unlike RCA, GE put both their hold controls in back. Below the six pushbuttons on the HM-226, the six controls on front are tone, volume, fine-tuning, focus, contrast, and brightness. The first pushbutton on the channel selector functions nicely as the off switch. When the television is off, ac power is applied to the radio.

It is apparent that GE may have cut a few corners in the design of the HM-226. The horizontal output circuit does not include a damper diode. Without a diode, horizontal linearity is not as good as in an RCA TRK-12. It also does not have a video dc restorer. A dc restorer helps hold the black level constant by forcing the dc operating point to be at the tip of the sync pip. This helps to keep the fade-to-blacks dark and free of retrace lines. When video is ac coupled, the blacks float upward to greys and retrace lines appear on dark scenes. But even RCA had cost-reduced the dc restorer out of its early production TRK-120's, but it did make it back into later production models.

The anode voltage is only 4,000 volts in the HM-226 and is supplied by a single 879 rectifier and a brute force 60-Hz power transformer. The Philips cathode ray tube is much shorter than the RCA 12" tube. This forced GE to design their own deflection yoke. The tube's wider deflection angle and the shorter yoke required more horizontal sweep power. The power needed is even higher when the electron beam is more energetic (intense), and this may be one of the



Figure 1. Although austere, the GE display at the World's Fair attracted crowds. (Picture, taken May 25, 1939, courtesy of Hall of History Foundation, Schenectady, NY.)



Figure 2. Here is the GE promotional illustration of their HM226 television.

reasons the anode voltage was kept down.

Over the last 10 years I have had the pleasure to correspond with George Fyler, one of the key development engineers on this receiver at GE Bridgeport. Through several letters and phone calls, I learned a few interesting anecdotes about GE Bridgeport. George held on to one of these sets for many years. His was the first to have an intercarrier sound system, on which George holds a basic patent.

George had an interesting story about the horizontal design issues involving the HM-226. The short Philips tube with the GE yoke required more horizontal stored energy and thus produced a higher voltage retrace pulse. In 1939, most of the tubes used in GE radios and televisions were labeled General Electric, but they were actually manufactured by RCA. There were some, identifiable by orange ink, that were made by Raytheon. During the design of the HM-226, GE asked RCA to design and manufacture a special version of the 6L6-G tube with a plate cap, to handle the higher retrace pulse voltage. RCA agreed to make the 6AL6-G. One week before GE was to start production of the HM-226, RCA said that they would not make the 6AL6-G. George thinks this was because GE was buying the Philips cathode ray tube from Holland and not using the production RCA tube. Raytheon was contacted and given the specifications over the phone and produced good samples over the weekend. RCA was furious that GE still made their production schedule on the 12" direct-view TV. RCA then started shipping GE all their reject (usually owing to non-uniform screen phosphors) 5BP4

kinescopes, used in production GE 5-inch sets. George went to New York City on a complaint from a distributor: "The pictures on all the RCA 5-inch sets look nice and white and all the GE 5-inch sets look lousy." It was George who was given the job to get RCA to deliver decent tubes. "Some fun," recalls George.

It is believed that the chassis of the HM-226 pictured in Fig. 3 may have belonged to W. R. G. Baker, the Vice President in charge of radio and television at GE. His name appears in bright red across the back of the chassis. Each time the television standards were changed the chassis would be recalled for modifications. Thus, with the many trips back to the shop, it is common to find the names of the original owners marked on chassis of prewar televisions. GE was broadcasting in Schenectady on W2XB, later WRGB, which was named for Baker. It is logical that Baker would have had a television in his home.

The HM-226 chassis we own still contains most of its original GE tubes, identifiable by the deco logo and RCA date codes, but guess what! The 6AL6-G does not have the GE logo, but Raytheon, instead! Recently I had the opportunity to examine another receiver. It contained a replacement 6AL6-G with the deco General Electric logo. The tube carried a 1943 date code and does not look like an RCA. It also had the orange ink used by Raytheon! I am not sure RCA ever made the 6AL6-G. I do know replacements are very scarce. Although I have not found anyone to confirm George's story, I believe there must be some truth to it.

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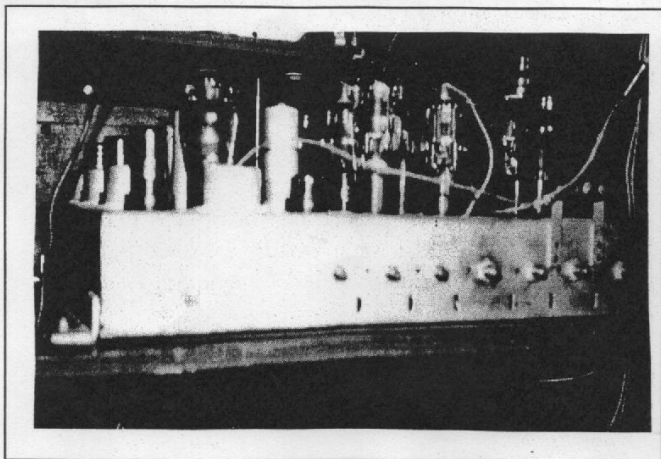


Figure 3. This is the chassis of the author's HM226. The name *W.R.G. Baker* can be seen faintly on the back, written in red grease-pencil, indicating that it may have once belonged to the GE veep, himself.