

ANTIQUE RADIO GAZETTE
SUMMER 1982
**RESURRECTING
A 1939 T.V.**

by
Richard Brewster

In the summer of 1976 I was offered an opportunity to acquire a GE HM 225 television set, circa 1939. Having been interested in antique T.V. for quite some time, I should have immediately snapped it up! But this set was in very bad shape: a genuine basket case! So, I turned it down. I had ample opportunity to reflect on this decision during my flight back to Japan where my family and I had been living for the past year. Shortly after arriving in Japan I wrote and made an offer for the set which was subsequently accepted. It would be a challenging project upon my return to the U.S.A.!

When I was about fourteen years old, living in the N.Y. area, I had managed to get hold of a similar set. Unfortunately, I didn't have the foresight to keep "hold" of it! Because I couldn't get the set operational, it added to my parts collection! That wasn't all bad since one of the salvaged parts was the picture tube!

The HM 225 that I have is a "9" console model equipped with a side of the cabinet mounted 6AC7 pre-amplifier. (But no side mounted all wave radio which my earlier set did have.) The power supply is on a large, heavy chassis in the lower part of the cabinet and consists of two 5U4s and a 2x2/879 high voltage rectifier. (This was a very common arrangement in the first electronic sets.)

The audio/video chassis (about 18" square), is mounted midway up the cabinet in the normal horizontal fashion. The controls on the front are, left to right: tone, volume, fine tuning, focus, contrast, and bright-

ness. There is also a row of 6 push-buttons for 'off' and channels 1 through 5.

The picture tube is mounted for direct viewing just above the controls. One of the unusual features of this set is the 9" tube which is made in Holland. It is a rather short magnetically deflected and focused Phillips no. MW-22-2, with a 5 pin base.

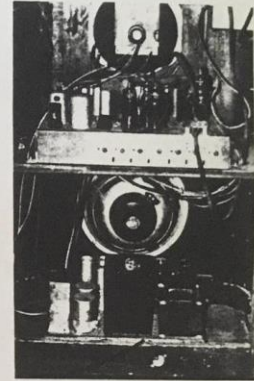
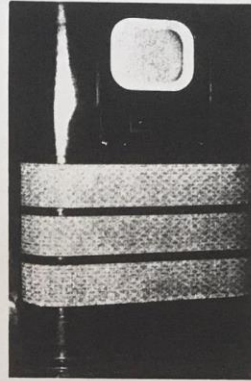
The rear mounted controls are, left to right: vertical size, vert. linearity, vert. hold, horizontal damping, horiz. hold, horiz. linearity, and horiz. size.

The front end has no RF amplifier (also common in pre-war sets), and thus the need for the pre-amplifier which has several switch positions similar to those on an old "rabbit ears" antenna. There are no markings on the preamplifier selector switch. The operator just chooses the position for the best picture. This unit is powered from an adaptor socket plugged under one of the 6F6 audio output tubes.

The push-button tuner has trimmer adjustments which are not accessible from the front of the set. The set has a dual-triode 6F8 oscillator/mixer which is followed by (4) 6AC7/1852 I. F. amplifiers operating at 12.75 MHZ. The video detector is a 6H6 followed by one triode section of a 6F8 for video amplifier and a 6F6 video output tube driving the picture tube grid.

The sound I.F. (8.25 MHZ) is picked off the first video I.F. and is amplified by a 6SK7 and the pentode section of a 6B8.

The sound detector, which is the



diode portion of the 6B8, is A.M. (T.V. sound was amplitude modulated in pre-war T.V.) Adequate F.M. reception is possible using "slope detection" which provides an output dependent on frequency as the sound carrier deviates up and down the slope of the detector response curve. The audio channel is completed with a 6SC7 dual triode operating as an amplifier and phase inverter followed by push-pull 6F6s.

Horizontal and vertical sync pulses are tapped off the first video amplifier and feed a 6F8 sync clipper followed by a sync amplifier. A separate clipper provides vertical sync. The horizontal oscillator is a 6N7 which is followed by a 6AL6 horizontal amplifier. As was previously mentioned, this set is magnetically deflected and the 6AL6 is transformer coupled to the deflection yoke. The vertical oscillator is a 6F8

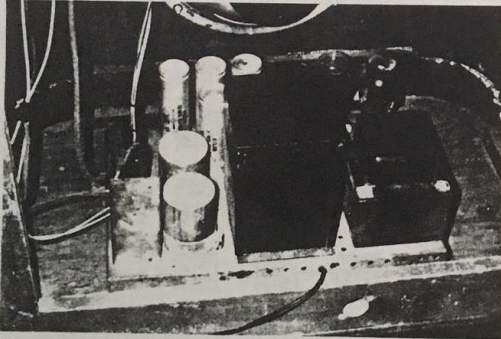
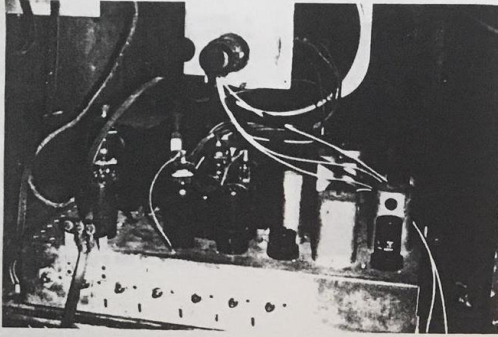
which drives a 6F6 which is transformer coupled to the vertical coils of the deflection yoke.

Now the fun begins: making the set operational!

The first step was to replace missing and bad tubes. This could have posed a problem if the 6AL6 were missing as this is a *rare* tube.

It should be noted at this point that a lot of the wiring in the set had deteriorated insulation; especially the leads that went from chassis to chassis and to the picture tube. These connections were replaced with wire of about the same vintage, although with far more durable insulation. This effort took quite some time!

The picture tube filament was good but the 5 pin base was missing with only the leads coming out of the tube. I spent a bit of time trying to figure out how to wire the cath-



ode, control grid, and accelerating grid to a 5 pin base. A decision was finally made to use the previously mentioned tube that had languished so long in the junk box!

Next, the transformers were checked for open windings and proper resistances as indicated on the schematic. No problems here. (The schematic, by the way, was located in volume XI of Riders, G.E. pages 11-35. A revised schematic was also located which defined a modified horizontal output circuit.)

The next step was to check the 8+ resistance to ground which at 20K OHMS was considered high enough to indicate that no obvious short circuit existed. I don't recall measuring the high voltage circuit resistance but that would sure be a good idea.

In any event, power was applied to the set with the rectifiers removed. All glass tubes lit! This verified that the power transformers were not shorted.

Then the rectifier tubes were replaced and the set was energized with a variac, slowly increasing the line voltage up to rated. This is done to allow the filter capacitors to reform while monitoring a series connected A.C. ammeter. During this time the low voltage was monitored to verify a smooth rise to about 300 volts. The high voltage was measured CAREFULLY and noted to be 3600 volts. I should mention at this point that this is a DANGEROUS power supply, capable of relatively high currents. (A modern T.V. set with a "flyback" type H.V. supply is quite safe in comparison, even though the voltage may be at least 5 times higher.)

Next, voltage measurements were made at all the plates and screens of the tubes. An open coil (L-17) was found in the plate circuit of the first video amplifier. This was repaired by soldering a poor connection at the coil terminal.

The biggest problem involved the

horizontal circuitry. Someone had made changes and left it half done. The circuit was rewired per the schematic.

Now, I was delighted to see a poor, out of sync picture and hear some distorted sound! GREAT!

Next, I set out to improve the picture. I immediately discovered a shorted capacitor (C-47) across the vertical linearity pot. Replaced same.

The B+ seemed too low so I tried adding a 30 microfarad capacitor across the B+ supply. That raised the low voltage to about 400 Volts and improved both picture and sound. (Electrolytic capacitors often deteriorate with age and do not provide effective filtering. In a power supply this also affects the DC output voltage.)

The vertical frequency control range was not sufficient and had to be corrected by replacing R78 with a smaller value in series with the vert. hold control.

The next project was the sync. There was very little — the picture would not hold vertically or horizontally! It was soon discovered that C34 which coupled the sync to the syn clipper grid was shorted. Replaced same and now the picture locked in quite well.

Another capacitor in the vertical circuit had to be replaced to improve the vert. linearity.

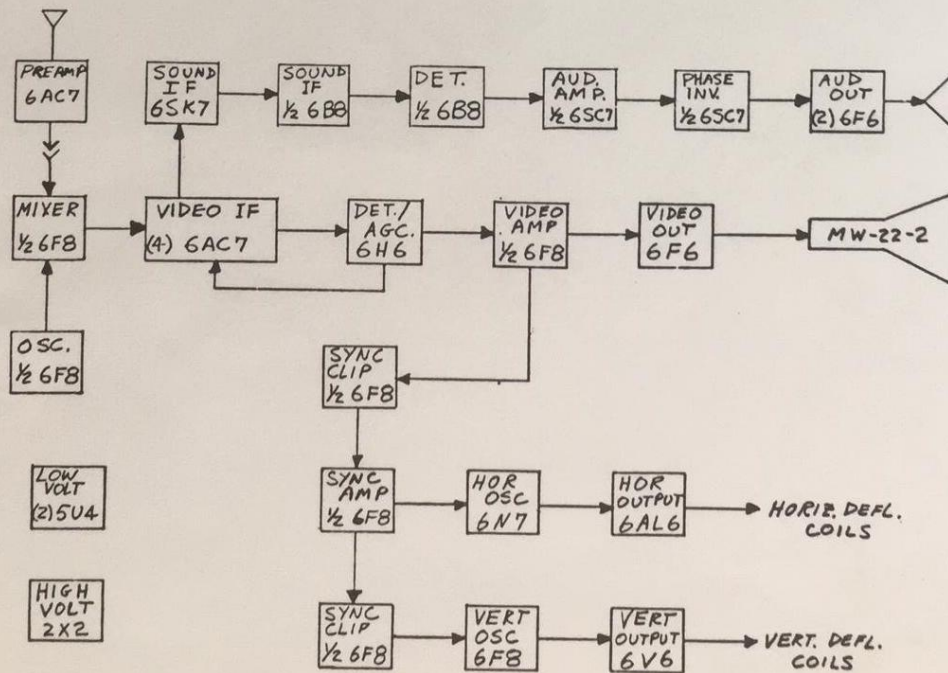
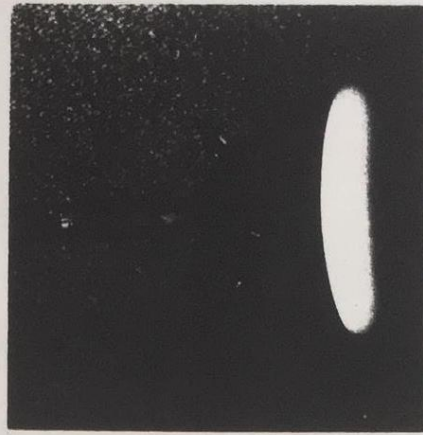
As you can see, relatively few components had to be replaced. It may be as time goes by other capacitors may become leaky but now four years later, the set still works!!!

The set works quite well even with a poor antenna in a relatively weak signal area. The contrast is adequate and the picture tube appears to be as good as new! But, it sure is great to have a spare even if it means determining how to wire up the five pin base. Of course only the low channels (2-6), can be received on this set. In our area we receive 2 & 4.

As a precaution, I have wired a thermistor in series with the AC line to reduce the surge when the set is switched on. Also an auto-transformer is used to provide 115 volts to the set from our 120-125V line.

Cabinet work is not my specialty but I was able to get it looking rather good with a little effort. The major work was the replacement of the grill cloth.

It certainly was a challenge to get this set operating even if it isn't in "like new" condition. But it has the latest push-button tuning feature — interesting for a set 43 years old!



G.E. HM-225B BLOCK DIAGRAM