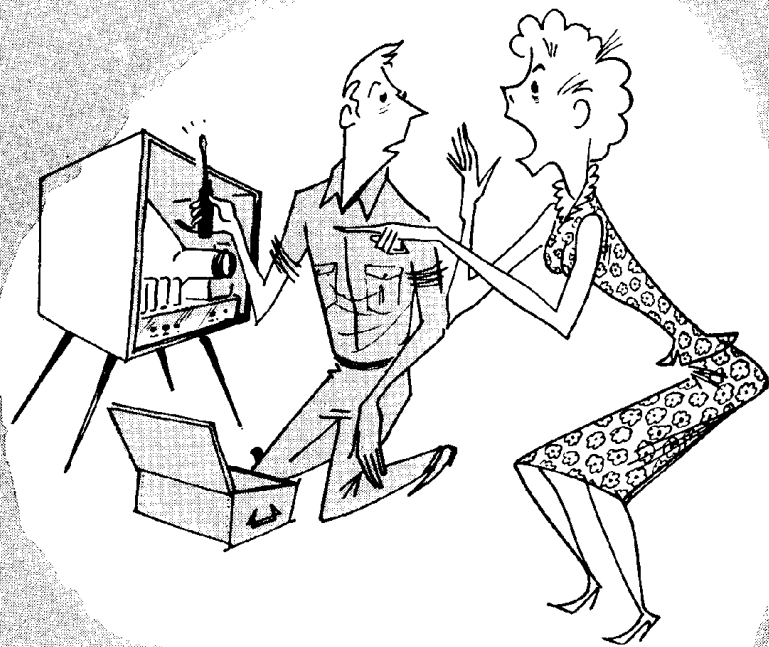


THE LITTLE THINGS THAT COUNT

By ART MARGOLIS



IMAGINE this situation. A gigantic nation-wide TV manufacturer decides to cut expenses. By an odd quirk of ill planning he comes to the conclusion that he no longer needs a production line test setup. All testing is abolished and the testers fired. The production line continues and untested receivers are boxed and shipped. Do you think any confusion would result? Which do you think would cause more consternation, this situation or a carefully placed hurricane? Getting back to reality, do you think anyone would ever let a predicament such as this occur? Of course not! Not for all the white collars on Wall street.

But consider this set of circumstances. A 19-inch RCA chassis is pulled into the shop. The benchman takes a fast gander at the complaint tag. "Fixed brightness and loss of sync." From long experience he turns the chassis on its side and quickly locates a .02- μ f capacitor connected from the sync separator to the picture-tube grid. As expected, the suspicious roll of foil measures 3 ohms. Since capacitors were not made to measure 3 ohms, he replaces it with a more normal one. As an added precaution he checks for a possible resistor that might have received too much current flow due to the short, but he finds none. With a triumphant smile he lifts the chassis high and puts it on the rack labeled "Repaired Sets." Casually he turns to his next job.

Do you think anyone would ever let a situation like this occur? Of course, it happens all the time. The TV receiver is repaired just as those mythical untested TV sets were manufactured. The repairs consisted of locating the defective part, and replacing it. Then the set was declared ready for delivery. No further testing or checkout was even considered, especially with this chassis, since it arrived at the shop in three sections, minus the picture tube, and it would have been a full 5-minute job to hook everything up.

You will shrug your shoulders and murmur that there is a big difference between making a set and repairing one. O.K. Naturally there is hardly a comparison. A checkout procedure for TV repair need not be anywhere near as complex as a manufacturer's test of a receiver. The entire affair can be taken care of in a few minutes, but these minutes can reduce dollars lost in call-backs.

The reminder chart

The factory, in its engineered test setups, uses all sorts of sheets and charts. Some resemble the tube voltage and resistance tables found on some schematics. These are necessary for a successful high-speed production line. But all we need is a reminder card (see chart). It can be attached to each chassis or simply tacked to the wall.

After we clean the chassis and tuner of dirt and corrosion, we invest in a few drops of solvent and swish a bit in

each pot. A dirty control, especially volume or contrast, can result in an annoying callback.

A 12-inch Artone came into the shop a while back. The complaint read, "No nothing." The service technician was not quite accurate—the filaments still lit. A shouted hallelujah was heard from the benchman as he located a burnt focus pot. This restored raster and video to the screen, but it was way out of horizontal sync. After about 20 minutes, more laughter was heard together with the clicking of the solder-gun trigger. He had found that a horizontal multivibrator grid resistor measured 500,000 ohms—it should have been 270,000. Changing this resistor brought back horizontal sync. Then, another discovery—no audio. Another hour of exploratory surgery uncovered two open 1,000-ohm resistors in the B plus feed line and a shorted .02- μ f capacitor in the grid circuit of the audio output tube. After that the set seemed in good shape and was delivered.

I got the report from the technician who delivered the set. The owner was satisfied with the picture but when she found the volume control scratchy, she hit the ceiling. Upon her return to the hardwood floors, she told the technician, in true customerlike fashion, that we hadn't done anything, because the volume control was just as noisy as when the set was pulled. A few drops of solvent were all that was needed to bridge the gap between a satisfying expensive repair job and the unlucky results of this one.

A somewhat parallel case—a 19-inch Crosley—went swiftly through the shop. The complaint was picture shrinking. The service technician had suspected weak selenium rectifiers but instead the horizontal output screen-grid resistor, when heated, went from 4,700 to about 900 ohms. This short lowered the screen resistance on the horizontal output, ran the tube hotter, drew more screen current and lowered the B plus voltages throughout the set—four-sided shrinking resulted. The resistor was changed, the set delivered and the technician received a large tip. The customer was more thrilled with the volume control that no longer grated than the repair. The repair was taken for granted, but the few drops of suitable solvent constituted the little extra that gave us a satisfied customer.

Insufficient width occasionally is pooh-poohed over lightly in the shop. The customer usually has a different opinion of it. We make a very definite width check in the shop and we don't settle for anything but the best. Typically, a 10-inch Motorola stared blankly up at me the other day. The complaint read simply, "No B plus." Checking revealed a leaky 140- μ f filter capacitor in the B plus line. This restored the missing B plus and all was well with the receiver—that is, all but the width. Try as I might, I could not get enough width. After playing with adjustments for 15 minutes I broke down and in-

stalled two new gayly colored selenium rectifiers. The picture seemed to grunt as it came on and then confidently pushed its way outward till it crept around either side of the tube. Then the delivery man went forth bravely.

Insufficient width can be corrected rather easily with new rectifiers, horizontal output tubes, dampers or even by juggling the screen and cathode resistors in the horizontal output stage. But no matter how, it must be done for satisfied customers and repeat business.

Checking sweep circuits

Vertical sweep headaches, though not as constant a pest as horizontal sweep problems, occur frequently. A 10-inch Admiral arrived for care. There was no vertical sweep. An open primary in the vertical output transformer was quickly located. Upon replacement the picture blossomed out once more, top and bottom. However, to center the picture properly and spread it to fill the entire screen, the vertical linearity pot had to be opened all the way.

The actors on the TV screen had pointy heads and stumpy legs. Further research showed that the vertical output cathode resistor had changed tremendously in value. Inserting the correct resistance restored the maligned TV performers to their normal proportions.

Another time a 16-inch set was brought into the shop. Like a mongrel, it resembled three or four brands, but there was no name on the cabinet and none on the chassis. The customer confessed she did not know the name of IT either.

There was very little vertical sync. The picture would, upon ticklish manipulation of the vertical hold control, lock in; but even walking past the set rapidly would kick it off. A 6SN7 tube was located acting the dual role of vertical oscillator and vertical output. The last of the three legs in the integrator was a .05- μ f capacitor that had the audacity to measure about 500,000 ohms. We all breathed a sign of relief as a new .05 "boingned" in the picture to stiff attention.

Once more our lips trembled, for there was not enough vertical sweep. Scouring the circuit revealed no other bad parts. Then, miraculously, we were delivered in our hour of need by a stroke of genius. One of the outside service technician pulled out the 6SN7 tube, winked at us once and inserted a 6BL7. We all witnessed the expansion of the picture with lots of leeway on both of the vertical sweep controls.

Another must on our list is a horizontal frequency stability check. For circuits such as the Synchrolock, a fast scope alignment doesn't do any harm. A 21-inch Muntz was brought into the shop. The complaint was no sound, no video and, though only a 6-months old infant, the set was smoking. Somehow the raster remained during the melée. After a fast check through the tuner and i.f. sections, hot on the

trail of a couple of hundred ohms between B plus and ground, the trouble was naturally located in another section of the receiver. The 6W6 audio output tube had a screen-to-cathode short that killed B plus to the tuner and i.f. stages. The 6W6 screen grid dropping resistor was mercilessly having heavy current pumped through it, and it was doing the underage smoking. A new 6W6 and 5U4 in addition to the damaged resistor had the TV pumping along nicely once more. The set was returned.

A day or two later brought a frantic plea for assistance from the proud owner. She told us the picture was going off again, but this time the sound remained. Further questioning revealed it was horizontal sync trouble this time. As an added attraction, it was intermittent. The little monster was brought back to the shop once more and the oscilloscope showed in bright chartreuse that the horizontal alignment of the Synchrolock circuit was not all it should be. About 45° rotation on the underside of the Synchrolock can make the scope form identical with the picture on the alignment notes. Needless to say, the set has lived happily ever after. Also, needless to say, horizontal alignment became a 3-minute must on every chassis that runs through our shop.

The audio system is another circuit that we give a quick check. A 12-inch Admiral, brought in for bench repair, had high voltage arcing all over everything. The picture tube was arcing to the chassis. This was successfully shielded with some plastic sheets. Then just as we began to pat ourselves on the back, the second-anode lead began to arc to the high-voltage cage. Gobs of high-voltage tape straightened that out, but there was no rest for the weary. The IB3 socket began to spit miniature lightning into the metal frame of the flyback transformer.

Somehow at this point we began to

REMINDER CHART

- Clean chassis and tuner
- Clean all controls
- Width and blooming
- Vertical sweep
- Horizontal frequency
- Sound clarity
- Picture—all channels
- Shadows
- Cook

Remarks:.....

TELEVISION

suspect there just might be something causing it. A few fast resistance checks revealed the 470,000-ohm limiting resistor in the lead from the 1B3 cathode to the picture tube open. With no place special to go the high voltage was spilling onto everything! Replacing the resistor eliminated the trouble.

Congratulations were passed around freely and without further fanfare the set was returned from whence it came. However, we were not off the hook so easily, for the customer called back promptly. She told me that after about a half-hour the sound became garbled. Her complaint was justified. We went out and found the TV performers speaking excellent Martian. A new 6AL5 and some discriminator trimming brought the set back to this world. An audio check could have easily bypassed this expensive interplanetary episode.

Here in Philadelphia we have channels 3, 6 and 10. It follows then that it might be sensible to see whether all three are coming in properly. We weren't always that sensible. For example: a 10-inch Motorola came in with no sound, no raster and the distinct odor of rotten eggs. Following the plot I substituted my nose for my trusty v.t.v.m. and tracked the odor to shorted selenium rectifiers. They were replaced, the picture popped back on and the sound rallied loud. Everything looked pretty good and the malingering smell of hydrogen sulfide was gone. Then with a glance at the checkout chart, I went through the routine.

I cleaned all the controls and the tuner. There was no width problem and no blooming, the vertical sweep was doing an excellent broomlike job and the horizontal frequency was performing in stellar fashion. Then I checked for all three channels. Number 6 was there but, try as I might, neither 3 nor 10. But good fortune was riding at my side—I discovered a 12AU7 acting the role of local oscillator and mixer. It was a poor substitute for the 12AT7 that the set had been designed for. The tube swap restored the missing channels and we had saved a costly callback.

If possible we find it a good idea to adjust the yoke, focus magnet and ion-trap magnet in the shop to remove all corner shadows. One of the boys delivered a 12-inch Muntz that had received a new yoke in our shop. The set got the usual checkout procedure, but this was done while it was lying on a metal bench. After the delivery I heard some mumbling from the technician about some difficulty he had in centering the picture, but I didn't pay too much attention.

A few months later I returned to our customer's home on another service call. The horizontal output tube had passed away and a new replacement soon had the set working again. Before I put the back on I noticed a screwdriver carefully balanced on top of the focus coil. I thought it was a good thing my technician was not a surgeon. He'd leave a scalpel inside someone's kidney. Right-

eously I removed the implement. I might have taken it from the customer's kidney, from the howl she let out. Removing the screwdriver shifted the picture about 4 inches, leaving a most remarkable black margin.

Then I invested 20 minutes of attempted centering. I ended up balancing the screwdriver in the same precarious perch, and silently blessed my service technician for his ingenuity. Evidently the tool channeled some of the magnetic lines of force from the focus magnet, enabling the electron beam to shift to the correct position. As far as I know the screwdriver is still acting as part of that focus magnet. If we had caught the condition in the shop, a more professional approach could have been used.

Cooking

The last thing we do to a completed chassis, after all else is done, is play it for at least 3 or 4 hours. This is intimately called cooking. Cooking has saved us much money on callbacks.

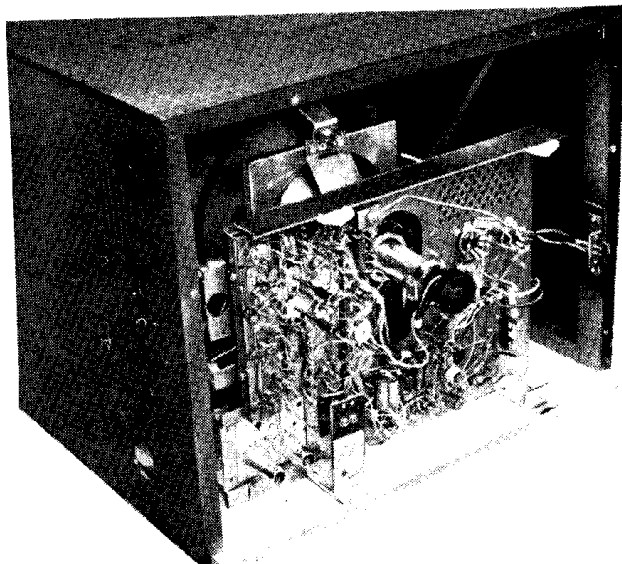
For instance, a 16-inch Philco was tagged: "Arcing in the picture and then

loss of raster entirely." Quickly we located an arcing 2-megohm high-voltage resistor and changed it. The arcing stopped. The set was put through the usual routine and then set on the shelf to cook. About 2 hours later the raster disappeared with a pop. An hour or so of circuit scouring uncovered a cold solder joint. It was on the cathode of the 12AU7 horizontal multivibrator. When the tube got really hot the cathode bias resistor went out of action.

When the chassis is removed to the shop, the TV service technician is under a much heavier obligation than when it is repaired in the home. The customer has all kinds of wondrous ideas about the miracles that are going to be performed on her TV receiver in the "factory." It is not good to encourage the idea that a complete overhaul is going to be performed but it is a definite asset to have her feel that it is your automatic practice to clean and check along with the repair. A spotlessly clean chassis with an X'ed-in checkout card hanging from it will never permit a TV set owner to say, "Why, you didn't do anything!"

END

EASY SERVICE FEATURE ON NEW TV



A TV chassis recently introduced by the Canadian Marconi Co. of Canada features a tilt-back arrangement for simplified servicing. The chassis is of the vertical type and is conventional in all other respects. A similar chassis was announced later by CBS-Columbia. Fastened to the base by two hinged brackets (top photo), the service technician can work on the chassis underside and, when desired, lower the unit to a horizontal position (bottom photo) for topside servicing.

