SERVICE CLINIC

Expect the unexpected

JACK DARR, SERVICE EDITOR

IN THE BUSINESS OF ELECTRONICS servicing, when we make a diagnosis of a fault, we usually find the things we *expect* to find. We're familiar with the problems: If there's no voltage at a given point, we know right where to start looking. However, there are times when we find a familiar symptom, but all of the "normal" checks fail to show up its cause. When that happens we must learn to look for something that is logical, but unexpected! (All faults in electronics turn out to have a logical basis, but sometimes we don't realize that until after the fact.)

For example, I once had a tube-type black-and-white TV set where I could get sound, but no raster. Checking, I found no HV, but the B + checked out normal and the tubes all lit up. The DC voltages on the horizontal-output tube were all OK; the screen voltage was a bit high, but the control grid showed a normal drive-signal and bias.

Finally, I put a milliammeter in series with the cathode of the output tube; the current was practically zero. When I checked the plate voltage on the damper tube I read full B + , but when I checked its cathode voltage (knowing it was safe to do so, because there was no boost voltage), it turned out to be zero! That was strange—it should have also been full B + ! Continuity from the cathode of the damper to the plate-cap of the horizontal-output tube proved to be perfect.

With the damper's cathode-voltage at zero, there was no plate voltage at all on the output tube—every bit of current used in the horizontal output stage must flow *through* the damper tube; there's no other connection to B + . While the tube *looked* good, something was obviously wrong. I replaced the damper tube, put a voltmeter on the cathode, and turned the set on. When the set had warmed up, the cathode voltage had risen to full B + and was continuing to go up. Removing the voltmeter hastily, I looked at screen and saw a perfect picture.

What had been wrong with the damper? Examining its base under a strong light with a magnifying glass I could see that the ribbon connecting the cathode cylinder to the base pin (Fig. 1) had a hairline crack in it—the cathode was completely open!

Along the same line, some time later on I got a set that would play perfectly for exactly 60 seconds, then lose all AGC. That would happen any time the set was turned on from a cold start—60 seconds exactly! A

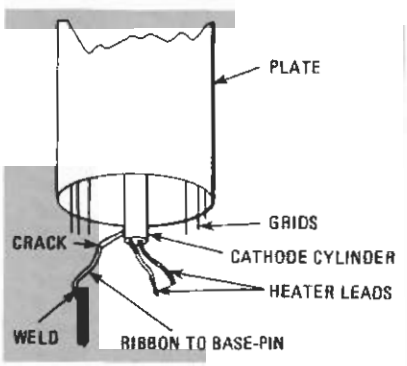

FIG. 1

faint bell rang in my mind and I pulled the AGC tube, a 6GH8. On the tube tester, the reading came up to normal, stayed there for exactly 60 seconds, then dropped to zero. Examination under the magnifying glass showed exactly the same fault that I'd found in the other set—but in this case, when the tube cooled off, the ribbon made contact again! In exactly one minute, it heated up and expanded enough to break the contact again. That tube is still somewhere on top of my bench; it'll do its trick over and over again on request.

Another tale of the unexpected

The set this time was a brand new tube-type black-and-white portable, right out of the box. It had no vertical sweep at all; there was just a very thin horizontal line on the screen. I opened it up to check the vertical-sweep circuit. (In those sets, a very thin line usually meant a problem in the output stage. A problem in the input stage made a thicker line due to stray AC-pickup on the grid of the output tube.) All the DC voltages were OK, with the single exception of that on the grid of the first stage, which seemed to indicate that the circuit just wasn't oscillating.

Several minutes later, I'd tested every part in the vertical-sweep circuit—every part that I expected to cause that type of trouble, that is—and everything had checked out OK. I applied 6-volts AC to the grid of the input stage but still got nothing but that thin line. I was puzzled—what part in there *hadn't* I checked? (At that time, I thought of a phrase I'd seen in many, many letters from readers: "I've checked every part in this circuit and it still won't work!") I finally realized that I hadn't tested the output transformer. (It was not really part of my vertical-stage servicing technique to do that, since that part is so seldom bad. More perfectly good vertical-output transformers are replaced than any other part, I believe.)

So, I checked it. I knew it had continuity, for I'd checked the plate voltage of the output tube; I'd felt safe doing that since it obviously wasn't working and had measured full B + . Now, I measured the resistance of the primary...and then sat there and laughed! It was a big flat zero ohms! I disconnected the leads and rechecked. Still zero—a shorted primary. I really hadn't expected that, since the set was brand new.

When I tacked in a substitute output transformer, I immediately got full deflection and when the new part from the dealer arrived, the set worked like a charm. Somehow, I managed to keep the original part and, sometime later, I cut the paper wrapping off the windings and found exactly what I'd suspected. The bare ends of the leads of the primary had slipped and were making very good contact with each other. Separating and retaping them, I had a perfectly good new transformer, which I used in a set of the same make a bit later on.

There again, all the normal procedures had failed to turn up the problem. The cause was eventually found, but in an entirely unexpected place. *Moral*: When the usual tests fail to produce results, look somewhere you normally wouldn't! You will have one solid fact to start with—the stage doesn't work, so there *must* be a bad part in it that you didn't check. **R-E**

SERVICE QUESTIONS

TEMPERATURE-SENSITIVE IC

This RCA CTC-97 JB starts up with a little color, and then goes to a good black-and-white picture when the temperature is in the 90's. When it's in the 80's, the color's OK for few minutes, but then goes to reddish-brown. In the 70's, the color is there most of the time. I suspect the chroma-processor IC; could it be temperature-sensitive, and how can I tell?—R.D., Dutton, VA

From the description, I'd say that something in there is very definitely temperature-sensitive. It may be the IC, or could even be external parts. An easy test is to warm up the