



By Marc Ellis

# ELLIS ON ANTIQUE RADIO

## A little housekeeping is worth a lot of troubleshooting!

□ DURING THE LAST COUPLE OF months, we've been working on the restoration of a Zenith 7S232 BC-SW set. The set is a large table-model radio with some very interesting features, including a tuning dial of unusual and beautiful design. Called a "shutter-dial," it contains a mechanical arrangement to automatically display the correct set of calibrations for the band that is in use. The radio also features flywheel-aided vernier tuning, a magic-eye tuning device, and individual indicator scales for the tone control, volume control, and bandswitch.

I introduced the set in the August column, giving a fairly complete physical description, and noting some of the more-obvious problems. In September, we concentrated on the dial. An internal jam had caused the mechanism to stick, and a previous owner had tried to resolve the problem by applying brute force to the bandswitch. That resulted in some of the metal parts in the dial being badly buckled and twisted. The problem looked a lot worse than it really was, though.

Once the dial was removed from the set and dismantled, the distorted parts were easily straightened in a vise. After reassembly, the shutter-dial assembly worked well, and was set aside for later installation.

In the September column, I also fired up the set for the first time. Starting at reduced line voltage, I slowly increased to the full 117-volt line voltage as it became apparent that the electrolytic capacitors were going to be OK and no short circuits were developing. The set then came to life, though it would pick up only a few strong local broadcast stations. There was no trace of hum, but signals were distorted and accompanied by strong oscillation. Nothing could be heard on either shortwave band.

### Clean, Adjust, and Straighten!

As I mentioned at the time, it was too

early to be concerned about the oscillation. Instability of that kind can easily be caused by poor ground connections at tube shield cans, and would be remedied by the deep cleaning that was to come next. Which brings us to the point of this month's column.

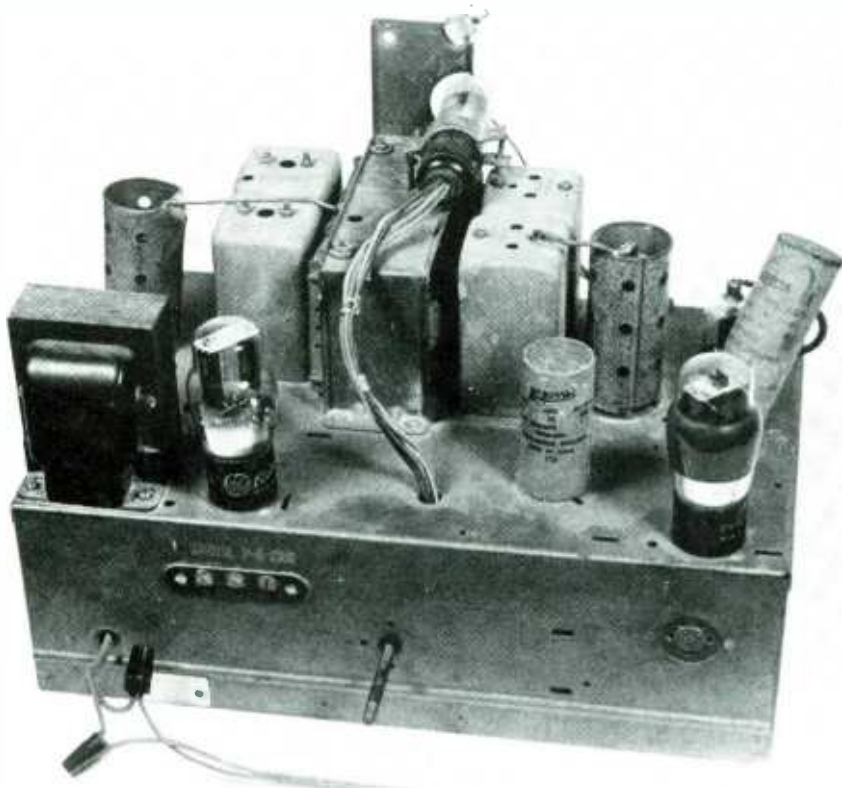
It doesn't pay to get too analytical about troubleshooting an old set until you've given it a thorough cleaning, tightened and readjusted all loose components (especially tube shield-cans), and subjected everything to a searching inspection.

A preliminary inspection of the chassis showed that the radio was physically intact—but suffering from the effects of time, "quick-and-dirty" servicing, and storage in a less-than-ideal environ-

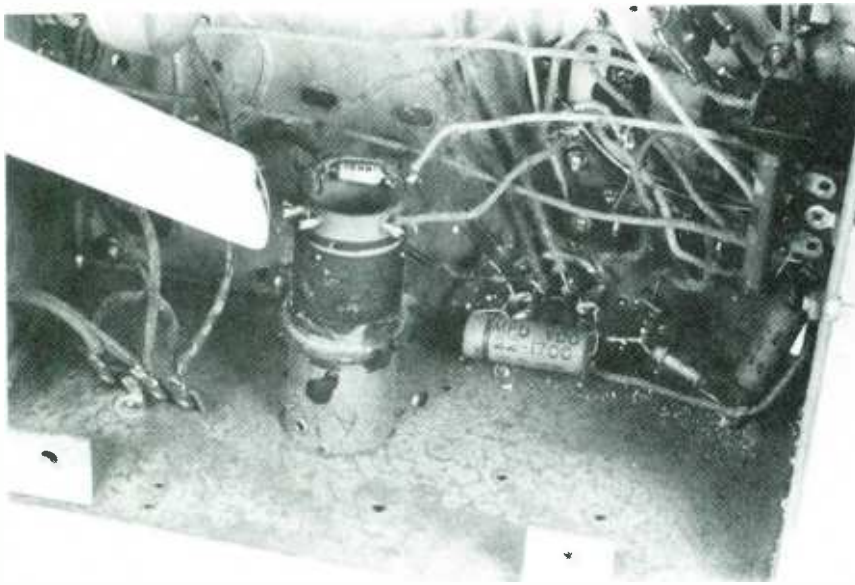
ment. Aside from the usual dust and grime, I could see evidence of corrosion and oxidation on both painted and bare-metal surfaces. While there was nothing that wouldn't clean up nicely, the set was obviously never going to look brand-new again. But it would at least be very presentable.

### Checking Topside

Looking at the top of the chassis, I could see that both tube shield cans were improperly mounted on their bases and very loose. One of the shields had been crudely pinched at the top to give the grid lead enough clearance to extend much farther down into the can. That had been done so that the original glass ("G" style) 6A8 tube could be



Here is how the set looked when as this month's restoration work was started. Note the stretched grid wire and pinched shield can on the tube behind the power transformer.



Using a vacuum cleaner helped remove spider webs and other accumulated debris from the tight spaces underneath the chassis. Once that was done, it was time to get down to the serious troubleshooting.

replaced by its much-shorter metal equivalent.

The top-mounted electrolytic condensers (capacitors) were both Aerovox replacements rather than originals. And the universal mounting bracket on one of them had become bent out of shape, leaving the capacitor to hang by its wires. Finally, part of the tone-control selector switch (a multiple-contact wafer type) was broken off. But I was relieved to see that the missing part of the wafer had carried only unused contacts, so operation would be unaffected.

Remounting the loosened electrolytic capacitor was an easy job. It had been held in place by a simple screw-attached bar that extended across the mounting hole. The bar had been bent out of shape, but was easily removed, straightened in a vise, and replaced. With the electrolytic standing straight and firm again, I turned my attention to the problem of the tube shield.

Luckily, I happened to have a good "G"-type 6A8 in my tube collection. With that substituted for the metal version, there was no longer any need for the shield-can top to be pinched in. Straightening out the dent was fairly easy and left only a few visible ripples. As it turned out, though, I didn't have to use the repaired can because I also happened to have an identical—and perfect—replacement in my junkbox.

When working with the shield cans, I found that they were designed to bay-

onet-lock firmly onto chassis-mounted flanges. That arrangement guaranteed a good electrical connection between chassis and can. However, as received, those locks were not engaged, and the cans were simply held in place by friction. The lack of good electrical contact could easily explain the oscillations I'd observed during my initial test of the radio.

Since the top of the set definitely needed a deep cleaning, I decided there was no time like the present. To provide better access, I carefully removed all the tubes and tube shields. I also removed the metal tuning-eye/tuning-capacitor bracket.

The capacitor was suspended from the bracket by three threaded studs passing through grommet-lined holes. Besides making it easier to clean the tuning capacitor and surrounding chas-



The overheated burned resistor was replaced with a new one of the proper value. Finding problems like that up front eases troubleshooting later.

sis, the removal of that bracket gave me the opportunity to replace the dried-out and hardened "shock-absorbing" rubber grommets.

I began cleaning by going over the chassis with a cloth kept moistened with soapy water and periodically wrung out. A small screwdriver was used to poke the cloth into difficult crevices, like the space between adjacent coil cans. As evidenced by the condition of the wash water, an astonishing amount of dirt was removed in just that manner.

The soap treatment was followed up by rubbing with Brasso—a metal polish that also works well on glossy paint (such as used by Zenith on most chassis of that period). The Brasso was used not only on the chassis, but also on all coil cans, transformer cans, and tube shields. With the tubes carefully cleaned up using a damp cloth, the shield cans firmly locked in place, and the tuning-eye/tuning-condenser bracket reinstalled, the chassis top was beginning to look quite presentable, if not impressive!

A word of warning about cleaning tubes: The type markings on most tubes of this period appear to be etched in the glass, but they are apparently only stenciled using some very easily removable paint. One vigorous swipe of a damp cloth may be enough to completely obliterate the marking, leaving the tube embarrassingly blank. A word to the wise: when you clean the tube, carefully avoid the area around the stencil!

### The Situation Underneath

Conditions under the chassis were just about what you might expect of a radio that was probably stored in a basement or garage for about thirty years, and my first official act was to get out the vacuum cleaner to remove the dust, debris, and cobwebs. In areas that were especially dirty, the vacuum worked better after the debris was first loosened with a soft brush.

As I scrutinized all of the components for signs of overheating or other failure, my eye was almost immediately drawn to a big orange resistor that proved to be the screen dropping resistor for the 6K7 IF amplifier. At some time in the past, the resistor had become so hot that much of its paint had burned off. The scorch marks on the chassis above the component also suggested severe overheating.

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Without the set's schematic, I would never have known that the unit was supposed to be a 33K resistor. The color code was unreadable and—because of the overheating—the resistance had almost doubled (I measured it at 65K). I replaced that part with one of the proper value, making a mental note to check for overheating next time I turned on the set. Whatever circuit condition had caused the original overheating might still be a problem.

I also took a close look at the wiring for the two replacement electrolytic capacitors. It was very sloppily done, and such an excess of solder was used in making the joints that shorts to adjacent terminals were only narrowly avoided. I figured that if the wiring was so carelessly performed, it might be technically incorrect as well.



**Here's how the set appears as we conclude this month's restoration work. The installation of a proper, "G"-type tube in the shield can behind the power transformer gives the grid wire enough clearance without pinching the can top.**

Sure enough, checking the values of the replacements against those shown in the schematic, I found that a 16- $\mu$ F section had been wired into a portion of the circuit where an 8- $\mu$ F unit should have been and *vice-versa*. So I switched them around, changing the filter configuration back to the one intended by the set's designers. And, while I was at it, I cleaned up the joints to get rid of the excess solder.

As a final touch, I sprayed contact cleaner into the volume control, band switch, and tone-control switch; working all the controls back and forth to get the most effective cleaning action. That would minimize control noise and erratic effects caused by dirty contacts.

## The Second Test Run

With the deep cleaning accomplished and all of the obvious problems corrected, it was time to make another test. When the radio warmed up, I was gratified to find that it picked up a full complement of broadcast stations without a trace of oscillation! And switching to one of the shortwave bands (formerly dead), I found it alive with signals. However, the tuning eye did not respond even when a strong signal was being received, and there was no reception at all on the second shortwave band. Those are problems that I'll try to have solved by next month, when we'll have another installment of the restoration project.

But the progress that's been made so far is an excellent example of what I consider to be one of the most important principles of antique-radio repair. Don't get serious about troubleshooting your radio until you've thoroughly cleaned and carefully examined it to uncover any components that have obviously failed; checked for any sloppy or incorrect repairs, or for any parts that were incorrectly installed by the previous owner(s).

Although it wasn't a problem with this particular set, the tube types should also be checked against the tube location chart to make sure that the correct type is in each socket. If your set doesn't have a tube chart, and you haven't been able to obtain service notes, remove each tube and look at the socket. The correct tube type may be marked on it.

Removing and replacing tubes (and other plug-in components) is a good idea for another reason. If contact between the pins and sockets have become impaired through oxidation and corrosion, the act of removal and replacement may reestablish it.

So by applying a little elbow grease to the set, and by using your powers of observation and a little common sense, you can take care of many problems that might otherwise be difficult to isolate and resolve.

## Until Next We Meet

That's about all the space allotted to us this time around. But be sure to join us next month when we'll continue the Zenith restoration saga. Until then, please continue to send me your comments, questions, and stories! Write to Marc Ellis, C/O Hands-on Electronics, 500-B Bi-County Blvd., Farmingdale, NY 11735. ■