The Serviceman

New and familiar problems with old sets

I had a real blast from the past this month, with a job that took me back twenty years to olde worlde valve circuitry. At the same time it hit me with a problem that's just as common with modern solid state equipment. It's very easy to be misled by your test gear, if you're not extremely careful.

I was asked by a customer to repair an old HMV M7 monochrome TV, a valve type set dating from the early sixties. I did my best to convince him that the set wasn't worth fixing, and that my bill would be more than the set was worth.

He was very persistent though, and kept insisting that "it was only a resistor." It's usual to hear customers insisting that it's "only the picture valve", so "only a resistor" seemed to be an easier job and one more worth doing.

In detail, this set was showing a very dark picture which took about half an hour to struggle onto the screen. Now, even without seeing the set, I would be prepared to bet that it had a dud tube. And so it turned out to be. When I put the tester on it, the tube showed not the slightest sign of emission and it is still a puzzle to me that it could show any kind of picture at all.

I told the owner that no resistor on earth could repair that set, and that he would be best served by dumping it on the nearest tip. But he would not be convinced, and kept insisting that a similar fault five years ago only required a resistor to fix. He even pointed out to me the particular resistor involved.

Nothing I could do or say would convince him that his set needed more than one resistor, so to humour him I replaced it. I think he suspected me of fitting a dud one because there was absolutely no improvement in his picture. Try as I might, I couldn't convince him that only replacing the picture tube would cure his set.

Eventually, I had to pack up my tools, push past him to the door and take my leave. As I drove away I made a fervent wish that I would never see that set again. But my wish was not to be granted.

Next day, the customer was back to ask me if I would try to get a replacement picture tube for his old set. He was desperate to have it working again and was prepared to mortgage his pension to pay for the job. I must admit, I felt a bit sorry for him, yet I wondered why he didn't invest the cost of this job in a newer, second hand colour set. Still, it was his set and his money, so who was I to argue?

When I got the set back to the workshop and had a good look at the picture tube, I began to think that the customer might have got a bit lucky.

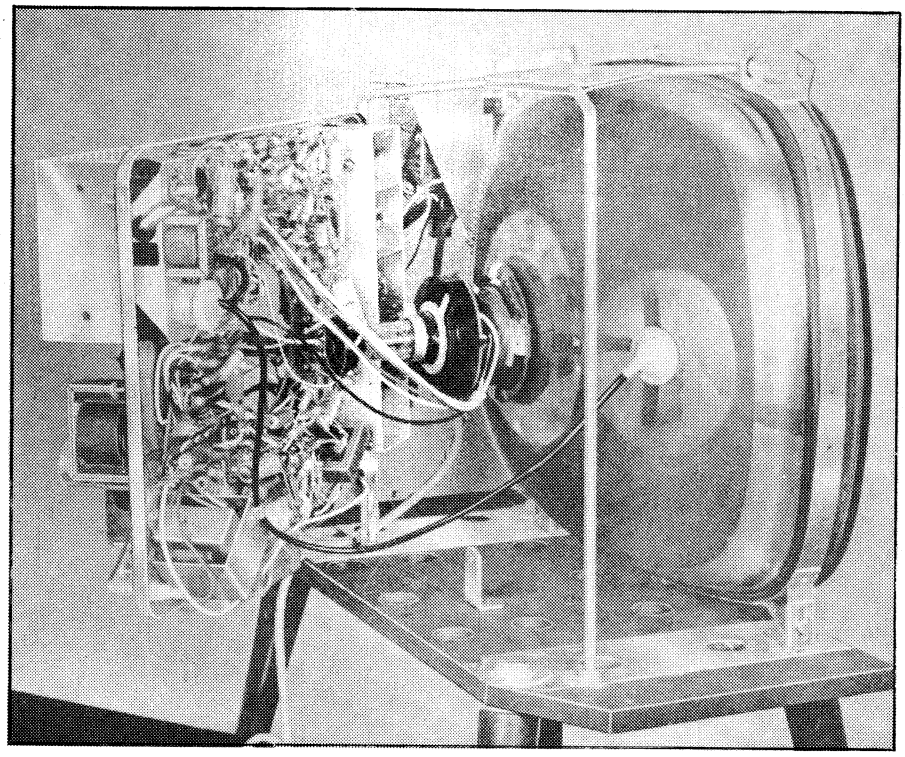
Some ten or twelve years ago, a local wholesaler had closed his business and I had bought his stock of regunned black and white picture tubes at very low prices. Some of them had been sold off at the time, and the rest stowed away under the house and almost forgotten.

Among them was a tube similar to that in the old HMV, still sealed in its original carton, with its twelve month warranty card – and still giving a 100% emission reading!

It took me some time to locate the old B&W picture tube replacement charts, but when I did I realised just how lucky my customer had become. The new tube was not merely a suitable replacement, it was THE recommended replacement for the old one.

To make matters even better, tube replacement in this set could not have been easier. First the cabinet back and the control knobs are removed, then six screws around the base board and two short bolts above the picture tube. After this, the whole cabinet can be lifted off, leaving the tube and chassis sitting naked on the baseboard.

The tube was held in place by a stout rim band, secured by heavy screws at the top and bottom. Loosening these screws allowed the old tube to be lifted



Picture tube replacement was very easy with the early HMV monochrome sets – the cabinet lifted off, and the chassis swung back.

away from the chassis and the new one fitted just as easily. Fifteen minutes and the job was done. (And there were no problems with the convergence, either!)

Unfortunately, when I fired the set up I got a brilliant screen, but no picture. The sound was OK, although a little weak. But if there was any picture, I certainly couldn't see it.

I turned the brightness down and was rewarded with a very faint picture – enough to be recognisable, but quite unsatisfactory for comfortable viewing.

An oscilloscope check at the picture tube base showed that there was only 3V peak to peak of video signal, where there should have been 60 odd volts. And so began a long and frustrating hunt for the reason for the weak video.

The trouble with this set was that it used valves instead of transistors – and I haven't worked with valves for ten years or more. One tends to lose track of old technology when it is not in use day after day. I had to get out my old valve manuals to read up about voltages and currents, in order to make sense of the readings I was getting around this chassis.

An unfortunate aspect of the set was that I couldn't get at the valve bases for measurement while the set was turned on. The chassis could only be swung out far enough for service after the yoke plug and its B+ link had been removed.

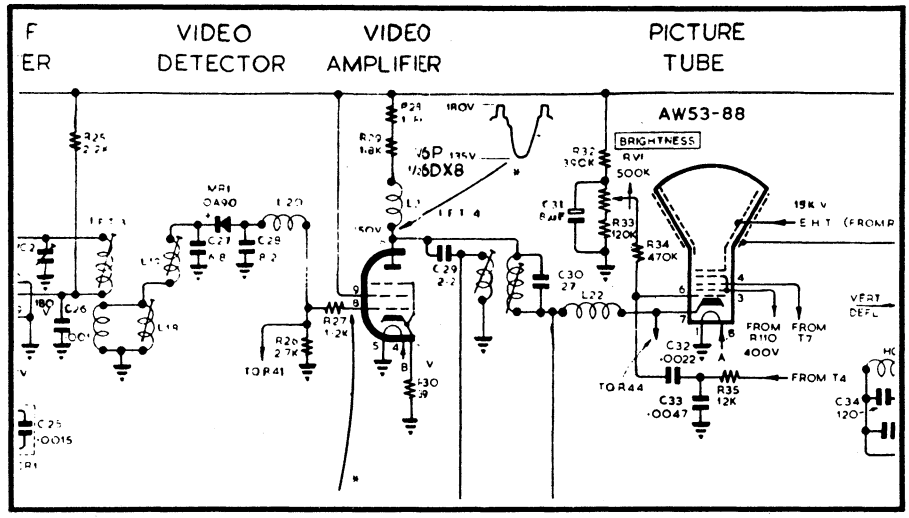
So all I could do when the chassis was open was to measure various resistances to either ground or B+. When the chassis was restored and switched on, I could remove the valves and check for voltage at the top of the sockets. But it was difficult, almost impossible, to take any meaningful measurements while the set was working.

Then I remembered a dinkus I had made up twenty years ago for just this purpose. It consisted of a valve socket soldered on the top of a matching plug. The socket pins were splayed outwards to allow access for measurement while the valve was plugged in and working.

I finally found the device in a box of assorted small tools, and soon had most of the measurements that I needed. The set was developing no AGC voltage, which wasn't surprising. But all the anode, screen and cathode voltages that I could get at were about normal.

It wasn't possible to get readings from the valves in the tuner, because they were mounted upside down with deep screening skirts around them. All I could do was to pull the valves and poke a meter probe into the socket to chek for voltages.

Everything seemed to be in order, yet



One problem with the old HMV set turned out to be in the video amplifier stage, shown here.

the chassis wasn't doing anything useful with any of the signals I applied. Not even a couple of millivolts applied direct to the tuner antenna terminals could produce any more than a dark, murky picture that disappeared as soon as the brightness was advanced above very dim.

I persevered with resistance measurements in all the old familiar places, and some that were not so familiar. I checked everything I could lay hands (or a meter probe) on. I found a number of the old cracked carbon resistors had gone high, and replaced them with modern metal film types, but all to no avail. There was still no worthwhile picture.

At this point I had to abandon the scientific approach and go in for a more suck-it-and-see type of servicing. Another piece of my useful home made test gear was then pressed into service. This is a small 5" National portable TV, that has been extensively modified.

Among other things, the IF lead from the tuner to the IF strip has been broken and brought out to two RCA sockets in the bottom of the cabinet. In normal use a U-shaped link joins the two sockets, but the link can be removed and the tuner output fed through a suitable lead to another set. Or the output of a suspect tuner can be fed into the test set through the IF input socket.

In this case, I fed the National tuner into the IF amplifier of the old HMV and got a passing-fair picture. It was still lacking good contrast, but at least it was brighter than the earlier effort.

Next, I fed the output of the HMV into the little set – and got a very poor picture as a result. It seemed that I had at least two faults in the big set, one in the tuner and the other in either the IF strip or the video amplifier.

I decided to get the tuner working properly first. One good thing about old valve tuners is that they are big and robust and pretty easy to work on. First, I pulled out the channel "biscuits" and checked them for damage or dry joints. Then I cleaned and retensioned the spring contacts.

None of this made any worthwhile difference, so I resorted to a more critical assessment of resistances and voltages around the tuner. With the valves out of their sockets, I got readings of HT voltage (180V) at the anode and screen of the converter valve and at the top anode of the RF amplifier valve.

The 6ES8 RF amplifier in this set is run in cascode, where the second anode gets its B+ voltage from the cathode of the top triode. With the valve out of the socket, there can be no voltage – so a resistance check is the only way to make sense of the system.

I checked for continuity from all the external terminals to the various socket pins and found that most of them were very close to the values given in the service manual. But when I came to the feed resistor to the converter screen (R8), it was quite a different story.

Instead of the expected 47k ohms between the 180V terminal on the tuner body and pin 3 in the 6BL8 socket, I found a resistance of some 18 megohms, as read on my modern digital multimeter. And that was it! The resistor was as good as open circuit.

This is yet another example of confusing readings caused by the high impedance of a digital meter. I rechecked the voltage at pin 3 again, first with the digital meter, then with an old analog meter. The digimeter read 178 volts, the

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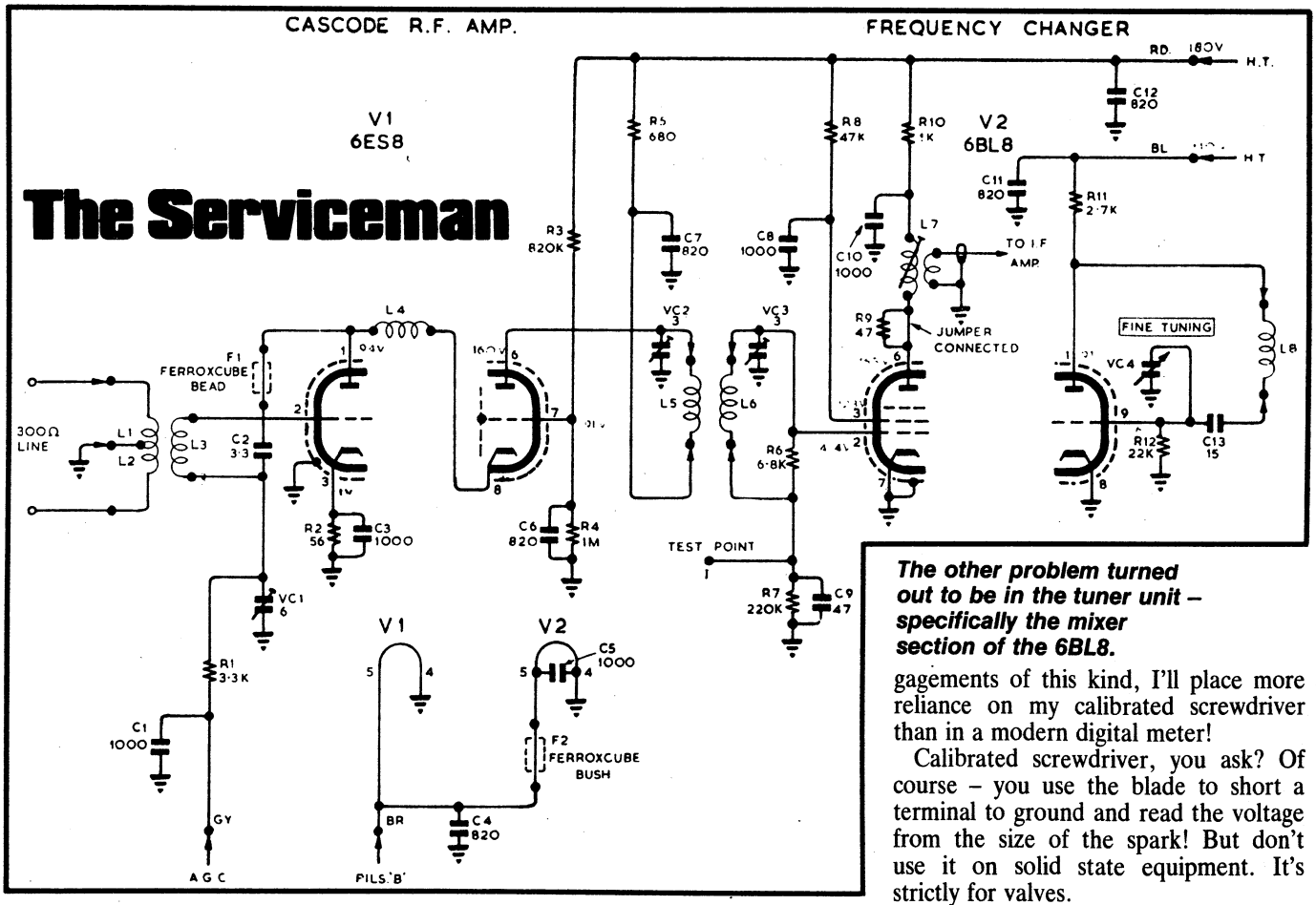

The other problem turned out to be in the tuner unit – specifically the mixer section of the 6BL8.

analog meter – 0 volts. In this case there was a very high resistance for the digital meter to read through, but I have known them to read voltage on a particular terminal through an impedance that is to all intents and purposes open circuit!

Getting the rotor out of the tuner was a bit fiddly, but I managed and soon had a new resistor in place of the faulty one. With everything back in place, I switched on and was rewarded with quite a good picture. Still a bit darker than one would expect from a new tube, but far better than anything I'd had up to this point.

All that remained was to get the brightness up, and for this my little socket doohicky was invaluable. With the video output valve sitting on the test socket, I was able to determine that a good two volts peak to peak of video was being supplied to the grid of the 6DX8. At its anode there was something over 80 volts of video, considerably more than was called for by the circuit diagram.

The only problem that I could see was that the anode voltage of the video amplifier was a bit higher than specified. This could have been caused by higher than normal resistance in either the anode or cathode circuits.

The anode resistance was spot on, but the cathode was higher than the manual said it should be, 100 ohms instead of 39 ohms. I hooked a 68 ohm resistor across from the cathode pin to earth and the picture suddenly sprang to life, with brilliant highlights and a good, rich contrast. Indeed, the picture was as good as new.

When I swung the chassis out to replace the faulty resistor, I was surprised to find that it was in fact a 100 ohm unit. It had been in the set since new and had not changed its value. Yet the set clearly needed a 39 ohm resistor to work properly. I don't know how or why, but fitting the correct value resistor has restored the set to perfect operation.

So the customer was nearly right when he told me the trouble was "only a resistor." It was "only two resistors" (plus a picture tube, of course), although neither of the resistors was the one he pointed out.

He has no idea of how much work I put into repairing his antique. If I charged him the full bit, it would buy him a new colour set. But in a perverse sort of way, I have enjoyed my reunion with the old technology. In future engagements of this kind, I'll place more reliance on my calibrated screwdriver than in a modern digital meter!

Calibrated screwdriver, you ask? Of course – you use the blade to short a terminal to ground and read the voltage from the size of the spark! But don't use it on solid state equipment. It's strictly for valves.

I've also heard of one technician who uses a calibrated finger. He only recognises three voltages – "Yep, it's on!", "Ouch!", and "Bloody Hell!!"

Finally this month, a follow-on from my story in the April issue, about the Rank C2205 with very odd symptoms.

Remember the story where the owner used the volume control to adjust the picture?

I said then that I was looking forward to seeing more of those sets, so that I could check just what symptoms appeared in the chassis under other circumstances. Well, several such sets have come in since, and they all experience queer symptoms when C351 is either faulty or removed experimentally. There is a family resemblance to all the symptoms, but there are still big differences between them.

In one set, for instance, removal of the cap showed that channel 6 was perfectly normal over most of the volume control range, although the horizontal sync became unstable at the very lowest setting.

Channel 2, on the other hand, could only be seen with the volume control at either the very bottom or the very top of its range. At every other setting the fine tuning pulled the set right off chan-

nel – not even the sound was audible. And finally, when switched off, the set gave out with the loudest, rudest Bronx Cheer you've ever heard.

Another Rank, this time with a faulty C351, had yet another set of symptoms. This one had weak sound without distortion, but the sound crackled when the volume control reached the bottom of its travel. A secondary symptom was intermittent total loss of horizontal hold.

There was a moderate herringbone pattern on both channels at the higher volume levels, but the owner claimed never to have noticed this until I pointed it out. It was the horizontal problem that most worried him.

When the faulty cap was removed, but before the new one was fitted, the only other symptom was a squeaky blurt when the set was turned off. A new capacitor produced loud sound, cleared the other symptoms and gave a new life to the old set. (It had been threatened with the "Tip"!)

Quite obviously, C351 is responsible for the bulk of these odd symptoms. However the state of other electros on the 19V rail is a factor in determining the variety and severity of the various symptoms. Who knows? It might just be possible to pinpoint faulty caps by a careful analysis of the secondary symptoms when C351 is removed from circuit!

I have been repairing these Ranks for a good many years, yet it was only a few months ago that I first came across this C351 fault. Since then I have had the same fault in three more sets. How do the electro makers arrange for their products to last exactly 11 years and three months? EA

TETIA Fault of the Month

Philips CP510 (KT3A-2 chassis)

Symptom: Intermittent but regular vertical collapse to narrow line at centre screen. Rather like a hiccupping vertical stage.

Cure: Q520 (BD233) output transistor breaking down. This fault is heat sensitive and can be tested for with freezer spray. Freezing the transistor will hold off the fault for several minutes.

This information is supplied by courtesy of the Tasmanian branch of The Electronic Technicians' Institute of Australia. Contributions should be sent to J. Lawler, 16 Adina St, Geilston Bay, Tas 7015.