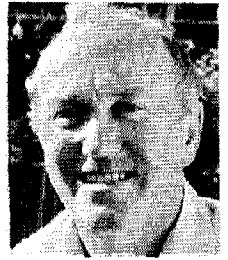


# VINTAGE RADIO

By JOHN HILL



## Crackles & what might cause them

**Crackles are common problem in old radio receivers & fixing them can be a real challenge. Here are a few tips to get you started.**

On many occasions in the past, I have emphasised in this column the importance of replacing old and highly suspect paper capacitors when restoring valve radios. Retaining the paper capacitors is an open invitation to trouble.

I have also stated that mica capacitors give very few problems and rarely need replacing. I would now like to withdraw that statement!

Of late, I have had a number of repairs where the major fault was not due to faulty paper capacitors (although they were replaced as a matter of routine), but due to mica capacitors – mica capacitors of the silvered mica variety to be precise.

It is strange when something like this happens because there is usually a run of similar problems and that is exactly what happened in this instance: two identical model 5-valve Astors, each with a troublesome mica capacitor. What's more, it was a fault that eluded me for quite some time.

Since the Astor experience, however, several other sets have had mica capacitor faults and it would appear that these inconspicuous little components are not as troublefree as I had previously thought. I have had almost no problems with mica capacitors until the two Astors came along.

Both receivers worked quite well except for an irritating intermittent

crackle. The odd characteristic of this particular crackle was that it could be faintly heard through the loudspeaker for well over half a minute after the set had been switched off. Now that's what I call a persistent crackle!

Crackles can emanate from many places: a loose connection such as an ill-fitting valve pin socket, a dry solder joint, a wire that is on the verge of corroding through, a faulty valve, a failing capacitor, a faulty resistor, or just about any component that is about to break down.

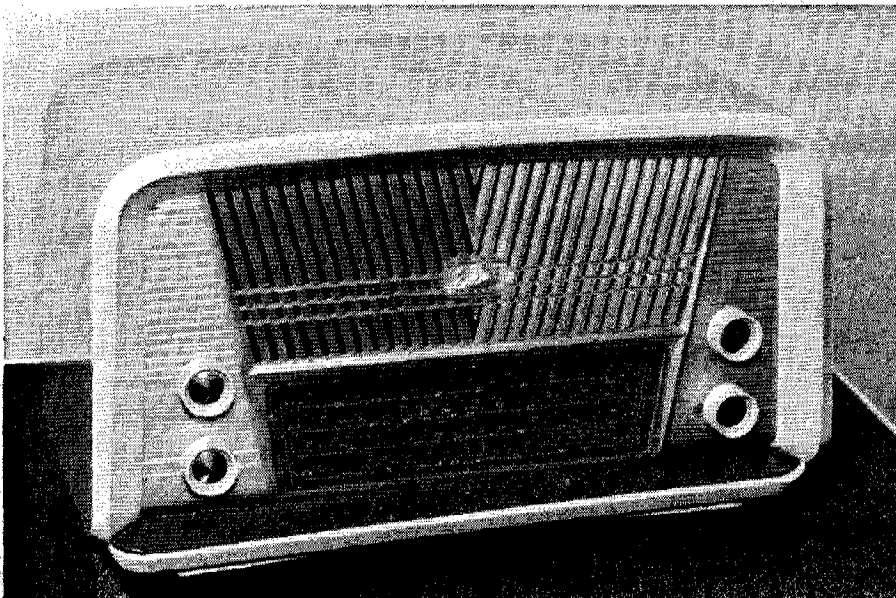
And the defective component or connection causing the crackle, wherever it is, must be found and replaced. However, some of these faults can be incredibly difficult to track down. If the troublesome component would actually break down completely instead of just malfunctioning, then it would be much easier to find. It is pleasing to know that some of these faults can elude even the experts at times. I know because they have told me so! Knowing that gives some comfort when confronted with a hard to find phantom fault. There is a lot more to vintage radio repairs than replacing a defective valve!

### Removing the valves

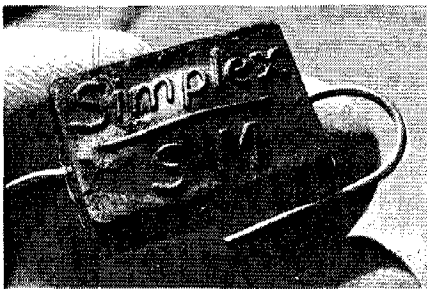
Anyway, let's get back to those troublesome Astors.

Pulling the valves, one at a time, indicated that the crackle was in the output stage of the receiver. The crackle could still be heard after the frequency changer, the intermediate frequency and the first audio valves had been removed.

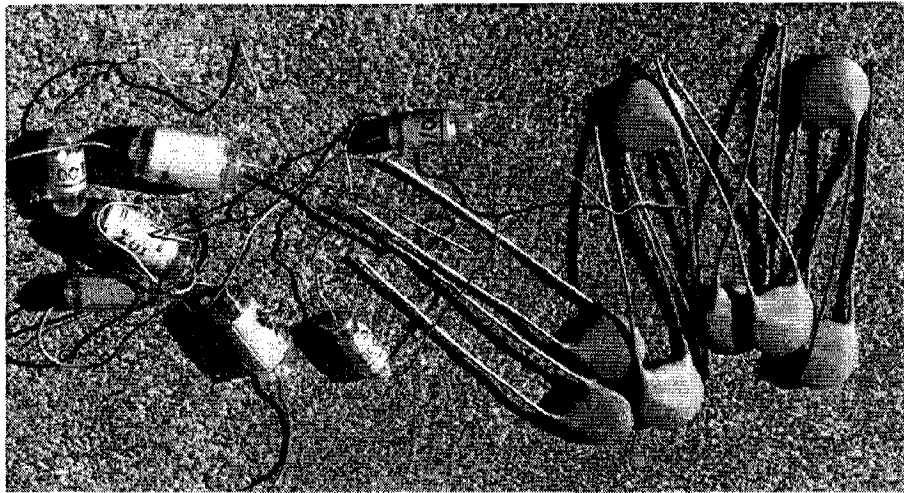
A crackle in these circumstances could perhaps be a failing output transformer or a faulty output valve, but neither of these were the source of the fault. Replacing every component



This photo shows one of the troublesome Astors mentioned in the text. One faulty mica capacitor caused no end of trouble with these receivers. Note the replacement control knobs – the originals disintegrated on removal.



This new & unused mica capacitor shows an ominous bulge in its moulded casing. It may be OK but it certainly looks a bit suspect & should be discarded.



Small styro & ceramic disc capacitors are suitable replacements for mica capacitors, provided they have an adequate voltage rating.

associated with the output stage failed to cure the crackle.

I might add at this stage that the high voltage electrolytics had already been replaced and the rectifier valve replaced with a known good one. The problem was not in the high tension supply.

Now this particular model Astor is similar in construction to many other 5-valve receivers in that it has a small mica capacitor connected from the plate of the driver or first audio valve to chassis (in this case 220pF – see Fig.1). Its purpose is to bypass any unwanted radio frequency components in the audio signal. It also top clips the higher audio frequencies and makes the audio a little more pleasant to listen to.

After much searching, this small mica capacitor was found to be faulty and was the source of the elusive crackle. Spasmodic high tension leakage across the capacitor was feeding through to the control grid of the output valve via the .02μF coupling capacitor. The crackle still fed through even when the driver valve was removed – which really threw me off the scent.

When one lacks proper training in radio servicing, some of these more obscure faults can be devilishly hard to locate. If problems, such as the one just described, had been pointed out to me as an apprentice learning the trade, then life today would be much easier regarding fault finding. As I never served an apprenticeship (well, not at radio servicing), I have had to work by trial and error with nearly every fault I have encountered. And although I am getting better as time goes by, there is always something new to test the grey matter.

Actually, I'm glad that I did not



Defective paper capacitors can cause many problems in an old valve receiver & that includes the odd crackle. Their replacement with modern counterparts is highly recommended.

serve an apprenticeship in radio servicing because it would have spoilt my interest in vintage radio. The troubleshooting aspect of the hobby is a big plus as far as I'm concerned.

Learning repair techniques by perseverance and sheer cussedness makes the restoration of old receivers intensely interesting. The rewarding

feeling when a new and baffling fault is found and rectified is very stimulating indeed. Collectors who do not do their own repairs are missing out on most of what vintage radio has to offer.

Returning to the problems of mica capacitors, it's now apparent that they too can contribute to odd and often

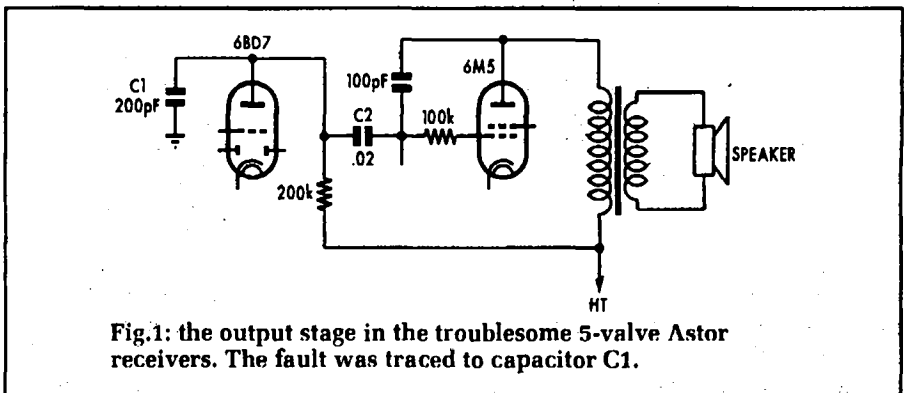
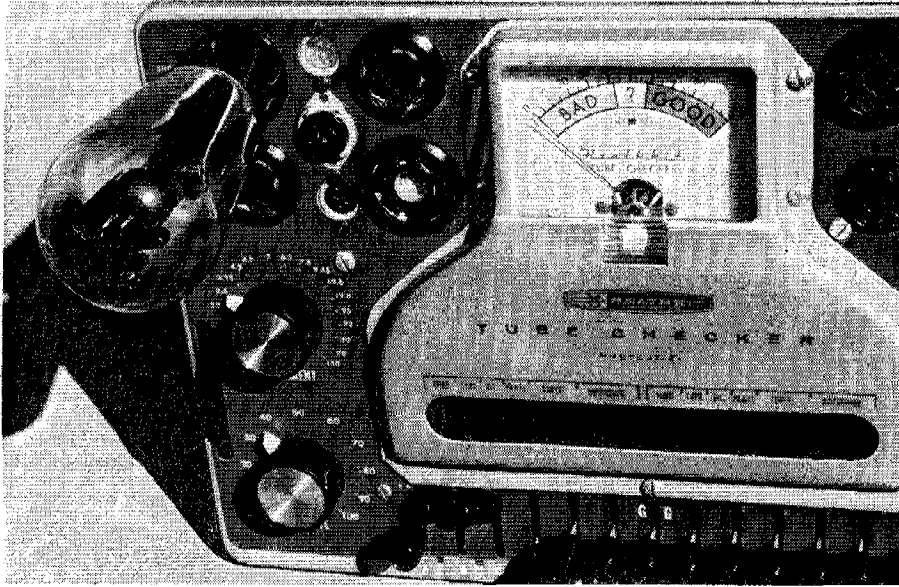
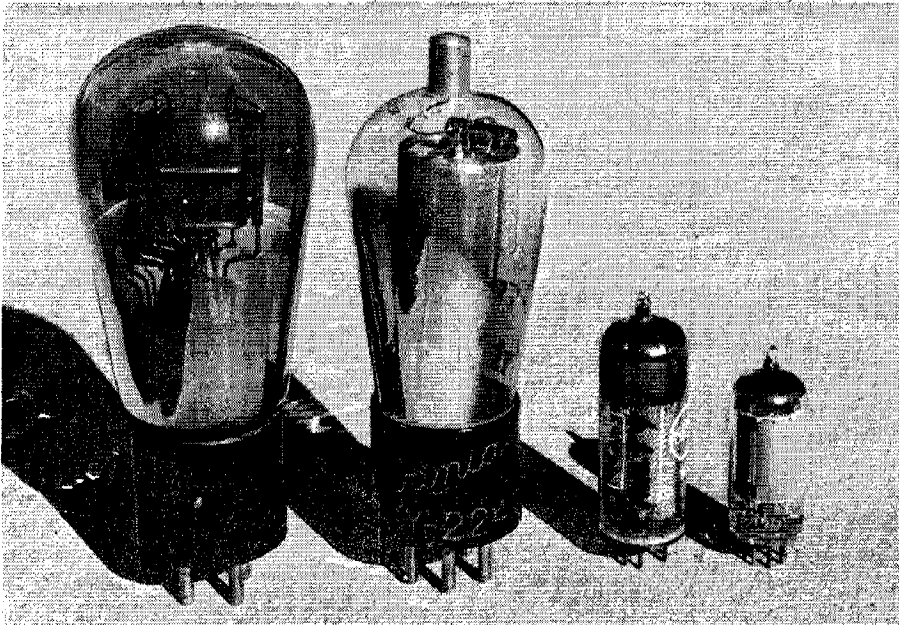


Fig.1: the output stage in the troublesome 5-valve Astor receivers. The fault was traced to capacitor C1.



Testing a suspect valve is usually of little use when looking for faults such as crackles. A valve test provides only an indication that the valve should work OK. Crackles don't usually show up on test.



All these valves test OK but produce crackles & splutters when in service. It is a shame that they have to be discarded because of internal faults.

difficult to locate faults. Perhaps they should be treated in a similar manner to paper capacitors?

With paper capacitors, not all of them are troublesome nor do all of them need replacing, although to do so always removes doubt. Similarly, not all mica capacitors need replacing but some are perhaps more suspect than others.

If a radio crackles or has other faulty capacitor symptoms after replacing the paper capacitors, then check the voltage across the mica capacitors and replace those that operate under high

potentials. This could well solve some of those hard to locate problems.

### Silvered mica capacitors

Of the mica capacitors found in valve receivers, it appears as though the silvered mica type is the one most likely to cause trouble. The problem may be due to ageing or perhaps a manufacturing flaw that takes years before it causes a breakdown. I'm not in a position to state categorically what the reason is. However, silvered mica capacitors do cause the odd problem and vintage radio enthusiasts should

be aware of this. One cannot assume that mica capacitors do not breakdown. They can and they do!

As mica capacitors are no longer made, the options regarding their replacement are perhaps limited.

One can use new old-stock mica capacitors if a supplier can be found. Failing that, secondhand ones may have to do. Unfortunately, used mica capacitors may be as troublesome as those being replaced. I have accumulated heaps of secondhand mica capacitors but now view them with considerable suspicion?

If it's good enough to replace old paper capacitors with modern equivalents, then it should be good enough to do the same thing with suspect mica capacitors. They can be replaced with ceramic discs or small styro types, providing that they have a suitable voltage rating. Even small polyester capacitors are OK in some instances.

As soon as I can lay my hands on a megger, I will be better equipped to check out suspect capacitors. Capacitors new or used can then be given a real high voltage test. Testing the dielectric strength at 400-500V should soon sort out any weak or faulty ones.

### Other causes

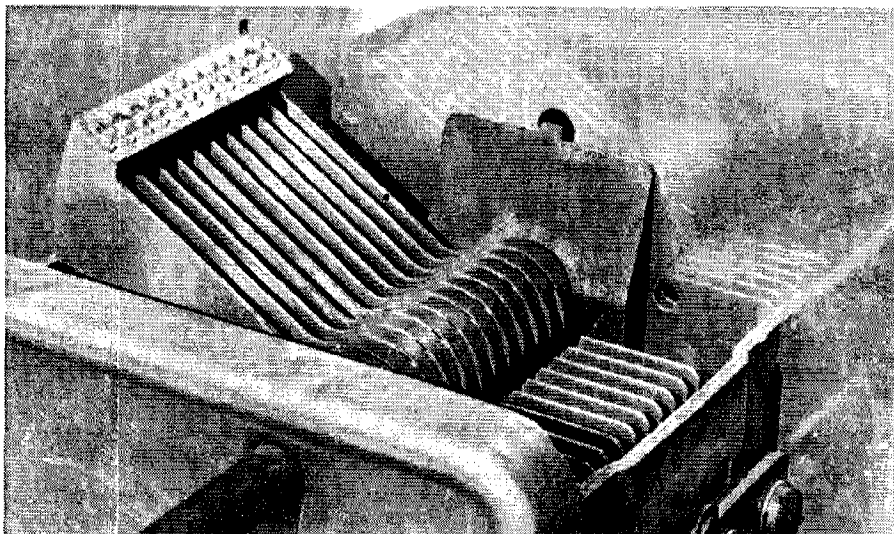
Earlier in this story, mention was made of a failing output transformer as being a possible source of a crackle. This cause was listed because I have had first hand experience with such a fault.

The set was working quite well before it developed a crackle which steadily increased in intensity. Then, quite suddenly – silence!

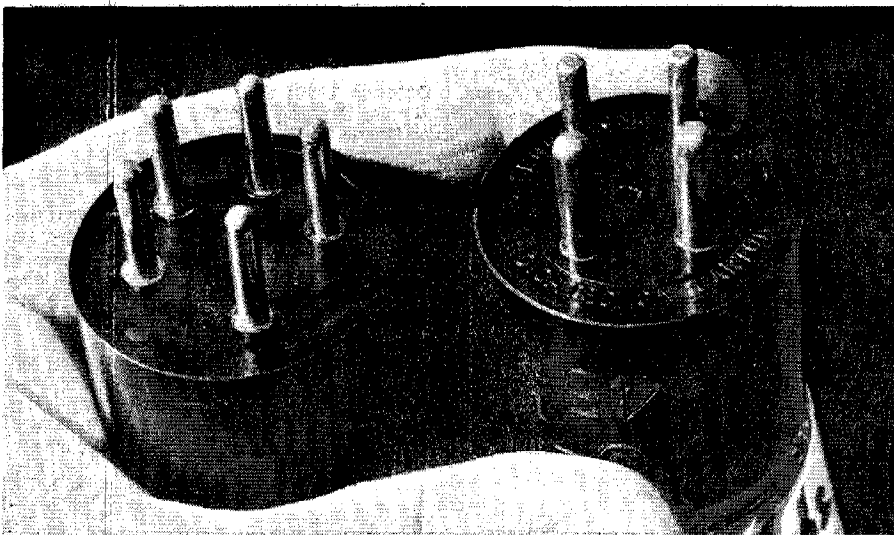
Within a few seconds of the receiver stopping, a red glow from the output valve's screen grid immediately suggested that the output transformer primary had failed. Checking with an ohmmeter soon confirmed this theory and a replacement transformer was installed. The result – a clean, crackle-free sound reproduction!

No doubt there was a well corroded copper wire involved somewhere in the primary winding and it was on the point of total breakdown. Once the transformer had completely failed, the defective component was much easier to locate.

On another occasion, a hard-to-find intermittent crackle was traced to the set's volume control. In this instance,



Crackles can have mechanical origins. Poor contacts in moving parts can lead to noise problems which can often be easily cured with a dash of solder.



Corroded solder joints in base pins & top caps can cause crackles in some cases. Resoldering the base pin connections has brought many a troublesome valve back into service.

the wiper arm inside the potentiometer was loose and often caused a poor contact. A replacement pot soon fixed that problem.

### Intermittent faults

Old Doug is a friend of mine who has spent the best part of his working life involved in radio and TV repairs, including a 20-year stint at Astor. Although now retired, he still does a bit of vintage radio repair work at home to occupy his spare time. But even a man of Doug's vast experience can have trouble finding an intermittent crackle.

Doug had a crackle that eluded him for days, mainly because it was of an intermittent nature and only raised its ugly head on odd occasions. Then

it would disappear completely for a while, only to come back again.

The problem was eventually traced to the high tension filter resistor which needed replacing. While I have not come across this one myself, it is a location that I would expect to find the source of a crackle. Any faulty high tension component is likely to cause this sort of problem.

### Valve problems

Valves are a common trouble spot for crackles and the cause can be both external and internal.

External valve faults often originate where the solder connects the lead-out wires to the base pins. In very old valves, it is advisable to clean and resolder these connections. Poorly

soldered top caps can also cause trouble and a resolder job is sometimes necessary to establish a reliable connection. I can recall one instance where a resoldered top cap cured a persistent crackle.

Most valve crackles originate inside the valve itself and there is little that can be done to overcome these faults other than to replace the valve. Cracked cathode material, faulty spot welds and loose components can all contribute to noisy, crackly valves.

Valves with loose or defective internal components can often be detected by lightly tapping the glass envelope. On other occasions, the fault may not show up so easily but it can still be a valve that is at fault. Unfortunately, valve faults such as crackles do not usually show up on a valve tester so testing is of little use in this regard.

Crackles in radio receivers can be of a mechanical nature as well as electrical, and can be frustrating things to locate. But a systematic approach will eventually find the problem. It's just another of the many things that makes vintage radio such an interesting and challenging hobby. **SC**