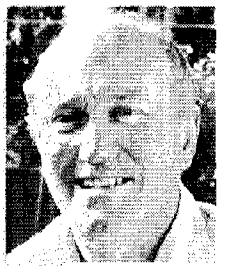
VINTAGE RADIO



By JOHN HILL

Vintage radio repairs made easy

Old valve radios should be carefully checked for faults before power is applied to them after years of neglect. Often, they have multiple faults & these must all be tracked down to restore the set to working order.

A few weeks ago, a young lad came to visit me with an old pre-war receiver that was much in need of repairs. He had collected several valve radios which he had been able to repair himself simply by replacing a burnt-out valve. But this particular set had him tossed because there was nothing visually wrong with it. His repair techniques had not developed beyond that level.

Looking back, I saw myself in exactly the same situation when I started collecting back in 1984. My first repair was successful only because I could see a capacitor with a big split at one end. Replacing the cracked component restored the receiver to working condition and I was indeed pleased with myself.

Over the years, I have been confronted with numerous problems, some of which were consigned to the "too hard basket" for quite a considerable time. Eventually, often through sheer determination and cussedness, the problem is usually solved – but not always.

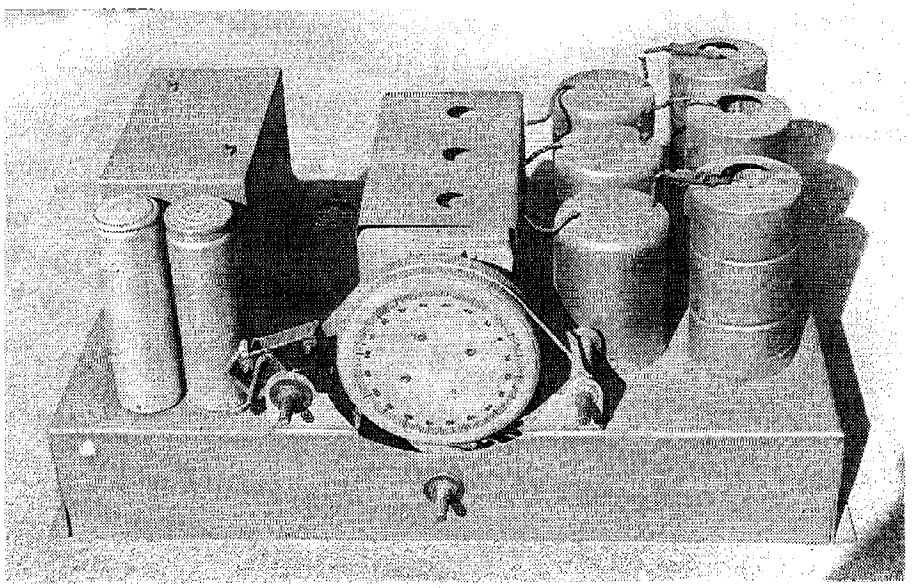
As much as I hate to admit it, there have been a few occasions when I have had to seek the services of someone else. How can a hobbyist of a few years standing compete with the knowledge of a radio/TV serviceman who has a lifetime of experience to draw on?

I might add, in my defence, that it is damned hard trying to fix a radio that someone else has had a go at beforehand. If there are missing components and lots of disconnected wires, then the hobbyist hasn't much hope unless he really knows what he is doing. Enthusiasm is no substitute for experience.

On the other hand, if an old valve receiver is complete and has not been tinkered with, it is not hard to track down a fault. However, what some novice repairers fail to realise is that there is often more than one fault and a systematic check of the whole receiver is necessary if all the problems are to be isolated. The receiver may require the replacement of many components, not just one.

I believe that an extensive knowledge and understanding of radio theory is not necessary to repair vintage radios – but it sure helps. If a collector can correctly identify the individual components and respect the dangers of 240V AC, then there is a good chance of finding and correcting most faults.

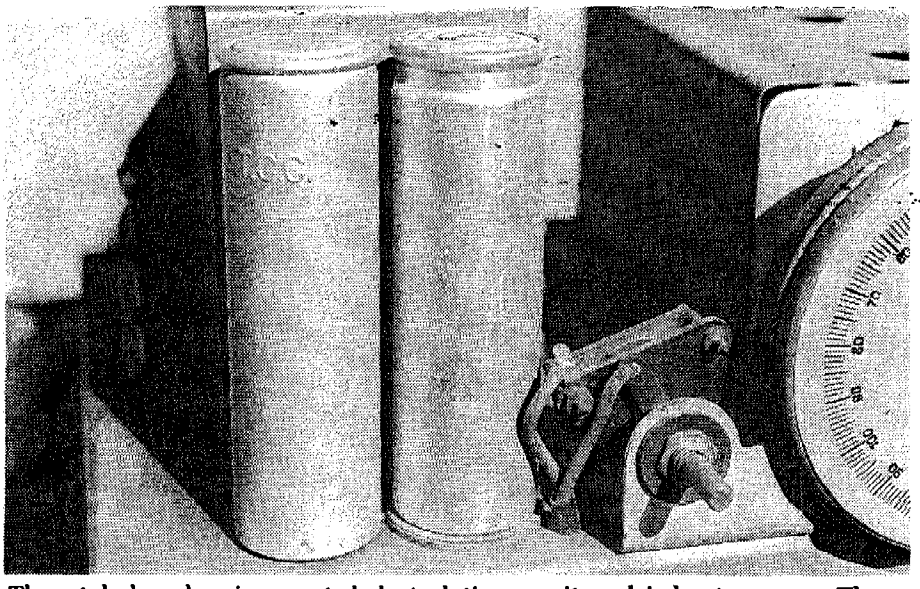
In this particular article, I hope to discuss various common radio components and their likely problems. Checking through a receiver in a systematic manner will reveal most of the faults that lurk in the maze of wiring that makes a chassis look so imposing to the inexperienced.



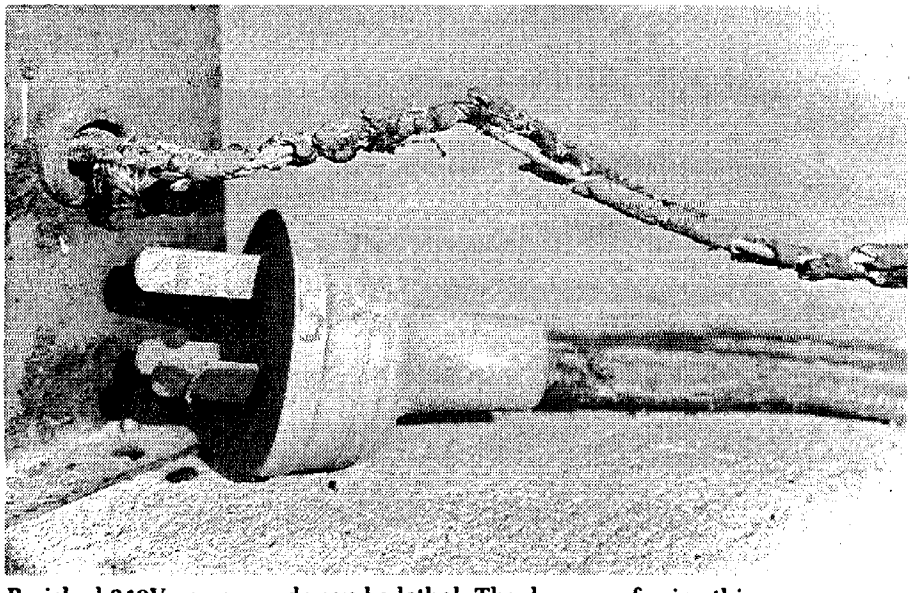
This old TRF chassis is nearly 60 years old. It is unreasonable to expect it to work from scratch & it should be thoroughly checked before switching it on.

Switch-on blues

In many cases, particularly in very old receivers, I initially avoid turning them on to see if they will work. Age can do terrible things to ancient electronic parts and I always prefer to



These tubular, chassis-mounted electrolytic capacitors dried out ages ago. They will have to be replaced with modern units to restore the set to working order. A good trick is to house the new capacitors in the old cans, in order to maintain an authentic vintage appearance.



Perished 240V power cords can be lethal. The dangers of using this one are plain to see but less obvious cord damage can be a trap for the unwary. To avoid problems, it's always a good idea to replace the power cord.

check a set out before plugging it in.

Of course many old receivers can be plugged in without damage. They may work; they may not. Even if they do not work there is no reason to suspect that the set will totally self-destruct in 30 seconds. However, in some instances, plugging in a faulty receiver for a prolonged period (which can be as short as a couple of minutes) can overload a particular component to the point of no return.

My reluctance to switch on an unknown receiver has been brought about by a number of bad experiences. I have seen receivers with short circuits in 240V power cords and plugs. I have seen rectifier valve anodes glowing red hot, which is something they are not supposed to do. I have also observed boiling wax running out of power transformers and high tension chokes, a hot electrolytic spewing out its overheated contents, internal arcing inside valves and smoke pouring off overloaded resistors and other components.

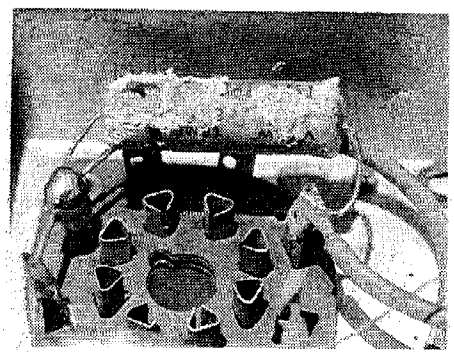
These potentially dangerous and damaging situations can be avoided almost entirely if the restorer spends a little time checking out the likely trouble spots before switching on.

Initial check list

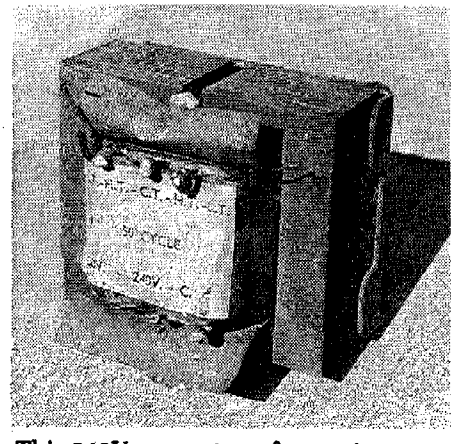
In the interests of more successful vintage radio repairs, here is my pre-switch on check list.

Power transformer: check power cord from plug to transformer, plus the on/off switch if the set has one. The wiring should be safe and secure. Check the continuity of the transformer primary winding, the centre-tapped high tension winding and the low tension windings. If all are intact, the transformer will most likely work OK. Replace the transformer if any windings are open.

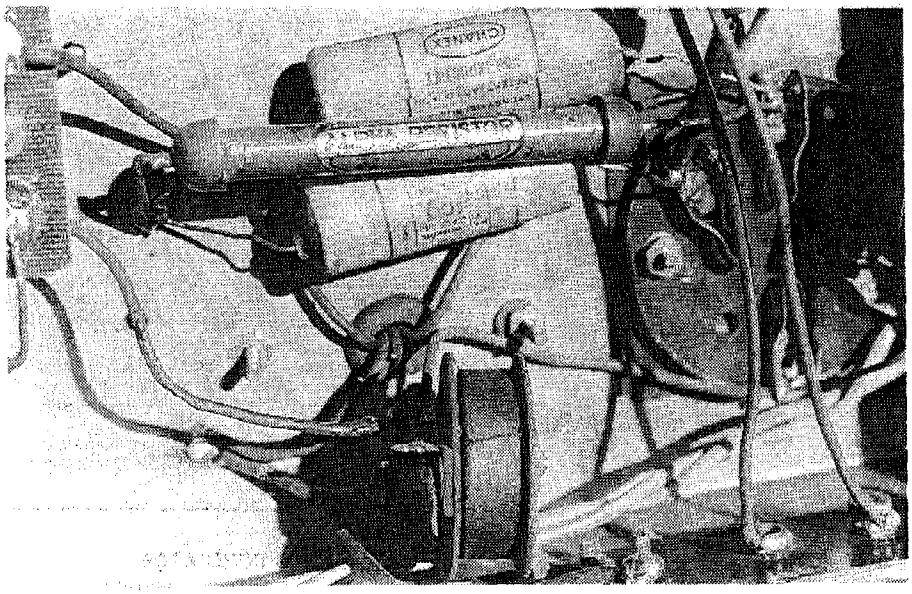
A more difficult transformer fault to check is the shorted turn (or turns). The most obvious symptom is overheating, to the point of self-destruction if allowed to continue. Other com-



Mice can totally wreck old radio components. This particular capacitor would cause a high tension short if power were to be applied and would seriously overload numerous components.



This 240V power transformer is typical of those used in valve radios. Continuity checks on the primary & high tension windings will give some indication as to whether or not the transformer is in working order.



Old capacitors and resistors must be considered suspect until proven otherwise. The radio frequency choke (bottom) would also require checking for continuity.

ponent faults can overheat a transformer but, if it overheats with no load across it, then it has a shorted turn. Short of a total rewind, there is no cure.

Loudspeaker: assuming that the loudspeaker is an electrodynamic type, check both the field coil and the speaker transformer primary for continuity. The transformer secondary and the speaker voice coil are unlikely to cause trouble. Speakers with open field coils must be replaced or the field coil rewound. Faulty output transformers must be replaced.

High tension choke: not all receivers have these as a separate unit, the speaker field coil sometimes doubling in this role. A burnt-out choke or field coil will effectively cut the high tension supply.

If a replacement is not immediately available, a resistor of suitable value and rating may be substituted temporarily, at least to get the rest of the set working. However, this will give less effective filtering and usually an unacceptable hum level. The long term solution will depend on what can be salvaged from other sets.

Alternatively, a choke and resistor combination may be used, the resistor value being chosen to bring the total resistance to that of the original field coil, typically 1.5kΩ. Resistor wattage ratings must be adequate. As an extreme example, a 1.5kΩ resistor, carrying 80mA, would dissipate 10W. And a safety margin of 50% would be advisable.

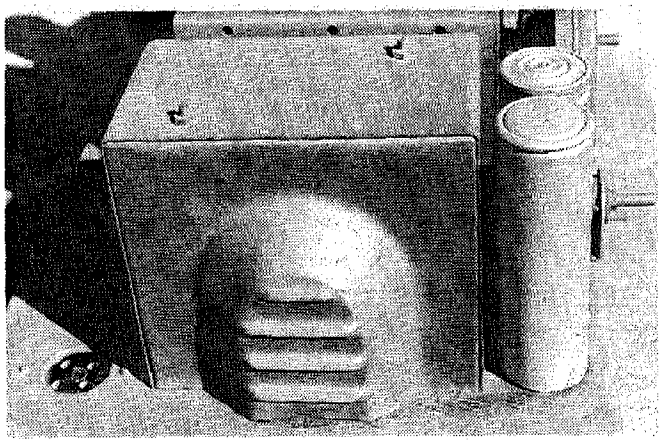
Intermediate frequency transformers: IF transformers usually have four base connections – two for the primary and two for the secondary. Odd transformers have a centre-tapped winding or windings with additional connections. Check for continuity. Don't forget that the grid cap connection is one end of the secondary winding. Open windings will stop the receiver and the offending coil will need to be repaired or the transformer replaced with a similar unit.

Aerial & oscillator coils: once again, these units usually have two windings and four connections, although some coils have series connected multiple windings with taps. Check for open circuits. Any breaks in the windings will either prevent the set from working or adversely affect its performance. Repairs to broken wires or complete replacement will solve the problem.

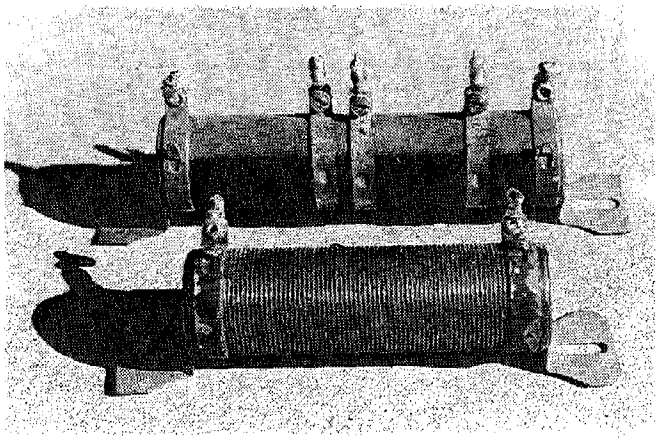
Resistors: check each resistor for both open circuit and correct value according to its colour code. It is common for old resistors to increase their value with age. Values above 1MΩ are particularly susceptible, often increasing in value by two or three times. If they do not exceed 20% tolerance, they are OK.

Check all wirewound resistors and the tapped high tension dropping resistor – the voltage divider – if the set has one. Voltage dividers frequently fail at the taps.

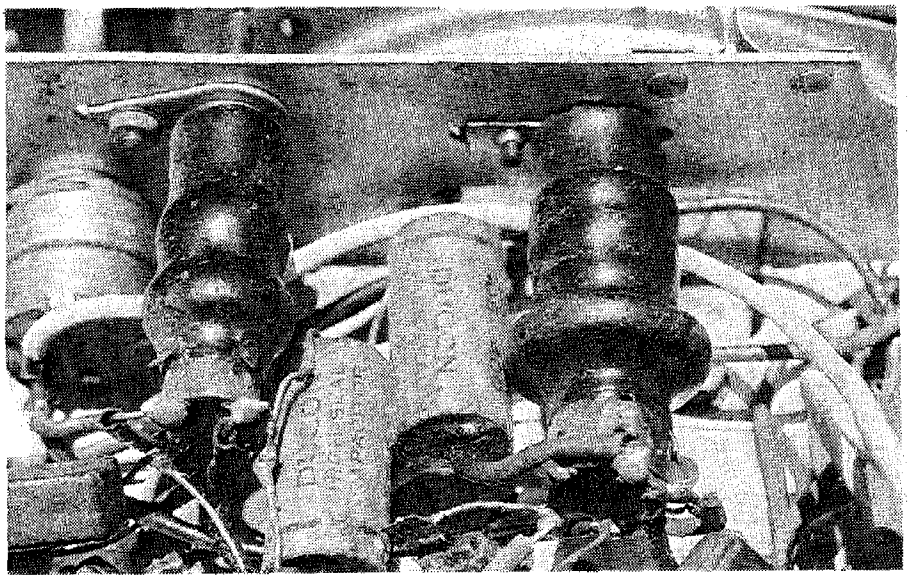
Volume and tone controls also come under the heading of resistors and these should be checked for smooth operation. An open circuit volume control can stop a receiver from working. Particularly troublesome are the old wirewound potentiometers from the 1930s.



Power transformers from the early 1930s were large and robust. However, they can still give trouble and should be checked before putting them into service.



Voltage dividers are another troublesome component. Often the taps must be removed and cleaned so as to re-establish a good connection.



Aerial and oscillator coils often fall victims to mice, particularly coils that are wax coated. Checking the base connections with an ohmmeter will quickly establish their serviceability.

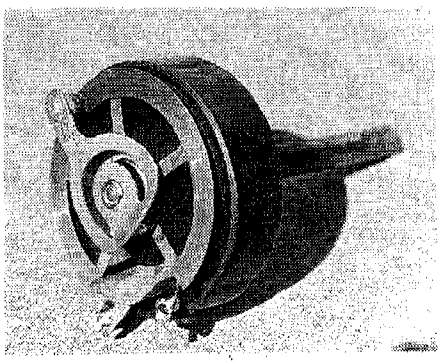
Capacitors: ageing capacitors cause many of the troubles found in old valve radios. Although the mica types are relatively trouble free, the same cannot be said for paper capacitors and electrolytics.

For reliable restorations, it is a good idea to make a clean sweep and replace all paper capacitors with modern polyester types. This in itself can solve many receiver problems that would perhaps be difficult for the novice repairman to locate. (The purist may elect to hide the modern types in the cases of the old units, to give the chassis an authentic appearance).

Old electrolytics should be checked for shorts, leakage and capacitance to determine whether or not they are serviceable or in need of replacement. Since electrolytics are polarised, the polarity of the ohmmeter test leads is important. It is often opposite to that for the other ranges. And capacitors that test OK on an ohmmeter may break down at higher voltages.

The tuning capacitor should also be checked. Scraping plates will cause trouble and objectionable noise.

Valves: it is advisable to remove the valves and check the heater pins for continuity. Better still, test the valves in a working receiver (or a valve checker), as this will remove or confirm any doubts as to their condition. Cleaning the base pins and the valve socket connections will also help to minimise valve problems. It only requires one base pin to have a faulty contact and the receiver will not work.



This photo shows an old-style wirewound potentiometer, as used for volume controls in early superhets and TRF receivers. An open circuit winding will prevent the set from working.

Obscure faults

If a receiver passes all the checks just described, it can be plugged in with reasonable confidence and there is every chance it will work. If it doesn't, it will be due to some rather obscure fault that could be quite difficult to track down.

Some of these faults could be: an internal break in a length of wire (possibly the speaker cord), a dry solder joint, a joint that has never been soldered, a loose blob of solder shorting a connection, a faulty replacement part, a replacement part that has been wrongly installed, a corroded or loose chassis connection (particularly common on aluminium chassis), or maybe a broken valve socket connection in the socket itself.

If all the foregoing seems a bit extreme or unnecessary, then consider the following.

It is not uncommon to be confronted with a 50-60 year old receiver that has not worked for the past 30 years or more and has been stored in a damp garage for that period of time.

A typical check out of such a receiver will often reveal that the loudspeaker field coil and output transformer are open circuit, that the electrolytics are shot, and that the paper capacitors have been chewed by mice. It may also have a burnt-out resistor, a gassy rectifier valve and corroded valve socket connections. In addition, all the rubber insulation on the internal wiring will have perished. There is no easy single cure for these problems.

The restoration of most old radios is not a simple process involving the repair of one particular fault. In most cases, there are many faults and all must be found before the restoration can be considered successful. If a systematic fault finding routine is followed, it must ultimately improve the novice repairman's success rate. **SC**