VINTAGE RADIO

By JOHN HILL

Checking & replacing resistors

Although generally more reliable than capacitors, resistors also cause their share of problems in old valve radio receivers. They should all be carefully checked and, if necessary, replaced as part of the restoration process.

Resistors, both fixed and variable, are common components in valve radios. The big difference between resistors in vintage radios and those in modern circuits is size. Modern resistors are much smaller due to greatly improved manufacturing techniques.

Old fixed resistors can be quite troublesome and a problem that is frequently encountered is that they go high. In other words, what might have been a 250kΩ resistor 40 years ago could well be a 0.5MΩ resistor today.

But although some resistors may have gone high, most will measure within their original tolerance or very close to it. Those old resistors were manufactured with a tolerance of ± 20%, which gives sufficient latitude for most of them to fall into the "near enough" category.

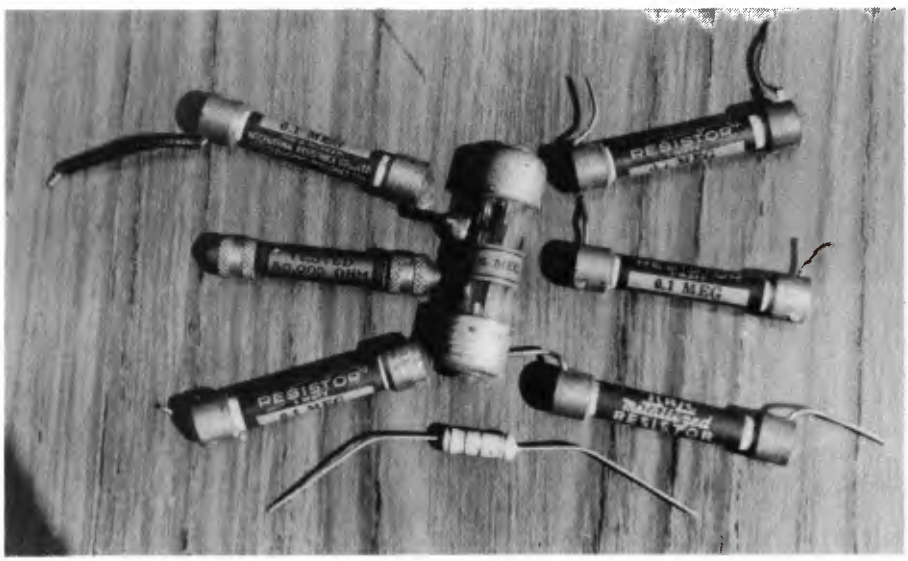
However, some resistors appear to be less stable than others and these can sometimes rise well beyond tolerance to double their original value. Odd ones may go even higher. Naturally, such resistors should be replaced if a radio set is to operate at anything near its normal performance level.

When restoring an old radio, it is advisable to individually check each resistor with an ohmmeter. Such a check out will detect a lot of potential problems. It will also quickly locate any burnt out resistors.

It is a simple matter to read the colour code so as to determine a resistor's original value, then check with an ohmmeter to see if the measured value is somewhere near where it should be.

You will find that most resistors will check out near enough but every now and then one will appear to be way off value. While the resistor may indeed be faulty, the most likely reason for the screwball reading is that the resistor is still connected into the circuit. In-circuit tests work OK most of the time in valve radios but occasionally, other resistances or the influence of leaky capacitors may completely upset the reading.

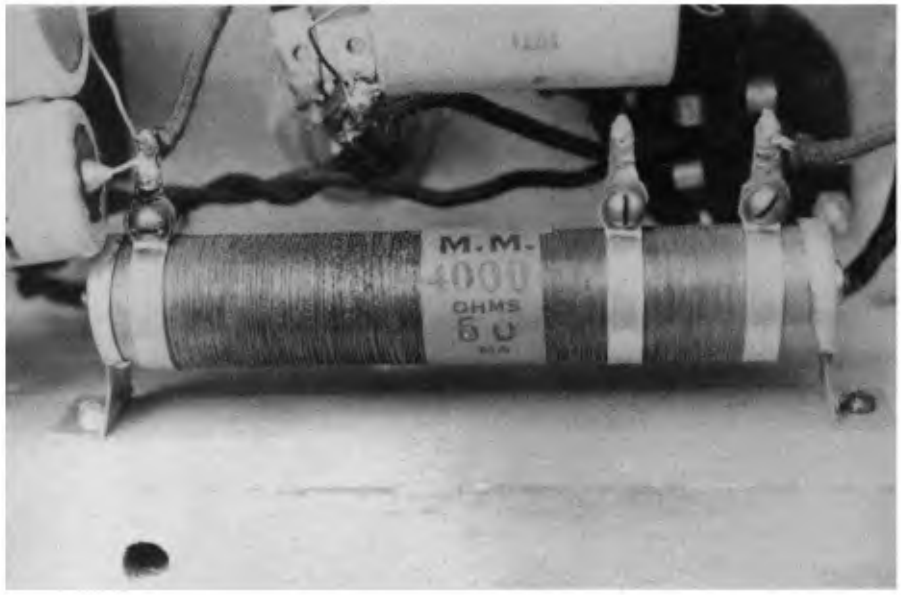
Any resistors that fall into this category should be disconnected at one end and tested again. This will usually show that the resistor is quite serviceable but if the reading is still off-value, the resistor should be replaced. Strictly speaking, all resistors should be checked out of circuit but such a procedure is not always convenient and mostly unnecessary. My advice is that you only disconnect the suspect ones.



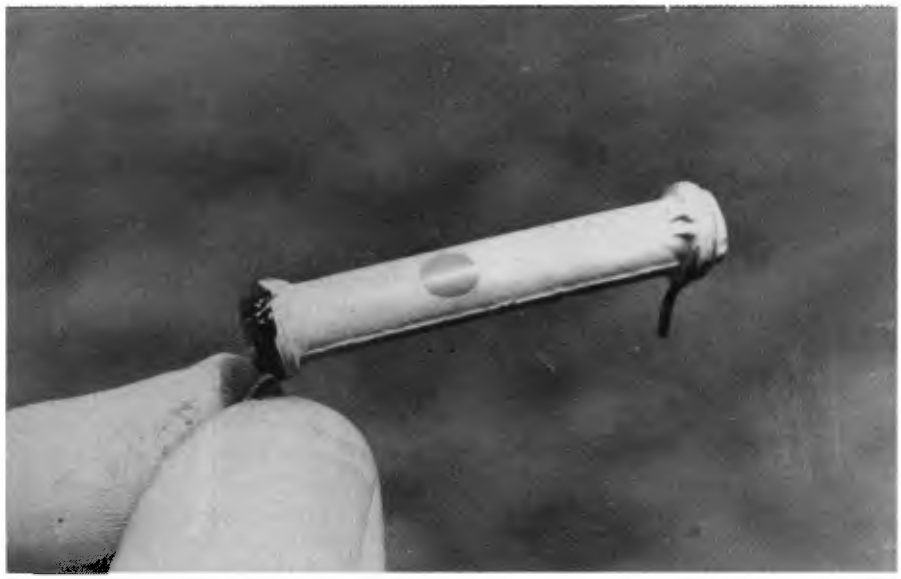
Early resistors were quite large and their resistance value was clearly marked. Colour coding of resistor values didn't become common until around the mid 1930s.

Colour coding

Some mention should be made at this stage regarding the colour coding of resistors, as the majority of resistors found in valve radios use a different scheme to that currently in use. The colours have the same values as for modern resistors but the arrangement of the colours is different.



Tapped wirewound resistors were common in valve sets from the early to mid-1930s. They often give trouble at the taps due to poor contacts.



This is a typical body, end and dot resistor. The colours have the same code as for modern-day resistors but are read differently. The body colour represents the first figure of the reading, the end colour represents the second figure, and the dot represents the multiplier in powers of 10. Some resistors will have a band instead of a dot to indicate the multiplier.

The old system of identification was knows as the "body, end and dot" method and the colours are read in that order. The body colour represents the first figure of the reading, the end colour represents the second figure, and the dot colour is the multiplier in powers of 10. So the actual colour code remains unaltered — it is only the order of reading that is different with these old style resistors.

Prior to the body, end and dot system, fixed resistors were clearly labelled with either a paper sticker or the resistance value was painted onto them. Early radios up to about the mid-1930s had this type of resistor identification but colour coded resistors took over from about that time.

But regardless of how a resistor is labelled, the important thing is to determine its original value. This is necessary if the resistor is to be checked or replaced.

Rheostats (or variable resistors) were used in early battery radios to regulate the filament voltage. These units are typically quite robust and seldom require replacement.

A typical wirewound potentiometer from the 1930s. These can give trouble due to dust and dirt in the works. A careful clean followed by a spray with WD40 will usually restore the pot to as-new condition. The wiper arm requires periodic lubrication.

Replacing resistors

Replacing a resistor is a bit like replacing a capacitor (see last month's issue). Once the old component has been unsoldered, it is extremely easy to lose track of where it came from. A better method of replacing resistors is to cut them out with side cutters, leaving the old wire leads in place to mark where the component came from. This practice is a good procedure to adopt for it prevents mistakes.

Like other radio components, each resistor has a job to do and just one burnt out device can stop the set from working or cause a serious malfunction. A burnt out resistor is a fairly common complaint in valve radios.

A burnt out resistor is a fairly common problem in valve radios and generally occurs when some other component (eg, a capacitor) breaks down.

A noisy pot can often be cured by spraying WD40 or similar cleaning fluid onto the carbon track. For early pots, the dust cover must first be removed for the treatment to be effective.

There are a number of reasons for a resistor burning out and some of the more likely causes would be poor or faulty internal connections to the lead out wires, corrosion due to moisture, and overloading beyond its wattage rating. The latter problem can be caused by other components breaking down.

For example, a leaky high-voltage paper capacitor could well be the cause of a resistor giving trouble. When this is the case, replacing the resistor is only half the cure. That's just one reason why it's a good idea to replace all paper and electrolytic capacitors when restoring an old valve radio. It may take a little extra time but will result in the restoration being far more reliable and trouble-free.

Wirewound resistors

Another type of resistor that was fairly common in early radios is the large wirewound type that had a number of tappings along its length. These resistors can give trouble at the tap connections and can also burn out if overloaded. A bad tap or a burnt out section can be quickly detected with the aid of an ohmmeter.

When restoring a set with a tapped wirewound resistor, it is a good idea to measure the resistance of each section and pencil its value on the underside of the chassis. If the resistor gives trouble at any time, either all or part of the resistor can be built up by adding separate wirewound resistors of the appropriate values. Pencilling bits of information under the chassis is a great reminder for those with lousy memories.

Any resistors that can no longer be identified by their colour code should be disconnected, their resistance measured and once again, the resistance value pencilled onto the chassis. It's anyone's guess what the resistor value should be if it has burnt out and only someone well experienced in valve radio repairs would know what to replace it with. Not everyone has a circuit for each of the sets in his collection.

Potentiometers

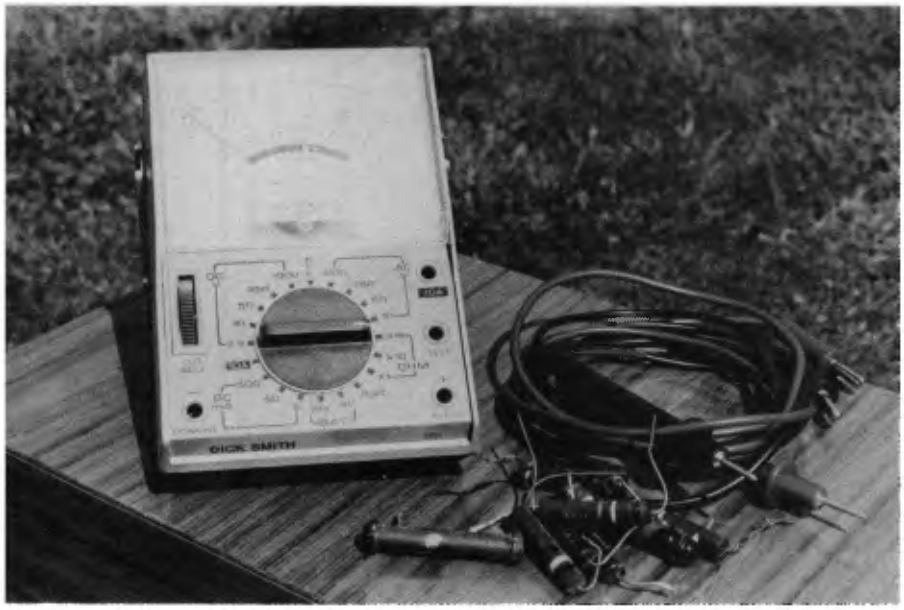
Variable resistors, such as potentiometers and rheostats, can also present the vintage restorer with a few problems.

Rheostats hardly warrant a mention as they were only used in ancient battery receivers to control the filament voltage. These units were made very large and robust and should require little maintenance other than a good clean (eg, with WD40).

On the other hand, potentiometers cause the vintage radio restorer quite a few worries and one common problem with them is excessive noise when the pot shaft is rotated. Volume controls frequently give trouble in this regard and in bad cases, there may even be dead spots where the sound is completely cut off.

Many of the early superhets had wirewound potentiometers for volume controls and these can cause a few headaches when the fine wire wears through and creates an open circuit. Finding a suitable wirewound replacement can be difficult but you can use a secondhand pot that is in good condition. The replacement will need to

It's not hard to see why this carbon pot was giving trouble. Excessive power dissipation, probably due to an external component failure, has "cooked" the carbon track. Pots in this condition must be replaced with an equivalent type.



A good multimeter is essential for checking resistor values. When restoring a vintage radio, it is a good idea to check the value of every resistor in the circuit as a matter of course.

be cleaned and lubricated if it is to work smoothly.

However, many early wirewound pots seem to be wirewound not because they needed to be, but because that was the way they made them back then. What that statement really means is that in most cases (but not all), a carbon pot of similar value can be used quite successfully. But if the substitute belches smoke when the set is turned on, then you will know that a wirewound replacement is really needed in that particular application.

If in doubt about using a carbon pot, install a milliamp meter in the circuit in series with the pot. If no more than 10mA flows through the pot, then everything should be OK.

Most old wirewound pots give trouble because of dust and dirt in the works. They are completely open at the back and an accumulation of dust can stop them from working. These potentiometers need a good clean up and should be fitted with some form of dust proofing if they are to continue to work smoothly.

An effective dust cover can be improvised by attaching a small plastic bag to the back of the pot. Sticky tape or even string will hold it in place. If you are good at sheet metal work, perhaps a neat metal can could be fitted instead. Either way, a dust cover on an open pot is a good idea.

A noisy carbon pot can easily be cured by replacing it with a new one although that is often easier said than done. Modern potentiometers can be either too short in the shaft or of the splined metric type. An extension can overcome these problems.

However, a new component is not always required and quite often a clean and lube job will get a noisy pot working smoothly again. The first step is to remove the pot from the chassis and clean it externally. Once this has been done, you can prise off the metal dust cover from the back of the pot and inspect it carefully for internal damage. If everything is OK, spray lightly inside with WD40 or similar. Finally, flick out the excess fluid and replace the dust cap.

A drop of oil on the pot shaft may help free up the movement if it's a bit stiff.

This procedure works quite well but is only effective if the dust cover is removed. There is little hope of the spray penetrating the working parts of the pot with the cover in place, although some late model radios have pots with an opening that allows the spray (and dust) to enter.

If this rejuvenation process fails to give satisfactory results, then the pot will have to replaced.

That just about covers most of the important aspects of resistors as far as vintage radio restoration is concerned. One final comment should be made, though. When replacing resistors, remember to always use a component of similar (or greater) wattage, otherwise the resistor will quickly burn out. This applies to both carbon and wirewound types.

Next month's vintage radio topic is on high tension supplies.