# VINTAGE RADIO

By JOHN HILL

# One thing leads to another

**It's funny how one simple act can lead to a series of events that probably would not have otherwise happened. In my case, these so-called events were well overdue and it was about time something was done anyway.**

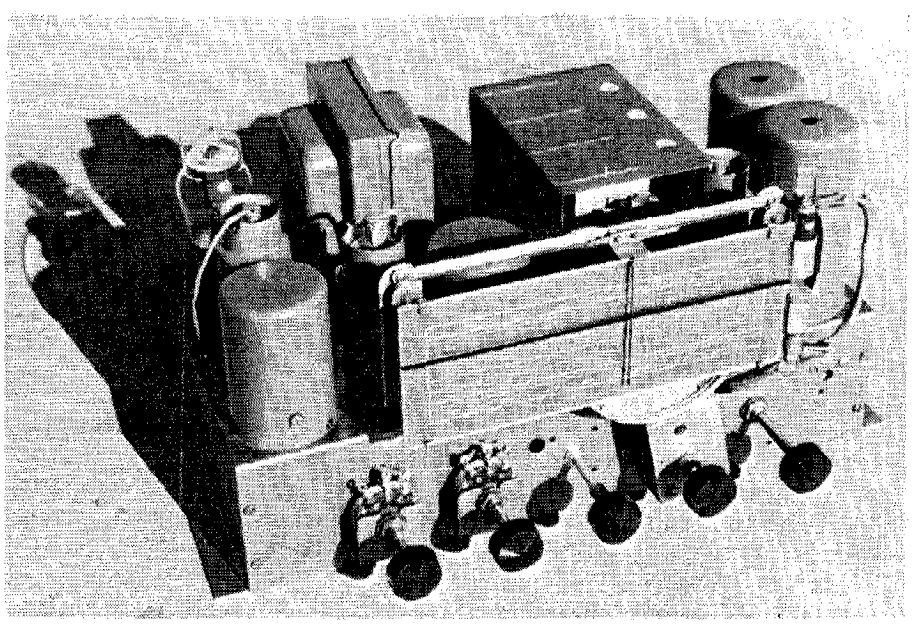
It all started when I was looking for a potentiometer. I have hundreds of these items in various shapes and sizes and while looking for one particular pot I kept finding others. I was surprised to discover that I had so many wirewound types and these were put to one side rather than mix them up again with the other potentiometers.

I eventually found what I was looking for and put the wirewound assortment into a box to be inspected at a later date. As my potentiometer collection is mostly secondhand, such pots need a thorough clean and check-out before they can be put back into service. In many cases, they don't make the grade.

This particularly applies to old and used wirewound potentiometers. Not only are they secondhand but they are also often well worn, dirty and clogged up with dry grease. Checking and reconditioning these old pots seemed like a good idea for they would then be ready to use when needed.

Wirewound potentiometers were used as volume controls in early superhet receivers up to about the mid-1930s, before the advent of AVC (automatic volume control). The usual setup was to place the volume control in the cathode circuit of the intermediate frequency amplifier valve(s) and, in some instances, the frequency converter valve as well (but not in an autodyne). A variable resistance in the cathode circuit alters the cathode bias (effectively the grid bias) of the valves and, therefore, controls the gain or volume of the receiver.

It was also normal practice to connect the aerial to the unused end of the volume control. This gave a secondary control of the volume because as the resistance in the cathode circuit increased, the resistance between aerial and chassis decreased.



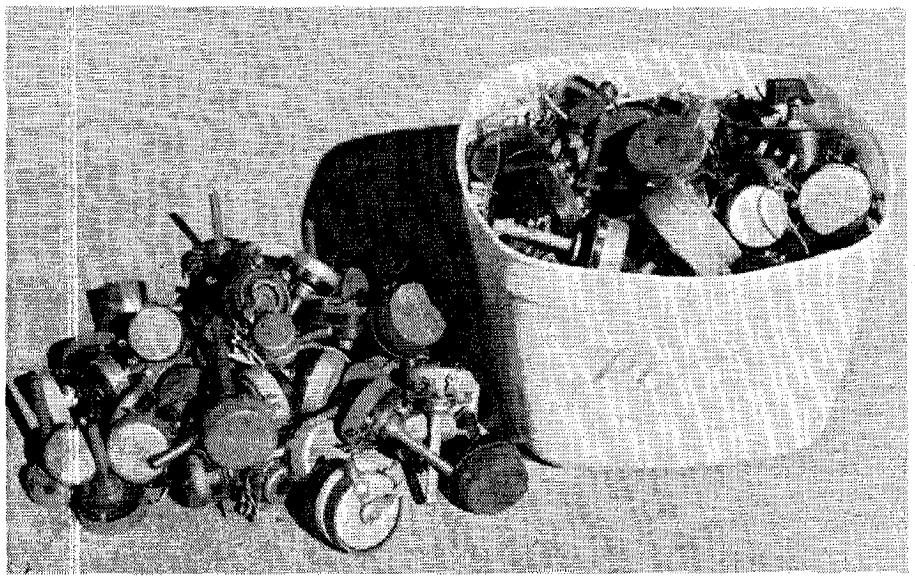
**This 1936 model Radiola has two volume controls, one in the cathode circuit of the IF amplifier valve and the other in the audio section of the receiver. This arrangement is especially useful if the set is operated close to a powerful transmitter, since cutting back the gain ahead of the detector stage helps prevent overloading the audio stages.**

## Two volume controls

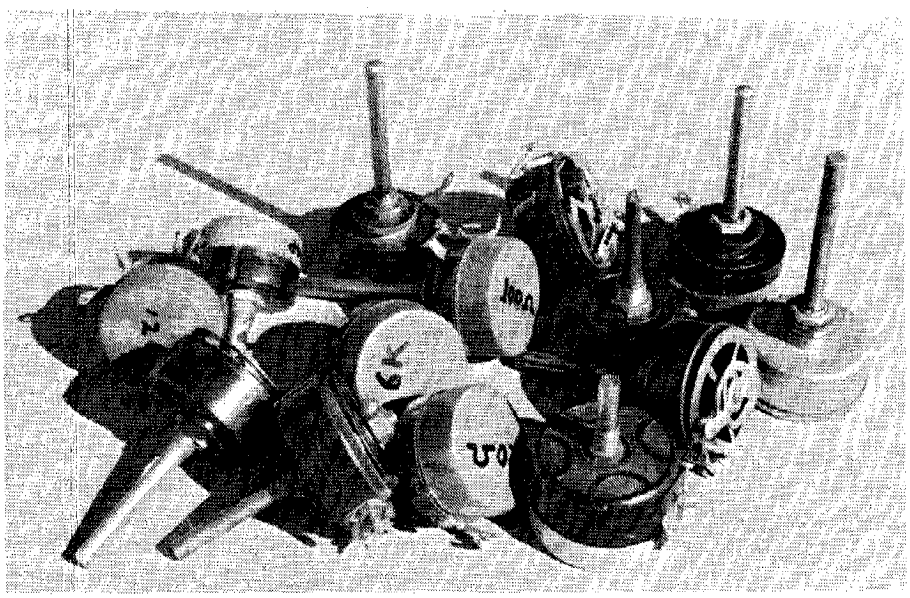
Some pre-war superhets actually had two volume controls. One control was, as previously explained, in the cathode circuit of the IF amplifier valve, while the other was in the audio section of the set.

Such an arrangement can be an advantage if the set is operated close to a powerful transmitter. Cutting back the gain ahead of the detector stage helps prevent overloading the audio stages. A local station switch has much the same effect but lacks variable control.

Superhet design moved away from these early ideas, with the advent of AVC, and the volume control was eventually placed in the control grid circuit of the first audio valve only. When this is the case, a cheaper car-



**This is just part of the author's potentiometer collection. Many old pots require cleaning and lubrication before they can be put back into service. One certainly collects lots of parts in the vintage radio business!**



**A few hours work was all that was required to restore these old wirewound potentiometers. Many old radios from the 1920s and early 1930s used wirewound potentiometers as volume controls.**

bon potentiometer is used.

The need for a wirewound volume control in those early superhets is because larger currents flow in cathode circuits than in control grid circuits.

However, in some instances, a carbon potentiometer can be used as a replacement for a wirewound type. If the volume control only alters the cathode bias on one valve, there is every chance of getting away with it. If it controls the bias on two valves, then a carbon pot may not be able to carry the current. Anything greater than a 0.25W load might be asking too much from a carbon potentiometer, although the larger old types were rated at one watt over the whole element. The wirewound pot was originally used for good reason.

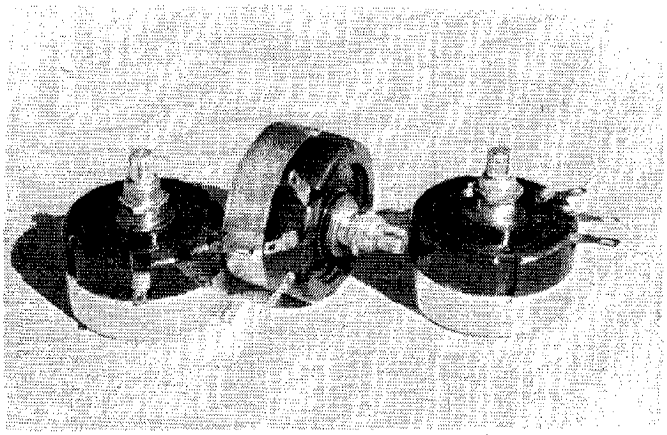
Dick Smith Electronics and other electronics outlets sell nice new wirewound potentiometers, including 5kΩ and 10kΩ, types that are ideally suited to early superhets. There is, however, one disadvantage with these modern replacements: they seem to be only made with an extremely short splined shaft which is suitable for metric style control knobs only. That problem can be easily overcome, however.

## Extension shaft

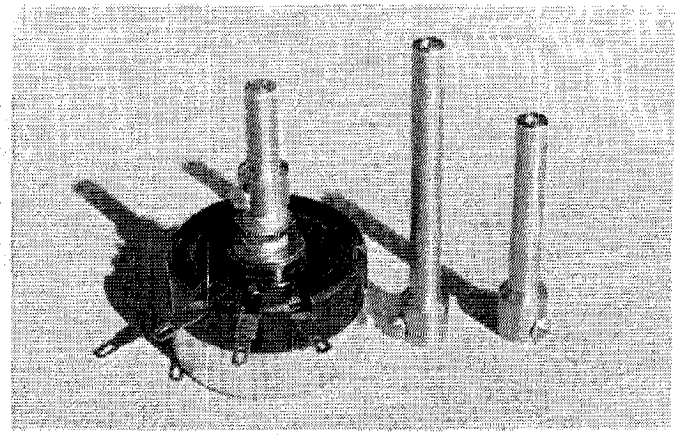
If these modern potentiometers are to be used for vintage radio applications, then they will require a neat-fitting extension shaft. Because I have a lathe in my workshop, tailor-made extensions are no problem. Without the lathe, difficulties could be encountered because the extension shaft needs to be a very close fit in order to maintain reasonable alignment of the shaft. An ordinary commercially made extension may not fit these extremely short shafted potentiometers.

When using modern wirewound potentiometers, remember that the wiper arm is insulated from the control shaft whereas in the older types this was not usually the case. This simply means that the arm is not automatically earthed when the pot is installed in the chassis by its securing nut. Therefore, the wiper arm connection may require earthing.

As I like to keep my vintage radios as original as possible, I prefer to use a similar potentiometer if there is a



**Modern wirewound potentiometers usually have very short control shafts. A suitable extension will thus be required if you intend using this type of potentiometer as a replacement in a vintage radio.**



**Making up suitable extensions for wirewound pot shafts is a fairly straightforward job if you have access to a lathe. Alternatively, you may be able to find a suitable commercial shaft extender.**

need to replace one. Hence the reason for reconditioning all those wirewound pots that had been put aside.

Many of these volume controls are quite reusable but they do require a particular maintenance routine if they are going to work smoothly again. In this case, the word "smoothly" has two meanings: smooth mechanically and smooth electrically.

## Watch the needle

To see how rough some of these old pots are, one only has to connect an ohmmeter and watch the needle dance up and down the scale as the wiper arm is turned around. Dusty or corroded contacts will cause the meter needle to fluctuate, a fault that will result in considerable noise if the component is used as a volume control.

Worse still is the possibility that the fine resistance wire element has a break in it which will render the control pretty useless. A continuity check should be one of the first steps when repairing old wirewound potentiometers.

Checking the overall resistance often shows a variation in the specified resistance of up to 20%. For example, it is common for a 10kΩ pot to measure as low as 8kΩ or as high as 12kΩ when checked with an ohmmeter. Modern wirewound potentiometers are made more accurately - not that it really matters in a volume control.

## Restoring old pots

Cleaning up an old wirewound pot can only be done properly if the whole unit is stripped first. The bearing part of the shaft needs to be thoroughly cleaned and regreased so that it will work smoothly. The electrical clean-up may require more time and effort.

If the wire element is in good condition, it can be cleaned with a toothbrush or a blast of compressed air. However, all too often, years of wear and tear have almost worn the wire through. Even those types of potentiometer where the wiper arm presses a metal disc onto the wire can be worn to almost breaking point. Pots that employ a direct contact wiper arm are even more likely to wear the wire through.

Now if the worn track is still in one piece, the potentiometer can usually be salvaged simply by removing the resistance winding and turning it over so that the opposite side of the coil is brought to bear on the wiper arm. This operation varies from being fairly easy to quite difficult, depending on the type of construction. Some types may not allow the wire element to be reversed.

Naturally, reasonable care needs to be taken when repairing potentiometers in the manner just described, for it can be a delicate task. In most instances, wirewound volume controls can be completely restored by reversing the resistance element and cleaning and relubricating the mechanicals. This treatment costs absolutely nothing whereas a new pot costs around $8 and requires an extension shaft.

The best part of an afternoon pased before I finished repairing my collection of wirewound potentiometers. Only two were discarded. It was a job that had been put off for quite some

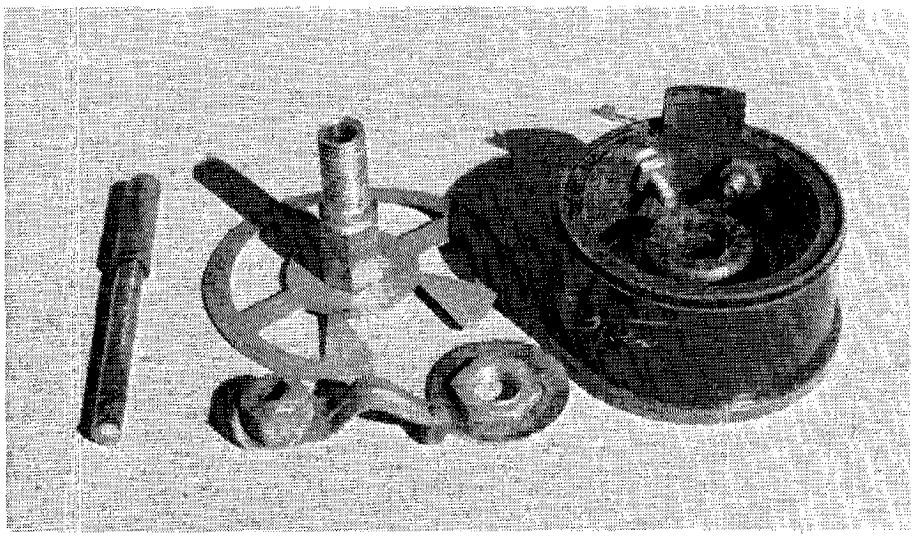
## Background To Volume Control

The very early superhets used an autodyne type local oscillator/mixer. The circuit values in these were quite critical and so they could not be included in the volume control system.

With only one stage under control, overload on strong signals was a serious problem. The local/distant switch was the first solution but, because it relied on the user switching it in or out, was not always successful. Connecting the antenna to the unused end of the variable cathode resistor was a major improvement, provided the resistor value was carefully selected.

The development of the pentagrid converter was the next major step and allowed both valves to be controlled. Then, with the advent of AVC, the volume control was moved to the audio stage.

Some people did object to AVC in the early days. One reason for this was the increase in noise between stations, particularly on the very sensitive sets that were popular in those days. Another reason, probably arising out of the first one, was the belief that sets with AVC "picked up more static".



**Depending on design and condition, many wirewound potentiometers can be restored by cleaning them and by reversing the wire resistance element so that a fresh section of track is brought to bear against the resistance arm.**

time and now they were all ready to use. As a matter of fact, I could even think of where I could use one straight away.

## Modifying an Airzone

One of my radio treasures is a 1937 5-valve console model Airzone. Although a 1937 model with octal based valves, it had a wirewound volume control in the cathode circuits of the first two valves. This control had developed a particularly bad spot where it made a lot of noise and the volume level jumped noticeably. It seemed like a good time to swap it over for one of my reconditioned units.

When removed, the pot was found to be in excellent condition and it was repaired and put back into service again instead of being replaced. The main problem with this particular potentiometer was a dob of gunk on the wiper track which effectively isolated a number of turns on the resistance element - hence the noise and the jump in volume.

However, this simple repair was about to lead onto a more ambitious project. While the set was on the workbench, it seemed like a good opportunity to look at other things.

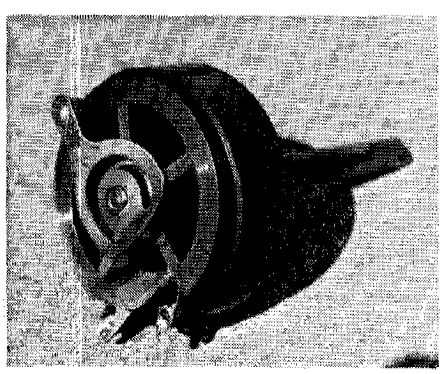
The old Airzone has no AGC (Automatic Gain Control; also known as AVC or Automatic Volume Control). It is one of those receivers which requires two hands to tune in order to avoid "crashes" on the stronger local stations. Automatic gain control was one of the really good innovations to come out of the early 1930s.

Why the Airzone was made without AGC is a bit of a mystery. Perhaps receivers without AGC were a little cheaper and the Airzone was a budget priced model? Perhaps some people liked them that way - who knows?

What I proposed to do was add AGC to the old Airzone. It is a good receiver with a very attractive timber cabinet and the addition of AGC would most certainly improve an already excellent radio. I had been thinking about such a conversion for quite a while and now seemed like the ideal time to do it, even if I had to remove the volume control that had only just been fitted.

A number of modifications would be necessary to convert the receiver to AGC. To begin with, the set would have to be changed to diode detection and the volume control shifted from the present cathode circuits and placed in the control grid circuit of the first audio valve. Finally, the AGC voltages would have to be connected to the control grids of the first two valves.

Unfortunately, we have run out of space, so the AGC story will have to wait for some other time. If the conversion turns out OK (and there is no reason why it shouldn't), I know what it will lead onto next. The old Airzone isn't the only set in my collection that would benefit from such a modification, so the operation will be repeated a number of times. **SC**



**Many early pots had their working parts exposed to the dust and grime. Cleaning the resistance element and lubricating the mechanicals (particularly the wiper arm) often restores the unit to working condition again.**

## Vintage Service Tip

### Checking Early Pickups

Old crystal & magnetic pickups can be quickly checked by connecting them to a set of high impedance headphones and then rubbing a finger across the needle or stylus. The scratching should be clearly heard in the headphones. The relative output can be checked by comparison with a known good unit.

Other then being open circuit, faults in early magnetic pickups are mainly confined to misalignment or drying out of the rubber armature dampers. In the latter case, repairs can be effected by using bicycle valve tubing. Cut off a length slightly less than that required and split it lengthwise. In most cases, the top (blade) rubber will also have hardened or disintegrated. Replacement of this is essential as it not only provides damping but also stops the armature hitting the magnet pole faces. This damper will have to be hand-shaped from sheet rubber of suitable resilience.

Watch out for shorts in the old shielded cable used in these pickups. This often has rubber compound insulation which also cracks & hardens.

*Vintage Radio Service Tip is supplied by Resurrection Radio, 51 Chapel St, Windsor, Vic 3181. Phone (03) 529 5639.*