

Vintage Radio Feature



While it was quite grubby, this AWA 467MA set was a good candidate for restoration as its cabinet was sound and it had all three original knobs.

The AWA 467MA

... an ideal first restoration

By RODNEY CHAMPNESS, VK3UG

As the saying goes, we all have to start somewhere, and so it is with restoring vintage radios. But the restoration of a 1930s 7-valve, triple-wave, mains-powered, wooden console receiver with a tuning indicator and a complex dial cord arrangement would be an ideal project to attempt if you wanted to become disillusioned.

SELECTING A SIMPLER and more common receiver as the first project is much more likely to be a success, even if a small amount of help is needed in some areas. Your first restoration will be remembered long after the tenth and it is much better to remember it as a success rather than a costly failure.

A friend expressed interest in an AWA plastic-cased mantle set. It was a model 467MA which is similar to the 449MA except it has a loopstick antenna. It was like his parents' radio, hence the interest. While I was in the process of restoration, it struck me that here was an ideal set for a beginner in vintage radio to restore.

There is nothing special about this receiver which is a relatively simple broadcast band 4-valve superhet. Sets of this type were produced in the tens of thousands, so it's relatively easy to find a suitable receiver for your first restoration. Circuits and bits and pieces are not too hard to find and help with the project is often available from experienced restorers.

Perhaps your long-term interest in vintage radio will not be 4-valve plastic-cased receivers. If they aren't of interest, does it matter if your restoration isn't perfect? The value of the set is probably only a few dollars and you will have had some practice for your

next radio and a lot of fun into the bargain.

There are a few important points that the first time restorer should consider before obtaining a set such as this to practice on:

(1) The plastic cabinet should be in good condition, with no chunks out of it, or cracks (if possible), not discoloured, no distortions due to valve heat or other reasons, and complete with all knobs. It doesn't matter if the cabinet and knobs are dirty, as they can be cleaned. Check the knobs; some may be broken, loose or extremely tight on the shaft.

(2) Look inside the cabinet. It may be dusty and have slight corrosion or discoloration of the chassis but that is OK. However, sets from marine environments can be bad choices, as are sets that have had water through them. They will have major corrosion on the chassis, in the pots and tuning gang and most of the components are liable to be leaky.

The smell of mice or the smell of something such as a transformer that has been too hot is enough reason for you to pass up the set for something more acceptable.

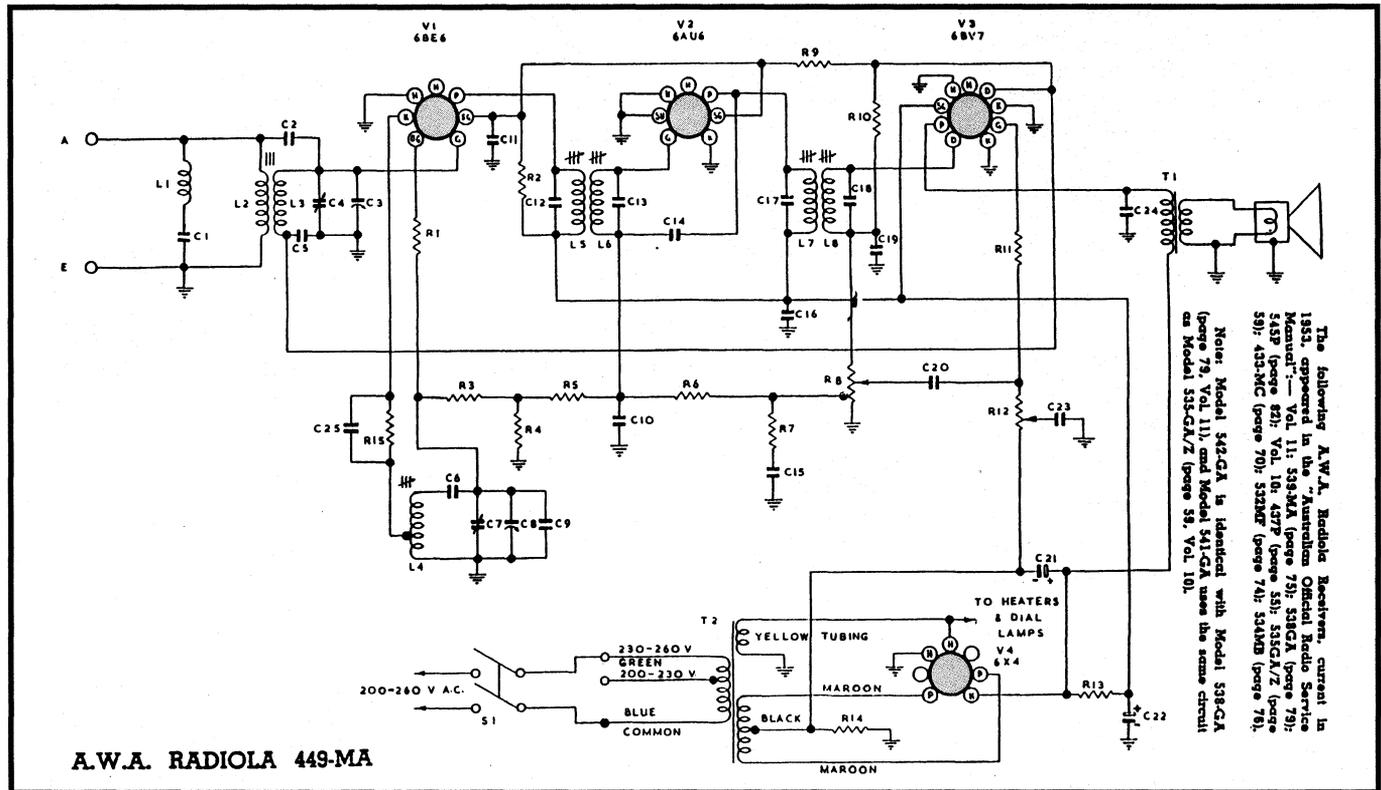
(3) Are the valves all there? It is not absolutely essential that they are but if they are, it indicates that the set has probably not been fiddled with. Mini-

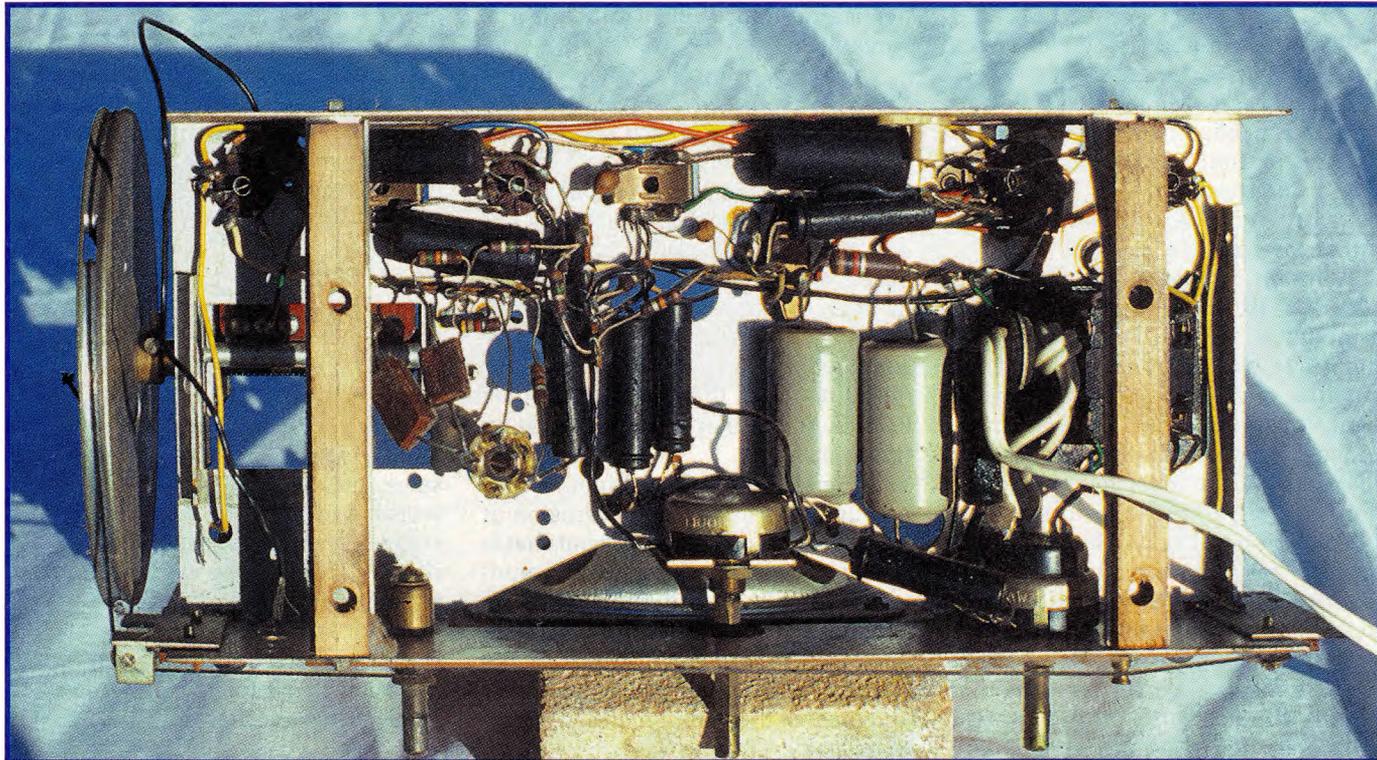
ature valves are reasonably easy to obtain. However, you will need to know what valves are used in the set and which sockets to plug them into. Often there is a sticker in the set showing which valve goes where. Sometimes, would-be repairers change the valves around and the set will definitely not work then – and the valves may be damaged.

(4) The radio should be a 240V AC Australian unit, certainly not AC/DC which can be dangerous. Look for a power transformer in the set.

(5) Sources for such sets are second-hand dealers, relatives and garage sales, etc. If you ask "does the set work" and are told "yes", never assume that the set does work properly, if at all. If the owner wants to demonstrate it, get them to do this before you buy. If it starts to smoke, leave it. If it sounds distorted it could be OK, providing it is switched off pronto – if you really want that set (this can be a

Fig.1 (below): no, this is not the circuit of the AWA 467MA but the 449MA which is very similar. The 6BV7 is a double-diode pentode, with the pentode used in the audio stage. Its cathode uses "back bias" with about 4V being developed across the negative supply return resistor, R14.





This was the under-chassis view before restoration. All the black “moulded mud” paper capacitors were replaced with ceramic and polyester capacitors.

bargaining point too). Don't expect the dial lamps to work.

(6) The set you select should not be a midget, as parts are crowded in them, making access for the new recruit difficult.

(7) A “hand-span” dial on the receiver will mean that no dial cord stringing will be required. This is not essential but it does make the first job simpler. The set described in this article has a relatively simple dial-cord drive.

(9) The set should be a broadcast band only set, with a maximum of three or four controls.

(10) Once you've obtained a suitable receiver, it is desirable to get as much servicing data as possible, before you start work on it. This is available from the Historical Radio Society of Australia or the New Zealand Vintage Radio Society.

Tools and instruments

You will need a collection of basic tools and instruments for servicing and restoring receivers, although most electronic enthusiasts would already have these. You will need a soldering iron and solder and a digital multimeter (DMM) with $10M\Omega$ input impedance. Don't go for the cheapest of DMMs as you really do get what you

pay for. An analog multimeter with a sensitivity of at least $20k\Omega/V$ is OK for most measurements too, although in high impedance circuits such as the AGC system its readings will be erroneous.

You will need a small collection of hand tools, including small-to-large flat blade and Phillips head screwdrivers, long nosed pliers, side cutters and small adjustable spanners.

This is a basic list and these items will usually be all that you will require to get a receiver going, but not to its peak. Additional tools, instruments and bits and pieces will be required as you gain experience.

Restoring the AWA 467MA

The description that follows is a good procedure for restoring vintage radio receivers. The methods described in this article achieve a reasonable end result with not too much effort.

Time to start: I never turn on a radio before I have dismantled it and made a number of checks inside to ensure it is safe; smoke signals from the set may herald an expensive restoration. So take the chassis out of the cabinet and put the cabinet to one side.

I had a problem getting the knobs off. They had been put on with some

sticky green gunk which had become semi-solid. The knobs are a slide-fit with a circlip providing pressure to hold them on. I was able to put my fingers under the edges of the knobs and gently ease them up and off the shafts.

Sometimes it isn't possible to do this and I may resort to using two screwdrivers, one on either side of the knob to gently ease it off the shaft. Make sure that even pressure is applied on both sides or the knob may break – broken knobs are not easy to replace.

Then it is time to carefully inspect all the electronic works. The dial cord was checked and found to be intact, however the cord is often broken. If it is broken, it may be evident how it was strung, sometimes not. Get help here as each set is different. If your set has a “handspan” dial there is no dial drive system, which makes things easier.

Cleaning & lubrication

I dislike working on a dirty chassis, so I cleaned all the top and bottom of the chassis and the mounted components with a small paint brush. If you have access to an air compressor you can blow most of the dust and gunk out but be careful around the tuning

gang; close the vanes before doing anything near it. Don't blow compressed air into the gang at close quarters.

If the chassis is really dirty, a kitchen scouring pad (not steel wool) soaked in household kerosene will do a good job of getting the grime off. If need be, cut the pad up into strips to get into awkward places. The kerosene tends to act as an anti-rust treatment. Wipe everything clean with a rag.

I then lubricate the pulleys and the shafts of the various controls with sewing machine oil. All of the controls must move freely. The figure-8 power cord fitted to most sets of this era is often quite dirty. To clean the cord I run a small screwdriver down each groove in the cord to loosen the gunk. I then clean the cord with a rag soaked in methylated spirits.

Usually the power cord comes up OK but if not, it is not expensive to replace the power cord completely. It is a good idea to check the power plug at this stage too. It should not be damaged. Older plugs which allow access to the live wires on the underside should be replaced – those older plugs are really quite dangerous.

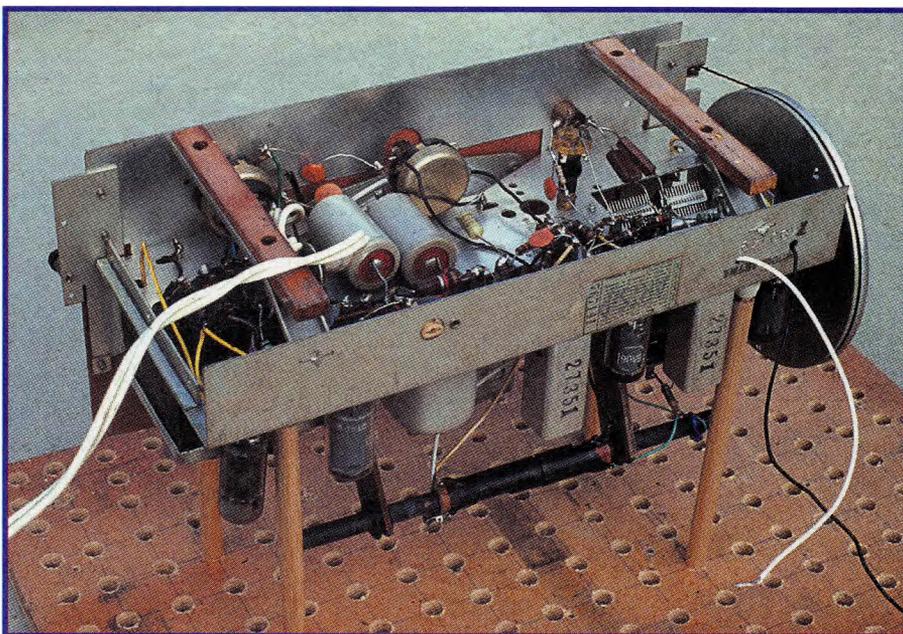
I remove all the valves and clean them. If they are miniatures (ie, all glass construction), I clean them up with soapy water, rubbing the muck off with my fingers. Be careful not to rub off the valve identification. I rinse the valves under clean water and allow them to dry.

Octal valves with Bakelite bases must not be immersed in water; soapy water residue in the valve bases is likely to cause trouble. Hence, only clean the glass top of octal valves and then let them dry. They come up looking like new.

Underneath the chassis

The next task is to see what things are like under the chassis. I have made up a stand to mount upturned radio chassis on and this has been described in a recent article. It does make servicing a whole lot easier. With the set mounted on the servicing jig, all the components were carefully inspected.

The black "moulded mud" paper capacitors were replaced with ceramic and polyester capacitors. It isn't always easy to just desolder components as they often have their leads wound around and through terminal points. If they can't be desoldered eas-



Sitting the receiver on a servicing jig makes it easier to inspect and service.

ily it will be necessary to cut them out, unfortunately. As a newcomer it is much easier to replace all units rather than try to test them.

An important tip – remove and replace only one component at a time, as it is very easy to forget which lead goes where.

It is not my usual policy to replace all paper capacitors, just those that are in critical locations and leaky – usually around half of them. Despite the physical damage to several of the capacitors in this radio, cracked ends in particular, they generally had much less leakage than normal as tested on a high-voltage tester.

All replacement capacitors should have the same values and voltage ratings as the originals, although I often use 50V ceramic capacitors in the AGC circuit, at the volume control and as cathode bypasses, as the voltage across them is quite low. The lowest voltage paper capacitors were 200V.

The wiring will probably be in plastic covered hook-up wire and should be in good condition. I tested all the resistors in the set and two were found to have gone high in value and out of tolerance.

In most cases, the resistors can be tested in circuit. However, quite often there are parallel paths with other resistors which give erroneous readings. In these cases it is necessary to unsolder one of the leads from the circuit and test across the resistor. It is desirable to know the colour code for

resistors or have access to a resistor colour code chart.

I checked the dial lamps and replaced them. If they test OK but the glass is blackened, replace them anyway as they won't have a lot of life left.

Checking for shorts

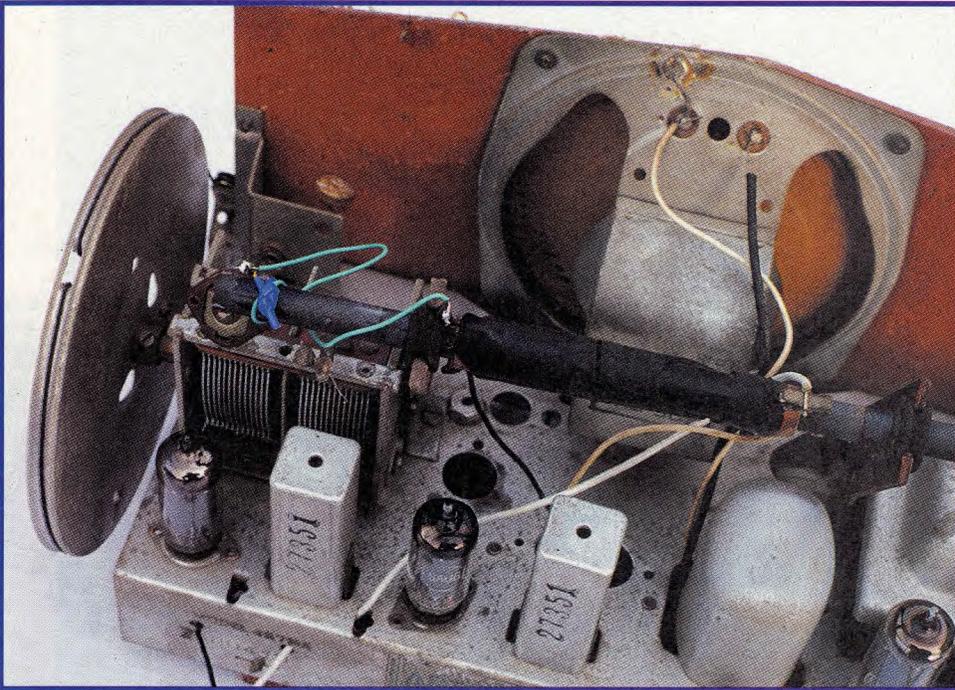
Now an important test. With a DMM set to a high Ohms range measure between the chassis and the Active and Neutral mains leads. There should be a very high reading (many megohms) or over-range. This is not the best method of checking that the power transformer insulation is good but it does check for direct shorts.

Use a safety switch

The DMM resistance check is handy but it is more practical to obtain a Safety Switch (RCD, earth leakage detector or whatever you like to call them) as it will quickly detect any dangerous leakage to earth in anything attached to it. Note too that **dangerous voltages are present in valve receivers, so don't touch any part of the circuit while a set is switched on.**

To test the receiver, attach an earth lead to it, connect it up via the Safety Switch and apply power. If there is dangerous leakage the device will trip, removing power before damage is done to anything or anyone. I use one all the time and I strongly suggest that you do too.

All being well, which it is 99.9% of



This above chassis view shows the modification which was necessary to peak the loop stick tuning at the low frequency end of the dial.

the time, I then turn the power on with the dial lamps installed but no valves in the sockets. I run the set for perhaps half an hour and check the transformer for heat rise. It should just be above cold; certainly not hot.

Testing the power supply

I then switch off and check with the multimeter (using one or more ohms ranges) that there is no short circuit between the high tension (HT) line (the plus terminal of the first electrolytic capacitor) and the chassis. It should not be lower than around 47k Ω . If it is, I check to see why and correct the problem. A shorted capacitor (eg, one of the electrolytics) is a likely source, as the paper capacitors have already been replaced.

Next, I set the multimeter to a high DC voltage range and connect it across the HT rail using insulated clip leads. I then fit the rectifier valve but leave all the other valves out.

The next step is to turn the set on and observe both the rectifier and the multimeter, as the rectifier warms up. All being well, the high tension (HT) voltage will rise quickly as the valve warms. If it doesn't, look at the rectifier; if its plates are glowing red, you have a short that has developed with the application of voltage.

The way to check this is to switch off and disconnect each of the electro-

lytic capacitors and see what happens when power is reapplied. If there are still problems, the rectifier may be faulty or there is some other voltage-dependent short. It will eventually be found, by progressively disconnecting bits and pieces. **Warning: make sure that the voltage on the HT rail has fallen to a very low value before disconnecting the electrolytics; ie, they must be discharged.**

Forming the capacitors

Having sorted out any shorts, it is quite likely that the electrolytic capacitors may need forming – the more modern ones don't need much attention in this regard. "Forming" is the development of an insulating dielectric layer in the capacitor with applied voltage. This layer deteriorates over a period through lack of use.

Turn the set on again and observe the voltage rise until it nearly stabilises. Now turn the set off and observe how quickly the voltage disappears. Initially this is fairly quickly. Leave it about a minute and go through the same procedure again. Do this several times, until such time as the voltage drops quite slowly – providing there is no bleeder resistor from the high tension to chassis.

If all appears well, leave the set to run for a few minutes, turn off and then feel each of the electrolytic

capacitors. There should be little or no increase in temperature. If there is, that capacitor has excessive leakage current and should be replaced.

In this set, the capacitors formed up quite quickly, so none required replacement. However, they could still require replacement if hum becomes evident in the audio.

To check if an electrolytic capacitor has lost its capacitance, try bridging a similarly rated capacitor across the one that you are checking. Remember that electrolytic capacitors are polarised and must be connected positive to positive, and negative to negative or the capacitor may be ruined. If the hum disappears when you bridge the suspect capacitor, it proves that it is defective and should be replaced.

Checking the audio stage

The AWA 467MA has only one audio stage, a 6BV7. I check that the speaker transformer primary has continuity between the plate and the high tension (HT) output of the supply. Make sure the set is off and that the HT voltage has dropped to zero before connecting your multimeter (switched to Ohms) across the transformer. The reading will usually be in the range 300 Ω to 500 Ω . If there is no continuity, the speaker transformer will need to be replaced. Faulty speaker transformers are common, unfortunately.

Next, I reconnected the test leads across the HT to chassis and set the multimeter to a high DC volts range again. I fitted the 6BV7 valve with the set turned off and then turned it on. As expected, the DC voltage was not as high now, as the valve was drawing current. To check the current, turn off the power and connect the multimeter across the back bias resistor – ie, the one from the transformer centre tap to earth.

Most of the last valve sets used back bias and in this particular set, the bias voltage developed is around 4V. With a 6M5, it would have been up around 7V and with a 6V6GT or 6AQ5, it would be around 12V. All the tests so far had been quite successful.

Alignment

The next step I take is to install the remainder of the valves and connect an aerial and earth. Once the set warmed up, there were signs of activity and I was able to tune in a number of stations. I check the tuning range

and the intermediate frequency (IF) response with a signal generator. As a newcomer, it is unlikely that you will have one, hence it is desirable to leave the alignment alone or if possible take it to another enthusiast and ask him/her to align the receiver for you.

In this receiver, I found that the IF response was slightly out and it was adjusted for optimum performance. I did run into trouble with the loop stick aerial coil adjustment at the low-frequency end of the dial. The coil is held in position on the rod with some sticky gunk. It had gone very hard and I could not shift the coil along the rod to get peak performance at that end of the dial.

In one of the photos, it can be seen that I have added some wire and wound it around the rod to peak the performance. It was necessary to wind one turn of wire on the rod in anti-phase to peak the performance. This was a messy job but the end result was improved performance. The technique for doing this will have to wait until another time.

A sparkling cabinet

This set's cabinet was in good order so it didn't take a lot of work to make it look loved again. I usually wash the plastic cabinets in warm soapy water in the laundry sink. If the cabinet has any transfers in it such as valve placement or similar, try to make sure that they don't get wet or they may disintegrate. Often receivers of this vintage have had the odd sticky transfer put on them by the teenagers of the family

and these need to be soaked off.

A nail brush or an old toothbrush makes an ideal scrubbing tool to get the gunk off the surfaces. The knobs usually respond to a good scrub too. Once they're thoroughly clean, rinse them in clean water and leave to dry.

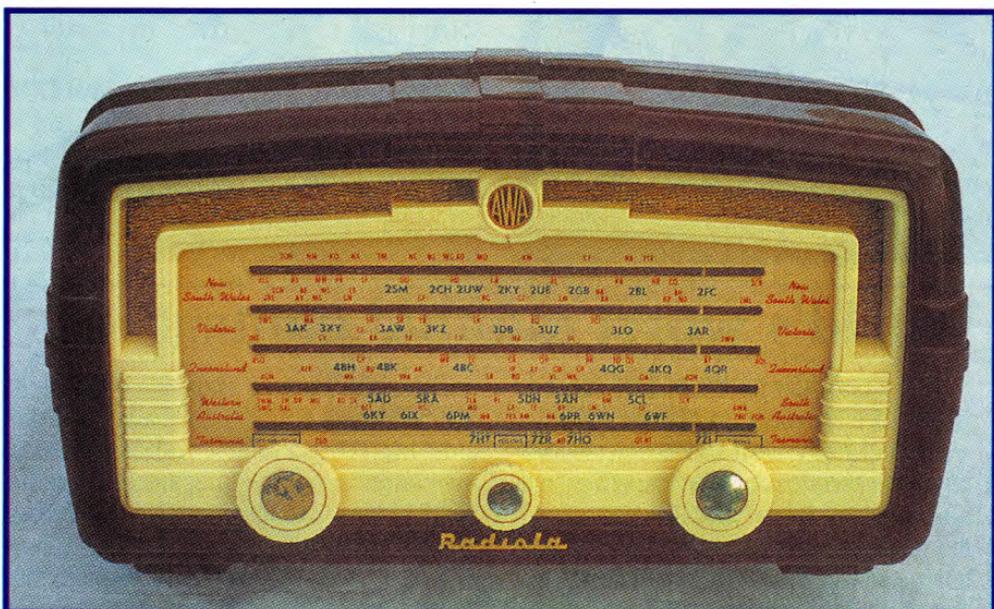
Once dry, the clean but dull looking cabinet and knobs need a dose of automobile cream cut and polish. Read and follow the instructions on the tin and the end result will be a sparkling receiver cabinet.

Summary

You may have noticed over the time I have been writing these articles that I seem to have very few nasty faults in sets. I believe this is because the faults have been removed by replacing components that are usually faulty and not turning the set on until all of these things have been attended to.

In the later period of valved equipment, valves proved to be quite reliable. I average around none to one valve per set restored. The old saying in the valve days was "it's probably just a valve". However, I have found the most likely fault to be a leaky paper capacitor.

With everything operating and clean, it is just a matter of putting the chassis back into the cabinet, putting the knobs on and standing back, admiring and listening to your first restoration success. As time goes by, you will become more venturesome and will restore some very elaborate pieces of our radio history, but you won't forget your first restoration. **SC**



Car polish and elbow grease result in a pristine appearance, adding to the satisfaction of a restored receiver.