Vintage Radio

By Associate Professor Graham Parslow

The 1948 AWA model 517M mantel radio

Designed for the budget end of the market, the AWA model 517M is a conventional 4-valve radio that was produced just a few years after the end of WW2. Restoring this one proved to be quite a challenge.

In 2008, I acquired a 1946 AWA model 500M (the prelude to the 517M) which I regard as a classic of simple design. It's the same size as the later model 517M and its components and layout are almost identical.

The older 500M is a 4-valve mantel set with two conventional front control knobs for tuning and volume. A problem with this design is that dial string drive between the tuning capacitor and the dial indicator is unreliable. In use, the dial indicator has a tendency to slip out of alignment with the tuned station.

This was corrected for the model 517M which has concentric control knobs at the centre of the dial. In this model, the outer dial knob is solidly geared to the tuning capacitor, so that sweeping the dial through 300° reliably rotates the vanes of the tuning capacitor through the required 180°. The centre knob controls the volume.

In addition, the 517M's case differs from the 500M's by having a domed top and a more elaborate speaker grille pattern.

The radio featured here was acquired at an auction. It was sold as damaged and had a long crack in the top of the cabinet. In addition, a rather large chunk of the cabinet was missing. There were also smears of paint and other foreign material on the cabinet which further detracted from its appearance.

As can be imagined, the bidding wasn't highly competitive and I was able to obtain the radio at a moderate cost. In spite of its damaged and dilapidated appearance, I was confident that it could be restored to full working order.

Circuit details

Fig.1 shows the circuit details of the AWA Radiola 517M. It's a conventional superhet with a 6A8 mixer-oscillator, a 6G8 IF amplifier/detector/AGC stage, a 6V6 output pentode and a 5Y3 which provides full wave rectification to produce the HT rail. The design provides grid bias by connecting the mains transformer's HT secondary centre-tap to earth via a resistor network, a technique which eliminates the need for bypass capacitors on the valve cathodes.

One feature omitted from the circuit diagram is the simple "top-cut" tone control that's located at the rear of the chassis. This consists of a 0.02µF capacitor and 500kΩ potentiometer connected in series between the plate of the 6V6 and earth.

Restoring the case

The crack in the top of the case had previously been glued but the bond had completely failed. It was re-glued, this time using PVA glue. PVA is not an intuitive choice for this type of repair but experience has shown that the bond is more enduring than for other glues. A possible explanation for this is that aqueous PVA penetrates the Bakelite filler (often sawdust) more completely and as a bonus, it leaves only a slight amount of external residue.

PVA adhesive works by tangling polymer molecules together to link the materials being bonded. No chemical change is involved; it simply dries out, so the gluing is reversible.

The glued crack was subsequently

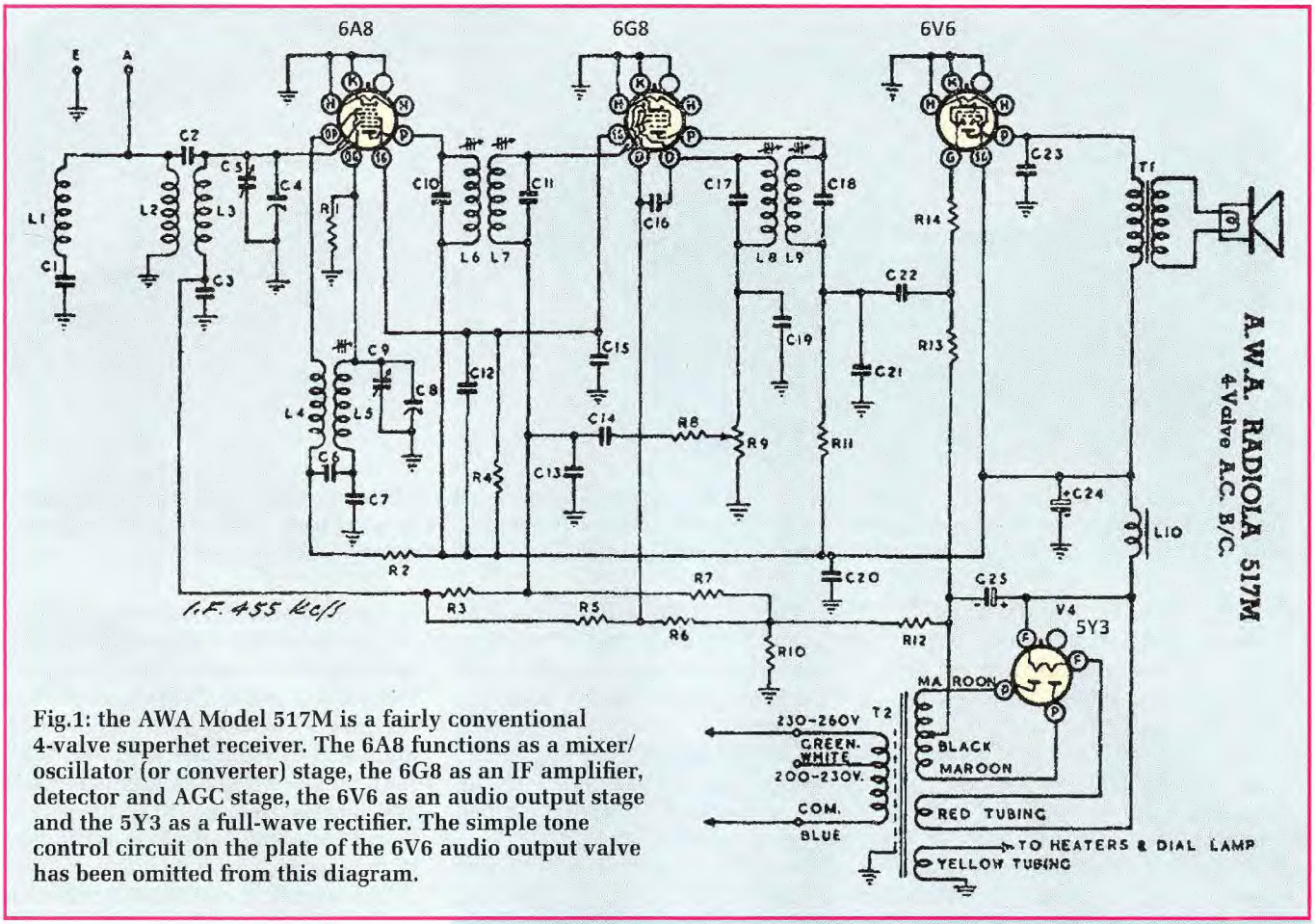


Fig.1: the AWA Model 517M is a fairly conventional 4-valve superhet receiver. The 6A8 functions as a mixer/oscillator (or converter) stage, the 6G8 as an IF amplifier, detector and AGC stage, the 6V6 as an audio output stage and the 5Y3 as a full-wave rectifier. The simple tone control circuit on the plate of the 6V6 audio output valve has been omitted from this diagram.

covered with grey car filler putty and sanded back to a smooth surface. I initially made the mistake of using wet and dry abrasive with water, as I had wrongly assumed that the grey putty would provide an impervious barrier. Unfortunately, water seeped into the crack and dissolved the PVA glue, causing the crack to open up again. As a result, I had to redo this repair.

It was not immediately obvious how the large section missing from the side and base of the cabinet was going to be replaced. The base has two moulded strips running from front to back that act as feet under the case. One of these feet only had the front half remaining, so something had to be done to provide a serviceable base.

In the end, the solution was to cut out a base of 3-ply that would look like an extra moulded layer under the radio. Contact glue was used to fix this new base in place, after which 2-part car-filler (bog) was used to fill the gaps between the ply and the original feet.

Once the new base was in place, filling the hole left in the side of the case was straightforward. A section cut from a plastic cylinder was taped to the inside of the gap and bog applied from the outside using a spatula. This bog was roughly crafted to the final shape but well proud of the wanted profile.

The AWA 517M's cabinet was in poor condition when received, with a large crack in the top and a large piece missing from the bottom and one side.

After allowing it to set for 20 minutes, a rasp was then used to further shape the profile, so that it was very close to what was wanted. It was then just a matter of using some spray putty

At left is another view of the damaged cabinet while the view at right shows the unit with repairs well under way. The bottom of the case was repaired by gluing a new base made from 3-ply under the existing base, while the hole in the side was filled using a section cut from a plastic cylinder. Car-filler "bog" was then used to fill the gaps.

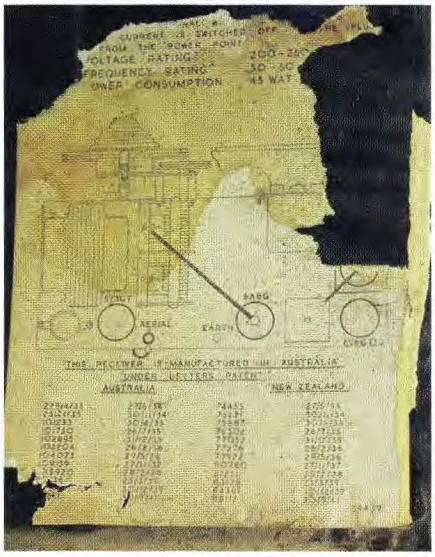
and sanding to give the final finish.

Unfortunately, restoration to the original mahogany Bakelite finish wasn't a practical option. However, the model 517M came in a number of other attractive colours, so spray-painting the case was the obvious answer.

I wanted a light colour and previous experience has shown the value of starting with a light undercoat. The case was therefore sprayed with white undercoat inside and out. I was keen to try vivid yellow and I applied an experimental coat to the inside of the case. My wife said "yuck" to yellow so I reached for a spray can of Heritage Cream and this turned out to be a good choice.

The rusty-red speaker grille cloth that came with the radio had faded strips and had also frayed at the edges. Fortunately, some speaker grille fabric I'd purchased from Mack's Electronics in Rundle St, Adelaide during the 1960s had an appropriate yellow and brown pattern combination and, in fact, was similar to some of the patterns used by AWA.

A piece of this cloth was cut to size and glued to the inside of the case, giving a flush finish. This gave a better appearance than the original mounting method, which involved attaching the cloth to a cardboard baffle that was riveted to the frame of the 5-inch speaker.



This tattered manufacturing label was attached to the inside of the cabinet. It clearly shows the connection between the 6A8's top grid and the tuning gang.

Chassis restoration

The chassis on the old model 517M was rusted and dusty, so it wasn't only the case that had suffered with age.

My first step was to remove the valves and here I got a surprise. Instead of a 6V6 output pentode, this radio had a 6AU4 installed. So was this an equivalent? The answer is a resounding "no". It's not even close because the 6AU4 is a single plate, half-wave rectifier that was used in high-current applications in early TV sets. It had simply been plugged into the 6V6's socket to give the appearance of a full complement of valves!

Another strange "modification" involved a connection between the 6A8's top grid and the antenna post. Fortunately, establishing the correct connection to the tuning capacitor was easy. It was just a matter of referring to the tattered layout diagram that had been glued to the inside of the case.

The top of the chassis was thoroughly cleaned and any corrosion rubbed back with abrasive paper. The rusted sections were then covered with metallic silver paint. This sacrificed the original stencilled chassis lettering and the ARTS&P label. As a result, reproductions were computer-generated and printed onto acetate transparencies before being attached to the rear of the chassis.

The earlier model 500M had two narrow straps of metal running under the chassis from front to back to reinforce the structure. These also acted as anchor points for the screws which fastened the chassis to the case.

By contrast, in the 517M, a pair of wrap-around end sections are attached to the chassis to serve the same functions. This more substantial metalwork also provides extra shielding, the only disadvantage being that a significant number of components cannot be accessed without removing these brackets (not too difficult, fortunately).

Component replacement

All but one of the components looked original, the exception being the second HT electrolytic filter capacitor. This had obviously been replaced at some stage.

The low-value capacitors were each sheathed in a one-piece moulded pitch case. This is arguably superior to the earlier style end-filled pitch case with a cardboard cylinder as a cover. Even so, after many years, the pitch contracts and splits and a number of cracks were visible in some of the capacitor cases (and in coil cases).

Because it has a high voltage applied

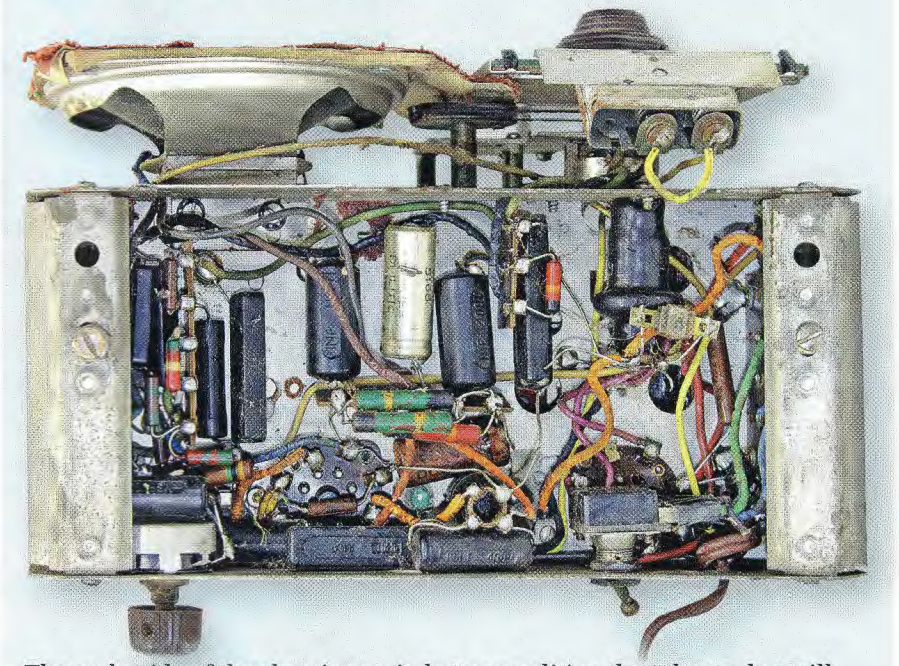
across it, capacitor C22 was replaced as a matter of routine. This capacitor couples the signal output from the 6G8 to the 6V6 audio output stage.

The model 517M has a rear-mounted DPDT switch for the mains and this was used to switch both strands of the original twin-core mains flex. This is clearly superior to single-pole switching which could result in 240VAC mains Active being connected directly to the transformer (the conventions for connecting Active and Neutral to sockets were not introduced until the 1950s). This DPDT switch was retained when the original twin-core mains flex was replaced with a 3-core mains lead. This new lead was firmly clamped inside the chassis and allowed the chassis to be securely earthed, in the interests of safety.

The original first HT electrolytic was mounted above the chassis adjacent to the power transformer. This was left in position to maintain the set's appearance but was disconnected and a new 33µF 450V electrolytic wired into place under the chassis.

One thing that did puzzle me was what looked like the end stub of a capacitor connected to earth. A bit of circuit tracing showed that C3 (0.05µF) was missing and may even have exploded. The other end of C3 connects to the aerial coil and a short pig-tail stub was evident on one of the aerial coil lugs. A new 0.047µF 630V capacitor was fitted in its place.

This view shows the top of the chassis before restoration. A 6AU4 had been fitted in place of the 6V6 output valve but it is completely unsuitable for this role since it is a half-wave rectifier.



The underside of the chassis was in better condition than the top but still required work. Note the crude knot used to restrain the original twin-flex mains cord (now illegal).

Powering up

Now for a smoke test. As a precaution, the set was initially powered up without the valves and this produced a steady power consumption of 8.2W which was about what was expected. This figure increased to just 13W when the valves were subsequently installed and there was no HT.

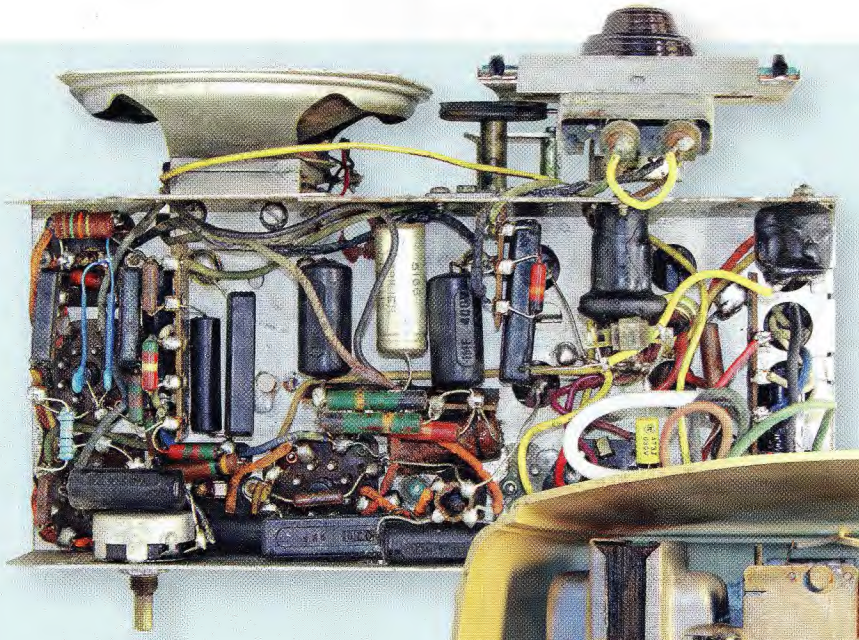
The problem was easy to diagnose; the 5Y3 rectifier's heater had gone open circuit. Replacing this valve restored the HT and increased the set's power consumption to a more reasonable 48W.

The set now worked but there was a disconcerting high background noise in the audio due to electromagnetic interference (EMI). This was quickly traced to a bank of mains-powered LED lights in an adjacent room and the solution was to simply switch them off.

However, although the set was working, there were clearly problems. It was exhibiting erratic changes in volume, a persistent background noise was still evident and the loudspeaker rattled at high volume. I began by checking the voltages on the 6V6. Its plate was at 248V, the screen was at 261V and the grid was excessively negative at -15.8V.

As a result, the grid voltage was reduced to -11.7V by adding a 560kΩ resistor in parallel with R13, the aim being to avoid operating the 6V6 non-linearly and thereby reduce the distortion. This raised the set's power consumption to 51W but it hardly altered the poor sound quality.

The rattle could be controlled by putting finger pressure on the back of the speaker cone. Removing the riveted front baffle immediately revealed the cause of the problem. The entire circumference of the speaker cone had come adrift and was rattling against the frame when the set was operated. Reattaching the cone to its frame with craft glue stopped the rattle.



Left: an under-chassis view of the unit after restoration. Despite the set's age, only a few parts required replacement

Below: the fully-restored chassis after it had been fitted into the repaired (and repainted) cabinet. The ARTS&P label was reproduced on a computer and printed onto an acetate transparency before being affixed to the rear of the chassis.

Below: a top-side view of the fully-restored chassis. An additional metal shield was later added adjacent to the 6G8 IF amplifier/detector valve to reduce the set's sensitivity to electromagnetic interference.

The erratic sound level problem appeared to come and go when I prodded R11 (16kΩ), C19 (200pF) and C21 (0.001µF). All were replaced but the erratic sound level variations continued. Further prodding then cast suspicion on the wiring between the antenna post, the antenna coil and the oscillator coil. This wiring was replaced but the set still continued to misbehave.

It was time to be to analyse the fault a bit more carefully. The power consumption remained constant during the set's erratic performance so I figured that it was probably a component in the audio signal path. And that proved to be the case; the faulty component was capacitor C14 which feeds audio to the volume control's wiper via series resistor R8. It had a crack around one end of its case and prodding almost anywhere in the radio was enough to cause the erratic volume changes.

In fact, the crack had penetrated so deeply that the faulty end of the capacitor broke away as it was being removed.

Fixing the EMI problem

The set's sensitivity to EMI was annoying and the cause was poor shielding of the 6G8 IF amplifier valve. In fact, some valve radios completely fail to function without shielded IF stages.

Hence, a supplementary shield was fitted around the 6G8 and soldered to the side of the chassis. This proved to be quite successful, as the sound quality was much improved and the set now turned in quite a good performance.

So that was another vintage radio rescued from the scrap-heap. Restoring it was quite a challenge but it was well worthwhile. SC