

VINTAGE RADIO

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Restoring a B15 mantle radio with some interesting faults

Just when you think that you've seen all the faults possible in vintage radios, another one suddenly pops up to shatter that sense of complacency. Such was the case with an AWA B15 1960s "plastic" mantle set that I restored recently. It had an interesting problem that lies dormant in many sets.

A friend recently asked me to do up a rather dilapidated AWA B15 5-valve mantle radio that he had acquired. Apparently, the set once belonged to a farmer and by the look of it, had spent many years in a shed gathering dust, grease, grime and the odd mouse

dropping along the way.

Obviously, the first step in the restoration process was to give the set a thorough clean-up. This meant removing the chassis and stripping all other parts from the set, so that the cabinet could be scrubbed in soapy water.

After quite a bit of elbow grease, it scrubbed up quite well, as can be seen in the photos. Unfortunately though, the cabinet had several broken mounting posts. This prevented both the back and the loudspeaker from being properly secured.

As luck would have it, I was able to raid another scrap B15 for missing screws and a few other minor pieces. The back of the set is normally fastened by four metal-thread screws – two at the bottom into the chassis and two into threaded metal sleeves embedded in plastic posts. It was one of these posts that had broken.

To fix this problem, I fitted the metal sleeve into the base of the broken post and glued it in place using a small amount of 5-minute Araldite. I then made a larger sleeve out of paper and fitted it over the metal sleeve. Another batch of 5-minute Araldite was then made up and poured between the two sleeves. Some of this oozed out the bottom, making a wider area for the glue to grip.

Once this batch had set, another small amount of Araldite was mixed up and poured between the sleeves to build the post up further. It was a bit of a messy job but the end result was quite satisfactory. The owner wasn't after a meticulous restoration job – just a set that looked good and worked well. And of course, cost comes into it too.

The mice had been hungry and had devoured a section of the speaker cone. Despite this,



The AWA B15 is a 5-valve mantle set from the 1960s. The plastic cabinet caused a few restoration problems, as some of the internal mounting posts had broken.

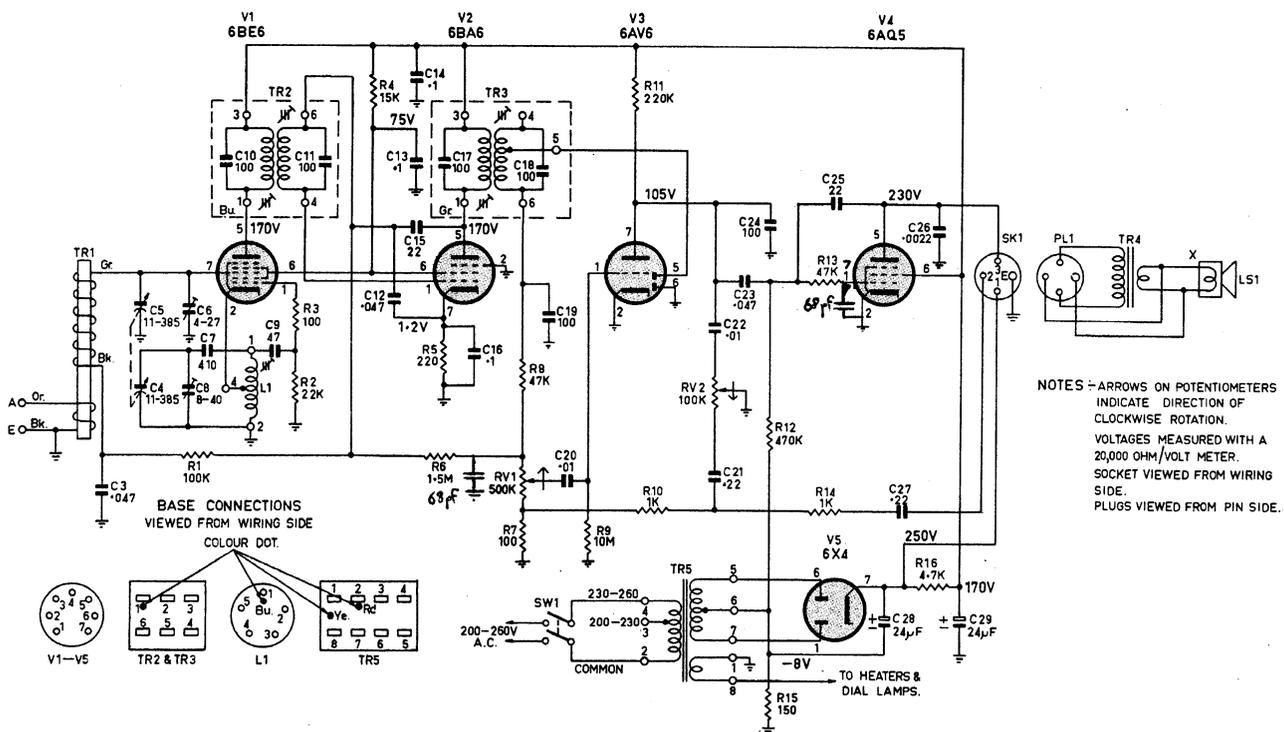


Fig.1: the circuit of the AWA B15 mantle radio set. The two hand-drawn 68pF capacitors were added to improve filtering of the 455kHz IF.

it still sounded OK after it had been cleaned, with no audible poling of the voice coil. It was repaired by “gluing” a piece of writing paper over the 25 x 25mm hole, using clear nail polish. Nail polish easily soaks into porous materials and is quite a good “glue” for this type of repair.

The repaired speaker can be seen in one of the photos. It may not be a joy to behold but it works well – particularly as price was an important part of the whole deal.

Unfortunately, two of the loud-speaker mounting posts had also been broken – a common problem with these sets. This meant that the loud-speaker had to be secured using just two retaining clips and mounting posts. The other two support posts were then attached using Tarzans Grip. There was just no other economical way of attaching the loudspeaker to the front of the cabinet.

Paper capacitors

UCC brand paper capacitors had been used throughout the set and these were all found to have significant leakage. All were replaced except for C14, C16, C21 and C27, as these four capacitors could have significant leakage

without affecting the operation of the set. Once this work had been completed, the set “worked” but its performance was rather poor. Clearly, it needed more work to bring it up to scratch.

A close examination of the chassis soon revealed that someone in the past had replaced R11 (220kΩ) with a 100kΩ resistor. This resistor had altered the operating conditions for the 6AV6 (V3), so it was replaced with the correct value.

Next, I discovered that the HT voltages from the power supply were rather low. A replacement 6X4 rectifier valve soon livened things up by increasing the HT voltage, after which the set was beginning to show some promise.

Alignment

My next step was to carefully check the set’s alignment. The IF (intermediate frequency) stages were found to be close enough for all practical purposes, although a tweak did give a bit of a lift in performance. The oscillator stage was a different story. It was about right at the low frequency end of the dial but was miles out at the top end. This meant that the oscillator trim-

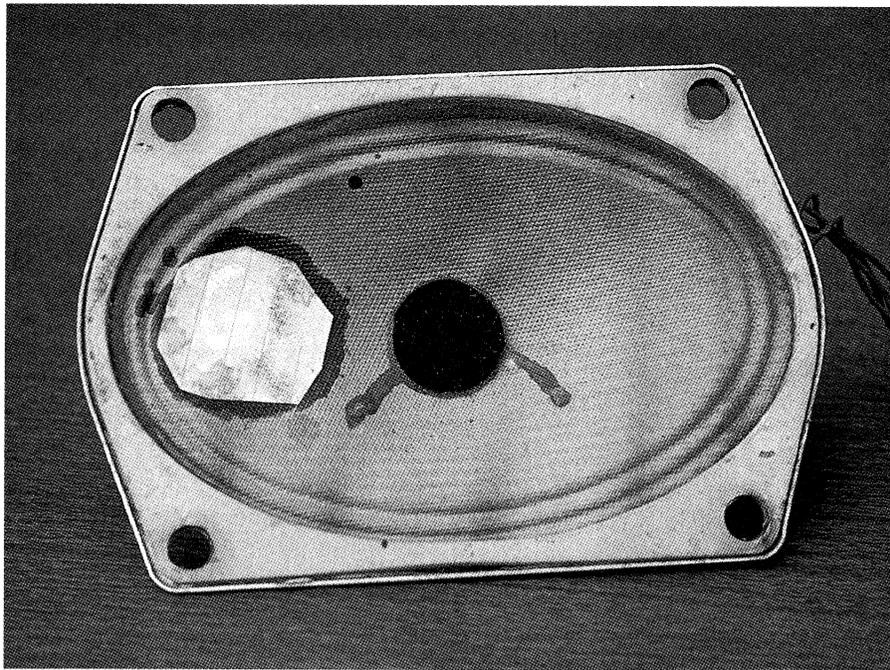
mer had to be wound in, so that the stations appeared at the correct places on the dial.

In order to detect the peak output (and thus the correct alignment point), I attached a digital voltmeter across the AGC filter capacitor (C3 in this case). This allowed me to measure the AGC voltage developed when a reasonably strong input signal was applied to the set.

Having set up the voltmeter, the antenna coil was slid along the ferrite rod and adjusted for peak output with the set tuned to 621kHz. The antenna trimmer was then adjusted for peak output at around 1450kHz.

After all this effort, the performance was still not really all that marvellous. What else could be checked? First, I tried replacing the 6BE6 and 6BA6 RF & IF amplifier valves (V1 & V2) and found that this lifted the performance noticeably. I also found that the back bias across R15 was low, so a fresh 6AQ5 (V4) was tried. This noticeably increased the back bias, along with the audio output level.

The set was now better but still had a couple of problems. The first was an intermittent fault, the set working quite normally and then abruptly



The loudspeaker cone was patched up by “gluing” a piece of writing paper over the 25 x 25mm hole, using clear nail polish. It might look a bit rough but the speaker still works well.

changing volume. It appeared to be slightly sensitive to movement and eventually, after some judicious prodding around with the insulated handle of a small screwdriver, I discovered that C16 was the culprit. One tap dropped the volume; another brought it up again.

I should have known – another UCC capacitor. Not only did the UCC capacitors of that era go leaky, they also went intermittently open-circuit. Once this was replaced, the volume remained constant but the set still wasn't right – it tended to oscillate at the low frequency end of the dial and the sensitivity didn't seem to be what it should be.

I was puzzled about this, as everything in the set appeared to be correct. However, I then remembered that I'd had problems with several of these sets in the past, due to the 455kHz IF signal radiating back into the input (and also causing interference in other sets). I had previously cured this problem by connecting a 68pF ceramic or mica capacitor between pin 7 of the 6AQ5 and earth and adding a similar capacitor between the top of the volume control (RV1) and earth.

Once again, this approach did the

trick – in fact, the instability at the low frequency end of the dial disappeared as soon as I connected a 68pF capacitor from pin 7 of the 6AQ5 to chassis. This also improved the sensitivity to the extent that a signal of just 1μV was useable. Readers should note, however, that the amount of improvement achieved by this minor modification may vary from set to set.

After that, it was simply a matter of reinstalling the chassis in the cabinet and giving the set a final soak test. The set ran very well and the owner was happy with the result.

Insufficient filtering

Why did the extra 68pF capacitors make such a difference? A glance at the circuit reveals that very little filtering of the 455kHz IF signal takes place after the detector. In fact, only C19 and C24 provide any degree of filtering and they don't do much. In effect, the unwanted 455kHz IF signal being fed to the audio amplifier was de-sensitising the whole set!

C24 (100pF) is relatively ineffective where it is and would have achieved a better result if it was connected between the grid of the 6AQ5 and chassis. C22 provides some filter-

ing when the tone control (RV2) is in the “bass” position but has no effect when the tone control is wound towards the “treble” position.

You might think that V3 and V4 are only audio amplifiers and so they won't amplify 455kHz IF signals very much. However, that's not the case. Circuits almost identical to this were used as video amplifiers in valve TV sets and were capable of amplifying frequencies up to 5MHz or more, so amplifying a signal at 455kHz is no problem at all!

This means that the 455kHz IF signal should be filtered out. In fact, quite a few receivers benefit from better IF filtering, so fitting a capacitor to the grid of the audio output valve is often worthwhile. Without this modification, the AWA B15 mantle radio also causes interference to other sets in the near vicinity if they only use a loop antenna.

Summary

Some vintage radio enthusiasts would not consider a “plastic” set like this worthy of restoration. However, they are part of our radio heritage and so many find them quite collectable. That point aside, this particular set was a real mess when it arrived and it certainly had had a long, hard life. It needed a thorough clean-up, the replacement of most of its paper capacitors and four replacement valves (all low in emission) to get it up to scratch – and even then it required extra work to fix the remaining problems.

Fortunately, the coils and transformers in these sets are almost always OK, the exception being the speaker transformer which can occasionally have an open circuit primary winding.

Was it worth the effort? In terms of time and money, it was a doubtful proposition but for the old gent who owned it, the sentimental value made it worthwhile. It certainly looks a lot better than it did when it came in and it now performs very well – better than new, given the improved IF signal filtering. It is amazing how many of our manufacturers didn't quite get things right.

I have several such sets in my collection, all with the IF filter modification. They are not my favourite sets but I am quite happy to have them on display. **SC**