

# VINTAGE RADIO

By Fred Lever



## Astor HNQ Mickey 4-1/2 valve radio



**This is a plain-looking set, and as a four-valve reflex superhet, it isn't particularly good at pulling in weak stations. But it does have one interesting feature in that it uses permeability tuning, which was common in car radios but not so much in mantel sets.**

I recently purchased an Astor "Mickey" bread-loaf shaped valve radio set from a character called "Step-toe". That makes it sound like I bought it out of the back of a van in a pub parking lot, from a man dressed in a trench coat. But I actually bought it on eBay. Perhaps that is the modern equivalent of the pub parking lot...

Anyway, I was attracted to this set due to its use of permeability tuning; something I had heard about but never seen up close before. The set looked honest and most of its parts seemed to be present, except for the rear cover.

The set was described as a non-runner and even with the less-than-stellar eBay photos, I could see that one valve was white inside, denoting a loss of vacuum. But I figured that whatever was wrong with this set, I could fix. I mean, how hard could it be? So I went ahead and bought it.

The set arrived very carefully

packed into a big box; well done, Step-toe. The parts were mostly original, not having been butchered in some sort of amateur repair attempt, and overall the set appeared to be in good condition, with minimal dirt and corrosion given its age.

A closer inspection revealed that it had been serviced at some point, probably many years ago; I noted that some resistors had been changed and a couple of critical capacitors such as the audio coupling and AGC bypass had been replaced with 1980s-style units.

The output transformer had also been replaced, as the original red and blue wires were cut off close to the attachment points and new leads soldered on top. I'm guessing that all of this work had been done in the 70s or 80s, based on the components used.

### Permeability tuning

You can clearly see the permeabil-

ity tuning mechanism in the photo of the top side of the chassis removed from the case.

A traditional tuning gang looks like an evenly spaced stack of thin metal plates, often with odd-looking shapes, where every second plate is fixed and the others rotate, thus varying the overlap as one set rotates, changing the capacitance between the sets of plates. But this one looks very different, with pistons that move in and out of coils, geared to the tuning knob so that they move when it is turned.

I guess the main disadvantage of this scheme is that the pistons are quite a bit wider than a capacitive tuning gang but there must have been some reason why the Astor designers decided to use it in this set; most likely, to reduce the cost of manufacturing the set.

Permeability tuning was used in car radios because it was possible to provide push-button presets for the user's





**The inside back of the Astor HNQ. The damaged 6AQ5 output audio amplifier valve is directly right of the power transformer. The visible two-core power cable was replaced with a proper three-core cable with Earth.**

The amplified audio signal then appears at the plate (mixed with the amplified RF signal) but the RF signal is filtered out by capacitor #13 and the resulting audio is coupled to the grid of the 6AQ5 Class-A amplifier via 20nF capacitor #6 and 50kΩ resistor #26.

The 6AQ5 operates as a conventional Class-A amplifier, with a transformer (which also acts as its anode load) to couple the signal to the speaker. This part of the circuit has a very heavy top-cut filter, removing anything above speech frequency. This was necessary as, without it, the stage would become unstable and oscillate.

There is negative feedback from the speaker back to the bottom end of the volume control, with an RC filter network feeding a tap on the volume control pot. This provides bass boost at low volume settings, akin to a loud-

ness control. As a result, the set is a bass lover's delight when the audio is fed into a wide-range speaker. But when driving its own tinny speaker, the boost only serves to overcome its deficiencies.

### Fixing it up

I'm not going to claim that I "restored" this set since I didn't strip it back to individual parts and rejuvenate everything, resulting in an as-new radio. Rather, I simply got it working and gave it a bit of a spiff-up to make it presentable. So I think "fixing" is a more appropriate description. It makes me quite cross when I see sets advertised as "restored" when they still have plenty of rust and dirt evident.

Initially, before I applied any power to the set, I did some safety checks to make sure that the power transformer

insulation to Earth was intact and the windings were intact. I also fitted a three-core mains flex in place of the dodgy old two-core cable, retained with a knot.

I used a fabric-covered cable taken from an old toaster, to better suit the era of the set, and I made sure to anchor the cable properly and solder the Earth wire to the set's chassis.

While doing this work, I discovered that the power switch was open circuit. The power switch is integrated with the volume control pot, so I removed it and pulled it apart. I found that the mechanism was working fine but the contacts were severely corroded. A shot of WD-40 and then chemical cleaner fixed that problem and it worked fine after reassembly.

At this point, I had to address the vacuum-less vacuum tube. It had a crack around the base and was undoubtedly beyond my repair abilities. Luckily, I happened to have a 6AQ5 in my spares with the box marked "brand new", so I swapped it into the set.

### Testing it out

I poked around the circuit a little more looking for any suspicious shorts but seeing as I didn't find any, I plugged the set into my variac with an in-line power meter and applied 50VAC. The supply circuit breaker did not drop out and the meter hardly moved – so far, so good.

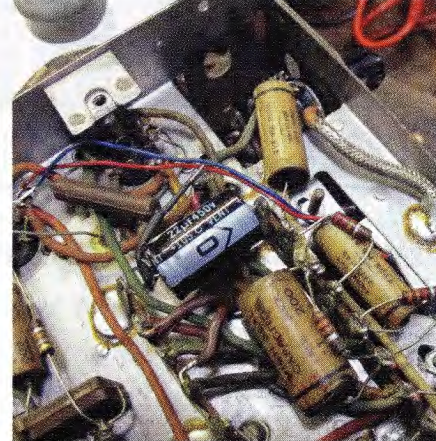
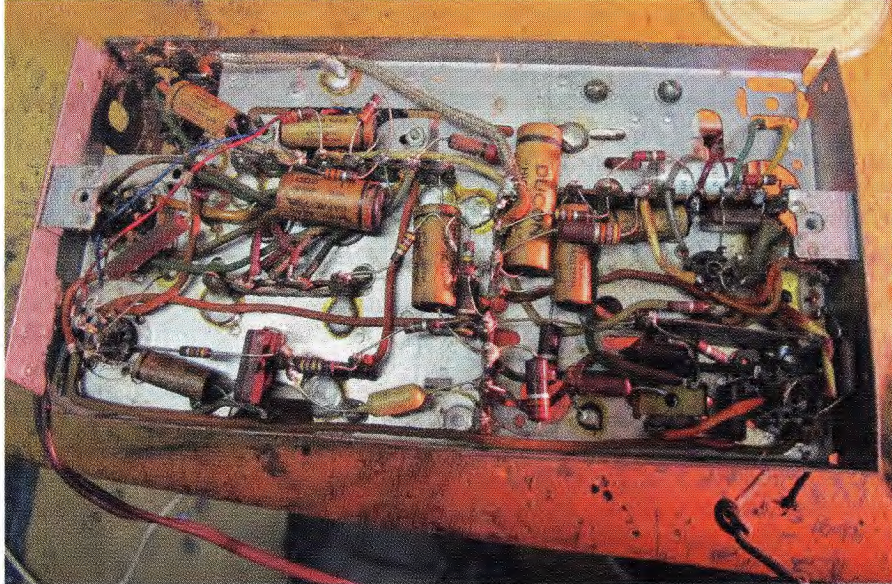
I ramped the variac up to 100VAC and was greeted by a glowing dial lamp, with some power flowing to the set. A voltmeter on the HT rail indicated 30V DC after a couple of minutes. There was no glow visible in some of the valves, so I sprayed WD-40 onto all the valve pins and plugged them back in. They all then lit up; I also noted some hum from the speaker.

I left the set running from 100VAC for about 10 minutes and then checked for any hot parts with an infrared spot (contactless) thermometer. Nothing was getting smelly hot and the HT had crept up to 70V DC. The mains power meter was reading about 20W, which seemed reasonable.

I then applied the full mains voltage and tried to tune into a strong station. I found that the set worked well as long as it was connected to an external aerial. Realistically, to use this set, you need to be in the city or surrounding suburbs so that you have access to nice strong stations and



**The contacts on the power switch/volume control (bottom left) were badly corroded; a bit of cleaning brought it back into action.**



The underside of the chassis is primarily populated by resistors and capacitors. The photo on the right shows the newly fitted electrolytic capacitor which reduces audible hum.

even then, you would at least need to string a wire around your living room (if you couldn't run a longer outdoor antenna).

Unfortunately, these days in the suburbs of Sydney, there is a lot of interference to the AM broadcast band, from switchmode-based lighting (CFLs and LEDs), poorly installed solar panel inverters, overloaded street transformers and so on. So it wasn't surprising that I needed a decent aerial to get decent reception.

### Checking its operation

I then checked all the DC voltages and found most to be as shown on the service manual circuit diagram, with -8V back bias indicating that the set had the expected current draw. The hum level was a bit high though, with HT ripple measuring about 0.5VAC at the HT 16 $\mu$ F capacitor (#18), increasing to about 2VAC when tuned into a strong station, with the audio modulating the rail!

So I fitted a new high-voltage electrolytic capacitor across #18, leaving the original in place. That drastically reduced the hum, both audibly and on the scope.

I probed the audio both at the demodulator diode output (across 250pF capacitor #14) and at the input to the 6AQ5 amplifier valve. The loss of high-frequency information due to the top-cut was readily visible upon comparing the resulting traces.

I also checked the operation of the oscillator and measured a clean ~1.5MHz sinewave at pin 1 of the 6BE6. I could also see that the mixer

was working nicely by probing the 6BE6's grid, which revealed a mix of the incoming RF signal and the oscillator signal, as expected.

With the set up and running, I popped it back into the cabinet and had a listen via the massive Rola 5C speaker. I had to shuffle both sets of controls around a bit by loosening the fixing nuts and bolts to get them in the best position to line up with the cabinet holes. The best that I can say about its sound quality is that it is "pleasant".

### Aesthetic restoration

Having established that everything was working well, I removed the chassis again and cleaned it up.

I brushed the top of the chassis with Jaycar PCB cleaner to remove the dirt and applied a bit of black paint to the rusty laminations on the power transformer. I then sprayed a light coat of Jaycar PCB clear coat over the lot, taking care not to get any of that into the tuning mechanism.

That improved the appearance of the chassis no end, so I did the same to the speaker and left them to dry while I had a go at the cabinet.

The cabinet was in good shape with just a couple of cracks and finished in a custard colour they call cream. I gave it a good wash in warm water and rubbed it back with soap inside and out. Once that was done it did not look so bad. I had considered painting it blue or red as I have done to other similar sets, but seeing I don't have a cream radio, I left this one as-is.

I removed a lot of marks and ingrained dirt spots with a good rub

over with 0000# steel wool, followed by car polish and a wool buff. This just exposed all the imperfections on the surface of the plastic, so I backed the shine off a bit by polishing the plastic with a fine abrasive pad and left it at that.

The last thing to do was cut up and fit a replacement backplate. I could not find a picture of what shape was fitted originally so I just cut up a paper template from my imagination until it fitted into the back.

I then cut a scrap of fibreboard to the shape of the template and drilled the four securing holes. Once it fitted in OK, I cut a big chunk out of the top to form a handle which also acts as a vent for hot air to escape. I then cut a few slots toward the bottom for the cords to pass through, and others to let in some fresh, cool air.

The fibreboard tends to fluff at the edges where it was cut, so I sprayed the whole thing with a couple of thick coats of automotive filler undercoat to hold it together. Then, as I had a nearly empty can of iridescent Hot Red paint, I emptied it onto the back for a bit of contrast with the case. Whether you consider the final result good or not is a matter of taste. **SC**

