Vintage Radio

BY ROGER JOHNSON

Three Healing vibrator radios

Having spent the last three months examining the operation and repair of vibrator units themselves, I think it's timely to tell the stories of some of the typical radios that they powered.

JUDGING FROM THE photos and circuits of 'Healing' radios given in the last few columns, the reader may well ask it the author is a Healing devotee. Well, it happens that by fate and fate alone, I did happen to be at various sales when Healing radios seemed to be on offer, without necessarily going out of my way to look for them. I did at one stage have about 80 of them.

I say it's by fate that I collected Healing radios, because it so happened that my late uncle sold Healing radios from his shop on The Parade, Norwood (Adelaide) in the early 1930s. I was completely unaware of this until informed by my late father some 10 years ago, as he cast a disbelieving (and disapproving) eye around my shed and noted the large number of Healings!

Be that as it may, this month's story is really about vibrator radios in general. I've simply used some Healing models as illustrations, rather than try to limit the discussion specifically to Healing sets in their own right.

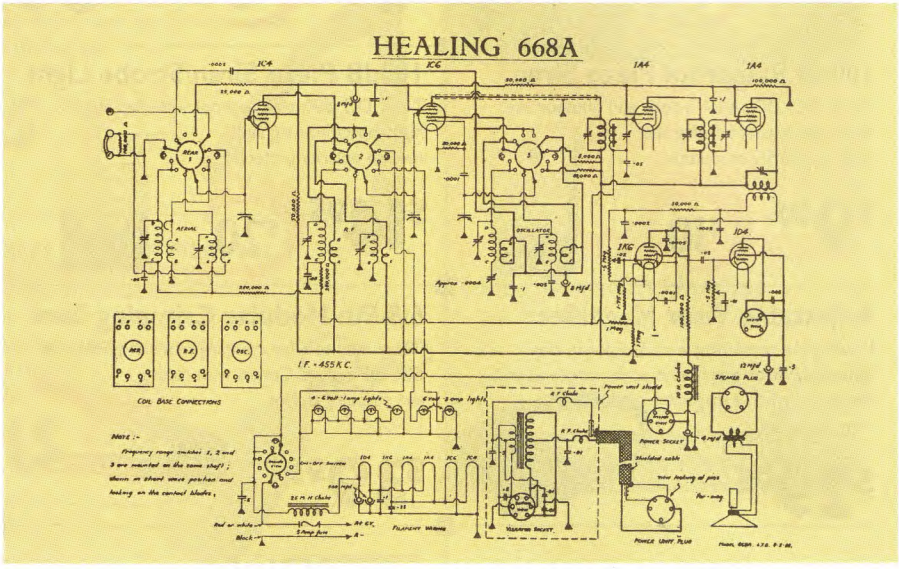


Fig.2: The circuit of the Healing 668-A vibrator-powered console radio, as pictured after restoration last month.

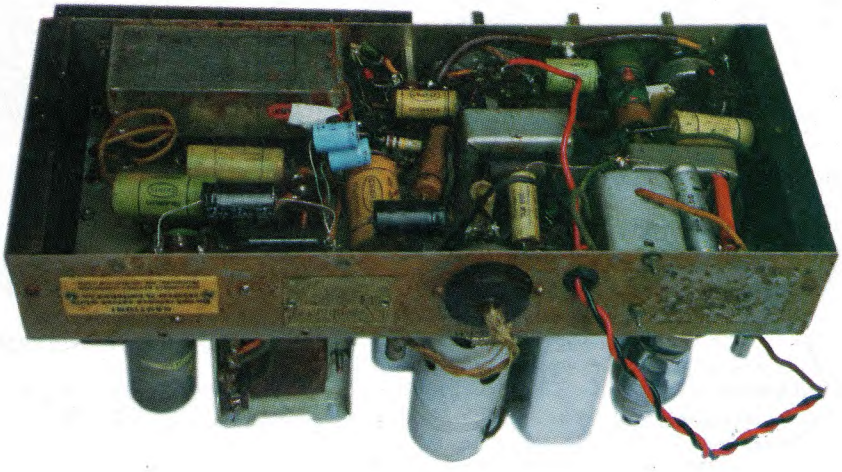


Fig.1: A look under the chassis of a Healing model 401-A vibrator-powered mantel set.

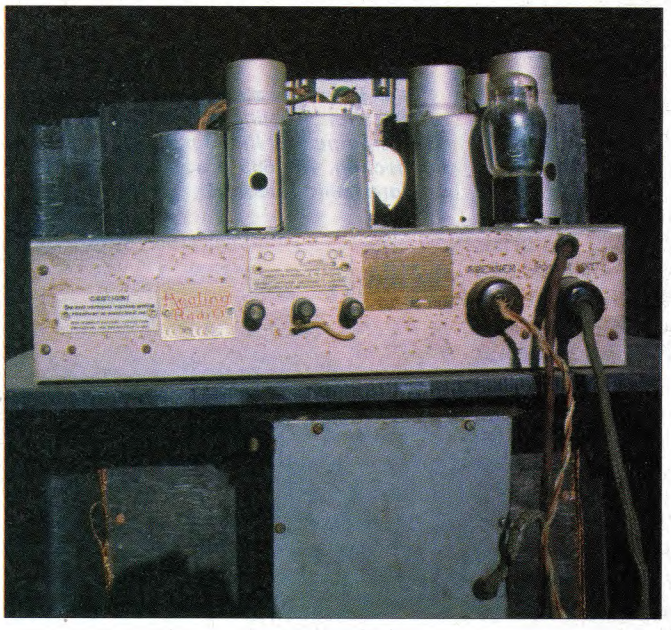
The little 401-A

This model is as about as compact as it was possible to get a vibrator mantel. The same cabinet and largely the same chassis layout, with of course obvious exceptions, was used for the electric model 308-E. It used no shielding of the battery leads, and no metal box to enclose the various elements of the vibrator power supply, and no acoustic suppression of the vibrator cartridge. However, for all that, the amount of 'hash' and extraneous noises creeping into the electrical circuit is remarkably low. As the design and construction was not considered good practice by standards of the day, it is perhaps more by good luck than good management that the amount of interference is as low as it is.

Conversely, the model 57-A mantel from the previous year, which includes one or two more standard precautions, transmits 'hash' through the electrical circuit to the point where it is almost intolerable. Some things just defy explanation!

The 401A is a small four-valver using the

Fig.3: Looking into the rear of the 668-A console, showing the chassis above the shelf and the vibrator power unit beneath it.



pre-octal series 1C6 mixer, 1C4 IF amp, a triode-connected 1K6 detector/audio and the ubiquitous 1D4 output.

The choice of a triode-connected 1K6 over the single ended 1B5/25S is interesting. One can speculate, but perhaps there were two reasons. Firstly, the triode-connected 1K6 has about half the same plate resistance of the 1B5, and a gm (transconductance) of 900 as opposed to 575 of the 1B5, thereby probably giving a little more gain; but the reason was probably more economic than anything else.

Radio manufacturers purchased their valves not in singly packaged boxes as the home constructor and repairman were used to seeing, but in large cartons containing 72 or 144 units. No doubt the more they purchased, the lower the price they could negotiate. The savings must have been considerable, for a 1K6 would have required more wiring time, a shielded lead to the top cap and a valve can as well.

The radio itself was shown last month, and an underchassis photo is shown in Fig.1, with many original components in place. The only replacement items are the 500uF filament filter, and the HT electrolytics which are plainly seen. The original LT filter electrolytic is a large twin unit housed in a metal can measuring 110 x 30 x 45mm and can be seen in the photo. It has been retained for the purposes of originality.

Last month we stressed the importance of ballast resistors to ensure that each valve received its correct operating filament voltage and current. In the circuit it was shown connected across the filament pins of the 1C4, for the very reason explained last month; the 1C4 required zero bias.

When acquired, this little radio was for the most part as you see it in the various photos. The electrolytics were replaced, the valves were checked, it was hooked up to a 6 volt accumulator and it worked! The voltages were within tolerance, and an alignment pepped up the performance a little and it has remained like that for the past 10 years at least. It still worked when dragged out for photographic purposes. For all that, a decent aerial and a good earth does improve performance considerably.

The 668-A console model

Dating from 1938, this is about as big as vibrator radios became — emulating, but far outperforming the six and eight valvers of the early 1930s. It possessed a tuned RF stage, converter, two IF amps, det/AGC/audio and a pentode output. The circuit is shown in Fig.2.

Some manufacturers, AWA in particular, produced a six valve job with RF amp, mixer, IF amp, det/audio, driver and class B push-pull output. The only known set with two IFs *and* push-pull output was a big Airzone of 1941 vintage, containing seven valves in all.

With six valves, one could imagine ballast resistors all over the place to ensure that the valves all had their correct filament voltage and current. However, Healing neatly overcame this trick by using type 1A4-P for the two IF stages.

The secret of the 1A4-Ps is that they only consume 60mA of filament current. Put them in parallel, and *voila*! The filament consumption is 120mA, the same as a 1C4. Better still, when placed in parallel again with the 1K6, the bias is 2.0 volts — about right for the stated figure of 3.0V initial bias for this variable-mu valve.

Nothing has been left to chance for the big 668-A. The rear photo (Fig.3) shows the vibrator box suspended beneath the chassis board. Not clearly shown are the rubber mounting grommets through which the bolts pass. The power unit is shielded, and everything is done properly.

The front view was shown last month with its impressive array of controls, its most handsome cabinet and elaborate dial mechanism.

Switching

In the circuit published a couple of months ago, and the two Healing circuits shown here, we see a three-position on/off switch. The positions are 'Off', 'On - dial lights on' and 'On - dial lights off'. The idea was to switch it on, use the dial lamps to tune a station, and then flick the switch to the third position to leave the set running and extinguish the dial lamps. (Such a configuration was quite common in sets using a 2V accumulator and dry batteries.) The reason was quite simple: dial lamps consumed current and shortened battery life.

In the 668-A things are a little more complicated. Following the circuit, we see that the 'on - dial lamps on' position is connected to the four dial lamps surrounding the main dial, and then a further connection to the wave change switch. A set of contacts on this switch in turn lights a spotlight, which illuminates a rotating shadow disc so that the main stations are portrayed through the little ground glass window at the top of the escutcheon. A separate template was required for each state!

In the shortwave position, the spotlight was extinguished, and another lamp lit a 'short wave' decal on the main dial glass.

The wavechange switch is also a three-position affair, and the positions are 'short wave' (shown switched to that position in the diagram), 'B/C distant' and 'B/C local'. Remember that it is generally not possible to provide any form of back bias with vibrator supplies, and since there is no cathode resistor to increase via a toggle switch or other switching, what happens here is that in the 'local' position, a 25kΩ resistor is connected from the screens of the RF, mixer and IF stages to earth, thereby dropping their voltages by 10 or so volts and reducing the gain accordingly.

In the short wave position, the oscillator anode voltage on the 1C6 was increased

considerably to 125 volts. This had the effect of slightly reducing the screen current, such that the drop across the screen resistor network was reduced by about another 10 volts, which increased the screen voltages on short-waves and hence gave the set a little more 'oomph'. Of course six valves wired in this configuration could possibly draw 25mA on short waves, which would be way too much load on even heavy duty dry 'B' batteries.

The tone control is a typical Healing arrangement of placing a 0.01uF (or 10nF) in a potentiometer arrangement in the 1D4 grid leak. It has the unfortunate habit of attenuating the 'highs' far more than is necessary when at the extreme grid end, and produces slight muffling and distortion. The top cut treble in the plate circuit is by far and away a better system.

Given that minor shortcoming, the performance of this set is what one would expect — outstanding. Although the audio output is only about 400 - 500mW, it is more than sufficient to fill a large room. The sensitivity and selectivity are both excellent.

The Healing 550-A

The photo of the 1940/41 model 550-A shown in Fig.4 also gives you a good idea of the sorry condition of the large 668-A chassis when found. The cabinet was pretty horrible, too. However restoring a cabinet is within the capabilities of most collectors, and a rusty, dust laden chassis is not beyond restoring. Indeed, the more difficult the job, the greater the satisfaction.

The 550-A was chosen because it had a feature peculiar to Healings for one or two years only, and only on their vibrator radios: variable selectivity.

Fig.4: The sorry state of a 'waiting for restoration' Healing 550-A vibrator-powered mantel in the author's collection. The 668-A was like this, before being restored...

The circuit is a dual wave five valve using the 2V octal series of 1C7-G mixer, two 1K5-G IF amps, a 1K7-G det/AGC/audio and 1L5-G output. Two IF stages instead of one IF stage and one RF stage was not uncommon, and there was little to choose between these alternatives.

An RF stage certainly improved the signal to noise ratio and probably offered a little more sensitivity and selectivity, but two IF stages definitely improved selectivity, where it would be particularly useful on the short wave bands. Against this is the additional cost of a three-gang tuning capacitor, a set of low production RF coils for B/C and S/W, extra switching and wiring, and more time in final alignment. Economics was probably the key issue once again.

Looking at the circuit, we see a four-position main switch. At the bank to the right of the valve filament filter choke, the configuration appears as (1) S/W; (2) B/C with dial lights off; (3) B/C with dial lights on; and (4) B/C variable selectivity. This appears to be an error, in that positions (2) and (3) have been transposed. Another definite drawing error would be in the switch bank beneath the secondary of the first IF. According to the circuit, the S/W position is in broad selectivity, B/C positions (2) and (3) standard selectivity, and in the B/C 'broad selectivity' position the secondary is left untuned!

The chances of this actually being so are remote. It would virtually block the entire IF channel and no signal would pass. More likely, positions (1), (2) and (3) would all be joined together as for positions (2) and (3), and the wiring and connection for position (1) would be at position (4). Over the years one can expect to find the occasional draughting error, particularly in the early days.

Variable selectivity?

But why variable selectivity, I hear you ask? It comes down to bandwidth. A receiver tuned to a given station does not just select that station carrier frequency and that frequency alone. It must be able to tune the carrier plus and minus the audio frequencies that modulate the carrier. In simple terms, this is known as the 'bandwidth'.

If the selectivity is so sharp that the bandwidth is very narrow, it might only allow +/-4kHz, and any audio components over 4kHz will be severely attenuated, if not 'clipped' so that distortion occurs.

In this case of the 550-A the variable selectivity involves a small additional winding on the first IF transformer, only a few turns and connected with reverse polarity to the secondary — but coupling back to the primary. This 'dampens' the primary without detuning or loss of gain, and broadens the bandwidth. In theory this was supposed to deliver a cleaner and better high frequency response.

I hope to check this out, when the receiver in question is restored! ❖

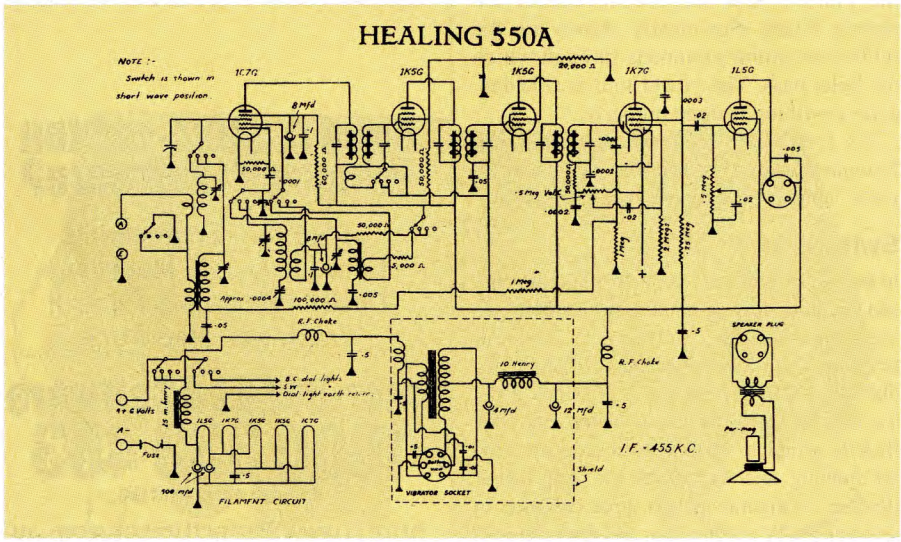


Fig.5: The circuit of the 550-A given in a contemporary servicing guide — with possible errors, as discussed in the text.