

Vintage Radio

By RODNEY CHAMPNESS, VK3UG



This view shows the Breville 801 prior to restoration. The "D" cell gives some idea of its size.

signed for use with 1.5V dry batteries and 90V high-tension (HT) rails meant that the battery size and cost could be reduced. As a result, a new range of battery-powered portable radios appeared in the 1930s using octal-based valves, such as types 1P5GT, 1A7GT and 1D8GT. These sets were more convenient to transport, smaller and less costly to run than their predecessors.

But that wasn't the end of the improvements. At the end of World War II, the appearance of miniature 1.4V filament valves such as the 1T4, 1R5, 1S5, 3S4 and 3V4 meant that portable receivers could be made just that little bit smaller again. In addition, the intermediate frequency (IF) transformers were now more compact thanks to the use of improved ferrite materials and iron dust cores and shields.

Batteries like the Eveready No.482 45V unit were also introduced around this time. This unit featured a layer method of construction for the individual 1.5V cells, resulting in a battery that was more compact than its predecessors.

By the late 1940s, the manufacturers were producing portable 5-valve receivers that generally performed extremely well. However, the quest for "smaller is beautiful" led many manufacturers to design and build even smaller receivers. Two No.482 batteries were necessary for a 90V rail and although still reasonably compact, they were still too big for the "small is beautiful" brigade. This subsequently resulted in the development of the smaller No.467 67.5V battery, as the new miniature valves still worked quite well with a 67.5V HT rail.

This meant that a single No.467 67.5V battery could now supply all the HT requirements of a dry battery receiver. The 1.5V battery used in the full-size portables was a No.745 which consisted of eight F-cells in

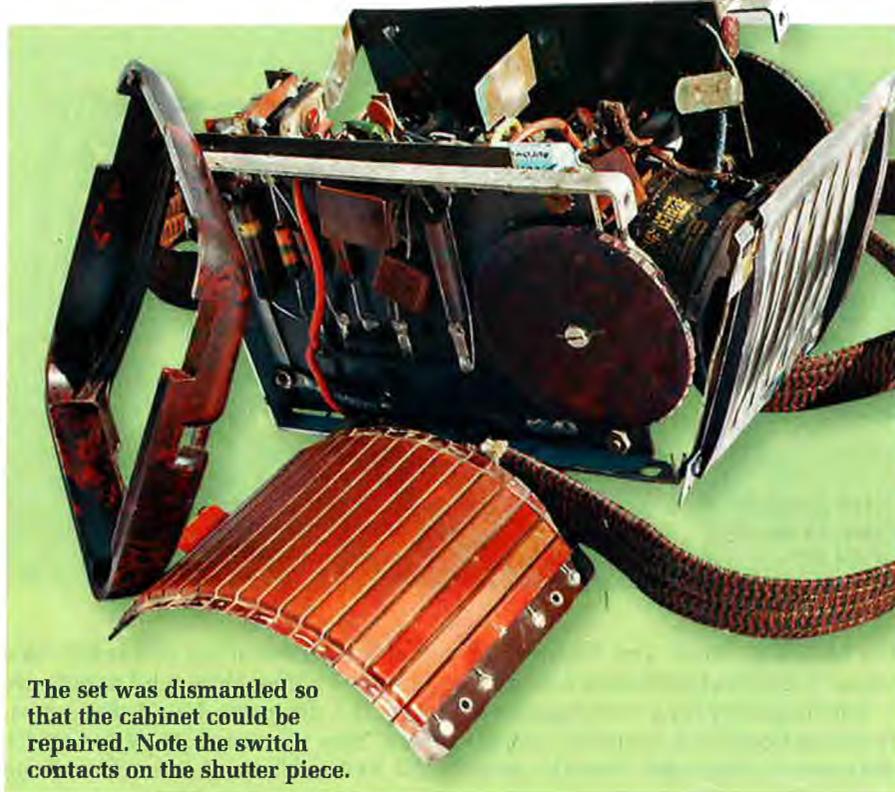
The quirky Breville 801 personal portable

Based on miniature 1.4V filament valves, compact portable radios such as the Breville 801 enjoyed a brief period of popularity during the late 1940s and early 1950s. Their performance was rather mediocre, however.

SOME OF THE FIRST battery portables used a 2V wet cell and either two or three 45V batteries to power them. They were awkward, heavy sets and were ill-suited for portable use – not surprising considering that they were no more than adapted domestic home sets.

However, the public was keen to really get "with it" in those halcyon days of radio development. Experimenters and manufacturers could see that there was a market for compact, portable receivers and they set about producing specialised designs.

The advent of valves specifically de-



The set was dismantled so that the cabinet could be repaired. Note the switch contacts on the shutter piece.

To operate the set, the shutter was moved away from the speaker and when the loudspeaker was fully exposed, the edge of the shutter closed two sets of contacts which applied power to the receiver's filament and plate circuits. One of the accompanying photographs shows how this was done.

The tuning and volume controls consist of two recessed knobs and these are turned by finger along their exposed edges. There is no likelihood of damage to the knobs due to the way they have been mounted. The batteries are easily replaced by removing two 3mm screws from the base of the set and then slipping off the bottom section of the case.

Circuit details

Fig.1 shows the circuit details of the Breville 801. It's a fairly conventional superheterodyne receiver covering the range from 550-1500kHz.

The front-end consists of a 1T4 RF stage, a 1R5 frequency converter and a 1T4 455kHz IF stage. A 1S5 is used as a combined detector, AGC diode and first audio amplifier, while a 3V4 acts as the second audio stage which then drives the loudspeaker.

The RF stage is different to most valve portables of the era in that the antenna consists of an untuned loop

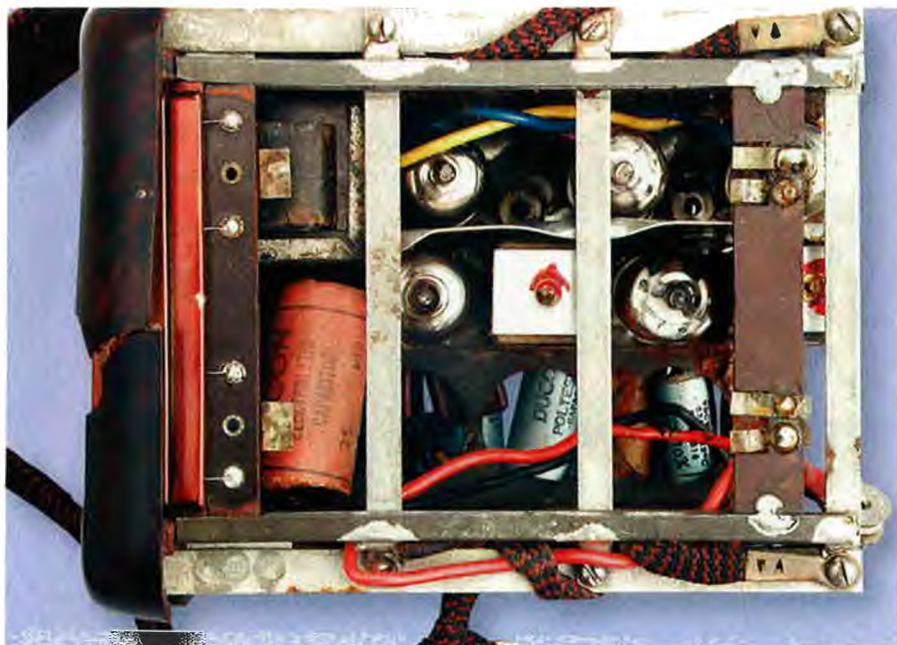
parallel. It was reasoned that if the HT battery supply could be reduced in size, albeit with a reduced (but still useful) life, the same could be done with the 1.5V battery. This was achieved by using two "D" cells (No.950) in parallel.

So that was the way manufacturers tapped into the "miniature" personal portable market in the late 1940s and early 1950s. The result was a range of quirky little four and 5-valve portable receivers that were popular with those on higher-than-average earnings.

However, the popularity of these receivers waned fairly quickly. Basically, they suffered two serious limitations: (1) high battery consumption (and high replacement cost); and (2) unsatisfactory performance on anything other than local radio stations. In addition, these sets were usually subjected to a relatively hard life which meant that failures were common. And due to their compact construction, they were not easy to service.

By contrast, full-size valve portables were a much better proposition when it came to receiving distant signals. They were also much easier to service and their larger batteries lasted much longer.

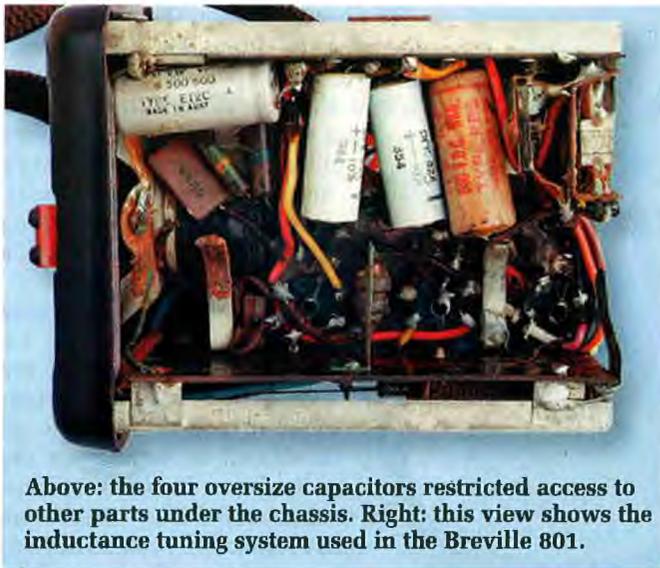
probably the most compact of the Australian personal portables, the receiver measuring just 120 x 120 x 160mm (W x D x H). The case is a 2-piece Bakelite construction made by Marquis. The 75mm (3-inch) loudspeaker faces upwards and a roller type shutter, similar to that fitted to the writing bureaus of old, was slipped over it to protect the speaker when down at the beach.



This above-chassis view shows just how tightly the various parts are packed together, making the valves difficult to remove.

Breville 801 receiver

For its time, the Breville (1948) was



Above: the four oversize capacitors restricted access to other parts under the chassis. Right: this view shows the inductance tuning system used in the Breville 801.



which doubles as a carrying strap. The output of this loop is coupled into the first tuned circuit. This tuned circuit is also different in that both it and the local oscillator (1R5) are inductance tuned.

The coupling between the RF amplifier and the 1R5 frequency converter is aperiodic (ie, no tuned circuit). As shown, it uses an RF choke and a 20kΩ resistor as the load across which the RF signal is developed. This configuration saves using another tuned circuit at the expense of performance. In fact, the Philips 111 of 1948 uses a similar circuit to the Breville but it is designed to give a more even response across

the broadcast band. The Philips 111 wasn't a brilliant performer either!

The frequency converter stage (1R5) is conventional and, as stated, uses inductance tuning rather than the more commonly used capacitance tuning. The IF amplifier has two double-tuned IF transformers and the 455kHz IF signal is amplified by the 1T4. As mentioned earlier, the detector and AGC diode is located in the 1S5. AGC is applied to the RF and IF stages but not to the converter.

The audio from the detector is applied to the 1S5 pentode section and its output is then further amplified by the 3V4 audio output stage. Note

that the screen of the 1S5 is fed via a voltage divider, although I'm not sure why the designers found this necessary. Bias of around -3.5V to -4V for the 3V4 is obtained from the voltage developed across a 350Ω resistor and 25μF capacitor.

Cleaning up

Unfortunately, the set featured here had had a hard life. The case was cracked at the top and a set of batteries that had been left in had leaked corrosive muck over quite a bit of the set.

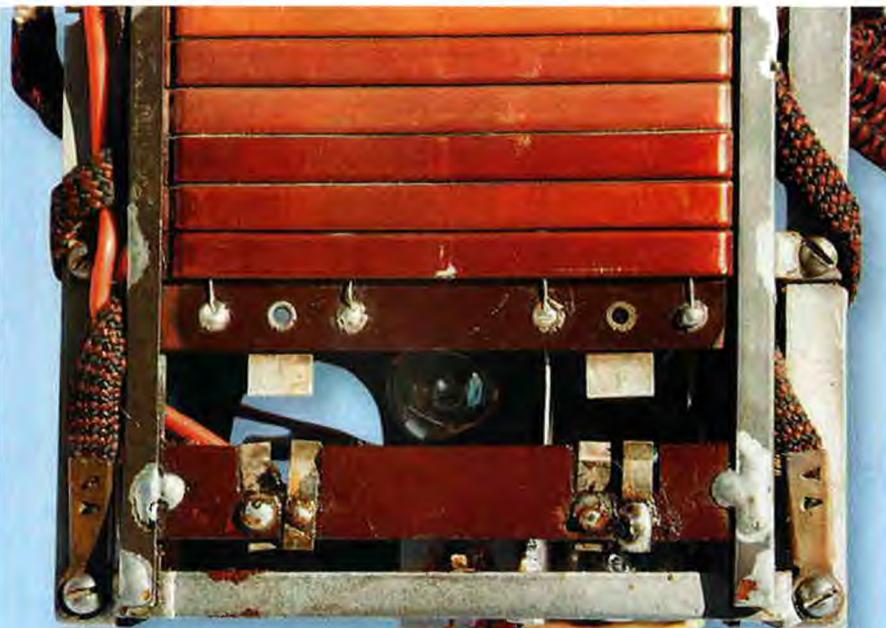
Initially, I sprayed the rusted terminals and metal work with Inox (WD40 could also be used) to soften the corrosion. I then used either used fine wet and dry paper or the blade of a screwdriver on the affected areas, periodically wiping away the loosened material with a cloth. Eventually, I was able to clean the set reasonably well but it still isn't pristine.

Part of the problem here is that the compact nature of the set restricts access to some areas. So the set isn't as clean as I would have liked.

Fixing the circuit

The next step was to get the set working. First, the valves were removed and a multimeter used to check that their filaments were intact. That done, I sprayed each valve socket with Inox and then replaced the valves. Once again, the compact nature of the set makes valve removal and replacement a difficult job.

In fact, to remove the valves, I had to first wriggle them in their sockets to ease them out slightly and then



This close-up shows the switch contacts at the end of the roller shutter. They close when the shutter is fully open.

The fully-restored receiver almost looks new, at least from the outside. Note the antenna wire wrapped around the strap.



ple: the volume control markings on the cabinet are the wrong way around! Alternatively, the control could be rewired to make it work correctly.

There was quite a bit of noise and it varied as I tuned across the broadcast band. The set appeared to be unstable, with audible whistles that varied in intensity and frequency as the set was tuned. What's more, I couldn't hear any stations.

It was time for some troubleshooting, so I coupled my signal generator to the antenna strap and found I could force a signal through the set. I then decided to check the antenna strap for

continuity. It proved to be open circuit but what was really strange was that both ends of the strap were earthed!

There was no way the set could work like this.

I also found that the antenna coil input winding went to a terminal that had nothing attached to it. Someone had certainly been busy with this set – it's just a pity that they didn't know what they were doing.

Because the loop was open circuit I decided the best thing I could do was to loosely wind a piece of thin hook-up wire over the antenna strap and connect it into circuit the way

it should have been connected. I'm not sure how the strap was originally made other than the fact that it uses "tinselled" wire. Whether it was woven as a flat strap or just used as a circular wire I don't know (the set isn't mine, so I didn't feel inclined to cut into the strap).

Some readers may not be familiar with tinselled wire. Headphones and similar items that required leads to be repeatedly flexed without breaking have this type of wire. Basically the centre of the cable consists of cotton (or similar) with a fine metal strip wound along it. It is difficult to solder so it is usually clamped to the termination point.

With the new antenna wire in place, the set was now receiving a couple of stations but it was still oscillating in the RF stage. My suspicion was that the RF choke may have been coupling signal from the plate circuit back into the grid so I replaced it with a more compact unit. I also noticed that the 1T4's grid lead was rather close to its plate lead.

As a result, I replaced the existing grid lead with a longer piece of wire and dressed it well away from the plate circuit. I also decided to fit a tin plate shield around the 1R5 and earthed it alongside the valve to make the set more stable. These measures proved successful and the receiver is now stable in its operation.

Alignment

The set has no frequency markings on its simple dial scale, so I didn't attempt to make sure it only tuned from 550kHz to 1500kHz (it actually tuned to 1550kHz at the high-frequency end of the dial). However, I did peak the

Photo Gallery: STC A141 Bantam (1947)



RELEASED BY STANDARD TELEPHONES & CABLES PTY LTD in 1947, the Bantam A141 was a miniature 4-valve superhet that measured just 230mm wide by 150mm high. In fact, it was so compact that it was necessary to remove the chassis in order to replace the 6AG6 output valve! The mottled green cabinet example illustrated here is uncommon.

The valve line-up was as follows: 6K8-G frequency changer; 6G8-G IF amplifier/detector/AVC rectifier; 6AG6 audio output; and 6X5-GT rectifier.

Photo: Historical Radio Society of Australia, Inc.

tuning of the antenna coil at around 1400kHz by adjusting the trimmer across this coil. That done, the IF adjustments were checked and they all appeared to be correctly tuned, so I left it at that.

Summary

In operation, this receiver is rather noisy when tuned to a station, as the signal pick-up is not good with the antenna system used. However, the performance may have been better when the original loop antenna was still in good order.

Some of the lead and component layout also leaves a bit to be desired and can cause instability in the RF stages (hence the need for modifications). The coupling between the RF and converter stages is also inefficient, resulting in less sensitivity than otherwise. The IF and audio stages are conventional and these parts of the receiver work quite well.

Another problem with this set is

that it is difficult to work on, due to its compact design. In fact, the layout and construction is rather amateurish in many ways.

That said, the controls are easy to use and they are well-protected against damage. The dial scale is nothing more than a 0-120 designation, rather like the sets from the 1920s. It probably doesn't matter as the set won't receive many stations anyway.

In the end, these little miniature four and 5-valve sets from the 1940s and 1950s enjoyed a very short period of popularity and then only in areas of high signal strength. Like almost all sets of this type, the performance of Breville 801 is mediocre to say the least and the battery life is short.

Would I have bought one of these sets when they were new? I doubt it. However, it is a good example of a type of set that deservedly only enjoyed a short period of fame and for that reason alone it is worthy of restoration and display.

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