

# VINTAGE RADIO

By JOHN HILL



## The humble 4-valve receiver

**In the past, valve radios were built in many forms; from simple home assembled units to huge affairs having a dozen or more valves. Just how many valves were needed to make a good receiver was a question that had many answers. Let's take a closer look.**

In the 1920s, the "bigger is better" syndrome was becoming evident and this period saw domestic receivers develop from simple one and 2-valve units to sets with five or six valves. By the mid 1930s, some upmarket radios had grown to incredibly large units having up to 15 valves.

These multi-valve monsters were, in the main, quite unnecessary and in some instances only the heaters of certain valves were connected

into the circuit. These extra valves served no useful purpose and were there only for show, making the chassis look impressive if nothing else. The buyer was paying for a lot of additional hardware that wasn't even being used!

A domestic radio generally requires five valves, including the rectifier, if it is to be classified as a reasonable receiver. In fact, the 5-valve radio became the industry standard because it was such a

practical size. A 6-valve receiver will allow a stage of radio frequency amplification while a 7-valve receiver can offer the additional luxury of a push-pull output (ie, two valves driving the loudspeaker instead of the usual one). Not many radios were built with more than seven valves.

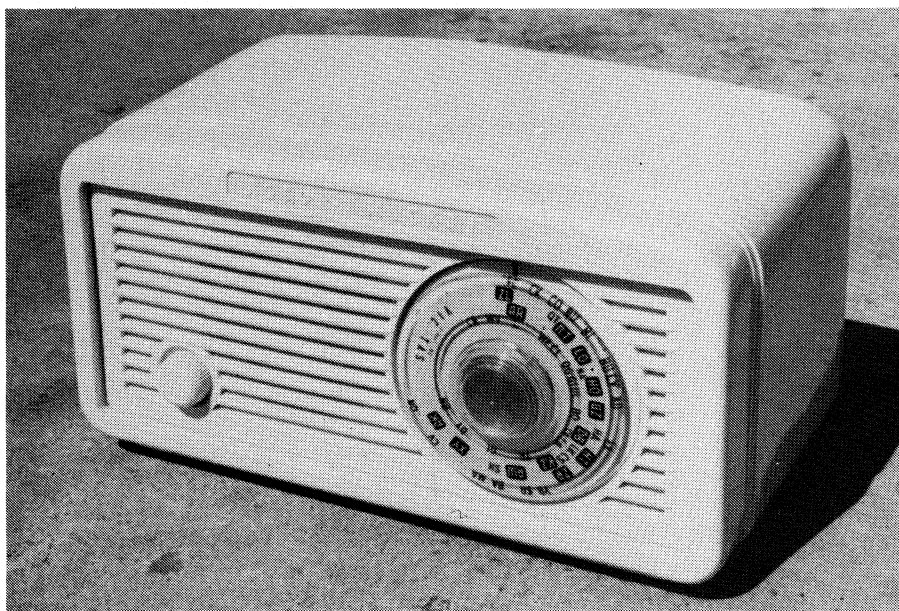
### The 4-valve receiver

After the 5-valve receiver, the next most popular set was the "four valver" which was usually a smallish, budget priced mantle radio. This particular variety of valve radio is the subject of this month's column.

The 4-valve receiver was popular for a number of reasons. First and foremost, it had one less valve and associated components and was therefore cheaper to buy. Second, if used in a capital city location (ie, close to a number of strong local stations), its performance was more than adequate. As far as the average big city listener was concerned, there was little or no difference in performance between a 4-valve receiver and a 5-valve receiver.

The difference between a 4-valve set and a 5-valve set generally lies in the audio stages. In a 5-valve superhet there are two stages of audio amplification after the detector. Most superhets use diode detection and the diodes are usually incorporated in one of the valves.

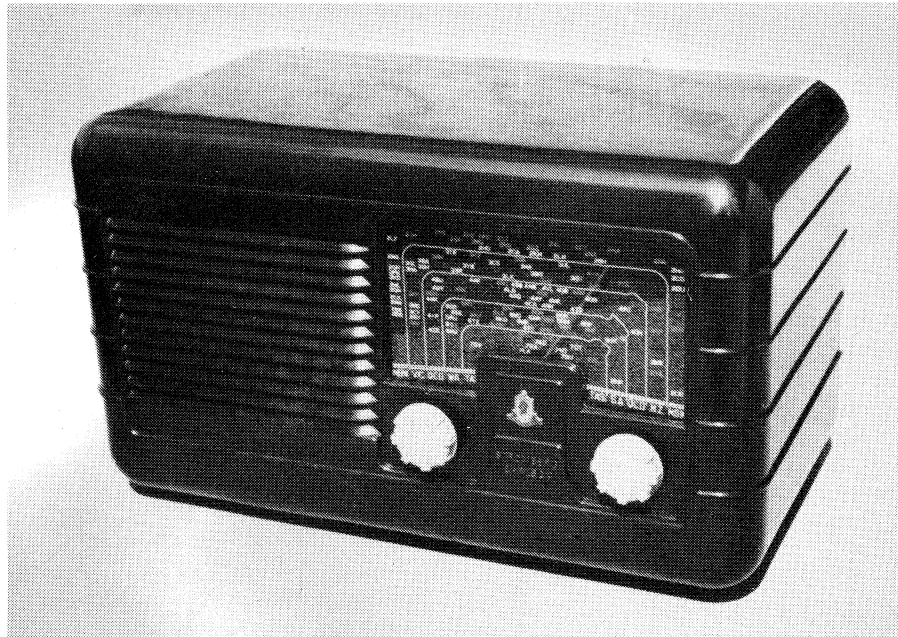
With the 4-valve setup, the audio signal comes straight from the detector to the output valve without the added boost of the five valver's first audio stage. This has a significant effect on the volume of distant stations and it is quite often the



**This little Astor Mickey is a typical 4-valve radio receiver. Although not up to the standard of 5-valve receivers, 4-valvers were quite adequate for use with strong local stations.**



Four-valve receivers must be kept in tip top condition if they are to perform well. The performance of this 4-valve Tasma was considerably improved by replacing the output valve with the correct type and by giving it a full alignment using an RF generator and output meter.



Stromberg-Carlson made a number of popular 4-valve receivers. This photograph shows an early post war model. Unlike their 5-valve brethren, 4-valve receivers have little in reserve.

case that the 4-valver is only satisfactory on local stations or distant stations of considerable power (eg, 50kW).

However, some 4-valve radios are better than others. Occasionally, a good 4-valver will perform as well as a not so good 5-valver but only if it is in tip-top condition.

It must be remembered that a 5-valve radio has some reserve. If its valves become weak and it gets a bit out of alignment, there are no real problems because the set will continue to work reasonably well even though its performance level has dropped a little.

On the other hand, if a 4-valve

receiver has a couple of weak valves and is a bit out of alignment, then it's a pretty sick little radio. Therefore, if a 4-valver is to work well it must be kept up to the mark. This means that it must have good valves, correct alignment and a reasonable aerial and earth.

This point was made obvious to me quite recently. I repaired a "Precedent" 4-valve tablegram for a friend and was quite amazed at how well the radio performed when the job was finished. It was outstanding to say the least and comparable to many 5-valvers.

### Tasma tweaks

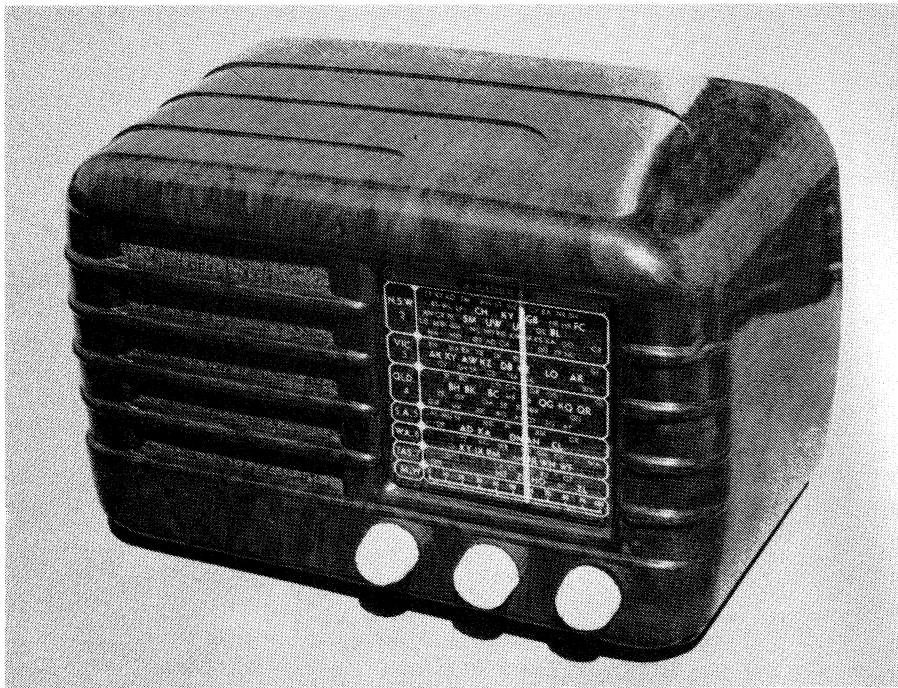
Such an experience made me think about some of my own 4-valve receivers and I selected one (a Tasma) and gave it the once over in order to improve its performance. The Tasma had been restored back in the days when I didn't have a valve tester or a radio frequency generator; nor did I know then what I know now. There was every chance that a good tune up would improve this little receiver. The set was in fairly good condition but it didn't have the performance that the Precedent had.

The first step after removing the chassis from the cabinet was to test the valves. The 6V6 tested at 35% — not a very strong output valve for a small four valve set. The other three valves all tested at around 75-80% and were considered good enough to go back into service.

The "7,000" figure marked on the speaker transformer indicated that the output valve should not have been a 6V6 but an EL33 or similar valve requiring a 7,000 ohm anode load. The correct anode load for a 6V6 is 5,000 ohms. A suitable replacement valve was found. It tested at 85% and was fitted to the socket.

The next job was to check out the intermediate frequency transformers and a radio frequency generator was connected to the top cap of the 6A8 convertor valve. This particular exercise proved to be very interesting.

When aligning a radio, one often has to take a guess at the intermediate frequency and in some cases a sweep of the generator dial



This neat little 4-valve Radiola is an attractive mantle model. It is housed in a Bakelite cabinet and has been restored to "as-new" condition.

is required to pick up the frequency of the IF transformers. Sometimes it is a common IF, sometimes it is not. The Tasma's intermediate frequency appeared to be 460kHz.

IF transformers are frequently misaligned in old receivers simply because someone back in the dim past has had a fiddle with them. Tightening up all the "loose screws" doesn't do much for IF transformer alignment. It would also appear as though a good many tune ups were made in the past without an RF generator.

When it comes to IF alignment on 4-valve receivers, the job must be done with the utmost care so that the set will work at its maximum potential. In some cases, maximum output can be a little above or below the set's recommended IF. By using an RF generator and an output meter, such slight differences can be observed and the IF transformers can be tuned for maximum deflection on the output meter.

I'm not suggesting that the set should be tuned to some intermediate frequency it was never designed to work on. What I am suggesting is that due to tolerances in the manufacture of the IF transformers and the RF generator, the best performance may not be at

the specified frequency as indicated by the generator dial.

This special alignment procedure may require several trial IF transformer adjustments to establish the optimum frequency. In some cases it may make no difference and even if it does, the gain will be only slight. Remember, however, that some 4-valve receivers haven't got much going for them and if one can gain a bit anywhere along the line then it's worth having.

The little Tasma turned out very well and the improvements wrought by using the correct output valve and a full alignment with an RF generator were well worth the effort.

### Reworked Radiolette

Sitting on the shelf next to the Tasma is a very small 4-valve Radiolette. Although it too was supposedly "restored", it was like the Tasma and had been repaired back in the days when I lacked both the knowledge and the equipment I now have. So the little Radiolette was the next 4-valver to be reworked.

There were two things wrong with this set. First, there was an annoying buzz in the speaker when the volume was turned up. Second, its overall performance was well down, particularly when compared

to the Tasma with its new lease of life.

The valves tested OK with the exception of the rectifier which was decidedly weak. This was replaced and there was a considerable increase in high tension voltage, with a corresponding increase in volume.

The Radiolette has an HT filtering arrangement that consists of a 10k $\Omega$  resistor (actually two 20k $\Omega$  1W resistors in parallel) with a 24 $\mu$ F electrolytic capacitor to earth at either end. A resistance check indicated that the two resistors had gone high for they measured 19.5k $\Omega$  (together). Closer inspection revealed that one of the resistors had burnt out.

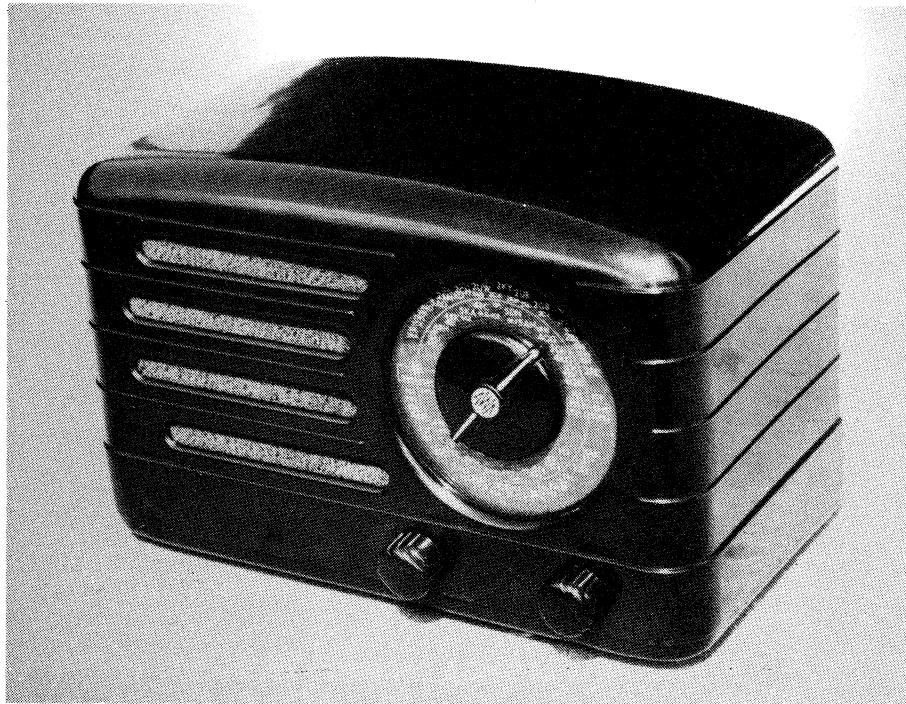
Replacing the burnt out resistor lowered the resistance to 10k $\Omega$  (which is what it should have been) and again the HT voltage increased. Accordingly, the volume of the set continued to increase and the performance level was noticeably improved because of these two simple repairs.

This particular problem of the burnt out resistor emphasises a point I mentioned some months ago when discussing various aspects of resistors and the role they play in valve radio circuits.

It was suggested in that story that all resistors should be individually checked when restoring an old valve radio. Resistors that are open circuit or have changed value beyond their tolerance should be replaced. In the light of what happened with the Radiolette under discussion, checking resistors is a worthwhile precaution against trouble.

The next step was an alignment check and the IF transformers were tweaked for maximum readings on the output meter. This was followed by careful alignment of the oscillator and aerial circuits, during which dial alignment discrepancies were corrected. Melbourne radio stations can be made to line up reasonably well on old dials, even though station frequencies have changed a little since the dials were made.

Capital city stations in other states may or may not line up quite so conveniently.



Another set to be reworked by the author was this Radiolette. It was well down in performance and suffered an annoying buzz from the speaker until it was properly checked out and re-aligned.

The buzz in the Radiolette's speaker was the result of poor mounting. The speaker frame is rivetted to a small cardboard baffle which had warped considerably, allowing the speaker cone to detach itself from the frame at points between the rivets. Using a few drops of glue and clothes pegs for clamps, the speaker cone was stuck back onto the speaker frame and the warped cardboard baffle was straightened up at the same time.

This relatively simple repair resulted in the speaker working properly without irritating buzzing sounds at odd frequencies.


My efforts were well rewarded and the little Radiolette turned out a good deal better than it started out. Before the rework job it was struggling to bring in anything other than local stations. Now it distorts on local stations and really needs a local station switch or a shorter aerial to reduce overloading.

### Leaky capacitors

Only last night I was working on another 4-valve radio (a love job for a workmate) which was sadly lacking in performance. A check on the high tension voltage showed it was down to 150 volts despite the rec-

tifier being in quite good condition. Replacing five paper capacitors resulted in the high tension rising to 245 volts, with a noticeable increase in volume.

There was so much leakage through those old paper capacitors that they caused the field coil in the loudspeaker to overheat. It doesn't take much to rob a little 4-valve receiver of its performance or to create other problems. If used for prolonged periods, the field coil would have eventually burnt out.

Summarising, 4-four valve radios require good valves, faultless capacitors, resistors of the correct value and tip top alignment if they are to function well. Unlike their 5-valve brethren, they have little or no reserve power and require more regular attention if they are to be maintained at their peak. 

### Footnote

A variety of speaker grille material suitable for vintage radios is available from Mr John Post, Lot 232 Patanga Court, Karana Downs 4306. Phone (07) 210 0067. He can supply samples if you promise to return them.