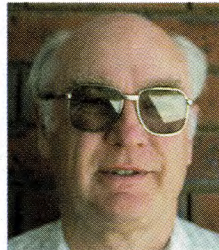


VINTAGE RADIO

By RODNEY CHAMPNESS, VK3UG



The Hellier Award, Pt.2: the simple superhet vs the TRF

Last month, we talked about the latest Hellier Award which was restricted to sets with just two valves. There were eight entrants and we asked which type of set would have the best performance – the TRFs or the simple superhets?

Who were the judges for the award? Max Johnson and I took on the task and that eliminated both of us from the competition. Max and I worked together to assess the more technical matters while my wife Lyn judged the aesthetics. The judging was divided into six areas, which gave members with different skills an even chance of achieving the top marks in the award.

All were marked out of 100, with 20 for the cabinet, 20 for the operation of the receiver, 15 for the chassis (mechanical), 15 for the chassis (electronic), 15 for innovation and 15 for the information supplied on the set.

Cabinets

As can be seen in the photographs, the cabinet styles varied. All were

made of wood, except for one. Timber is much easier to work with than metal and who has the necessary moulding equipment for plastic or bakelite cabinets? In fact, several of our members are very good at woodwork as can be seen in the photographs. There were three polished cabinets, two painted, one stained and one with a leatherette covering. One innovative set used part of a 2-litre blue plastic ice-cream container as the significant part of its cabinet, although the baseplate was made of wood.

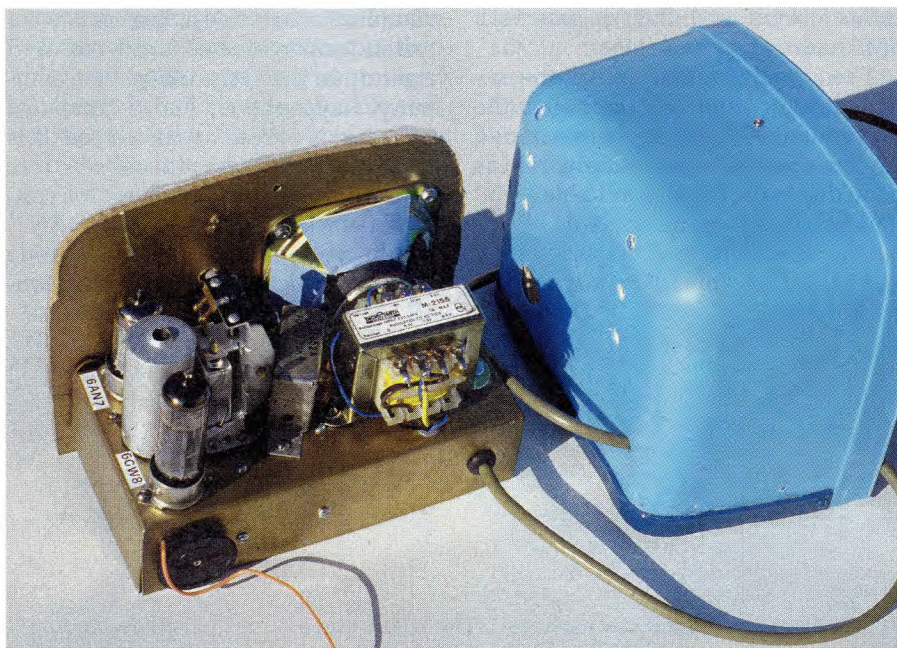
Although the cabinets were excellent in many ways, some members dipped out when it came to enclosing the chassis. For example, some had open backs which would let mice or other pests into the sets, although these sets did have good ventilation! Others excluded the pests but the ventilation was poor, while others kept the pests out by using fly wire or by drilling small holes in the back and bottom of the cabinet.

Most got the baffling of the speaker spot on, at least as far as the size of the cabinet would allow. Most sets were also easy to dismantle.

Perhaps the best as far as service was concerned was the plastic-enclosed set made by Noel. Three screws in the front of the set allowed the set to be withdrawn with the dial and controls intact and with access to both sides of the chassis for service.

Operation

Now this is the real test as to whether a set is worth having or not – after all, if it doesn't work what good is it? The sets were to be easy to use, with no cranky or critical controls so that they could be operated by all



This innovative set used inductance tuning (which was quite effective) and a plastic icecream container as part of the cabinet.



Des (left) and Gary (right) holding their winning entries in the 1999 Hellier Award. Both sets were simple superhets using a converter and a regenerative IF on 455kHz plus one stage of audio amplification.

members of the family. It was expected that the sets would need an aerial 15-20 metres long and about 5 metres high. The test aerial was around 23 metres long and 4.5 metres high.

The performance of individual receivers varied from quite insensitive to "red-hot". Because the club members had quite a bit of latitude in what they built, this showed up in the relative performance of the sets.

One entry was a stock standard 2-valve regenerative set using a 6J7G and a 6V6G. To the best of my knowledge, it is based on "Tiny Tim II" circuit. It is a beautiful set to look at, being the larger of the two Empire State style sets in the photograph. Because it has only two active stages, it really needs to be quite close to stations if loudspeaker reception is to be realistically achieved. It could be considered a typical replica from the early

1940s and a very nice one at that.

There were two sets which were nominally based on a design originally published in "Radio and Hobbies" around 1950/52. This set was called the "Christmas Box" and is a 2-valve TRF set using a 6N8 as a tuned RF amplifier and detector. One tuned circuit is in the grid and another in the plate circuit. The RF amplifier has regeneration applied to it but it is not a regenerative detector. The audio is applied back through the 6N8 in a reflex circuit and then passes to a 6M5 audio amplifier stage.

The circuit is not unlike the so-called Astor "Football", although the performance of the two sets entered in the contest was possibly not as good due to the fact that suitable aerial and RF coils were unavailable.

One member, Eric, experimented with the Christmas Box circuit and

found that it was very touchy in a couple of areas. The two tuned circuits were too closely coupled, with the RF stage being regenerative, so he isolated the tuned circuits by using a 6BL8 triode-pentode. The pentode took the place of the 6N8 and its output was RC coupled to the triode grid. The RF coil was in the plate circuit of the triode and this gave much improved stability – see Fig.1.

By the way, **the high plate voltages are applied to one side of the tuning gang** via L3 so exercise due caution if experimenting with this circuit.

The second problem he experienced was that the preset regeneration had to be set at the high-frequency end of the dial. If set near oscillation at the low frequency end, it oscillated at the high-frequency end. This meant that the set was not as sensitive at the low-frequency end of the dial as it could be.

To overcome this problem, he experimented with a 3-gang tuning capacitor, using one gang in series with the regeneration control, in an endeavour to increase regeneration at the low-frequency end. He hadn't finished experimenting with this arrangement at the time of the competition so hadn't quite got it going to his satisfaction, but was confident that this would work quite well.

Simple superhets

The most common sets built by members were simple superhets. In amateur radio circles, these sets were called "supergainers" and were used right up to the early 1960s. One company, Raycophone, had a small set called a "PeeWee" which used this principle and others probably did too.

In this competition, the radios consisted of a converter (typically 6AN7) and a regenerative IF with a pentode output (typically 6GW8). The con-

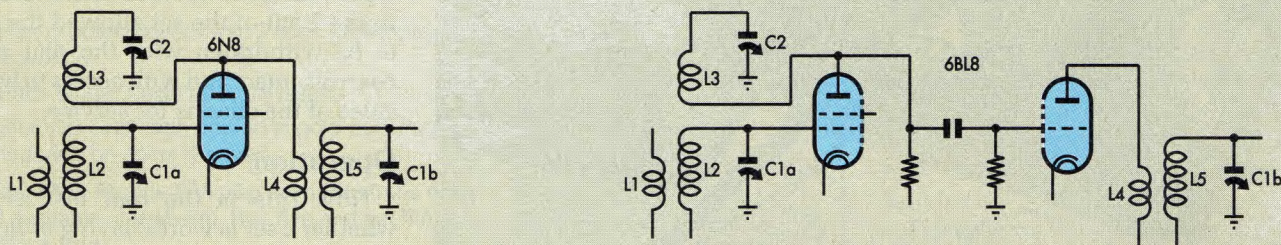
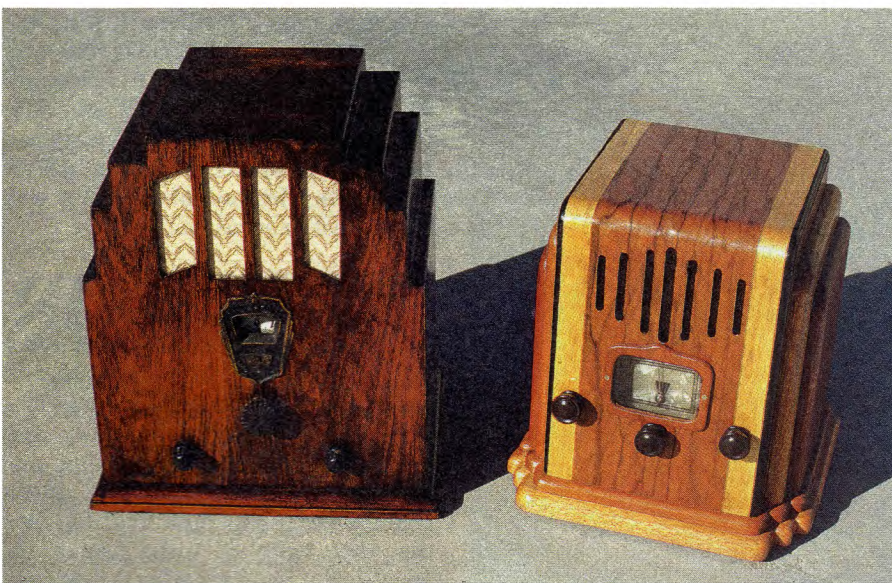


Fig.1: the original Christmas Box RF circuit and the amended circuit (right). The triode stage serves to isolate the two tuned circuits, thereby giving much improved stability. Note that the high plate voltages do appear on one side of the tuning gang which could present a shock hazard.



The two "Empire State" radios were housed in beautifully-made cabinets.

verter circuitry is quite conventional and in each case is typical of what you would find in most radios using the 6AN7(A). A couple of sets used different valves – one used a 6AN7 and a 6AB8 and the other a 1A7GT and a 1D8GT.

The IF circuitry is very different to that in most superhet receivers. There is one IF transformer at (nominally) 455kHz, as used in a conventional IF stage. This feeds the grid of the 6GW8 triode which is wired as a regenerative detector. The IF transformer had to be modified by adding a feedback winding near to the grid winding and this involved dismantling the IF transformer. Most had considerable trouble getting the regeneration to work properly but all ultimately succeeded, using 100-150 turns of thin enamelled wire to get it to operate effectively.

The regeneration is adjusted to just below oscillation and as the IF (intermediate frequency) is fixed, the setting doesn't alter with changes in the tuning as it does with Christmas Box sets.

Following the regenerative detector, the pentode section of the 6GW8 amplified the signal to a comfortable speaker level. In fact, the "giant" mantle set with the 12-inch speaker was quite loud if the gain was turned up.

No AGC

Because none of the sets had AGC (automatic gain control), the volume control has to be adjusted when tuning different stations but this wasn't a

real problem. Most of these sets used a potentiometer in the cathode of the converter, with the moving arm to earth. The aerial is connected to one end of the potentiometer track, while the other end of the pot goes to the cathode of the converter via a low value resistor – see Fig.2.

These sets performed quite well, the exception being the one with the battery valves which hadn't been completed. The receiver that really set us all back on our heels was the "giant" mantle set. Harvey, the constructor of this set, really worked hard at it (not that others didn't) and got results better than expected for such a simple set. In daylight, a few stations were expected but there were many Melbourne stations, both national and commercial, that provided comfortable listening here at Mooroopna in

Northern Victoria. Mooroopna, by the way, is about 150km away from these stations.

As to which sort of set is better, the answer is unequivocal – the simple superhets thoroughly thrashed the TRFs. However, a better design for the TRFs would have made them stronger competitors. One of the very real advantages of the superhets was that the regeneration only had to be set once which made them easier to operate for non-technical people.

Chassis details

All members had their own style of chassis construction but in general they were all conventional upturned boxes. Some were made out of aluminium and some out of thin galvanised iron sheet. All were well-made although one entry used metal that was a bit too thin (it was probably all that he could find in his junkbox). What's more, the main chassis-mounted parts were all easy to access, so that they could be quickly removed and replaced if necessary.

The soldering was also generally good, with very few examples of pos-

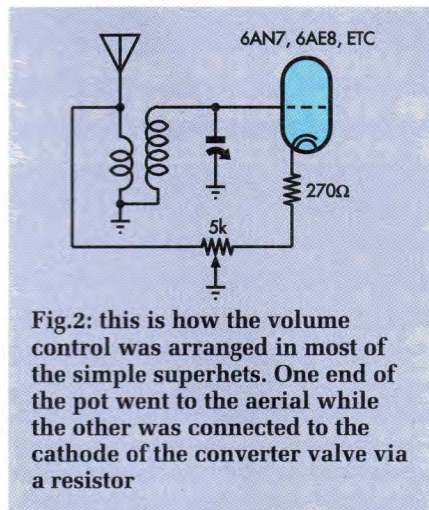


Fig.2: this is how the volume control was arranged in most of the simple superhets. One end of the pot went to the aerial while the other was connected to the cathode of the converter valve via a resistor



The winners – Gary and Des with the Hellier Award shield.

sible dry joints. It was very pleasing to see that most entries had a logical progression of components, with short leads (wherever possible) and with most inputs and outputs kept well apart. The components were generally easy to get at for service and most of the contestants remembered to install the parts so that their values could easily be read in-situ. It usually takes no more effort to do this than to place the parts so that their values are hidden.

Colour coded wiring makes servicing so much easier too. I have always endeavoured to use different coloured wires for different functions and this

is particularly important when using a wiring loom. The attention to detail here helped to make many of the sets real winners in this area. The high-tension (HT) feeds to various parts of the circuits were also well decoupled which is important when it comes to extracting the best performance from the sets.

Innovative ideas

This is an area where it's hard to come up with anything really new. However, slightly different ways of doing things, such as a better method of gaining access to a set or a different method of tuning, could be examples

of something innovative. Noel's plastic (icecream container) cabinet was certainly different and he used parts in his radio that are readily available to anyone. He was also the only entrant to use inductance tuning (which was quite effective) and his set was the easiest to access for service.

Information

This is an important area as it is so much easier to operate and service sets if the appropriate information is available. In the past, many manufacturers supplied information on the circuit, technical specifications, operating methods, methods of disassembly, parts lists and anything else that they believed to be important. Wouldn't it be wonderful if this happened all the time? It doesn't, of course, as you will appreciate from the stories in "Serviceman's Log". He often has trouble even reading circuit diagrams because the reproduction quality is so poor and there are frequently errors in the diagrams.

Most of the entrants supplied relevant information for their radios, although one or two needed to be just a little more careful to ensure that all the collated information was up-to-date. This can be the boring side of a project but the job isn't finished until the paperwork is complete!

Finally, although all this may seem to be concentrating on just one club and its activities, the intention is to give readers an idea of what vintage radio buffs can do in a club atmosphere.