Vintage Radio

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The unnamed console – an orphan from the 1930s

Orphans have always been with us and that includes products with no identifiable manufacturer. This month, we take a look at a rather interesting 6-valve console receiver from the 1930s. It's a well-made set with no name but is one that any manufacturer would have been happy to claim.

THE ORPHAN RECEIVER described in this article is owned by Mark who restored it to full working condition with the help of fellow club member Marcus. Mark regularly browses secondhand and antique shops and he obtained this particular console a couple of years ago.

The job of tracing out the circuit fell to Marcus and some of the odd component values are those that were fitted when the set was obtained – see Fig.1. The purpose of some components has us mystified, while others have strange values so someone in the past had had a fiddle and got it very wrong. These errors have since all been corrected in the chassis, so the set now works quite well.

Circuit details

As shown in Fig.1, the first stage consists of a 58 valve (a 6U7G is identical electrically) which functions as a conventional RF amplifier. This then feeds an autodyne converter stage based on a 57 valve (6J7 equivalent) via a tuned circuit.

Autodyne frequency converters were used before good pentagrid and triode hexode type frequency converters came onto the scene. They can be critical to set up but a well-designed circuit will give few problems. As an aside, autodyne converters were also commonly used in solid-state receivers.

Following the converter stage, the signal is fed to the first IF transformer which is tuned to 175kHz and amplified in the following 58 valve. The amplified output from the 58 then goes through the next IF transformer and is detected using a 55. AGC is also generated in this stage and it is applied to the 55 and to the two preceding 58 valves. To me, this appears to be a significant mistake and the set would not work at all well if it were wired this way. That's certainly not the way the chassis is wired now.

After detection, the audio signal is

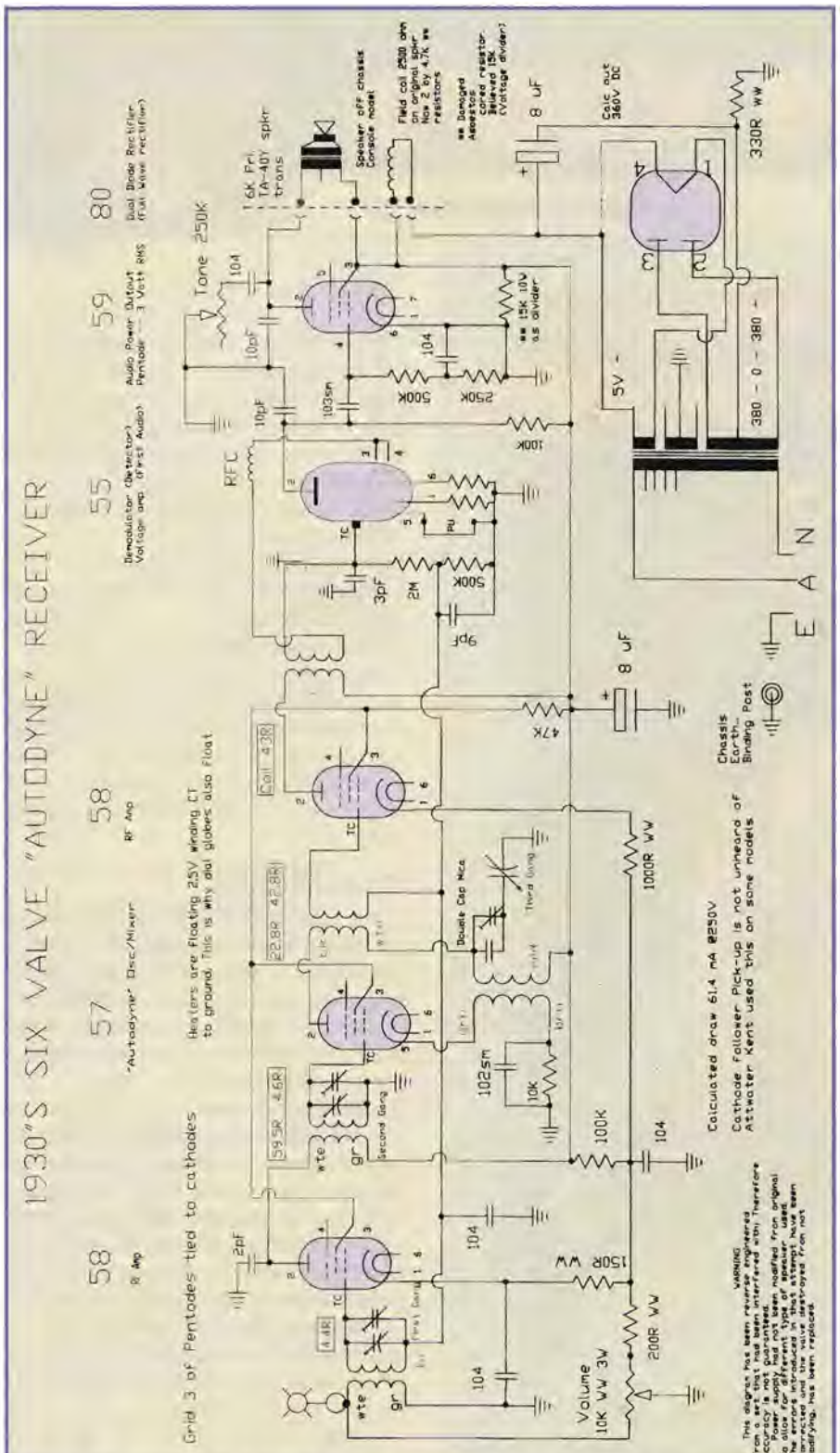


Fig.1: the circuit is a 6-valve superhet design with an autodyne converter (57) stage. The first stage (58) functions as an RF amplifier, while the second 58 functions as an IF amplifier. The 55 functions as the detector, the 59 is the audio output stage and the 80 is the rectifier.

applied to the triode section of the 55 and then fed to a 59 audio output stage. The 55 has only quite low amplification so the audio amplifier isn't the most sensitive in the world. The resulting audio output is fed through a speaker transformer to an 8-inch (200mm) speaker which is mounted on the substantial baffle board that forms part of the cabinet.

Other features of the circuit include a tone control which is wired between the plate of the 59 and earth, to provide a degree of high-frequency audio attenuation. In addition, the unit can be used to amplify the signal from a record player turntable. The 55 audio appears to be wired as a cathode-driven stage, with the grid supposedly grounded for audio signals. However, the circuit as drawn won't work, as the grid is not earthed for audio signals.

In practice, the chassis has since been modified so that it works as originally intended.

Power supply

The power supply is quite conventional, with an 80 used as a full-wave rectifier. Bias of around 20V is developed across the 330Ω resistor and this is fed to the grid of the 59 output valve.

Originally, the set had a 2500-ohm field coil following the first 8µF electrolytic capacitor but two parallel-wired 4.7kΩ resistors have replaced this. Following the resistors, another 8µF electrolytic capacitor completes the filtering of the power supply.

Cabinet restoration

The cabinet of the old console was in remarkably good condition and according to Mark, required very little to make it look almost like new. The controls on the front of the set are, from left to right: Tone, Tuning and Volume. However, like most sets of the era, it had no On-Off switch.

The speaker escutcheon is quite attractive and the dial, although only calibrated from 0-100, is quite easy to read and looks much better than the keyhole-sized dials used on many sets of the era.

The cabinet was first brushed out and then carefully cleaned using a damp cloth to remove any residual dust. A couple of joins in the cabinet were then re-glued but the rest was physically in good order.

Next, teak oil was applied to the outside of the cabinet using a soft cloth, while the inside of the cabinet was treated with linseed oil diluted with mineral turps. A fresh speaker cloth was then fitted as the original was in poor condition.

The end result is a cabinet that looks like new. Cabinet manufacturers, when console receivers were king of

the lounge room, really made some excellent pieces of furniture.

Cleaning the chassis

As can be imagined, the chassis was showing the ravages of time, with a number of minor rust patches showing through. A 15kΩ wirewound resistor had also been severely damaged and because it was covered with asbestos, it had to be dealt with safely.

Marcus used an industrial vacuum cleaner, gloves and a mask to clean the underside of the chassis and remove any asbestos fibres. Acetic acid (or cleaning vinegar) was then used to remove the small amount of rust on the chassis, after which the chassis was thoroughly cleaned using household kerosene and WD40.

It now looks quite good and a clean chassis is always much more pleasant to work on than a dirty one, especially when it comes to troubleshooting.

Circuit repairs

As obtained, the receiver wasn't in working order but that's hardly unusual (despite what the secondhand and antique shops sometimes claim).

One of the first things to do is to get hold of a circuit diagram if at all possible. Most domestic radio circuits from 1939-55 will be found in the Australian Official Radio Service Manuals (AORSM) but circuits for many earlier sets are not so easily found.

In this case, because the set was an orphan, it was not possible to find a circuit and so Marcus laboriously traced out the circuit as he found it. As indicated earlier, there were several mistakes in the circuit. Some may well have been there at the time of manufacture but others had obviously been introduced by a repairer many years ago. In fact, there were two serious mistakes which had caused some components to break down.

First, Marcus found that the original electromagnetic speaker had been replaced with a permanent-magnet "Amplion" speaker. There is nothing inherently wrong in changing the speaker type but in this case, the 2500-ohm speaker field coil resistance had not been taken into account and no resistance had been fitted to the HT line in place of the field coil.

The resistance of the field coil is indicated on the back of the chassis, so there was no excuse for a previous repairer to get it wrong. As a result, higher voltages were applied to various stages than the set had been designed for and this had caused the demise of the output valve and the 15kΩ asbestos-cored wirewound resistor mentioned above.

Marcus replaced the 2500-ohm resistance of the field coil with two 4.7kΩ wire-wound resistors wired in parallel. Another wirewound resistor was used to replace the damaged 15kΩ asbestos-cored resistor.

Another problem was that the chassis-mounted electrolytic capacitors were missing. Dark discolourations on the chassis indicate that they may have disintegrated due to the errors made by the previous owner. The replacement 10μF 450V electrolytics are tiny in comparison with the original 8μF capacitors that would have been used.

In most sets, the switch-on voltage

The parts on the top of the chassis are closely packed together, with the RF, converter and IF valves all fitted with metal shields. Despite its age, the chassis was still in good condition and cleaned up quite well.

The chassis sits on a shelf about half-way down the cabinet, while the speaker mounts on a baffle below it. The original electrodynamic speaker was defunct and was replaced with a more modern permanent-magnet unit.

at the output of the rectifier would rise to around 530V with a 2 x 380V HT secondary feeding the rectifier. In this case, however, this does not occur as the 15kΩ resistor loads the HT line sufficiently so that it does not rise above the 450V rating of the electrolytic capacitors.

Having replaced the electrolytics, Marcus then checked the carbon resistors. Most were out of tolerance and were replaced, as were all the paper capacitors. To keep the chassis looking authentic, the leads of these components were sleeved in fabric-style spaghetti similar to that used in the early 1930s.

Testing the power transformer

As a safety precaution, the power transformer was tested using a high-voltage insulation tester and found to be in good order. However, its leads were showing their age and so spaghetti sleeving was slid over them.

Even after 70 years, the varnish on the underside of the transformer looked like new but the top metal cover hadn't fared nearly as well and shows signs of corrosion. The original mains cord had also deteriorated and was replaced with a 3-core fabric-covered lead which was securely anchored to the chassis.

One potential problem was a mains socket on the rear of the chassis, presumably for a turntable motor. This had exposed (recessed) pins which presented a serious safety hazard. As a result, the mains leads to this socket were removed to render it inoperative and so it is now purely a cosmetic item to help maintain the original appearance.

Finally, the tone and volume controls were both faulty and were replaced with new items. Note that the volume control is a wirewound potentiometer which is wired into the cathode circuit of the RF and IF amplifier valves. One end of the potentiometer goes towards the valve cathodes, the other end is connected to the antenna terminal and the moving arm is connected to earth.

When the moving arm is at the 200Ω end of its travel, the volume is at maximum. Conversely, when the moving arm is at the other end of its travel, the antenna (and hence the incoming signal) is virtually shorted to earth. In addition, the self-bias on the RF and IF valves is increased significantly, which reduces their gain to quite a low level.

This type of volume control was quite common in the early to mid-1930s and is quite different to that used in later receivers.

Alignment

When power was initially applied, it was discovered that the 59 audio output valve was defunct, probably due to the previous owner's modifications. As soon as it was replaced, the set showed signs of life and the voltages were all nominally as expected. No overheating was evident and it was apparent that the restoration had been successful.

Having checked that the voltages were correct, it was time to align the receiver. I always start with the IF (intermediate frequency) amplifier but Marcus couldn't do that as this set has no tuning adjustments in the IF amplifier stage at all. Instead, it appears that the IF transformers were aligned during manufacture and then sealed.

This is rather strange as it means that if any components in the transformers drift in value with time, they cannot be re-aligned.

Marcus began the alignment by

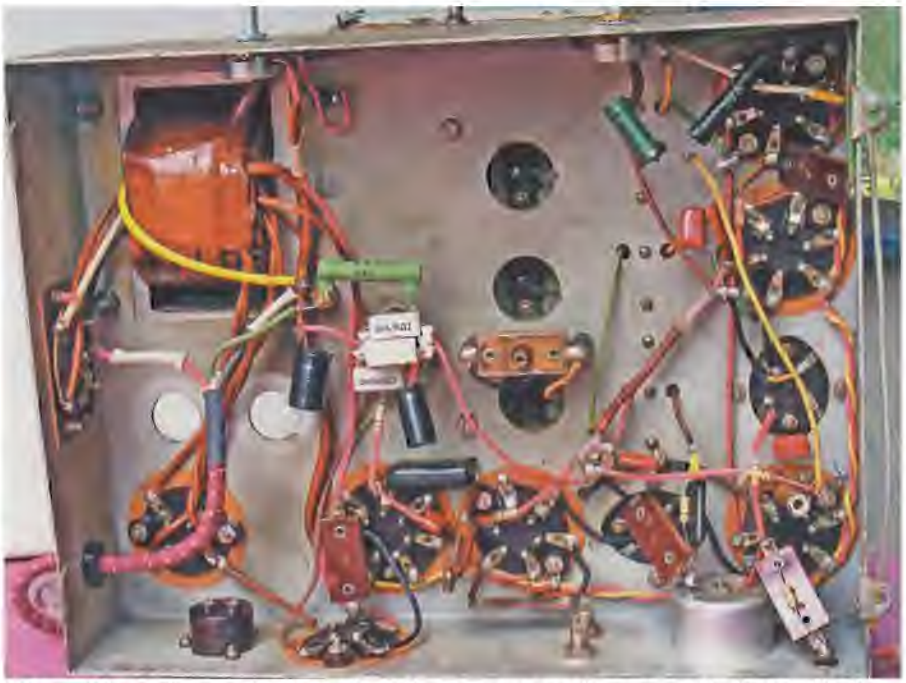
This close up view shows the dial fitted to the receiver. There are no station markings. Instead, it's simply marked with a 0-100 scale.

connecting a signal generator to the grid of the 57 autodyne converter stage. By then sweeping the output frequency of the generator, he found that the maximum response occurred at between 175kHz and 180kHz, thus indicating the set's IF.

The next step was to tune the front-end. The tuning range of this receiver is from 550-1500kHz. The local commercial broadcast station at Wangaratta in North East Victoria is on 1566kHz but the tuning range of the set could not be adjusted so that this station could be received, although the set can tune 2AY on 1494kHz at Albury.

With the signal generator lightly coupled to the antenna and the gangs closed, the padder on the oscillator was adjusted so that the set tuned to 550kHz. Then, with the gangs fully open, the oscillator trimmer capacitor was adjusted so that 1500kHz was tuned. The tuning gangs were then closed again and the padder adjusted so that the receiver still tuned down to 550kHz before being opened again and the set retuned to 1500kHz at the top-end of the dial.

Finally, the set was turned to around 1400kHz and the trimmers on the RF and antenna sections of the 3-gang tuning capacitor peaked for best performance. The set was now performing quite well and had no trouble tuning numerous stations. In fact, it is better than many other sets in terms of selectivity – the local national 10kW station is just 8km away and appears only where it should on the dial, despite the high signal strength.



Most of the carbon resistors and all the paper capacitors were faulty and had to be replaced, along with the electrolytic filter capacitors. The wiring to the mains output socket at bottom left was disconnected in the interests of safety.

Summary

The circuit as traced out is not how the set was originally made. However, it gives a good indication of the set's basic configuration.

Personally, if I have any doubts about a circuit, I look at other circuits from the same era and alter the wiring if necessary. I also try to work out if the circuitry in doubt is original or if it's been modified by someone who didn't understand what they were doing.

In short, this is an interesting console from the early 1930s. It's quite an attractive set which performs well, so it's surprising that the manufacturer's name isn't on the set somewhere, as it is obviously a commercial product.

It's also surprising that the IF transformers have no adjustments. However, they appear to have kept their tuning over the 70 years or so since the set was manufactured.

Finally, we would like to be able to put a name to this set and discover its manufacturer. It has the figures "75-425" on the back of the chassis and Rickett and Thorp of Sydney made the cabinet. Can anyone help? **SC**