Vintage Radio

By RODNEY CHAMPNESS, VK3UG

The simple Aristone M1 4-valve mantel receiver

The Aristone M1 is a 4-valve superhet receiver that was sold during the late 1950s & early 1960s. Designed for the budget end of the market, it was typical of the re-badged sets that appeared during that era.

There were many small radio receiver manufacturers in Australia until the Japanese began to dominate the radio manufacturing industry in the mid-1970s. In most cases, these small Australian firms made radios for much larger organisations like Myers and similar chain stores. The sets were branded to suit Myers and the various other organisations that did not make radios themselves.

This re-badging has been part of the radio and TV consumer market almost since radio made its appearance early last century. Of course, once a set was opened up, its true manufacturer was usually obvious to an experienced serviceman.

The Aristone M1

The Aristone M1 is one such set that was made by a small manufacturer for a large retailer, in this case Myers. As far as I can determine, "Aristone" was the name Myers used on the radios badged for them but I have not been able to discover who actually made the Aristone sets.

The M1 was a fairly standard 4-valve mantel receiver that came housed in a plastic case. It employs a conventional superhet circuit, with a 6AN7A converter stage followed by a 6N8 as the 455kHz intermediate frequency (IF) amplifier – see Fig.1.

The diodes in the 6N8 are used as the detector and for the delayed AGC system. From there, the detected audio is passed through the volume control and then to the 6M5 audio output valve.

The power supply uses a 6V4 as

This is the full-restored receiver. The set is housed in a rectangular plastic cabinet and carries just two controls: an on/off volume control and a simple "handspan" tuning control.

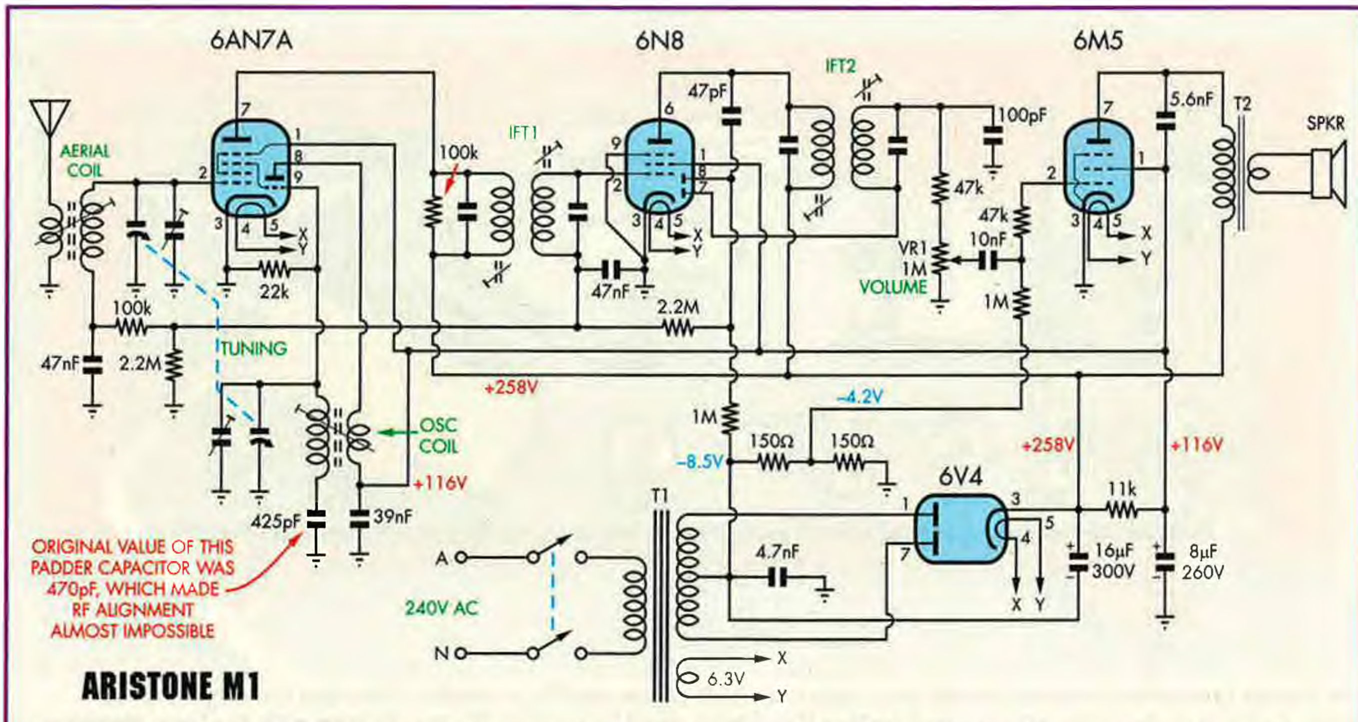


Fig.1: the Aristone M1 uses four valves in a superhet configuration. A 6AN7 functions as the converter stage and is followed by a 6N8 IF amplifier and detector stage. The detected signal is then fed to a 6M5 audio output stage. The power supply is conventional and is based on mains transformer T1 and a 6V4 rectifier valve.

a full-wave rectifier. This provides around 260V DC at its cathode, which is then fed directly to the plate circuits of all the amplifying valves.

By contrast, the screens and the oscillator plate circuit are fed via a dropping resistor and receive around 116V DC. This voltage is really a bit high for the RF valves which are nominally rated at 85V. Bias for the valves and the AGC bias are both obtained from the back-bias developed across the resistors in series between the HT secondary winding centre-tap and the chassis.

Cabinet details

The M1 is mounted in a rectangular plastic cabinet, which is rather large for a simple, 4-valve mantel receiver. There are two controls on the front of the set: an on-off/volume control and a "handspan" direct-drive tuning control. The circular dial scale has markings for stations in all states.

While writing this article, it occurred to me that the Aristone's cabinet was similar to the cabinet used for the Admiral 5BW (described in the September 2006 issue). Sure enough, when I placed the two cabinets side-by-side, they were identical, except that the front escutcheons are different and the Aristone is red whereas the Admiral is cream.

So it would seem that the cabinets for the Admiral and the Aristone came out of the same factory and that they were available in at least two different colours. In fact, I believe that the cabinet was designed for the Admiral, as there is a cutout for a serial number on the back cover. This corresponds to where the serial number is on the Admiral chassis.

By contrast, the Aristone chassis is recessed 75mm from the back of the set and its serial number is at the opposite end of the chassis from the serial number cutout. In fact, the physical layouts of the two sets are quite different and the chassis were definitely made by different manufacturers.

Undoing three self-tapping screws allows the back to be removed. This reveals that the chassis is mounted vertically and consists mainly of a flat piece of steel attached to the front of the cabinet. Because the cabinet is so large, the components mounted on the top of the chassis plate are well spread out, which makes them easily accessible.

In order to remove the chassis, it's necessary to first remove both control knobs. The on-off/volume knob simply pulls straight off but the tuning control knob is slightly more complicated. It's removed by first rotating the control so that the tuning gang is closed and then continuing to rotate it while pulling on the dial until it comes off.

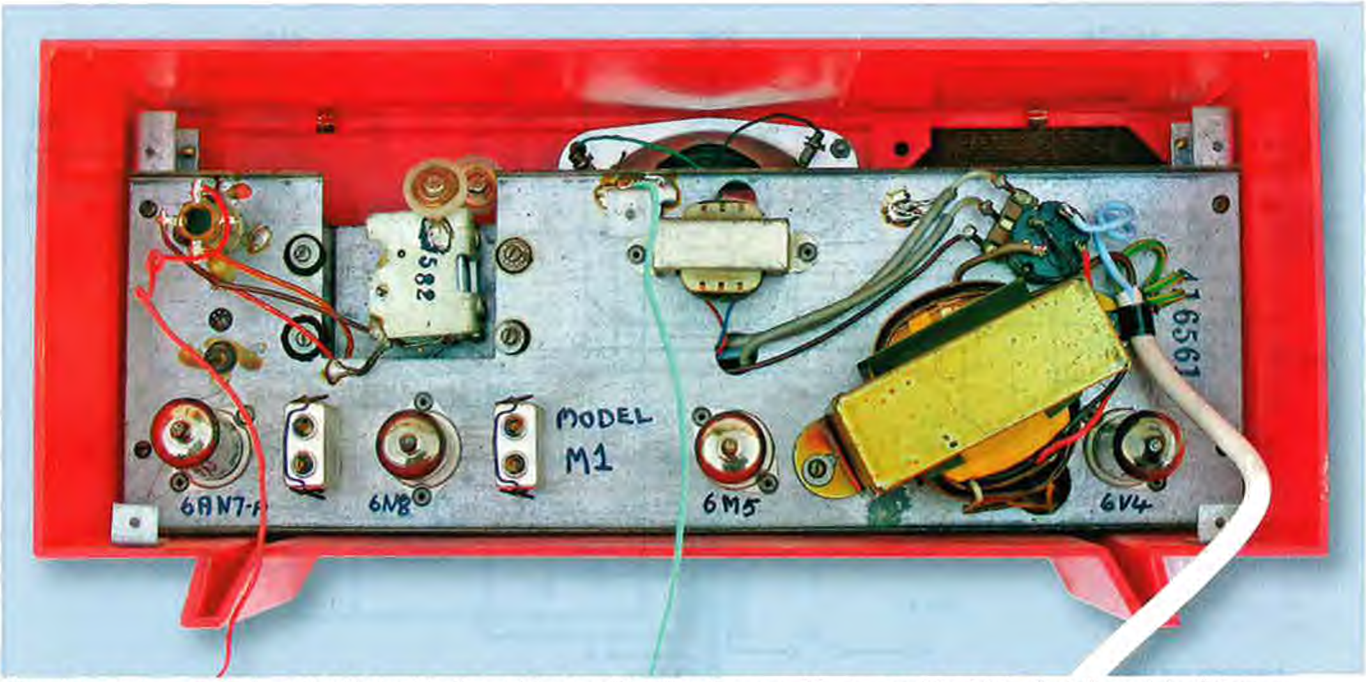
Next, four screws in the back of the set that hold the chassis plate in position are removed. That done, the two loudspeaker leads are removed using a pair of long-nosed pliers, after which the chassis plate can be removed.

Once it's out, the under-chassis layout can be inspected. Like the top of the chassis, there is a lot of space to mount the components and they are well spread out, with no overcrowding. The wiring is also extremely tidy for what must have been a budget-priced receiver. Single-core hook-up wire has been used to maintain the neat look but a bit more variety in the colour of the insulation would have been a good idea to assist circuit tracing.

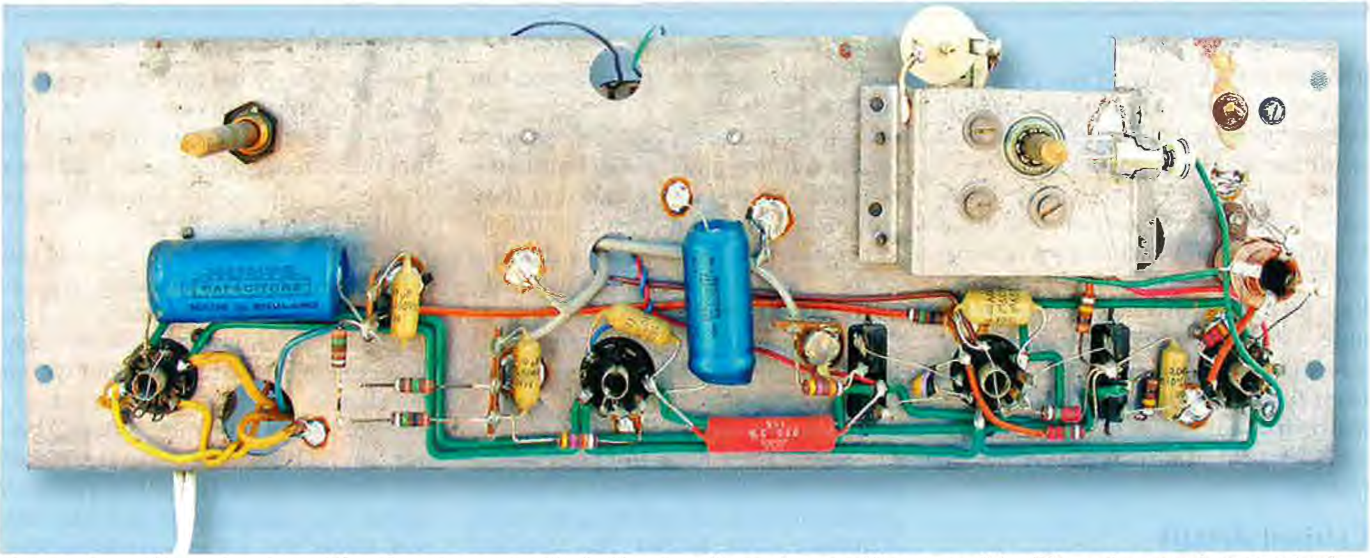
Restoration

When I obtained the set, some work had already been done on it so only a small amount of extra work was required to restore it to full operation.

First, the cabinet needed cleaning up and a light rub-down with a some automotive cut and polish compound



The chassis is mounted vertically inside the cabinet, with all valves readily accessible. Note that the original 2-core power lead was replaced by a 3-core lead, so that the chassis could be earthed. It's shown here with its clamp temporarily secured by a transformer mounting screw. The clamp was later separately secured to the chassis using a machine screw, lock washer & nut, to comply with current standards.



The parts on the underside of the chassis are neatly laid out and are also readily accessible. The only part that required replacement was the paper bypass capacitor for the screen circuit.

did the trick. That done, it was time to turn my attention to the chassis components.

The majority of the fixed capacitors were Philips polyester types and none of these needed replacement. However, the bypass capacitor for the screen circuits was a paper type and so this was replaced with a polyester unit.

All the other components appeared to be in good order and a visual inspection was easily carried out, as the layout is so open. I also checked for shorts and partial shorts on the high-tension (HT) line. (partial shorts can be caused by defective electrolytic capacitors). I then checked the speaker transformer and found that its primary winding was continuous. This is an important step, as an open-circuit speaker transformer primary can result in damage to the output valve.

Smoke test

It was now time for the smoke test. I connected my multimeter across the HT line, switched it to the 400V range and turned the set on. I then allowed it to warm-up, all the time keeping an eye on the meter reading and the rectifier valve.

When the voltage had risen to around 100V, I switched off the power and waited until the electrolytic capacitors had discharged. This procedure was then repeated several times over the next few minutes, each time allowing the voltage to rise a little higher before switching off. The rectifier showed no sign of overload during this procedure which was necessary to reform the electrolytic capacitors.

I then ran the set for around half an hour to make sure the power transformer was not overheating. That done, it was time to check and adjust the set for best performance.

Checking the performance

There are basically only four points on the chassis where the voltages needed to be checked. First, the HT voltages can be measured at the positive terminals of the 16μF and 8μF electrolytic capacitors. These two points measured 258V and 116V respectively, with the mains at 245V AC. Note that if the mains voltage had been 240V AC, these two voltages would more likely have been 250V and 110V.

The HT voltage to the plates is quite normal, although I believe that the designers were pushing the two RF valves a bit by applying 110V (nominal) to their screens (the recommended screen voltage is around 85V). The 6M5 on the other hand is run with a relatively low screen voltage, which will not do it any harm.

Checking the bias

The back-bias was checked next and I was initially a little surprised at the measured voltages and just where they were applied in the set. With no input signal, the back-bias voltages measured -4.2V and -8.8V. I had expected to see the -8.8V applied to the 6M5 rather than to the RF valves as the latter usually have around -2V applied to them.

As shown in Fig.1, the -8.8V bias is applied via a voltage divider network consisting of a 1MΩ resistor and two 2.2MΩ resistors to chassis. There is around -7V at the junction of the 1MΩ and the 2M2 resistors, which is the delay voltage for the AGC system. This reduces to around -3.5V (relative to chassis) at the junction of the two 2.2MΩ AGC resistors, which is the standing bias for the two RF valves.

With such a high delay voltage on the AGC diode, the RF signal needs to be quite substantial for any AGC to be developed. The two 2.2MΩ resistors then divide this AGC voltage in half, so not a lot of AGC is applied to the two RF valves unless the signals are quite strong.

So why have such a high delay on the AGC and then only apply half the available voltage to control the RF valves? In fact, there is a very good reason for this.

Basically, there has to be a reasonably high output level from the detector in order to drive the 6M5 stage to full audio output. However, if a low level of delay and full AGC were applied to the front-end of the set, the output level from the detector would be more constant for all signals (weak or strong) and so we would not be able to obtain full audio output (even with the volume control turned full up).

On the other hand, if the set had a 2-stage audio amplifier, this method of obtaining full audio output would not be required. A few simple superhets use this system but I'm not all that keen on it as it is very much a design compromise.

Initially, I believed that the -4.2V of bias on the 6M5's grid was rather low. However, it really is quite adequate as the screen voltage is so low.

The converter (6AN7) and IF (6N8) stages are quite conventional, with quite high gain from the IF stage. Two miniature Philips 455kHz transformers do a good job in keeping the gain of the stage high.

The IF amplifier was stable but had a slight tendency to be regenerative if I brought my hand near it. One possibility was that the audio amplifier was receiving some 455kHz signal, amplifying it and then re-radiating it back into the IF stage. To check this, I connected an oscilloscope probe to the top of the volume control and found that there was a small amount of IF signal there.

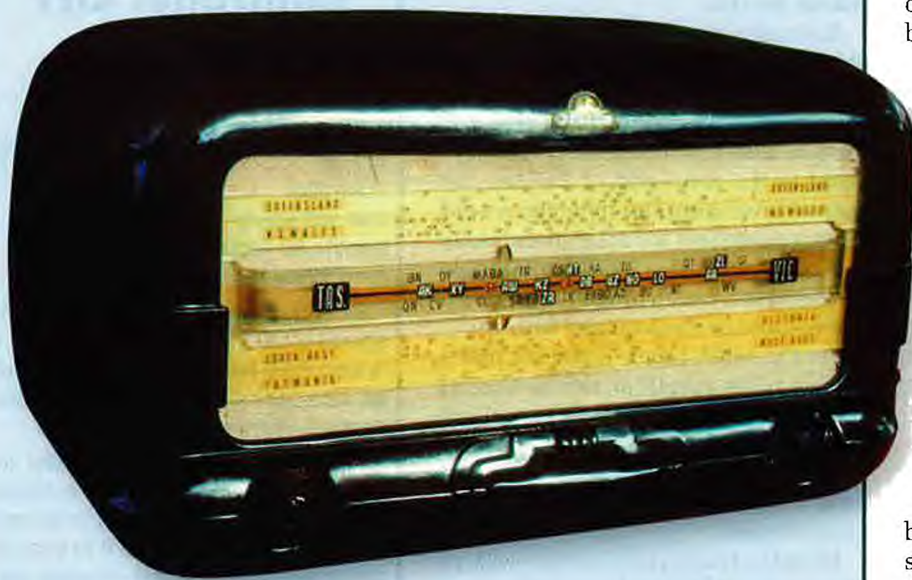
Knowing what to look for

You have to know what you are looking for here and how to go about it. To inspect audio waveforms, the scan rate is set to around 5ms/cm. By contrast, to inspect the IF component of the audio signal, the scan rate has to be set to around 5μs/div.

In addition, the ratio of 455kHz signal to audio is quite low, so the sensitivity of the vertical deflection must be increased so that the audio waveform extends well outside the screen.

When there is no signal modulation, a sinewave signal will be seen on the screen, which is the 455kHz signal on the audio line. In this case, some 455kHz signal was observed so

Photo Gallery: 1949 Astor Model GJ



ANOTHER PRODUCT OF RADIO CORPORATION, MELBOURNE, the Astor Model GJ was produced in 1949 and is housed in a large bakelite cabinet with a large, easy-to-read tuning dial. In spite of the size of the set, it is only a 4-valve model.

The valves line-up was as follows: 6A8-G frequency changer; 6B8-G reflexed IF amplifier/1st audio amplifier/detector/AVC rectifier; 6V6-GT audio output; and 5Y3-GT rectifier. Photo: Historical Radio Society of Australia, Inc.

I then checked at the moving arm of the volume control. However, there was virtually no sign of the 455kHz signal at this point, which was what I was hoping for.

Shielded cable

It's interesting to note that shielded cable is used for the audio connections to the top of the volume potentiometer and to its wiper terminal. Fairly obviously, it's the stray capacitance of this shielded cable that attenuates the IF signal.

The shielded cable also helps prevent hum pick-up. It's a pity that more manufacturers of that era didn't shield the low-level audio lines.

The 6M5 audio output amplifier is simple and effective. Note that its plate circuit has a 5.6nF capacitor which connects to the screen. This filters out any residual IF signal that may have found its way through and acts as a top-cut filter on the audio.

Alignment

Alignment of the IF and RF sections in a set such as this should be a snack, as access is easy and there are only eight adjustments in total. We won't discuss the alignment procedure here – the full details are in the December 2002, January 2003 & February 2003 issues of SILICON CHIP.

The IF alignment went very well but when it came to the RF section, I found that the oscillator and aerial tuned circuits would not track correctly across the band. What was puzzling was that the set tuned easily to signals below 500kHz. This was unusual as most sets will not tune so low in frequency, even if a deliberate attempt is made to make them do so.

I looked around the circuit to see if there was anything that might cause this and eventually spotted the problem. The set had been fitted with a 470pF padder capacitor instead of the correct 425pF capacitor. As a result, I replaced the padder with a combination of styroseal capacitors (as I didn't have the right value) and tried the set again.

The alignment of the front-end was now a breeze. Because the tuned circuits were now tracking correctly, the dial readings were correct and the sensitivity had improved dramatically.

In fact, this set had probably been considered to be a "dog" all its life because someone, at the time of manufacture had put the wrong padder capacitor in the circuit. I wonder how many other sets of this model had the same inbuilt fault?

Power cord

In the interests of safety, I replaced the original 2-core power lead with a 3-core lead and added a cable clamp to secure it. This allows the chassis to be earthed and a cable clamp is much more secure than simply tying a knot in the lead (which is illegal these days).

By the way, one of the photos shows the cable clamp secured by one of the transformer mounting screws. This clamp was later separately secured to the chassis, to comply with current requirements.

Similarly, the power cord earth lead was secured to a separate earth lug that was securely bolted to another point on the chassis.

Summary

The Aristone M1 is a real "bitser" (ie, it has bits from all over the place). The cabinet probably came from an "end of run" Admiral set, the knob and handspan dial look suspiciously like AWA parts, and some of the other parts look like they were made by Kriesler and Philips. There was certainly nothing wrong with using these components, as they all did the job.

Aristone, or whoever the actual manufacturer was, produced quite a good receiver using these bits and pieces. In fact, if something like a 6BM8 had been used as a 2-stage audio amplifier along with a slightly redesigned AGC system, this radio would have been a really red hot performer.

The set is also easy to access, although longer speaker leads would have made servicing easier. The aerial coil could also have been positionted so that it could be adjusted when the chassis was installed in its cabinet.

This is certainly not a set that would have collectors crawling over broken glass to obtain. However, considering what it represents – a "bitser" made by a small manufacturer (probably from production over-runs by other manufacturers) – it's a nice little set that I'm happy to have in my collection. **SC**