VINTAGE RADIO



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The Armstrong C5 dual-wave console receiver

For those familiar with vintage radio, the main brand names of the domestic receivers –AWA, HMV, Astor and Stromberg-Carlson, etc – all roll easily off the tongue. But when the name "Armstrong" is mentioned to someone, their most likely response is "never heard of it".



Recently, I was visiting a friend (Laurie) and he showed me an Armstrong console receiver. He had never heard of the brand before it came into his possession and neither had I.

As can be seen from the photos, the console cabinet housing the receiver is quite an attractive piece of furniture. The timber used is lighter than that used on some of the HMV consoles of the same era but this has one advantage – it makes the set much easier to lift!

Another difference is that the dial slopes back at a slightly greater angle than on most other consoles, which makes the set easier to operate when the operator is standing up. It also means that the chassis is mounted on a sloping shelf, although (fortunately) the angle is not high enough so that the chassis slides out by itself when the retaining screws and knobs are removed.

Large tuning dial

A dominant feature of this set is the larger than average circular tuning dial. This is very attractive in appearance and makes the set easy to tune.

As can be seen in the photos, there is a small red circle at the bottom of the dial. This is marked "Short Wave" and has a dial lamp behind it which illuminates when the set is receiving shortwave signals. Certainly, console manufacturers set out to make their sets look special in what ever way they could to impress people.

A glance in the back of the set reveals that the dial drive system and the tuning gang are mounted several centimetres proud of the chassis. This was necessary because the large dial would have otherwise interfered with the chassis. But despite being



There is plenty of space inside the cabinet for the 5-valve chassis and the large electrodynamic loudspeaker. The loudspeaker's field coil also acts as the filter choke for the HT supply.

on "stilts", the tuning system is quite stable in operation and has minimal backlash.

On shortwave, the mechanical stability of the dial system may not have been particularly good but then shortwave was usually only used on an occasional basis. In fact, the shortwave bands could have been left off 99% of domestic radio sets, as they were rarely used by the general listening public. By contrast, listeners who genuinely wanted to listen to shortwave could purchase more upmarket sets, such as one of the AWA "seven banders", which were serious shortwave receivers.

Circuit details

The Armstrong C5 console is a conventional 5-valve dual-wave receiver covering the broadcast band from 550-1600kHz and the shortwave band from 7-22MHz (42 to 13 metres). Its valve

line-up is quite conventional and includes a 6A8G converter, a 6U7G 455kHz intermediate frequency (IF) amplifier stage, a 6B6G diode detector and first audio amplifier and a 6F6G audio output valve. The power supply uses the ubiquitous 5Y3GT as the rectifier.

Note that the 6B6G is not shielded and it would appear that the metal plate mounted between it and the output valve provides enough shielding to prevent audio feedback. The audio output stage drives a 305mmdiameter (12-inch) electrodynamic loudspeaker.

Front-end & IF stages

A somewhat unusual feature of this receiver is that it doesn't have AGC. Instead, it relies on manual control of the converter and IF amplifier gains, via a wirewound potentiometer.

The moving arm of this pot is con-

Vintage Radio – *continued*



This close up view shows the C5's chassis from the back. Note how high the tuning gang sits so that the large tuning dial can easily be accommodated. The holes in the tops of the IF cans provide access to the alignment trimmers.

nected to earth, while one end of the resistance track is connected to the top of the selected antenna coil. The other end of the track goes to the cathodes of both the 6A8G and the 6U7G via a cathode resistor. This system works well but it would have been simple to arrange delayed AGC to the controlled valves. Back bias is used for the 6F6G and this could have been used on the AGC system as well.

Another unusual feature of this set is that the antenna lead-in is routed right across the underside of the chassis to the wave-change switch. Other manufacturers usually route this lead so that it is at least "semi-shielded" from the rest of the circuit, to avoid any possibility of unwanted feedback. However, Armstrong obviously didn't have a problem with this, as no signs of any instability were evident when the set was tested.

On a similar theme, both the antenna and oscillator coils for the broadcast band are mounted on the chassis. By contrast, the shortwave coils, which are more critical in their placement, are mounted on the wave-change switch itself.

All coils are air-cored with no pro-

vision for adjusting their inductances and this includes the IF transformers as well. By contrast, the broadcast band has trimmers on both the antenna and oscillator coils for tuning adjustment at the high-frequency end of the dial. In addition, the oscillator coil has a padder for adjusting the lowfrequency dial calibration.

On shortwave, it is another matter entirely. It is simply a case of "forget it", as there are no adjustments for the shortwave band at all! This seems a bit crude at first glance but when you look at the dial-scale calibrations on shortwave and consider how poorly calibrated most shortwave sets were at that time, it probably didn't matter all that much.

The IF amplifier stages are tuned to 455kHz which is quite conventional. However, the IF transformers are different from most others, as they are tuned using two trimmer capacitors at the top of each unit. At that time, most manufacturers had changed over to fixed capacitors, with slugs (iron dust core) used to alter the inductance to tune the IF transformers to the correct frequency.

There's one very important point to

keep in mind if you come across sets with two trimmers on the IF transformers and it's this: one trimmer is usually at HT voltage! Damage can be done to the transformer winding if it is shorted to chassis while being adjusted. What's more, you could receive a very nasty (and possibly lethal) shock if you are careless enough to come into contact with this HT voltage!

Detector & audio amplifier

The two diodes in the 6B6G valve are strapped together to act as the detector. The resulting audio signal appearing across the diode load resistor is then applied to the grid of the 6B6G and the signal from this stage then fed to the 6F6G audio output valve. This then drives an output transformer and a 305mm (12-inch) Rola electrodynamic speaker.

The tone control circuit consists of a capacitor between the plate of the 6F6G and a potentiometer which connects to earth.

Power supply

The power supply is quite conventional, with the loudspeaker's field coil also acting as the filter choke. The centre tap of the power transformer goes to earth via a low-value resistor which provides bias for the 6F6G. Why this couldn't have also been used to provide bias for the RF-stage valves and to provide delayed AGC is a puzzle. Perhaps the designer didn't feel confident that he could get it right and stayed with a "tried and true" method from previous designs.

General comments

Although the receiver has an "ARTS & P" transfer on the chassis, the letter which designates the year of manufacture is missing. However, it's likely that the set was manufactured during the 1937-39 period.

(Editor's note: according to the Historical Radio Society of Australia, the "ARTS & P" system was a licensing system that was used in Australia and New Zealand between 1934 and the 1960s. The system was introduced to verify that radio manufacturers paid royalties for items that were covered by patents. Each licensed radio was fitted with a small sticker attached to the back of the chassis and the colour of the sticker is a useful way of determining the age of manufacture).

The year indicators for these trans-

Photo Gallery: Astor "Mickey Mouse" Model BE



Produced in 1936 by Radio Corporation (Melbourne), the BE is another example of a small mantel set carrying the "Mickey Mouse" name. An interesting feature of the set was the provision of a 7-pin socket which enabled a shortwave converter (dubbed the "Oversea-er") to be connected. This unit contained its own 6A7 frequency changer valve and enabled the receiver to tune the 6-19MHz shortwave band. The receiver was fitted with the following valve line-up: 6A7 frequency changer, 6D6 IF amplifier, 6B7 detector & first audio amplifier, 41 audio output and 80 rectifier. (Photo courtesy Historical Radio Society Of Australia (Inc.).

fers are as follows: A = 1934, B = 1935, C = 1936, D = 37, E = 1938, F = 39, and G = 1940 (it's possible that "G" may have been used for several of the war years).

The set's controls are mounted underneath the dial and along the front edge of the chassis. From left to right they are: tone, tuning, wave change and volume. This differs from most sets, which have the tuning control to the right of the volume control, to suit righthanded people.

The painted (green) chassis was in good condition, with the chassis-mounted components arranged logically and neatly. The chassis is easily extracted from the cabinet by first removing the control knobs and the screws holding it to the mounting shelf. The loudspeaker plug is then disconnected from the chassis, after which the assembly can be removed from the cabinet.

A close inspection of the chassis reveals that the mechanical and wiring layouts are quite logical, with good access to most parts. This makes it easier to work on than many other sets from the same era. In fact, Laurie found that there wasn't much to do to get the set up and running.

Over its life, the set has only had one paper capacitor changed and this was to a Ducon brand capacitor as commonly used in the 1950s. These capacitors were not particularly good and became leaky after only a few years, so it may have to be replaced again soon.

In fact, the set has been sitting around for some time since it was initially restored, so it will need to be completely rechecked before being used. In particular, it will be necessary to check that none of the critical capacitors have become excessively leaky.

The one I routinely replace in a set without AGC is the audio coupler between the two audio stages. Other than that, most of the capacitors in this design can be quite leaky without causing any harm to the set or



The C9 chassis has a simple layout, with easy access to all parts. Note the knot used to restrain the power cord, which is unacceptable by today's standards.

having any discernible effect on its performance.

Testing capacitors

I use both 500V and 1000V testers to check capacitors for excessive leakage. These high-voltage testers are able to detect leakage resistance in capacitors that's not evident on a normal ohmmeter.

Another very effective method that can be used is to heat the capacitor and then measure its resistance. To do this, it's necessary to first disconnect one



A close up view of the Armstrong C5's impressive dial. The small red circle at the bottom of the dial illuminates when the set is receiving shortwave signals.

lead of the capacitor from the circuit. That done, you connect an ohmmeter (preferably digital) across the capacitor using a couple of clip leads and set the meter to a very high ohms range (over a hundred megohms if possible). Finally, you use a hair drier to gently heat the capacitor until it's quite warm (85°C to 100°C).

If the capacitor is defective, its leakage current will increase significantly and the meter reading will decrease.

Finally, despite its age, this receiver was obtained in quite good condition. The cabinet required some touch-up work in a few places but generally it had been very well looked after during its life. What's more, the chassis was in very good condition and needed little more than dusting.

This is one set that was obviously not stored in a damp garage or shed after being retired from service!

Although not a "top of the line" receiver, the Armstrong C9 is a wellmade set that would have given reliable and impressive service over many years. It's obvious that a lot of thought went into the design of the set and it is a worthwhile receiver to have in a collection – provided you have enough room for a console! SC