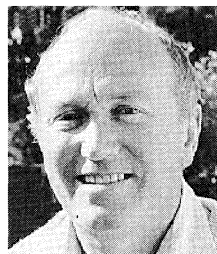


# VINTAGE RADIO

By JOHN HILL



## The 4-valve Airzone superhet

During the 1930s era, large TRF receivers in huge cabinets were very popular and remained that way for some time. However, the depression years saw many changes in radio manufacture and these hard times spawned a variety of smaller and cheaper receivers.

Making a successful low-cost radio meant cutting back and although the 5-valve receiver was the accepted norm of the day, some manufacturers produced 4-valvers – something that was not all that practical at the time. While quite reasonable 4-valve receivers were common in the 1940s and 1950s, their predecessors of the early 1930s were sadly lacking in performance. Nevertheless, the 4-valve superhets were considerably better than their TRF counterparts.

### The 4-valve Airzone

This month's story is about an early Airzone 4-valve mantel style superhet of about 1933 vintage. It was bought

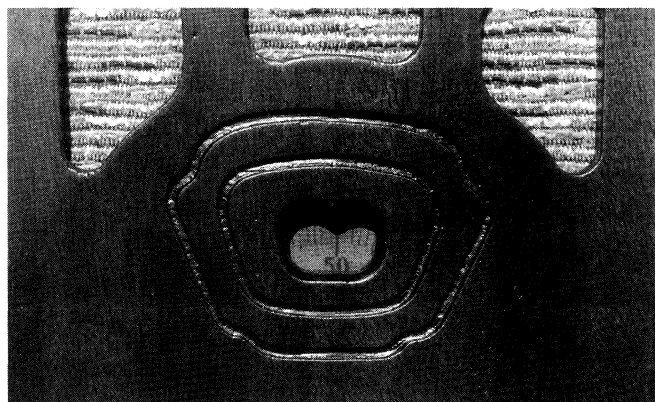
in a fairly sad state of repair and although a few whispers (whimpers) came forth from the loud-speaker, one could not really say that the set was working.

The Airzone's valve line up is as follows: 80 rectifier, 57 autodyne mixer, 58 intermediate frequency amplifier and 59 output pentode, the latter used as a combined anode bend detector and output stage.

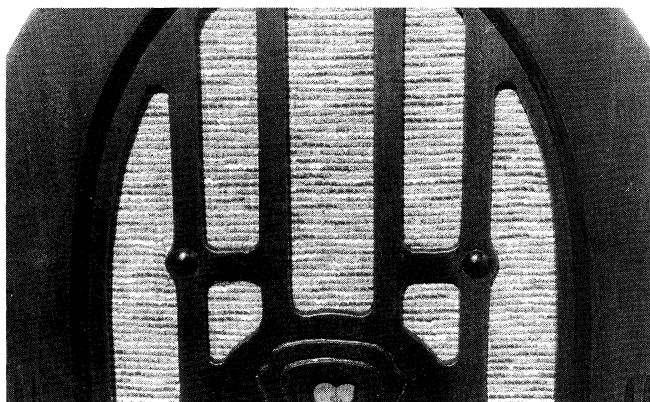
The Airzone has an intermediate frequency of 465kHz, which means that the 3-gang tuning capacitor and



The Airzone 4-valve superhet, circa 1933. A semi-gloss lacquer treatment seemed appropriate for the age of the receiver.



The budget-priced Airzone has no dial escutcheon. Instead, it features two routed grooves around a heart-shaped peephole dial aperture.



The speaker grille cloth was reversed so that its clean side showed through the front of the cabinet. This trick is well worth remembering if you are restoring an old receiver.

bandpass filter used on early superhets with 175kHz IFs were not required. That in itself would amount to a worthwhile reduction in production costs.

Anode bend detection had been used in radio receivers for some time and was the current trend when the Airzone was made. However, using this method of detection on the output valve was a departure from the normal practice of putting the detector ahead of the output stage.

### Anode bend problems

Using the output valve as an anode bend detector creates a number of problems. First, because the valve is biased to work near cut off, its plate current is considerably reduced. This means that the set requires an output transformer with a much higher than normal primary impedance, otherwise its output power will be well down compared to that from a conventional class-A output stage.

Second, because of the reduced plate current, there is insufficient current flowing through the field coil to adequately energise the speaker magnet, if a standard  $2k\Omega$  field resistance is used. This speaker problem was overcome by employing a tapped high resistance winding. Other 4-valve receivers did use standard speakers but the circuit was designed to bleed off sufficient high tension current to energise the field.

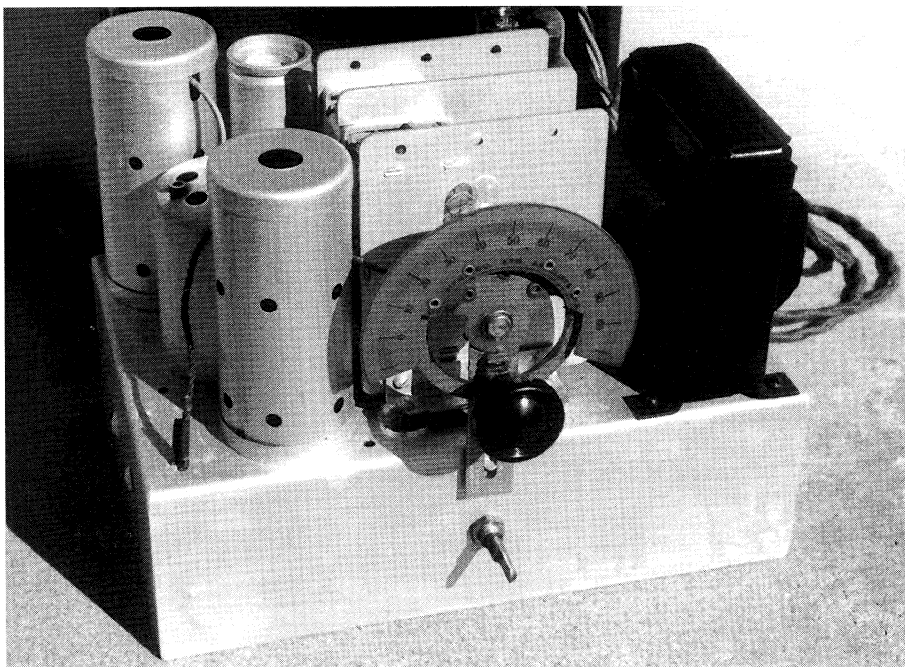
It wasn't until diode detection came into general use that the output valve was used as a conventional output stage in these early 4-valve superhet receivers. When diode detection was used, the diodes were usually enclosed in the IF amplifier valve. The old 6B7 and type 55 valves had built-in diodes and were much used during the mid-1930s.

But let's return to the old Airzone.

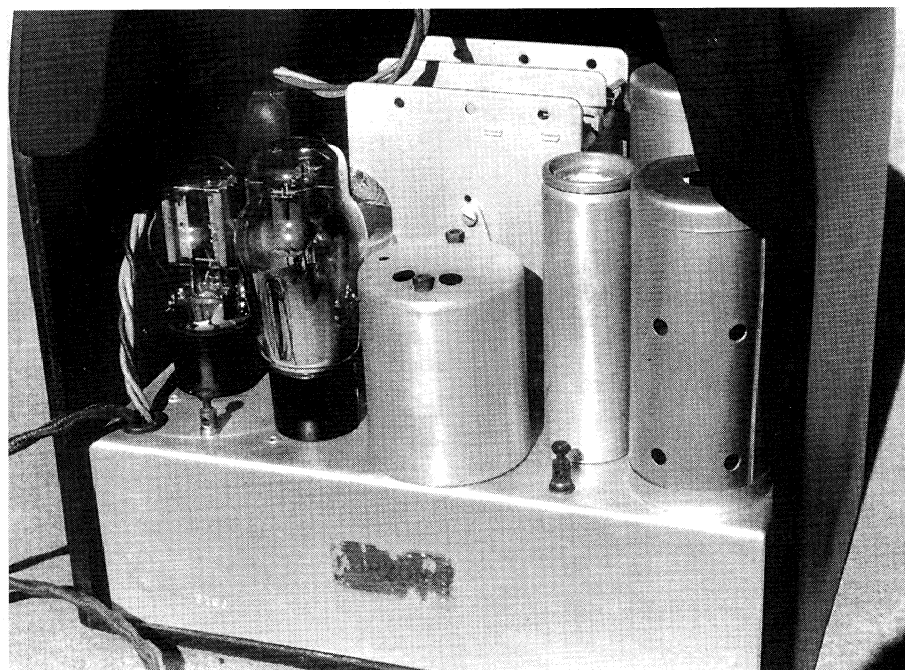
### Budget market

This receiver was undoubtedly aimed at the budget end of the market. Its manufacture was so cost-effective that the lightweight plywood cabinet has no dial escutcheon and relies on a routed shape in the front panel to substitute for this common embellishment. Most receivers of that era had either a pressed brass or moulded bakelite escutcheon but not the old Airzone!

The dial pointer takes the form of a



This view shows the front of the chassis after the restoration work had been completed.



This rear view shows the chassis inside the cabinet. The old receiver cleaned up quite well, despite its initial condition.

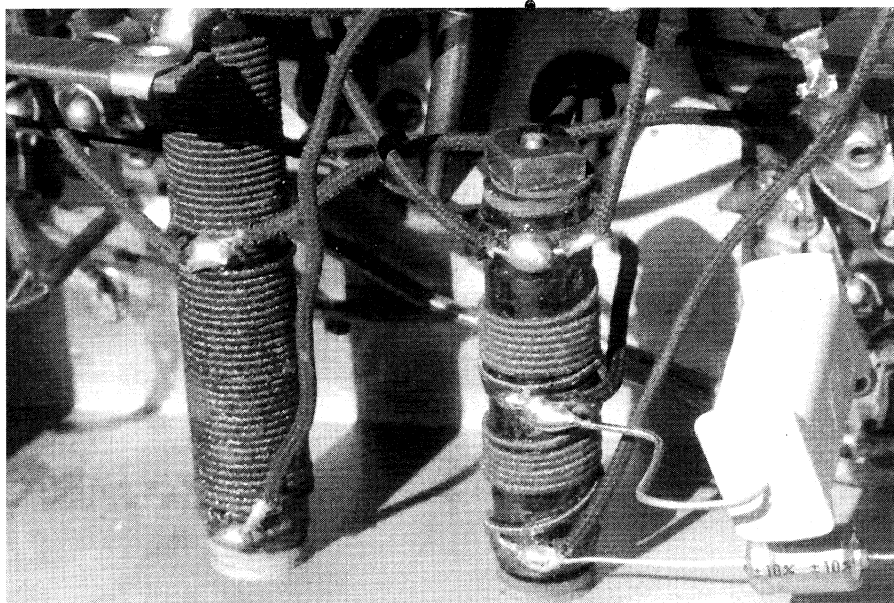
heart-shaped peephole cut into the front panel. If a radio manufacturer was to survive in the early 1930s he had to trim costs in every way imaginable. Airzone successfully did this and was still making radios well into the post-war period.

The speaker is the original Magnavox 150D, a 6-inch (150mm) electrodynamic type with a tapped field winding. The field winding has an imped-

ance of  $6k\Omega$  and is tapped at  $3.5k\Omega$ . The original high-impedance output transformer was still attached to the speaker.

Fortunately, both the tapped field and the output transformer were still in working order. As might be expected, these somewhat rare items are difficult to find and expensive to buy or have rewound.

The IF transformers are mounted

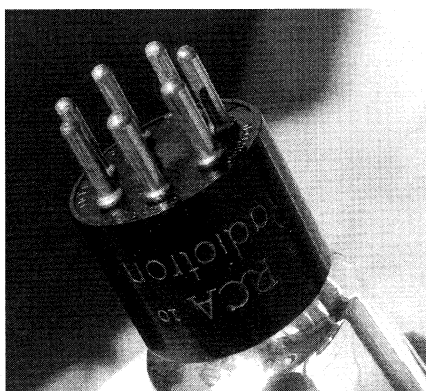


**All the bias resistors in the old Airzone are wirewound.**

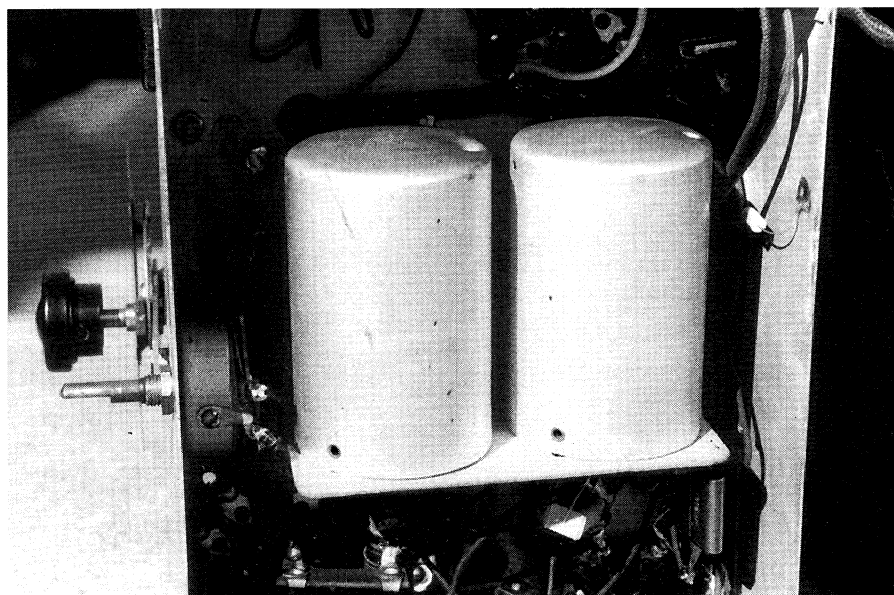
on top of the chassis in large aluminium cans and are adjusted by trimmer capacitors.

The aerial and oscillator coils are also mounted in large aluminium cans. These are underneath the chassis and occupy approximately one third of the available space below. They hinder access to some of the valve sockets and wiring.

The high tension setup is unusual in that the voltages are extremely high (460V at the rectifier) and only one filter capacitor, an 8 $\mu$ F electrolytic on the input side of the field winding, is used. The original – and defunct –



**The type 59 output pentode has a large 7-pin base which gives the suppressor its own pin connection.**



**A great deal of the under-chassis space is taken up by the aerial and oscillator coils. These units restrict access to several valve sockets, making voltage checks quite difficult.**

wet type was replaced with a new 10 $\mu$ F 500V unit.

The wirewound voltage divider and cathode bias resistors are unusual in that they are wound like a bunched filament in a light globe, thus making very compact units.

Also of unusual design is the type 59 output pentode in that it has two cathodes and a suppressor grid that connects to a separate base pin. Even with one heater out of action, the old 59 will still work reasonably well. While most other pentodes have the suppressor grid connected internally to the cathode and use a 6-pin base, the 59 has a pin connection for the suppressor and a large 7-pin base.

## **Anode bend detector**

The output/detector has a very high cathode resistor of around 4k $\Omega$ , which operates the valve near its cutoff point. This is necessary for a valve operating as an anode bend detector.

When set up in this manner there will be pulses of anode current during positive half-cycles at the control grid and little or no current during negative half-cycles. Thus, the valve rectifies or detects the radio frequency signal applied to its control grid.

Inserting a milliamp meter in the output valve's cathode connection was an interesting experiment. Total valve current varied between 6-10mA, depending on the signal strength at the control grid. If set up as a normal class-A output stage, a 59 would pass about 44mA. The cathode bias voltage is around 40V.

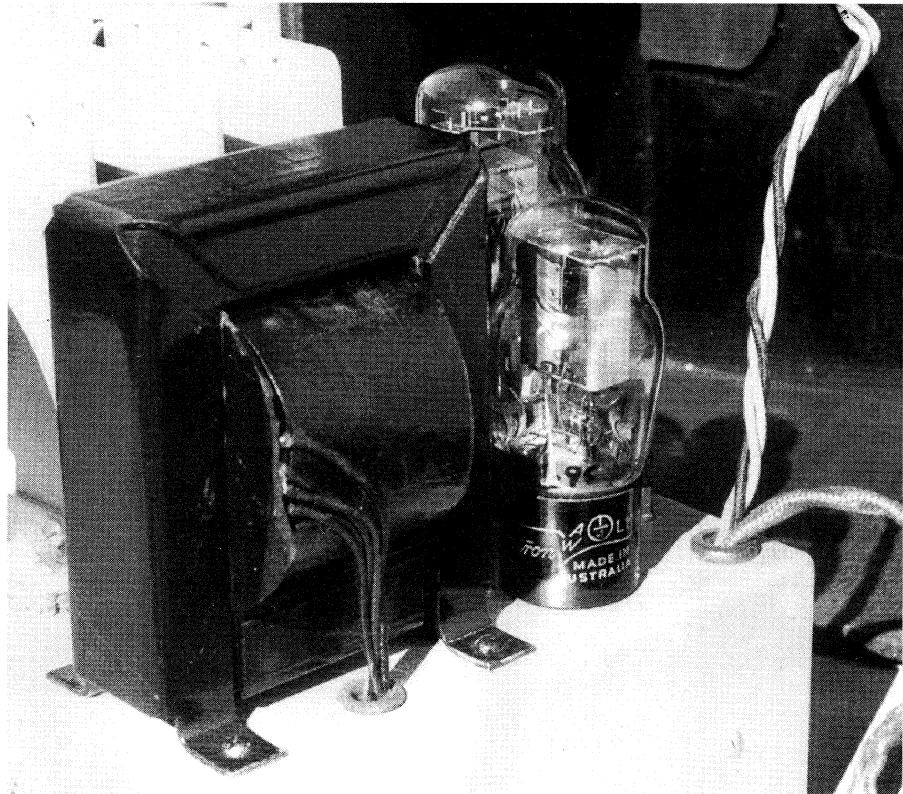
Another point worth mentioning is the fact that, because of the low current flow, the valve does not operate at a very high temperature. One can grasp it firmly without being burnt. Even the rectifier works much cooler but is still too hot to hold for long.

Plate voltages throughout the Airzone are extremely high, with 320V on the 57, 350V on the 58 and 360V on the 59. I guess that's one way of squeezing out that extra performance.

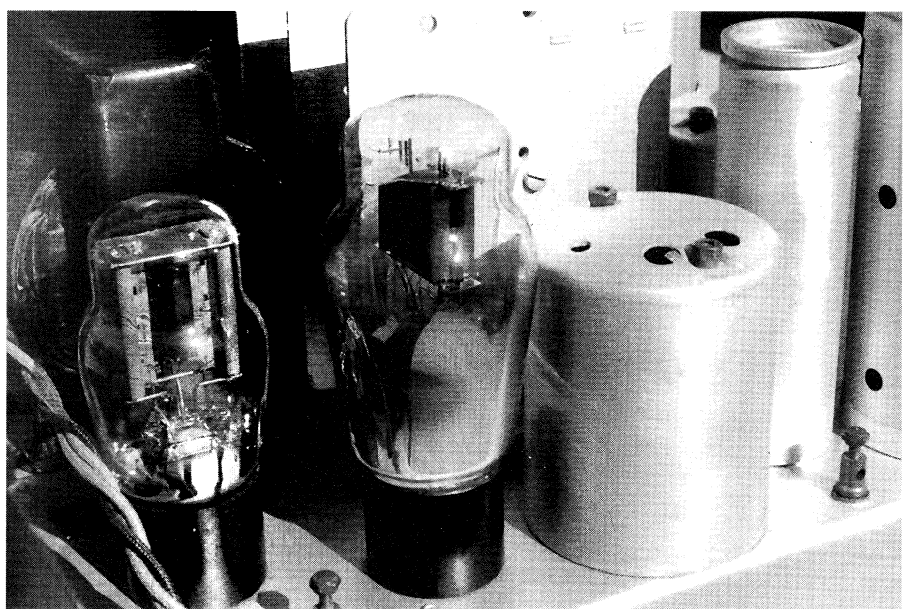
## **Repairs**

The repairs involved replacing the paper capacitors and the previously mentioned 8 $\mu$ F electrolytic. Due to the high tension supply being so elevated, 630V capacitors were used throughout as some would be stressed at close to 500V potentials during the warm-up period.





The power cord and speaker leads share a common grommet. The speaker has no plug and is wired directly into the circuit.



This view shows the 80 rectifier and the 59 output detector. Note also the large IF transformer and the single wet type electrolytic capacitor.

The cabinet required the usual regluing treatment and was refinished in semi-gloss. The speaker grille cloth was dirty but otherwise in reasonable condition. Turning it back to front soon solved that problem.

All things considered, the old 4-valve superhet Airzone is a fairly un-

sual receiver when compared to the 4-valvers that followed in the diode detection era. While it was originally marketed as an economy model, it is nevertheless a very collectible item today – particularly as it is housed in a “Cathedral” style cabinet and retains its original speaker setup. **SC**