# VINTAGE RADIO

By JOHN HILL

# Wave traps — a useful vintage radio accessory

**A "wave trap" was a common radio accessory in the 1920s and can still be of use today for those who dabble in vintage radio. This month's column delves into the mysteries of this long forgotten device.**

Back in the days when most domestic receivers were of the "reaction type", selectivity (the ability of a radio to separate out adjoining stations) was something that left much to be desired. Early radio sets were not very selective.

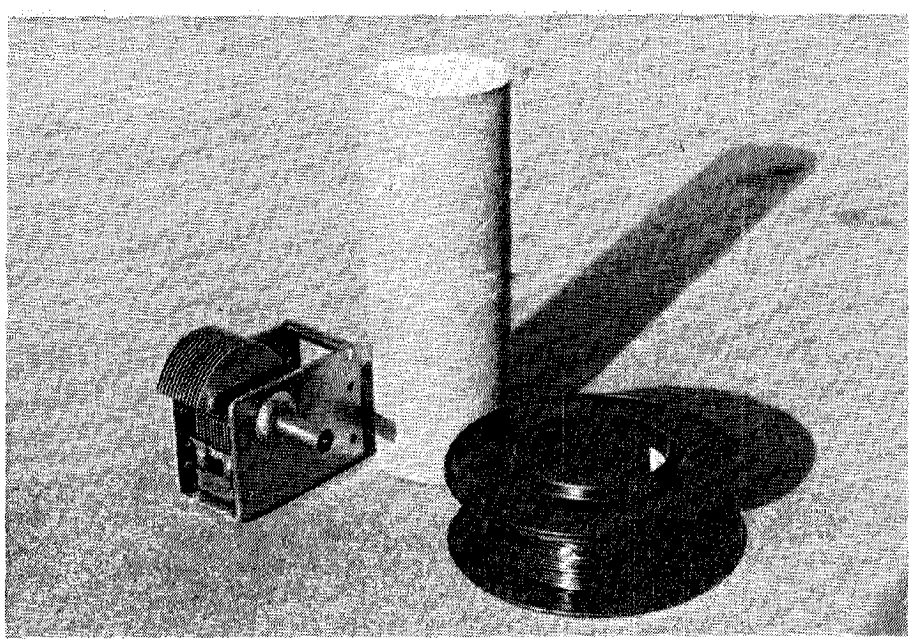
A simple reaction type receiver is reasonably selective on distant stations but nearby stations will literally swamp the dial, being audible from one end to the other.

Selectivity can be improved by altering the aerial tappings in order to tighten the coupling to the tuning coil but any improved selectivity by this method will be at the expense of distant station volume. Selectivity can also be increased by removing the earth wire from the receiver or by using a shorter aerial. Again, both methods will reduce the long distance performance of the set.

The regenerative receiver's lack of selectivity was just one of many reasons why superhets rapidly took over from reaction types.

In my childhood days I had a 1-valve reaction set in my bedroom. In those days I was living approximately 6km from 3BO's transmitter at Bendigo and from memory, I'd say that 3BO completely obliterated about one third of the dial. Stations within that particular zone were unlistenable because of local station interference. It is this type of situation that lends itself to a wave trap for such a device can almost completely tune out a local station, thus making more stations available for listening.

A wave trap is about the most uncomplicated electronic device one can make. It consists of nothing more than a coil of copper wire and a tuning capacitor (see Fig.1).



**A basic wave trap is nothing more than a tuned circuit made up of a coil and a variable capacitor. The capacitor need not be a single gang unit. Instead, you can use a 2 or 3-gang unit salvaged from a derelict radio.**

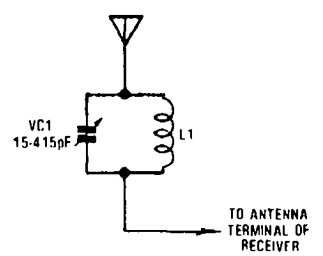
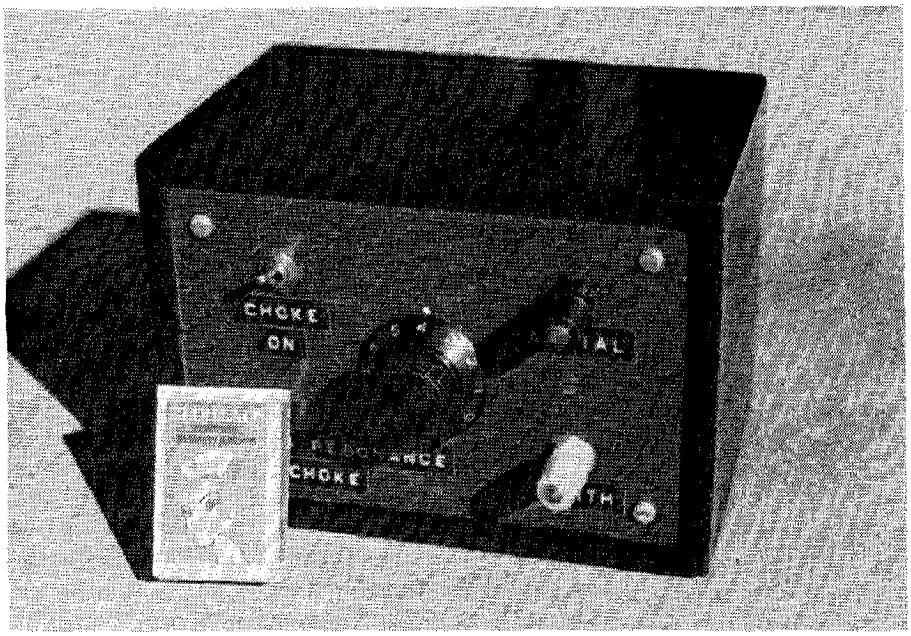
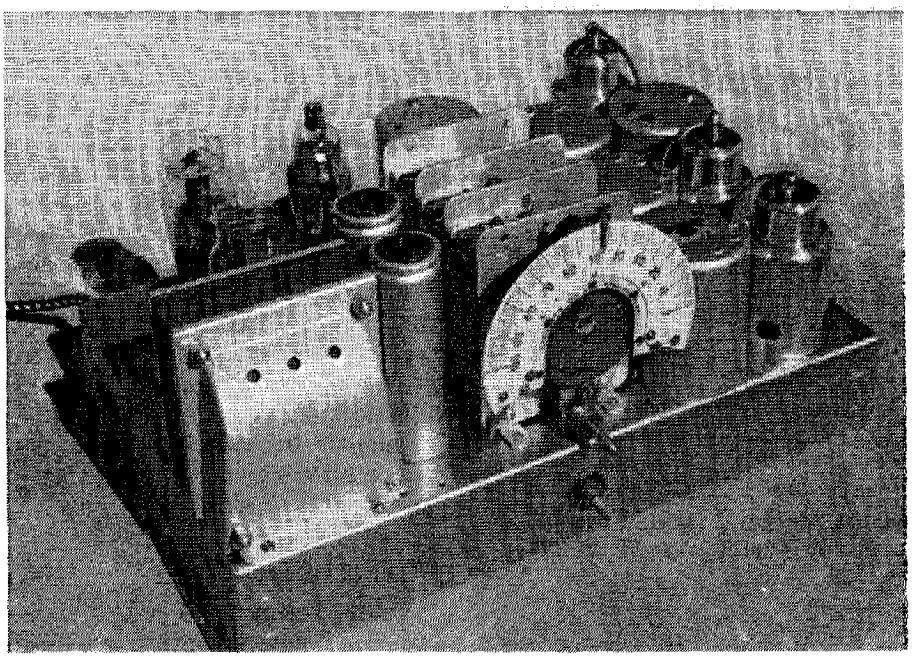



**Fig.1: a wave trap consists of a tuned circuit in series with the aerial input.**

A quick glance at Fig.1 shows it to be nothing more than a simple tuned circuit which is identical to the tuning coil and tuning capacitor of a radio receiver. Ideally, it




**This is the author's wave trap. It need not have been so large but the box was available — it previously housed a crystal set. A much smaller unit could be built using more modern components.**



**This superhet receiver has an intermediate frequency of 175kHz. A wave trap helps to reduce the number and intensity of the heterodyne whistles that occur when such a set is operated in close proximity to a powerful local station.**

should cover the same frequency range. Adding a diode and a set of earphones to a wave trap would convert it to a crystal set.

When using a wave trap it must be placed in series between the aerial and the aerial input on the receiver. If the wave trap is tuned to the local station, the tuned circuit of the trap resonates at the station frequency, allowing only a reduced signal to pass through to the receiver. All other radio frequencies pass through unhindered.

Perhaps that last statement is not quite correct. Almost unhindered would be a more accurate statement for there is a slight drop in volume on other stations when a wave trap is in use. Also, frequencies close to the one being trapped are diminished to some extent. Unfortunately, every convenience has its price.

## TRF receivers

We will digress for a moment and discuss a particular type of early radio, for it may help to make the operation of a wave trap more clear.

One way that early receivers were made more selective was to introduce more tuned circuits. This was the way the first TRF (tuned radio frequency) receivers operated and it was common to see radios in the mid to late 1920s with two or three tuning dials on the control panel.

In the case of a 3-dial set, there were two stages of radio frequency amplification prior to the detector. This involved three separately tuned circuits and such a set up increased selectivity by a considerable degree.

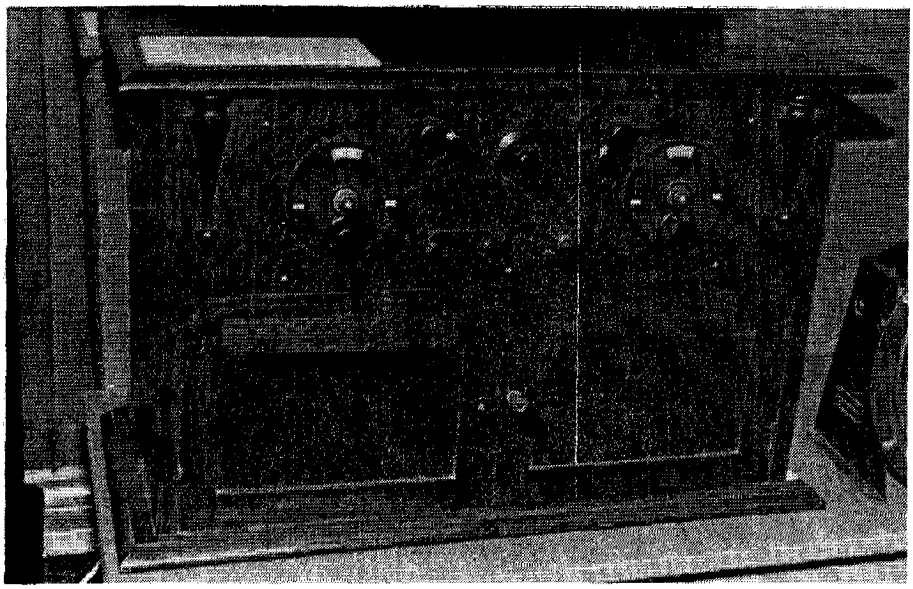
Incidentally, those old TRF receivers with independent dials were quite difficult to tune for it was most unlikely that a radio station could be received with all the dials set at the same numerical position. In order to listen to a particular station, each dial had to be set to a position where each tuned circuit was correctly aligned with the others. If the circuits were not properly synchronised, the operator would hear nothing.

A special log chart was usually supplied with multi-dial radios so that station positions could be recorded for future reference.

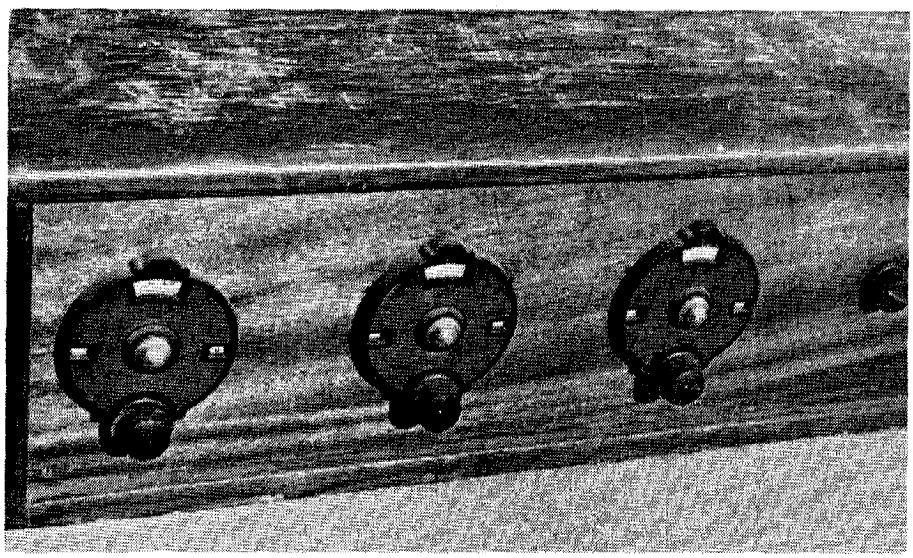
It is little wonder that single knob tuning became popular. However, this required far greater accuracy in the manufacture of coils and tuning capacitors.

Now the reason for the foregoing paragraphs on TRF receivers is this: installing a wave trap is, in effect, the same as adding another tuned circuit to the radio being used.

When using a wave trap, the tuned radio frequency circuit of the trap does not track with the rest of the receiver and is only effective at one particular frequency — the frequency of the local station that it is designed to suppress. Under these circumstances, the wave trap makes the set more selective because it reduces the signal strength of the station it is tuned to restrict.



**Wave traps were common when this old Martin receiver was the latest thing. Reaction type receivers, such as the Martin, often needed an additional tuned circuit to minimise the swamping effect of a strong local station.**



**A 3-dial TRF receiver such as this unit was quite tricky to tune so it was little wonder that single-knob tuning eventually took over. Multiple tuned circuits helped these old receivers to be more selective.**

Unlike the first tuned circuit of a TRF receiver, the resonant frequency in a wave trap is not passed on to other stages for further amplification. It works in a similar way but no use is made of the resonant energy, although enough signal passes through so that the trapped frequency can still be heard on the receiver at a much more restrained level.

The term "wave trap" has been around for a long time and although the name explains the function on the device, I think that it should have a more scientific name. In actual fact, I believe a wave trap should be called a "series connected, variable resonance, radio frequency choke". Now doesn't that sound a whole lot better than wave trap? However, for the convenience of readers, I shall continue to use the term wave trap.

## Early superhet problems

Readers can be excused for thinking that a wave trap is only of use when using an ancient reaction type receiver in close proximity to a local station. While this is the most obvious application for a trap, it can also be used to advantage with early superhets which had low intermediate frequencies.

Although the standard IF for domestic receivers has been around 455kHz for about 50 years, this was not always the case. Many of the sets from the early to mid 1930s operated on much lower intermediate frequencies. One such frequency was 175kHz and this IF was quite common in early superhets. The peculiarities of these particular receivers becomes obvious when they are used close to a powerful station.

In my own situation, I live approximately 4km from 3CV's 5kW transmitter and this causes considerable local station problems with all of my vintage radio listening, including my early superhets.

There are several types of receiver malfunctions caused by such strong interference. Firstly, heterodyne whistles appear at numerous points on the dial — there are not just a few whistles but dozens of them.

Secondly, harmonics of the local station frequency also appear at various places around the dial. One of my old superhets tunes in about three 3CV's and two 3BA's (a more distant local station).

It is under these annoying circumstances that the old wave trap can be of assistance for it can help control the previously mentioned problems. Using a wave trap will eliminate many of the whistles and harmonics because it reduces the local station signal strength to more manageable levels.

## AGC problems

Another situation where a wave trap can be an advantage is with a radio that lacks automatic gain control. If such a receiver is used carelessly and is tuned onto a local station without backing off the volume, the speaker can be severely overloaded and possibly even damaged.

Again, a wave trap will help reduce the signal strength to more normal levels.

## A practical wave trap

Although a wave trap is basically just a coil and a variable capacitor, it is far more convenient to use if properly housed. The one shown in

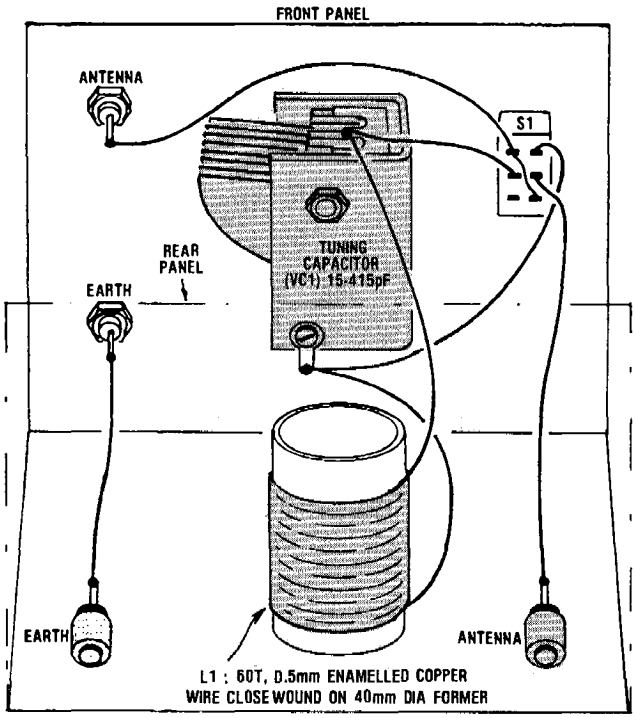



**Fig.2: here's how to wire up a practical wave trap with IN/OUT switching. Use one section of a 2 or 3-gang tuning capacitor if that's what you have available.**

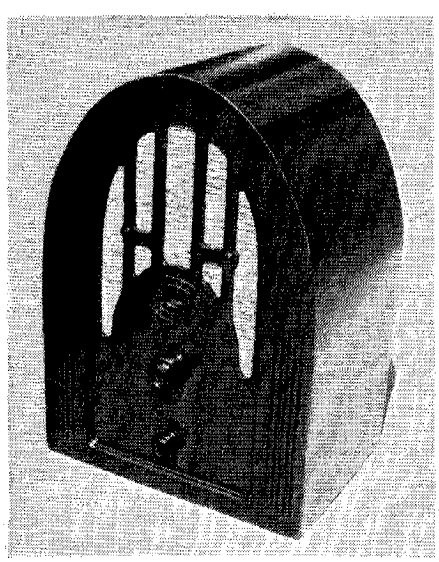
the accompanying photographs has been placed in a wooden box (an earthed metal box may be even better). It has both aerial and earth connections, plus a double pole double throw (DPDT) switch which either switches the aerial straight through to the set or to the set via the wave trap.

The earth connection just goes straight through the box from the terminal on the back panel to the terminal on the rear panel — it is more convenient to have both the aerial and earth leads coming from the same position on the work bench. It is also very convenient to be able to switch the trap in or out at the flick of a switch rather than having to connect the trap into the aerial lead when it is required.

Fig.2 shows a wiring diagram that completely cuts out the trap when the aerial is switched straight through.

The number of turns on the coil will vary according to the gauge of the wire, the diameter of the former and the capacitance of the tuning capacitor. 60 turns on a cardboard tube from a toilet roll may be a reasonable starting point.

If that local radio station is spoiling your vintage radio fun, then trap it out with an old fashioned wave trap. If you decide to build one, the convenience of the switchable model is well worth the extra effort.



**Although this old 4-valve Airzone is a superhet, it lacks AGC. Using a wave trap on this and similar receivers helps to throttle back the overwhelming effect of a local station.**