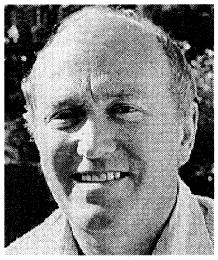
VINTAGE RADIO

By JOHN HILL



Wave-traps: another look

A versatile wave-trap can be a useful accessory in any area where there is a strong local station. A wave-trap can make a big difference when it comes to tuning other stations and all my vintage receivers, superhets included, perform better when used with a wave-trap.

As the crow flies, 3CV Central Victoria on 1071kHz is about six kilometres from where I live. Its 5kW output belts out 24 hours a day and to a vintage radio enthusiast such as myself, my local station is a complete pain in the neck – so to speak!

When it comes to crystal sets, simple regeneratives and TRF receivers, 3CV dominates the dial. When listening to a simple crystal set, the local station can be heard over the full tuning range. TRF receivers handle the situation a little better but the amount of interference can still be very annoying.

Even superhets with their superior selectivity are not immune to the problem and splatter from 3CV can be heard some distance either side of the 1071kHz position on the dial.

My local radio station has not always caused such frustration. Some years ago, 3CV ceased transmission at 11pm every night, thus providing a good opportunity to listen beyond the usual veil of interference.

Using a simple crystal set, I was amazed to find other stations out there just waiting to be heard. These included 3BO Bendigo, 3BA Ballarat, 3LO Melbourne, and even 5AN Adelaide on odd good nights. However, those exciting late-night long distance DX sessions with crystal sets came to an abrupt end when 3CV changed to 24-hour nonstop broadcasting.

It was much the same when I was a lad living in Bendigo. Back then, 3BO swamped my crystal sets and little regenerative receivers. So local radio stations have been an annoyance to me for most of my life.

It is not surprising, therefore, that I have spent some time experimenting with wave-traps. The basic function of such a device is to block out any unwanted frequency (the strong local) yet, at the same time, let all the other frequencies through. It sounds good but there are trade-offs as you will see later on.

Different designs

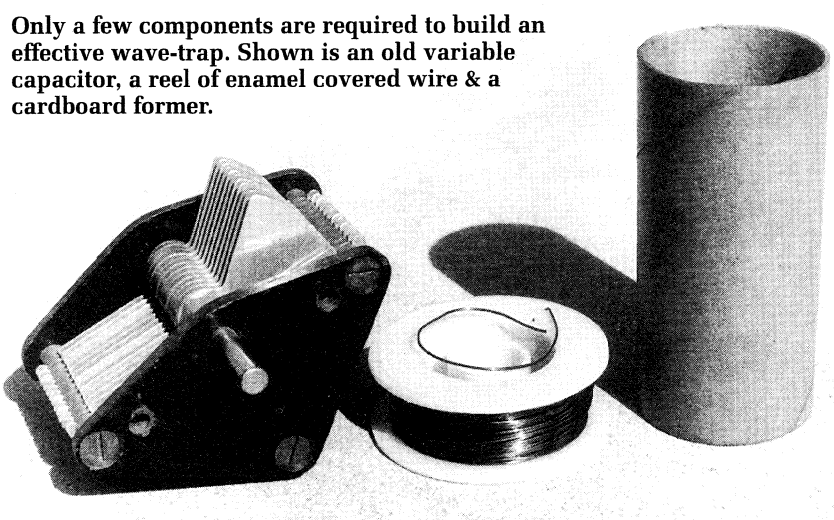
Wave-traps (or rejector circuits as they are correctly termed) are nothing new and many old wireless magazines published details on how to build them. I have tried several different types over the years and have found that they all have advantages and disadvantages. Finally, I have come up with a fairly good compromise.

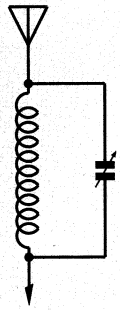
There are quite a few different designs of wave-trap but three in particular are applicable to vintage radio receivers. The first one to be discussed is the common parallel tuned trap (Fig.1).

As can be seen from Fig.1, this type of trap is connected in series with the aerial lead. When tuned to resonance with the strong local station, it blocks (or rejects) that frequency while allowing other frequencies to pass through it (apart from those close to the resonant signal).

This type of wave-trap works very well on superhet receivers and the

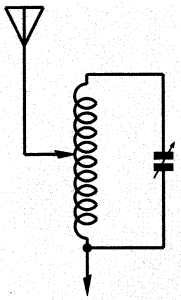
Only a few components are required to build an effective wave-trap. Shown is an old variable capacitor, a reel of enamel covered wire & a cardboard former.





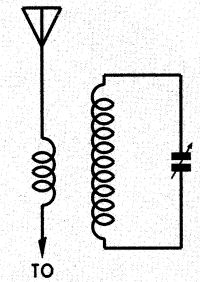
PARALLEL TUNED
WAVE-TRAP

Fig.1: the parallel tuned wave-trap is easy to build. It uses just a coil and a variable capacitor.



TAPPED PARALLEL TUNED
WAVE-TRAP

Fig.2: by connecting the aerial to different points on the coil, the effectiveness of the trap can be varied.



TUNED SECONDARY
WAVE-TRAP

Fig.3: the tuned secondary wave-trap works well with crystal sets and simple regenerative receivers.

This is the author's "Super Wave-Trap". It can be changed from a parallel-tuned configuration to a secondary-tuned configuration at the flick of a switch. What's more, in secondary-tuned mode, the aerial can be switched to any of the four taps on the primary winding.

previously mentioned splatter either side of 3CV is reduced to nothing. But this benefit is not without a small cost.

Other nearby stations are reduced in volume a little as a result of using the trap and there is also some degree of attenuation over the rest of the dial. So what the trap giveth with one hand, it taketh away with the other.

But any good 5-valver can make up for any losses the parallel-tuned, series-connected wave-trap may introduce. Lesser receivers are not so tolerant, namely crystal sets and small regenerative receivers.

The effect of a parallel-tuned trap on a crystal set is interesting. However, before going into details, mention should be made of another powerful local station.

Some 145km away at Horsham, the 50kW transmitter used by 3WV on 594kHz is powerful enough to be considered a strong local station. In crystal set terms, it supplies quite good listening volume and is the second most powerful station in my listening area.

Now when a parallel tuned wave-trap is used with a crystal set and is tuned to reject 3CV, there are two noticeable effects. First, it is so effective it blocks out 3CV as though it doesn't exist. Second, it broadens the tuning of 3WV to such an extent it can be heard over the entire range of the dial. When trying to tune in 3WV, the tuning never peaks on the station. It's everywhere but nowhere in particular.

In this case, the wave-trap not only filters out 3CV, it also disrupts the receiver's tuning circuitry. As far as crystal sets are concerned, a parallel tuned trap is much too severe and a more compatible trap is required.

Simple regenerative receives do not perform that well on a parallel tuned trap either. The trap is effective as far as controlling the local station is concerned but there is a tendency to block out a sizeable band of frequencies on either side of the resonant frequency. So this type of trap is by no means suitable for use with all vintage receivers.

Tapping the coil

The trap shown in Fig.2 is a variation of the parallel tuned trap and incorporates a tapped coil. By tapping the aerial into the coil at different connection points, the effectiveness of the trap can be altered. Perhaps the best setup would be to have a sliding contact so that the aerial can be connected to any part of the coil.

A tuned secondary wave-trap with a 6-turn primary is the ideal wave-trap for the author's crystal set (shown here) and the prevailing reception conditions.

Although I have never used this type of trap, it seems to have very good possibilities.

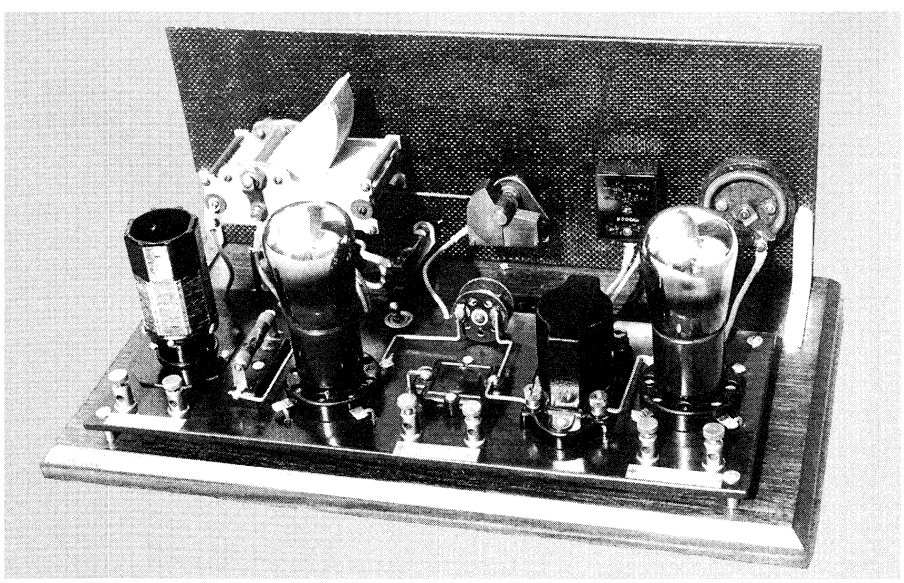
Tuned-secondary wave-trap

At this stage of our story it is time to discuss the third type of trap. This is known as the tuned secondary wave-trap and is shown in Fig.3.

There are some significant differences between this design and the previous ones. The most obvious is that there are now two windings and the tuned section is inductively coupled to the primary through which the aerial is connected.

In this design, the effectiveness of the trap depends to a large extent on the number of turns on the primary. These turns are wound directly over the secondary winding and the greater the number of primary turns, the more effective the trap.

Experiments with crystal sets have indicated that about six turns on the primary winding are just about right for my reception conditions (and for the type of crystal set being used).



This 2-valve regenerative receiver's performance is greatly improved when using a secondary tuned wave-trap with a 24-turn primary.

And with so few turns, there are no adverse effects. No longer is 3WV spread across the entire dial, nor is there a void near the resonant frequency as previously mentioned.

The tuned secondary trap only moderately suppresses 3CV and allows sufficient signal to pass through to enable the station to be heard at a normal listening level. Without the trap, the headphones are too loud for comfortable listening and when they are laying on the bench they can be heard "barking" away from anywhere in the room.

However, a 6-turn primary is not sufficient for a 1-valve regenerative receiver as the local station is still quite unrestrained and swamps half the tuning range. Instead, simple regenerative receivers seem to work better with about 20 or more turns on the primary. Even then, 3CV is still fairly broad in its tuning but it is not a bad compromise considering the type of receiver and the close proximity of the station.

A point worth mentioning is the fact that two secondary tuned wave-traps can be used in series to trap out two strong local stations without greatly affecting the signal strengths of other stations.

The super wave-trap

Each type of vintage radio requires its own special wave-trap setup. This could lead to a situation where one has half a dozen or so different traps in order to obtain optimum results from a number of receivers.

To remedy this situation, the "Super Wave-Trap" has been built. The Super Wave-Trap incorporates the best of both designs and can be changed from parallel-tuned to secondary-tuned at the flick of a switch. In addition, when switched to secondary mode, the tapped primary can be switched from six to 24 turns in increments of six turns at a time.

Wiring up the trap was a bit of a nightmare and two switches (a rotary and a double-throw multi-pole) were used to sort out the problem.

Now some experts may suggest that, in theory, the last thing a low-performance receiver such as a crystal set needs in its aerial system is a network of tapped coils and switches. The theory is that RF currents are impeded by such things and, therefore, the Super Wave-Trap may defeat its own

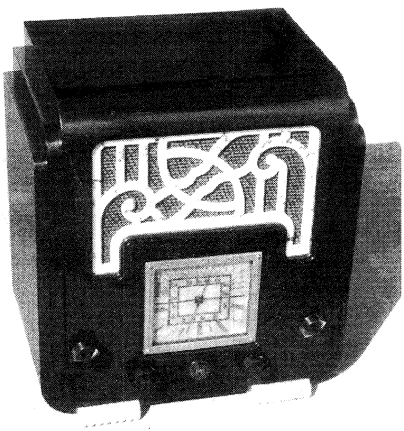
1920s receivers such as the "three-valver" lack selectivity and are easily overpowered by local transmissions. A wave-trap can help overcome this problem.

purpose by having too much high-frequency impedance.

This theory did not hold up in practice and while there might be losses, in practice they are too small to detect. The advantage of using the trap far outweighs any disadvantages.

The Super Wave-Trap has what some may consider an odd addition – an earth terminal. It's not that a trap actually needs one but it can be convenient to have both aerial and earth leads coming from the same part of the bench. The earth lead simply passes through the cabinet of the trap. While such a setup is unnecessary, it's OK as far as I'm concerned.

Talking about earth leads, it is a good idea to use an earth on any receiver that's connected to a wave-trap. Although the trap works without the receiver being earthed, it seems to be more effective if it is.



Even superhets can have some minor problems with nearby transmitters and, in some cases, a wave-trap can be of assistance. Shown is a dual-wave AWA Radiolette.

In a very strong local signal area, the lead from the wave-trap to the receiver's aerial terminal should be as short as possible. If living under the shadow of a transmission tower, a long lead from the trap to the aerial terminal will only pick up unwanted RF signal. If the lead has to be long, it's advisable to use coaxial cable to make the connection.

Crystal set DX'ing

Back in my boyhood days, the term "wave-trap" meant nothing to me. Yet, if I had known then what I know now, my crystal set listening may not have been restricted to one station.

DX'ing with a crystal set is a lot more practical today than it ever was in the past. Transmitters operate at much higher wattages now and effective crystal set range has increased accordingly. But although increased power can be an advantage, it can also be a disadvantage if a powerful transmitter is in your neighbourhood.

Simple regenerative receivers and crystal sets, in particular, benefit from such a device because these receivers lack selectivity. A wave-trap helps to reject the stronger signals these simple receivers cannot cope with. If you are having reception problems due to a nearby transmitter, then a wave-trap may help solve or at least reduce your problem. **SC**