



## Building an old classic: 'Little Jim'

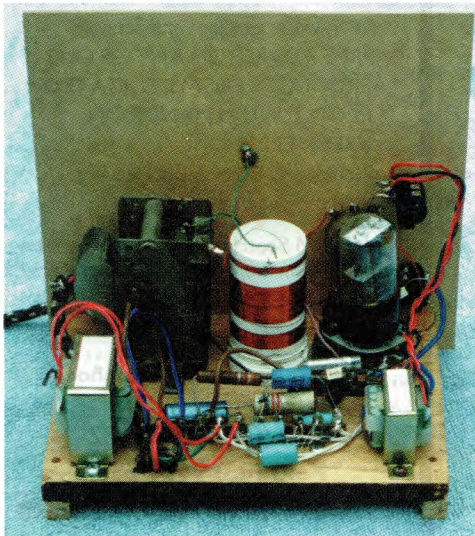
If you have the power supply I described last month up and running, how about trying your hand at building another simple project with a strong vintage radio flavour? It's a classic *Radio & Hobbies* receiver design from the late 1930s — the 'Little Jim' one valver.

**THE FIRST TIME** that the Little Jim design appeared was in a May 1938 issue of this magazine's distant ancestor, *Wireless Weekly*. A cheap, reliable and easy to construct little receiver for headphone use, it was made for listening to the then-new direct broadcasts of the 1938 tour of England by the Australian cricketers. The idea was to remove each of the headphones from the headband, and place one under each pillow so that two people could listen in bed. I suppose this wasn't necessary if 'mum' wasn't a cricket fan...

As you can see from Fig.1, the original circuit used a type 6A6 class 'B' dual triode as a regenerative detector, R-C coupled to one stage of audio. The HT was from a 45 volt light-duty battery built into the cabinet, and the consumption was so slight that the battery deterioration resulted in only slightly less than shelf life. The valve heater was powered by a low current 6.3V transformer.

A full battery version was later described using a type 1J6-G or type 19, in which the filaments were powered by a 'No.6 Bell Battery' (a large 1.5V dry cell approximately 200mm in height and 50mm in diameter, with a prolonged life) and HT by the same light-duty 45V battery. With this version both batteries were contained within the cabinet.

**A completed Little Jim** made using 'breadboard' construction and with a 'GT' type octal valve.



Essentially the same two versions of the Little Jim design were republished in the first two issues of *Radio & Hobbies* (April and May 1939), with later versions in 1941, 1946 and 1953. These covered both all-battery and battery-electric versions.

### Little Jim anew

The guidance notes that follow are aimed mainly at 'first timers' to valve radio, who probably have a good knowledge of modern solid state electronics but are unfamiliar with steam-age valve technology. You might be a keen hobbyist,

or perhaps even a serviceman or woman, technician or engineer who is daily poring over micro chips and undertaking complex system repairs.

This project would be quite a change, and relaxing. It has no systems and no PCBs at all; it's very much a simple component-based project, with point to point wiring and no test gear needed except perhaps a multimeter. You *will* require a few hand skills and initiatives, though, in building a cabinet and winding a coil.

Where possible, new components will be described for those unfortunate not to have a vintage radio junkbox. Where appropriate, sources of supply for new components will be given.

Strict departure from the original design is not only tolerated — it's encouraged! An insistence on authenticity is likely to make things very heavy going, and act as a disincentive.

In fact the circuit we're going to use is not the original of Fig.1, but a revised version as shown in Fig.2, which is designed to overcome some anticipated component problems. It's still very similar, though, and essentially the same set adapted to use the components available nowadays.

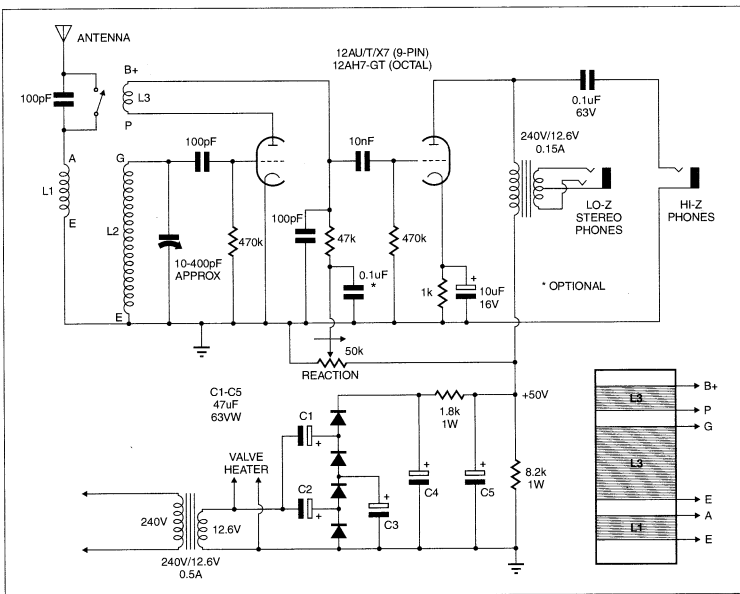
### The RF coil

The heart of a regenerative detector like this is a properly constructed coil, for which you need a former. Reproduction 'paxolin' formers are available from Brian Smith's Workshop, of 12 Mansfield St., Rockhampton Qld (phone 07 4927 1272) for only a few dollars. Otherwise you can use PVC plumbers' pipe of 30mm outside diameter, or any suitable material of 30mm OD. In the set shown in the photo, the coil is wound on an inverted pill container. The cap makes a very useful mounting base!

Enamelled winding wire is available in small quantities from the major supply houses. Here are details of the coil itself and its connections:

The primary is wound from 15 to 20 turns of 0.25mm enamelled wire. The secondary is 110 turns and the regeneration (reaction) winding 35 turns, both wound with the same wire. All windings are close-wound in the same direction, with each winding a single layer and the spacing between windings 5mm. The total length of the three windings will therefore occupy approximately 52mm of the length of the former (5mm





**The circuit is modified a bit, to make it easier to build using components available nowadays.**

a hammer!) Once completed, if you are really keen, it can be covered in thin vinyl material for a neat, professional and attractive appearance. The choice of the final finish is left up to you.

For the panel, a piece of 4mm three-ply is a good choice but if a scrap of sheet aluminium can be pressed into service, so much the better (an earthed metal panel will help make the set easier to adjust and more stable). After it has been drilled, give it a fine sand, and paint it either gray or black with spray paint suitable for timber. Follow the instruction on the can — some require an undercoat, some do not.

The use and fashioning of a subchassis is optional, and is left entirely to the constructor.

## Construction

It is probably easiest to use the old fashioned baseboard method of construction. This means that the panel is screwed to a baseboard that fits inside the cabinet, and the sides of the panel are then screwed to the front of the cabinet walls. A larger layout is easier to work with. Most of the larger components (tuning capacitor, coil base, transformers etc.) can be secured to the baseboard with 13mm wood screws.

You will have to use a little ingenuity, but mark out the position of the tuning gang, and make a hole in the front panel for the shaft. If the panel is from three-ply, use if possible a 'dowelling bit' — these bits have edge cutters on them so that the timber is not torn away by the passage of the bit through it. Otherwise if it's an aluminium panel, use a hole punch.

Mark out the position for the reaction control so that they are symmetrical. Next mark out the position for the Aerial, Earth and headphone terminals. Mark out the position for the switches and phone jacks (if used) too, keeping their positions symmetrical.

On the baseboard, mount the valve socket on pillars or spacers that are readily available. Remember that when looking at the socket from above, the corre-

sponding pin numbers are a mirror image of the valve base — in other words the numbering and direction are reversed from that shown in the valve data books.

The wiring should not prove too difficult, even for a novice.

## Operation

Thoroughly check the wiring, and if all seems OK you should be ready to try the set out.

Connect an antenna of 10 or 12 feet of wire, with the end thrown out the window. If you are using a mains supply, use the green/yellow earth lead for the earth connection. (This can be internally connected to B-) Connect the voltages from whatever source, and then the 'phones.

Advance the reaction control for a higher voltage on the anode, and slowly tune the capacitor. If the coil has been connected properly, you should hear a whistle and plop as the tuning capacitor is advanced, particularly toward the high frequency end. In this condition the detector is oscillating. You may or may not hear music — but you should be able to find the stations by the heterodyne whistles.

When you tune in a strong station, retard the reaction control until just below the point of oscillation. The programme should be heard quite well.

With this type of set, tuning becomes a process involving both the tuning capacitor and reaction control. Each time you tune a station the reaction control needs to be re-adjusted for optimum reception — which is generally just short of oscillation.

Should the set fail to work at all, check the coil connections, the wiring and voltages in that order. The problems simply cannot be too great. For example if the reaction control doesn't seem to work, the signals are weak and tuning is very broad, it's almost certain that the connections for the reaction winding have been inadvertently reversed.

If you have difficulty in separating stations at the top end, reduce the antenna coupling by removing three or four turns from the 'E' end of the antenna coil (primary). On the other hand if the reaction is too severe (i.e., it's hard to adjust the set just short of oscillation), remove a few turns in a like manner from that winding.

In the circuit of Fig.2, a small switch is shown which shorts out a series antenna coupling capacitor. When this capacitor is in circuit (i.e., NOT shorted) it reduces antenna loading; this assists in separating the stations at the top of the band, yet allows adequate coupling for the lower frequencies.

In closing, one of the fun things with simple receivers of this type is the opportunity for experimenting to get the best results. There's an interplay between signal strength, antenna length, antenna coupling and reaction adjustment. Different locations will have different requirements for best results.

The results will probably amaze you. Firstly, there's the way the detector portion will work with merely 5V or so of HT; and secondly, the set's ability to pull in stations. In Adelaide, some of the regionals can be heard on about five feet of antenna, and the locals are heard with no antenna at all!

Good luck, and most important of all, have fun. ■