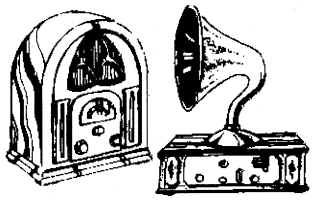
Vintage Radio

by ROGER JOHNSON



Battery powered valve sets

For various reasons, many of the early valve radio receivers were battery powered. In fact battery powered radios were made in large numbers and have formed an important part of our radio history. This month we're discussing how the battery set evolved, and why they surviving examples should be preserved.

At the risk of stating the obvious, once upon a time all radios were battery powered. Despite the introduction of 'electric' sets from about 1927, battery powered valve radios endured until the mid 1950s, although by then they were available only as portables. During the 1930s and 1940s they were made in large numbers, as mantels, consoles and portables.

There are several reasons for this. Firstly, reticulated 240V AC mains power as we know it today was by no means the norm. Rural properties as close as 50km from the outskirts of Adelaide, and in all probability other capitals as well, still relied upon 32V home lighting plants until the mid 1960s. This is demonstrated by the fact that several television set manufacturers included in their range a model operable from 32V DC.

Secondly, up to the the war years, some country towns and indeed council areas in larger cities, ran on DC mains. Whilst there were radios that were made for DC mains, there were problems with installation, interference and safety. Some consumers opted for the easier option of an all-battery receiver. (Receivers for DC mains will be the subject of a future article).

A.C.
RINGAROOMA, Tas., 240v, 50c, A.C.
RINGWOOD, Vic., 400/230v, 50c. and 460/230v, 50c, A.C.
RIVERTON, S.A., 240v, 50c, A.C.
ROBE, S.A., 220v, D.C.
ROBERTSON, N.S.W., 415/240v, 50c, A.C.
ROBIGANA, Tas., 240v, 50c, A.C.
ROCHESTER, Vic., 400/230v, 50c, A.C.
ROCKDALE, N.S.W., 240v, 50c, A.C.
ROCKHAMPTON, Qld., 415/240v, 50c, A.C.
ROCKINGHAM, S.A., 250v, 40c, A.C.
ROCKINGHAM, W.A., 440/250v, 40c, A.C.
ROCKY CAPE, Tas., 240v, 50c, A.C.
ROLAND, Tas., 240v, 50c, A.C.
ROMA, Qld., 220v, D.C.
ROMSEY, Vic., 400/230v, 50c, and 460/230v, 50c, A.C.
ROOKWOOD, Tas., 240v, 50c, A.C.
SALE, Vic., 400/230v, 50c, and 460/230v, 50c, A.C.
SALISBURY, S.A., 200v, 50c, A.C.
SAMFORD, Qld., 240v, 50c, A.C.
SANDFLY, Tas., 240v, 50c, A.C.
SANDGATE, Qld., 240v, 50c, A.C.
SANDRINGHAM, Vic., 200v, 50c, A.C.
SANDY BEACH, Tas., 240v, 50c, A.C.
SARINA, Qld., 415/240v, 50c, A.C.
SALAMUA, New Guinea, 415/240v, 50c, A.C.
SAMARAI, Papua, 240v, D.C.
SASSAFRAS, Vic., 230v, 50c, A.C.
SCARBOROUGH, N.S.W., 240v, 50c, A.C.
SCONE, N.S.W., 415/240v, 50c, A.C.,
Supply is also provided for Aberdeen.
SCOTSDALE, Tas., 240v, 50c, A.C.
SEAFORD, Vic., 230v, 50c, A.C.
SEA LAKE, Vic., 230v, D.C.
SEFTON, N.S.W., 240v, 50c, A.C.

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Fig.1: A portion of the listings of mains power throughout Australia in 1938, which shows the diversity of supplies.

Fig.1, taken from the first edition of Volume 2 of the *Australian Official Radio Service Manual*, shows part of the listing of electrical supplies throughout Australia, and serves to illustrate the point.

A third reason was that, for portable radios, there was really no alternative but batteries. And lastly, it seems that it was standard practice that boys and other novices simply *had* to build a one or two valve battery set as part of their introduction into the big time of valve radio!

It must be remembered, too, that certainly up to WW2, not all houses opted for reticulated AC mains power merely because it was available.

Vibrator powered sets, both for automobile and domestic installations, can be classed as 'battery sets', but they are a separate classification in themselves and will be treated as such.

Early developments

Although aspects of the progress of the development of radio has been covered in this and other columns on many previous occasions, it is really necessary to look at the development of the battery set as an alternative to an electric set.

The first all-triode 'coffin box' and 'tin trunk' receivers are quite familiar to many collectors and probably need no further explanation. With the introduction of valves with an indirectly heated cathode, and rectifier valves to provide the HT, the first electric sets were simply the same as their battery operated counterparts; all-triode affairs with two or three neutralised stages of RF amplification, and transformer coupled audio stages with the occasional set having push-pull output.

The Americans introduced the screen grid type UY-224 in about 1928, together with its battery counterpart the UX-222. These valves were used as RF

amplifiers with good effect. The output stage was still commonly a single ended or push-pull low power triode. Valve manufacturers in the UK, and no doubt Europe, followed suit. However, with the development of the more powerful output triodes and pentodes, electrodynamic speakers and large cabinets, the all-electric set was in a class of its own in terms of operating costs and performance, and could not be challenged by battery powered radios.

For example, an all-triode affair using six 201-A's consumed 1.5 amps of 'A' battery current. If you listened to the radio for only four hours per day, a 100Ah accumulator would need charging about every fortnight. The 'B' batteries cost 16/- to 18/- ($1-60 to $1-80) each, or one sixth of an 'average' weekly wages, and two if not three were required. Fortunately, anecdotal stories suggest that these only need replacing every four to six months.

By 1927 Philips, followed by Osram and Cossor amongst other manufacturers, released a whole series of valves which consumed merely 60mA of filament current — thereby contributing markedly to 'A' battery economy. Valve types A609, A615, B409 etc. were typical of these lower consumption types. There are stories of chaps who re-valved their sets with the newer types, and flogged off their 201-A's to new chums, to help defray the cost!

Battery sets were not powerful, were expensive to run and sometimes inconvenient to opereate. So where AC mains power was available, the choice was simple!

The 'Country Man'

Australia's population distribution in the years from 1930 to 1955 was far less urbanised than it is today. This fact, together with the reasons outlined above, meant that battery sets had a very captive audience. Also, by 1932 there were 58 broadcasting stations in the capital and provincial cities, which meant that reliable reception was possible for the farming community.

Despite the Great Depression of the 1930s, there were still plenty of people around with plenty of money. (It has been argued that purchasing power actually increased during the Depression.) Radio manufacturers catered for this market with aplomb, and the 1930-1935 period is one of the most fascinating for battery powered radios.

With the release of new valves such as 230, 232, 234, and a host of European types such as P215, A442, S215, PM 12 etc., the radios at the beginning of this period were very much like their electric counterparts — TRF's with sometimes up to four tuned stages (requiring, incidentally, a four ganged tuning capacitor). Transformer coupled audio stages and triode output were the norm.

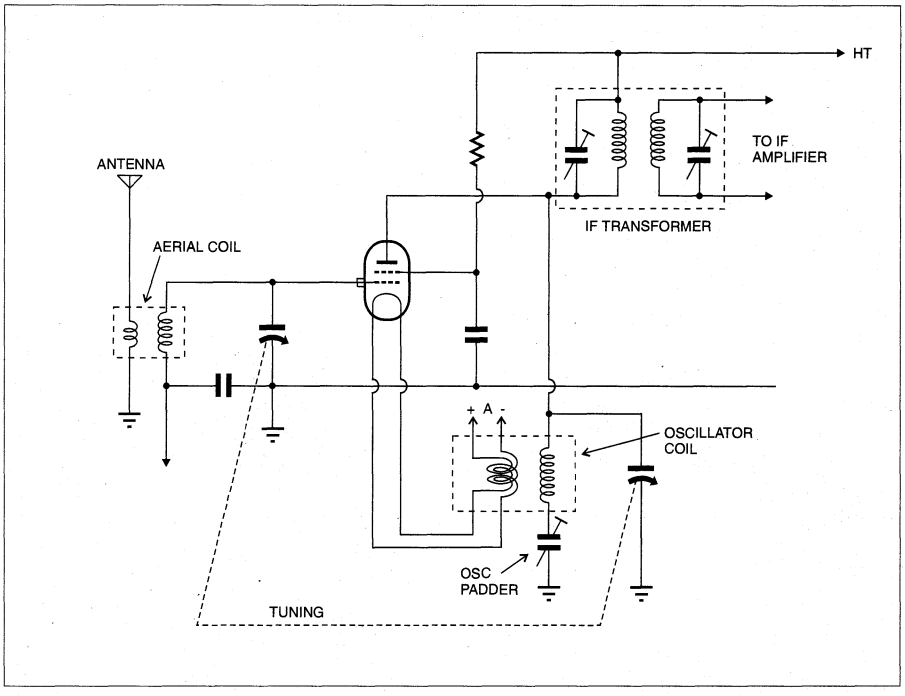

Fig.2: A 'filadyne' autodyne converter circuit. The tickler coils are bifilar wound, so that each side of the cathode is at the same RF potential.

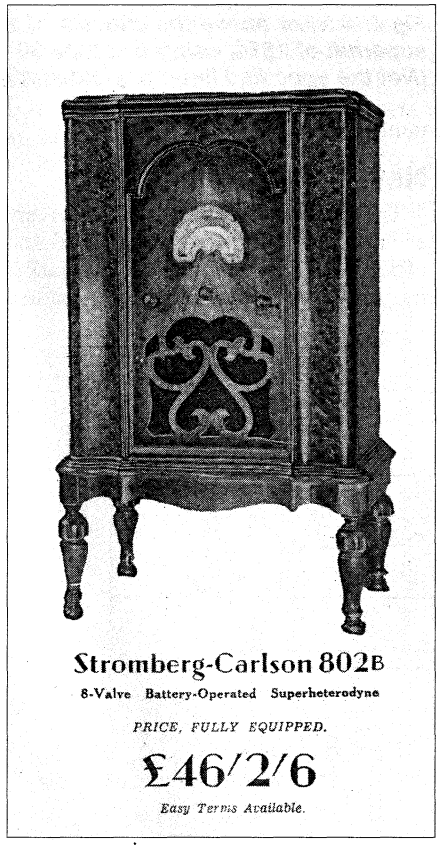

Fig.3: The Stromberg Carlson 802-B, as advertised in Wireless Weekly for May 5th 1933. It was big, bold and expensive.

Battery radios of the time were therefore TRFs with typically four to six valves, and a single ended triode output. The biggest divergence occurred in the 1931/32 period when the autodyne oscillator heralded the re-introduction of the superhet.

Indirectly heated valves, by virtue of their separate cathodes, were readily adaptable to the autodyne circuit, and coupled with the new type 247 pentode output valve, a very good 4/5 receiver was produced which performed well, was both sensitive and selective, and had a reserve of audio power. Such sets abound today amongst collectors.

The 1932-1935 period

The battery RF pentode could be adapted to the autodyne, but required a special and critically wound oscillator coil. An example of the battery autodyne, sometimes called the 'filadyne' is shown in Fig.2. A separate oscillator valve was more often than not included in the design. For country work, conventional wisdom was for a tuned RF stage.

By now the radios had grown. More valves meant more 'B' battery current. A final Class A audio stage, whether triode or pentode, was going to consume more current than was desirable. The answer came with push-pull class B triode output, whereby the current drawn by the

valves depended upon how hard they were being driven. As well as these valves being biased to cutoff, they had the added advantage of producing a better sound because the second harmonic distortion was cancelled out.

The radios now were approaching monstrous proportions and were amongst the largest chassis produced for what was essentially the domestic, rather than specialised, markets. They had cabinets and a price tag to match. A typical line-up was now an RF amplifier, mixer, oscillator, one or two IF amps, detector, driver and push-pull output. In all, eight valves! A classic example of such a set is seen in the advertisement for the Stromberg Carlson type 802-B, shown in Fig.3.

The first push-pull outputs were invariably the reliable type 30, together with a sprinkling of European types such as the A209. In about 1934, and continuing on until WW2, the twin triode type 19 was introduced especially for class B output, followed by its octal equivalent type 1J6-G. The other popular types were KDD2, B240 and PM2B. An above-chassis photograph of the eight-valve 'Tasma' model 150 for 1934 is shown in Fig.4.

It should be added that of course not all battery operated receivers were of this variety. There were many manufacturers producing three and four valve TRFs. A 'Healing' model 33B of 1933 is a classic example, consisting of a type 34 RF amplifier, a type 32 regenerative detector and a type 33 pentode output.

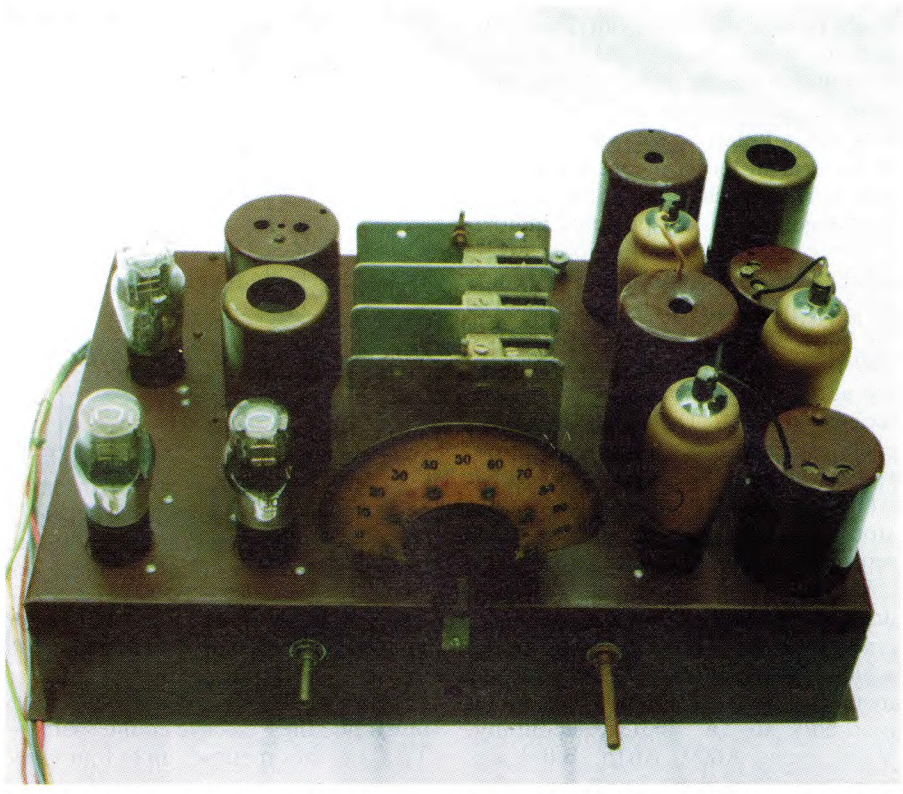

Fig.4: A view above the chassis of a part-restored 'Tasma' eight-valve battery superhet of 1934, using five type 30 triodes and three type B255 RF pentodes. (Not the specified line-up, incidentally.)

Newer valve types

The introduction of the 1A6 converter valve for battery operation, and also efficient pentode output valves marked the end of the era for the giant battery superhets. The type 33 output valve was introduced in 1933, along with the European types C243N, PM22, PM22A, PM22B, PM24A etc. In 1934 Philips introduced the battery octode type KK2.

With better coils, and higher gain valves, a four-valve battery superhet was now viable, and this magazine's predecessor *Wireless Weekly* introduced the 'Pentagrid 4' superhet in the issue for May 25th, 1934. The circuit is shown in Fig.5, and contains some anachronisms, such as a filament rheostat, leaky grid detector and a triode transformer coupled audio stage. It was claimed to be the first four-valve battery superhet in Australia.

However the die was cast, and from 1935 onwards, with the release of the Australian designed types 1C6, 1C4, 1K4, 1K6 and 1D4, and several higher gain RF pentodes such as the 1A4-P and KF2 etc., the majority of set manufacturers contended themselves with a standard four-valve superhet lineup. To this basic configuration some sets added an RF amplifier, and occasionally a foray into push-pull class B output.

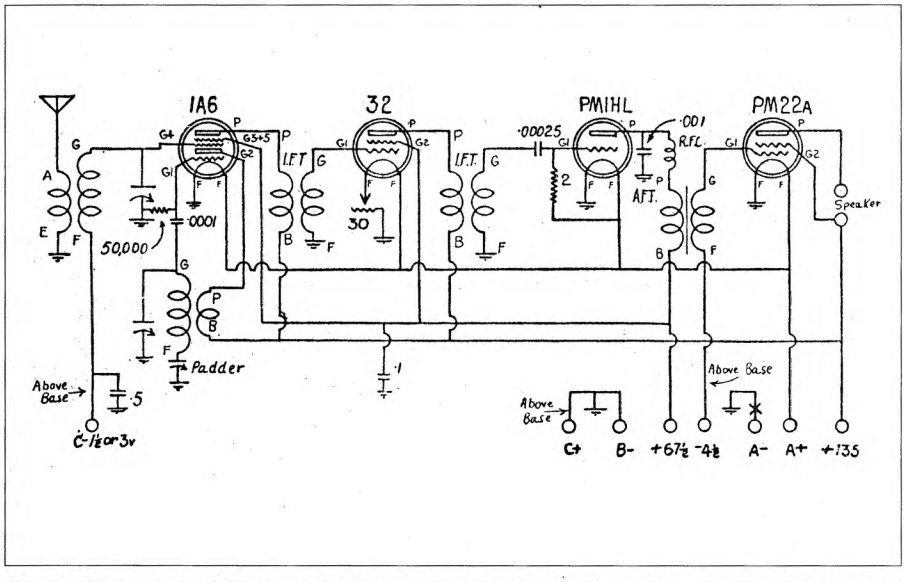

Fig.5: The original 'Pentagrid Four' circuit, as published in the September 28, 1934 issue of Wireless Weekly.

Philips released their P-based valves, which were used by some manufacturers. Apart from the fiendish bases and metallic coating, the characteristics were pretty similar to the American and Australian counterparts.

The 'Pentagrid' series of battery operated superhets continued with that name until 1950 — but employing the newest minature valve types.

Portable power

Portable sets have been adequately covered on previous occasions. The very earliest of them used small accumulators in glass cases for the 'A' battery, and were not user friendly. The introduction of the 1.4 volt battery operated valves in 1938/9 meant that these sets could operate from 'all dry batteries', and battery manufacturers responded with a line of 'A' and 'B' batteries which had compatible amp-hour capacity — so that they would more-or-less become flat at one and the same time.

Valve portables endured until the mid 1950s, when they frequently had an inbuilt power suply for operating from the 240V AC mains and a dubious circuit for 'regenerating' the dry batteries!

Keeping them alive

One of my reasons for writing about battery sets this month is to try and convince the doubtful that these sets have a proper place in the scheme of things, and to encourage their preservation. Unfortunately, because they are not easily plug-in-able, many have been discarded, stripped for parts or in some way 'converted' to use AC valves with an inbuilt power supply.

Many collectors, and especially dealers, realise that a radio which cannot be simply plugged into the AC mains is not a saleable item (other than to real enthusiasts), no matter how attractive the cabinet might be. But please do not discard them for this and no other reason.

A universal power supply is all that is required. One has already been described in this column in *EA* for March 1990, and another simplified version which will cater for the many, many surviving 2V/135V battery sets will be described in coming months.

Battery valves are not particularly hard to come by. Many collectors have purchased battery valves in a job lot, and don't know what to do with them! Apart from these two limitations, servicing is no more difficult than their electric counterparts. In fact, lower voltage components, particularly capacitors, are cheaper to purchase than the equivalent value rated at 630V, which are necessary for AC sets.

In closing, battery powered radios formed an important part of our history, and with renewed enthusiasm from collectors, they should take their rightful place amongst our collections. They do, after all, have a fascination all of their own. ❖