

THE SEARCH FOR A TOP-PIP BRIGHT EMITTER

PART III

By Philip Beckley

It was a characteristic of Western Electric valves of the 1920's that they used a pair of flat plates one on each side of the filament/grid assembly for their anodes, the filament being a hairpin shape supported at the top.

Possibly as a left-over from this early electrode layout S.T.C. (Now I.T.T.) used to make a hot cathode ionisation vacuum gauge (or manometer tube) type M103/1G using flat plate anodes, and a hairpin filament (see Fig.1)

The filament (pure tungsten) consumed 2.4 amp at about 6 volts so offered promise of enough emission to operate a loudspeaker. As sold these tubes were some 8 inches long including the body of the tube and the sealed-off extension for connection to a vacuum system (see Fig. 2). As produced they were sealed off with a rather soft vacuum inside.

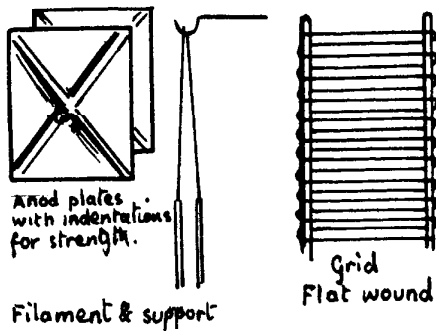


Fig 1

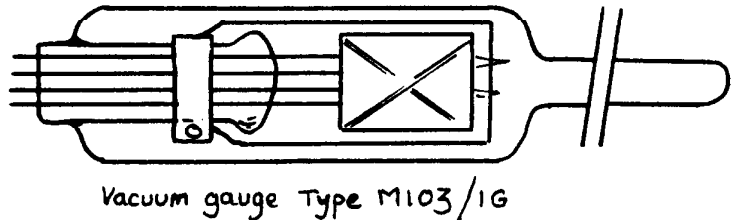


Fig 2

So, it was necessary to arrange for a few tubes to be pumped hard and outgassed (baked at 450°C) besides shortening the long extension tube till it formed only a normal top seal-off pip. After some difficulty, these modifications were carried out on several tubes and tests were made of the resulting 'valve'. On inspection before modification the grid pitch looked very open, but since an output valve was sought I hoped that this would not reduce μ too far.

At the time efforts were still being made to find valves which would operate a Marconiphone V2 reflex receiver, so tests were made to map performance over a range of operating conditions. A great many graphs were drawn and the outcome is summarised below:

Filament 6volts 2.4 amps

	For Detector	For Output Valve	For LF/HF amplifier
V_a volts	50	200	100
V_g volts	0 to -3	-12	-6
S_m ma/V	0.28	0.6	0.45
R_a k	15	12	13
I_a ma	1	8	2.5
μ	4	7	6

Encouraged by the results base shells were made up for the valves by cold working brass tube to make a splayed out socket for the bottom of the bulb. Ebonite insulators were used to carry four pins and the whole fixed with various cements.

The overall result is shown in Fig.3. The base shells were polished and stamped BEB6 before mounting the bulbs on them in conformity with the naming code of the home 'factory'. Two of the tubes were put into a Marconiphone V2, and with 42volts H.T. supply the set was tried out. The usual slide rheostat was set at zero ohms to avoid overheating from the five amps of filament current and a large external rheostat and car battery used to power the filaments. Remarkably, the detector oscillated well when asked and loudspeaker reproduction of the local station was quite possible at the usual V2 level of volume.

Of course 5amp of filament current at 6volts is a terrible overkill compared to DER's or even R type valves, never mind the 0.06 valves....but the experience was educational!

Just to see how loudspeaker reproduction would go a simple 2-valve L.F. amplifier was set up and a system amounting to a V2 plus 2L.F. using 4 BEB6's was run up. Loudspeaker output was very good given proper bias and 200volts on the last valve.

However it was only for fun, as 60watts of L.T. power really is too much and four stages of large-filament valves emphasises the 'bright-filament-crackle' which the 20's literature tells us about. Added to which you can't close the lid of a V2 with 6½ inch high valves in place!

The BEB6 then, was a great success as an output valve, well able to drive a Magnavox loudspeaker and with plenty of dynamic range. It could well be the cousin of the LS1/LS2 family (look them up!). Probably it would do well in a low power transmitter with more anode volts, as its R_a is a little high for a final audio amplifier.

A few years later I decided to obtain a few more to improve my 'stock' but alas wher once there had been 40 in the manufacturer's rack there were now none at all. "No more will ever be made". So another rare bottle will never get a wider circulation tion.

I have found that a line-up consisting of: BEB5 H.F.(Not neutralised); BEB5 detector; BEB5 1st L.F., R.C. coupled; BEB6 output, transformer coupled, gives a very satisfactory result and offers plenty of experience in set handling and valve control.

There's nothing like practice to teach the operator the difference between a filament hot enough for adequate performance yet cool enough not to waste filament life.

Having worked out the manometer tube vein, thoughts turned to manufacture of a valve from scratch, design and all. It would of course be a bright emitter exhausted at the top. Part IV tells of the problems encountered.

I am sure that, if Gerald tyne had heard about Philip Beckley's own personal 'Saga of the Vacuum Tube', he might well have considered adding a chapter on 'Cottage Industies in Wales'. I look forward to reading Part IV of Philip's 'Saga'. Ed.

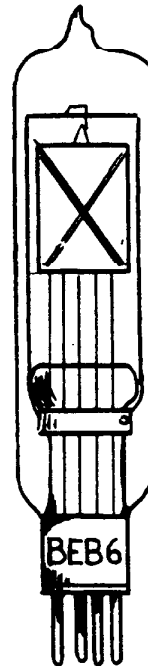


Fig 3

A "Beckley" Bright Emitter.

DON'T FORGET THE A.G.M. SEE PAGE 50

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