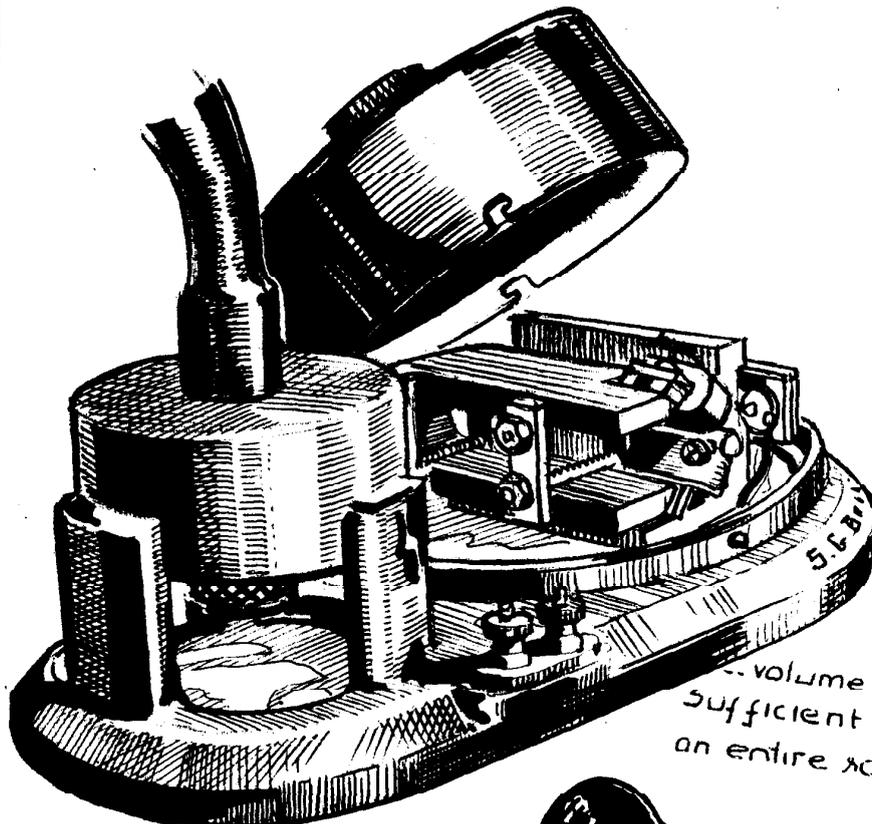


BRITISH

VINTAGE WIRELESS

SOCIETY



The only Loud Speaker
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The
CRYSTAVOX

£6



Brown Crystal Set £2.

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All correspondence concerning Bulletin to be sent to Editor.

DEADLINE FOR NEXT ISSUE: 25th November send ads and articles sooner if possible. Please make sure your name is written on all material ... editor has a few unidentifiable articles on file!! It helps if articles are typed.

Don't forget the WINTER WIRELESS SWOP at HARPENDEN on Sunday November 25th

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FRONT COVER ILLUSTRATION: The 'Crystavox' was manufactured by S.G.Brown and came on to the market in 1923/24. The drive unit is similar to the Brown Type 'A' headphone and consists of a thin conical diaphragm attached to a balanced armature. The speaker is driven by a microphone amplifier for which great claims were made in the 1920's. With the aid of a Crystavox, it was supposed to be possible to get good loudspeaker reception from a crystal set. It is nowadays assumed that this was an excessive claim, unless perhaps one lived within a mile or so of a transmitter! Several collectors have either this unit or the S.G.Brown crystal amplifier (which is two microphone amplifiers in tandem) and most of them find it difficult to obtain amplification greater than unity! See David Read's article on page 21.

BRITISH

VINTAGE WIRELESS

SOCIETY

Volume 4 Number 2

Bulletin

September 1979

EDITORIAL

First let me apologise to all those BVWS members who have so kindly sent material for the Bulletin which has not yet appeared. You may wonder how material is selected for inclusion in our Bulletin. There is no editorial committee and no democratic system of making sure everybody 'gets a turn', as it were. There is simply an old fashioned type editor who cuts as he wishes and selects with very little thought of democratic principles. The one guiding thought when compiling a new issue is to make it cover the widest possible spectrum of interest - not necessarily the widest possible spectrum of antiquity.... and patently not the widest possible spectrum of authorship! An editor always likes to have more material than he can possibly use ... tailors do also. So, if your article - the results of a few hours of hard labour - has not yet appeared, take heart from the fact that it has already been used to give the editor the 'cutting' scope he needs! Fine words, you may say, thinking of your article as having been cut away and discarded. But this editor's approach to these cut away fragments is not the same as a tailor's after all. They are transferred from the current file into the file prepared for the next Bulletin and so always come up for reconsideration. Most things submitted appear sooner or later. Keep writing. Articles will go on being needed and we are dealing with a subject which is almost without limit so there is scope, whatever your special wireless interests may be. One thing we are short of is Company Histories. I am sure the BVWS membership has a wealth of information on this subject and I can only say, please find out what you can about sources of information on wireless companies (Giant size, big, small, miniature or back-yard variety). All contributions will be gratefully received..... get writing!

The recent deaths of two great wireless men should not go unrecorded in the pages of the Bulletin. John Scott Taggart died on July 30th at the age of 82...and Stanley Robert Mullard died on September 1st at the age of 95. These two men earned for themselves special places in the history of wireless and their names will always live on as long as there are people like the members of BVWS whose collections abound with memorials to them. Short obituaries appear in this Bulletin on page 24.

Your Bulletin editor would very much like a rest! He enjoys preparing the Bulletin four times a year but has now done so for long enough and would like to hand over in time for volume five. The new editor (or editorial committee perhaps) will become involved immediately and participate in the production of the final two numbers of volume four (December and March). After that, the existing editor will definitely stand down but promises to remain involved if necessary throughout volume five, in an ex-officio manner only. Will any BVWS member who feels he, or she, can contribute in any way to the continuance of the Bulletin please contact the editor or any BVWS Committee member - this is an urgent call seriously requiring an immediate response.

"THE LICENCE PROBLEM"

By Ian Higginbottom

The title quotes a recurring phrase in wireless periodicals throughout the first twelve months of broadcasting. The problem was caused by the lack of any provision in the original broadcasting legislation of 1922, for the licensing of home-made sets. This account of the consequences and their eventual resolution may help others who, at a distance of nearly sixty years, have tried to follow the convolutions of what became a very tangled situation.

Before the advent of broadcasting, only the amateur holding an 'experimenter's licence' could legally receive wireless telegraphy or telephony. The licence was obtained by first writing to the secretary of the G.P.O. for an application form, on which were entered details of the applicant's wireless qualifications (if any) and experience, together with 'particulars of the nature and object of the experiments which it is desired to conduct'. If the authorities were satisfied that the applicant was a bona-fide experimenter, the licence would be granted for a fee of ten shillings. Incidentally, the power of the Post Office to control the transmission and reception of wireless telephony (and broadcasting) was assumed as an extension of that granted by the Wireless Telegraphy Act of 1904 (which makes no mention of telephony) and seems never to have been seriously questioned. All holders of the experimenter's licence had been ordered by the Postmaster-General to remove their aerial wires and dismantle their apparatus at the outbreak of World War I but strictly speaking their licences remained in legal force until they were officially cancelled on July 5th 1919. Thereafter fresh licences could be applied for and by 1st November 1922, 18,064 had been granted, of which 10371 had been issued in the seven months since 1st April 1922, under the stimulus of interest excited by the broadcasts from 2MT Writtle, which had begun on 14th February.

The British Broadcasting Company was formed on 18th October 1922 and from 1st November that year a second form of licence came into being alongside the old experimenter's licence. This 'broadcast licence', which also cost ten shillings, and for which no qualifications, experience or experimental objectives were necessary, was available from any branch Post Office and entitled the holder to listen-in only on equipment approved and registered by the Post Office and marked with the BBC roundel bearing the legend 'type approved by Postmaster General'. Condition 2, on the reverse of the licence, also required ancillary equipment (such as amplifiers, telephones, valves and loudspeakers) to carry the BBC trade mark, although these were not subject to the procedures of approval and registration which were applied to the receivers themselves. Half of the broadcast licence fee went to the BBC, together with a royalty on the wholesale price of all sets sold by the member firms of the broadcasting Company. The broadcast licence did not authorise the operation of home-made sets or of commercially built sets whose makers were not members of the BBC. Foreign manufacturers were excluded from membership and the domestic wireless industry was thus protected in its infancy for as long as this arrangement lasted.

It was thought that these restrictions would guarantee the sale of BBC-marked sets, on which an important part of broadcasting revenue depended. Unfortunately, predictions were almost immediately upset by a surge of public enthusiasm, during late 1922 and early 1923, for the much cheaper home-made set. This phenomenon appears to have been totally unexpected by the Post Office, although the manufacturers in the BBC seem to have been less sanguine. How were these sets to be licenced? The new broadcast licence specifically excluded them, and wireless literature of the period therefore encouraged the home constructor to apply for an experimenter's licence and offered advice on how to pose as a bona-fide experimenter (see e.g. *Modern Wireless*, February 1923, pp 75-79). At first the Post Office seems to have assumed that anyone capable of constructing his own set must ipso-facto qualify for this licence, not foreseeing that a flood of ready-made components, many of cheap foreign make and none requiring any special skill or knowledge to assemble, would overwhelm the market. Experimenter's licences were issued at a rapidly increasing rate, but the BBC received no income

from these licences, or royalties from the home-made sets, which threatened to displace the relatively expensive commercial equipment. Of the 200,000 broadcast licences on which the BBC's financial calculations depended, only some 80,000 had been issued by 1st March 1923. The Company's revenue suffered accordingly and a confrontation developed with the Post Office, who were accused of issuing experimenter's licences indiscriminately and of not honouring their obligations to the BBC under the terms of their agreement with the latter.

Late in 1922 the Post Office attempted to curb the rush of experimental licence applications, by stating that licences for home-made broadcast receivers would only be issued to bona-fide experimenters who actually made their own components (see Popular Wireless, December 30th, 1922, p.704). Any parts which had to be bought ready-made, such as valves or headphones, were supposed to carry the BBC trade-mark. Experimenter's applications were scrutinised more closely. Many were refused, a large backlog built up, and more and more constructors, deterred even from applying, simply carried on without a licence of any kind. In reality, no licence existed which was appropriate to their case. The scale of licence evasion, and presumably a feeling by the authorities that they were in some way to blame for the situation, prevented any serious campaign of detection and prosecution, despite continued remonstrations by the BBC and by fully paid-up licence holders among the general public.

Obviously, one solution would have been a third form of licence for the home constructor, but this was opposed by the BBC, which maintained that its financial viability could only be ensured by the rigorous implementation of the terms of its original agreement with the Post Office. To break the resulting deadlock, a committee was appointed under Major-General Sir Frederick Sykes, to re-examine the entire structure of the licencing system. The Sykes Committee held thirty four meetings between 24th April and 17th August 1923 and reported to the Postmaster General on 23rd August. Publication was delayed however until 1st October, pending behind-the-scenes negotiations between the Post Office and the BBC, by which time it was estimated that some 200,000 unlicensed sets were in use.

The main recommendations of the Sykes Committee, so far as the licence question was concerned, were that one form of licence only should be adopted and that protection of British manufacturers against foreign competition should cease. However, an agreement was already in existence which guaranteed protection to the BBC until 31st December 1924. Mainly for this reason, the Post Office was unable to implement the committee's recommendations fully until 1st January 1925 and during the fifteen months from 5th October 1923 the confusion was resolved by a temporary system in which no less than four different types of licence existed concurrently.

The experimenter's and the broadcast licences continued essentially unchanged at a fee of ten shillings each. Bona-fide experimenters however, would be required to sign an undertaking not to listen to the broadcast programmes except for experimental purposes. Such an unrealistic stipulation would no doubt have been honoured more in the breach than in the observance, and at the suggestion of Wireless Weekly the Post Office agreed to waive the clause for applicants willing to pay an additional five shillings, which was credited to the BBC. The broadcast licence, for use with BBC marked sets, continued as before except that 7s 6d was paid to the BBC instead of 5s as before.

Two new types of temporary licence were introduced after 4th October 1923. First, a constructor's licence became available to those building their own sets after that date. The fee was fifteen shillings, of which 12s 6d was paid to the BBC, and only British made components were supposed to be used. To the owners of unlicensed home-made or imported sets, an amnesty was granted provided an 'interim' licence was taken out by 15th October 1923, later extended to 31st October. The fee was the same as that for the constructor's licence but there were no restrictions as to the source of the sets or components. On expiry of the amnesty the Post Office reserved the right to pursue licence evaders with the full rigour of the law. These measures brought in about 234,000 licence applications of all types by 31st October, of which some 200,000 were for interim licences. By the end of the month the total number of wireless licences had increased to 414,000.

Although the constructor's licence was planned to continue until December 1924, the position had improved so much that the BBC suggested, in May 1924, that it be suspended from 1st July. The Post Office agreed to this proposal and in consequence a uniform 10shilling licence was in operation from 1st July until the end of December, the formal end of the protection period. The single receiving licence then continued, little changed, until the sound-only licence was abolished from February 1st 1971. By that time the fee had been increased twice: to £1 from June 1st 1946 and finally to £1 5s from August 1st 1965. Other details of developments in the licence system since 1925 must be another story.

Acknowledgements.

Besides the articles mentioned in the text, information has been obtained from the following sources:

Modern Wireless, November 1923, pp 85-87

BBC Hand Book 1928, pp 37-39

BBC Year Book 1930, pp 151-164

BBC Handbook 1975, p 352

The early licence statistics were mostly obtained from The History of Broadcasting in the United Kingdom by Asa Briggs, Vol.1., The Birth of Broadcasting, O.U.P., 1961.

Some useful dates were also obtained from World at their Fingertips (The Story of Amateur Radio in the United Kingdom and a History of the Radio Society of Great Britain) by John Clarricoats, R.S.G.B., 1967.

LICENCES IN SUMMARY

Experimental Licence.

The first printed experimental licences were issued in 1905 and required registration only. A fee of £1 1s was introduced in May 1913. In the post war period an experimenter's receiving licence became available from 5th July 1919 at an annual charge of 10 shillings.

Broadcast receiving licence

Available from 1st November 1922 at an annual charge of 10 shillings.

Constructor's Licence

Available from 4th October 1923 at an annual charge of fifteen shillings... Discontinued on 1st July 1924.

Interim Licence

Available from 4th October 1923 until 31st October 1923 at a cost of 15 shillings by way of an amnesty for the large number of licence evaders using receiving equipment not complying with the regulations.

Uniform Broadcast receiving Licence

Available from 1st July 1924 at an annual charge of 10 shillings. This became £1 from 1st June 1946 and £1 5s from 1st August 1965 and was abolished from 1st February 1971.

WINTER WIRELESS SWAP

HARPENDEN

SUNDAY 25th November 1979

Again the B.V.W.S. will hold its winter meeting at Harpenden. This will again be an occasion for members to bring their exchangeables. Arrive at about 11.30 a.m. and come prepared to trade, gossip, display etc until about 5.00 p.m.

Members are invited to set up displays of their equipment and for this purpose it is hoped you will bring some of those rare specimens which other members did not know existed! See you at Harpenden.....

LOUDSPEAKERS

Part I

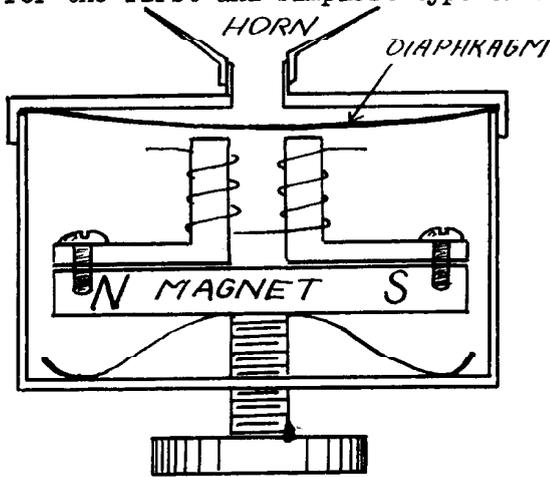
By David Read

Cup your hands, say "Ahoy there!", and you have an amplifier of sorts. The practice of achieving greater acoustical efficiency in the transfer of energy by horn loading was well known from earliest times through the megaphone or speaking trumpet, and in the 19th century the horn became a common domestic feature with the phonograph and gramophone.

Before 1920, the term 'loudspeaker' was probably unknown. Manufacturers of telephone equipment referred to horn loaded receivers (earpieces) as loud speaking telephones, and judging from contemporary literature, this term was contracted to loudspeaker during the early years of wireless broadcasting. Soon after, the apparatus was colloquially referred to as a 'speaker'.

For wireless work the great sensitivity of the telephone earpiece when wound to an appropriate impedance made it an ideal transducer (once rectification had been achieved) for the audio signal impressed on the carrier wave.

A straight horn added to an enlarged headphone of this type provided the basis for the first and simplest type of loudspeaker. Maximum sensitivity is achieved



by placing the diaphragm in a state of dynamic balance between its own 'springiness' and the pull of the magnet; generally so that the diaphragm is not quite pulled onto the magnet's pole pieces. In this condition of tension the diaphragm will have a sensitive response to very small variations in magnetic flux and thus act as an efficient transducer of weak audio currents. Fig.1.

Nearly all manufacturers of horn loudspeakers used this basic design. There were many variations in the shape and composition of the horn and the method of adjusting the distance between the diaphragm and the pole pieces.

Fig 1.

In this series of articles for the BVWS Bulletin, I shall examine the variety of technical and aesthetic ideas which grew from this beginning, and it is appropriate to start with S.G.Brown and his adjustable reed telephone and microphonic amplifiers.

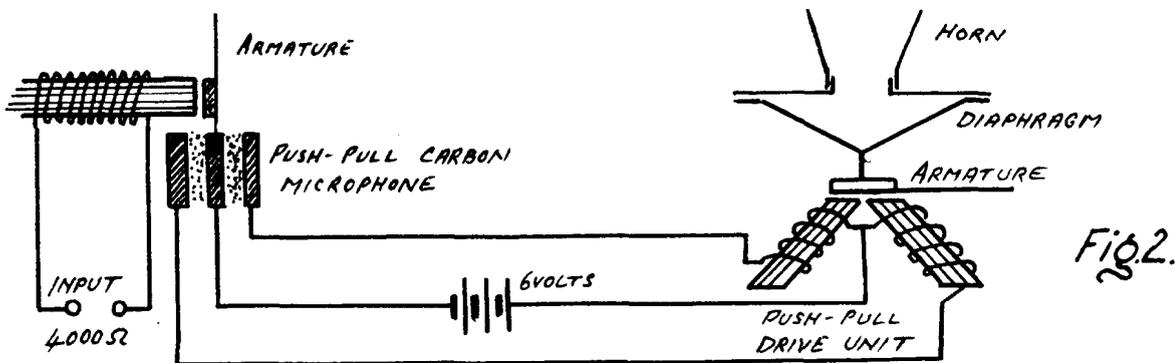
Prior to the revolutionary developments made possible by the triode valve or vacuum tube, the energy available to actuate a pair of headphones was so small that horn loading was of little use. It was not until a way was found to amplify the received energy that there was a possibility of using transducers which did not need to be held close to the ear. In 1914-15, just as detectors of the contact or crystal type were about to give way to valve detectors and amplifiers, attempts were made in Europe and the U.S.A. to magnify the crystal rectified signals by use of the carbon microphone amplifier developed as a repeater for telephone landlines (See BVWS Bulletin Vol. 2., No.1, June 1977 for an article on the Microphone Amplifier by Philip Beckley.). These devices linked with a horn loaded earphone comprise the earliest loud speaking systems as far as wireless is concerned, and were to reappear in the early days of public broadcasting when valves were expensive and the crystal set was the most popular type of receiver. The inventor in Europe of the adjustable reed telephone receiver in 1899 and the microphone amplifier in 1909 was S.G.Brown, and it is therefore appropriate that his Cristovox loudspeaker (see front cover of this issue) which uses both these inventions should be the first to be dealt with in this series. Though not an early loudspeaker as such (it was introduced in 1923) it contains the earliest elements pioneered for loudspeaking; and as a

loudspeaker which can be connected directly to a crystal set or single valve receiver it is unique and therefore especially interesting to collectors.

Under the cover on the base of the Crystavox loudspeaker is a primary circuit wound to high impedance in which the small audio currents such as would be provided from a crystal set or single valve receiver are employed to change the position of an armature in a magnetic field. The secondary circuit is designed to carry a relatively large current through a carbon microphone and loudspeaker driver unit as shown in Fig. 2.

The armature in the primary circuit is used to change the pressure on the carbon granules in the secondary circuit so that the larger current is modulated by and proportional to the smaller. The telephone receiver in the secondary circuit is wound to low impedance and is horn loaded and, of course, constitutes the horn speaker part of the system. The drive unit is mechanically identical to Brown Type A headphones, the standard issue in W.W.I. and without doubt the best known of all headphones. It employs an armature or reed connected to an extremely thin conical aluminium diaphragm rather than the usual system shown in Fig.1. By manufacturing the reed to have a natural resonance at around normal speech frequency, and providing a method of adjusting the gap between the reed and the pole pieces, quite extraordinary sensitivity was achieved, though, of course, rather peaky where music is concerned. The circuits are in a push pull arrangement and are made electrically clear by the diagram (Fig.2.).

The S.G.Brown microphonic amplifiers were continuously developed from his 1909 Type A single point system, through types W and C which were used by the Post Office as repeaters and then in the First World War as amplifiers in wireless work. By the time broadcasting received a public licence, S.G.Brown had further developed the system to provide push-pull amplification. Before the widespread use of valves these (as well as the earlier type) were used as wireless amplifiers in aeroplanes, and the 'Aeroplane Double Microphone' was on display in the London Science Museum as an item of historic importance by the mid-1920's.



How well then does the Crystavox work? On the top of the cover is a small vulcanite wheel or knob which has a magnet embedded in it. By careful mechanical adjustment of the reeds in the primary and secondary circuits with the adjusting screws provided and further fine adjustment when the cover is in place using the vulcanite knob, the horn will work well with a single valve receiver. However, when connected to a crystal set the results are frankly poor unless one is under the shadow of a transmitter. One is left with the distinct impression that the modern directors of fair trading and advertising standards would challenge the claims of even so eminent an inventor as Mr. S.G.Brown, Fellow of the Royal Society.

Don't forget to come to the Winter Wireless Swap at Harpenden... Sunday Nov.25th

THE SEARCH FOR A TOP-PIP BRIGHT EMITTER

Part V

By Philip Beckley

Experience with the BEB 3 (See BVWS Bulletin, Vol 4, No.1., June 1979. p. 11) as a replacement for the French TM or the British R valve had been reasonably happy, yielding a characteristic of $\mu = 11$, $R_a = 40k\Omega$, and $g_m = 0.3 \text{ mA/v.}$ for a 3watt bright filament. How could this valve be adapted for loudspeaker use?

An audio output valve needs to have a fairly long and straight mutual characteristic so that a large input voltage can be accepted with little distortion. A longer grid base will, for a given filament emission, be accompanied by a lower μ and lower anode impedance. Normally a more open grid mesh is used to achieve this.

It seemed, therefore, that all that was needed was to specify fewer spirals on the grid of the BEB 3 to reduce its impedance to that of a Marconi LS3.

The LS3 was quoted as $\mu = 4.5$, $R_a = 12k\Omega$, and $g_m = 0.375 \text{ mA/v.}$ A burnt out LS3 was carefully examined and the grid turns counted - no easy task peering into the anode through the glass. A small trial batch of modified BEB3's was made up and evaluated. The characteristics found were in general $\mu = 4$, $R_a = 13 k\Omega$, and $g_m = 0.3 \text{ mA/v.}$ This seemed to be a fair result and the valve was tried with a loudspeaker. Results were quite good and the valve could be loaded up so as to give nice volume in an average room when feeding a 2000 ohm horn speaker via a choke capacity output filter. The superior power efficiency of the horn speaker was clearly shown up when the valve was asked to drive a moving coil speaker (properly matched) and could not give adequate 'domestic' volume without overloading as heard by ear and seen by milliammeter in the H.T. line.

There is a long history of the LS family of Marconi valves using the suffix A for a lower impedance power valve and the suffix B for a higher slope, higher voltage gain driver valve. e.g. the LS5 and its relatives LS5A and LS5B. (You can tell them apart if the markings have rubbed off by counting the spirals).

Using the same scheme, the new valve was labelled BEB3A and passed into service in a Marconiphone V3 set - now equipped with a line-up of RRB3, RER3, RBR3A in place of the original R, R, LS3 or DER, DER, DE6.

To give a professional finish, the pin insulation discs were moulded in bakelite-type material using black powder and a specifically made up hot pressing jig (baked in domestic oven at 150°C). This involved a lot of work but avoided the problem of soldering to pins set in ebonite which softens easily. Further tests will be needed to see if the bakelite-type material is also suitable for BEB3's which may have to do H.F. duty - where dielectric losses are important.

It seemed that little more could be squeezed out of a 3 watt filament and thoughts turned to the valves LS1 and LS2 with 9 watt filaments (1.5 amp at about 6 volts) with the intention of really driving a 1920's Magnavox moving coil speaker. This project may or may not mature before all parties run out of cash - I must wait and see. What then have been the lessons learned from the search for the top-pip bright emitter valve?

Well you really can do without a voltmeter and judge temperature by eye very well with a little practice. The filament really is a 'control' and R_a , μ and input capacitance all vary as the emission changes, enabling a rheostat for each valve to give optimum results. I used to wonder exactly what was meant by the instruction, "advance the filament rheostats till all valves are appropriately lighted... ..". Now I know.

Will the author of the article entitled 'Those Awkward to Find Bits and Pieces' please write to the editor your name has become separated from the article and when it appears in a forthcoming Bulletin, I don't want to call you 'Anon' !

Ed.

FAREWELL TO TWO OLD TIMERS

John Scott-Taggart died on July 30th, at the age of 82.

Stanley Robert Mullard died on September 1st at the age of 95.

For different reasons but with many parallels these two men bore two of the most widely known names in the world of wireless. Although we regret their passing, the events afford us the opportunity of remembering the part they played in the history of wireless.

Many members of BVWS will have had their first taste of the wonders and magic of wireless as a constructor's hobby through the prolific writings and inventive circuits of John Scott-Taggart. The name 'S.T.' appeared everywhere in the popular radio magazines - he founded the Radio Press in 1922 which published Modern Wireless and Wireless Weekly. But ST was more than a populariser of the subject. He played a significant role in the pioneering days, which was finally recognised at the highest level when he received the O.B.E. in 1975 for his services to radio engineering.

ST was born in Bolton and published his first article in Wireless World at the age of seventeen, and seven years later, in 1924, he published one of the best books of the period on the subject of valves - Thermionic Tubes in Radio Telegraphy and Telephony (see review of this in BVWS Bulletin, Vol 3 page 13, June 1978).

In the early days of broadcasting, the skills and enthusiasm of the home constructor had been totally miscalculated by the various official bodies responsible for introducing the licencing systems. This army of constructors had a significant effect on the scope of radio manufacturing in this country and cocked a snook at the pomposity and officialdom which encouraged the make-believe that wireless was a form of magic. The undoubted leader of this constructing army, which came from all walks of life, was John Scott-Taggart. His ST100, and all subsequent circuits bearing his initials and a number, will be long remembered, and well made examples are now among those highly collectable prizes sought by wireless collectors.

As may be expected of a man who was always so dynamically involved with all he undertook (as well as radio engineering must be added the law, business, journalism and art) many stories are told of S.T. One I particularly like concerns his involvement with the Hazeltine Corporation (the neutrodyne connection). It appears that S.T. prepared a report for the Hazeltine Corporation for which he charged an appropriate fee of several hundred guineas. The corporation then requested a similar report from a firm of patent agents as a 'second opinion'. This second firm approached S.T. for a report on which they could base their report! Well, S.T. thought this was not exactly cricket but his protestations to the patent agents were dismissed. He then gave them a report from which they could derive their 'independent' views. S.T. in fact gave them his original report and charged them the same fee for this - er - 'second-hand' opinion!!

We regret the passing of this great man, though his name will live on in the annals of wireless history. Those of us who attended the Wireless Show at the Victoria and Albert Museum on October 19th 1977 had the opportunity of meeting Scott-Taggart and I for one felt a sense of history and privilege at being fortunate enough to have five or ten minutes conversation with him.

In contrast to John Scott-Taggart, Stanley Robert Mullard was a retiring and secretive man. His role in the valve industry is too well known for much comment. He developed successful valves shortly after the first world war and, like S.T., spent some of his early career at the Ediswan factory at Ponders End. The Mullard ORA and PM series of valves which appeared in the 1920's became probably the best known of all battery valves and were widely used by manufacturers and home constructors. Mullard's expertise was widely recognised during the first world war and his skills were in demand by all three services. His early attempts to establish himself as a valve manufacturer were obstructed to some extent by the Marconi Company who started an action for alleged infringement of patents. After two years of litigation the House of Lords finally upheld the Mullard case.

Mullard formed his own company in September 1920 and at first produced the high powered silica valves he had developed while at the Z Electric Lamp Co. Ltd. at Southfield. The great demand for valves at this time prompted Mullard to produce his own valve in competition with the French valves and British R valves then available. His ORA valve ('Oscillates, Rectifies, Amplifies') was an immediate success. He also produced R valves and he manufactured his valves with American as well as British bases. He also brought out the LF general purpose valve and the PA loudspeaker valve and, in 1924, a four electrode valve designated DG. Mullard gradually sold his stock in the Mullard Radio Valve Co. Ltd. to the Philips organisation who became the sole owners in 1927. The very well known series, PM1, PM2, PM3 and PM4 were introduced in 1926 and, although the PM signifies the Philips Mullard connection, these will always be known to collectors as Mullard valves.

Mullard was a great contributor to the high technology of the world of wireless from its very early days and like many other pioneers in this field was to some extent a victim of the grasping tendencies of the litigation hungry large radio companies. It is a pity that this new industry, the first large scale modern technological industry, seems to have acquired a reputation for having pioneered not only radio but also the sport of being unkind to its founding inventors.

Salutations to these two great men whose names will live on through the enthusiasm of this and all subsequent generations of wireless collectors and historians. The Daily Telegraph ran obituaries for both of these men and one or two of the facts quoted above were taken from this source. Some facts concerning Stanley Mullard were taken from Gerald Tyne's 'Saga' and the remaining information was found in the editor's personal file.

ARC

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A PASSIVE GRID BIAS BATTERY

By Philip Beckley

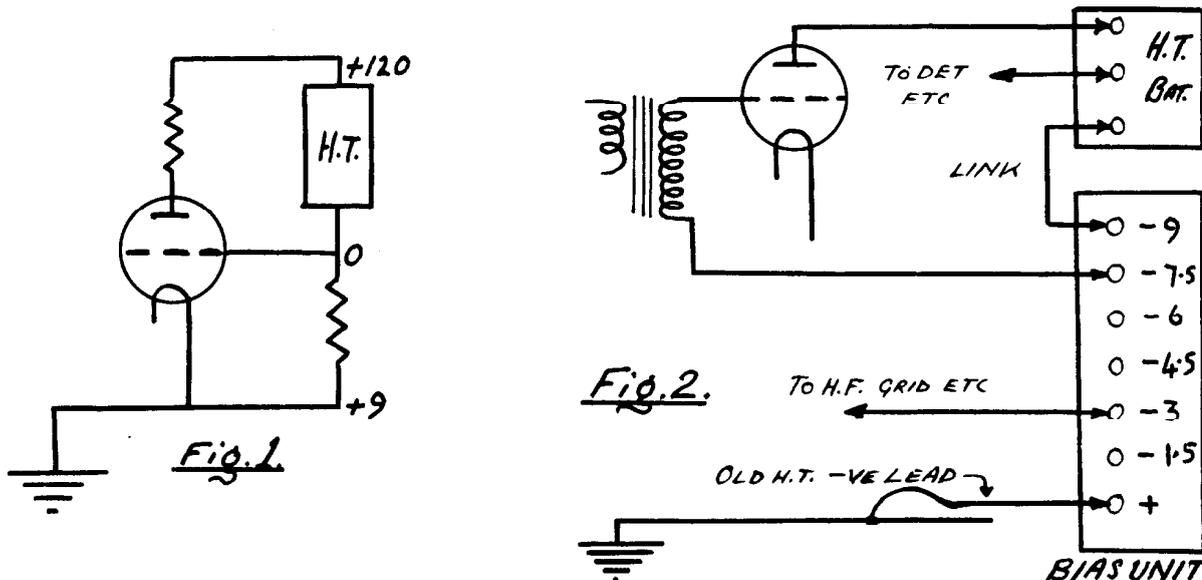
Most older receivers use a grid bias battery, and these days the maintenance of this battery in good condition is a considerable expense. Further, although a few are still made, the day may soon come when production enters class C for ever.

Certain alternatives are possible. Assemblages of single cells can be made up in sixes and taps provided but this again is not cheap. In the course of time cells develop a high internal impedance, a reduced e.m.f. and a tendency to leak.

Directly heated valves can be fed with a type of automatic bias by the insertion of a resistor in the H.T. negative feed line - see Fig 1. If the earth line is at +9volts then the valve grid, at zero, will receive -9volts bias. This arrangement was used commercially in later model battery sets, the output valve often being the only one to receive formal bias. The resistor involved may be decoupled with a large capacitor and perhaps be tapped to feed lower bias voltages to other grids. As early as the Marconiphone V3 receiver (1923/24) auto-bias of this type was in use.

One of the disadvantages of the system is that the bias developed varies with the H.T. current drawn. For an output valve this offers rough justice as the H.T. battery runs down. For other valves, e.g. H.F. amplifier, it is less satisfactory. For sets of intermediate age the 'modern' appearance of added auto bias is not attractive.

The writer devised a system for use with the V3 set (the model using a grid battery) which is shown in Fig.2.



The old H.T. negative lead is re-labelled G.B.+, and a link wire goes between the battery negative & the negative end of the bias unit. This link can travel into the set guts and out again, secured at some point inside, as a direct short link looks suspicious! If -9 volts is required then two plugs go into this hole and collectors are familiar with the type of stacking plug that is doubtless available from the vintage 'junk box'. The bias unit clips in to the place normally occupied by the grid bias battery and is made up as follows:

1) Electrical See Fig 3.

When total H.T. current exceeds about 3mA, the zener diode conducts and even when H.T. current rises the voltages at the 'battery' tappings remain constant, provided grid current is not drawn. For sets with very low H.T. drain the resistor

values may need increasing. The use of six decoupling capacitors may appear excessive but guarantees freedom from feedback.

2) Mechanical See Fig. 4.

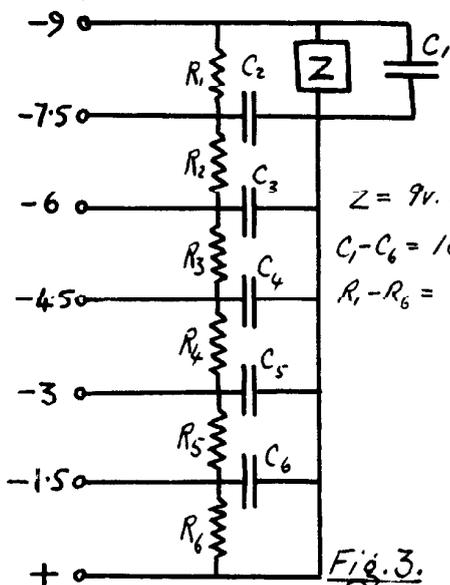
The writer packaged the device in the following way.

- a) Procure an old G.B. battery - preferably marked in old shillings and pence, but a more modern one will do.
- b) Carefully remove the cardboard cover (scalpel, patience, coaxing etc.) and put this aside.
- c) Remove the brass sockets from the black pitch (two batteries or more are useful in case of breakage.)
- d) Make up a hollow wooden form as in Fig.4. Drill holes and set brass sockets in place (glue) with wires from each leading into the central cavity.
- e) Assemble components on a small tag board and wire into the cavity and test the circuit.
- f) Make up a pair of side plates out of 1/16 inch steel sheet or the like, insulate with paper on the inside and glue to the wooden frame. The steel gives a more plausible weight to the 'battery'.
- g) Assemble into cardboard case and glue up carefully.
- h) Plug any gap in the pitch tray formed at the top, and put temporary plugs in the brass sockets. Melt up some pitch (beware, it is flammable ... great care needed.) from the tops of old batteries and pour just enough into the pitch tray to make an authentic looking new top. About 1/16 inch of brass socket should protrude. Allow to set.

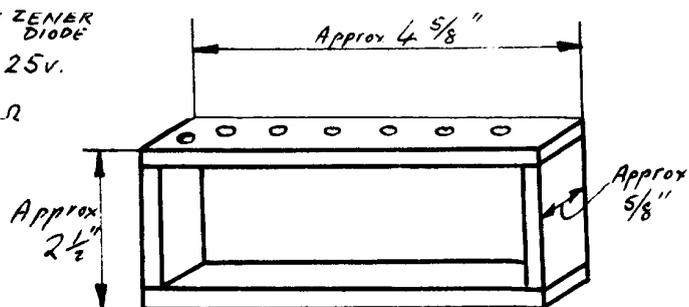
The imitation battery is now complete and the set leads may be re-arranged to suit - just one extra plug is needed.

Unfortunately the 9volts for bias is deductible from the available H.T. hence a 130volt battery is better than the usual 120volt version to allow for this. However, the 111volts available from the 120volt battery is usually sufficient, and no less than is normally obtained when the battery is a little less than new.

Should the 'battery' be connected in reverse by mistake no bias will be produced as the zener diode will be forward biased. Zener polarity should be verified during construction. Correct polarity of electrolytic capacitors must be observed.



Z = 9V. 1WATT ZENER DIODE
C₁-C₆ = 10μF. 25V.
R₁-R₆ = 500Ω

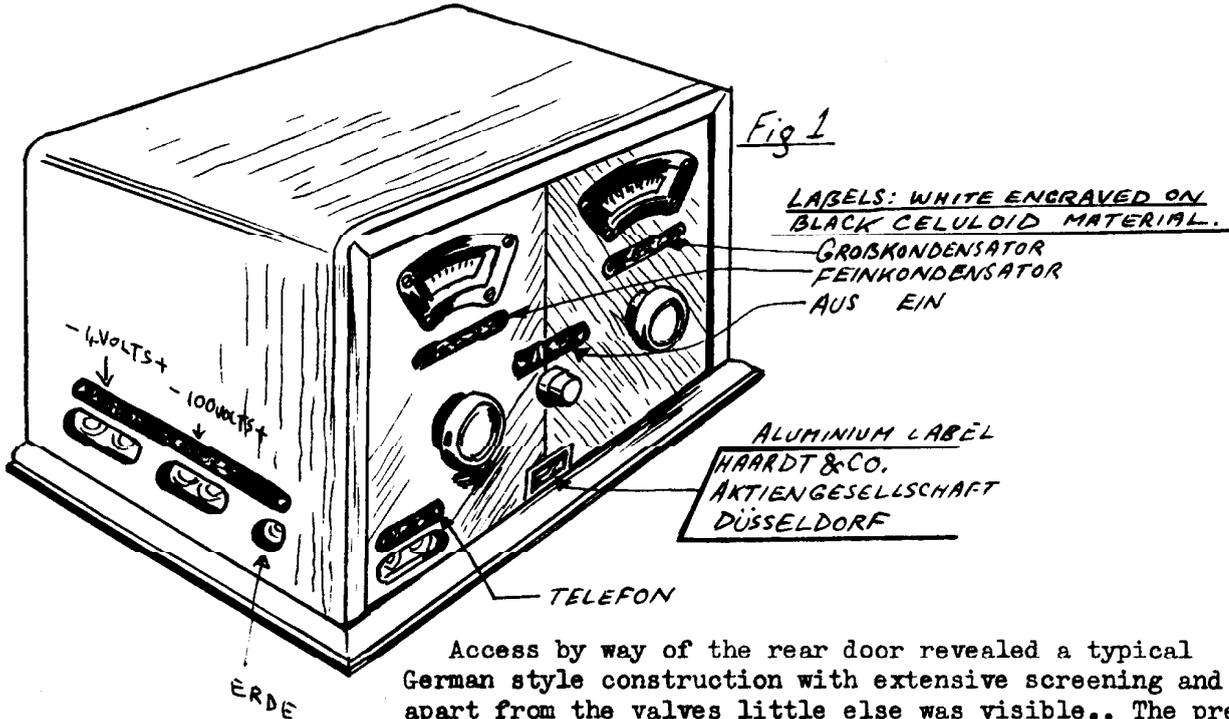


A GERMAN PUZZLE

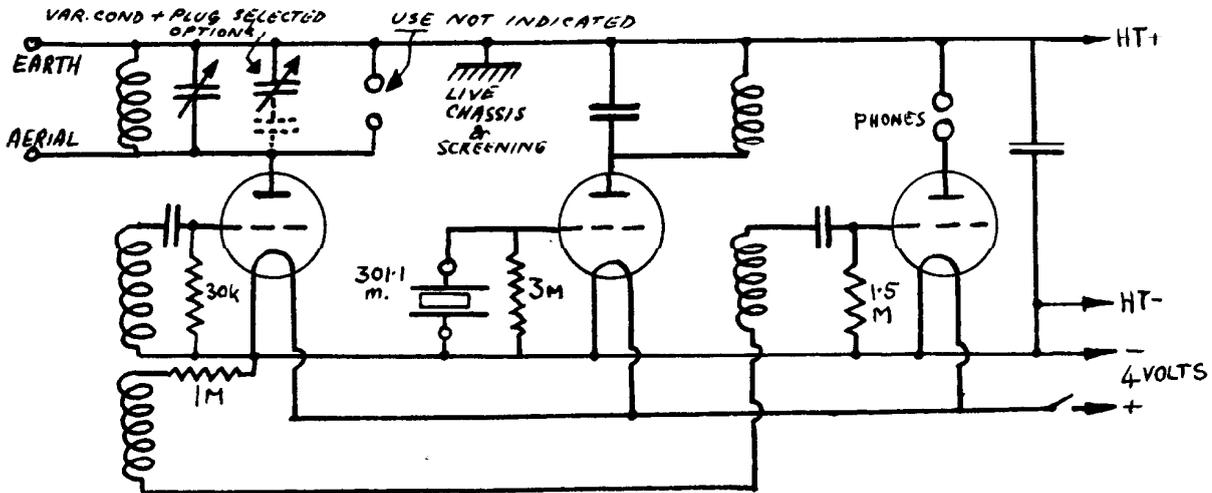
By David Read

Some years ago I picked up in a street market what I imagined was a mid-1920's three triode battery receiver. Made by Haardt & Company of Düsseldorf, it has massive linear air-dielectric condensers with superb slow motion drives and ivory scales with a vernier overlay. There is an on-off switch, headphone socket and sockets for aerial, earth and power sources. The chassis is wired with bare 2mm wire and valve and other sockets are constructed with ceramic. The neatly made oak cabinet is lined with aluminium. See illustration Fig. 1.

It soon became obvious that this was not a conventional receiver - if indeed a receiver at all, and closer examination showed that I had picked up a 'German Puzzle'.



Access by way of the rear door revealed a typical German style construction with extensive screening and apart from the valves little else was visible.. The presence of a Loewe plug-in crystal unit (301.1 metres), an unused 2-pin ceramic socket and rows of shorting link options raised a host of questions. Without further delay I dismantled the chassis from its screening and cabinet and traced the circuit (see Fig.2.) A satisfactory explanation of the circuit and its probable use has never emerged. It is reproduced in this issue of BVWS Bulletin in the hope that someone somewhere has the answer. In the next issue we hope to publish the most authoritative and interesting response.



FROM THE EDITOR'S BOOK SHELF

SOS The Story of Radio-Communication. By G.E.C. Wedlake. David & Charles 1973 240pp.

Those of us who enjoy collecting or studying the early equipment used by professional wireless operators often wish there were more old-timers around to tell us what it was all like in those by-gone days. Well, the author of this book, Mr. G.E.C. Wedlake is just such a man - he was a radio officer in the Merchant Navy from 1917 to 1934. In this book he traces the history of radio-communication from the very earliest experimental trials right up to the current techniques using communications satellites. The story is told in a very lucid manner by a man who obviously knows the subject of radio very thoroughly and also by one who knows his history and by one who knows how to write. By and large, as is so frequently the case, the narrative skips from one great event to another - and radio history abounds with such events - the Marconi sagas, Dr. Crippen, the Montrose, the Titanic etc etc. But this author does add very much besides. He tells of the parts played by most of the great inventors on both sides of the Atlantic - Fleming, De Forest, Dunwoody, Fessenden, Armstrong to name but a few. For those readers interested in the history of broadcasting chapter 10 presents a very readable account of some of the 'firsts' but it is very obvious that the author is very familiar with American history and hardly knows the British and European story at all. However, the American story is very fascinating and far too few people on this side of the Atlantic know it anything like well enough - Wedlake's account should be required reading for anybody who has read Asa Briggs. The book is well illustrated but most of the pictures are those well used illustrations which crop up in all the books on Marconi and Wireless which abounded some decades ago. Wedlake's book cannot be recommended for its pictures - pity - there was good scope in the subject for original material here. Appendix A discusses some details of early equipment and this is very clear and well done. Appendix C is a chronological table and while very helpful to the amateur radio historian, is a little incomplete for the European reader. I am glad to see an index at the back of the book - and a well compiled one at that. It should be possible to find this book - price about £5.

ARC

Wireless at Sea. By H.E. Hancock. Marconi International Marine. 1950. 233pp

This book is one of those referred to in the previous review which abounded some decades ago and which contain all those well known illustrations from the Marconi archives. While most of us are very familiar with these illustrations this should not detract from the fact that they are of great historical significance and this particular book contains one of the most complete collections of Marconi pictorial material that I have seen. And it is all very relevant to the narrative. The author makes no pretence whatsoever - he is telling the story of Marconi Marine and the great part the company played in the history of maritime communications. It somehow seems much more relevant to read of the Dr. Crippen, Montrose and Titanic sagas in this book than it did in Wedlake's. Many of the stories told are so well known that they really have become a bit 'hoary' and yet at the same time with acquired age they have become venerable. If we cast our minds back to the first time we heard them, they really were impressive - and Hancock tells them well. Remember the account of A.R. Burrows aboard the 'Victoria' trying to contact Poldhu? "..... he gave one more shout: 'Hallo Poldhu!' To his great astonishment a loud voice replied through the headphones he was wearing: 'Hallo, Burrows! I hear you are in difficulties'. The voice was certainly not that of Poldhu, so Burrows immediately replied: 'Yes, this is Burrows, but who are you?' Back across hundreds of miles of land and ocean came the answer. 'I am Round, speaking at Chelmsford. I heard you calling and, gathering that you are having difficulty with Poldhu, we are prepared to help you.' ". See page 113 to read all about it. These are great dramatic stories which perhaps on re-reading for the umpteenth time sound a little melodramatic ... like another Hancock, Anthony, and his 'May-Day' experiences! This book is recommended both for its classic collection of pictures and its sound historical content.

ARC

TRANS-ATLANTIC LETTER

From Dave Brodie

My local Society, California Historical Radio Society (C.H.R.S.), has entered into agreements with several similar Societies throughout the U.S.A. and Canada whereby we exchange quarterly journals and extend to each other the right to reproduce contents (unless forbidden by the author). By this means, particularly outstanding articles of general interest are available to a wide body of collectors. Also, from reviewing these journals it is apparent to me that interest in antique radio is constantly increasing - also evident from the growth of these societies.

Collectors on this side of the 'Pond' are eagerly looking forward to the main event of the year ... the National Conference of the A.W.A. to be held again at Canandaigua during the three days commencing September 28, 1979. Indications, based upon advance registrations, point to a record breaking attendance. The program includes an 'Old Gear Contest', general auction, valve auction, flea market, special ladies program and numerous technical sessions. Your representative (me) plans to attend together with a number of Californians and will provide a condensed summary of the event in the December Bulletin.

You may recall from previous Letters that we have two National Societies in the USA in addition to the regional Societies - namely the A.W.A. (Antique Wireless Assn) and A.R.C.A. (Antique Radio Club of America). The latter club held its 1979 conference during the three days ending June 23, 1979 at the Holliday Inn in Elgin, Illinois. Approximately 200 attended the meeting which featured visits to Muchow's Historical Radio Museum - curator: Dr Ralph W. Muchow. More about this extraordinary museum later but I must say the fleet of antique Model 'T' automobiles used to transport members from the hotel to the museum provided a unique touch. The conference was most successful and included a flea market, old equipment contest, special ladies' program, technical sessions, and the annual banquet. The program included sessions on restoration techniques, the history of microphones, early broadcasting and restoration of Scott receivers, early television, rewinding transformers and a presentation of the history of an early radio manufacturer, The John Firth Company. British crystal sets captured the major honors in that category. A Marconiphone Crystal A won first prize and this was followed by a Marconi 106 in second place. An English perikon detector set received honorable mention. A Marconiphone V2 earned second place in the regenerative category. A.R.C.A. is to be congratulated on their splendid conference.

I have received and glanced through two additional booklets from the firm Puett Electronic mentioned in my last Trans-Atlantic Letter. Booklet No. 2 deals with the restoration of battery powered receivers and Booklet No. 3 with A.C. powered receivers. Of course both refer to antique sets. These publications are for the beginner although even the experienced collector may find a few wrinkles here and there. Only the electrical aspects are discussed and certainly not in depth since each publication consists of only eight pages. The publisher intends to issue a similar booklet on cabinet restoration which may be of interest to many of us. These booklets are available from Puett Electronics, P.O.Box 28572, Dallas Texas, 75228, U.S.A. The cost is \$2.00 each and I suggest that you include a mailing estimate when ordering.

Muchow's Historical Radio Museum

This museum is, without doubt, one of the largest privately owned antique radio museums in the entire country. It is unfortunate that circumstances prevent the publication of photographs in the Bulletin since, without them, it is impossible to convey adequately the size and completeness of the collection.

The curator, Dr. Ralph W. Muchow is a practicing dentist who developed a keen interest in radio early in life and constructed crystal sets, and one and two valve sets at the age of ten. In 1959, Dr. Muchow purchased the two floor building which houses the museum but did not commence acquiring a collection until 1967. At the present time, the Doctor's offices occupy the first floor and the second floor and part of the basement are devoted to the museum.

The collection now numbers approximately 2000 receivers and transmitters together with thousands of valves and components. About 2000 valves are on exhibition including a complete Geissler tube display. Dr. Muchow specializes in Atwater Kent receivers and has on display 49 of the highly treasured early breadboard sets each of which is a different model from the others. He is approaching his goal of exhibiting one of each model (including all variations) of all sets produced from 1921 until the company ceased manufacturing in 1936. The British collection comprises receivers, headsets, horns etc and includes such well known names as Burndept, Marconi, Ericsson, Brown, Osram etc. The museum covers approximately 3000 square feet of space and consists of 11 show-rooms plus a service area in which there is an original service bench of the type provided by Atwater Kent to certain distributors who serviced the company's products. Dr. Muchow explained to me that the purpose of the museum is to document the history of wireless from the days of Marconi to the development of scanning disc television. To this end the museum's displays have been arranged in sequence in order that the visitor may follow this development as he progresses through this collector's paradise.

To those of you fortunate enough to be in the Chicago area (about 30 miles from the museum) I suggest you contact Dr Muchow to arrange for a visit:

Muchow's Historical Radio Museum, 107, Centre Street, Elgin, Illinois, 60120
Tel: 312-742-0183 (museum) Or 312-741-0573 (residence)

EXCHANGE

SEARCHING

Front flare for Amplion horn speaker No. AR13. Also, crystal sets wanted - will exchange items in 'disposal' ad below. Ron Jones, 2, Rose Ave., Alvechurch, Worc., B48 7PC. Tel: 021-445-3264

Case for Burndept 'Ethophone' Mk I crystal set plus lid instructions - will buy or trade. L.Coakley, 'Woodleigh', 11, Pear Tree Lane, Dunnington, York YO1 5QG. Tel: 0904-489420

'British General' tuning coil moving coil reaction long & medium. Two or three way variable coil holder for plug-in coils. 'Ormond' slow motion diff. reaction condenser (0.0003mfd). 'Eddystone' tuning cond. (0.00016mfd). 'Ormond' slow motion dials 3" and 4" dia. 'Indigraph' vernier knob and dial 4" dia. Celestion balanced armature speaker in cabinet - types D12, J12, C14, D50 or Z20. Osram valve (PT4) - working. Oiled silk systoflex sleeving for 18 or 20 swg wire. 'Igranic' 400 ohm ceramic baseboard potentiometer. Norman Richardson, 2, Edna Rd., Maidstone, Kent, ME14 2QJ.

BBC marked valve sets wanted - items for exchange listed in disposal below.
Dennis A. Yates, 327, Coppice Rd., Arnold, Nottingham. Tel: Nottingham 205441

Any information on a two valve receiver with lift-up folding lid and sloping panel which is engraved 'Sir Oliver Lodge "N" Circuit, Cleartron Radio, Charing X, London'. The receiver has been modified to a 3 valve circuit and I wish to restore to original. What was the Sir Oliver Lodge 'N' circuit??? Also wanted, the drive unit for a BTH type C horn speaker. Will purchase or trade from a supply of 1920 & early 1930 components. K.Chorley, 7, Fox Field, Everton, Lympington, Hants, SO4 0LR Tel: Milford-on-Sea 5231.

Marconiphone V2. Gecophone crystal sets or early valve sets. Also round EKCO and Wireless Worlds wanted. A.R.Nolf, 7, Cambrian Way, Ewlof, North Wales, CH5 3RE Tel: Hawarden 534 329.

Complete front panel for Gecophone BC 2001. Also wanted, complete variometer unit for BTH Bijou crystal set and GPO handset No 28 or mouthpiece. W. Pozniak, 32, Worsley St., Oldham, Lancs, OL8 2DE Tel: 061-652-4251.

Valves wanted: 'R', DER, LS3. Also wanted, S.G.Brown microphone amplifier/crystal amplifier/crystavox speaker. Also, Pre-1925 Wireless World - preferably bound volumes. Ekco AD65 or similar. Aerial, H.T. etc plugs and sockets of Marconi/G.E.C. type for V2, Gecophone No.1 etc. Mike Kemp, 10, Rue Babie, 92190, Meudon, France. Tel: 010 331 - 534 3972.

Loudspeaker drive unit for Gebescope L516. Also 16mm sound projector. Also any of the following DC mains valves: VDSB, DHD, PEN383, DH, VDS, DC2/P. New or used. Also AC chassis R.G.D. type 700. Steve Sidaway, 32, Cemetery A., Lye, Stourbridge, West, Midlands, DY9 7EF.

Copies of any information/service data - Gecophone pre 1931. Also service data or brochure for Marconi 22. Photocopies quite acceptable. Philips 834 wanted and 930, 2634 or 2601 in restorable condition. 4volt plus H.T. etc transformer (mains) for Marconi 42 (1932). Also wanted, any Gecophone sets 1927-32. G.A.Horrox, 65, Greenwood Rd., Crowthorne, Berks. Tel 3758 or (wk) Ascot 22601.

Eddystone two valve short wave set c. 1938. Bulgin mains plug and socket 1933. Lissen Skyscraper 4 - any condition with or without cabinet. Weco valve holder. BTH valve TS215. Military radios 1930's. Aircraft TR9 radio. Blueprint for A.C. ST400. Will exchange Brownie No.2 Xtal set for Brownie Tube type. Bob Warner, 45, Eastry Close, Ashford, Kent. Tel: 0233 36185.

DISPOSING

Cossor Console battery set 3456. Cossor mains set 337, Orr battery set No. 03, Marconi mains set No 298, Cossor portable No P43 and Murphy No A30 ... will exchange any of these items for crystal sets. All are reconditioned. Ron Jones, 2, Rose Avenue, Alvechurch, Worcs, B48 7PG. Tel: 021-445-3264.

Pye 'Q' portable - good condition. Also, G.E.C. model BC 3240 - 5valve mains TRF with matching speaker (1931) - good condition. Also B.T.H. C2 Horn speaker - working - gd.cond. All are for sale or trade. I am interested in crystal sets; horn loudspeakers; 1920's and 30's mains radios; Magazines and books. L.Coakley, 11, Pear Tree Lane, Dunnington, York YO1 5QG. Tel: 0904-489420.

Three all-dry battery portables (not working) and large upright table cabinet walnut finish with fret out for 8" pm speaker ... £1 but must be collected. A quantity of new and used valves (battery) for trade for my wants. Norman Richardson, 2, Edna Rd., Maidstone, Kent, ME14 2QJ.

Marconi No.31A double (balanced) ship's crystal receiver (1917). Marconiphone V2A and V3B. Pye 830 (1926). Various crystal sets, horn speakers, some 1930's sets - Philips 2634 (Octagon), Ekco. Also MkIII tuner. Will exchange these items for BBC marked sets of good quality. Also for exchange: Loewe one valve (3NF) and Loewe two valve (3NF & 2HF) sets. Also for exchange: 900 1920's magazines - Wireless World, Amateur Wireless, Wireless & Wireless Constructor 50pence each or W.H.Y. Vol 1. No.1. and No.2. Television dated 1928 also for disposal. Dennis Yates, 327, Copice Rd., Arnold, Nottingham, Tel: 205441.

Aircraft receivers BC453 (190-550 kHz) and BC455 (6-9MHz). Small hinged-lid cabinet (c. 1930) and WWII battery utility receiver cabinet - both now containing home-brew receivers of post-1950 construction. Quantity of metal cased paper capacitors. British 4-pin, 7-pin and octal valveholders - no 'oldies' among them - mostly paxolin or frequentite. Tin of Pye plugs and sockets. All for disposal - any offers? Or have you books on early wireless (sparks and crystal period preferred) to swop?

Harmsworth Wireless Encyclopaedia - v.g. condition. Ditto; parts 9 to 16 (vol 2) only. Marconiphone 42. McMichael 364 mains s/het c 1937. BTH HT unit. Mike Kemp, 10, Rue Babie, 92190 Meudon, France. (All items in U.K.)

Wireless World Vol I and II bound (not original cover) to swop for W.W. vols IV, V, VI, VII, or XIV to XXI - bound or loose. Frans Driesens, De Wijer 6, 5527EA Hapert, Holland.

Decca Wall projection T.V. - fair condition - spare tube - free to good home. Philips 2511, 2531. Prefer to exchange for Philips sets mentioned in searching ad above. Large selection of octal valves. Greysham C.R. bridge. Large selection of post-war magazines. Various Murphy models - mid 1930's. G.A.Horrox, 65, Greenwood Rd., Crowthorne, Berks. Tel 3758 or WWK) Ascot 22601.