BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

ISSN 0955-9345

# BVWS BULLETIN

1976 - 1996 BRITISH VINTAGE WIRELESS SOCIETY
20 GLORIOUS YEARS


VOLUME 21 NUMBER 3 AUTUMN 1996

BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

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Contents: Bulletin of the British Vintage Wireless Society Volume 21 No.3 Autumn 1996




Front Cover: The KB BM20, designed by Lawrence Griffin (of KB FB10 'toaster' fame) and manufactured in 1947. The BM20 came in many colours of bakelite and seems to have been an exercise which was not to be repeated by KB, with the possible exception of the FB10, which was available in only 4 different colours, as opposed to the double-figure numbers of its larger predecessor.

Rear Cover: Colonial 'New World' Radio, made In Bakelite or more specifically Urea Formaldehyde as in the white models, manufactured in 1933, this set was the most well known of the models manufactured by Colonial.

**Cover Photography by Mark Groep**
**Graphic design by Carl Glover**

## Contents



# From the (Marconi) chair

As far as us mere mortals are concerned the arrow of time moves in only one direction. Yes, my house move has been accomplished. There were as always last-minute hiccups such as the removers omitting to tell me that they had run out of time and had left the contents of half my attic behind. I should have smelled a rat sooner when I was told that they had covered up some empty boxes which they hadn't got the time to fetch down by a piece of old carpet which they decided was best left *in situ*. As any wireless collector knows all too well you get little for nothing these days. In the end I bestirred myself and opened the attic by means of an old walking stick which was the only appliance left in the house. What confronted me would have gladdened my wife's heart who would have been only too pleased if half the contents of the house could have been left behind if the new owners could have been kept quiet: ten assorted radios, twenty odd boxes of *Bulletin* back numbers, three crates of assorted pianola rolls (I am the proud owner of a 1905 fully restored extraordinarily heavy 65 note player piano which ceased to work the minute it entered our new home!), a 16mm sound film projector with some lethal, half decomposed film spools, and many other discarded items ranging from the objectionable to the unmentionable. In other words, the usual contents of an attic belonging to a collector. To cut a long story short and not to prolong my agony, the following morning my wife took drastic measures. She ordered a skip into which we dumped the most dusty and unpromising items. The remainder we transported to our new home in three car loads and one Volvo load, including *Bulletin* back issues. Mike Barker will be pleased!

The important item of news on which I reported on the last occasion was the wireless exhibition– *One Hundred Years of Radio* to be staged by the BVWS in conjunction with the Radio Academy from Monday 15 until Wednesday 17 July at the Birmingham ICC. The display held in the main foyer (see pictures below) was a great success and was referred to by a number of the speakers in their seminars. Over one hundred items were displayed in ten cases in chronological order: (1) Communications Without Wires; (2) Early Wireless in the Forces; (3) Origin of the B.B.C.; (4) Listening in (1922 - 1925); (5) The Masses Start to Listen (1926 - 1930); (6)The Thirties; (7) Propoganda and War; (8) FM; (9) The Portable; (10) The Future. The only cases we were not responsible for were cases 3 and 10, although here too we managed to liven things up with some items from our collections. The exhibition was organised by Alison Taylor for the Radio Academy and prepared by Guy Peskett, David Read and myself on behalf of the BVWS. The exhibition script was prepared over an intensive weekend by Guy with input from the team and other BVWS members. The display came from the collections of the exhibition team with additions from Ian Higginbottom, Rod Burman and John Howes. The exhibition poster (see below) was based on material from Ken Tythacott's collection. I would like to concur with the warm thanks extended by the Radio Academy to all who helped with this exhibition. It has been good publicity!

It will not be long now before our own celebrations on Saturday 21st and Sunday 22nd September. From the positive reactions received from members it should be a great success. I am especially looking forward to the exhibition of members' favourite items from their collections. Ken Tythacott tells me that there is still time for members to submit items for the exhibition. Please make sure that we can all enjoy the items that have given you so much pleasure over the years. Contact Ken today!

Attentive readers may remember that in the Spring issue of the *Bulletin* I mentioned that the Committee was planning a momento to mark our September celebrations. I can now let the cat out of the bag. It gives me great pleasure to present to you on behalf of the Committee the enclosed facsimile of a rare pre WWI trade catalogue of the Marconi's Wireless Telegraph Co. Ltd. The Committee would like to thank GEC- Marconi for their generosity in making the original catalogue available and Gordon Bussey for having organised the printing. I trust that BVWS members will recognise this as a fitting tribute to mark both Marconi's great achievements and the BVWS having come of age.

*Willem Hackmann*


*Far left: poster for exhibition staged by the BVWS in conjunction with 'The Radio Academy' at the International Conference Centre, Birmingham. The exhibition ran from the 15th to the 17th of July and displayed a concise sample of apparatus spanning '100 years of Radio'. Captions and commentary were provided by Committee member Guy Peskett for the exhibition.*

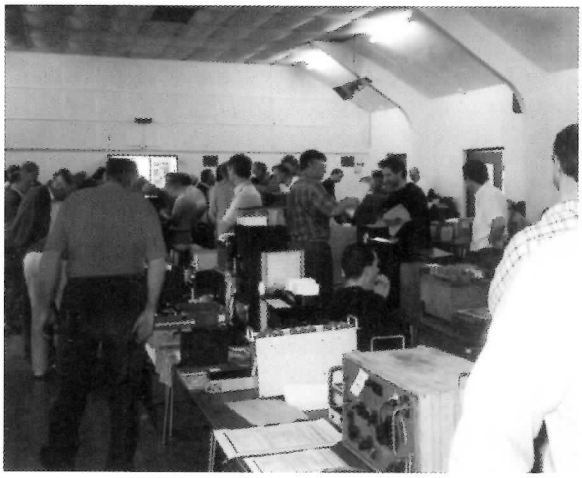
*Left: One of the cabinets from the '100 years of Radio' exhibition.*

*Below: A scene from Mike Barker's Wootton Bassett swapmeet held on the 30th of June. He will be running another swapmeet on December the 8th this year.*

# New swapmeet in Sussex

BVWS member Les Daniels is starting a swapmeet in Horsham, West Sussex. The swapmeet will take place on Saturday, 2nd November at North Heath Hall, North Heath Lane, Horsham, west sussex. The doors will open at 9.30 to stallholders and 10.00 am. to everyone else. There will be a mini auction and also meals and refreshments will be available throughout the day.

For tickets, table bookings and enquiries please ring Les on Horsham (01403) 263651



# Confessions of a Cartologist Part IV

## The BBC in Postcards

*by Willem Hackmann*

By the end of the First World War the industrialised nations were ready for public broadcasting. The transmitter at 2LO, Marconi House, London, became the first official broadcasting station of the British Broadcasting Company in November 1922, soon to be followed by eight other main stations: 5IT (Birmingham), 2YZ (Manchester), 5NO (Newcastle), 5SC (Glasgow), 2BE (Aberdeen), 6BM (Bournemouth), and lastly 2BD (Belfast). A network of relay stations was also established. These were operational by the end of 1924. The station that became most celebrated in both real photograph and comic (Fig. 1) post cards was LO2. What follows is not a 'potted' history of public broadcasting and the B.B.C., but rather the tantalising glimpses we get from post cards that have survived the ravages of time.

One of the most popular B.B.C.'s transmitting stations must have been Daventry, judging by the number of post card views that have survived in my collection. Daventry 5XX replaced Chelmsford 5XX for transmitting long-wave programmes on 1600 metres on 27 July 1925. I have two fine real photograph post card studies of 5XX's twin transmitting masts on Borough Hill, Daventry in Northamptonshire, one in the Derwent Real Photo Series by W.H. Smith & Son (Fig. 2), and the other by Victor W. Long of Rugby (Fig. 3). These are among the very best of their kind. It is a great pity that neither have been posted so no precise date can be determined. The next two post cards are purported to be of Daventry 5GB, the high power medium-wave transmitter operating on 491.8 metres which went operational on 27 August 1927 for experimental broadcasts to the Midlands for the proposed Regional Scheme. Fig. 4 is an anonymous real photograph post card of the twin masts and main building, and the next card (Fig. 5) is a panoramic view of the two masts by the same maker as it has the same back. As it is numbered 'No. 8', it is intriguing to speculate on the size of this series. On the other hand, these two cards may well be photographs taken by an amateur photographer and printed on sensitive paper with post card backs. The captions could have been added in the dark room. Kodak at this time marketed a range of folding cameras which allowed the photographer to write information on the film while it was still in the camera. Perhaps all four cards illustrate both Daventry 5XX and 5GB which together made up the world's first twin-wave transmitting station - the forerunner of the Regional Scheme which,


Fig. 1

Fig. 2

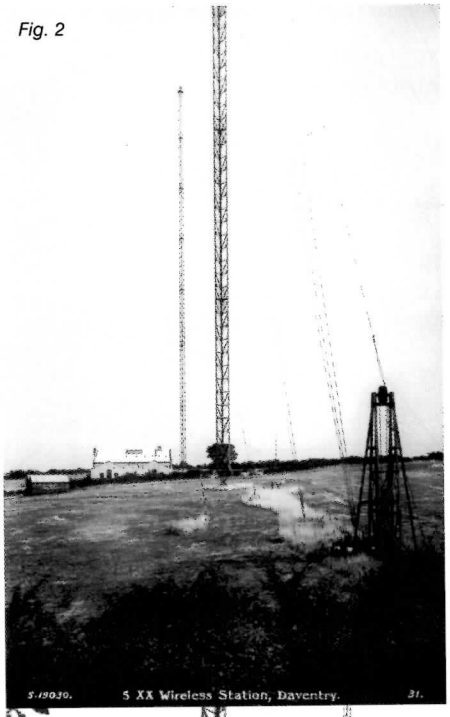



Fig. 3

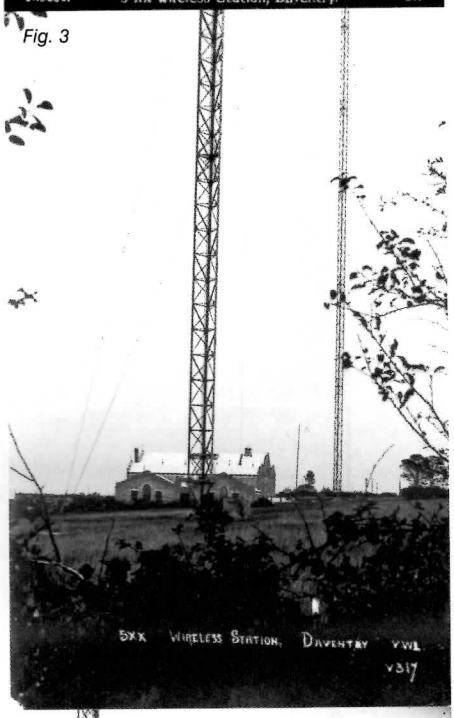



Fig. 4

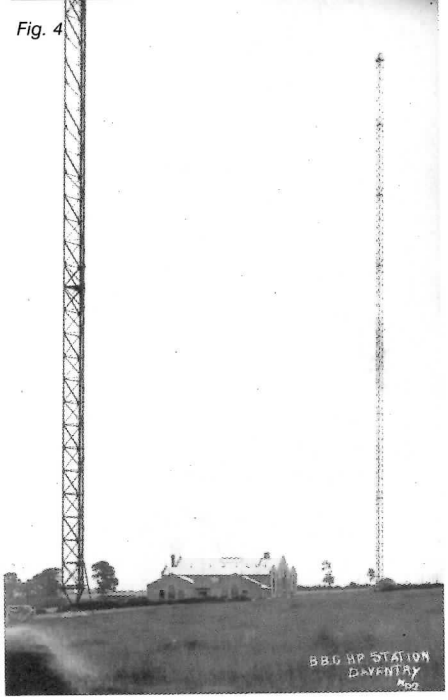



*Fig. 1 'I'm always bright on Sundays, 2.L.O. with the B.B.C.', one of a number of cards drawn by the well known artist Mabel Lucy Attwell on the wireless theme, in the Valentine's 'Attwell' series, no. 2140, posted in London, 18 August 1932. The post card theme of children and wireless will be discussed in a later Part of this series.*

*Fig. 2 '5XX Wireless Station, Daventry', W.H. Smith & Son's Derwent Real Photo Series, S.19030, and no. 31 printed in the r/hand corner. A fine study of how the masts were made secure, unfranked but probably early thirties.*

*Fig. 3 '5XX Wireless Station, Daventry' with initials 'VWL' and 'no. V317'. Standard post card back with no indication of manufacturer. Unfranked but same date as previous card. I have several cards with the same initials of the Rugby Post Office Station which turn out to be by Victor W. Long of Rugby. These cards will be discussed in a future Part in this series.*

*Fig. 4 'B.B.C. HP Station/Daventry', simple post card back with no inidication of maker, printed on front: 'No. 2'. Unfranked.*

as we shall see, was well documented by B.B.C.'s promotional post cards. In March 1930 Daventry 5XX became Daventry National, and Daventry 5GB Midland Regional. Finally, in 1933 Daventry was replaced by Droitwich in the Regional Scheme. I possess two other post cards of Daventry, the first (Fig. 6) of the Daventry Empire Broadcasting Station which was inaugurated in December 1932, and the last one in this group (Fig. 7) is a panoramic view of the entire Daventry site taken from the London Road probably in the mid 1930s.

A very prominent place in my collection are views of Broadcasting House. 'B.H.' as Broadcasting House soon began to be called by the B.B.C. certainly reflected a general mood that 'the stone age of broadcasting' has come to an end with the shut down of Savoy Hill on the night of 14 May 1932. The new 'radio-aeroplane-steel-and-concrete' style building in Portland Place was regarded by many a fitting home for a confident and forward-looking B.B.C., while others called it 'a damned awful erection'. The new building, designed by the architect Lieutenant-Colonel G. Val Myer in association with M.T. Tudsbery, was immediately popular with post card publishers, not least because its modernist façade was in striking contrast with the surrounding traditional 'classical' archtecture (Fig. 8). Most of the eleven other versions in my collection are unfranked, undoubtedly because visitors to London wanted to keep them as souvenirs. I shall only illustrate three close-up views of the imposing front. Fig. 9 was published by the well-known postcard publishing firm of J. Beagles & Co., a pioneer of photographic publishing at the turn of the century. They became a limited company in 1908 and ceased trading shortly before the Second World War. They were noted primarily for their postcard portraits of royalty, both English and foreign. The firm carried an enormously varied stock, including 5,000 different designs of famous actresses, but I have found no mention of their Broadcasting House card which probably dates from 1932.

The next card (Fig. 10) is a real photograph postcard which is completely plain on the back. Since it has printed on the front 'B.B.C. Copyright', it is probably a promotional card issued by the B.B.C. It is difficult to date; the photograph may have been taken shortly before the building was completed as the clock has no hands, the famous statue of Prospero and Ariel by Eric Gill is lacking, and there is sign of some construction work at the left-hand side of the building where the display window was situated. In fact, I have two other views with the building in a similar state of undress: one lacking both the statue and the clock hands (real photograph post card no. 116 but indicating no publisher) and the other card only lacking the statue but taken at quite a different time as the large stone window box is in flower. This card is by Raphael Tuck & Sons Ltd and has printed on the back their two distinctive trade marks: the artist's easel and palette with the letters 'RTS', and their additional trade mark of a reclining lady looking at a globe, with the words 'The World's Art Service', which first appeared in the 1930s.

Four of my cards which although at first glance look different are, in fact, the same image as they show the identical motorcar emerging from the right-hand side. One is a real photograph in a sepia finish in the 'Excel series' (otherwise unknown to me) with printed on the front the serial no. 49. Two others were originally tinted by hand and then printed. There are minor variations in the colours and both have the serial no. 149 printed on the front (obviously, the previous '49' with a '1' in front). Their backs have their printing in different fonts, but both have the same caption: 'Broadcasting House. The Home of the British Broadcasting Corporation. A huge edifice, not inaptly compared to the curving bulk of an ocean liner'. The final one is a rather poor reproduction of the same view which was posted to Holland on 2 November 1945. Among the remaining versions is a rather whimsically drawn card predominantly in blues and reds published by Chromart and posted from London on 22 March 1940, but I want to end this sequence with a card showing Broadcasting House by floodlight, taken during happier days before the wartime blackout (Fig. 11).

Those with keen eyesight and knowledgeable in these matters will have noticed that there are minor changes in the aerial configuration sprouting on Broadcasting House's roof. The main 25ft high masts were said to be purely ornamental since as *Wireless World* put it their purpose was 'to give the place an *air* in order to distinguish itself from a hostelry or a treacle factory'. Actually, these masts did for a time carry receiving aerials for testing the reception quality of programmes.

The other popular view (of which I have four versions) is taken from the side, and gives one much more the impression of an ocean liner steaming down the West End of Regent Street. Fig. 12, published by Walter Scott of Bradford was posted from London on 18 June 1942 to friends in the 'Lubricating Oil Pool, St Stephens House, Bristol', and is of the 'having a good time' variety. The sender obviously took seriously the wartime government's warning that 'walls have ears'. Two of the


*Fig. 5*


*Fig. 6*

*Fig. 7*

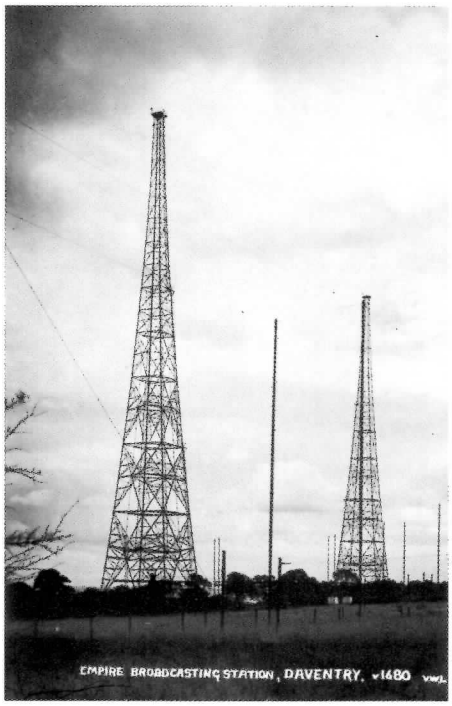



*Fig. 5 'B.B.C. HP Station Daventry', identical post card back to previous card , with printed on front 'No. 8'. Unfranked.*

*Fig. 6 'Empire Broadcasting Station, Daventry, v1680', real photograph postcard with blank back and initials 'VWL' (as Fig. 3), posted from Daventry, 12 July (date illegible) but probably early thirties.*

*Fig. 7 'Daventry Wireless Station, from London Rd', simple post card back with no indication of manufacturer. Unfranked but probably mid 1930s.*



*continued on next page*

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Fig. 8

*Fig. 8 'London B.B.C. Broadcasting House', real photo published by C. Richter of London, no. 40297, unfranked but mid 1930s.*

*Fig. 9 'Broadcasting House, London', in the Beagles' Postcards series no. 721 N, unfranked but probably made shortly after it was opened in 1932.*

*Fig. 10 'Broadcasting House B.B.C. Copyright', postcard with plain, unprinted back and unfranked. Probably early 1932.*

*Fig. 11 'London by Flood Light. Broadcasting House' published by Photochrom Ltd of Tunbridge Wells, posted from Cranbrook 1 December 1935.*

other three cards have the identical real photographic image, one is no. S 19610 in the Kingsway Real Photo Series (with the trade mark 'WHS'), and the other has the same serial number in the Bridge House Real Photo Series. We have already come across the postcard activities of W.H. Smith & Son. They supplied cards under franchise and Bridge House may well have been one of these. The final card in this sequence is a fine drawing reproduced by Sketch Post Card.

Much is made in the literature of the time about Broadcasting House's unique construction. Twenty-one (some sources list twenty-two) studios were constructed inside a central brick tower surrounded by offices built inside a steel framework. This protected the studio tower from external noise but at the same time had to be ventillated artificially as there was no access to fresh air either. This and other features of Broadcasting House were illustrated in a series of B.B.C. promotional postcards of which I have fourteen all marked 'B.B.C. Copyright'. None of my cards have been

Fig. 9


Fig. 10

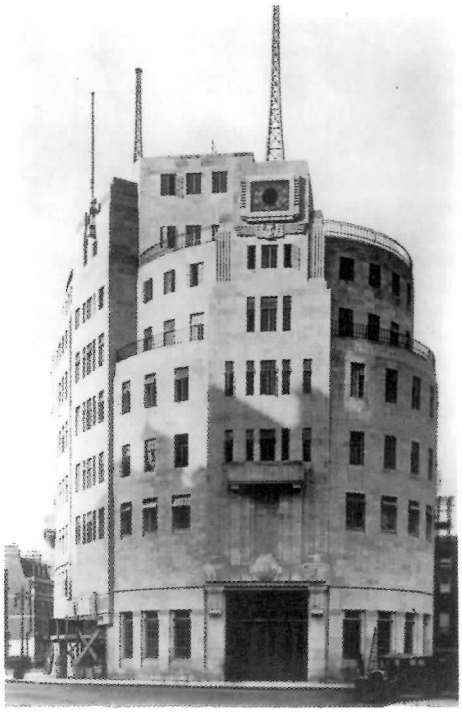



Fig. 11

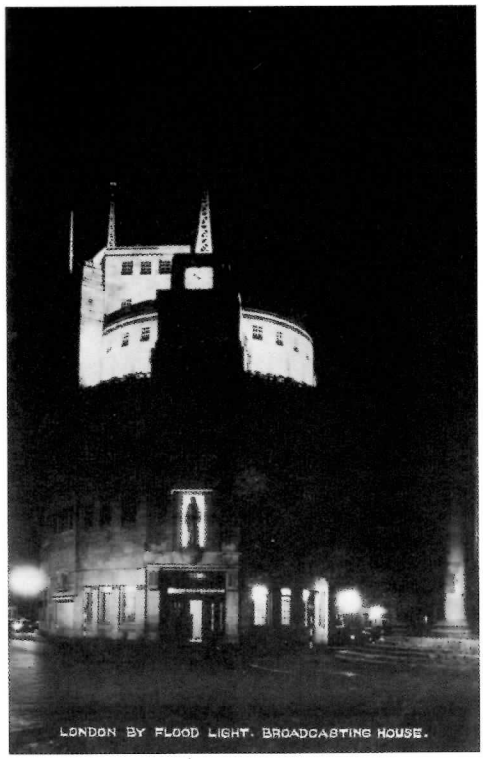
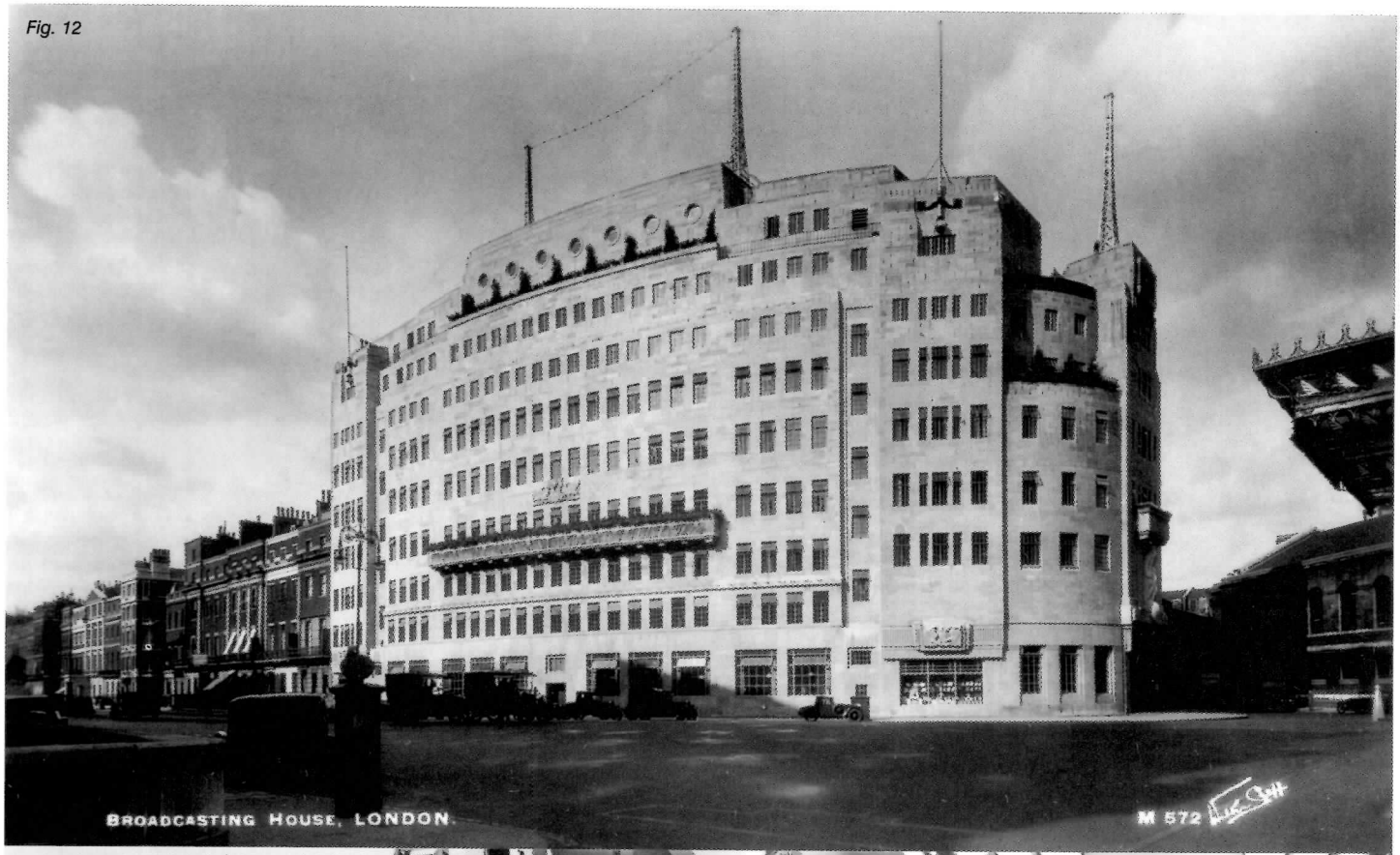


Fig. 12



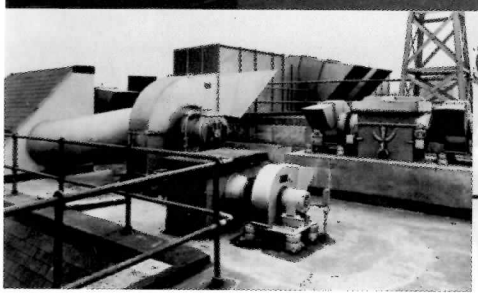



Fig. 13

Fig. 14

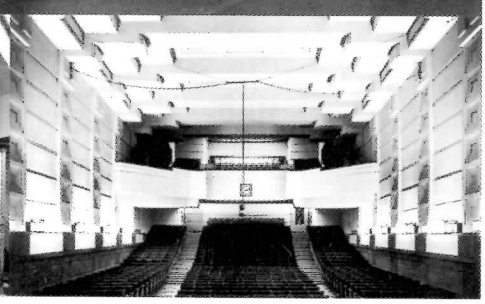


Fig. 15

*Fig. 12 'Broadcasting House, London', sepia 'real photograph copyright' published by Walter Scott of Bradford, no. M 572, franked London 18 June 1942.*

*Fig. 13 'Broadcasting House:- Roof showing General Extract Fans and Coolers in distance which operate in conjunction with the 'carrier' Centrifugal Refrigerating Machine. B.B.C. Copyright', divided back with single line spacer and the words 'Post Card/Correspondence/Address', unfranked. Identified as variant B.*

*Fig. 14 'Broadcasting House:- The Control Room. B.B.C Copyright', divided back with double line spacer and the words 'Post Card/Carte Postale/Communication-Correspondance/Address-Adresse', and the superimposed `K' on `LTD', unfranked. Identified as variant C.*

*Fig. 15 'Broadcasting House:- The Concert Hall. B.B.C. Copyright', divided back with double line spacer and the words 'Post Card/This space for communication/The address to be written here', unfranked. Identified as variant A.*

posted. They are (1) of the 'Ariel Piping the Children' sculpture by Eric Gill; (2) Entrance Hall with Eric Gill's statue 'The Sower' and above it the famous Latin inscription beneath which every broadcaster had to pass, and which reads in translation: 'This Temple of the Arts and Muses is dedicated to Almighty God by the first Governors of Broadcasting in the year 1931, Sir John Reith being Director-General. It is their prayer that good seed sown may bring forth a good harvest, that all things hostile to peace or purity may be banished from this house, and that the people, inclining their ear to whatsoever things are beautiful and honest and of good report, may tread the path of wisdom and uprightness'. What of broadcasting today? (13) the Refrigerator Unit for the Air Conditioning Plant; (14) the Roof showing the general extract fans (Fig. 6); (5) The Council Chamber; (6) the Control Room with two of the 'B' Amplifier Bays; (7) the Control Room (Fig. 7); (8) Studio BA (Vaudeville); (9)Studio 3E (Religious Services; (10) Studio 6D (Effects); (11) Studio 8A (Military Bands and Orchestras) situated at the top of the building; (12) Listening Hall No. 1; (13) The Concert Hall which measured 106 ft by 42 ft (Fig. 15); and (14) of the Maida Vale Studio No. 1 which was at one time a skating rink. There are two additional postcards: (15) of the Gramophone Effects Studio and (16) of the Vaudeville Studio. Judging by the minor variations we are dealing with four different groups of post cards even though they all carry the B.B.C.'s imprint. The last two items are identical in finish to Fig. 10 in that they all have plain backs and are a slightly smaller size than the other cards. Although Fig. 10 has no series no., item 15 is numbered 'E9' and 16 'E14'. This may signify that this series consists of three sets of six cards making a total of eighteen cards. I would be pleased to hear from any reader with a card in this set with a number greater than E14! (In fact, I do also have E7 which is a publicity shot of Lilian Harrison in front of a large B.B.C. 'meatsafe' microphone). Two of the remaining three groups carry no publisher's name on the back but do have two distinctive print fonds and slightly different wording: items 9, 12, 13 (Fig. 15) and 14 form one group and 1, 3, 4 (Fig. 13) and 6 the other (we'll call them variants A and B respectively). The final group consists of items 2, 5, 7 (Fig. 14), 8, 10 and 11 (variant C). These making up a set of six cards have printed in the place indicated for the postage stamp the letter 'K' superimposed on 'LTD'. I have not been able to identify this firm. All in all, the B.B.C. appears to have taken promotional postcards seriously in the mid 1930s judging by the large number of views they produced and have survived. Two leading architects who designed studios for Broadcasting House also designed bakelite wireless cabinets for E.K. Cole in the 1930s. Wells Coates designed the News Studios 4a and 4b and the Dramatic Effects Studio 6D (see 10 above) and Serge Chermayeff designed Studio 8A (see 11 above) and the two Talk Studios 3b and 8b.

Broadcasting House may have been considered by the B.B.C. the jewel in their crown, but the development of the Regional (broadcasting) Scheme during the thirties was also comprehensively documented by their promotional postcards, and hence feature prominently in my collection. Brookman's Park to service London and the Home Counties came on air on 9 March 1930 and



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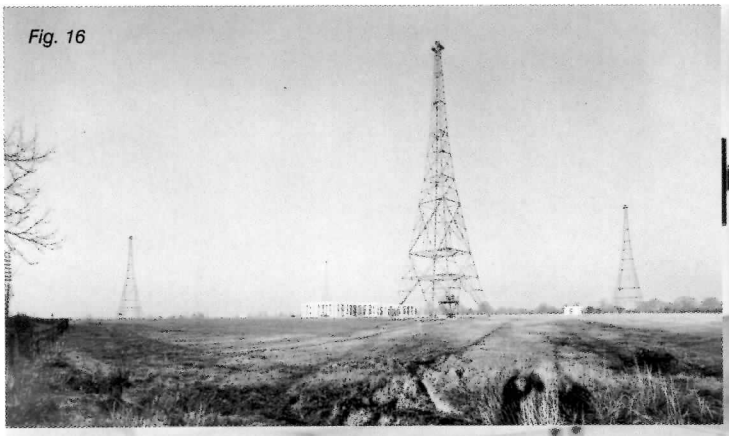


Fig. 16

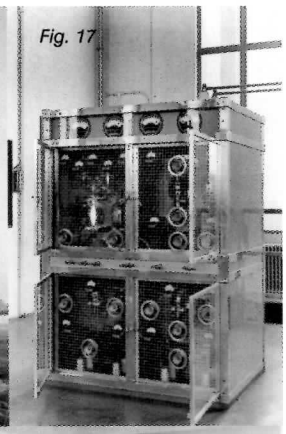


Fig. 17

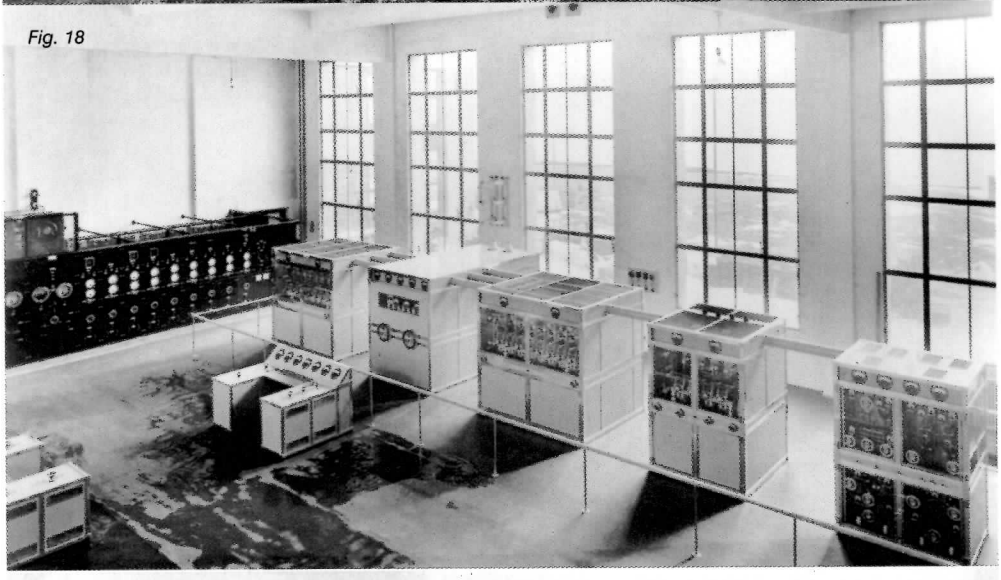


Fig. 18

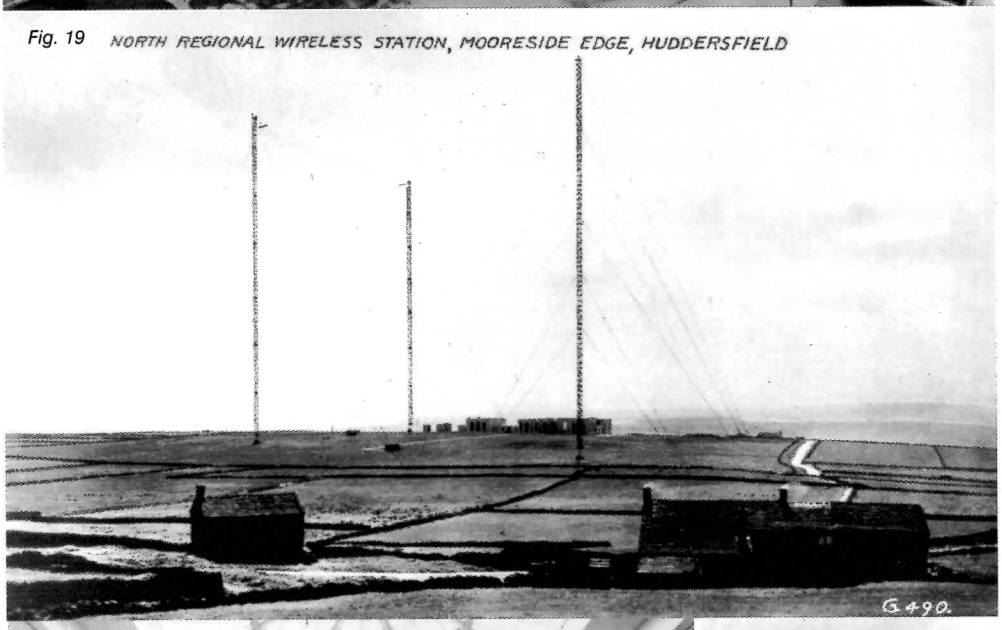



Fig. 19

Fig. 20

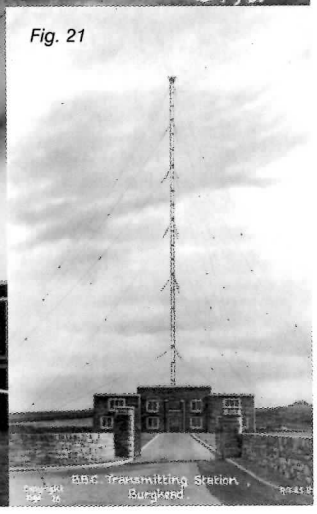



Fig. 21

was celebrated by a set of six promotional cards with the B.B.C. Copyright imprint on the front and the superimposed 'K' on 'LTD' on the back (see variant C above). As usual the cards are not numbered but I have the following: (1) 'General View of Station' (Fig. 16); (2) 'General View of Power House'; (3) 'Transmitter Hall'; (4) 'Filament Current Motor Generating Sets' (5) 'Small Motor Generator Sets for grid bias, high tension for low power stages, etc.'; and (6) 'One of the Transmitter Units, containing Master Oscillator, Separator, Modulator and Modulated Amplifier' (Fig. 17). This group may have the answer to the problem thrown up by our detailed examination of the Broadcasting House cards as I have two identical cards of the 'Filament Current Motor Generating Sets' one with the 'K' and 'LTD' trade mark on the back (variant C) and the other with its back identical to the set of Broadcasting House with no trade mark and identified for convenience sake by me as variant A. I have one other card of this station in my collection: a general view with plain back and with on the front the number 'A12'. This card is very similar in finish to the Broadcasting House card illustrated in Fig. 10 and may well be part of that series.

The second phase of the Regional Scheme got under way when the North Regional Transmitting Station at Moorside Edge near Huddersfield became operational in May 1931. Again I have a set of six cards of this station still with their envelope on which is printed

*Fig. 16 'Brookman's Park. General View of Station. B.B.C. Copyright', divided back as Fig. 14 (variant C), unfranked.*

*Fig. 17 'Brookman's Park. One of the Transmitter Units, Containing Master Oscillator, Separator, Modulator and Modulated Amplifier. B.B.C. Copyright', divided back as previous card, unfranked.*

*Fig. 18 'North regional Station. The Regional Transmitter. B.B.C. Copyright', divided back as Fig. 15 (variant A), unfranked.*

*Fig. 19 'North Regional Wireless Station, Moorside Edge, Huddersfield', Valentine's real photo, no. G490, franked Slaithwaite 7 August 1936. I have a second unfranked specimen by Valentine's now marked 'Phototype' postcard which carries one of Churchill's slogans 'This is the time for everyone to stand together, and hold firm!' The use of slogans became a common wartime practice by several post card publishers.*

*Fig. 20 'Scottish Regional Station. The Transmitter Hall. B.B.C. Copyright', franked Kensington 26 August 1936, and the only card of all my B.B.C. sets to have been posted! The sender refers to a television demonstration which he has just witnessed. At Radiolympia of that year (26 August until 5 September) visitors could see twice-daily experimental television transmissions prior to the B.B.C.'s inauguration of the world's first regular high-definition television service from Alexandra Palace on 2 November.*

*Fig. 21 `B.B.C. Transmitting Station, Burghead. Copyright Bgd. 28. R.T.& S Ltd.', published by Raphael Tuck & Sons, and posted from Burghead on 26 July 1938 with the message: 'Saw through the wireless station on Saturday, it is a beautiful place...'*

'North Regional Station/B.B.C./Copyright', which indicates that originally these cards could be purchased in sets of six in their envelope. The cards are as follows: (1) 'The Regional Transmitter' (Fig. 18) ; (2) 'Reservoir and Oil Storage Tanks'; (3) 'Power House, showing Direct Current Generators and Main Switch Board'; (4) 'Power House, showing one of the Four Diesel Engines'; (5) 'Filament Current and High-Tension Motor Generator'; and (6) 'Base of one of the 500 Ft. Masts'. None of these post cards have a publisher's name or trade mark (apart from 'B.B.C Copyright'), but two of them have identical backs to Fig. 15 (designated variant A) and Fig. 13 (designated variant B), which leads me to conclude that all these back variations, including those with the trade mark 'K' superimposed on 'LTD' originate from the *same* source. There is one other variation (item 6) which has the back divided by the sentence 'This is a Real Photograph', and 'Post Card' in large type with underneath 'British Manufacture' underlined and 'Address' (variant D). I have four other views of this station. Two have no publisher's name but are obviously part of a series as they are numbered 381 and 382. The others are by J.A. Briggs of Slaithwaite and a panoramic view by Valentine & Sons which shows the station's remoteness (Fig. 19).

Of the Scottish Regional Transmitting Station which was the next to come on the air at Westerglen near the end of 1932, I have only two of the B.B.C.'s promotional postcards: (1) 'The Transmitter Hall' (Fig. 20) posted from Kensington on 26 August 1935; and (2) 'Music Control and Dramatic Control Panels'. These appear to be rarer than the other sets. There is a minor variation in the captions in that the first one is headed 'Scottish Regional Station' and the second 'Scottish Regional Office'. In October 1936 the Scottish Regional Service was reinforced by a new high power transmitter operating from Burghead (Fig. 21) at the same frequency as the Westerglen station.

The West Regional Transmitting Station at Washford Cross near Watchet in Somerset began broadcasting in the early summer of 1933. Again I have the full set of six promotional post cards: (1) 'Outside of Building and Aerial Masts' (Fig. 22); (2) 'One of the 500 ft Masts'; (3) 'Transmitting Hall'; (4) 'The Transmitter Power Switchboard'; (5) 'Power House showing the four Diesel Engines and Generators'; and (6) 'High and Low-Tension Generators in the Machine Room'. A fine panoramic view of the station with its twin masts was produced by Vowles (Fig. 23). This was probably a small local firm. The card in my collection was posted from Minehead on 6 July 1933. I am always amazed by the number of post cards produced of wireless masts. I have two others in my collection of this station, the first is another detailed view of the twin masts by the well-known post card publishers J. Salmon Ltd of Sevenoaks (Fig. 24), and the second is a fine atmospheric study of the station with gathering clouds published by H.H. Hole of Williton in Somerset, posted from Washford on 9 August 1933. The firm of J. Salmon, originally established in 1815, was acquired by Joseph Salmon in 1880. They were the principal post card publishers of the famous water colour views by Alfred Robert Quintin but also produced real photo post cards from soon after the turn of the century. They became a limited company in 1930 but the family remained in control.

Fig. 22

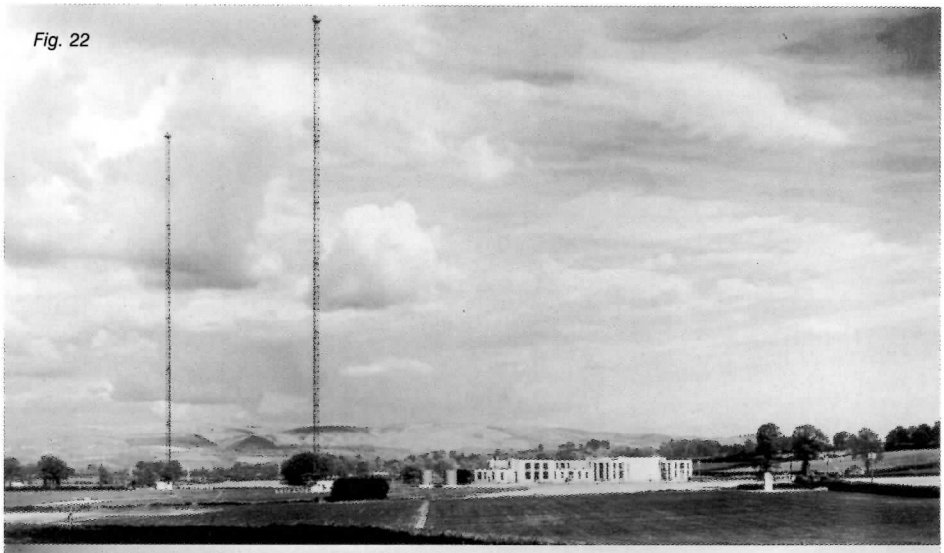


Fig. 23

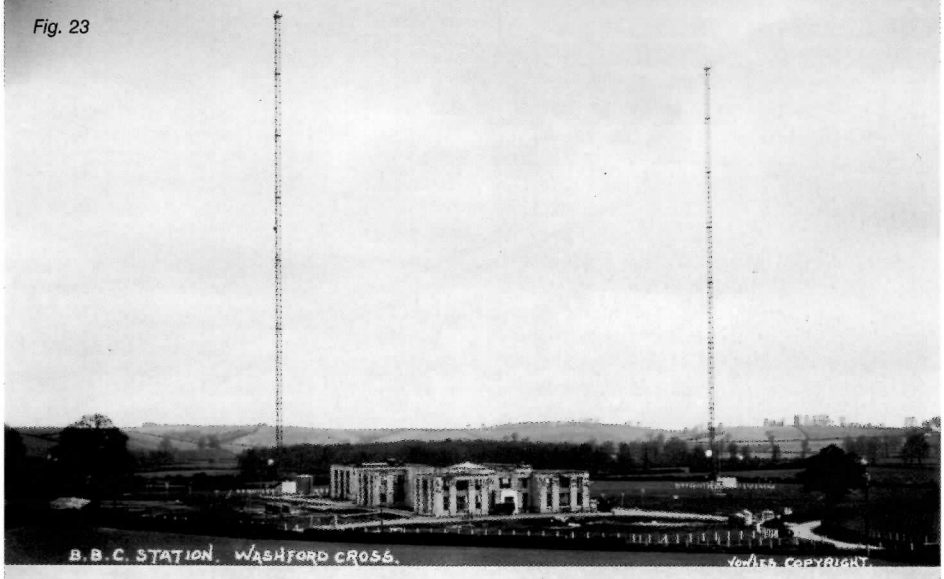



Fig. 24

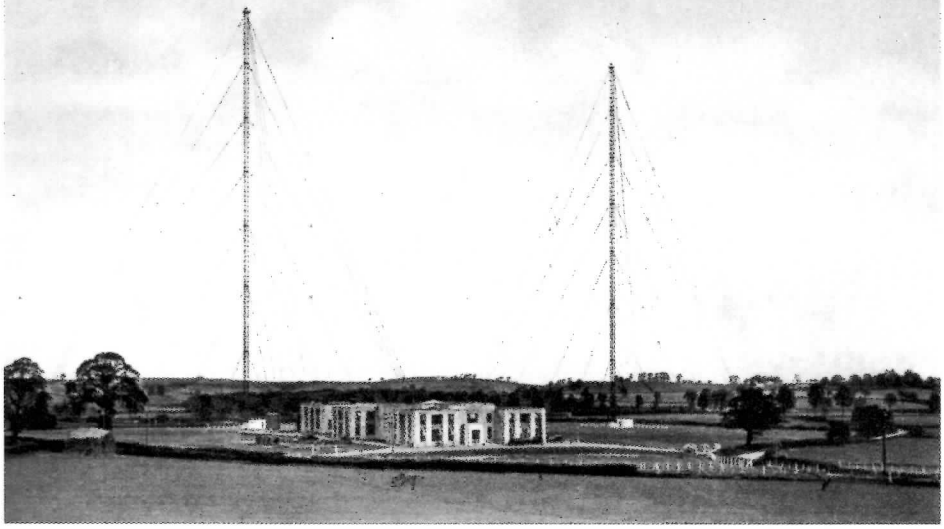


*Fig. 22 'West Regional Transmitting Station. Outside of Building and Aerial Masts. B.B.C. Copyright', divided back as Fig. 15 (variant A), unfranked.*

*Fig. 23 'B.B.C. Station. Washford Cross. Vowles Copyright', with trade mark of a house with a turret both ends. Posted from Minehead, Somerset on 6 July 1933 to Exeter, with the message from the sender `Where the West Region comes from...'*

*Fig. 24 'B.B.C. Station. Washford Cross', by J. Salmon Ltd, Sevenoaks, Kent, 'Gravure Style' in their Salmon Series, no. 9214. This is almost the same view as the previous card but the wires have been enhanced.*



*continued on next page*

Continued from previous page

Fig. 25

Fig. 28

Fig. 26

Fig. 27


*Fig. 25 'Droitwich Transmitting Station. The Long-wave National Transmitter', unfranked. The back is identical to variant D described in the text.*

*Fig. 26 'Droitwich Transmitter Station. Transmitter Power-control Desk and National Transmitter', unfranked and back as the previous card.*

*Fig. 27 'Wireless Station, Droitwich', publisher unknown but perhaps originally by Valentine & Sons but card numbered G.1668. Posted from Banbury to Bristol on 9 September 1936.*

*Fig. 28 'Capt. P.P. Eckersley/Chief Engineer of the B.B.C.', photo by Archie Handford, 62 George St.,Croydon', divided back as variant A (Fig. 15) with the addition of a printed box for the stamp. Unfranked.*

*Fig. 29 'The Engineering Training Department of The British Broadcasting Corporation', by Aero Pictorial Ltd, 137 Regent Street, London W1, no. 10838, unfranked.*

*Fig. 30 'Another Wireless Signal.../2 O.L. Calling!', by D. Tempest, Bamforth 'Comic Series', no. 1856, posted from Whittington, Newcastle, 8 October 1925.*

My final B.B.C. post card set is of the Midland Regional Transmitting Station at Droitwich which became operational in October 1934. I am assuming that it is a B.B.C. promotional set even though these cards do not carry the 'B.B.C. Copyright' as the previous sets. However, they are identical in appearance and all the backs are as item 6 of the Moorside Edge station (variant D). The views are as follows: (1) 'General View from North-East Side'; (2) 'The Long-Wave National Transmitter (Fig. 26); (3) 'Transmitter Power-Control Desk and National Transmitter' (Fig. 27); (4) 'The High-Tension Machine Room'; (5) 'One of the four Diesel-generator Sets and Power Switchboard'; (6) '20,000 volt Transformer, Mercury-arc Rectifier and Switchboard'. I also have a rather dull card just of the building (Fig. 27) which was posted from Banbury in Oxfordshire on 9 September 1936. It is numbered G.1668. Perhaps this card, if not the image, originated from Valentine & Sons as I happen to possess another card of the building and masts with the same caption 'Wireless Station, Droitwich' numbered G1669 followed by the initials 'JV' in a circle (for John Valentine). This card is in the Valentine's 'Sepiatype' series according to its back. The serial numbers follow each other rather conveniently.

Fig. 29


Fig. 30


Popular, too, were publicity real photograph postcards of performers and the B.B.C.'s various 'aunties' and 'uncles'. Less well known are post cards of members of the engineering staff, although Captain P.P. Eckersley had achieved celebrity status. This fine portrait study of him (Fig. 28) must date from before the autumn 1929 when he was forced to resign from the B.B.C. over a divorce and joined Rediffusion Ltd. Aerial views began to appear after World War I. I am in possession of an aerial view of the B.B.C.'s Engineering Training Department (fig 29) which is probably dating from the late 1930s.

I have come to the end of the survey of the B.B.C. post cards in my collection. At times this account may have seemed to appear somewhat pedantic but it is only through careful observation that we can learn from such mute artifacts as post cards. In our study we have to apply the techniques of the achivist and archaeologist. Leafing through my post card albums of early wireless cards is like turning the pages of one's favourite album of family snap shots. Here and there the eyes alight on an arresting image. I hope that you've enjoyed our journey through time. What was the audience's reaction (Fig. 30) to broadcasting? *'Listening In' and the Comic Post Card* will be the subject of Part V.

# The 'Missing link'
## a Bush hybrid receiver

*by Tim Voore*

Just when I thought that I had seen every possible variant in the 'Classic' Bush TR82 series of early transistor radios, along came something completely new. What makes this discovery exciting, is that it represents a definite milestone in the 'new' technology of semiconductor electronics, and is indeed a sort of 'Missing Link' between the new technology and the old one of vacuum devices. When I was first shown this receiver, with its short wave rod aerial and three button wave change switch (medium wave and short wave bands), I thought that it was the ETR92 dating from about 1960. This is an eight transistor receiver, with short wave coverage up to 24 Mhz. The 'E' prefix almost certainly means export model, which could account for its rarity in this country.

The new set however, was completely different, for on removing the back it proved to be a hybrid valve/transistor receiver. The transistor line up was the same as that used in the 1959 TR82B, ie OC44/5 etc, but there, in splendid isolation, proclaiming its high-frequency superiority over that of the upstart transistor was a DC96 heptode mixer/oscillator valve. In the Bush hybrid, it is easy to understand the reason why the design engineers reverted to old technology. The high frequency limitation of the OC44 being clearly demonstrated in the 3 MHz upper limit of the 1959 Perdio PR73 'Continental' short wave receiver.

The design philosophy behind the earlier, (1957), Marconiphone/HMV hybrid, model numbers: Marconiphone P60B, HMV 1410B & 1410G), is not so clear cut. By mid 1957 Pye/Pam & Cossor had marketed 'all transistor' receivers which performed well when compared with their valve counterparts. It was not however, the possibilities of further miniaturisation so much as the lower running costs of the new technology receivers, that most caught the imagination of the public at the time. This latter consideration may well have dictated the approach by Marconiphone/HMV.

In the Marconiphone/HMV hybrid, the output valve was replaced with a two transistor push pull output stage. This change required an additional transformer, and whilst it did not significantly reduce the physical dimensions of the set, it did lower the loading on the expensive h.t. battery. To provide h.t. for the valve in the Bush hybrid, a vibrator unit has been fitted in the position normally occupied by the PP9 battery, and there is also a separate D cell holder to provide a heater supply. The main battery pack consists of a holder taking 6 D cells to give a 9V supply.

Much to my surprise, after fitting a set of batteries, the receiver sprang to life giving excellent performance with acceptable sensitivity on the lowest short wave bands.

Vibrators have a reputation for unreliability, the main cause of failure being contact erosion or welding. If the vibrator fitted is the original, which seems to be the case, the fact that it still functions some 36 years after installation is rather unusual.

The results of subsequent measurements on the vibrator running frequency and output voltage give a clue as to the likely reason far such a long life:

*The vibrator fitted is a high frequency type, running at 325 Hz with a 6V input, and 290 Hz with 9V. The output voltage is 40V with a 6V input, and 55V with 9V.*

These figures indicate that the vibrator is almost certainly designed for a 12V input, which would put its operating frequency at about 250 Hz. (This was a vibrator standard at the time). The output voltage would be about 70V with a 12V input.

The under- running of the vibrator by 25 percent and the very light output loading (about 5MA) is undoubtedly the reason for absence of any 'vibrator hash' on the receiver output and is also a clear indication that there is no significant contact arcing. The penalty for under-running the vibrator is a loss of sensitivity due to the low 55V ht. supply.

The 96 series represents the peak and final development in battery superhet valves, achieving current requirement of 25 mA. The superiority of the DK96 valve over the early transistors was however to be very short-lived. Transistor technology would rapidly leapfrog ahead to produce the alloy diffused 0C170 / 0C171 transistors with enhanced high- frequency performance. These were intended for r.f. and mixer oscillator circuits of a new generation of V.H.F. f.m. receivers.

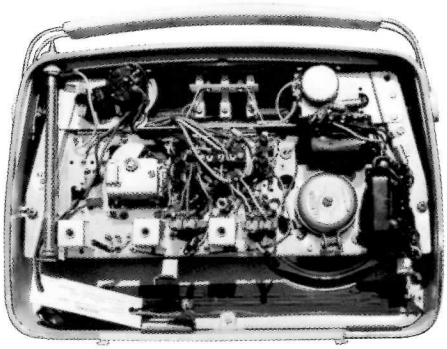
The ETR92 uses two 0C170 transistors, one as the oscillator and the other as the mixer. The short wave coverage of the ETR92 extends to 24 MHZ as compared to 17MHZ on the hybrid. The sensitivity of the ETR92 is slightly better at the high frequency end, but we must bear in mind that in the hybrid, the ht. feed to the DK96 valve is on the low side.

The main advantage of the all-transistor version is the reduction in running costs. The hybrid requires an additional heater battery, and at normal volume consumes about 45 mA from the 9V supply. The all-transistor model on the other hand only requires one battery and at normal volume takes 25mA.

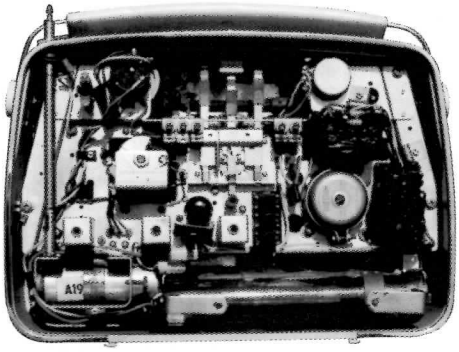
One mystery remains. The hybrid bears no model number plate. This should be riveted to the bottom of the case, but although holes are present, there is no sign that rivets have ever been used. Sets in this series also carry a circular chassis ident disc, held with one screw on the left hand chassis mounting flange. This is also missing.

As the previous owner is deceased, no information is available as to the origin of this receiver. The only thing I have been able to determine is that the set spent much of its life in Switzerland.

Was it a prototype or a pre-production model? If anyone can shed any light on this, please get in touch, I would dearly like to know. ■



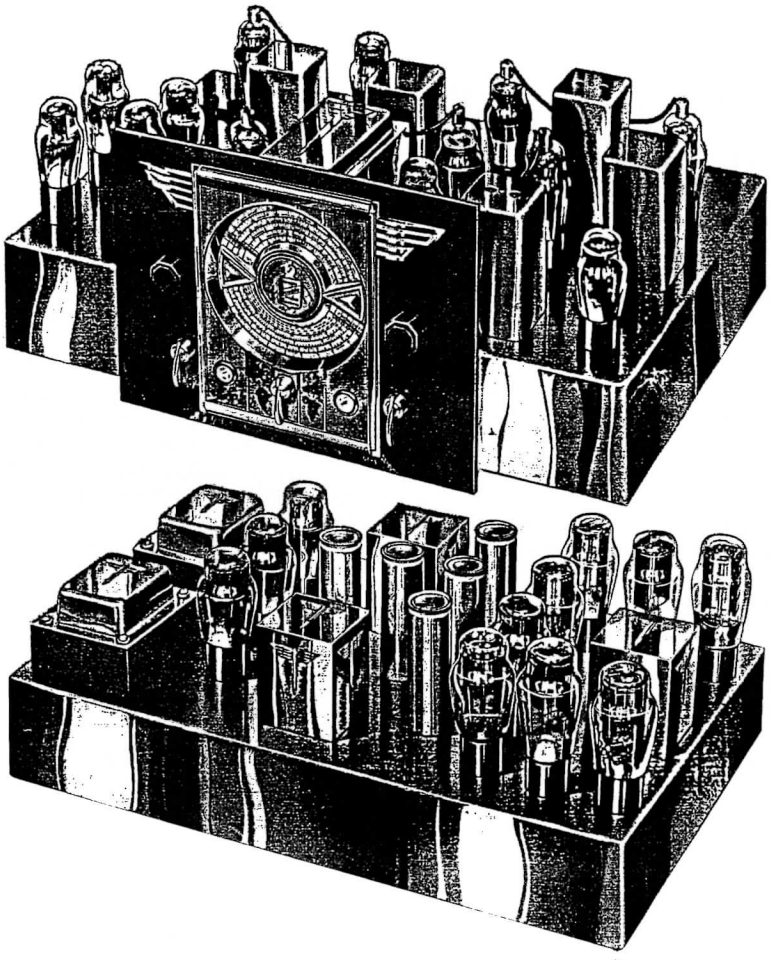
*The 'export' model ETR92*



*The 'hybrid' model*

# Size is Important

*by G. Dixon-Nuttall*



Readers of Another paper will know that I have always enjoyed very large wireless sets, so when the opportunity arose of looking at a Royale I jumped at it.

What, you may ask, is a Royale? It was produced by the Midwest company, in the same way as Ford produced the Lincoln Zephyr, to prove that they were not entirely dedicated to the cheap and nasty.

The Midwest company was a phenomenon. They sold chassis only, mail order, at quite amazingly low prices. The hype of the advertisements was excessive even by the standards of the time, and would probably not be allowed nowadays.

The chassis were cheap imitations of the Scott, and the combination of flimsy construction and clever design is intriguing. Their performance is not to be sneezed at, if one discounts the flashy gadgets.

Anyway, the Royale was quite a set in its time. A total of 24 valves was used, and as you can see, it looked the part. The really startling bit was the output stage, which used six 6F6s, connected as triodes. The drivers for these were another pair of 6F6s.- they must have bought them by the gross. If you look carefully at the photo you will see that in fact all the tubes on view are rectifiers, as they filled up the sockets with anything handy for the picture!

The specification is elaborate, with six wavebands, and includes amplified A.V.C., two I.F. amplifiers, a B.F.O., variable selectivity, and noise suppression. The chassis, are polished cadmium plate, not chrome.

This particular specimen had seen better days. The cabinet and speakers had been lost, and the plating was very rusty. Luckily the basics were O.K.

Having no speakers meant that there was also no smoothing choke or output transformer. The same twit who threw away the speakers had also chopped short the cables rather than pull out the plugs. It also appeared that the noise limiter had been converted into a gram amplifier, not very cleverly, but somebody had apparently changed all the paper capacitors, so that was a bonus. There are two separate cables connecting the two chassis, one for the L.T. and mains on-off switch, and the other for the H.T. and audio. This avoids the mains getting too near the latter.

The original electrolytics were all present, but disconnected, and as I couldn't unscrew them they were left in position and replacements fitted under the chassis- there is plenty of room. Luckily there was a circuit diagram, otherwise I would have been lost.

Having supplied a choke, power was tentatively switched on. After a short while there was a slight sign of smoke, so off again. It was discovered that there are decoupling capacitors inside the I.F. transformers, and these had not been changed. Having replaced these, another try. It, basically, worked, but having got the set to go is only half the battle with these things. You then have to sort out the gadgets!

It was discovered that the tone control was very noisy, and a check revealed that there were volts across it. After a lot of fiddling about it was discovered that the cable to the power chassis had an internal leak, so a new one was made up.

The selectivity control works by shunting, with a variable resistor, a tertiary winding on two of the I.F. transformers. This is a nasty arrangement, but sort of works. The problem is that it uses a double 8k potentiometer. I had to first find a double pot, and then it was the wrong value. Obviously nobody makes an 8k pot, but a pair of 10k tracks were grafted on. The mains switch is ganged with them too, which makes it more difficult.

The trimmers for the tertiary windings, like all the other I.F. trimmers, are air-spaced. (They claimed this for a first; what about Philips?). They are mounted in dinky little cans, one of which had a dent in it. Feeling in a tidy mood, I pressed it out. It was then discovered that due to a miscalculation, it has to be there to clear the phone jack, so I had to put it back again. Somebody in the factory must have had an interesting job denting them all!

As one would expect, widening the I.F. response produces a large drop in gain, due to the losses in the damped tertiary winding. It does work, but the response curve is nothing like the one in the brochure, which is no bad thing, because that is horrid.

The noise suppressor is ingenious, and original. A 6J7 has a capacitor between grid and anode, so making it look like a capacitor. Its grid is connected to the diode load. Thus large signals switch it off, but on small signals or none it acts as a capacitor across the diode load, and removes noise and top.

Having got signals in all the right places a start was made on that output stage. Temporarily, a mains transformer was used, with the H.T. windings as primary. The ratio required is rather strange, as three valves are in parallel. A pair of triode 6F6s need a load of 10k, so we are looking for about 3. For a 15 ohm speaker the transformer needs to be 14 to 1, centre tapped.

It went quite well, so a special transformer was ordered. This proved a disappointment, as the best it would give was ten watts without distortion. Of course, the output with distortion was enormous. I suppose if I had a wave analyser it might prove to be about twenty watts at a T.H.D. of ten per cent, but I was quite happy with my ten clean watts. After all, it was not the output that mattered, it was the look of the thing.

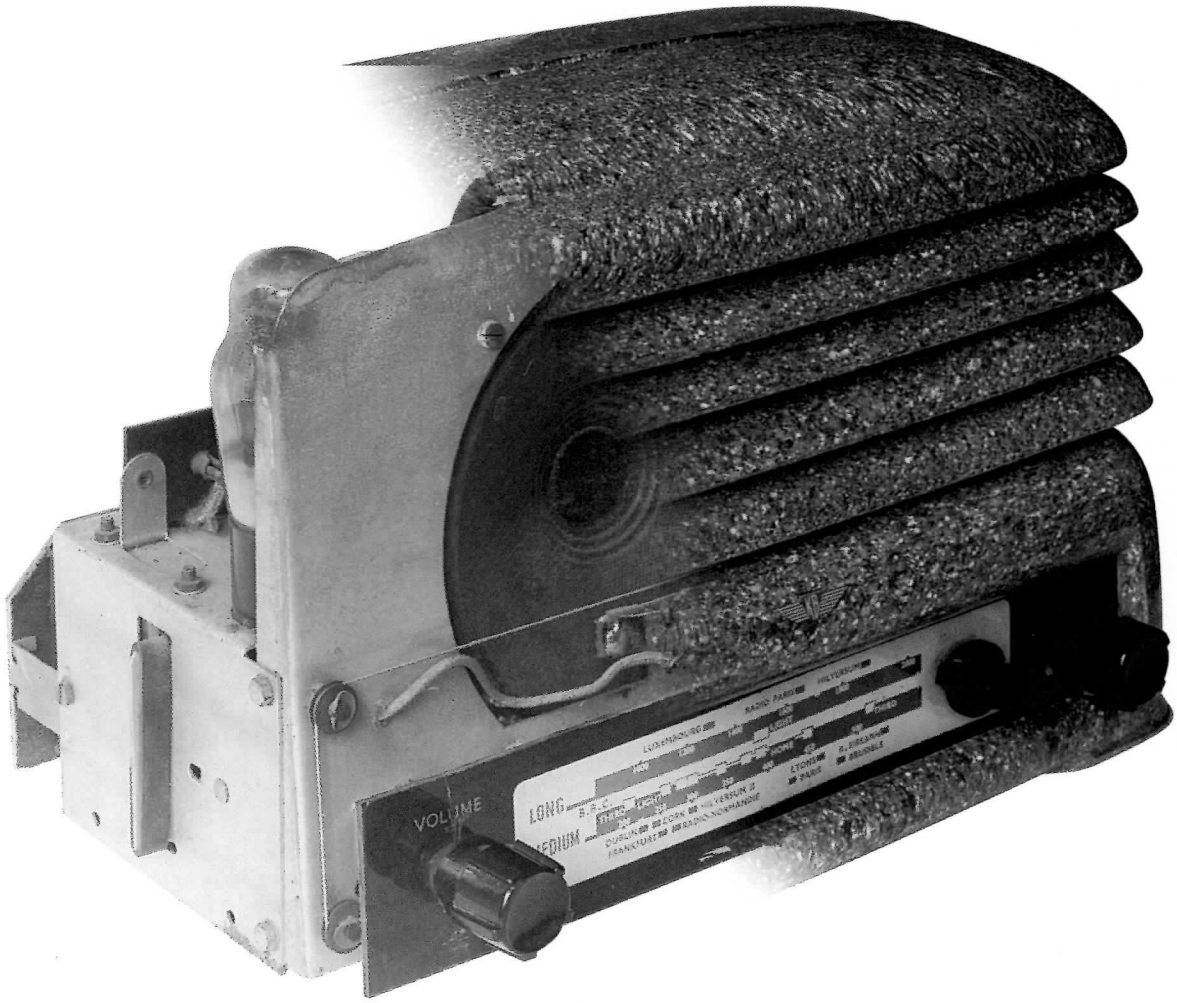
It is quite a nice set on the whole, although if it is in a cabinet the impact of that extraordinary output stage is lost. There is slight microphony on the short wave bands, although the tuning gang is still on its rubber mounts. These, however, do nothing, as the geared dial drive anchors it firmly to the chassis.

The set gives the impression that it was developed from a standard Midwest, rather than start afresh. It is a pity, for example, that in what was an expensive set (presumably; I have not got the price) the dial backing is still a bit of cardboard. The usual Midwest knobs have been gold-washed over the chrome, but this has worn off.

As far as I know, this was the only time they tried to aim high. It is, I gather, quite a rare set, even in the U.S., although it is probably not all that valuable. These things, as I said at the beginning, are a matter of taste. Anyway, the brochure, tied with a silk cord, is a real work of art!

# Inside the BM20

*by John Ounsted. Photography by Mark Groep.*



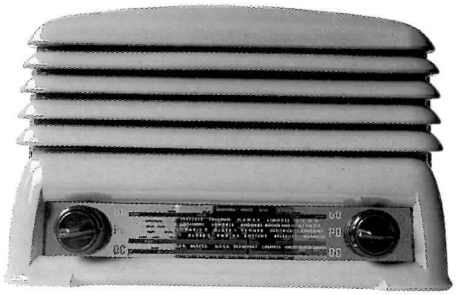

In profile, it's like a sort of art-deco Easter Island statue... full face, more like Robbie the Robot from 'Forbidden Planet'. Is it a bird?... Is it a plane?... Is it a tastefully-styled wireless set? Why, no, it's the Kolster Brandes BM 20- a strange and other-worldly radio, a veritable kitsch masterpiece from 1947! If it's just conceivable that, years later, Ford were inspired to create their Sierra motor-car having first glimpsed the KB Toaster, then perhaps Terry Nation was thinking of our BM20 when he unleashed the Daleks on an unsuspecting world - the resemblance is uncanny!

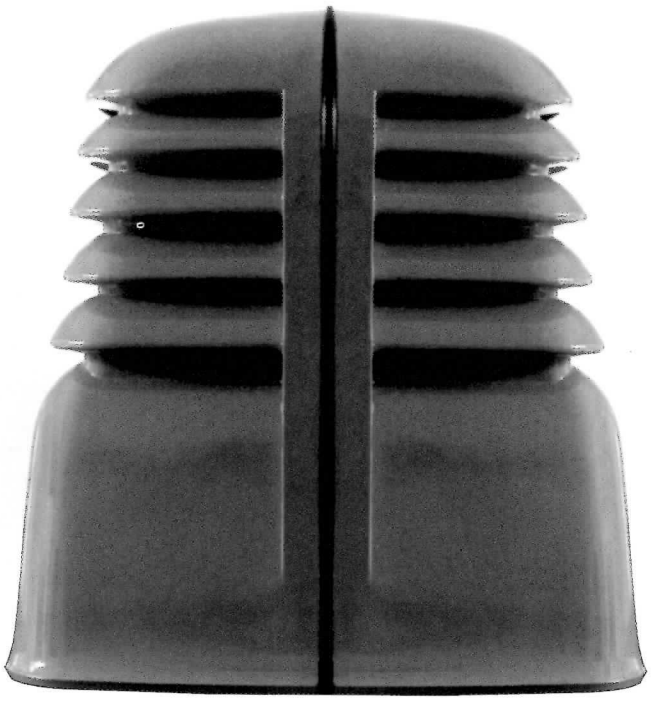
To business, then - the BM20's curvilinear cabinet is made as two identical mouldings, permitting a 'backless' presentation with a full three-hundred-and sixty degrees of visible bakelite from any viewing angle. Only the presence of the tuning-scale and the oddly protuberant knobs differentiates the front from the back.The set may then be placed on the centre of a table and still look reasonably attractive, which was doubtless the stylist's intention. In addition this is probably the best place for it since it's chunkier and bulkier than it looks in the pictures; it's actually heavier than, say, a Bush DAC 90, and, unlike the later FB 10 Toaster, it's not equipped with an obvious means of carrying it about. (For the record, the best purchase may be had by using the bottom-most louvres on each side of the cabinet). This model was styled by the same Lawrence Griffin who did the FB 10, which it faintly resembles, but the similarity is (thankfully) only skin-deep: the interior build-standard of the BM 20 is in the main noticeably superior to the Toaster's, offering a fully isolated chassis and a Bush-like constructional quality unheard of in later KB efforts.

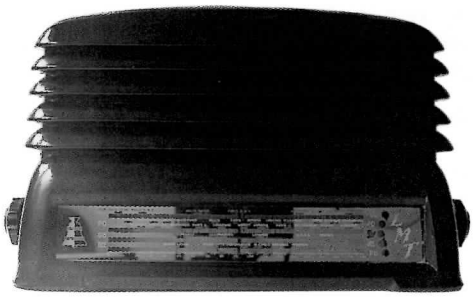
Going outside again and glancing at the dial, we observe that Radio Normandie is marked - at about 275 metres. This is rather baffling - the station in question had been off the air for a full seven years by the time the KB hit the shops. Curiously, it's not the only post-war set to include the popular pre-war commercial station on its dial; a number of GEC and Pye radios did too, and all at a wavelength different from that used in the thirties. Perhaps the setmakers thought that just mentioning the name would be good for business in the showrooms... or maybe the station itself was confidently planning a return that never actually happened!

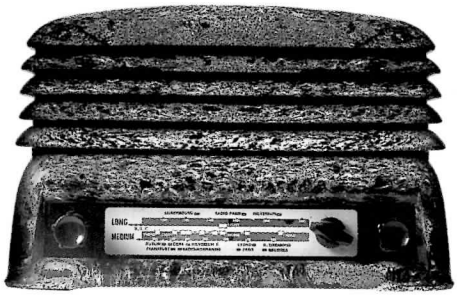
**Inside the Set**

Some bouquets before the inevitable brickbats: firstly, sincere top marks to KB for creating one of the most technician-friendly cabinet designs in post-war wireless. The two halves of the case come apart, sarcophagus-like, after undoing just two screws. There are no chassis fixing screws as such; the works are clamped in position by two vertical chassis outriggers which are pinched in a sandwich by the two cabinet halves. Thus, full dismantling of the set takes literally twenty seconds. Another boon - the knobs, speaker and tuning-scale all stay with the chassis during service work. Sonically, this is not too









*Top far left: A French 3 waveband variant by 'LMT' of the KB BM20 utilising exactly the same case but using a peach coloured mirrored dial and brown bakelite knobs. The cabinet is coloured in a tasteful mid green; aethsetically more succesfull a piece of design than its British counterpart*

*Left: The Dalek- a BM20 viewed sideways*

*Centre far left: Another French variant by 'LMT', this time with 5 wavebands and the knobs jutting out of the sides instead of the front, the dial is also mirrored, but versions with plastic dials have been sighted. LMT also produced versions of KB's 'Rhapsody' transistor portable*

*Bottom far left: A bright yellow BM20 with dramatic black marbling*

*Bottom left: A BM20 in a 'portafleck' bakelite cabinet containing flecks of no less than four different colours which are orange, white, dark blue and red.*

good - the speaker lacks a proper baffle - but front-end L.0. alignment is much more sure-fire; there are no worries-about parallax when setting cursor positions, since cursor and scale are never separated.

As touched on above, the build quality is better than one might expect from this make; the smaller components are mostly mounted on a single small neat tagstrip, and not soldered casually together in mid-air with no insulation on their leads. The wiring is the cloth-covered rubber variety. It had not perished much in the author's example, except in one very important place- the connections to the mains voltage selector sockets. These wires pass through the chassis and their jacketing was crumbling to the touch- very worrying, seeing that they had virtually the full mains voltage on them. (The problem was solved by stripping the old insulation back to the bare wire and slipping new sleeving on in its place). These wires feed the big, fully isolated mains transformer which lurks beneath the chassis. It has to go there, there's no room for it on deck! It's mostly this item that makes the set such a heavy boy, as well as generating a large 50 Hz mechanical vibration which is quite noticeable when handling the cabinet. (It will also be conveyed to any wooden surface on which the receiver might be placed - our display table recommended earlier will tend to act as a sort of sounding board for the hum.)

Rather more bizarrely, the single-tuned-second IF transformer also finds itself quartered below decks - it's mounted horizontally with its long sides parallel to, but beneath the chassis, again presumably, to save space above. An awkward consequence is that one has to remove the frame aerial to tweak this IFT's core. As a recompense, all other alignment adjustments are readily accessible.

### A Tour around the Circuit

The circuit itself uses three octal glass-tubular valves (6A8GT, 6B8GT, 6V6GT) in a reasonably effective superhet circuit with a surprise twist: the second valve is arranged as IF amp., detector **and** reflex first AF amp. Its screen-grid acting as 'triode' anode for the audio signal. A conventional 6X5G rectifier is fitted, and this manfully endures 200V HT between its cathode and earthed heater as only an old trouper can.

Starting from the front-end, a basic, rather small MW frame aerial is provided, apparently as something of an afterthought. It's placed oddly close to the vertical rear edge of the chassis, where signal pick-up is likely to be less than optimum, and its long spans of unsupported fine-gauge wire are vulnerable to accidental damage during dismantling. Despite all this, it functions tolerably well on MW, but on LW, it's partnered by that old cheapskate standby, a loading coil. The two work together about as efficiently as Laurel and Hardy trying to start a car, and, as a result, LW station-getting ability is feeble, to put it kindly. Radio 4 just about crawls in, but reception of any of the French stations depends heavily on the imagination of the listener. This circuit arrangement has always yielded inferior results against that of a pukka fully-wound LW frame aerial (as fitted to the aforementioned DAC 90) and, as a result, the KB struggles to get Droitwich, whilst for the Bush, Allouis is a breeze. There is little improvement either if a long-wire aerial is hopefully dabbed to the appropriate socket. This simply feeds a loosely-coupled auxiliary winding on the frame, which is way off resonance at long wave frequencies. If all this sounds rather gloomy then don't despair, there is yet hope for the BM 20, in the helpful form of a ferrite rod. We'll deal with this later in the article.



*continued on next page*

*Continued from previous page*

**Reflex Action**

Next, let's move on and feast our eyes on the wondrous reflex IF / AF / detector circuit, centering on V2. This electronic Jack-of-all-trades has the precarious fascination of a circus plate-spinner,dashing from rod to rod and just managing to keep the wobbling crocks from smashing on the floor. It seems the KB designers found themselves a tad short of audio gain with a conventional three-valve line-up, and had the wheeze of using the 6B8GT as an additional AF amp., by coupling back the detected audio to its grid for another tour of duty, and extracting an amplified AF output from its screen. This last is decoupled to deck (for intermediate frequencies only) by C14, with R7 acting as an anode load for this 'triode', and produces an extra voltage gain of about four times - worth having, but lower than would have been obtained with a standard additional triode. Also, the wheeze is not without hidden snags: the bias on V2, seen as an IF amp., is set not just by the ever-present AGC potential (as in a standard non-delayed receiver) but also by the detected audio, joggling the grid up and down hugely as the newsreader speaks. Since the valve is variable-mu, the positive-going IF modulated peaks will then receive less amplification than the negative going ones, Hence the final recovered signal will exhibit a degree of distortion. This may or may not be disagreeable to the listener - it largely depends on the programme material. Music seems to suffer rather badly, whilst speech gets off quite lightly. Things aren't exactly helped by the fact that V2 amplifies the full audio signal - the volume control is placed 'after' it, in contrast to other reflex sets, where it is placed 'before'.

Another strange divergence from normal practice is the decision to apply AGC to the reflex valve - again, many reflex sets preferred to dispense with IF AGC altogether, applying a control voltage merely to the FC valve. Not so the KB! The IF circuit is really something to see! If we apply a 'scope probe to V2's grid, we see what looks like a string of long, thin sausages, riding a spectacularly tall but very rickety roller-coaster. The tiny sausages are the modulated IF input, supplied from the frequency changer, and the roller-coaster is the enormous AF excursions, rickety because the whole structure moves massively up and down with AGC action as we tune in a powerful local signal, as well as changing shape continuously with the audio.

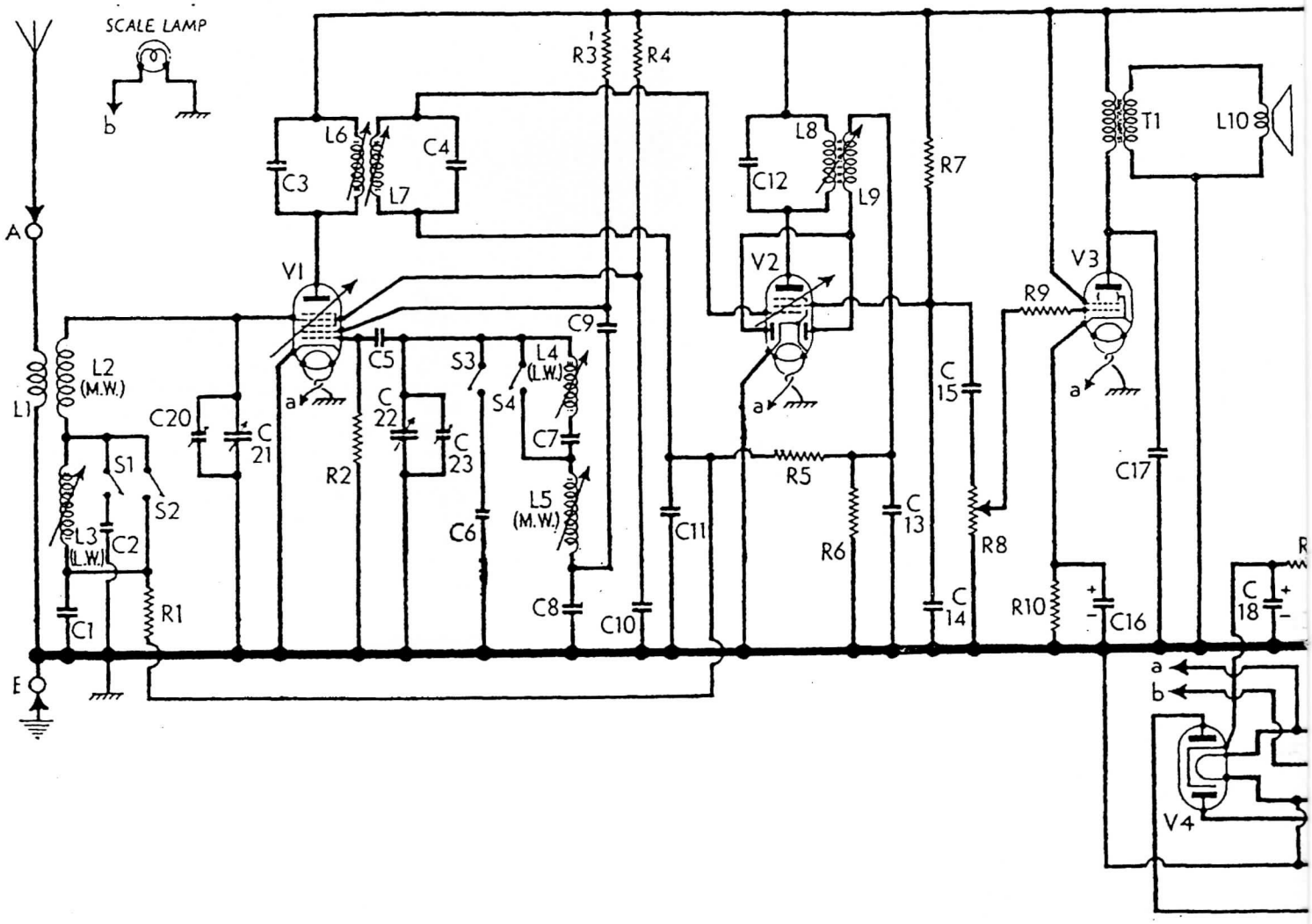
When the BM 20 is called upon to receive a heavily-modulated local signal, V2's AF grid swings will be large, but a large standing AGC potential will also be present on the grid, biassing the valve close to cut off, and possibly squashing one side of the sausages somewhat. As already noted, the resulting sound can be harsh. The KB is at its best (if that's not too strong a word) receiving medium-strength transmissions. In the final section we'll consider some modifications to correct this and other shortcomings, but first, let's look at likely problem areas in the stock circuit.

**Faults Encountered.**

A pleasant consequence of the set's simplicity is the resulting small number of those nasty old wax-paper capacitors that need be changed - just four, in fact, - Cl, 10 and 15, plus the tone-corrector C17, which you'll find is responsible for depriving you of a goodly amount of (rather mangled) treble. If you carry out the mods I suggest later on, you should find the KB will sound acceptable with this component simply removed,

As discussed earlier, it's important to ensure that all rubber-and-cloth covered wiring is sound, especially where it's at mains or HT potential. Perversely enough, these are often the very wires on which the rubber perishes first, whilst the insulation on audio or low-voltage leads endures. Something to do with the dyes used to colour the cloth coverings, perhaps, or maybe some effect to do with powerful electric fields. Who can say?

One peculiarity of the circuit is that efficient detection seems to make big demands on the emission of the 6B8GT's diodes. Two examples of this valve were tried in the author's receiver, both produced weak, distorted or non-existent results when the set was tuned to a distant station - the sort of symptoms you get on a fifties radio when the diodes of an EABC80 or EBF89 are feeling very tired - see 'Notes on Piano Keys' in Vol. 20 No.4. in this case however, the diode sections of the valves tested OK, but the fault could nonetheless be cleared by shunting one



of those new-fangled 0A81 wire-ended thingummys - Westectors by any other name, really - across the valve diode. Normal, undistorted reception then returned, and several more distant stations were heard for the first time.

**Modifications**
**(a) The Aerial Circuit**

As we have already seen, the KB's LW aerial arrangements - the frame aerial with added series loading coil - are best regarded as a dead loss. But, as with many unfortunate cheap sets that used this configuration, substantial improvements can be made by abandoning it in favour of a LW ferrite rod, possibly salvaged from a scrap set. The frame aerial is then kept for MW reception only. Despite the fact that the set will no longer be fully original, this is nonetheless a quick and attractive solution; the wide variations of inductance obtainable by sliding the coil along the rod mean that, with a simple parallel trimmer, the set can likely be rapidly aligned, with good three-point tracking, using any standard LW rod and coil from the junk box. Make sure it **is** a LW coil though - it'll be the bigger of the two coils on a normal rod - and that you're extracting the signal from the whole winding, not from some low-impedance tapping intended to feed the base of a transistor. Yes, I **know** a ferrite rod is an anachronism for a set like this - though not much of one; the Decca Decette of 1953 had one, as did some even earlier American battery portables, if memory serves.

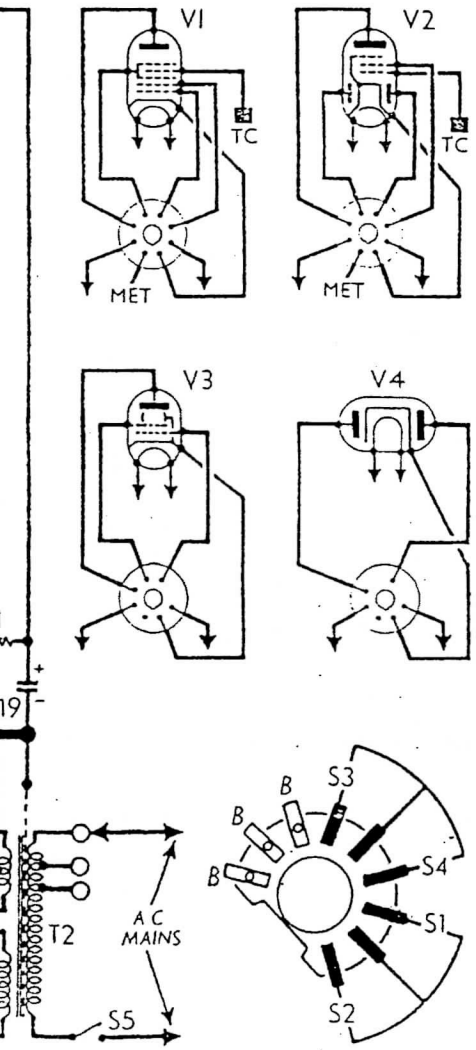
Those intent on a purist approach to the subject might like to try winding their very own frame aerial. This is not as easy as it might look. The usual technique, as used on the DAC 90, was to retain the MW frame winding and to switch in a LW frame coil in series with it. The two are then resonated with the gang condenser and appropriate parallel trimmers. Unfortunately, the inductance of the coils cannot be easily adjusted, other than by adding or subtracting turns, an action which also changes the all important self-capacitance of the windings. This is also affected by the way in which the layers of the winding are placed relative to each other. Because of this interdependence between inductance and capacitance, it is very unlikely that you'll chance upon the correct number of turns by trial and-error adjustments, unlike the ferrite rod, where you can change the inductance without changing the capacitance. Additionally, the KB does not take too kindly to the retention of the MW coil in series with that intended for LW. and tends to receive phoney image frequencies of MW transmissions just when you think you're finally successfully pulling in Radio Monte Carlo! In the author's experiments with this set, it was impossible, with a home made frame aerial, to get good tracking across the band whilst maintaining good overall signal pickup and freedom from images or whistles.

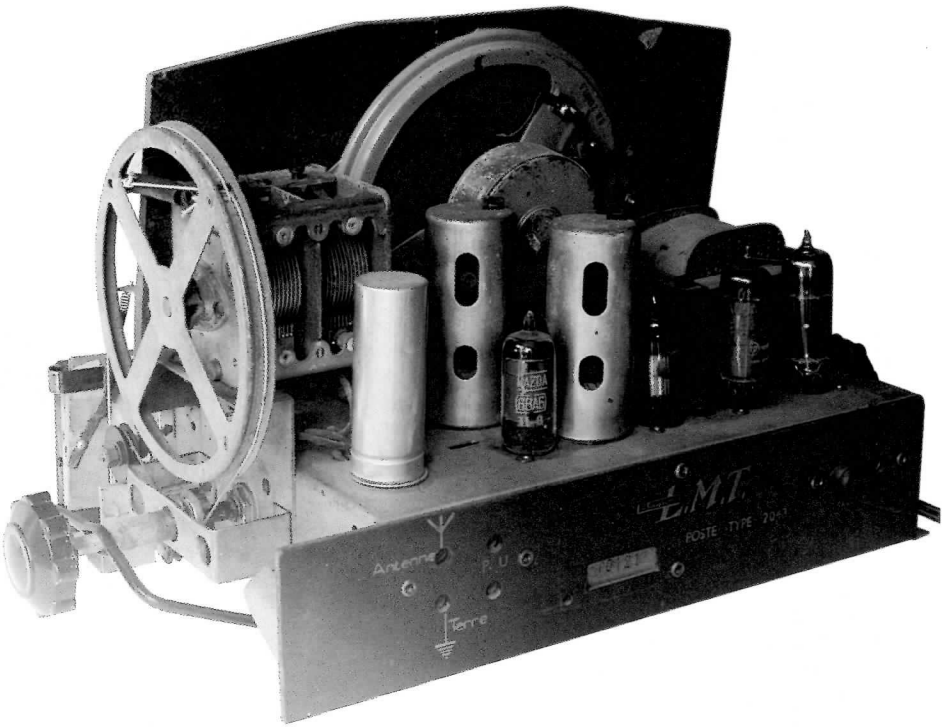
Even when the beautifully wound circular aerial -from a DAC 90 (together with the right value attendant trimmer capacitors) was temporarily fed to the BM 20 it still received images and showed classic mistracking symptoms. Since this aerial works fine in the Bush, the symptoms suggest that the shaping of the gang condenser plates might differ between the two sets. At this point, the author gave up, and took the easy way out with the ferrite rod discussed above. Perhaps a knowledgeable reader can shed some light on the subject.

**(b) The Reflex Stage**

Finally, as promised, let's look at some measures to prevent the squashing of the sausages mentioned earlier. The modifications shown in the diagram in the next Bulletin may help. By moving the volume control 'before' V2 AF 'triode' the audio grid swings are much reduced, (unless, of course, you plan to use the KB at maximum volume all the time, which I wouldn't advise) and loud local stations start sounding rather more civilised. These circuit changes ensure that the 6B8GT still receives its full whack of AGC potential, whilst the volume control now sets a lesser amount of AF swing at its grid. The amplified audio is extracted, as before, from the screen, via C15, and developed across an added fixed 470k grid-leak resistor for the output valve.

■




*Left: The circuit of the KB BM20*

*Above: The chassis of the LMT 2043- a French BM20 equivalent externally, but inside a different matter altogether*

# Plastics

*by David Read. Objects photographed by Mark Groep*

*Fig 1*

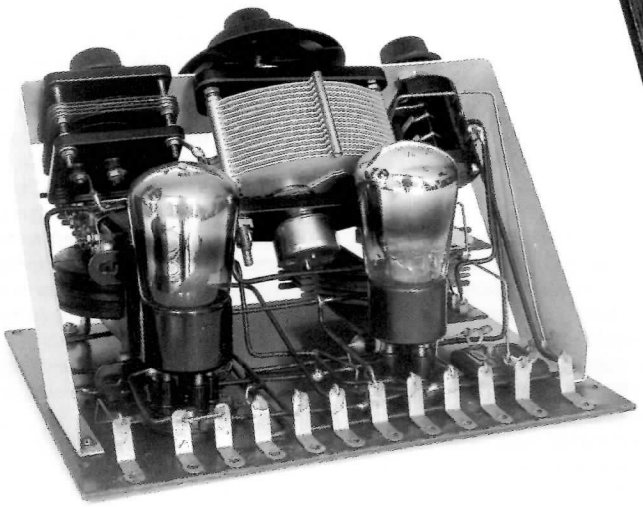


*Fig 2*

*Fig 3*

The way Americans speak English is a subject for friendly debate - certainly it is frequently said that we are divided by a common language. Today nouns are being used as verbs; for instance the noun rubbish as in 'let's rubbish his argument'. A particularly abrasive example is, 'he was burglarised', especially unnecessary as the verb to burgle is already available.

It was in this way that American businessmen developing and selling new materials after the 1914-18 war seized the adjective plastic used to describe the characteristics of these materials and applied it as a noun, both to the materials and the articles fabricated from them. Thus the resins and materials capable of being softened and shaped, i.e. rendered plastic, prior to hardening came to be called plastic, as did the finished products.

**Hardened Rubber**. As far as radios are concerned, the earliest important material with plastic properties was rubber which, when vulcanised (hardened by mixing with sulphur and heating) became the first thermosetting plastic material; ideal for moulding and machining into insulators, knobs and panels for electrical instrument and laboratory applications. Complete wireless cabinets were lmade later as in the Brownie Wireless Co. range, the Cosmos crystal set and the 3 valve 'cruet' sets.

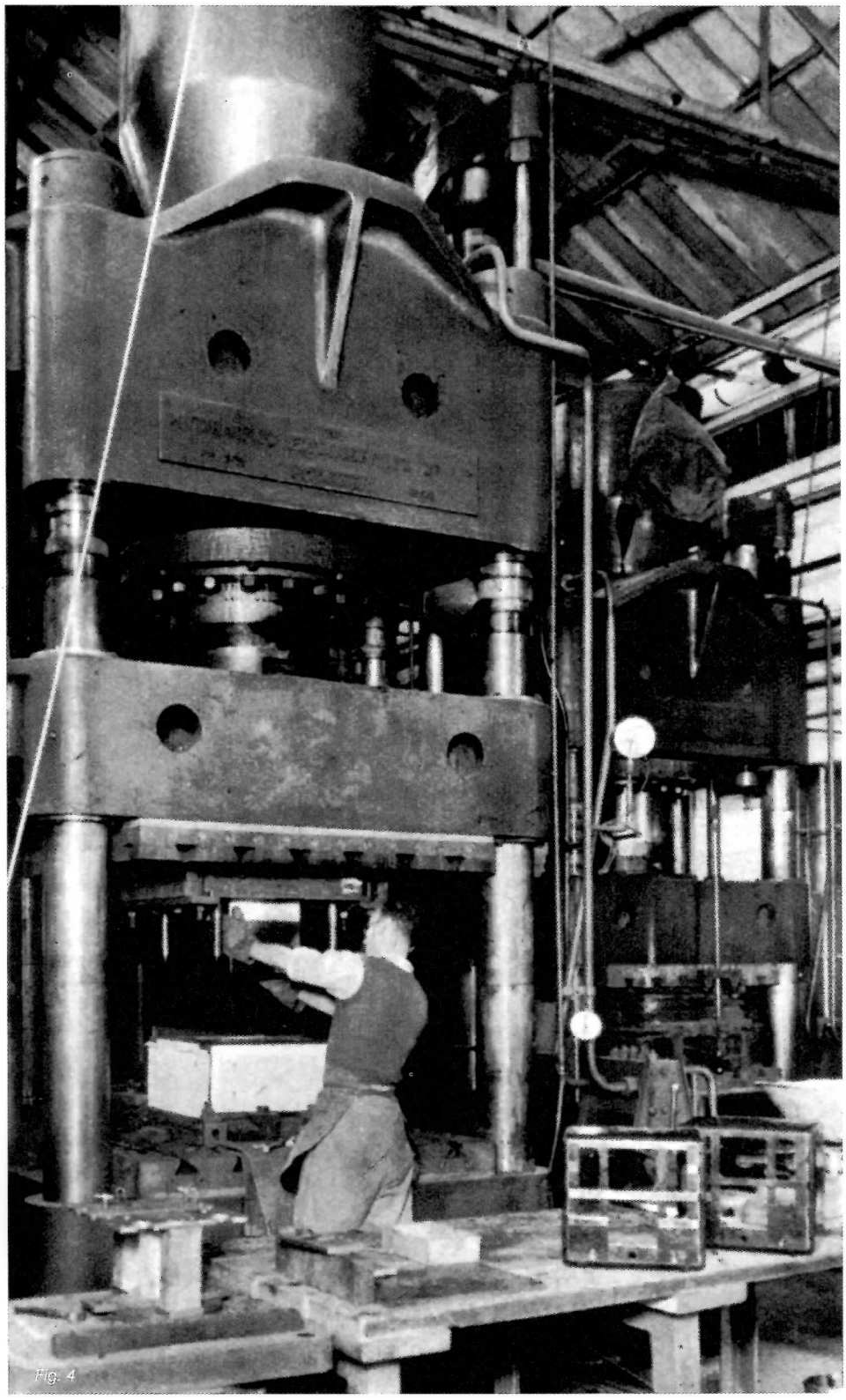
This material known as 'hard rubber' in the USA predated the growth of the semi synthetic plastics industry and was never known by the noun plastic. Strictly speaking however, this division in terminology is artificial and many books on plastic include it.

**Cellulose Plastics.** The first phase of the modern plastics industry was based on Parkesine, the invention of the English chemist Alexander Parkes. It was made by plasticising cellulose nitrate with alcohol and camphor and was exhibited at the Great Exhibition in Hyde Park in 1862. Parkes was essentially a materials technologist and inventor with patents in many areas including vulcanisation and metallurgy. His commercial abilities were less well developed and the product and its manufacturing processes were perfected in the USA and became known the world over as Celluloid, the trade name of the (then) Celluloid Manufacturing Co. Parkes successors in England failed to secure exclusive patent rights since Parkes was judged 'the first and true inventor of the process'. Without restrictions to use Parkes' processes, the Celluloid Manufacturing Co. went on to world-wide success, eventually becoming part of the Celanese Corporation. In England Parkes successor, Daniel Spills British Xylonite Co. manufactured the same product under the trade names of Xylonite and Ivoride.

As far as radios were concerned the early uses included accumulator cases, name plates, Ivoride tuning scales, separators for variable condensers and so on. In volume terms wireless applications were minute compared with, for instance, combs, plastic cuffs and collars, and of course the film used for moving pictures. Nevertheless some novel and attractive items were made for the Wireless trade and figure 7 shows the Magnora, a miniature horn speaker in imitation tortoiseshell only 3.5 inches high and advertised in 1923 as the smallest loudspeaker in the world.

Cellulose nitrate plastics are part of a group called thermoplastics. They can be reshaped and moulded using heat time and time again. They are fragile, easily deformed, unstable and worse, are highly flammable. A later development, cellulose acetate plastic was first made as aeroplane dope during the 1914-18 war and later made for moulding and spinning as yarn for textiles (Rayon). In its moulded form it was used for a few radios such as the Sentinel shown in figure 11 and the Automatic shown in my article on Personal Portables in Bulletin 20/1. The major use for cellulose acetate plastics was as a non-flammable substitute for products formerly made in cellulose nitrate, for instance toys and motion picture film.

**Phenolic Plastics.** The plastics so far mentioned have been rubber based or semi synthetic. The arrival of phenolics based on fully synthetic phenol-formaldehyde resins, enabled a crucial difference in technology and the characteristics of the material, that transformed the range of plastic products and their utility. I am of course now dealing with Bakelite and most collectors devoted to Bakelite radios will know that it was 'invented' by Leo Baekeland, a Belgian born chemist working in the USA. The crucial difference referred to above is the thermosetting property of this class of plastic which once heat-set could not be softened and remoulded or dissolved in certain solvents, as was possible with the thermoplastic class.



The possibilities and properties of the synthetic resins was initiated by the research work of Adolf von Baeyer at Strasbourg University with the reaction of phenols (carbolic acids) with aldehydes in around 1872. The materials were expensive, unobtainable in bulk, and further development had to wait for the coal-tar industry to produce phenol and chemical engineers to produce urea and formaldehyde in quantity. Formaldehyde is one of the few aldehydes which in combination with phenol yields thermosetting resins, and various people turned again to Baeyer's earlier research. Academic chemists looking for pure crystalline substances found the results of combining phenol and formaldehyde hard to control, messy, and not capable of purification. A different, more experimental, less academic, turn of mind was needed. One's thoughts turn inevitably to Marconi and the similarities which prevailed in the entirely different field of wireless telegraphy. To paraphrase Tony Constables definitive account in 'The birth pains of radio' in Bulletin 20/2: 'Technologies often have a prehistory when it is possible to say when a process began and when it progressed until the full realisation of its potential'. Baekland's predecessors represent the prototechnology, but before him there was no viable phenolic-resin technology. Like Marconi, he added some pieces, rearranged others, and like Marconi experimented in a laboratory built in his own house with commercial possibilities in mind. By experimenting in his home laboratory, Baekeland found that he could control the reaction between phenol and formaldehyde so as to produce a resin in powder form, which could then be moulded into shape by the application of heat and pressure. He had given birth to the first synthetic plastic. From 1908 patents were granted, known as 'the compression and heat patents' which safeguarded him while he developed the industrial processes and

*Fig 1: The Dr Nesper plastic cone speaker*

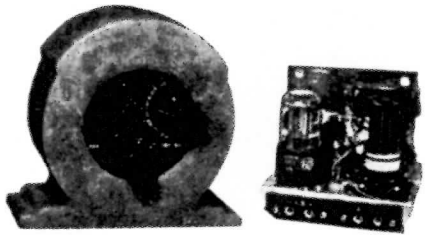
*Fig 2: Pye 232- 1929 chassis made out of Paxolin (laminated phenolic plastic)*

*Fig 3: Dominion 3. The Brownie Wireless Co. was one of the first to manufacture complete wireless cabinets in plastic materials. The hardened rubber Brownie No 2 crystal set was introduced in 1925 and the Dominion moulded Bakelite panel exploiting both decorative and consructional attributes in 1928.*

*Fig 4: The bakelite moulding press of De la Rue Ltd. manufacturing cabinets for Ever Ready.*

*Fig 5: Catalin UK Ltd made many objects in the United Kingdom. However, this country did not seem to favour coloured radios as Ekco quickly discovered. The closest that Britain ever got to a catalin wireless cabinet- the 'mini twin' kit-set. You are probably more familiar with this cabinet on speakers, which came with a control unit also made of catalin in a wide variety of colours and patterns.*

**"MINI-TWIN" 1-VALVE BATTERY SET**



A design of a simple 1-valve 2-stage Battery Receiver, giving excellent results on medium and long wavebands and having exceptionally low battery consumption.
Drilled chassis and practical diagrams make it the ideal set for the beginner to build.
The complete chassis, including valve, can be built for **37/6** plus 8/11 P/Tax, the attractive plastic case is **9/6**, and suitable headphones **14/9**.
The complete assembly instructions, layouts and a component price list, are available for **1/6**.
This Receiver also performs excellently, without modification, as a tuning unit, and in addition, with simple modifications for which a complete diagram is provided makes a first-class pre-amplifier for pick-up or microphone.

*Fig. 5*

*text continues on page 22*

Fig 6

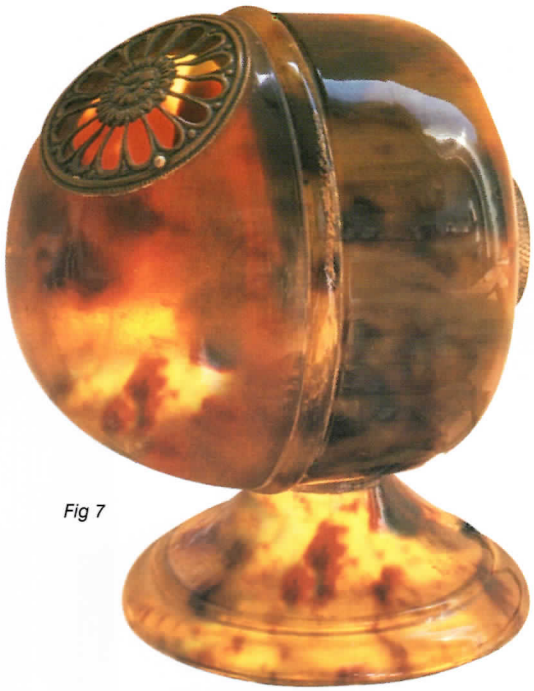



Fig 7


Fig 8


Fig 9

*Fig 6: Champion Venus- introduced in 1947 and constructed out of Perspex. Fig 7: Magnora speaker- 1923. Actual size. Figure 8: A control unit for the 'Solar beam' sun- ray lamp utilising a cabinet identical to the cabinet in figure 9- manufactured in 'Catalin'. Fig 9: Crosley G1465: 1938- An example of the plastic 'Catalin'. Originally this set would have been white and tortoiseshell but white catalin tends to go yellow over the years. Figure 10: Adey 4 valve wireless chassis in Bakelite. Interior moulded to hold components in place. Ebonite patent key provides reaction control, tapped anode and on / off jack switch all in one component. Figure 11: Sentinel personal*


Fig 10

Fig 11


Fig 12

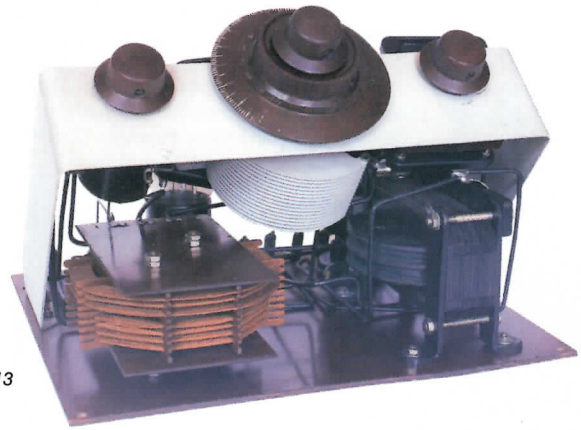


Fig 13

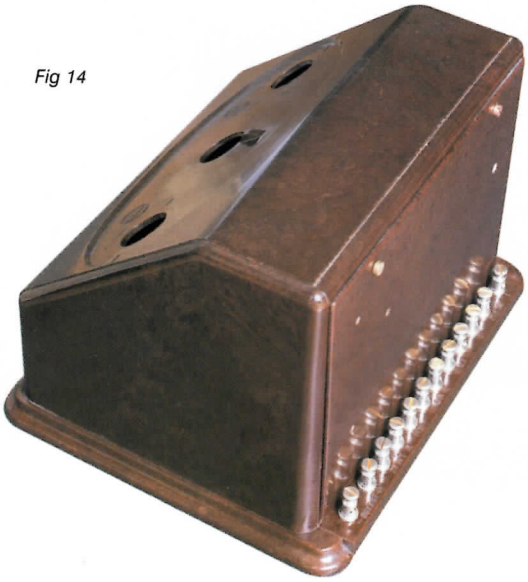


Fig 14

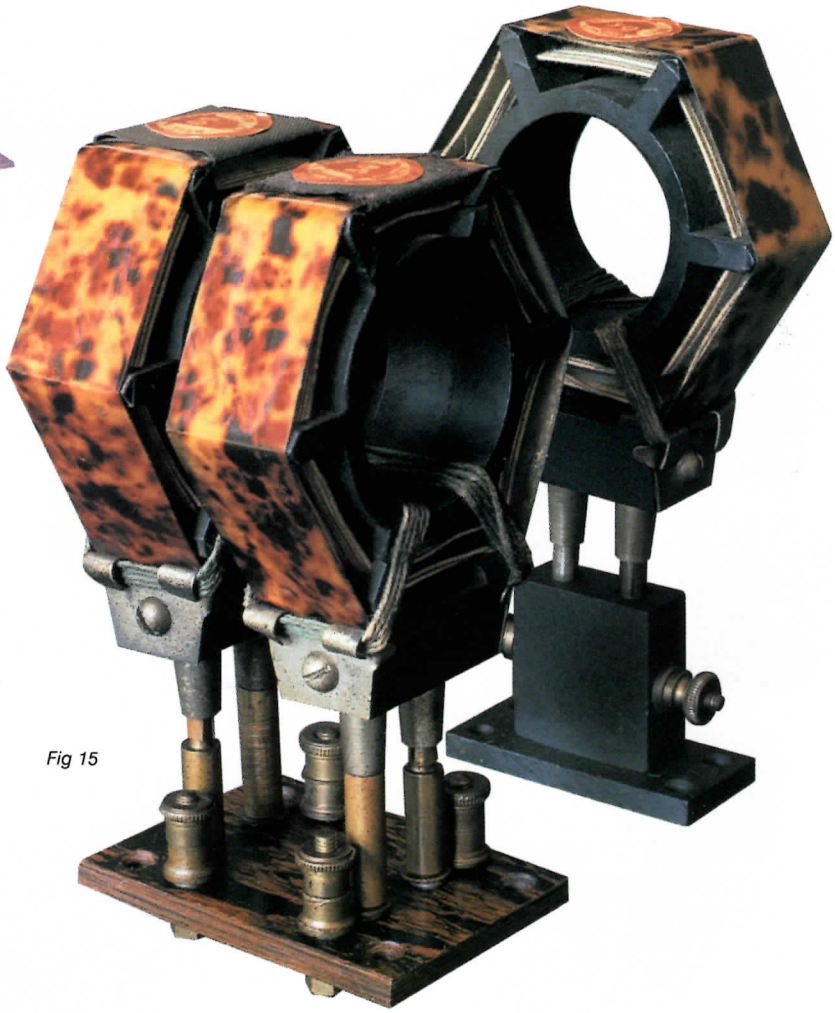
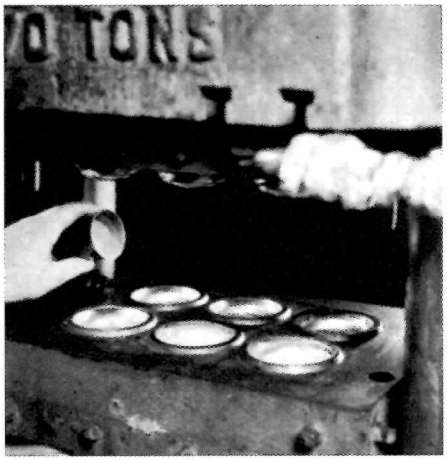
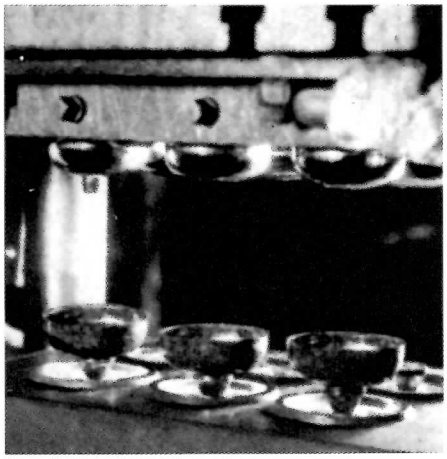


Fig 15

*portable- an example of the use of Cellulose Acetate. Figure 12: BTH Bakelite moving iron cone speaker- 1928. Figures 13 and 14: Pye 232: introduced in 1929 to replace the 222, it was one of the first complete wireless cabinets in Bakelite. The interior view shows Paxolin (laminated phenolic plastic) chassis and coil former. The on/off switch and reaction condenser are constructed in Bakelite. Figure 15: Typical plug- in coils of the early 1920's by Edison Bell. Hardened rubber, celluloid and mottled bakelite.*





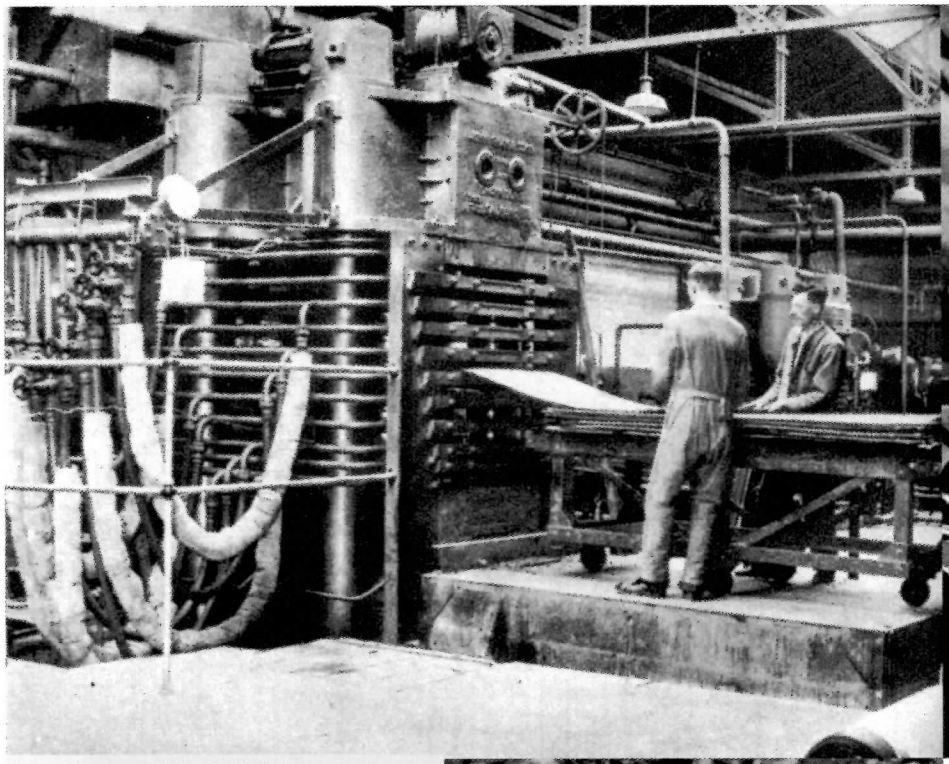


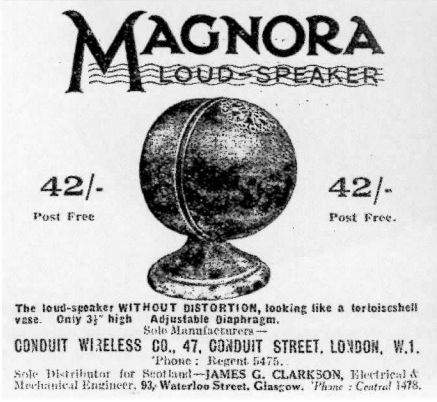
*Pictures above showing the different stages in the moulding of Bakelite: Firstly powder is poured into the mould, followed by the press about to close onto the powder, and finally the finished mouldings resting on ejector pins.*

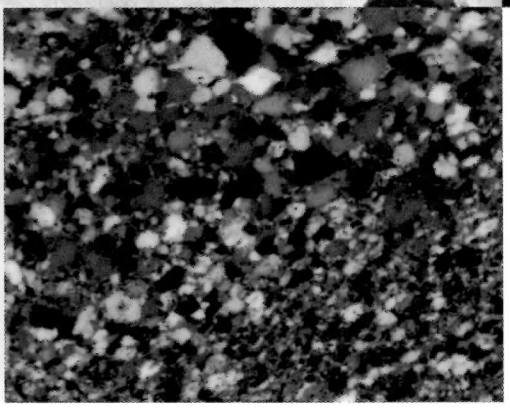
marketed Bakelite which he described as 'the material with a thousand uses'.

Electrical insulation was the first application for phenolic resin through its use in laminates (Westinghouse was his first customer in 1909). Phenolic mouldings became important from the 1920s and can be closely linked to the rising motor, electrical components and wireless industries. The colours are limited, usually to dark shades of brown, red and black due to the fillers used. The spectacular Colonial New World Globe radio of 1933 is shown on the back cover. Collectors are only too familiar with the controversy concerning round Ekcos in more exotic colours. Phenolic resin, in its cast, rather than moulded form did not use fillers, enabling clear translucent colours. Catalin, the trade name of the Catalin Corporation in USA and Catalin Ltd in the UK is the best known or most frequently used generic term used for this variety of phenolic resin. In the USA in the 1930s several manufacturers made radios of this attractive, though unstable, material which now forms a very strong niche in the collector's market.

**Amino Plastics.** In the mid 1920s thiourea and urea were used as a substitute for phenol in the reaction with formaldehyde to produce a light coloured moulding powder. These were followed by Melamine formaldehyde to provide a range of clear hygienic thermosetting plastics in moulded and laminated form. Trade names included Beetleware, Melamine, Plaskon, Makelot,





*Upper left: Bakelite laminated sheets being manufactured under tremendous heat and pressure*

*Above: The slicing of celluloid from a solid block*

*Far left: Advertisement for the tiny magnora loudspeaker (as illustrated on page 20); it was made in celluloid and consequently doesn't survive too well*

*Left: An example of 'Speckletone' bakelite, which was used on wireless cabinets occasionally after the Second World War. The pattern was made by adding granules of bakelite to the press instead of powder as in most cases.*

Formica, Bakelite and Warerite. The white Bush DAC 90 has a cabinet of urea formaldehyde, and it is the material for the white panel of the Vidor Personal shown on the cover of Bulletin 20/1.

**Ethenoid Plastics.** In the early 1880s it was found that substances derived from acrylic acid would form polymers when subjected to heat and pressure. By the late 1920s a clear plastic had been produced that was tough and did not shatter like glass. By 1930 factory production had started to supply the market for the windshields and cockpit covers of aircraft. These plastics known as acrylics are marketed under trade names of which the best known are Perspex in the UK and Plexiglass in the USA. It was not widely used for radios except in certain parts such as dial windows. The Champion Venus of 1947 illustrated in the centre spread is unusual in that the entire structure of globe and feet is manufactured from Perspex.

**Summary**

I feel an inevitable sense of frustration when I hear someone say 'it's only plastic'. Today, plastic is fundamental to electronics, mechanical engineering, yarns, ropes and clothing, paints, adhesives and fabrications of every sort from the everyday household objects such as radios (virtually all are now in ABS plastic) to boats and car bodies.

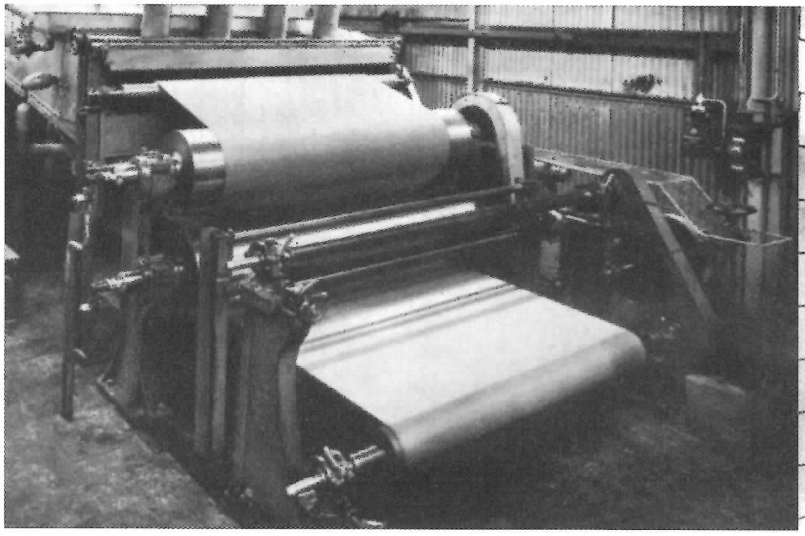
Like it or not, it represents a group of technology milestones fundamental to the 20th century. In all its varieties it is one of the most widely used of all materials and has literally changed the way we live in the developed world.

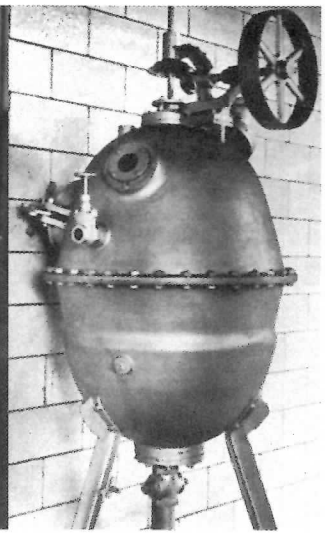
To conclude this brief article I should mention that whilst the interest of collectors and indeed most people is in the decorative aspect of plastics, the constructional and mechanical opportunities presented when these materials were new is every bit as interesting. This point is illustrated by several of the centre spread photographs. The table below shows some principle plastics classified by type and trade name.

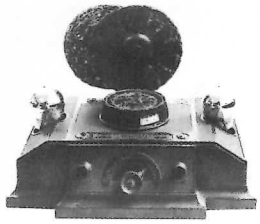
## Table of Plastics

| Class | Characteristic Ingredients | Names |
|---|---|---|
| **1. Rubber based 'plastic'** | | |
| Rubber<br>Thermoplastic and thermoset | Natural latex: sulphur | Hardened rubber<br>Vulcanite<br>Ebonite |
| **2. Some semi-synthetic and synthetic plastics** | | |
| Cellulose plastics<br>Thermoplastic | Cellulose nitrate<br>Cellulose acetate | Celluloid<br>Xylonite<br>Ivoride<br>Cellomold<br>Bexoid |
| Phenolic plastics and resins<br>Thermoset | Phenol: Formaldehyde | Bakelite<br>Catalin<br>Tufnol<br>Formica<br>Micarta<br>Paxolin |
| Amino-plastics<br>Thermoset | Urea: Formaldehyde | Beetle<br>Melamine<br>Bakelite |
| Ethenoid plastics (acrylic)<br>Thermoplastic | Ethylene<br>Methyl Methacrylate | Alkathene<br>Perspex<br>Plexiglass<br>Lucite |

*This table shows by class, ingredients, and names the major plastics used by the wireless industry from its beginning up to about 1950. However, it is not exhaustive and lovers of casein will not find it mentioned! It is appropriate to include hardened rubber because of its various degrees of elasticity, rigidity, thermoplastic and thermosetting qualities which predated the semi synthetic and synthetic industry, but most importantly because it was a major material with plastic properties in the early days of wireless. For purists it is worth pointing out it is technically plastic in character and was described as such (including by Leo Baekeland) before the modern industry developed and the word change from an adjective to a noun. After about 1950 the complexity of the most modern plastics and the differences between them defeat the amateur such as myself. Today, most radios are made in ABS which is I believe a type of synthetic rubberised polystyrene. So rubber has come full circle!*







*Above: Brownie 2 valve set- a fine example of the use of hardened rubber*

*Far left: An impregnating machine used in the manufacture of Bakelite laminated sheets*

*Left: The reactor originally used by Doctor Leo Baekeland in 1908 to produce the first ever batch of phenolic resin. It was in use well into the 1950's*

# Ferdinand Braun, pioneer of wireless telegraphy

*by A.R.Constable*

In 1909 the Nobel Prize in Physics was awarded jointly to Marconi and Ferdinand Braun (Fig.1). This was the first time that the prize was awarded for a practical achievement in technology rather than for an advance in fundamental physics. Marconi himself was not a physicist but Ferdinand Braun was and his contributions to fundamental physics were considerable. His interests were wide and included thermodynamics, gas discharge, X-Rays and electrical pyrometry. But his participation in the prize was specifically for his practical achievements in wireless telegraphy.

Neither man was surprised on being awarded the prize but, according to Degna Marconi (1), each was surprised at the other's participation.

At the end of the 20th century it is easy to see the significance of two of Ferdinand Braun's most outstanding contributions to the field of radio communication. He discovered the rectification properties of metal sulphides as far back as 1874 (2) and so prepared the ground for the eventual appearance of crystal detectors early in the next century. He was also the first to use cathode rays for observing and measuring oscillating voltages and so produced the world's first cathode ray oscilloscope (3,4). These two achievements alone, one might say, were well worth a Nobel Prize in Physics - but not in 1909. They, the solid state diode and the oscilloscope, were the germ innovations which, over a century later, constitute the most basic technological ingredients of modern electronics and computer technology.

But neither of these singular achievements were cited when Braun was awarded the Nobel Prize in 1909.

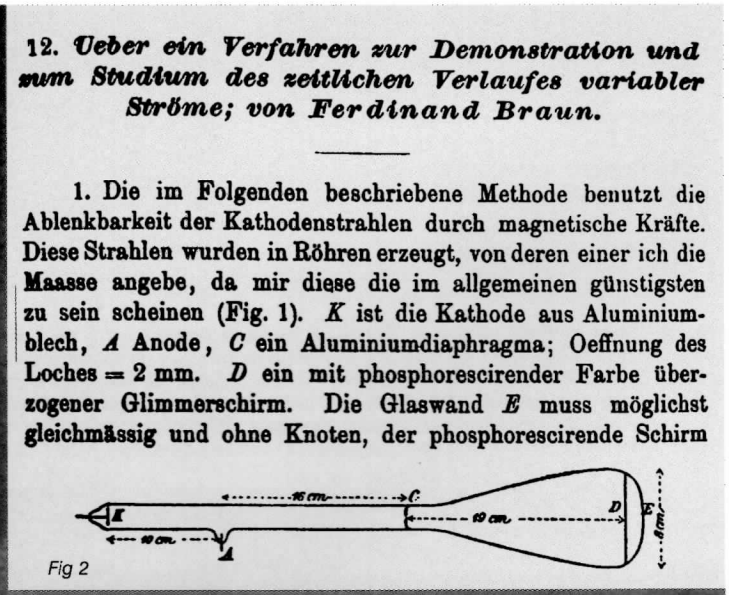
Braun (pronounced Brown, please, not Brawn!) was born in Fulda, Germany, in 1850 and studied at Marburg and Berlin where he took his doctorate in 1872 and was assistant to Professor Quincke for a short period in Würzburg. In 1874, at the age of 24, he became a probationary assistant school teacher in Leipzig where he taught twenty hours of science and mathematics each week. But he actively pursued his scientific work and completed his very thorough measurements on the conductivity through metal sulphides and published his results from Leipzig in 1874 (2). In this seminal paper, Braun showed for the first time how the conductivity of metal sulphides depended on the strength and direction of the current. Much of his success came from his choice of electrodes: a silver loop on one side of the specimen and a crimped silver wire point contact on the other. This paper is extremely thorough and deserves a prominent place in the history of the physics and technology of solid state devices. One of the sulphides he investigated was lead sulphide which crystal set enthusiasts refer to as galena. Thus the galena crystal detector complete with cat's whisker emerged in Braun's laboratory over thirty years before it made its debut as a practical radio wave detector in 1906.

Braun was appointed professor of theoretical physics successively at Marburg in 1876, Strasbourg in 1880 and Karlsruhe in 1883. He moved from Karlsruhe to Tübingen in 1885 and the Karlsruhe vacancy was filled by Heinrich Hertz. I wonder if Braun was responsible for placing the Knockenhauer spirals in the Physics cabinet at Karisruhe which, in 1886, set Hertz off on his great experiments? From Tubingen Braun was awarded the prestigious chair in Physics at Strasbourg (then in Germany) in 1895 where he did most of his work on wireless telegraphy.

After Roentgen's discovery of X-Rays in late 1895, this field became the subject of intensive research in most physics laboratories, Braun's included. But Braun did not let the 'X-Ray fever' affect his interests in other fields. His physics department had the great advantage of being wired up with an alternating current supply - a rare luxury at the time. The cathode rays in a discharge tube had long been observed and experimented with, but Braun decided to *use* them for investigating the wave form of his AC supply.

Early in 1897 he designed a cathode ray tube with a standard cold cathode, a side anode and a pierced diaphragm to form a narrow beam of cathode rays. He opened out the end of the tube into a conical flare and inserted a mica disc coated with zinc silicate to act as a fluorescent screen (Figs.2 & 3). He pumped out the tube, applied a

Fig 1



**12. *Ueber ein Verfahren zur Demonstration und zum Studium des zeitlichen Verlaufes variabler Ströme; von Ferdinand Braun.***

**1. Die im Folgenden beschriebene Methode benutzt die Ablenkbarkeit der Kathodenstrahlen durch magnetische Kräfte. Diese Strahlen wurden in Röhren erzeugt, von deren einer ich die Maasse angebe, da mir diese die im allgemeinen günstigsten zu sein scheinen (Fig. 1). *K* ist die Kathode aus Aluminiumblech, *A* Anode, *C* ein Aluminiumdiaphragma; Oeffnung des Loches = 2 mm. *D* ein mit phosphorescirender Farbe überzogener Glimmerschirm. Die Glaswand *E* muss möglichst gleichmässig und ohne Knoten, der phosphorescirende Schirm**




Fig 2

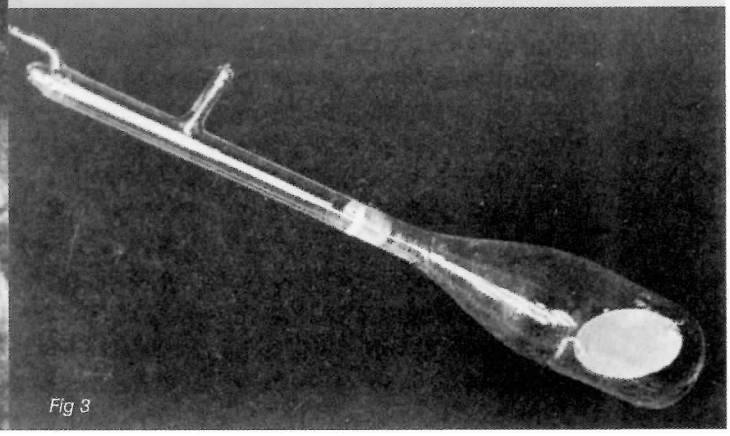


Fig 3

high voltage between cathode and anode and observed the expected luminous spot on the mica disc. He placed a solenoid with its axis at right angles to the tube axis which carried the 25 Hz (later 50 Hz) current from the laboratory AC supply. This caused the spot to stretch out into a vertical line on the zinc silicate screen. Viewing this line with a rotating mirror he observed the waveform of the supply voltage. Thus, in February 1897, the oscilloscope was born (3). The cathode ray tube is still sometimes referred to in Germany as 'Die Braunsche Röhre' and how right to so preserve Braun's name in association with such an important device. In his 1897 paper, Braun described his use of a second deflection solenoid mounted at right angles to the first to produce Lissajous' figures and he inserted an iron core in one of the coils to produce an elliptical figure to demonstrate the phase change the iron had brought about.

Braun's first CRT was one of the lesser sensations of the British Association meeting in Toronto in 1897 (5). The new device was by no means hailed as an important breakthrough and it took many years to assume its eventual pre-eminent role in electrical instrumentation. One of Braun's students, Jonathan Zenneck, improved the Braunsche Röhre by replacing the original side anode with a pierced anode as well as with further discs for concentrating the cathode ray beam. He also used, in 1899, an electromechanical device, a rotating potentiometer, to introduce a saw-tooth waveform for the horizontal deflection. The internal X and Y-deflection plates did not make their true appearance until the work of Roschansky in 1911 (6) but J.J.Thompson introduced deflection plates into a similar tube for his great experiment on the ratio of charge to mass of the electron in 1897 (7). A satisfactory hot filament did not replace the cold cathode until after about 1904, but the two forms of electron production coexisted for a considerable time. Thus, before the turn of the 19th century, most of the essential features were in place for one of the 20th century's most important technologies. And now, a hundred years later, the same device has developed into the sophisticated, ubiquitous colour TV tube and VDU screen found in every corner of the world. When will the Braunsche Röhre be finally displaced by flat screen technology?

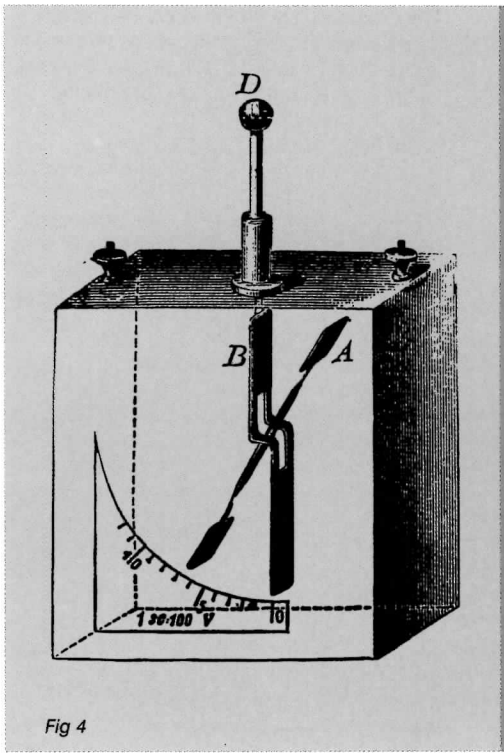


Fig 4

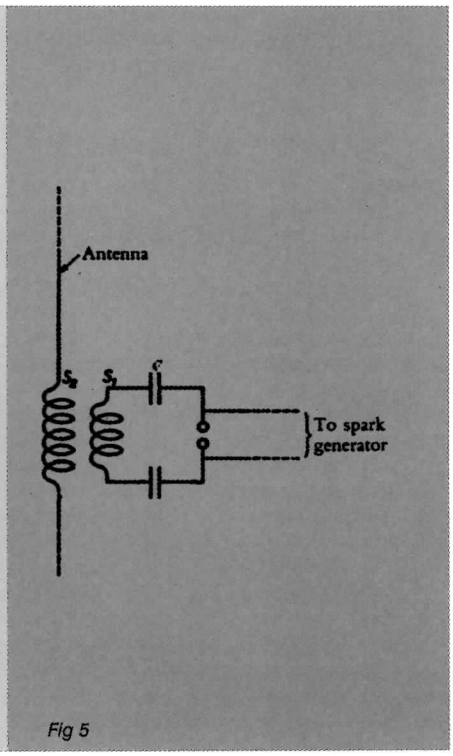


Fig 5

Among Braun's other electrical achievements, it should be mentioned that he developed a sophisticated practical electrometer (Fig. 4) out of the old gold-leaf electroscope. This became a properly calibrated instrument for use by scientists and engineers and three versions were manufactured with ranges of 1500, 4000 and 10000 volts (8). He and his group at Strasbourg took a great interest in high frequency measurement which prompted engineers at Siemens & Halske to produce one of the earliest commercial wavemeters - the Dönitz wavemeter. He also worked on long wave transmission through water and phased array directional transmissions. He, together with his students, William Varley and Hermann Brandes, also experimented with fine particle iron cores which eventually became iron filings compacted in glass tubes filled with vaseline oil. Thus, he anticipated ferrite cores in about 1902 (9).

But none of these notable achievements were cited when Ferdinand Braun was jointly awarded the Nobel Prize in 1909. Braun himself referred to the rectifier and oscilloscope in his Nobel Lecture (10) but only because he had made use of both during his quantitative investigations of oscillatory circuits. With the oscilloscope he had measured high frequency waveforms up to 100 kHz and had observed the hysteresis and measured the permeability of iron at frequencies up to 130 kHz. He described his and Emil Cohn's use of non-Ohmic materials, the valve- action of which allowed him to separate the positive and negative portions of oscillating voltages up to 25 kHz. He even began using his rectifier as a detector of Hertzian waves in 1898 - though he saw no clear advantage at the time over the coherer.

The Nobel Prize was awarded to both Marconi and Braun: 'In recognition of their contributions to the development of wireless telegraphy'. In the presentation speech on 11 December 1909, Hans Hildebrand, the President of the Royal Swedish Academy of Sciences referred to the weak points of Marconi's original system and said, "It is due above all to the inspired work of Prof. Ferdinand Braun that this unsatisfactory state of affairs was overcome". He then referred to Braun's modifications to reduce the heavy damping of the Marconi transmitter, and to

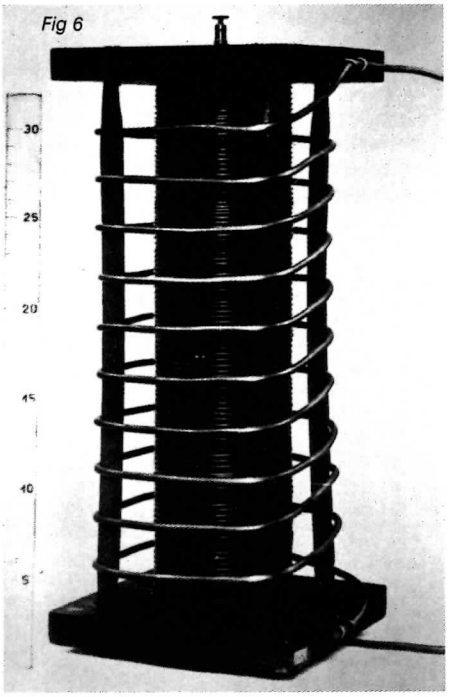


Fig 6

*Fig 1. Ferdinand Braun in 1886 at the age 36 while at Tübingen.*

*Fig 2. The description of Braun's cathode ray tube from his 1897 paper.*

*Fig 3. One of Braun's tubes showing an angled fluorescent screen now at the Deutsches Museum, Munich.*

*Fig 4. Braun's electrometer of 1891*

*Fig 5. Braun's transmitter (September 1898) from one of Zenneck's drawings.*

*Fig 6. A coupling transformer from one of Braun's early transmitters.*



*continued on next page*

his use of resonance and receiver tuning as the essential features which enabled long-distance telegraphy to become possible.

Braun investigated the problem of transmission over large distances with great thoroughness and a deep understanding of the underlying physical principles. The very basic system introduced by Marconi had all the damping problems inherent in a spark actuated Hertzian antenna which Hertz himself had remarked upon (11). Braun began tackling the problem in the winter of 1897/98 and first used very long waves underwater in the Kinzig River. He minimised damping by using a loose coupled transformer with capacitors between an open antenna circuit and a closed spark circuit, a device (Figs.5 & 6) which he continued to develop over the next few years (German patent October 1898 and British patent, January 1899). Braun also developed directional transmitters and resonant tuning.

All of these devices and ideas were in widespread use by the turn of the century but Braun was by no means the only one to contribute to their development. Adolph Slaby and Wilhelm Arco in Germany, John Stone in the U.S.A. and Oliver Lodge in England were among the principal contributors to advancing Marconi's primitive system into one capable of long range signalling and selective tuning. Lodge was one of the acknowledged experts and innovators in all aspects of syntony and coupled circuits. But it seems that the use of transformer coupling at the transmitter antenna was fundamentally Braun's idea - at least Braun thought so - and Lodge did not mention it in his famous patent in 1897 on 'Improvements in Syntonised Telegraphy'.

Marconi himself experimented with such a transformer which he called a 'jigger' also from 1897 and took out a patent in June 1898. His master patent No. 7777 of 1900 brought together ail the prevailing ideas of tunable transformers, coils and adjustable capacitors at transmitter and receiver. He probably arrived at some of his ideas by trial and error - but quite independently - even though much of the information was by this time available from published scientific literature and, most notably, from Lodge's famous patent of May 1897.

This period was fraught with misunderstandings arising largely from the financial rewards associated with patenting new devices in a young blossoming industry. A lot of acrimony also arose from an unwillingness to accept that, in the hyperactivity of this new technology, a 'new idea' was more likely to arise out of the intensive interaction between numerous intelligent participants rather than the isolated inspiration of a single genius. The field was ripe for developments which sprang from parallel routes all over the place. Lodge was one of the most original thinkers in all matters relating to the experimental production of Maxwell's waves. He carried out a watershed demonstration of the transmission and detection of Hertzian waves in 1894. He understood the importance of resonance or syntony, as well or better than any of his contemporaries. Marconi was a most energetic empiricist who abounded with practical ideas and visionary hopes while his company was a most opportunistic user of whatever ideas came its way.

Ferdinand Braun was a thorough scientific investigator backed up by a fledgling company, Funkentelegraphie GmbH of Köln, formed in December 1898. The company later became Prof. Brauns Telegraphie GmbH; then Telebraun; then Braun-Siemens with Siemens and Haiske AG, Berlin. Finally, with AEG-Slaby-Arco, a new company was formed in 1903 which took the name Gesellschaft für drahtlose Telegraphie mbH. At this time the word Telefunken began life as the telegraphic address of the new company and was derived from Braun's TELEbraun and Slaby's original use of the term FUNKENtelegraphie in 1897.

It is not easy to discover how the decision was made to award a half share of the Nobel Prize to Ferdinand Braun while omitting to include other worthy candidates, but it may have suited the climate of the times better than awarding it to Marconi alone. Oliver Lodge's contribution was well known and thoroughly acknowledged throughout the world of science despite the conflict of Interest between him and Marconi. But that is history! The prize was awarded to Braun, a most worthy recipient.

Braun's contributions to wireless telegraphy can be found in most of the transmitter and receiver circuits at the turn of the century and, which in principal, survive to this day. To say that his work on the rectifier and cathode ray oscilloscope were of equal if not greater importance to the development of the fledgling radio industry is to indulge in serious anachronism - neither of these important contributions could possibly have been recognised for their true worth in 1909. But they are recognised now, and perhaps we are at liberty to indulge in the fantasy that the Nobel Committee awarded the prize to the right man without knowing as well as we do how much he deserved it.

Braun left Germany in 1914 to represent Telefunken in a case brought by the American Marconi Company concerning infringement of the four-sevens patent by the Telefunken owned Atlantic Communication Company which operated the Sayville transmitting station on Long Island, NY. Braun was to attend solely to counter the effect of Marconi's planned personal appearance in court by the weight of his own personality - two Nobel laureates in conflict. In the event Marconi did not turn up! Braun's colleague, Zenneck, took up the cudgels in a secondary case which resulted in a full acquittal on all major points. Braun's attempts to return home were frustrated due to the war in Europe and became even more impossible when the U.S.A. declared war on Germany in April 1917. His health slowly failed and he finally died in Brooklyn on 20 April 1918 at the age of 68.

**References**


*1. Marconi, Degna, My Father, Marconi. McGraw-Hill, 1962.*

*2. Braun,K F. On the Electrical Conductivity of Sulphides. PoggendorHs Annalen.1874: 153. pp.556-563.*

*3. Braun,F. On a Method of Demonstrating and Studying the Time Dependence of Variable Currents. Ann. Phys. Chem. 1897: (3)60 pp.552-559*

*4. Phillips, V.J. Waveforms. A History of Early Oscillography. Adam Hilger.1987. A description of Braun's cathode ray tube on pp.240-245.*

*5. Report of the British Association for the Advancement of Science. (Toronto) 1897: p.570*

*6. Roschansky,D. Ann. Phys. Lpz.1911: 36. pp.281 307*

*7. Thomson,J.J. Phil.Mag.1897: 44(5) p.293*

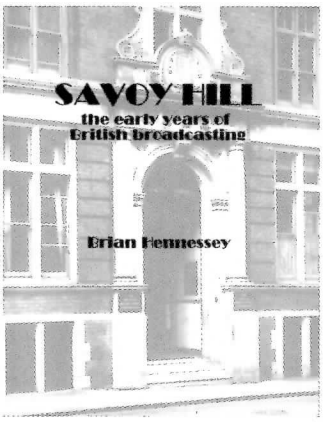
*8. Braun.F. Absolute Electrometer for Lecture Purposes. Nature.1891: 46 p.150*

*9. Braun, F. Some Experiments on Magnetism with high frequency Oscillations. Ann. Phys. 1902: (4)10:326-333.*

*10. Kurylo,F., and Susskind,C. Ferdinand Braun. MIT Press.1981. Ferdinand Braun's Nobel Lecture, Stockholm, 11, November 1909 appears in appendix B, pp.229 - 249*

*(This very important biographical work was first written by Friedrich Kurylo and published in German in 1965. It was translated into English and expanded by Charles Susskind and published by MIT Press, U.S.A. in 1981, pp289. It remains in print at $42.50)*

*11. Hertz,H. On Very Rapid Electrical Oscillations in: Hertz, H. Electric Waves. Trans. Jones,D.E. MacMillan 1893 p.49.*



## Book and Video review

**Savoy Hill- The early years of British broadcasting** *by Brian Hennessey*
Brian Hennessy has produced a concise 106 page history of the formative years of the BBC before the move to Langham place. Littered with over 60 photographs, room layouts and maps, this book provides a piece of historical research which will appeal to the expert or layman alike. An invaluable reference into the birth of a great British institution.
*£9.95 from Ian Henry Publications Ltd. 20 Park Drive, Romford, Essex RM1 4LH*

**Gerald Wells- the man in the white coat** *by Peter Brunning*
Gerry Wells is a man who needs no introduction in these pages, but for those who have yet to meet him and his collection, this video could be for you. Lasting for almost two hours, you are led on a tour through the museum and its contents, noting three new rooms since his last one. But more important than anything else is Gerry talking about wireless in his inimitable style.
*£11.00 (inc. P&P) from Peter Brunning, 91 Kenley Road, Merton Park, London SW19 3DR*

# B4 and After

*by Mike Barker.*

The B4 of 1930, was Murphy Radio's first commercially available receiver. A conventional 4 valve circuit of single screen grid H.F. amplifier, parallel-fed to a leaky-grid detector and two transformer coupled L.F. stages with direct connection to a cone loud speaker.

The speaker drive unit used was chosen as it gave the best overall response of those tested; it was found to give a fair response at the 100 cycle and 6000 cycle ends. In addition it was very reasonably free from strong resonance points. Provision has been made for external speaker and gramophone via jack sockets. External Aerial and Earth sockets are provided, but not really needed under normal signal conditions as I find the internal aerial is adequate for most MW/LW stations.

Ease of control was a major part of the design of this receiver. Based on the fact the user only has two hands, the number or controls that need simultaneous operation should not exceed two.

The receiver has four controls, On-Off/Volume, Reaction, Tuning and wave band selector. Volume control is achieved by varying the filament voltage on the screen-grid valve. Three controls have apertures cut into the knobs allowing a calibrated scale to show through. The tuning scale is calibrated in wavelengths, using a printed paper drum which rotates behind a small aperture in the cabinet. A wavelength scale was chosen to serve the public, as the numbers on the dial would then be the same as those found in any daily paper.

The receiver is built into a tin-plated box that completely screens it from the frame aerials and any external interference. The frame aerials are wound onto a wooden frame that is attached to the metal box. Thankfully, this construction has preserved the internal parts very well. The valves are housed conveniently under the main chassis and are accessible for service. Valve holders are mounted into an ebonite strip, but the anode connections are separately insulated to reduce the chances of leakage. The calibration of this set was guaranteed by Murphy to be + or - 2%, but it was stated that most receivers were accurate to within 1%.

At first sight it is not easy to establish how to get the receiver out of its cabinet. The knobs and indicator discs are first removed. Then you will find two holes near the top, back of the cabinet filled with wax. Remove the wax and remove the screws. Then put the set on its front and remove the screws holding the base to the rest of the cabinet. Two more screws just under the valve shelf must then be removed Once this has been done the chassis complete with frame aerial and speaker can be withdrawn from the cabinet. To get into the chassis is also rather tricky, you have to unsolder the frame aerial and speaker leads from the paxolin tag strips. Then remove the screws holding the frame aerial to the metal chassis. When this is done the flat metal plate now exposed can be removed, leaving clear access to all components.

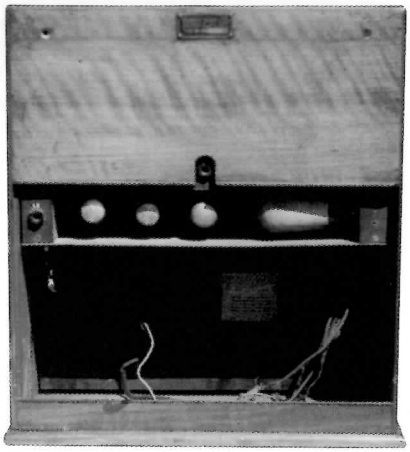
The cabinets of both the 1930 and 1932 versions of the B4 are very similar, both with small cut-aways underneath to place fingers when lifting. The 1930 version is made of solid walnut, picked as it would blend in with either oak or mahogany furnishings, and has a

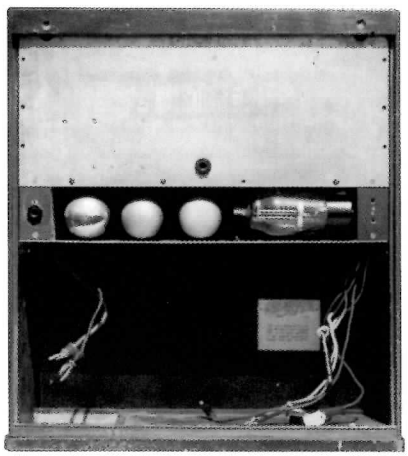
*Top left: the 1930 model of the Murphy B4*

*Above: the 1932 variant of the Murphy B4 with Art Deco styling on the speaker grille*

*Below left: rear view of the 1930 B4 with panel removed*

*Below: rear view of the 1932 B4 also with panel removed*







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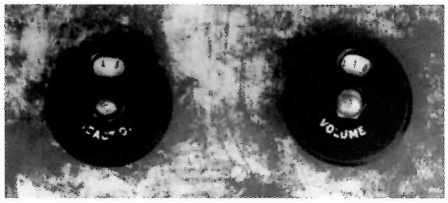
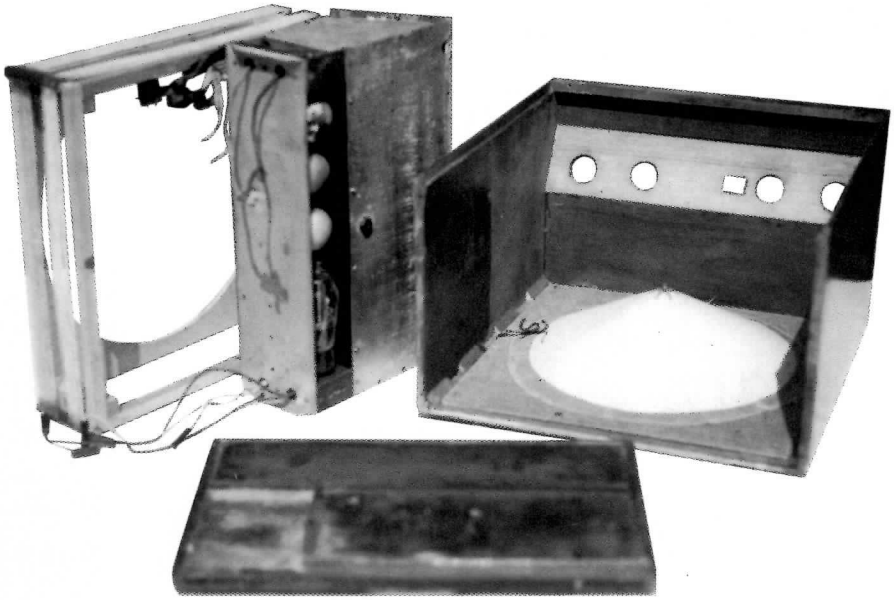
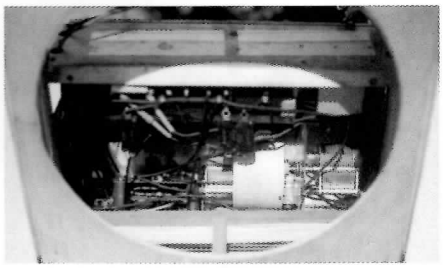


speaker fret of two inverted M's or is it an M and a W (Murphy Wireless ?) or perhaps just a pleasing geometric pattern? The 1932 version has a later Art-Deco style speaker grille of bold and original design with two raised black bars. Both receivers are on turntables. They weigh in at just over 32 lbs. inc. batteries. The 1930 version costing 17 Guineas and the 1932 version just 15 Guineas. complete with batteries. The 1932 receiver has its speaker mounted to the front of the cabinet rather than the frame aerial, it also has a door that covers the whole of the back of the receiver and allows (with care) the chassis to be removed without removing the cabinet base.

In operation I found the 1932 receiver to be quite sensitive, all BBC stations and many local (within 50 miles) stations could be received. Reaction is a delight with no threshold howl, and once a point has been found that gives good results almost no adjustment is needed when tuning once a point has been found that gives good results.

With the correct valve line up of Osram SG215, 2 x Osram HL210 and Osram P215 the HT current is 8-9 mA, giving a long battery life. ■





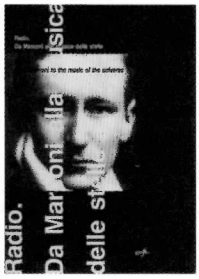
*Top left: detail of knobs showing indicator discs*

*Above: chassis removed from cabinet*

*Right: internal view of Murphy B4 receiver*

# Three (Italian) books on Guglielmo Marconi

*reviewed by Enrico Tedeschi*





Before you get too excited I must tell you that these are Italian published books, written in Italian. however the first one: *Radio. Da Marconi alle stelle* has an English text alongside the Italian one. The second one: giorni della Radio by Giorgio Maioli, has enough illustrations and photographs to be very useful to a collector or historian even in spite of the language barrier. The third one: Mio marito Guglielmo by Maria Cristina Marconi is not worth buying and so you have no problem there.

But let's go in order. The first tome, also titled Radio. from Marconi to the Music of the Universe, was published in the wave of the Marconi Centenary celebrations. In fact, apart from the historical contents depicting, fairly concisely, the usual history of the invention of radio, there is a section dedicated to a mini catalogue of the related exhibition held in Bologna called Science or Magic? This (the exhibition) has been organised and funded by several commercial companies among which stand IBM, GEC-Marconi and Motorola.

Apart from the occasional new picture or piece of information, this book is really scarce on original information and I therefore suggest that you skip buying it.

Quite different and more useful, the second book is full of photographs and documents, many original and never published before. The usual story of the great man against all odds also unfolds (for those who understand the Italian text) in an interesting way and the illustrations add a lot to the enjoyment of this volume. I have therefore no hesitation in suggesting that, if you are into Marconi, you should really try to get a copy of it.

On the other hand I am strongly suggesting that you do not buy the third volume, written (but published posthumous) in a rather unpleasant manner by the second (and last) wife of Marconi: Maria Cristina. In fact the book is full of inaccuracies ie. once and for all: the Marconi stately home in Pontecchio is named as *Grifone* with only one 'f' while as everybody slightly interested in the subject knows, it should be with two), wrong dates, wrong names and wrong circumstances. The clear recurrent theme is the desire on the part of the author to demonstrate that, contrary to what is stated in other books (especially the one by marconi's daughter, Degna) it is not true that Marconi, in his last years in Rome was getting impatient with family, social life, business and political establishments in Italy and wished to return to England and to the way of living he was used to.

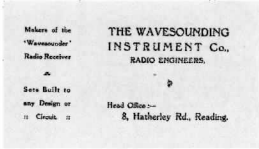
To this end the author, very conveniently, chooses to remember only what she wants to remember and tells us only the stories she wants us to read, forgetting, perhaps without intent (but neverless omitting), facts and circumstances not in line with her remembrances and purposes. It is somehow sad that what could have been an intimate and novel story of the Italian period of Marconi's life has ended up as a personal vendetta against other more documented and mature books (like *My father Marconi* by Degna Marconi and *Marconi* by Giancarlo Masini).

Should you wish to buy any of the above please call me for further information on getting hold of the stockists it is somehow difficult and unpredictable (if at all possible in some cases).

*Enrico Tedeschi- (01273) 410749*

# The Wavesounding Instrument Company

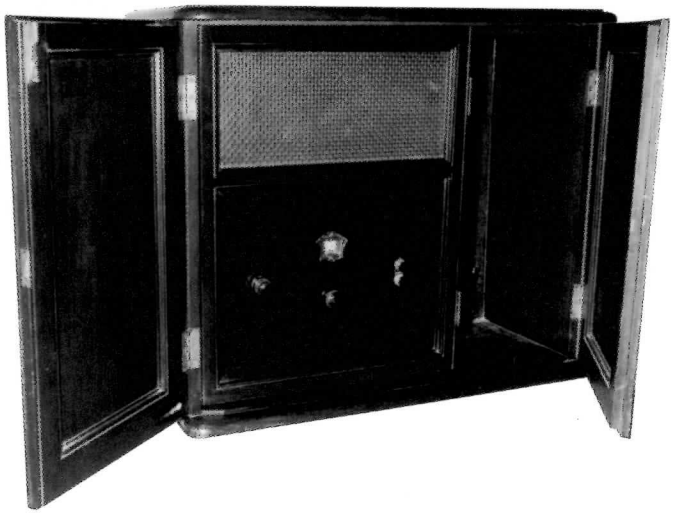
*by Pat Leggatt*

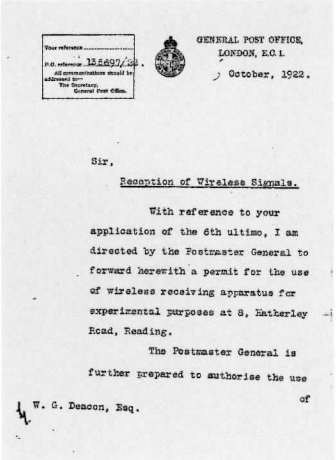

Makers of the 'Wavesounder' Radio Receiver

Sets Built to any Design or Circuit

THE WAVESOUNDING INSTRUMENT Co.,
RADIO ENGINEERS.

Head Office:—
8, Hatherley Rd., Reading.




Your reference .....
P.O. reference 135697/22.
All communications should be addressed to:—
The Secretary,
General Post Office.

GENERAL POST OFFICE,
LONDON, E.C.1.

October, 1922.

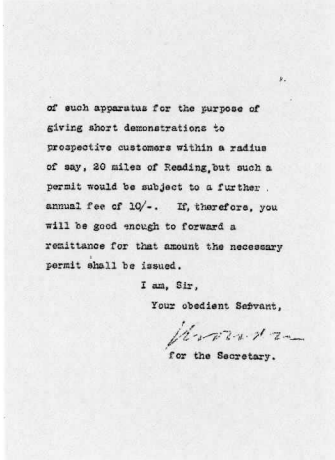
Sir,

Reception of Wireless Signals.

With reference to your application of the 6th ultimo, I am directed by the Postmaster General to forward herewith a permit for the use of wireless receiving apparatus for experimental purposes at 8, Hatherley Road, Reading.

The Postmaster General is further prepared to authorise the use of

W. G. Deacon, Esq.


of such apparatus for the purpose of giving short demonstrations to prospective customers within a radius of say, 20 miles of Reading, but such a permit would be subject to a further annual fee of 10/-. If, therefore, you will be good enough to forward a remittance for that amount the necessary permit shall be issued.

I am, Sir,
Your obedient Servant,

for the Secretary.

We all know that many small wireless companies started up with high hopes in the early 1920's, making sets on a small scale on the kitchen table or in a garden shed workshop. Not many survived to become household names, and one which did not is the Wavesounding Instrument Company of Reading.

This company was set up in Reading in 1922 by William George Deacon, pictured here a few years earlier at the age of 17. His daughter, now living in Bristol, has kindly given me some documents found among his papers and one of the sets he made. They throw an interesting sidelight on how an enterprising young man foresaw the broadcasting boom and took steps to join it.

The first requirement for an intending set-builder in 1922 was an Experimenter's Licence. Such licences had been available from the GPO since 1905, but were in abeyance during the first World War when amateur experimenters' aerials and apparatus had to be dismantled. After the war, in October 1919, licences once again became available subject to fairly stringent conditions.

William Deacon, then aged 22, applied for an Experimental Licence in September 1922, wishing to build receivers and to demonstrate them to potential customers within a radius of 20 miles round his home at 8 Hatherley Road, Reading where he lived with his parents. He complied carefully with the application procedures, including two referees regarding his British nationality, and on October 6th received GPO authority for reception. But the GPO were not giving in so easily and demanded - as their letter shows - a further annual fee of 10/- for permission to demonstrate his products to customers around Reading. He duly sent this fee and received a receipt on October 17th; but after a wait of some weeks he had to write again to the GPO on December 12th insisting that they now "forward the necessary licence at your early convenience". It seems that bureaucracy was alive and well in the past, as now!

Having got the authorisations, Deacon set up his Wavesounding Instrument Company and about this time registered it with the Registrar of Business Names: we can see that his business card rather grandly refers to the Hatherley Road address as 'Head Office'. In April 1925 the family moved to 276 Kings Road, Reading and the company was re-registered at that address.

Unfortunately there is no record nor surviving model of any sets built and demonstrated during the first half of the 1920's. But a list of components costed at £1-17-1 and a circuit diagram - now crumbling scraps of paper - remained inside a set built at Kings Road about 1925 and lay undisturbed for nearly seventy years. It is a three-triode set with reacting detector and two LF stages, fitted in a rather splendid mahogany cabinet as the photograph shows.

This, I understand, is the last that is known of the Wavesounding Instrument Company, and William Deacon went on to a different and successful career with Avery's Scales and Weighing Machines: but it is nice to have at least some of the background to his early wireless venture. My thanks of course to his daughter, Mrs Elizabeth Herring, for all her help in this. ■

*Left: William Deacon at 17 years old*

*Top: Business card for the 'Wavesounding Instrument Company'*

*First from top: Possibly the only example of a wireless manufactured by the 'Wavesounding Instrument Company'*

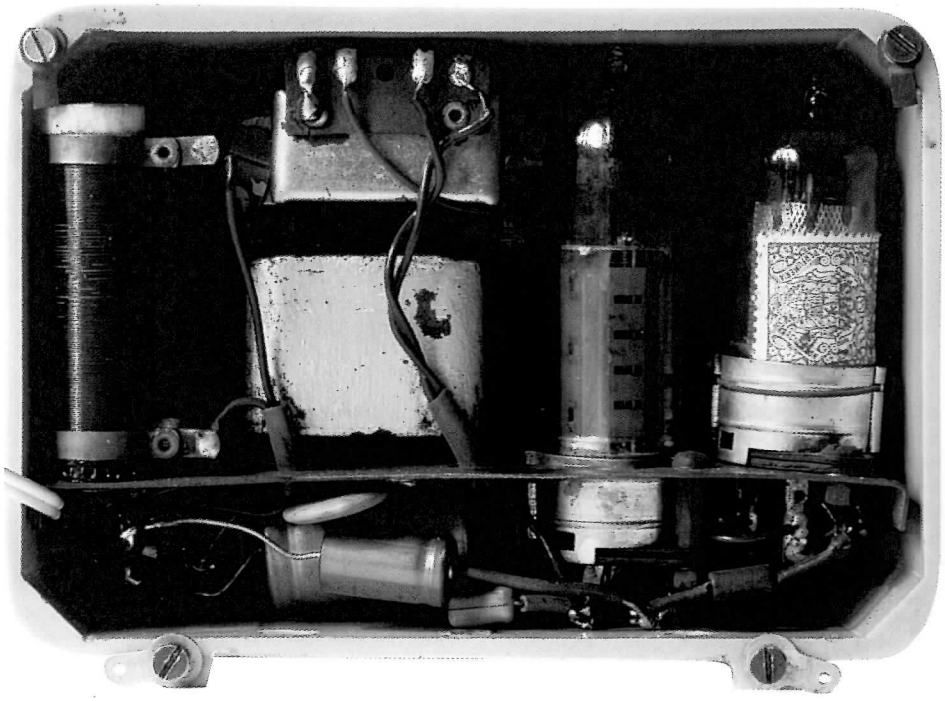
*Above: Letter from the Post Office demanding a further annual fee of 10/- in addition to a licence fee so that William Deacon could demonstrate his equipment to customers*

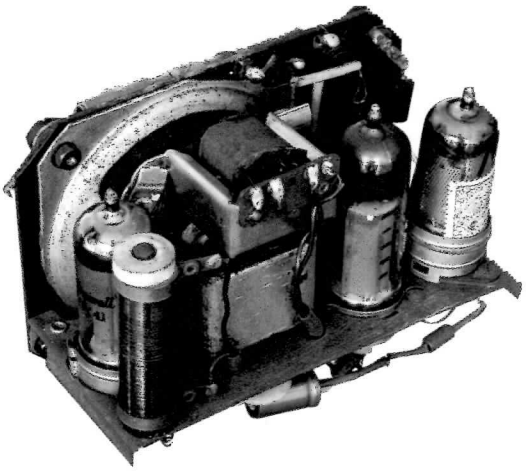
# Small is beautiful

*by John Ounsted. Photography by Mark Groep.*



Periquito... it's the Spanish for parakeet: 'a small long- tailed parrot of various kinds' as the dictionary tells us. An unlikely name for a radio, you might think, but nonetheless the one chosen for the tiny wireless to be looked at in this article.





*Top left: A rare bird indeed. The front of the Periquito (actual size). Note that knobs are made of Catalin. The cabinet is made of Urea Formeldehyde (see plastics article on page 18)- a rarity on non US and Canadian sets.*

*Top Right: Detail of cabinet showing Parakeet emblem.*

*Centre left: The rear of the Periquito displaying the dense cramming of components into the cabinet.*

*Left: The chassis of the Periquito.*

The Periquito is certainly small. To get an idea of just how small, extend the fingers and thumb of one hand. Now imagine a receiver - a valve mains set, mark you - which you could pick up widthways and carry, pinched between your thumb and second finger. Well, that's the Periquito, a Lilliputian two-valve (plus rectifier) single-band Spanish TRF of the 1950's measuring a diminutive 5"x3-"x3". The example shown in the pictures is, appropriately enough, in baby-blue, with contrasting orangey brown semi-translucent catalin knobs. Its minimalist appearance - just two knobs and a speaker grille - puts one in mind of one of those ultra-simple attractively-cased crystal sets, like the Ivalek, which one regularly sees at swapmeets. But the Periquito has rather more to offer technically than those; it doesn't just look sweet on the outside - the dinky plastic case conceals some quite intriguing and economical electronics within, offering an almost 1920's-like efficiency from only two valves. The set will pull in five or six stations with good volume and selectivity, on just five feet of aerial. This is mostly due to the clever and efficient circuit that the designers have hooked up around the UAF42 front-end valve. In the next sections, we take a closer look at the chassis and circuit.

**Inside the Set**

Like a number of Tom Thumb sets, the Periquito has no chassis fixing screws, and relies on the knobs and the cardboard back to keep the works from straying too far from their appointed place. With such a lightweight chassis this isn't as bad as it sounds, and at least permits rapid dismantling. The diddy mains dropper is worryingly close to the side and top of the plastic case, but there was no sign of either getting scorched; thanks to 110 volt operation, this

resistor only has a few watts to be rid of. To the right of the intrusive speaker magnet stands the lanky UL41 output valve, its sealing pip again clearing the case top with only millimetres to spare. Indeed, its valveholder has to be sunk at the bottom of a specially-provided hole in the chassis, likewise the UY41 rectifier, which would otherwise have similar skyheight problems. Of course, these two are quite capable of raising a lot of heat on their own, if only from heater dissipation, but, in practice, the receiver does not get too hot, even after several hours, which is a mercy.

The tiny speaker looks (and sounds) like a small modern tweeter. Bolted to it is an equally miniaturised output transformer. Moving to the front of the chassis, we see what looks at first glance like a pair of very small-bore ferrite-rods. On closer inspection, these turn out to be coil-formers, on which are arranged the five permeability-tuned coils necessary for ganging the ingenious regenerative front-end circuit. Through these formers passes - snake-like - one of those dial-cords-with-slugs-on-it arrangements, like in the VHF tuner of a fifties Bush set. All very fine until it breaks, you say, but the arrangement here seems simple and foolproof, with only four pulleys involved, there being no tuning-dial to speak of, just some arbitrary gradations around the tuning-knob.

### The Circuit

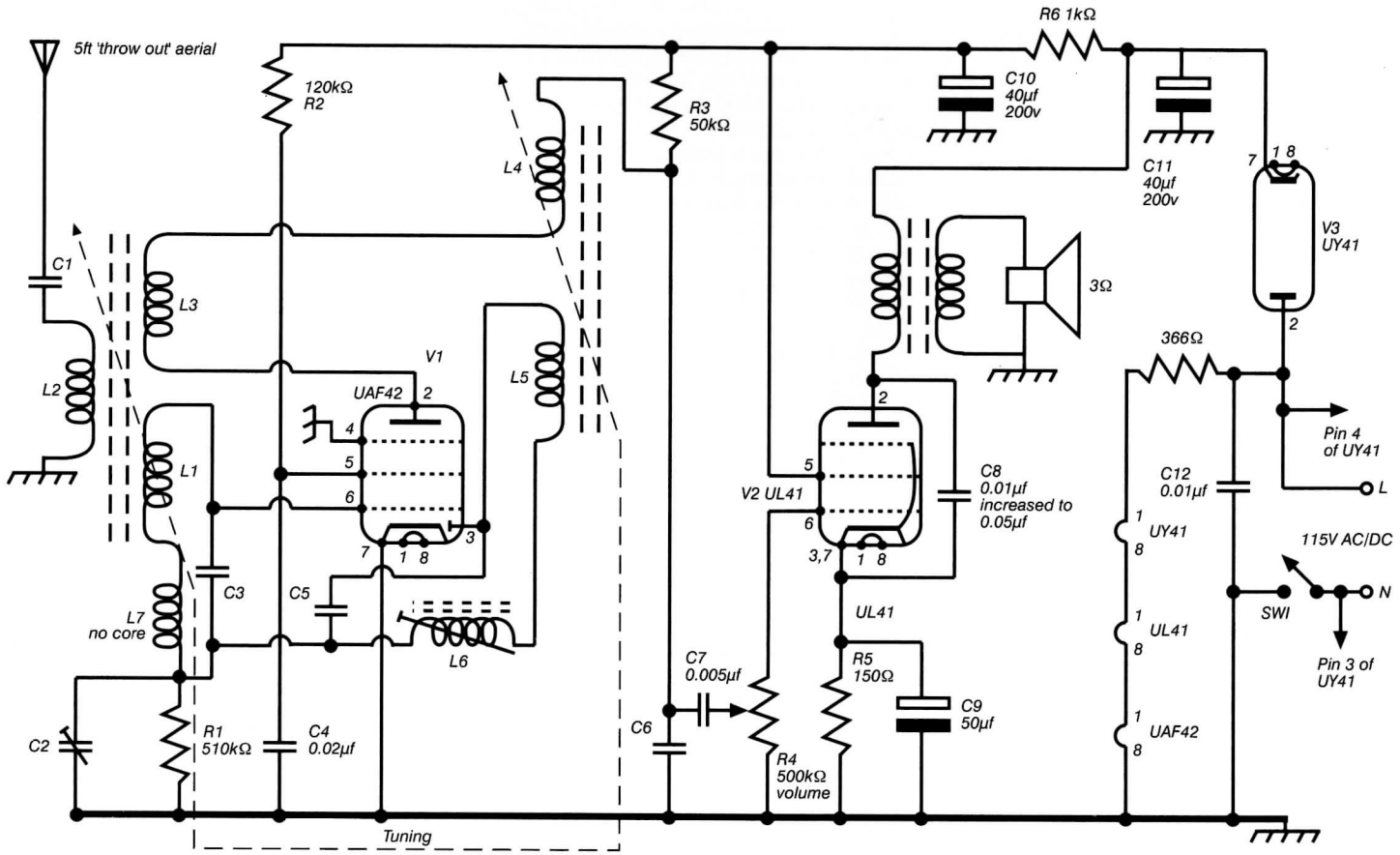
The schematic for the set is shown below. As already mentioned, the UAF42 is a busy little bee in this receiver - firstly, it regeneratively amplifies the incoming RF signal, with anode-to-grid-circuit feedback courtesy of L3 and L1, then it detects it, via L5 and L6 and the load resistor R1. It then dons another hat for a spot of reflex audio amplification, with R3 acting as an AF load resistor, before finally and reluctantly letting go of the signal via coupling capacitor C7. This last feeds the aforementioned UL41 output valve, which leads a very simple life, compared to the hectic travails of its partner. For the record, V1, seen as an RF amp, has a voltage gain of about a thousand times - a millivolt at the aerial becomes about one volt at the coil L5. As an AF amp, its performance is rather less spectacular, giving a gain of around twelve times. It's not really fair to seek an overall gain figure by multiplying pre and post-detector gains together - they are not like quantities - but it's certainly true there can't be many fifties receivers in which one bottle has an amplification of a thousand times, let alone twelve! Notice also that the amount of regeneration is fixed - there is no user 'reaction' control.

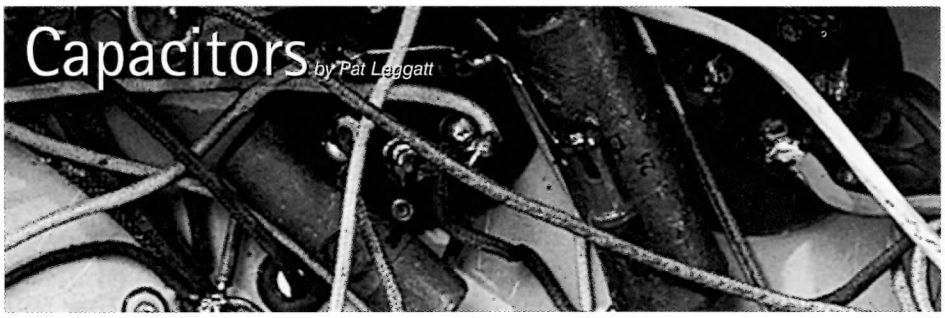
The rest of the circuit is by contrast, quite conventional, One alarming feature is that the hot-blooded Latins who put this baby together have deliberately courted danger by using valve pins which could be 'i.c.' as circuit connection points. For instance, the incoming 110V 'live' is taken to pin 4 of the UY41, and the 'neutral' is taken to pin 3, both necessary as anchorages in the absence of tagstrips. Fair enough, if you adhere to the original UY41, which has visibly no connection to either of these pins. But should the need arise to change the valve, there's a real danger of fireworks - most contemporary Mullard and Mazda data shows a possible internal connection to both pins. If experience with valves like the EL41 is anything to go by, these data-books are not kidding, and any candidate for rectifier should at least be checked by eye for unusual internal connections before being plugged into the Periquito.

### The Parrot Speaks- The Periquito in Action

Fine, let's now connect the receiver to a suitable 110V transformer and switch on. The first agreeable surprise, granted that this is a TRF, is the selectivity. Thanks to the regeneration, the sharpness of tuning is impressive when compared to non-regenerative economy last-ditch British TRF's of the fifties. Provided the aerial is kept short, you might almost be fooled into thinking you were driving a superhet. If, however, the aerial length is increased, in a quest for more distant stations, then the Periquito does get a bit flustered, and that familiar TRF 'bleeding' of powerful local stations across the dial starts to occur. Additionally, the volume control is not used to reduce the strength of the incoming signal - it's a true AF gain pot and is not arranged to short out the aerial signal in the usual time-honoured TRF manner. Thus, this set may overload on a long aerial. Nonetheless, its gain, stability, and general poise are more than creditable, granted that it does it all with two valves.

Sound quality is, unfortunately, a weak spot. The set seems to want to live up to its name, and screech like a parrot. It may be bounderish to say this, but there's really not a lot to choose, sound-wise, between the Periquito and a standard sixties PP3-powered transistor radio. At first glance, the problem might seem to be the small speaker and output transformer mentioned earlier, but on investigation the fault seemed to lie earlier on, possibly in the detector section. Bass is very lacking, but some compensation can be made for this by increasing the value of the AF tone-corrector C8 to 0.05μF. ■





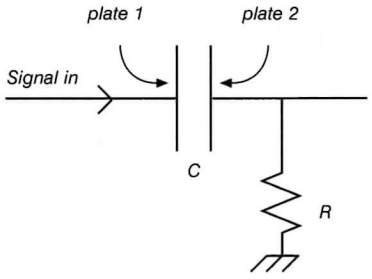




Figure 3

### It's a whatsitsname

There are rather too many names in this area, so let's start by sorting them out.

*Capacitance* is the property of a component which can store energy in electrostatic form. It is the electric counterpart of inductance which relates to storing energy in electromagnetic form. It has also replaced 'capacity' as the term for defining the electrical 'size' of a capacitor, in microfarads for example.

*Capacitor* is the name of the physical component which exhibits capacitance.

*Condenser* is the earlier name for capacitor. Although obsolete now, it is quite appropriate to speak of 'a condenser' when dealing with equipment of the 20s and 30s, before 'capacitor' came into common use.

*Capacity* was earlier in use to define the electrical 'size' of a capacitor, but is now formally replaced by 'capacitance'. Nevertheless 'capacitance' is slightly more of a mouthful than 'capacity', and it is still common and acceptable to speak of 'a capacity of 1 microfarad'.

### Units

The common unit of capacitance is the farad, in honour of Michael Faraday. But the farad is an inconveniently large unit - a 1 farad capacitor could be about 2 feet square and 70 feet high - not something we would want to use in our wireless sets!

So capacitors are normally found on the scale of a millionth of a farad (microfarad, $\mu$F or $\mu$fd), a thousand-millionth (nanofarad, nF) or a million-millionth (micro-microfarad, $\mu\mu$F or $\mu\mu$fd, often called picofarad, pF, colloquially known as a 'puff').

### Capacitor construction

In one form or another, a capacitor consists of overlapping metal electrodes separated from one another by an insulating 'dielectric'. The electrodes are usually flat plates in a small capacitor, or for larger sizes may be strips of aluminium foil wound up to form a tubular component; and of course in a variable capacitor the plates are arranged to interleave each other to a variable extent, controlled by a knob.

In all cases, the greater the area and the closer the spacing of the electrodes, the greater is the resulting capacitance.

A special form of variable capacitor is the 'varicap' or 'varactor' diode. In this semiconductor device the applied voltage causes the charge carriers (holes or electrons) surrounding one electrode to be attracted closer to the other electrode, thus increasing the capacitance. It is also possible to arrange a valve stage with suitable feedback to achieve voltage-controlled capacitance. Such voltage-controlled capacitance arrangements are found in automatic tuning correction circuits in some receivers.

### Dielectrics

The insulating dielectric between the electrodes may be air, or some solid material such as mica. An air dielectric does not appreciably alter the capacitance between electrodes of a given area; but other materials can multiply the capacitance by a factor known as the 'dielectric constant'. Mica, for example, has a dielectric constant of about 7; while titanium dioxide has a constant of 100 or more, very useful for making capacitors of appreciable value but small physical size. It is important that dielectrics have good insulating properties, since a capacitor with a 'leaky' dielectric will not work as it should.

In an electrolytic capacitor the dielectric is an insulating layer chemically formed on aluminium foil. The layer is extremely thin, so spacing between electrodes is very small and the resulting capacitance is high - often several thousand microfarads.

### What do capacitors do?

It is clear that no current of electrons can flow between capacitor plates separated by a highly-insulating dielectric; and it may seem that the component would not be of much use. But we all know that signals from one stage of a receiver can 'pass through' a coupling capacitor to the next stage, so how can this be explained?

Figure 3 shows a capacitor followed by a grid leak resistance to earth, which could form the coupling between receiver stages. The grid leak is holding the right-hand plate 2 at earth potential, while plate 1 will be at some potential determined by the circuitry of the preceding stage.

Suppose now the left-hand plate 1 is suddenly made more positive. Plate 2 is in the electric field of plate 1 and accordingly the potential of plate 2 also moves positively. The top end of R has therefore become positive to the earthed bottom end, and electron current immediately starts flowing upwards through R. The electrons cannot flow *through* the capacitor, but they can flow into it and pile up on plate 2, making it more and more negative (i.e. less positive) and eventually bringing it back down to earth potential. The same process happens in reverse if plate 1 is now made more negative, plate 2 becoming negative to earth until enough electrons flow from it through R, and plate 2 returns to earth potential.

When, as described above, plate 1 is suddenly made more positive, plate 2 immediately becomes positive also, so to begin with the two plates are at the same potential and there is zero voltage across the capacitor. But the current through R into plate 2 starts immediately at its maximum value, while the voltage across the capacitor slowly rises; so the current into the capacitor is at its peak before the voltage reaches its peak, and the current is said to 'lead' the voltage, unlike the current in an inductance which 'lags' the voltage.

It can be seen that an alternating signal fed to plate 1 will cause plate 2 to move positively and negatively in sympathy; and we can say that, although no electrons have passed between the plates, varying signal potentials will 'get through' and be reproduced on plate 2. Furthermore, any *direct* voltage on plate 1 will be blocked, since plate 2 always varies about earth potential.

### Reactance of a capacitor

If the frequency of the signal fed to plate 1 is very low, the voltage changes will take place very slowly and if the resistance of R is not too great the current through it will be able to maintain plate 2 almost at earth potential all the time, so that little of the plate 1 signal appears. On the other hand, with rapid high-frequency changes on plate 1 the current through R will not have time to bring plate 2 much towards earth potential before plate 1 is moved in the opposite direction during the next half-cycle of the signal. Consequently plate 2 is hardly discharged at all during cycles and follows the plate 1 signal almost exactly.

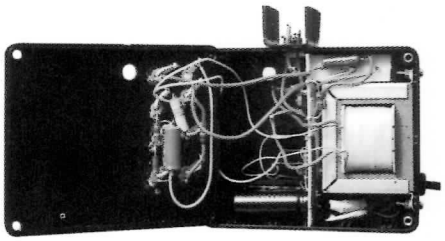
So we find that the 'resistance' of a capacitor to alternating signals becomes less and less as the signal frequency is increased. As with inductance, the AC 'resistance' is called reactance and the reactance of a capacitor is given by the formula $X_C = 1/2\pi fC$ ohms: the higher the frequency f and the larger the capacitance C, the lower will be the reactance.

With some exceptions such as in tuned circuits, most capacitors in radio sets are required to be of low reactance for coupling one stage to another or for by-passing unwanted signals or mains power ripples to earth. It is therefore necessary to choose a large enough capacitance for the frequency concerned. It is also necessary to take account of the resistive load into which the capacitor will feed - e.g. R in Figure 3. If the load resistance is high the current through it will be small and very little discharge of the potential on plate 2 will occur during a signal cycle: accordingly a modest value of 0.02$\mu$F with a grid leak resistance of 0.5M$\Omega$ will suffice for inter-stage coupling. On the other hand, the reactance of a mains power unit smoothing capacitor must be low compared with the DC load resistance presented by the receiver circuits, and a typical value is 32$\mu$F with reactance of about 100$\Omega$ at 50 Hz mains ripple frequency.

■

# Constructing a Universal battery eliminator

*by Andrew Zimmer*



What has prompted me to write an article about Battery Eliminators, is that most new comers to the 'Art of Radio', when visiting my home or workshop are always interested how I manage to run battery sets, and most state that they would be more interested in buying battery radios if they, like me, had a battery eliminator that would replace not only the high tension battery, but also the accumulator.

The type of unit which I made covers high tension 40/150 volts, at 35 m.A. with three outputs all adjustable. Low tension 1.4/9 volts at 1.5 Amps, and grid bias 0/15 volt.

While this unit is good for my workshop where all kinds of radios are repaired, I realise that most people who are collectors or perhaps want to run only one model, require something more simple. So I have broken down the circuit in basic units, comprising high tension circuit and low tension circuits, with details of how to adapt to individual requirements. As an example those of us who want to run a transistor portable would not require the high tension circuit at all, or those who have already an old fashioned eliminator, from the 20's or 30's would only require the low tension section to replace the 2 volt accumulator. On the other hand those who wish to run sets with 2 volt valves or the 1.4 volt 'All dry valves', would need the whole circuit. If we were making a circuit of this type 40 years ago, it would have been quite a bulky affair but with today's small semiconductors it is very miniscule indeed.

The basic unit fits into a plastic box supplied by Maplin and measures 115 x 95 x 43.5mm inside. All the components are readily available except the mains transformer, which as I have full coil and transformer winding equipment I wind myself, and can supply to members if required, I will also give winding details for those with similar facilities. Construction of the unit presents no problems and I am sure there are plenty of members in the B.V.W.S. who will be willing to construct this unit for those without the necessary skills and equipment.

### The low tension circuit

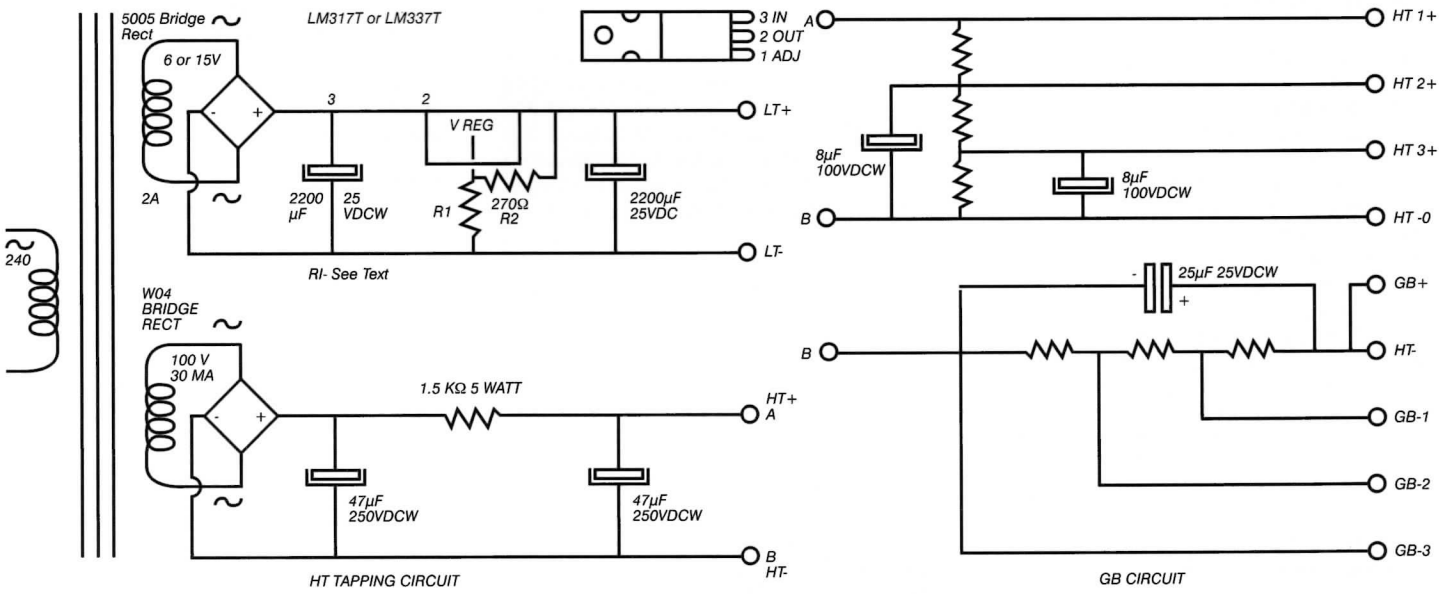
We will take first the low tension circuit. As will be seen from the circuit diagram a winding on the mains transformer is fed to a bridge rectifier, type 5005 which has a rating of 35 volts R.M.S. at 2 amps. Any other rectifier of similar ratings could of course be used. D.C. output of the rectifier is fed into a reservoir capacitor of 2200 microfarad with a working voltage of 25 volts R.M.S. and thence into the L.M.337T or L.M.317T voltage regulator. Which I might add is a marvel of modern technology (In the fifties, I was making amplifiers like the 'Williamson' and using selenium rectifiers to supply the preamp stages with D.C. to the heaters to combat mains hum, and the rectifier was as big as the whole mains unit which is described in this article).

The regulated output from the voltage regulator is smoothed with another 2200 microfarad capacitor of 25 volt working. The resistor R2 is 270 ohm half watt and for the value of Rl use a 1000 ohm pot to find the value that gives you the voltage required, then either leave the pot in circuit as an adjustable voltage control or fit a fixed resistor in its place.

The voltage regulator has automatic temperature and overload protection so you will see that this low tension part only of the full circuit could be made up to replace the conventional two volt accumulator or 1.5, 6, 7.5, 9 volt dry batteries as used in transistor sets of the 60's and 70's. 15 volt transformers are readily available from Maplins and many other sources.

### High tension circuit

This circuit is a conventional bridge rectifier circuit. The rectifier is rated at 280 volts R.M.S. and 1.5 amps: These ratings are far in excess of our requirements. The rectifier is supplied from a 100 volt R.M.S. winding on the mains transformer which will supply 30 m.A. current. The reservoir and smoothing capacitors have a value between 32 and 100 microfarad I used 47 microfarad as shown in the circuit diagram, these values are not critical but err on the larger values and not the smaller as you may experience hum or whistles (due to the high impedance of the high tension supply and unwanted coupling). Well that is the basic circuit, and it only remains for you to apply a little arithmetic and Dr Ohm's law to divide the high tension circuit to provide the required voltages, or you can do this empirically by using wire wound pots in place of the fixed resistors and if desired, when you have arrived at the correct values to suit your purpose, measure the pot values and replace with fixed



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resistors. Keep the high tension voltage divider chain fairly high resistance (about a 100 Kilohms total), or the divider chain will draw too much current to the detriment of the transformer. Grid bias is arrived at by putting resistors in the high tension negative line as shown in the circuits. Once again the values of the resistors will depend on the high tension current drain, and are readily arrived at by Dr Ohm's law, or use three 220 Ohm resistors and measure the voltage developed across them and alter values up or down until you get the grid bias voltages required.

**Construction**

There is little that I can say about construction as this is largely up to the individual. All the components are conservatively rated so there is no great heat to dissipate. The only component that it is advisable to fit a heat sink to is the voltage regulator, if used near its maximum ratings, for example as when used to supply 2 volt valved receivers. With 1.4 volt valves the current drain is small and a heat sink is unnecessary.

As you will see from the photograph of a unit made by myself it can be very compact. In the unlikely event of you experiencing difficulties you are very welcome to contact me. When once made you will I am sure wonder how you ever did without it, as new uses for it arrive all the time.

**Transformers**

I can supply 2 sizes of transformers. Lamination sizes as follows:

100 volts at 30 M.A. 6 volts at 2 amp.

(2) 60 X 50 X 33 mm 100 volts at 30 m.A. 12 volts at 2 amp.

All with fully interleaved primaries at 240 volt.

Cost: £12 plus P.& P.

As an alternative one can use one of the range of Maplin transformer kits: the 20 V.A. kit is suitable. These cost £8.49 Maplin code number YJ 61R. These are supplied with primary wound and you have to wind the secondaries. All data is supplied with kit.

In conclusion, the photographs show a three valve K.B. radio of the twenties running on my unit. I had joined the battery wires directly to the eliminator as the person who owns the set would have been confused with all the wander plugs. You, can of course can fit sockets to the lid of the eliminator and retain the original wander plugs and spade terminals as fitted to the set.

■

# BVWS Committee Minutes

Vintage Wireless museum, 28th May 1996

Present: WH, RL-B, MB, IH, DR, CG, KT, GP

**1. Apologies**

None. WH reported that Peter Bannon had resigned from the Committee. WH has sent a letter of thanks for his contributions.

**2. 1 Corrections to minutes**

.2 J *Narborough* was informed that details of his proposed swapmeet at Worthing *should be sent* to KT. .3 CG reported an opportunity to bring in £400 of advertising revenue. .5 KT informed the meeting that at the time of the commemorative weekend the anticipated net cost would be £4655. Subsequently with the costs of Jonathan Hill's souvenir publication this was expected to rise to £6255 (after making some assumptions about the level of sales of the publication to non-members). KT emphasised that the budget ceiling of £10,000 for the whole commemoration would not be exceeded. .7.2 *Brooklands*

**2.2 Matters arising**

WH and GP reported on a meeting with Alison Taylor and a colleague of the Radio Academy concerning an invitation for the BVWS to mount an exhibition at the RA festival in July. We were told that eight secure cases one metre square in area and two metres high would be made available. A preliminary list of eight topics was drawn up. The need for strict security and the reimbursement of out of pocket expenses was emphasised by us. We are waiting for a detailed written request from them for us participate (promised for this meeting but not received). The two visitors seemed to have no idea of what it would involve or whether a budget had been set aside. WH will contact the director to assess their seriousness.

**3. Editors report**

CG reported that all copy was in for the next issue of the Bulletin and proofs would be ready during the first week in June. IH reported that the Newsletters were being printed. Cg investigating cross- advertising deals with other journals. A question was raised as to where the journals presumably being sent to the Society were going. WH is willing to inform all sources that in future such journals should be sent to the Chairman. Some contact addresses held by KT will be passed to WH. RL-B is willing to search the AWA journal for others.

**4. Membership Secretary's report**

MB reported that the membership stood at 1112, there having been 32 new applications and 8 renewals since the last meeting. The new applications were mainly due to the Society having a stand at the NEC. There was a discussion on the need for sponsorship of applications, the role of the Committee in admissions, and whether more information should be sought on the application form or other changes made to it. It was recognised that these questions are bound up with the statement of aims and objectives of the Society and other points currently being considered as part of the review of the constitution. The matter will be raised again at the next meeting.

**5. Treasurers report**

None.

**6. Possible exhibition at RA**

Dealt with under matters arising.

**7. Commemorative Weekend**

KT reported that the organising subcommittee met on 7th May and tabled the action notes. The project is on schedule.

A 'wish list' of 300 major items and 200 support items for the exhibition has been drawn up. The request for items from members will be sent out within a few days and will not wait for the next Bulletin mailing.

Insurance quotations are being sought by DR and Rod Burman / KT for items in the exhibition. Basis will probably be gross sum plus itemised list of more valuable items. Period will be from time of signing in of items to the time of collection and return of receipt. Should be possible to fine tune the lists up to day of exhibition. Norman's drawings will now be mounted in the main hall. (The posters have now sold out.)

**8. Any other business**

DR asked the committee to consider whether 'Hi-Fi' not related to wireless should be part of the Society's remit.

GP asked the committee to consider in the constitution:

(I) Emphasising responsibility for conservation (particularly dry storage) of vintage equipment.

(II) whether if there was a move to all postal ballots it was necessary to retain the provisions for EGM's.

WH tabled a letter from Gordon Bussey offering the Society the opportunity to purchase 10,000 new Christmas cards (50 packs) at £680. WH agreed to write asking for price for 6,000 in packs of 5. If such a purchase is made one pack will be distributed to each member.

The date of the next meeting was fixed for Wednesday 26th June.

The meeting closed at 10.07 pm

# Letters

Dear Editor

The article by John Ounsted in the latest issue of the BVWS bulletin, has prompted me to put pen to paper regarding that universal problem of how to deal with valves where the metallised electrostatic screen has failed.

Three things rank in my mind as the best kept secrets of all time, the breaking of the Enigma code, the development of the Proximity Fuse, and last but not least, the formula and method of application of the metallised coating of valves.

For many years I have attempted to solve this mystery, even using that last resort of the 'old technology' enthusiast; an enquiry on the 'Internet'. Alas to no avail.

As stated in the aforementioned article, conductive paints are available, but being silver loaded are far too expensive for other than small area repairs. The practice of wrapping the valve in foil, although effective, is unsightly and can only be regarded as an interim measure.

There is fortunately an excellent solution to this problem. This is by using Graphite paint, (known to old time TV engineers as 'Aquadag', which is used to provide the outer coating of TV Cathode Ray tubes. Conductive, and with quite a low resistance when dry, it also adheres well to glass, and is heat resistant. It can be used to repair or completely replace the original coating. Although as far as I know, it can only be applied by brush, giving a not very smooth finish, this does not really matter as it is easily rubbed down with fine Emery paper. As many coatings as considered necessary may be applied, for it bonds well to itself. Once the new / repaired coating is in place, a suitable cosmetic paint can be sprayed over the Graphite coating.

Now for the bad news. Where can you get this substance in small quantities?. The obvious place to try is your local CRT Re-gun firm. My jar containing the last precious remnant bears the Legend: Graphite Products Ltd, Wandsworth Park, SW18. This firm seems to have vanished without trace. Perhaps one of our members who still has connections with the TV servicing trade, may be able to come up with an answer.

*Tim Voore*

Dear Editor

This is only the second time I've written to the BVWS editor. The first time, some years ago was to express pleasure on receiving the member's badge- I recollect describing it as an excellent example of the enameller's art. And now- I make the same appreciation of the car sticker. It too can be described in the same view. It really does credit to the BVWS. I have placed it immediately above my National Trust sticker and so they complement each other.

I take this opportunity to make a 'thank you' to our Committee for all the effort involved and seeing the society's continued success.

*Yours Sincerely*
*Mr PF Hulse*

Dear Editor,

In answer to Jonathan Hill letter about the Marconi celebrations this year I think he got it all wrong.

Just because I agree with him that Marconi success and his vision would only have been possible in this country I complained about **not doing enough** to celebrate the event and not, as he says, to throw cold water over on it.

I would have thought that such a landmark in British and world history should have deserved a better celebration so to make it the public event the importance of the case rightly deserved. The way it has been scheduled it will be just an internal affair among we hard core historians and collectors.

Pity.

p.s. As for the 'relative newcomer' I have been in the Society for more than 14 years. The fact that he didn't see me around doesn't mean that I did not exist (I was in Italy at the time).

*Yours Sincerely*
*Enrico Tedeschi*

Dear Editor,

Having a particular interest in the 'domestic' aspect of wireless, particularly the early days of broadcasting, I mentioned via the 'diary-cum miscellany' column of our local Tayside newspaper that I would be pleased to hear of readers' experiences with their first, or early sets. The replies from folk in their eighties- and nineties! are I think, worth recording as being of possible interest to members.

On the afternoon of the day the item appeared, the family of an elderly lady brought her some 35 miles to see me. She had, in a carrier bag, an immaculate BTH 'Model A' crystal set, complete with its pair of Sterling headphones. The set was bought by her father in 1925, and she was delighted to be told (via the BVWS Brown Bros. 1925 catalogue supplement), that it had been priced at three pounds and five shillings, as she had always wondered "what dad had paid for it". The 'phones would have increased the the price of installation by about a pound or so. The set was obviously of great sentimental value, and the family have pledged to keep it as an 'heirloom'!

Another elderly gent had spent his working life with a mining company, and he recalled taking batteries to the mine to be recharged, carting them there on a wheelbarrow. He remembered an early broadcast involving George Robey, the set being installed in a wooden hut, the young entrepreneur concerned charging 'thruppence' for the privilege of a five minute 'listen in'. He still has in his shed what appears to be a 1928 Cossor Melody Maker, and has, of course been suitably advised as to its present, and future, care. His preference, as the years went on, was for Philips sets.

A motor cycle trip down through the English Midlands to the south accompanied by a friend was written about by a reader who said they had taken a crystal set with them, connecting the aerial to the wire bedsprings when lodging near friendly 1920's local transmitters! Headphone reception was recalled as 'good', considering the conditions! Once again, the charge of a few pence for a short 'listen'- this time for scout funds- is mentioned. Another writer mentioned hearing a programme from the 1920's Edinburgh station on a Bryant & May matchbox crystal set in a room used by the scouts above the old stables in an Edinburgh boys' school, and the thrill of meeting one of the 'broadcasters' when 'out to tea' a short time afterwards.

The son of an enthusiastic rural kit set builder, a good 20 miles from the nearest small town, tells of the numerous sets his father built, including a short-wave converter, and his enthusiasm for the American stations and the 'Ham' bands. I quote the next part from his letter:

"...it is amazing how many items were actually constructed at home. Transformers came as a bundle of laminations, a former and a reel of wire. The former was mounted on the turntable of a hand-wound gramophone, a marker was put on the side of the turntable and off we went, my job being to count the turns. Chokes were constructed in the same way. I seem to remember that the kit came in various units, like a correspondence course. In any case, I don't think my father could have afforded to buy it all at once. Over a period of weeks all the parts came, eventually the big day arrived, and the set was switched on. One of my father's sets was still in use at the small local Post Office many years later."

As usual the LT accumulators went to the local garage for charging, and to alleviate the HT battery problem, the above worthy kit-set constructor- brave man!- **restored** a second-hand Milnes unit.

One particularly interesting letter told of the rather battered remains of a crystal set being recovered literally on a shovel!- from the rubble of an air-raid shelter being demolished in Dundee in 1953. The case was broken, but the part of the stamp. 'BBC Approved' is said to be legible, and a number, thought to be that of the set, is given as CY3859. Along with the set was a glass 'phial' containing two new crystals, marked Super Crystal Reg. No. 447149 price: one shilling and sixpence. The contents of the shovel also included a pair of S.G. Brown headphones.

The above material has, of course, been extracted / edited from some quite long, and painstakingly written letters, all of which have been suitably acknowledged.

PS. An afterthought- should really have been a first thought!- re the Bulletin. There used to be a note on the back of car company brochures which said 'The company's policy is one of constant improvement'. Substitute the word 'Society' and this is most surely true of the new, revitalised Bulletin, with its high quality of content and reproduction. Professionalism seems to shine through!

PPS. For those interested in the 'geographical spread of my little exercise, replies were received from the following areas or places: Anstruther, Coupar Angus, Crieff, Dunfermline, Kinloch Rannoch, Leven, Monifieth, Montrose, Perth and St. Andrews.

*J.M (Mac) Robertson*

Dear Editor

I was pleased to read JWB's 'Radio on the Net' feature as I have also had my pen poised for a month or two on this one. I wholeheartedly endorse his enthusiasm for this new and exciting way of enhancing ones knowledge of Vintage radio and radios which is difficult, if not impossible to do, in any reasonable time, by other means. I also believe its a good way of introducing children and students to the great radio era by visiting virtual radio museums from the class room, the extra



*Letters continued on page 38*

# Sound... Will it ever be silent?

*by Albert Noble*

As BVWS members collect objects emitting sounds and noises, I thought that the time had now come to study sound and its history in some depth. Hence this discord, sorry, discourse on sound.

The very first sound was a big bang. Until then it had been pretty quiet. There was much more banging and crashing whilst the Earth was being formed, but no one was around at that time to notice it. Later, Adam whispered some sounds into Eve's ear - ears were standard issue now - and the human race (for sound ), was on.

Sounds first came to the attention of stone age man. He observed that if he hit his partner over the head with his club then she emitted moaning and groaning noises. I should add that he is not allowed to do this these days as it is known as wife abuse.

In the beginning all sounds were natural. That means that there were no major or minor sounds, just the ordinary sounds of the birds and the bees. Much later in 1812, more noise was to be made by man. Someone wrote an overture to commemorate this event. Incidentally, in an orchestra, sound can only be made by scraping, plucking, blowing or banging. We wireless collectors too, scrape together the money, pluck up courage, and blow it all in on a wireless. Bang goes the lot.

In a quiet rural village on a pleasant day a gentleman discovered that if he folded his morning newspaper into a cone shape, and bawled at his butler through the small end, then he, the butler, jumped about even faster. So mankind had discovered the horn. Later a cape was to be named after this and a Mr. Kenneth Horn was to go around it. ( 'Round the Horn ').

To make the horn fit into small houses it was folded. It now resembled a French Horn but didn't have so many bends. A very clever man reshaped the horn 'parabolically'. This made it much louder. It was then reshaped 'diabolically' to make it even louder. Then a real sound genius came along and reshaped it 'exponentially'.. This made it very, very efficient, and very,very,very loud indeed.

Sound was now becoming so loud a method of measuring it was required. A Mr. Bel, (Graham Bell's smaller brother), measured it for the first time. This was very difficult to do as the sound kept moving about and, as his eyes were none too good, he couldn't see it very well.

Mr. Phon, who lived some distance away, was also involved in the sound measurement. So it came about that Bel's brother heard of this and named his own instrument after this event, 'The Telephon'. As a matter of interest, Mr. Bel's wife was called Dessie.

Until 1907 there were no real means of making sound extremely loud - only very loud. Fleming had invented the diode valve but this didn't make very much noise. Now along came Lee de Forest, adding an extra part to the diode, and mankind was to regret it ever since. The triode.

The triode was invented to amplify sound. This had what was called a control grid inside, but this grid was unable to control the volume, which kept on increasing. Then a screen grid was added. But again, this did little to screen mankind from the march of volume and sound. Someone made a last attempt by adding a suppresor grid but this was unable to suppress the increasing racket. I do not wish to appear biased about the grid, but emission of sound is greater with dull emitters than with bright ones. So silence receded further. The ton-up decibel was here.

Henry tried to choke the sounds with his inductors. The mystic meg, a large ohm sweet ohm (?), attempted to resist the increasing noise, but all was bypassed by King Farad's condensers.

Various schools had classes to teach how to obtain silence again. Class A, AB, AB1 and class C tried , but these only pushed and pulled the sounds to greater volumes. A member of the Noise Abatement Society made a valiant attempt to stem the flow by his invention of the volume control, but this didn't prove to be very popular and has fallen into disuse. The history of sound is littered with devices to make sound softer and to prevent your hearing it to the full (volume). The intervalve transformer increased the racket now by a factor of 3, and reaction to this by the public, oscillated from whistling, to shouting and screeching. AVC was invented to ensure that the increasing racket never, ever faded out altogether, and recently stereo ensures that you hear twice as much sound. Soon Quadraphonics will enable you to hear four times the volume. I do look forward to Octaphonics in the not too distant future.

At one time the sale of earplugs outstripped the sale of rawlplugs.

Transistors, being very small, gave some hope for less sound, but these now create even more noise for their size. Most of their casing is empty. Empty vessels thus make the most noise.

Modern transistors and IC's have some sort of remote influence thermal property which has not been researched. I find that as they become very hot making a racket, so too, under my collar, the temperature begins to increase as well.

The difference between decibels and watts, is that decibels measure your present agony, whilst watts measure that yet to come, and about to be emitted by loudspeakers.

A recent development has been multimedia PC,s equipped with loudspeakers with outputs of hundred of watts. Sounds are now very logical, old fashioned KT66's being replaced by DX2/66's. P150's now replace PX4's. The Pentium has replaced the Pentode. CPU's can process the sound faster so we may enjoy it sooner, with more of it, to boot.

Sound has revolved at 78, 45, and 33 revs. However the slower the speed, the louder it has become over this period, an anomaly of evolving revolution. It is now going digital, and as you would expect, the higher the number the greater the volume. 16 bit is 255 times louder that old 8 bit. 32 bit promises volumes we can only dream about. ( Or have nightmares over.)

Sound is very fast. It travels at 1031.2 feet per second so it is extremely difficult to get away from. It can be shown that the speed of sound is the square root of the elasticity divided by the density of the material the sound is travelling in. That's very technical but it just means that sound travels faster through water than through air. This explains why swimming baths are such noisy places. In a vacuum it's very quiet., but unfortunately you cannot go into one if you want some peace and quiet... If you do you will explode. You will be in pieces and quiet.

The intensity of sound falls off as the square of the distance from the source. This is why, if you live at John O'Groats, your quietest neighbours will be those living at Lands End.

Living as I do in the centre of Britain, I enjoy a quiet neighbour at both ends of the island.

Very high sounds can break wine glasses. Even higher sounds can shatter small dogs. This is known as pitch. Perfect pitch is when a small dog is shattered before it starts yapping.

Noise and sound is absorbed by most materials. This is measured by a coefficient, and is the ratio of total power to absorbed power. Very heavy curtains are good for this - wrap them firmly around the person making the noise.

Some human beings can emit very attractive sounds which others enjoy listening to. They can be subdivided into basses, contraltos,sopranos, and money lenders. Without the latter we could not afford to purchase the wirelesses on which to hear the former.

Noise, like gin, can be white or pink. A large gin can alleviate the effects that noise has upon you. Sound can be loud or soft (mostly the former). This is known as the dynamic range. If you are very dynamic (ar)range to have it soft. Incidentally, the difference between noise and sound is that we make sounds, whilst others make noise.

By the 60's not only crickets made sounds but beatles were making quite a racket too. This was quickly followed by stones and heavy metal (pig iron). Nowadays everything makes lots of noise. There is much competition in finding out how to make bigger and better noises from cars, motorcycles (Mr. Bel would have been a keen motorcyclist),and

aeroplanes, (Mr. Bel would have approved of Concorde). Little black boxes are now installed in all motor cars, and having their windows wound right down, all passers by may hear, 'The secret of the Black Magic box.'

You may be forgiven into thinking that other people's Audio litter is collected in a sound box, but this device is but an old fashioned way of propagating sound to greater volume. It is a sobering thought that if someone is cleaning his car with the radio on, (as sound is emitted in ALL directions), only .005 per cent of the total sound energy goes into the car owners ears... the rest goes into ours, although I am of the firm opinion that most of it goes into mine.

Throughout the history of sound, the sweetest sound of all has been that of a person's own voice. This is because sound reaches a person's ears by way of the bone structure in the head. This has the ability to filter out all monotonous monologue and poor repetitious vocabulary, you know, into scintillating wit, full of the charm of the language. Clearly, that's right. Clearly yes. You know. Yes, that's right. It's quite clear. Man. You know. That's right. You know.

Sound today has become the greatest growth industry we have. With planning by central government, (which also makes a great deal of noise ), I can see no reason why anyone should not receive their full (volume) quota of sound. That makes sound sense, and will be called a 'SOUNDLY based economy'. As I am deaf in one ear I shall look forward to receiving twice as much sound to make up my deficiency.

There are the pessimists among us who think that all this will finally lead to man's demise in one last big bang. This is known as recycling the universe, but as there is always background noise in space, sound will always have the last word as it were.

Finally, to end this discourse on sound, here are some meanings and anomalies which you may care to use as reference:

SOUND ADVICE... See your Hi Fi dealer.
SOUND ARCHIVES... Club for retired dealers above.
SOUND FINANCIALLY... The sound of coins at the local bank.
SOUND TRACK... The start at Silverstone.
SOUND... A building is sound when it is silent, and unsound when it suddenly makes a great deal of noise.
SOUND BARRIER... Where sound begins, not where it ceases.
SOUND OFF... Turn your own sound ON.
SOUND REPRODUCTION... Copy of a picture by Whistler.
SOUND LEVEL... The same as noise level but slightly more pleasant.
SOUND OF MUSIC... What the hills are alive with. A discovery made by that soundocologist, J. Andrews. ■

# Easy Station Selection even in the 1940s.

*by Harold Page*

Press button tuning and station pre-selection came in around 1930. Various methods of pre tuning have been employed over the years. HMV used a series of coils with cores which could be pushed in to the required depth to produce the frequency needed. Later they, and others, employed a small electric motor (large by to-day's standards). At the press of a button the motor drive could engage the cursor on the indicator dial and shunt it along to the next buffer which had been aligned to coincide with the required station. Philips 'did it' with bowden cables; they loved to make life as complicated as possible.

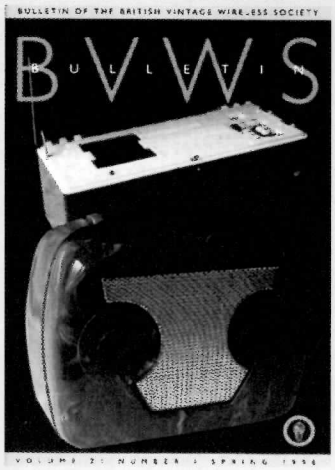
However, my story is concerned with an elderly lady customer who, having had her name on the waiting list for a W.T.C. radio for over a year, on its final arrival constantly got lost on the one and only M.W. dial. About twice a week she would call into the shop to ask the 'nice young man' to call on his way home and retune the wireless. She would always give him a cup of tea and a bun for his trouble. This was years before a dealer would dare to make a charge per visit, but the novelty of the bun and tea began to become an irksome chore. Bert Potter, our van driver cum handyman, always with an eye for a sale (and his 5/-commission), suggested that the old lady should have one of the new W.C.R. wirelesses with long wave as well as a medium wave band. Ideal. The extra £10 plus £2,3,4. purchase tax was no deterrent to the old lady.

There was, however, a snag; the old lady now had two wavebands on which to get lost. Bert's advice to have the Home Service on one set and the Light Programme (L.W.) on the other, had only succeeded in bringing his lady friend into the shop to request a 'tuning for a bun' visit about three times a week instead of twice.

There was a problem; I don't accept problems; there are no problems at Pages, only challenges. So Bert got his thinking cap on. Now Bert was good with accumulator terminals and he kept the shop in spotless condition. He could, if required, fit a 5 amp 2 pin Clix plug (no screws, just push 'em in), but anything too obscure would send him to one of the bench engineers. Not this time; this was his solo turn. The first was tuned to Long Wave Daventry Light Programme. There was no glass on the WCR dial; it comprised a yellowish metal back plate and another rotating metal plate on the same spindle as the variable condenser. Bert held the knob on station and his confederate attacked the two plates with a 1/16" drill. An appropriate brass nut and bolt was passed through the two plates and a similar modification was carried out on the second WCR for the Home Service. This masterpiece of electronic engineering was never rewarded by Bert getting Honourary Membership of the I.E.E. but the old lady was delighted.

■

**The following BVWS Bulletin back numbers are currently available.**




Vol 10 Number 2 Inc. The KB Masterpiece, Extinct Species "A Monster Defiant".

Vol 11 Number 2,3,4 Inc. BTH VR3 (1924) receiver, Marconi's 1897 Salisbury plain tests, Origin of the term 'Radio', Baird or Jenkins first with TV?

Vol 12 Number 2,3,4 Inc. the Emor Globe, The Fultograph, Ekco Coloured Cabinets.

Vol 13 Number 1,2,3 Inc. Direct action tuning, The Philips 2514, Noctovision.

Vol 14 Number 1,2,3 Inc. Cable broadcasting in the 1930's, The story of the Screen Grid.

Vol 15 Number 1,2,3,4 Inc. The wartime Civilian Receiver, Coherers in action, Vintage Vision.

Vol 16 Number 1,2,3,4 Inc. The Stenode, The Philips 2511, Inside the Round Ekco's.

Vol 17 Number 3,4,5 Inc. Wattless Mains Droppers, The First Philips set, Receiver Techniques.

Vol 18 Number 3,4,5 Inc. The First Transistor radio, The AVO Valve tester, The way it was.

Vol 19 Number 1,2,3,4,5,6 Inc. The Birth of the Transistor, Super Inductance and all that, reflex circuits, A Murphy Radio display, restoration.

Vol 20 Numbers 3, 4, 5, 6

Vol.21 Numbers 1, 2

**Supplements:**

1 "Just a Few Lines" The Birth and Infant years of BBC Television.

2 "Metro-Vick 1922-1928", "Early Television in the UK" , "Industrial aspects of the Valve before 1925"

**Brown Brothers 1925/26 Component Catalogue re-print SOLD OUT!**

*All Bulletins and supplements are priced at £2:00 each + postage. Bulletins from volume 21 onwards are priced at £2.50 each. + postage.*

*Postage:*
*for individual bulletins add 50p, for 2-5 bulletins add £1, for 6 or more add an extra 20p each.*
*All requests for back numbers, should be sent to the Membership Secretary (Mike Barker) whose address can be found in the inside-front page of this bulletin.*

*Letters continued from page 35*

investment for the net being relatively small compared to their original one of acquiring the computers.

I have been exploring Radio Sites after a very shaky start with a freebie net package which dropped through the post at Christmas and have since been in touch with one or two BVWS members on aspects of interest to them, gleaned from the very fine and professional American sites. On this point I would agree that Phil Nelson's is the king of them all... You can get a complete pictorial education (with notes) of magnificently presented sets of every kind from tombstone to transistor, classified under various headings from the 1920's onwards. This allows study of sets you are unlikely to meet in a lifetime; i.e. for me... Valve portables from all the great US companies of the 30's and 40's, in opulent deco styling and wonderful to behold for Zenith fans, a complete Trans-Oceanic site starting with the original 'Clipper' valve portable of the 1940's and much more to follow.

To break the ice, I would actually recommend starting with the 'Golden Age of Radio' site which has many resources. This not only directs you to gallery type collections such as Phil Nelson, Don adamson etc but also to others not so well known, such as Padgetts Trans-Oceanic site: this is more in the way of a thesis giving a very scholarly model review with detailed valve line ups, circuit and cabinet changes, servicing tips etc. There is also 'the Xtal set society' who aim to rekindle home construction interest and skills with an excellent journal and booklets. They respond to Email queries next day (as do all of the people I have mentioned so far- with great enthusiasm!). Finally, the Golden Age site has its own small but highly selected gallery of 20's to 50's famous sets and a selection of sound archives from films and wartime radio shows etc.

So there we have it. For existing seasoned BVWS members, as opposed to newcomers and students, an interesting complement to the irreplaceable 'hands on' and 'being there' aspects of Vintage Wireless, which doesn't need a computer! But if you were actually hovering on the brink of getting one, then the internet (warts and all... and there a lot) actually brings a PC to life with the live world coming in and out and constantly being updated. (I actually get the impression of tuning through the short wave bands as new sites (stations) pop up in front of me from nowhere!). This along with new communications leading to shared and enhanced knowledge brings greatly increased pleasure to the hobby. I hope therefore we can hear more about Vintage Wireless website discoveries in the BVWS pages from time to time, to complement the current excellent feature mix of the journal. I also hope good quality English websites will appear one day.

Finally, the only word I will say about computers and especially for using the net, I believe applies to the purchase of tools. ie. 'Nobody ever regretted buying a more powerful (faster!) one'.

*Yours sincerely*
*James Duckworth*

***Web sites mentioned***

*Golden Age of Radio*
*http://www.kqed.org/oldradio/oldradio/.html*

*Padgett*
*http://www.netmind.com/padgett/r520b.htm*

*Xtal set society*
*http:www.1stnet.net/~xtalset*

# N E W S

**Further Harpenden meetings**
More dates for your diary - mark them in now! A weekend meeting on the 21st and 22nd September (see advert on following page), the year finishing with another auction on the 24th of November 1996.

**New swapmeet in Sussex**

BVWS member Les Daniels is starting a swapmeet in Horsham, West Sussex. The swapmeet will take place on Saturday, 2nd November at North Heath Hall, North Heath Lane, Horsham, West Sussex. The doors will open at 9.30 to stallholders and 10.00 am. to everyone else. There will be a mini auction and also meals and refreshments will be available throughout the day.

For tickets, table bookings and enquiries please ring Les on Horsham (01403) 263651

**Other meetings**

Jonathan Hill will be holding a National Vintage Communications Fair on 1st December at Wembley and 4th May 1997 at the NEC.

There will be a Wootton Bassett swapmeet on December 8th 1996.
There will be a Portishead meeting on the 8th of September.
A swapmeet at Southborough will be held on the 13th October.

**Demonstration lectures by Ralph Barrett**
The first is a repeat (by special request) of 'Popov versus Marconi' in the new lecture theatre of the institute of Physics at 76 Portland place, London. Wednesday 23rd October. Tea at 6pm, lecture at 6.30
The second is in the refurbished lecture theatre (a microphone at every seat), of the institution of Electrical Engineers, Savoy Place, London. The lecture is entitled 'Baird- the Man and his television'. Pictures will be viewed on an original Baird 30 line Televisor. Monday 18th November, nearest underground, Embankment. Sandwiches at 6pm, lecture at 6.30 pm. Both are free entry.

**Bulletin Index**
The Bulletin Index is currently available up to issue 21/2 and is a complete cross reference of authors, subject matter and main articles back to the beginning of the society. Please send a large SAE with a cheque for £2 payable to Pat Leggatt at 28 High Park Road, Farnham, Surrey, GU9 7JL. His telephone number is 01252 719081.

**New Articles**
**If you have anything interesting to say concerning Wireless, Television, Broadcasting, Collecting etc. please send it to the Editor for future publication in the BVWS Bulletin, as the Bulletin is only as interesting as the articles that comprise it. We welcome all suggestions and comments regarding the new appearance of the Bulletin and hope that it is catering towards your needs as a collector / enthusiast / historian. Your article can be just a few paragraphs long as long as you think it conveys its message across to your fellow members.**

Also if you have any photographic material that would look good in the bulletin, don't hesitate to post it to the Editor. The chances are that I will definitely use it!

Please send all articles handwritten, typed, and / or on floppy disc to:
Carl Glover, c/o Runciter Corporation, 33 Rangers Square, London SE10 8HR.

**OBITUARY**

The death occurred on Monday May 20th of one of the newer members of the B.V.W.S., Ken Gledhill who was 65.

Although a member for less than 2 years Ken's life had been spent within the radio and electronic industries.

His interest began as a boy in the late 1930's, building the inevitable crystal sets and simple valve receivers whilst during the war years he repaired receivers for friends & neighbours in what was very much a 'make do and mend' era. After leaving school Ken obtained a job and apprenticeship to train as a Radio Service Engineer with a local Murphy dealership.

During this period the industry made an effort to set a standard for servicing work, so the City & Guilds/R.T.E.B. (Radio Trades & Electrical Board) introduced a five year course in Radio Servicing, Ken being one of the first people to be put through this course and sit its examinations (the advent of television as an established medium eventually reduced the course to 3 years, allowing the extra 2 years for Television Servicing).

Following National Service in the R.A.F. and a short period back in the service industry, Ken decided his future lay in sales and obtained a job as Sales Engineer for the North East of England with A.H.Hunt (Capacitors) Ltd., of Wandsworth, where he was involved with the sales of capacitors to both the radio & television service industry, but more importantly the industrial electronic manufacturing companies. As a point of interest the term 'electronics' had not come into general use in the mid 1950's when Ken joined Hunts and he used to tell the story of how he visited a company with the word 'electronics' in its name and asking a director of that company the meaning of the word !!!

One of Ken's major customers in the service sector was a wholesaler in Leeds, the name of which was A.C.Farnell Ltd., a very bright company who were quick to realise that specialist suppliers were going to be required to furnish the component needs of the growing new electronics industry. As a result of this foresight they asked Ken to join them in 1963 to start up an industrial sales division.

The rest is as they say history, the industrial division took off resulting in the abandonment of the wholesale business, the company name was changed to Farnell Electronic Components Ltd. & Ken eventually became Managing Director of a company which has a turnover of approximately £150 million per year and employs almost 1000 people (overseas operations included). In his latter years Ken became interested in model engineering and set up a workshop at home with every conceivable machine tool which the model engineer would desire. Various models were made including the obligatory static steam engine, but eventually his interest returned to radio and the equipment of the early days of the industry. He constructed a couple of crystal receivers manufacturing all the parts himself with the exception of tuning capacitors & some coils and spent many hours working on circuits which provided better sensitivity & selectivity than the original 1920's sets. At the time of his death a single valve receiver had been constructed, whilst 2 and 3 valve sets were planned.

Ken's work was a credit to the dedicated amateur in terms of the quality of construction and performance of the equipment produced; we hope to show some of this work at the 2 day Harpenden event in September. Ken was a good lifelong friend who is very much missed, He is survived by his wife, son, daughter and four step daughters.

*Geoff Horne.*

Saturday 21st & Sunday 22nd September 1996 • Harpenden Halls, Harpenden, Hertfordshire, England

# 20th Anniversary weekend

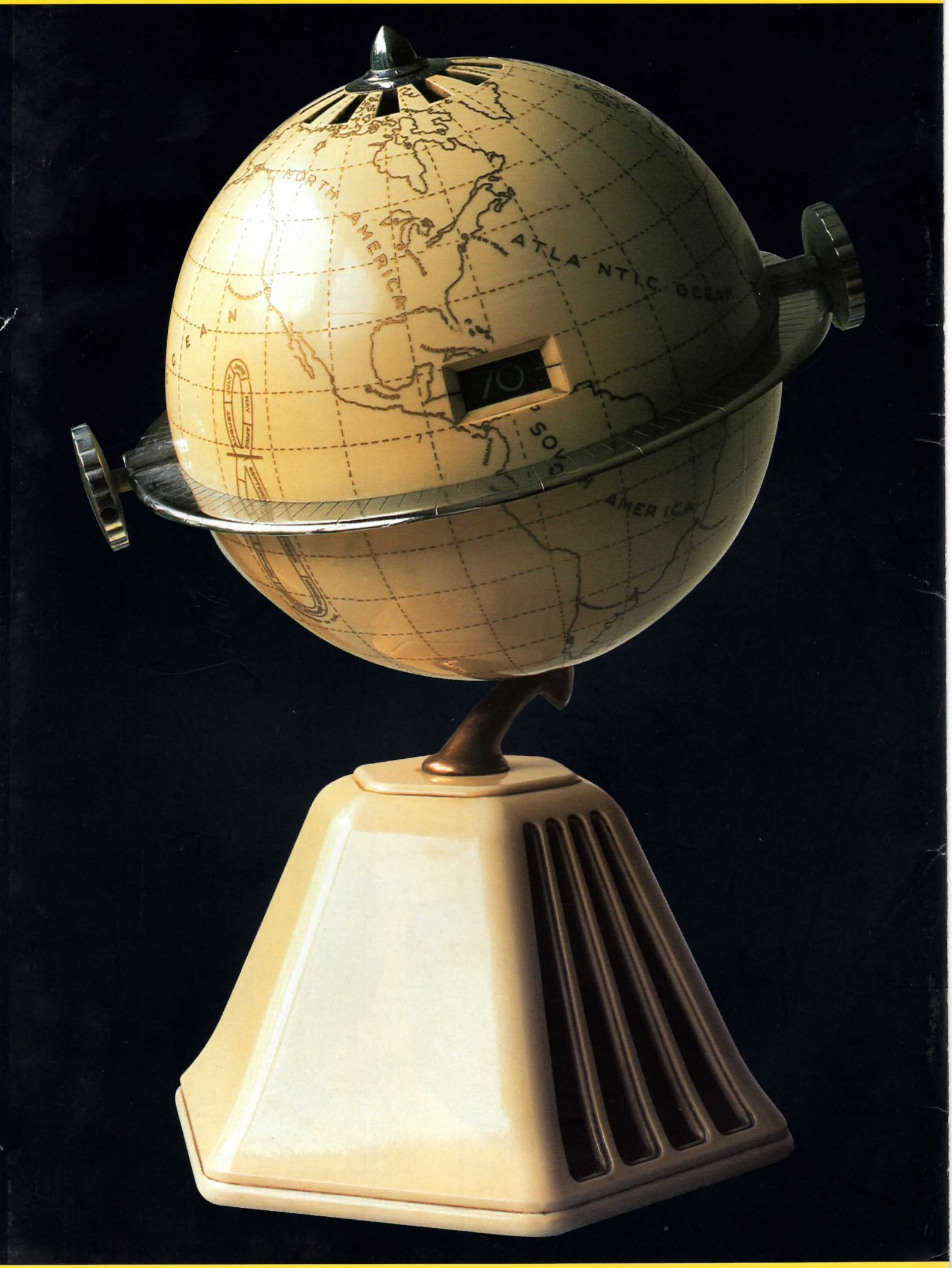
**Saturday:** A large exhibition of Telegraphy, Wireless and Television from the 19th Century to the era of the transistor An auction of collectors' items • Heinrich Hertz - a historical presentation by Ralph Barrett • a splendid display of rare valves • Vintage Radio Station • Norman Jackson drawings • Archive film & Video • registration from 10am, entry 11am
**Sunday:** A traditional Harpenden 'Swapmeet' packed with interest and opportunity to find the elusive item you have been looking for • restoration contest • bring and buy stall and much more • registration from 9am, entry 10am
**reduced** fee for 2 day attendance

all day catering will be available on both days from the cafeteria and foyer bar. If visitors wish to stay in the area on Saturday night we will be glad to help them find accommodation. Persons who require assistance because of disability should contact the event organiser. Parking - Saturday - special arrangements have been made - Sunday - parking in local roads as usual

**Special souvenir record of the event by Jonathan Hill, free to members early next year**

Many members have already sent in for their tickets and reserved a table at the swapmeet or have offered items for the exhibition, auction and restoration contest

**Write to Ken Tythacott the Events Manager at 21 Barrett Road, Fetcham, Surrey, KT22 9HL, England enclosing SAE, or telephone 01372 452569 for further information.**




Colonial 'New World' Radio, made In Bakelite or more specifically Urea Formaldehyde as in the white models, manufactured in 1933, this set was the most well known of the models manufactured by Colonial.