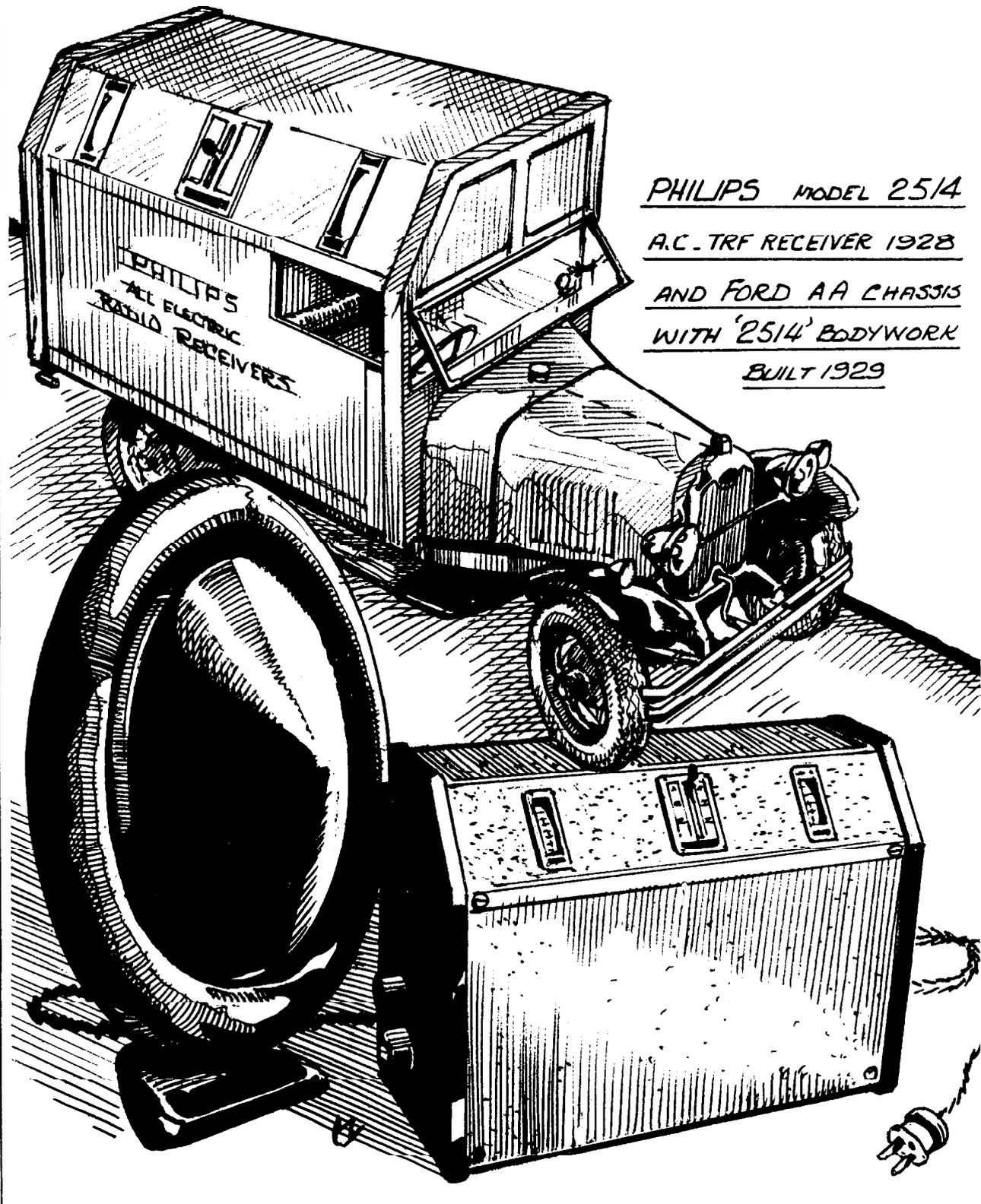


BULLETIN OF THE BRITISH

# VINTAGE WIRELESS

SOCIETY



PHILIPS MODEL 2514

A.C. TRF RECEIVER 1928

AND FORD AA CHASSIS  
WITH '2514' BODYWORK

BUILT 1929

## BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

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Editorial and advertisement enquiries should be made to the Editor, Robert Hawes, 63, Manor Road, Tottenham, London N17 0JH. Tel: (01) 808 2838. Editorial Assistant: Pat Leggatt.

## BRITISH VINTAGE WIRELESS SOCIETY

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## Feedback

### Cable Wireless

An article is being prepared for the next issue of the Bulletin on the subject of P. P. Eckersley's cable broadcasting experiments and the Editor is seeking photographs and any other illustrations to go with it.

If you can help please write, or telephone him on 01-808 2838.

### Woolworths set

Does anyone know whether Woolworths ever sold a crystal set of their own 'brand', and an earphone kit to go with it? Have any survived? Let the Editor know if you have any information please.

### Call-signs

Members who are radio amateurs are invited to send their call-signs, so that a register can be compiled.

The Chairman and Committee and the Editor of the Bulletin send seasonal greetings to members of the Society.



Illustration by E. Brier from the 'Wireless Uncles' Annual of 1925.

## Christmas tale of the Wireless Fairies

Once upon a time, when the Radio Times was just that, the Wireless Fairies brought music and laughter into every home as they lit the little magic lamps in every wireless set. Every little *Filament* a great deal to them. But now that there aren't many magic lamps left, the fairies have to ride the airwaves far and wide to find some quiet corner where they can still bask in the warm glow of a few remaining valves. So that we don't forget them this Christmas, let me introduce those faithful Wireless Fairies, who have kept your wireless bright these 60 years...

In the Technical Section there's *Galena* and *Crystal*, *Antenna*, *Meta*, *Resista*, *Detecta*, *Inducta*, *Condensa*, *Tuna* and last but not least, poor *Accumulata*, who's so run down these days because nobody seems to want her. On the cultural side, supplying those endless rhymes that fairies need to tell their tales are twins *Ann* and *Kath Ode*, and elder sister *Di*. Terrestrial transport is organised by the *Henry* family with their cycles... spare a thought for *Milli*, who used to drive a *Megacycle*, until she was banned by the powers that be (ten long years ago - and it still *Herz*), and she never had a *Kilocycle*. As each little wireless lamp goes cold for the last time, another fairy loses her hold on life, and drifts silently away on the long slow waves of *Aerial* into the eternal *Ether*. But - it's a poor Christmas Fairy Tale that has an unhappy ending: as the original Wireless Fairies waft out of the valvelight, a new and sturdy generation founded by *Audina* and *Videa* bring the magic of Wireless and Television to your home. The new Wireless Fairies are tiny sprites, *Chips* off the old block *Silica*, and are called *Transista* and *Semiconducta*. They're so small you hardly know they're there but you'd miss them if they weren't! But Please don't forget the old Wireless Fairies this Christmas: Light a valve and keep one warm!

Tony Hopwood

# In passing



by the  
Editor

Correspondence for the Society's Bulletin should be addressed to The Editor, Robert Hawes, 63 Manor Road, Tottenham, London, N17 0JH. Telephone: (01) 808 2838.

## Subscriptions

Members are reminded that all subscriptions are due for renewal irrespective of individual dates of joining, on 1st January 1989.

This is a change in policy because the membership used to run from 1st April.

The subscription has been held at the same rate for some time, but because of increasing costs we are having to make an increase this time. The amount required for these extra costs is, however, only a small proportion of the total new subscription increase. Most of it will be required for the post and other distribution costs in connection with our facsimile reprint of the Brown Brothers Wireless Catalogue of 1925, which is a free gift to members. We hope you will like this splendid reprint, which we estimate would be worth around £10 a copy on the open market. It has been taken from an original kindly lent to us by Rupert Loftus-Brigham, and carried out by Gordon Bussey who has taken tremendous pains to make sure it is perfect in every detail.

## Regional Meetings

The Society encourages the staging of meetings in various parts of the country to augment the major ones held twice a year at Harpenden, and we are anxious that they are properly organised and that as far as possible the various regions should get their fair share.

A set of Guidelines has been produced and is available to anyone wishing to organise such meetings. If officially recognised, such meetings will be given publicity, will be fully covered by our insurance policy and organisers are guaranteed against any financial losses but the Society will expect to receive any profits and the meetings must be for BVWS members only. Copies of the Guidelines are available on application. We are particularly anxious to find members willing to organise meetings in Northern England or the Scottish border.

## Harpenden meeting

The November meeting at Harpenden was by all accounts a great success and attracted a record number of members, raising a good profit for Society funds which will be useful to cover expenditure on new projects like the vintage catalogue reprint and the new badges.

The 'fleamarket' in the morning was the busiest ever and members reported that it was a friendly meeting and many especially enjoyed the atmosphere in the display and refreshment room, this time consisting of some very early equipment. Displays included some interesting scanning discs brought by Tony Ransom and a very early Televisor brought by Tim Voore. Most impressive was a line-up of early receivers, arranged by John Gillies, of vintage sets showing original 405-line material fed from a sound-and-vision Channel 1 modulator connected to an

ordinary VHS video recorder. The sets included an HMV 905 7" television-radio which sold in 1938 for 35 guineas; a Pye 9" of 1948 which employed Red EF50's in a TRF circuit and which was the first postwar set to use flyback EHT; and a Bush 9" TV22 which thousands of people bought to view the Coronation of 1953. To commemorate the centenary of the Hertz experiments a small display of equipment was arranged by Tony Constable. The objects on show were loaned by the Science Museum. They were quarter-scale models of the open oscillator dipole, receiving loop, parabolic reflectors, pitch prism boxes and polarizer. The simplicity of the apparatus is always impressive, considering the range and completeness of the Hertz experiments in 1888.

At the short annual meeting conducted by Chairman Pat Leggatt, the present officers were re-elected and the accounts for the twelve months ended March 1988 were presented, which showed a healthy situation (a copy of the accounts is available from the Editor on receipt of an SAE). An important event at the end of the day was the now well-established auction which not only helps members to dispose of the large quantities of goods they bring along, but also helps Society finances. Thanks are due to Roger Snelling and Tony Constable, who conducted the auction with chilled fingers and sore throats. Donations of goods for sale raised £197, mainly due to the generosity of Messrs. Hill, Leggatt and Thackeray. A total of 92 lots were sold for £764, and the Society's commission on this amounted to £56.70, so the total raised for our funds amounted to £248.70. We welcome more donations to the Harpenden auctions: members who are turning out their workshops are asked to keep this in mind please!

## The Bulletin

This issue of the Bulletin brings publication back on schedule so that it is now up to date. The next issue is due in March, to be followed by issues in June, September and December.

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## In Passing (continued)

### • "In passing" continued



#### Baird Commemoration

John Logie Baird's widow Margaret, unveiled a new National Trust plaque on 1st December at 'Swiss Cottage', Box Hill, Surrey, their residence from 1929-32 and the scene of the famous 'Noctovisor' experiments. (This photograph was taken recently by Ray Herbert).

#### BVWS badges

By popular demand, we are producing a Society badge. It will feature an 'R' valve in a colour circle in gilt and real enamel, made by an old-established Birmingham firm which still uses the traditional production methods used to produce the early 'twenties vintage BBC Circle badges which are much sought after by collectors.

Available just after Christmas at £2.50 including postage to UK members, the badges, designed by Bob Hawes, will have a universal pin fixing to enable mounting on equipment or displays as well as lapels with or without buttonholes.

#### New Museum

A new Design Museum, to cover everything from furniture and fashion to motor cars and hairdryers is being built at Butler's Wharf on the south side of the Thames near Tower Bridge, and will also include radios.

Their researchers are seeking donations or loans of particular sets: mostly, it seems, ones considered as being important by graphic designers, rather than ones which technically-minded vintage wireless enthusiasts might consider interesting, important or representing technological milestones.

There seems little demand from promoters of designer-exhibitions for objects which are produced simply to function well, the accent being on marketable appearance.

#### Second Wireless Seminar

Those who attended the Vintage Wireless Seminar last year found it a stimulating occasion and supported the idea of making it an annual event. It was so well attended that we have decided to hold the next one in the small hall at Harpenden which will accommodate many more people than Gerry Wells' front room. An application form has been included with this Bulletin.

Come to the meeting whether you have a talk to give or simply want to listen to others talking. It is a great opportunity for discussion and argument.

Speakers can select their own topic on any subject relating to Vintage Wireless. Last year's programme included wireless history, company history, restoration, servicing and technical subjects. We hope the second meeting will cover a similar range of topics.

We would appreciate offers of short talks, 20 minutes or less, on any vintage wireless subject, since a good variety of subject matter is needed. Anyone interested should contact Tony Constable or Pat Leggatt or complete and return the form enclosed with this Bulletin.

#### New Honorary Members

**We now have three new Honorary Members who will already be well known to members. They are, in alphabetical order, Gordon Bussey, Keith Geddes and Ray Herbert.**

Gordon Bussey has to his credit a notable list of widely circulated vintage wireless and television publications which began in 1976 with a book on crystal sets and have included histories of the Pye and Roberts companies, and articles for an LSE Biographical Dictionary. He was co-author of a book on the history of television with Keith Geddes, with whom he is currently engaged in the production of a history of the receiver industry. He was Philips co-ordinator for the 1977 Wireless Show at the V and A and for the 1986 Centenary of Television exhibition at Bradford. The Society is indebted to him for his help in various ways, not least in arranging production of high-quality facsimiles of rare vintage wireless publications.

Keith Geddes, OBE, who, before his retirement in 1986, had a distinguished record in the telecommunications division of the Science Museum,

assisted the Society from that position. He joined BBC research in 1947, working on recording, acoustics and subjective assessments. In 1968 he moved to the Science Museum where he greatly strengthened the domestic receiver collection, and in 1980 he pioneered the display of television sets showing programmes of their own vintage. He is currently writing a history of the receiver industry.

Ray Herbert is well known in vintage television circles and is a respected authority on early developments in the field, particularly the work of Baird. He has been of great assistance to the Bulletin Editor and to authors of various books. In addition, he is often called in by museums to give advice because of his special knowledge. Ray built a Baird Televisor as a schoolboy in 1933 and watched the original 30-line programmes. After completing an electrical engineering course, he joined the Baird Television Company and in 1939 he was fortunate to have been engaged on a historic project involving the transmission of high definition television pictures from a bomber in flight with a means of recording the video signals at the reception point. Much of his career has been spent in high power electronics, but in recent years he has been an independent consultant engineer. He is President of the Narrow Bandwidth Television Association and Honorary Secretary to the Baird Amateur Radio Society which has a licence to transmit television signals using Baird's original call sign 2TV. Ray has held an amateur transmitting licence for 54 years.

#### International Meeting

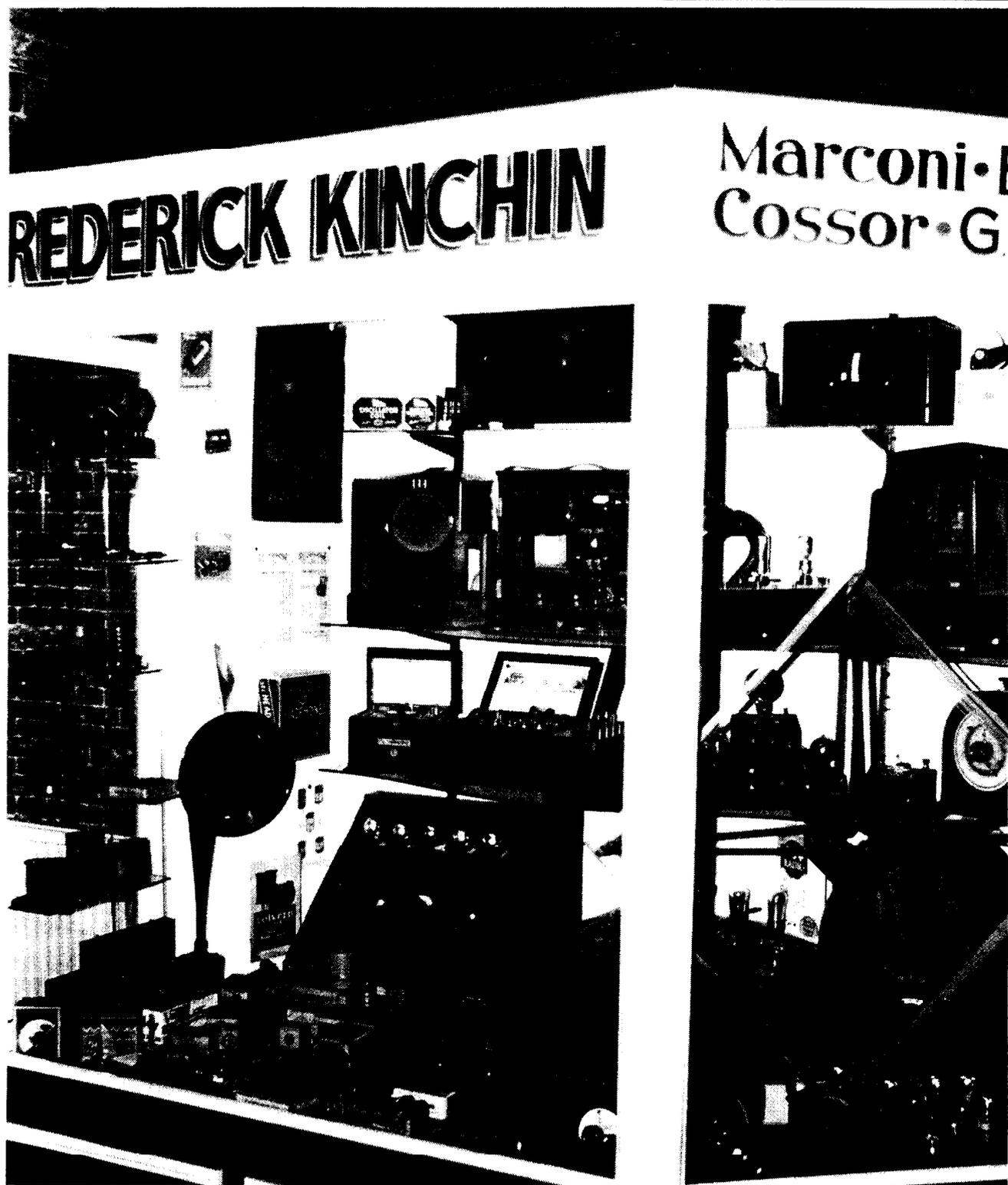
**Plans are well in hand for our International Meeting to be held in London from 24th to 26th June 1989 to coincide with our normal Harpenden meeting on 25th June.**

A good contingent from the American Antique Wireless Association is expected and we are also looking forward to seeing representatives from societies in other parts of the world. Pat Leggatt and Tony Constable would be pleased to hear from societies who would like to join in. They should write to Pat at Garretts Farm, Pankridge Street, Crondall, Farnham, Surrey GU10 5QU.

#### Greetings

*The Chairman, Editor and members of the Society's committee wish everyone the compliments of the season.*

## Round the Collections



Modern museums, even private ones, are being designed in new ways, to be more interactive and to present exhibits within historical settings. A private collection which is doing this is the one which BVWS member Dennis Norton of Birmingham, has been building up for many years. The museum he owns, which includes a crafts centre, is at 26 Birmingham Road, Bromsgrove, and has an expansion programme which will recreate some thirty vintage 'shops' displaying all kinds of objects. The latest to be completed is a replica of a pre-war radio shop, based on that of a dealer established in the twenties. Original advertising material and components for the amateur constructor are displayed among the sets, which include an Osram Music Magnet; a Co-Op Defiant (so called because it defied the industry's price-fixing policy by offering a dividend to the buyer); a Brownie no.1 standing on its rare 2-valve amplifier; a BTH with a compass to direct its frame aerial; and various more common crystal valve sets of the 'twenties as well as sets of the 'thirties. The museum is open all the year round, from Monday to Saturday 10.00am - 5.00pm and Sunday from 2.00 - 5.00pm and the telephone number is 0527 77934.

## Reminiscences

# "Service of the Antique World"

by Chas. E. Miller

**It has to be admitted that the "service" Shakespeare had in mind when he penned the words above was probably not associated with the repair of radio sets, but the quotation has a certain aptness, particularly as it comes from "As you like it".**

There is no doubt whatsoever that I *do* like servicing those very lively antiques, valve radio receivers. Looking back, I realise that I was born at a lucky time in radio chronology; when I was old enough to start work, a few years after the end of world war II, a shiny array of new sets was there to be tended, but because of economic conditions there were still vast numbers of pre-war radio sets that had to be maintained. Thus I had the best of both worlds. When I was sixteen-and-a-half years of age I found myself as junior service engineer in our town's largest radio store, the senior man having just passed his twenty-first birthday. The two of us, with one part-timer, repaired literally scores of sets every week. The firm had two vans constantly on the go fetching and delivering from a radius of about fifteen miles from home. It was, I suppose, extraordinary to be thrown into the deep end in this manner, but at the time this aspect never struck me. There was far too much work to be done to bother with thoughts of this type. We worked, nominally, shop hours of 44 per week, but in practice we often did many more, making collections and deliveries in the evenings when the regular van drivers had knocked off. It staggers me now to think of how many sets did pass through my hands in those days. As a day-by-day education in radio servicing it could hardly be surpassed.

I can picture our service department very clearly; it was about ten feet long by about seven feet wide, with a bench running the length of one wall. Our equipment consisted of a GEC "Selectest" multi-meter (my colleague's) and an AVO 40 used by me. We had an AVO signal-generator and a Hunt's resistance-capacity bridge. This conglomeration was sufficient for our needs and we never felt the desire for anything else. We used 65W "pencil-bit" Solon soldering irons that were kept in conical buckets fastened to the legs of the bench. These buckets were open at the lower end as well, with the ever-present risk of

drops of molten solder falling from the bit of the iron straight onto one's foot. Very painful that. For heating in the winter we had a single-bar electric fire that no self-respecting scrap dealer would have admitted to his premises. The element broke frequently. As there was no time to fit a new one, we simply twisted the end of the resistance-wire together. Inevitably, this created a hot-spot, followed by fearsome sparking and often a shower of molten metal and fire-clay across the floor. It can only be luck that we didn't set either the building or ourselves on fire. Equally astonishing is the fact that in these curious surroundings we got through the work speedily and with fair efficiency. We had very few "call-As" as if all this were not enough, we also used to build receivers for sale in the store. These were AC/DC straight-three midgets, of conventional design and housed in bakelite cabinets that were virtually identical to the contemporary Pilot "Little Maestro". Weymouth "P" coils were used in these sets, and they had "line-cord" mains droppers. The valve line-up was 6K7G, 6J7G, 25A6G and 25Z4G. I wonder if any of those receivers still exist?

In addition to the huge range of British sets that came our way (at least 65 makes, from Aerodyne to Zeetavox) a fair number of foreigners were brought in. In those days none was imported officially, of course, but many returning servicemen brought them home as souvenirs. Naturally enough, a good proportion originated in Germany, but many other countries were represented. Fortunately we had a copy of that wonderful valve Vade-Mecum, which was of inestimable value to us when checking out the more exotic "bottles". There was one range of sets for which no extra valve data was required, however. This was the Philips 209U "midget". We had near-identical examples from Holland, Sweden, the Far East, and the U.S.A., plus those, of course, made in this country. Splendid little sets, with a full specification despite their small size. We must not forget the American sets that were purchased by the Board of Trade during the war to fill a gap in home production. These were "Midgets" of varying specifications from simple 2-valve T.R.F.s up to quite sophisticated superhets. All had been designed for 110-120V, of course, and had had to be fitted with extra mains droppers for UK supplies, in many cases of the "line-cord" type. Unwary customers used to cut these down and over-run the valves severely. It was astounding how much excess heater voltage some would stand, but inevitably there were casualties. All too often the victim was a combined rectifier-pentode such as the 12A7 or 25A7. We then had the job of trying to cram an extra valve into a tiny cabinet to employ separate output and rectifier

functions, as those particular types just weren't to be had. This reminds me of a discussion in this magazine as to whether there really was a shortage of valves during the war, and for a time after.

In my experience there certainly was. For some reason a few specific types became seemingly non-existent, and as the sets had to be kept going by fair means or foul, we became adept at making adaptors. These usually consisted of the base from the old, useless valve removed from the envelope and fitted with a holder to accept another type of equivalent performance. The one that sticks in my mind was the AC/TP, which was used in, amongst others, Ultra sets from the mid-30s. We used to fit the base with a British 7-pin holder and use an AC/TH1. Another perpetual head-ache was the PenDD61 used in the Philco People's Set, made specially for them by Mazda. The official mod. was to fit a heater resistor and use the equivalent Mazda 4V heater valve, but because the resistor was not easy to come by we preferred to make up an adaptor and use an EBL31, which curiously enough was not in short supply in those days. Other routine adaptions were for the "P" base types which seemed to have disappeared from human ken - yet only recently I acquired a number of these in original packings that looked as though they dated from the '40s! These were mostly 6.3V and 0.2A 4V heater RF pentode. Thus I might have been observed making up one of the time-honoured valve adaptors. . . plus ca change, plus c'est la meme chose. . .

## Looking Back

From 'Wireless World' March 3rd 1926:

### Talk about taxes

'To make the listener pay a licence fee is one thing, but to tax him is another' says a newspaper critic. It sounds like a pious homily on the rights and wrongs of the listener; but one of the latter writes to me to say that when he read it he had just returned from booking three seats at a London theatre, and on each ticket he had to pay 1s/6d tax. The three tickets cost 22s/6d in all. This for just under three hours entertainment. 'These criticisms of the receiving licence fee' he winds up 'leave me cold.'

From 'Wireless World' March 7th, 1928:

### A new valve test

An express train recently assisted in demonstrating the strength of the filaments of Ediswan PV2 valves. A case of 50 valves fell off the platform of Ponders End station, and the express coming along at the critical moment, wrecked the box and scattered the valves over the permanent way. When collected 41 valves were found to be in perfect condition, four were completely smashed, two had broken filaments, two had filaments intact but distorted, and one was missing.

## Book Reviews

### Book Review:

by Ray Herbert

*The Story of Scophony by Thomas Singleton published by the Royal Television Society, price £5.75 post paid.*

The pre-war television scene was dominated by the two organisations which at different times provided the systems used by the BBC: Baird Television and Marconi-EMI. They tended to eclipse the activities of other firms who were developing interesting and novel alternative methods.

On the mechanical side the Nipkow disc by no means reigned supreme. There were mirror drums, the mirror screw, Baird's honeycomb structure where the pictures were built up dot-for-dot and not line-by-line, and Mihaly's Telehor.

The Wireless World in their issues for 19th and 26th March, 1924, provided a detailed account of the Telehor with its tiny oscillating mirror and tuning fork controlled phonic wheel. Later a description of this system caught the attention of Solomon Sagall, a non-technical entrepreneur from Russia. He visited Mihaly in Germany and this resulted in the formation of the British Telehor Company. G. W. Walton, the inventor of the Stixograph, having seen the announcement, contacted Sagall and eventually Scophony was formed in 1930 to exploit Walton's inventions. Joshua Sieger, formerly chief engineer of the Lotus Radio Company, joined the team in 1932 followed by Wikkenhauser and later, the person who invented the ultrasonic light control valve, John Jeffree.

The Scophony system in essence was a means of providing a large, bright, projected picture for domestic or cinema purposes using small optical components. The features fundamental to the Scophony receiver were the use of cylindrical lenses in opposing planes providing a split focus which greatly reduced the scanner size and a light valve of special design. This ultrasonic light control device consisted of a container filled with a liquid and a quartz crystal oscillating at about 18 MHz. This produced a series of wave-fronts in the liquid, of compression and rarefaction. A light beam passing through the liquid parallel to these wave-fronts was attenuated more by the compression regions than by the rarefied ones. After the modulated light beam emerged from the light valve it was focussed on

to a high speed scanner which for 405 line reception required a 20 sided stainless steel polygon rotating at 30,375 rpm. A low speed frame scanner employed 12 rotating mirrors.

This highly complex mechanical-optical arrangement was used at the Monseigneur News Theatre, London, on 23rd February, 1939, to project a large (6ft x 9ft) television picture of the Boon-Danahar fight from Haringay Arena. At the Marble Arch Pavilion next door the Baird Company were also showing the big fight on an even larger screen (15ft x 12ft) using an all-electronic system. This involved a high powered, 16" projection tube of their own design and manufacture operating at 45,000 volts and throwing a brilliant picture on to the screen through a 14" lens.

This well researched book provides a detailed review of the Scophony Company's many activities. Interesting reports and correspondence are reproduced and there is a fascinating synopsis of evidence given to the Television Advisory Committee. Searching questions are put by the Chairman Lord Selsdon, and Colonel A. S. Angwin to the Scophony representatives in relation to their contention that the bandwidth required for high definition transmission could be reduced by 80% but unfortunately the answers did not provide any clear indication as to how this could be achieved.

**Letter:**

from Joshua Sieger, C.B.E.

I always look forward to your Bulletin, it is so interesting.

In the September issue (Vol. 13 no.3), I note you say *The Story of Scophony* may be reviewed in your next issue. I look forward to it because I had so much to do concerning it in supplying information to Tom Singleton. Fortunately over the fifty years I have carried documents relating to the company with me wherever I have gone, and it has proved invaluable. The majority of the photographs, apart from those concerning Sagall and his family, Walton and Wikkenhauser, were those I had in my collection.

With regard to the book review on *Sermons, Soap and Television*, your bold type paragraph is so right I must congratulate you on the two columns you cover for that story. I had the first copy here and I still have the problem of trying to believe all that has appeared in Baird's diary. If I had

written a diary many years ago I would have talked about a rocket to take me to the moon and a rocket to take me back; I could have been the inventor! I think Baird's imagination, and he certainly had plenty, has been turned to emphasise that he was an inventor of television.

**Letter:**

from Keith Geddes and Gordon Bussey

**A tale to tell?**

The British Radio and Electronic Equipment Manufacturer's Association has commissioned a history of Britain's radio and television receiver industry while there is still time to draw on the memories of those who remember it in its heyday. Personal reminiscences will form a vital element of the project, for often they are the only key to the stories behind the statistics, the technology and the advertising campaigns.

The author of the history is to be Keith Geddes, formerly of the Science Museum, working in close collaboration with Gordon Bussey, well known in the field of domestic radio history. Mr Geddes would like to hear from anyone who recalls what it was like to be doing a particular job at a particular time.

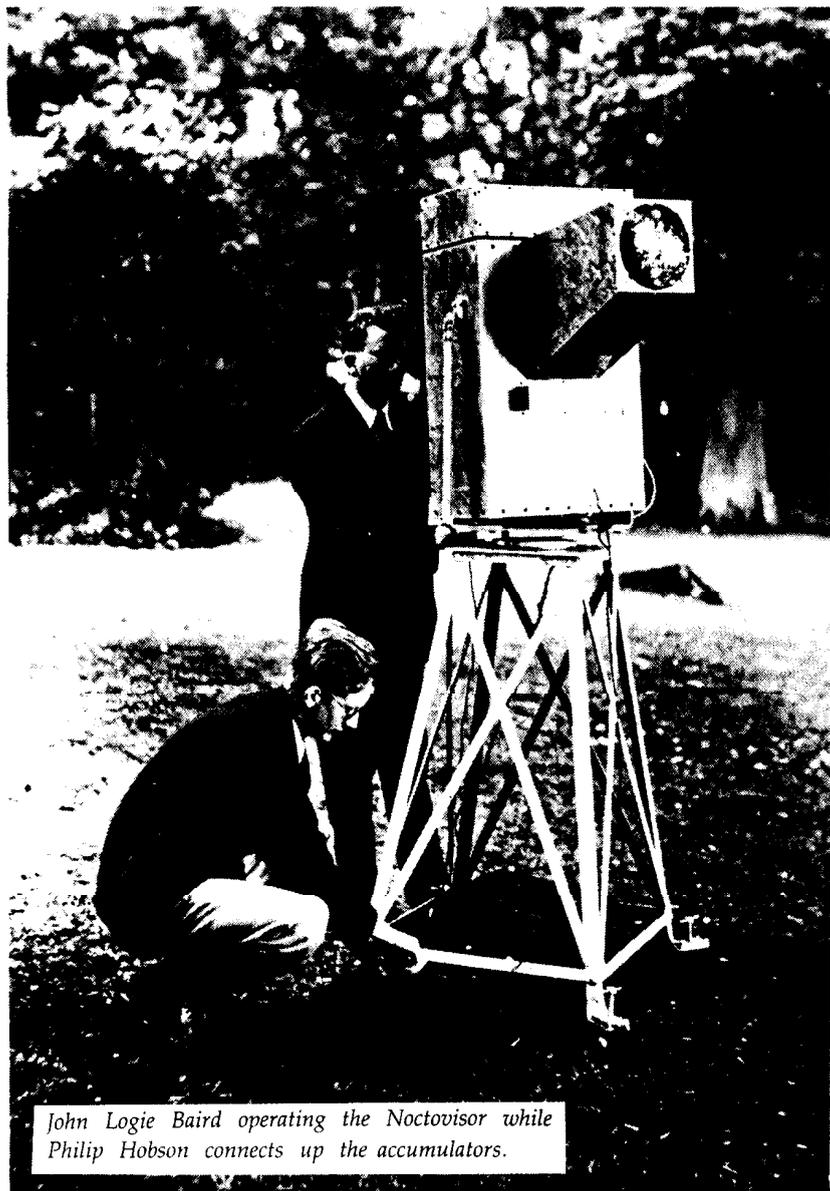
Mr Bussey would like to borrow, for copying, all kinds of pictorial material; photographs of factory scenes, exhibitions and dealers' premises; preliminary sketches of products; advertisements, brochures and catalogues.

The history, which will aim to depict the industry in a totally unbiased light, will cover the period from the early days of radio up to the present time and is expected to be ready for publication during 1991. All contributions will be welcome.

Reminiscences should be sent to: Keith Geddes, 9 Stockghyll Brow, Ambleside, Cumbria LA22 0QZ. (Telephone: 05394 34090).

Pictorial material to: Gordon Bussey, 64 Pampisford Road, Purley, Surrey CR2 2NE. (Telephone: 01-660 2240)

Gordon Bussey is at present seeking, in particular, any 'activity' photographs of radio and television factories and delivery vehicles, in particular, Decca at Brixton Road 1934-5/ and a photograph of the Burndept delivery van built in the shape of an Ethophone Five, circa 1923. Photocopies please in the first instance.



John Logie Baird operating the Noctovisor while Philip Hobson connects up the accumulators.

Close-up of Hobson's fog machine. Note the old car radiator, which was fed from a boiler and which dispersed water vapour into the horizontal wooden ducting behind it and into the windowed box used for experiments in 1930.



# The Story of Noctovision

by Philip Hobson

When I left school in July 1928, just after my seventeenth birthday, I was very fortunate in obtaining a job as laboratory assistant at John Logie Baird's premises at Long Acre, London. The laboratories at that time were littered with the remains of the apparatus used by Baird for demonstrations of colour and stereoscopic television, Phonovision – and Noctovision. All was more or less cannibalised, as no one then had any idea of their potential historic value.

The early demonstrations of television involved flooding the sitter with very bright light. An image of the sitter was formed on the scanning disc which originally used a spiral of lenses to provide sufficient light for the not-very-sensitive photoelectric cells then used to convert light variations into electric signals. As these bright lights were very uncomfortable for the sitter, Baird first tried using ultra-violet light, which proved even more uncomfortable. He then tried using infra red filters which cut off all visible light, leaving the sitter in complete darkness – hence the name, 'Noctovision'.

The issue of *Nature* for February 1927 includes an account of a demonstration of Noctovision given to Dr Aleksander Russell and Sir William Crookes in November 1926. Members of the Royal Institution were given a demonstration in December 1926, and there was another demonstration for members of the British Association meeting at Leeds in September 1927. A photograph of the equipment being shown by Mr Baird to Sir Oliver Lodge at this meeting appears in Thomas Singleton's article 'Before Television' in the *RTS Journal* for September/October 1987, and shows the ventilating ducts used to prevent the distinguished sitter from being roasted!

In the meantime, Baird had realised that infra-red rays were known to penetrate fog; therefore there were potential uses for Noctovision as military and navigational aids. In April 1927 Captain Hutchinson, the Managing Director of Baird Television Development Co Ltd, wrote to the Admiralty offering to give a demonstration of 'seeing through fog'; and in the following year when he was in New York to prepare for a demonstration by Baird of transatlantic 30-line television the St Paul

• continued on next page

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## Vintage Vision

(Minnesota) *Sunday Pioneer Press* came out with the claim that Hutchinson was arranging to have airplanes circling New York, illuminated with searchlights fitted with infra-red filters to simulate fog. This article stated that John I. Baird invented the invisible ray in England more than a year ago' and that this was hailed as an invention which might revolutionise warfare, and that there was a report that the British War Office 'had ended all further information so that the secret might be kept for England alone'. However, the article went on to say that Hutchinson denied this and that the demonstration would take place when Baird himself arrived – but I have no evidence that it ever did take place.

All this happened before I arrived at Long Acre. By that time photocells which were much more sensitive in the visible range of light had become available. Instead of flooding the sitter with light, the standard form of transmitter used a small arc-lamp to illuminate a scanning disc using a spiral of holes rather than lenses, an image of the resulting travelling spot being focused on the sitter – a much more comfortable arrangement. A box containing photocells was placed in front of the sitter and the effect of moving it about, as far as the viewer at the receiver was concerned was just as if the box was acting as a floodlight.

I was assigned to work as assistant to B. ('Monty') Banks, and about June 1929 Baird asked Banks to design a navigational aid version of Noctovision. Here I want to make it quite plain that the purpose was *not* to produce pictures of ships or any other objects which might be obscured by fog, but to locate the exact position of objects so obscured.

The resulting equipment was built in the machine shop at Long Acre, and Banks and I provided the amplifiers, etc. A full and accurate description of the apparatus is given by Sidney A Moseley and H J Barton-Chappell in their book *Television Today and Tomorrow* (1931). At that time, Baird was living at Swiss Cottage, a house on the top of Box Hill in Surrey overlooking the town of Dorking about 12 miles away as the crow flies, but about 2½ miles by road. The equipment was taken there, and Banks and I found accommodation in a couple of caravans on a site along the top of the hill, and I bought a small secondhand Rover 8 two-cylinder air-cooled car which was to play a leading part in my story of these events. I taught myself to drive in a convenient field. (Those were the days – no driving tests!)

On the night of 9 August 1929 Baird organised a press demonstration



Dr. Clarence Tierney with Baird. Note the ducting to the light boxes: to prevent the subject getting roasted!

which became the subject of an article in *Television*, the Journal of the Television Society for September of that year. An article also appeared in the *Dorking Chronicle* for 12 August which I saw for the first time only recently. Both articles referred to the mysterious lights appearing at night on and around Box Hill, which had apparently puzzled local residents, and both reported Baird as explaining that they were part of his experiments. To the *Chronicle*, my little Rover became 'Baird's car, fitted with a powerful headlamp', and they both made it quite clear that the light was 'extinguished' by placing a filter in front to cut out all the infra-red rays 'to simulate fog'. The demonstration was very successful.

Either late in August or early in September, Baird invited representatives from the Admiralty to a dinner at Swiss Cottage, to be followed by a demonstration timed for 11pm. Banks and I followed what had by then become a standard routine. Early in the evening I drove down to the Red Lion Hotel in Dorking (long since demolished) and turned on our 'powerful headlamp' mounted on the roof of the porch. As of course we knew the precise bearing, I then put the filter in place, and went back up the hill. For the demonstration the plan was to search for, and find the bearing of the

lamp from the scale provided on the instrument. But by about 10 o'clock the first of the autumn mists was beginning to form, and to our consternation we could get no response when on the known bearing. I dashed down the hill, and had some difficulty getting back after having removed the filter, as the mist was developing rapidly. The worst had happened; we had a real fog to deal with, and we could not find the light! Banks had the nasty job of telling Mr Baird, and he must have had an even worse one telling his guests.

If that wasn't bad enough, Banks immediately afterwards developed rheumatic fever and I had a difficult job getting him back to his home in North London. The equipment was brought back to Long Acre, and a mantle – or should I say 'fog' – of secrecy descended on the subject of Noctovision. Banks was back some six weeks later, and I worked with him until April 1930.

From that time on I was given work to do on my own, and had to make written reports to the Laboratory Manager, Mr Boulding, or the Sales Manager, Mr Pugh. There was always such a lot going on at Long Acre, and people were away from time to time on demonstrations both at home and

• continued on next page

## Vintage Vision

- continued from previous page

abroad and at another laboratory in North London, so that I have no recollection of having ever seen the Box Hill equipment again. But I did keep copies of my reports, and one dated 4 December 1930 shows that another member of the staff, McEwan, had been doing some experiments with a simplified form of the Box Hill gear down at Portsmouth, aimed at finding out why it didn't work, and I was told to take over.

Using McEwan's equipment on the roof at Long Acre, and after several abortive efforts to chase evening mists down the Chelsea embankment in the company's bull-nosed Morris driven by Wally Faulks, I came to the conclusion that I needed a controllable fog in the laboratory, and designed a 'fog machine'.

Steam from a suitable boiler was forced through an old car radiator with a big fan behind it to produce a fog at about room temperature. The fog then

travelled down a long wooden 'tube' and was dispersed at the far end with a hair-drier working in reverse. The tube was closed by glass at each end, with a light source at the front end and a lens and photocell at the other. An adapted form of Wheatstone bridge was used to balance out the ambient temperature so that changes in the photocell output due to light penetration could be measured. One of my reports states that 'the apparatus is sufficiently sensitive to detect the radiation from a lighted cigarette at a distance of 16 feet.'

I had a lot of help from the National Physical Laboratory, and from the two optical experts on the staff, Wilson and Myers, from which it could be shown that the moisture particles produced were about the right size for 'clean fog'. My final report, dated 21 January 1931, concluded that Noctovision as a navigational aid would not work unless very expensive quartz glass lenses were used, and until photocells became available which were much more sensitive to the infra-red

wavelengths which did penetrate fog. Boulding died some years ago and I have no idea what effect – if any – my report had. However, the Noctovision picture version lived on. My last record from my time at Long Acre is the programme for a major demonstration set up for Sir Ambrose Fleming on 26 February 1931. '30-line Noctovision picture' was one of the items shown. I was involved with another item, and have no recollection of seeing the Noctovision equipment used.

Finally, I greatly indebted to Ray Herbert for all the help he has given me from the results of his research into the early days of television, including many photographs and photostats from press articles. He also was responsible for 'blowing up' the photograph of my fog machine to reproducible size.

*This article is reprinted from the Journal of the Royal Television Society with the kind permission of the Editor Thomas Singleton. Thanks are also due to Ray Herbert for producing the illustrations – Ed.*

## Magazine Review: Télégraphie Sans Fils

Letters from BVWS members outside the UK area are a comforting reminder that this Vintage Wireless mania is not uniquely associated with the well-known insularity of the British. Other countries too have their own societies holding meetings and publishing magazines. On a par with the BVWS Bulletin for quality of production comes the latest (the 50th number) published by the Association des Amis du Musée de l'Electroacoustique (A.E.A.), 'Les Radiophiles Français' (there are 200 of them).

Its 36 pages (A5) are intended to cover not just radio but a wider range of interests, with additional subject editors for Telephone, Telegraph, Television and Valves. What better qualification for dedication to vintage telephones could there be than the admission by C. Laurencin: 'Was I not born in a telephone box?'

An article by J. Painsignan describes the early days of television in France and the work of René Barthélémy using Nipkow disc scanning with 30 lines and 15 pictures per second.

There is a nice quotation from *Monsieur Chamon* (presumably a Government Minister) who, when reproached with the high cost of developing a television service, replied, 'If I were to entertain a female dancer, you would not dare to

cast a remark. Well, television is my dancer!'

Barthélémy originally worked in the Télégraphie Militaire under General Ferrié of TM or R valve fame. He became interested in television and, after witnessing one of J. L. Baird's early demonstrations in England, concluded that the weakest aspect of the system was the method of synchronisation. Accordingly he built transmitting and receiving equipment, deriving a sync pulse at the end of each picture scan via a slit in the disc and mixing these pulses with the transmitted vision signal. In the receiver the sync pulses were separated from the vision signal by a pentode limiter and used to trigger a relaxation oscillator, which in turn drove the scanning disc motor.

Barthélémy's early work was done in the laboratories of the Compagnie des Compteurs in Montrouge. The first regular programmes were transmitted in November 1935 from a studio in the Ministry of Posts and Telegraphs' premises at 103, rue de Grenelle where a commemorative plaque has been mounted.

'Technical Talk' in this issue is contributed by M. Joly, who first provides a five-page history of crystal sets (Les Postes à Galène) including seven half-tone illustrations and five

line-blocks of circuitry. He then introduces the theory of negative feedback (La Contre Réaction) from a power output stage, under the exhortation 'Let's scour our grey matter' (Décrassons Nos Neurones). This is sourced from a 1935 original, and includes some algebra which the editor regards as little exercises to rejuvenate the reader by some years! The article finishes with more good advice: 'Pas de bricolage intempêtif', which one almost translated as 'No unseasonable odd-jobbery'. M. Joly also contributes a page on 'Philips' where his (Gallic?) enthusiasm for the marque flows unchecked.

Amongst several letters from foreign (to France) correspondents is one from Swedish BVWS member *Dr Anders Widell* who is introduced editorially as a man who refuses to eat French oysters. Unkind, I think, to point the finger at a non-indigen in that way. But one did approve of the review of BVWS Bulletin 11:4, since the reviewer J. Skwiercinsky singles out the two articles by B. F. Shepherd and Desmond Thackeray as being the most interesting; clearly a man of some discernment. Unfortunately he doesn't make it clear that the work Desmond was describing on crystal DX was not his own, but the splendid effort made by *Chris Long* in Australia 'Hard luck, Chris!' or as they say in la belle France 'Quel fromage.'

**Desmond Thackeray & Pat Leggatt**

The first Philips mains sets came out in 1929, in a bunch of three. The 2514 was the middle of the range, and the one produced in the largest quantity. It is probably the most advanced design for its time ever produced.

The circuit was not very adventurous, with few original features, but the mechanical design was like nothing seen before.

The peculiar shape is supposed to be due to the shallow shelving each side of the chimney breast in a Dutch house. Having started with such a small cabinet they proceeded to fill it with components. People who meet one for the first time are always surprised at the weight of a 2514; like Dorcas, it is full of good works!

The construction is on a steel chassis, with plastic ends. The valves live underneath, along with the audio transformers, and everything else is packed in on top. The right hand plastic end contains a metal plate for screening.

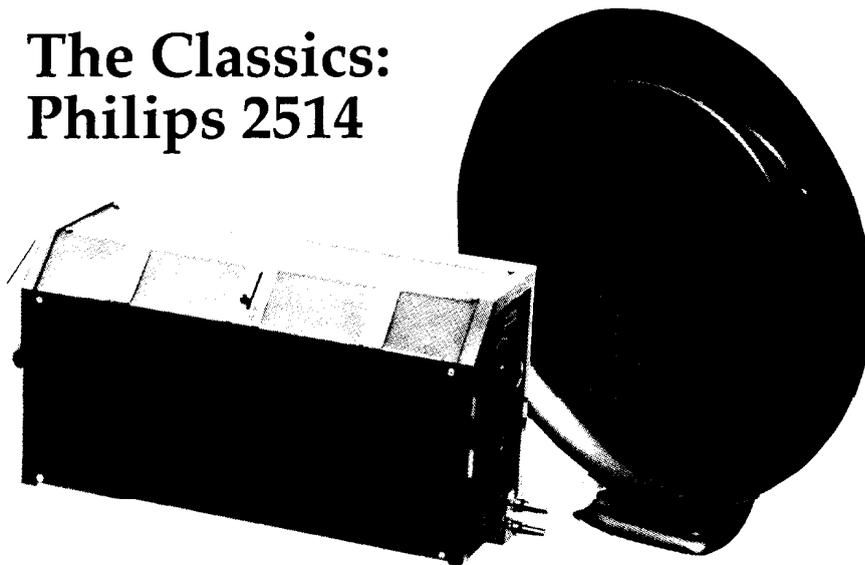
Looking at the front and working our way along from left to right we find first the aerial tuning capacitor and its dial, followed by the smoothing choke. The black shiny thing is the aerial coil, which is a toroid. The switch is mounted on the metal screen followed by the R.F. coil, and then the R.F. tuning capacitor and its dial. Below the chassis can be seen the mains transformer, the capacitors and the valves. The outer casing is of brass, covered with leathercloth.

There is quite an advanced safety feature in the form of a sliding base covering the valves, which interrupts the mains when removed. There is also a thermal fuse on the mains transformer.

Two small knobs (one each end) operate the tuning capacitors. The large knob on the right end operates the reaction, that on the left the R.F. gain. the reaction is adjusted by a rotating coil inside the R.F. transformer – to reach this the control spindle passes through the centre of the tuning capacitor spindle. The switch has four positions, but the bottom one is blocked off by the case – it is used for the battery version!

Turning to the circuit diagram there are some points of interest. It is drawn in Philips' own peculiar way – anything marked 'S' is a coil, and S10 is the reaction coil which, as mentioned above, actually rotates inside S8/S9. It

## The Classics: Philips 2514



by Geoffrey Dixon-Nuttall

will be seen that there are only two windings on the R.F. coil, and three on the aerial coil, although the set covers three bands. S15/S16 is the smoothing choke, tapped for the bias on the output stage.

It will be noticed that C1 is not connected. I have an early version of this set in which R7 (detector grid leak) is returned to C1, and then via 100k to R2/R3. This was discovered to be unnecessary, but C1 stayed on, being in the block.

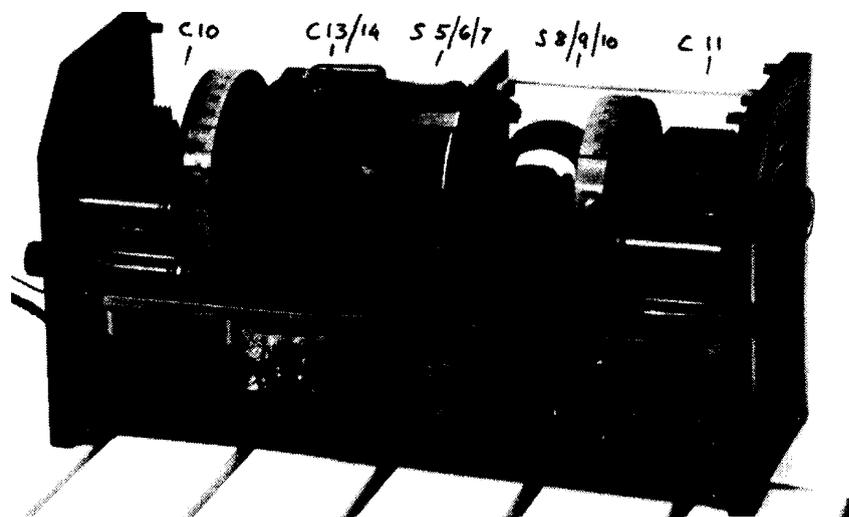
The circuit shows a mains switch, although this is not in fact fitted. It will also be noticed that there is a grid resistor on V1. This is a primitive device to prevent instability – in fact it is wire wound and must have quite a noticeable inductance.

Operation of this receiver is somewhat of an acquired art. The tuning range is

from 200 to 2,000 metres, in three bands. The peculiar switching arrangements have been mentioned above, and the best way to see what happens is to imagine tuning the set from 200 metres upwards. Both tuning controls turn away from the operator, but the aerial tuning knob (marked 'P') will move twice as far as the R.F. tuning (marked 'S'). At about 400 metres it will have reached the end of its travel, so we switch to band II. 'P' now goes back to the beginning and starts again, but 'S' continues from where it left off. At the end of Band II both tuners will have reached the end of their travel, and Band I is normal. I suppose it did not take long for the customer to get used to this. but at first acquaintance it is upsetting, to say the least!

Apart from the lack of mains switch and any form of dial bulb everything else is usual. An advanced feature is

• continued on next page



## The Classics • continued from previous page

the incorporation of Gramophone terminals.

These sets survive the test of time remarkably well. The capacitors are primitive in appearance, but seem to last for ever; and of course there are no electrolytics. A rather unexpected problem is finding valves which will fit. It seems that they got longer over the years, and there is very little headroom in the 2514. Unfortunately some sets are found with the base missing for this reason, which spoils them from a collector's point of view.

Having mastered the operation of the 2514, the performance is, for its time, very good. The aerial will usually be found to be best connected to '2', as overcoupling will restrict the tuning range. The tone quality could be better, but it was probably mostly used on a moving iron speaker, or even a horn. (The ratio of the output transformer caters for this). Philips supplied a series of 'tone filters' which plugged into the speaker sockets, and if one had one of these it would improve things. I have made one up containing .005 $\mu$ Fd, and this makes it much less biting.

The total production of these sets must have been enormous, and due to their solid construction there are still a remarkable number about. They seem to change hands at about £60-100 and at that price no collector should be without one!

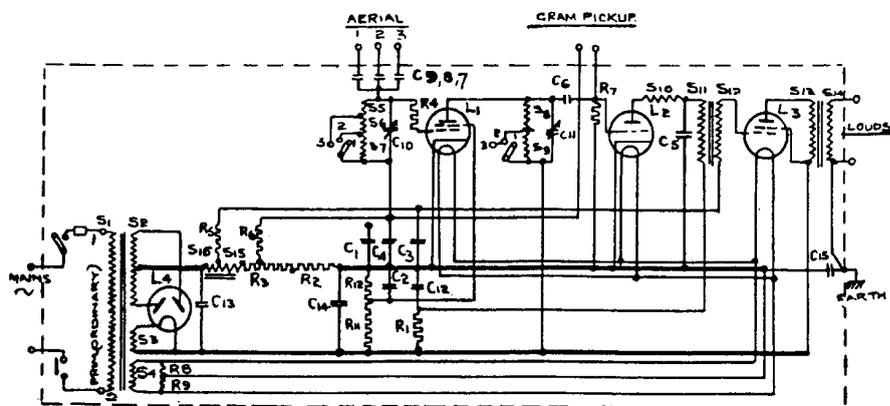
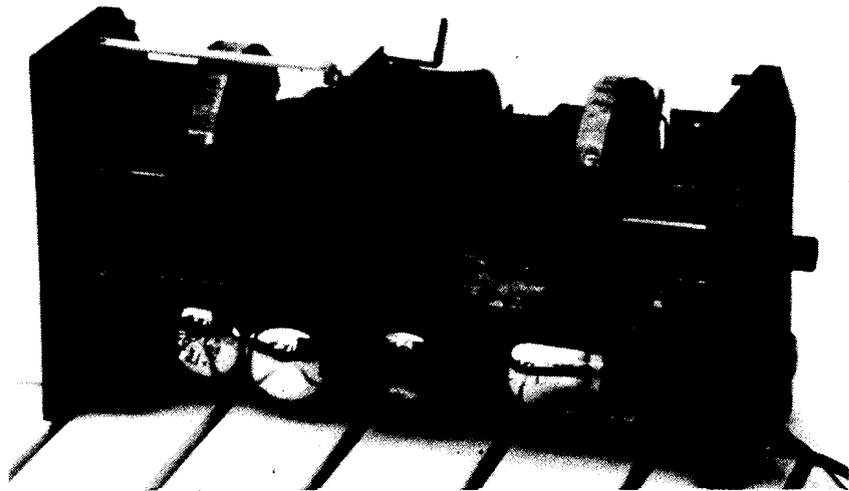


Fig. 30.—THEORETICAL CIRCUIT DIAGRAM OF PHILIPS TYPE 2514 RECEIVER.

## Information



### Odd item

The odd radio-related item pictured here is coming up for sale at Sotheby's, London, in February, but they're puzzled about its history and purpose. If anyone knows anything about it the auctioneers would be pleased. Thought to be circa. 1930, the object is made of brass in a sort of Greek classical style, has radio aerials on top and a light cylinder inside driven by a

motor with various switching devices to illuminate signs saying 'Radio House' and 'What about your Radio'. It measures 27" x 23" x 17" and will, it is estimated, realise between £3,000 and £4,000.

### Sparks

A book dedicated to ships' radio officers worldwide – he estimates numbering 750,000 since 1901 – is soon to be published under the appropriate pseudonym 'Sparks', in both Britain and America.

I can reveal that the author is Ray Redwood, who was born in England and was a wireless operator in the RAF in WWII, but did not consider himself a proper 'Sparks' until he had operated alone on a merchant ship crossing the Pacific to San Francisco, after which he became a US citizen and began globetrotting on US ships. He says that Sparks is likely to be phased out by the end of the century and wants to tell the story of what he describes as 'a soon-to-

be-extinct breed', who, he says, have saved a million lives this century. The publisher of Ray's book, entitled 'QTC: a seagoing radio officer's scrapbook' is Sequoia Press, 28 Sextant Avenue, London E14 9DX.

### Help?

BVWS member Dave Adams is prepared to act as a clearing house for wireless information and would welcome offers of assistance from other members. He also hopes to be able to help members who are seeking information.

Anyone interested in the idea should write to him at 36 Links Road, West Wickham, Kent BR4 0QW enclosing an SAE. He would especially like to hear from members who can give details of their collections, and of their particular expertise and the literature they hold, and would be prepared to respond to enquiries.

# A Battery Eliminator

by Ray Whitcombe

A Design for a convenient battery supply for 'D' series valve portables

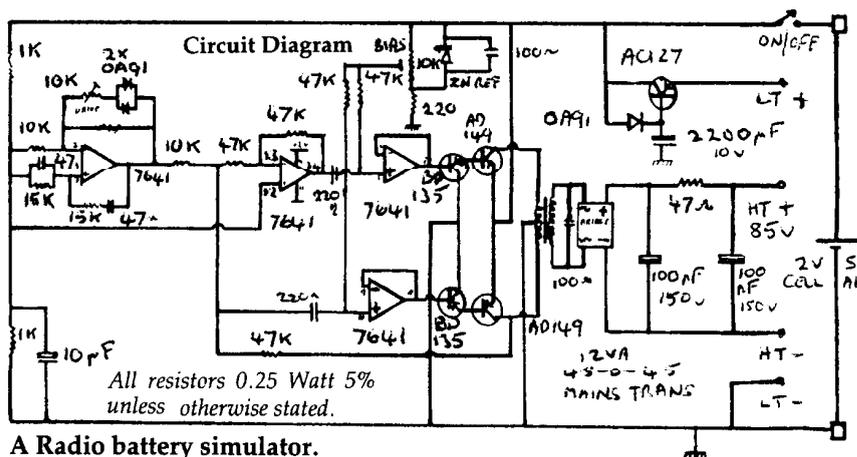
Just another of those solid state inverter designs? Ugh! Well I suppose that you are right, but take a while and consider just what is required to satisfy the title of this article.

The key word is 'convenient', ie: a unit which gives the least trouble to the user. To state this in another way, there should be no more difficulties encountered than in the original concept of going to your 'friendly radio dealer' and purchasing an 'All-Dry Radio Battery', fitting it, and switching on.

Easy enough with all this 'New Tech'? Or is it? Well, let's start the project on the right foot and make a list of design requirements.

## Design Objectives:

- 1) The completed unit must be the same size as original battery. This was not difficult in my case as set used a B103.
- 2) The replacement battery should be 'cheap' to run. For this reason a rechargeable cell was chosen.
- 3) The battery should be 'easy' to handle, so the charging should be straightforward, ie: not multiple cells all at different discharge rates. So a single cell was chosen to furnish both H.T. and L.T. (If G.B. is required, then the best solution is an alkaline battery since the very low drain of bias circuits means that it can be almost 'fitted and forgotten'.)
- 4) As the battery has to supply the filaments, the voltage should be low. Taking the requirements as stated in (3), it would seem that the best solution would be a single cell. There are several possibilities, Lead Acid at 2v per cell, and Ni-Cad at 1.3v per cell. We would have to use at least two Ni-Cad's to have enough voltage for the 1.5 volt filaments, and in addition the standard sizes offer limited capacity. On the other hand we would require only one Lead-Acid cell, (2v). This could directly feed the filaments via a low power waste dropper, and may be able to run an inverter? (on only two volts! well we will try our best!)



A Radio battery simulator.



- 5) The cost of making the unit should be kept to a minimum, and only readily available components should be specified.
- 6) Last, but not least, the radiation generated by any inverter must NOT interfere with the LW or MW wavebands. To make matters worse the unit has to fit inside a small radio right next to the frame aerial! It would be an advantage not to have resort to complex screening and filtering, especially with reference to (5) above.

## Design Solutions:

First let us consider the power taken by the radio, and then estimate the current consumption from a 2v supply. The filaments take 250mA, and the HT is in the region of 10mA at 90v, ie: 0.9 watts. For reasons to be explained later, the efficiency of the inverter will be around 60 per cent, hence the current at 2v will be around 750 mA, making a total of 1Amp. A 5 Ampere-hour cell will be sufficient to supply the set for more than 3 hours, this being considered long enough for present day demonstration requirements for such a radio. The cell chosen was a 2 volt, 5AH, 'CYCLON' sealed lead-acid cell. As only one cell is used, recharging is simple and optimum as there is no possibility of cell charge imbalance and the cycle can be completed in a few hours using a fast constant volts charge at 2.5 volts, initial current 5 to 10 amps.

The most important design consideration was considered to be the achievement of very low harmonic content in the inverter. Square-wave units, as used in camera flashguns, are very efficient, and operate from low volts, however they generate strong harmonics, as you may check by operating a flash gun near any radio. Another approach is to go for a sine-wave converter, or in other words an audio amplifier, not so efficient (around 50% for class B), but very low R.F. 'pollution'. The design employed is in fact a class B amplifier working into an output transformer in order to step up to 90 volts.

The biggest problem is to get such an amplifier to operate properly from a 2 volt line. Semiconductors need a bias voltage of 0.6v (Silicon) just to start, and then there are resistive losses in the various components, so our 2 volts is rapidly reduced! The best transistors at low voltage and high current are the now obsolete germanium types, in fact almost more obsolete than valves! However, some power output versions are still available for replacement purposes, mainly in car radio, and it is the power output device that concerns us. The AD149 was chosen, not because of its dissipation qualities (in this application little heat is generated and a heat sink is definitely not required) but because of its high current gain, its low saturation volts, low intrinsic emitter resistance, and the low 'germanium' base-emitter volts. It will be seen that the circuit does not employ any resistive current limiting to prevent thermal runaway, but at such a low operating voltage there is no possibility of this occurring considering the intrinsic resistances in the semiconductors together with the other components and wiring. In fact we cannot afford to have any extra resistance, and have to keep the wiring as compact as possible.

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## Workshop

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The next consideration is the selection of a suitable transformer. Obviously one can wind a special, and undoubtedly this will give the best results, but for convenience and cost a study of possible standard types is worthwhile. A good compromise was arrived at by selecting a standard mains transformer, the specification being as follows:

Secondary = 4.5---0---4.5 volts R.M.S.  
 Power = 12 Volt Amps.  
 Regulation = 9%

Using the transformer as specified above, the operating frequency was found to be best at around 150Hz, this giving the best compromise between transformer efficiency, and smoothing requirements.

The low level circuits were constructed round a 7641 C-MOS op-amp I.C. this approach being chosen for ease, compactness, and the fact that the 7641 is guaranteed to operate down to +1 volt line. In addition four identical op-amps are provided in the one package.

The first section of the 7641 is used as a diode stabilised Wein bridge oscillator to provide the 150Hz drive frequency. An amplitude control is provided. The second section is used as a phase inverter for the push-pull drive, while the remaining two sections are used as voltage follower drivers to the output stage pre-driver. A D.C. bias adjustment is provided at this point in order to vary the working point of the output transistors, this bias supply being stabilised by a 1.25 volt 'band gap' semiconductor device so that the output stage bias point does not vary as the 2v cell discharges.

The disadvantage about ultra low power devices like the 7641 is that they can only deliver 'flea power', hence in order to drive the current hungry AD149s we have to interpose a pre-driver. For this duty BD135s are used as emitter followers, thus giving current gain. Again relatively large transistors are used because of their low intrinsic resistance.

The 90 volts is obtained via a bridge rectifier connected to the output transformer, the primary of the mains transformer being used as the secondary and vice-versa. A smoothing circuit consisting of a reservoir cap', series resistor, and smoothing cap' was found to be necessary to reduce the ripple to a low level.

In operation it was found that considerable 150 Hz ripple was finding its way to the filament supply via the common impedance of the 2v cell. The

original idea of using a forward biased diode junction to drop the 2 volt supply to 1.5 volts did not provide sufficient series impedance to operate a successful filter, so the diode dropper was replaced with a simple transistor circuit, using our old friend a germanium device, the base impedance being high enough to effect reasonable filtering with a 1500  $\mu$ F capacitor.

### Adjustments and Use

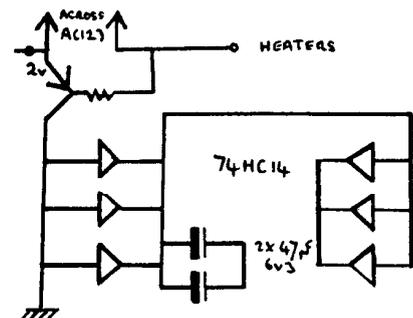
Although the amplifier is class B, the very act of connecting a bridge rectifier causes the waveform to be square-ish, but because the edges are 'soft' the harmonics thus generated do not extend very far. As in conventional mains operated equipment it is beneficial to connect a capacitor across the rectifier in order to reduce any interference caused by it. Also the connections to the bridge and the reservoir capacitor must be kept short, and any wires should be twisted so as to eliminate inductive loop interference problems, especially those between the bridge and reservoir, which are very 'hot'.

The unit is adjusted by observing the current drawn from the 2v cell and the output DC. If a 'scope is available the waveform can be observed as well. Adjust the amplitude to minimum, and then turn the bias pre-set to get approx. 300mA drawn by the inverter, (subtract the filament current if you have the radio on). Now turn up the amplitude till the output voltage reads 80 to 90 volts on radio load. If a 'scope is connected the waveform will be observed to be well squared as stated above.

In use, the unit as described was found to satisfy the original requirements, with little or no interference although it was built completely unscreened. The only action needed was to position the transformer/rectifier so as not to be directly under the frame aerial, otherwise some L.W. breakthrough was apparent. Also with the volume down, a quite room, and ear in L.S. some 150 Hz could be heard.

### A design for a current operated switch for the 'Battery Synthesiser'.

This design is not recommended for the beginner, since the operation of the circuit is 'beyond' the parameters of the devices used. However at this stage it offers the only low consumption option and the experienced should be able to get it to operate satisfactorily, albeit with some component 'selection'.



The purpose of this circuit is to switch on the DC/DC converter when the on/off switch of the set is operated, with no modification of the set. Another requirement is that any extra power drawn from the 2 volt cell should be insignificant. The main element of the circuit is a sensitive latching relay RS part 346-722. This has a coil operating voltage of 3.75 to 16 volts, hence putting it outside of the 2 volts available. I could find no latching relay more sensitive, and a latching one is required because it only takes current in order to change state.

By using a bridge drive circuit for the relay, theoretically the available voltage should be doubled to 4 volts, enough to operate the relay. A hi-speed CMOS logic IC was chosen for the drive because of simplicity. The speed was of course not required, but this logic family can operate down to 2 volts! The part is a 74HC14 (Six inverters on a chip). The relay coil is placed across the 'bridge', a series capacitor providing voltage storage. This capacitor has to be of a high value, and reversible. A normal electrolytic is therefore not suitable, however a solid dielectric aluminium 'miniature dipped' type is not only cheap, but will withstand reverse polarity up to 30 per cent of rated voltage. Two 47  $\mu$ F 6.3 volt caps were used in parallel, Mullard type 122-53479.

The current-sensing was done from across the heater supply dropper circuit. A general purpose silicon PNP transistor is switched by the change of volts that occur across this circuit when the set is switched on.

In operation this circuit was found to operate satisfactorily, but it must be remembered that the voltage available demands that the main drive element, namely the 74HC14, works perfectly. This, it does not and selection may be necessary. Operation is always better when the cell is fully charged; this could be considered an advantage since you will not be able to switch on a cell that is in need of a recharge!

*N.B. Make sure the relay is in the correct position by switching ON and OFF several times, a latching relay may be initially in either position!*

NEW BVWS BADGE: This will be available soon to UK members at £2.50 including post and packing. It is in gilt and real enamel with pin fixing. Delivery in 1 month.



Membership of the British Vintage Wireless Society is open to people who are interested in researching the history and technology of early wireless and television and preserving apparatus. The Society's Bulletin is issued free to all members, who are entitled to ask for "small-ads" to be inserted free of charge. Larger "display" advertisement spaces may be granted when space permits on application to the Editor, at 63, Manor Road, Tottenham, London, N17 0JH. Tel: (01) 808 2838. Rates will be sent on request.

# VINTAGE WIRELESS MUSEUM



The Vintage Wireless Museum, headquarters address for the British Vintage Wireless Society is at 23 Rosendale Road, West Dulwich, London SE21 8DS. Telephone: (01) 670 3667. The Curator is Gerald Wells, whom visitors should telephone before visiting the museum.

BOOKS  
CATALOGS

## NEW WIRELESS PIONEERS

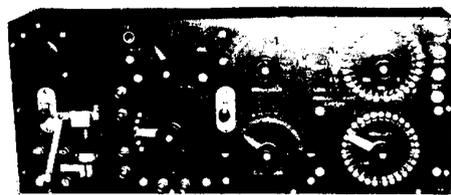
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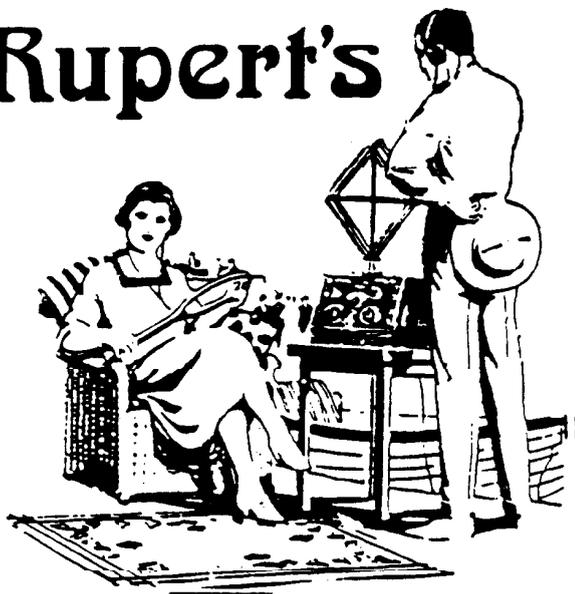
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