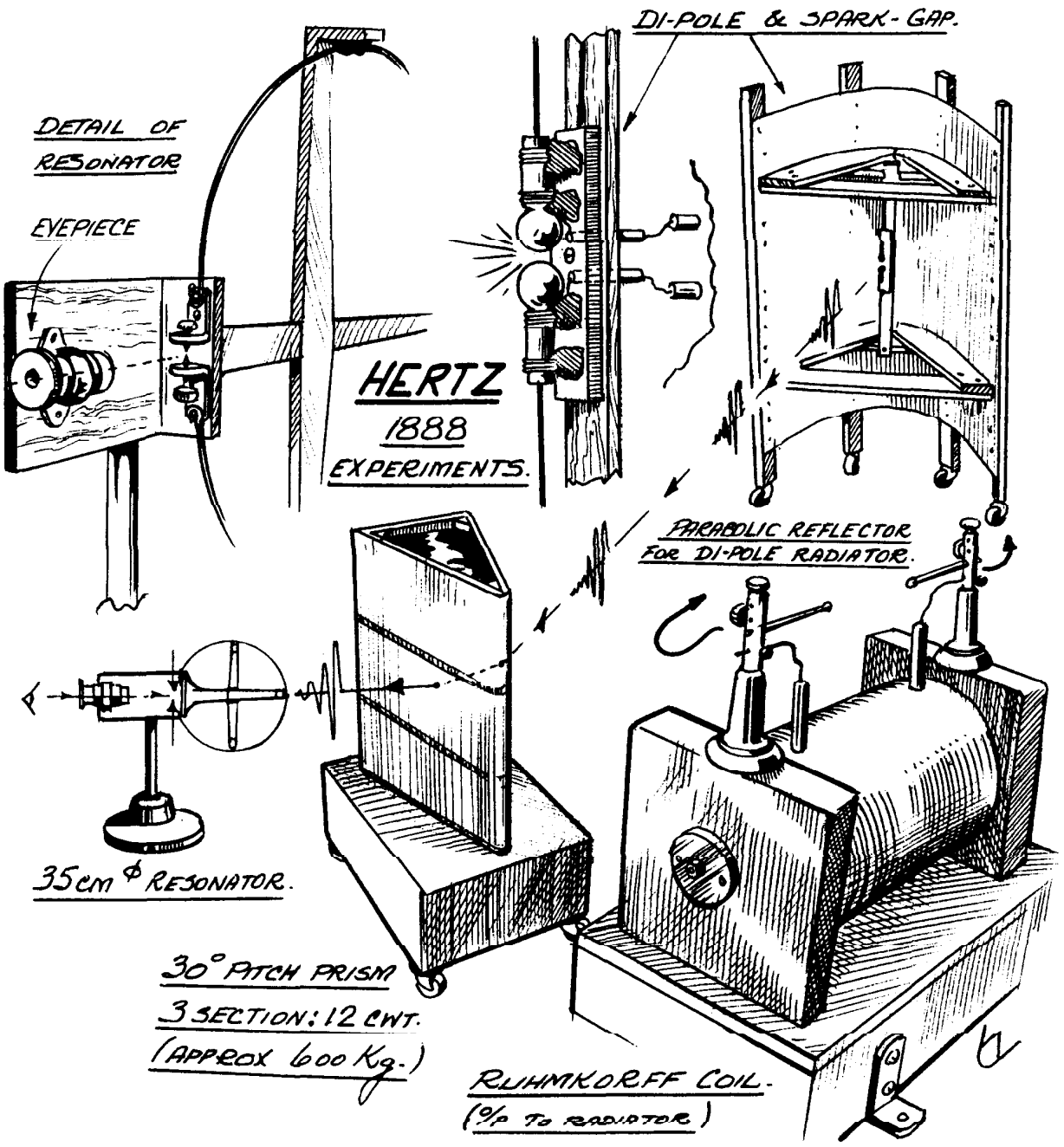
BULLETIN OF THE BRITISH
VINTAGE WIRELESS
SOCIETY



BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

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.

Cover Story:

Norman Jackson's drawing on the front cover shows some of the important apparatus used by Hertz in his important experiments of 1888 which culminated in the demonstration of the finite velocity of propagation of electromagnetic wave radiation and the verification of Maxwell's electromagnetic wave theory.

Readers' Correspondence

The "Fultograph" picture receiver:

Joshua Sieger, OBE, a distinguished name in wireless from the earliest days, has written to the Editor with some personal reminiscences of his experiences of the 1928 "Fultograph" picture-receiving machine, described in Vol.12 no.2 of the Bulletin by Pat Leggatt, who undertook a restoration project on an example of the machine. He writes:

Late in 1927 I was invited to Marconi House to meet a Captain Otto Fulton. He had on demonstration a facsimile unit which consisted of a transmitter and receiver.

I witnessed a demonstration of a photograph being placed on the drum of the transmitter and a photo-electric cell mounted on a lead screw moved across the picture drum. The variations in contrast, picked up by the photocell, were sent by wire to the receiver, which consisted of a similar drum with a similar lead screw on which was mounted a thin wire pen. Synchronisation of the two drums was obtained by a pulse transmitted on each rotation of the transmitter drum, and this pulse activated a solenoid which controlled the receiver drum at each revolution. The receiver utilised a filter paper immersed in a solution of potassium iodide, and the variations in contrast picked up from the photocell of the transmitter changed the electric potential of the wire in contact with the paper on the receiver, producing stains of various intensities of brown.

I was very enthusiastic at the demonstration and remember signing the visitors' book, and in October 1928 the BBC broadcast in the afternoons for about half-an-hour various press pictures, weather charts, and so on until the end of October 1929. I immediately decided, with the approval of the Editor, to construct a Fultograph, as it was then called, and enlisted the assistance of Frank Collinson of the Collinson Precision Screw Company who made most of my coils for the radio sets. The device was described in detail in "Amateur Wireless" and "Wireless Magazine", and Collinson would provide most of the equipment in parts for the home constructor.

The picture quality of this unit was extremely good, in clear detail, and when the transmissions ceased at the end of October 1929, they started again in April 1930 and continued until June 1932. This gave an opportunity of designing a number of radio sets having the output in the form of a variable voltage which could be connected directly to the recording pen on the Fultograph receiver.

A company interested in the Fultograph were Wireless Pictures Ltd. Unfortunately the stain on the paper did not last very long and most of my records, although they were carefully kept, lost the picture after two or three years. I should mention that the BBC London 2LO transmitter, which was on top of Marconi House in the Strand for some time, was transferred to the roof of the Selfridges building in Oxford Street.

In August 1929 the BBC, from their new Oxford Street transmitter on medium wave, sent pictures from Baird's 30-line Nipkow disc transmitter, and a number of home constructors became enthusiastic. Kits of parts were available and various sets were described with some constructional details on making these units. I did not have a lot of enthusiasm because I could not see the future. Having seen the good definition obtainable with the Fultograph, I felt that television would have to be quite different in order to get a picture of any quality. The Fultograph picture, if I remember rightly, was approximately 225 vertical lines which took about five minutes to record on the paper which was about 4" wide. The Baird transmission was only 30 lines vertically scanned at about 12 pictures a second. This was the maximum which could be transmitted at that time over the medium-wave transmitter.

The above is an extract from a biography which Joshua Sieger is at present writing.

Electrical safety:

The very valid points made in Tom Going's article (Vol 12 no2) apply equally well to electrical hazards.

AC/DC and live chassis sets are the greatest risk, particularly those designed for American 110 volt standards and converted by auto transformers or dropper resistors to work on 240 volts. There is usually no way to make these safe enough for use by the general public unless fed from an isolating transformer. I have labelled all those I have dealt with to that effect. The British European designs are much better and can be made safe provided **all** the screws

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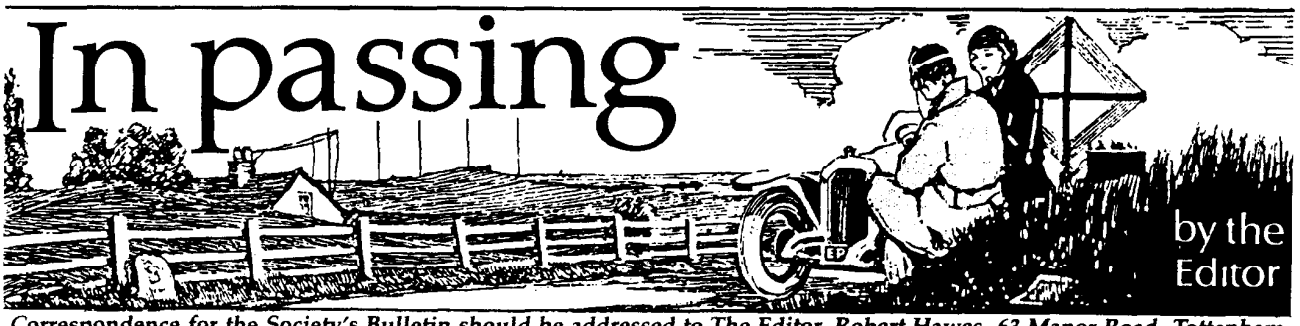
In passing



by the Editor

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

Meetings

Members may like to make a note in their diaries of forthcoming Society meetings. The dates for the two main meetings at Harpenden are: 26th June and 13th November.

In addition, John Howes is arranging a regional meeting at Royal Victoria Hall, London Road, Southborough, Tunbridge Wells, for 31st July. As with all BVWS meetings, it is for members only. The event begins at 10.30am and admission is £1 for visitors and £4 for stallholders. Members should send cheques payable to John Howes and must include an SAE for reply, to 11, Crendon Park, Southborough, Tunbridge Wells, Kent, TN4 0BE. Telephone: 0892 40022.

A further meeting of interest to BVWS members is being held at Shifnal Village Hall, off the M54 near Wolverhampton, on 17th April. It is being organised by our member Ray Holmes in conjunction with the "Radiogram" magazine. Stalls are £5 (8.45 am) and entrance is £1 (9.45am) and bookings can be made (cheques payable to R. Bates-Holmes) to 10 Daddlebrook, Hollinswood, Telford, TF3 2DS. Telephone: (0952) 594590. SAE required.

Society member Bill Journeaux is also holding a meeting: on Sunday 17th July from 10am until about 4pm at Crosfield Hall, Romsey, Hants. Details are obtainable from him by sending an SAE to 7 Blair Avenue, Parkstone, Poole, Dorset, BH14 0DA.

All society meetings are for members only and admission is by ticket only, obtained in advance.

Subscriptions

Pat Leggatt, our chairman, writes: **"Our membership period has up to now run from April 1st to March 31st the following year. This proves rather confusing, to the extent that it is sometimes difficult to be sure which year a new member is applying for. Accordingly, the Committee has decided that our membership year shall in future run from January 1st to December 31st. To achieve the change, we must make 1988 a 9 month 'year' running from April 1st to December 31st; and from 1989 onwards we shall be on the normal calendar year. I hope you will agree that this will make things easier for all of us.**

We plan this year to publish a bit more material in addition to the normal Bulletins, in particular a Supplement or two with rather longer or more technical articles than would be appropriate for the Bulletin proper. We intend also to catch up on the one missing Bulletin, so there should be two issues this Spring.

We shall need some increase in subscriptions to cover these things and general rising costs, but for the moment we are leaving the subscriptions payable on April 1st 1988 at £10 for UK members, £12 for those in Europe and £15 elsewhere in the world. This does of course represent an effective increase since the 1988 membership period will not be a full 12 months, and we should be able to keep rates for 1989 and beyond at a modest level.

Contents of BVWS Bulletin Volume 12 no.3:

Honorary Membership

At our Committee meeting in January it was agreed that we should create an Honorary Membership category, to be awarded to those who have given the Society particularly good service or who are in some other way eminent in the vintage wireless field. It is intended that this honour be quite exclusive, restricted to perhaps half a dozen people.

Anticipating this decision, six committee members (a majority), conferred by telephone prior to the meeting and it was agreed that the first three Honorary members should be Tony Constable as our founder and first chairman; David Read for his dedicated eight years as chairman and as an important contributor to Bulletins and Harpenden demonstrations; and Norman Jackson whose artistry in the Bulletin has given such pleasure from the very first issue of 1976.
I am sure all members will join in offering Tony, David and Norman our congratulations and thanks.

Bulletin Index

A really comprehensive Index to the Bulletin is now available, covering Volume 1 Issue 1 to Volume 11 Issue 4 (March 1976 to March 1987). It is very detailed with about 800 subject entries, including some you might not expect such as 'Handkerchief', 'Mickey Mouse', 'Ovaltiney', 'Parrot' and 'Pig'!

The Index is not simply a collection of separate indexes for individual Volumes or Issues, but is fully integrated so that, for example, the entry for the RB10 Marconi receiver

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By the Way, by the Editor

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lists 1/3-13, 5/4-59, 8/1-7 and 9/1-3, the numbers referring to Volume/Issue-Page. Also included is a list of all book reviews that have featured in the Bulletin; and a list of authors of Bulletin articles, giving the issues in which they appeared.

If you would like a copy, send a £2 cheque or Postal Order (payable to BVWS) to Desmond Thackeray, 7 Beech Close, Byfleet. Surrey KT14 7PS.

Members Small-ads

To reduce the rather heavy load carried by Bob Hawes as Bulletin Editor and Harpenden organiser, Ian Higginbottom has kindly volunteered to take over arrangements for members' small ads. Future requests for insertion of small ads should be sent to Ian at 5 Templewood, Ealing. London W13 8BA.

Seminar

The Seminar mentioned in the last Bulletin took place on Sunday, February 21st at Dulwich. Just over 30 members attended – the maximum that could be accommodated – and late applicants had to be rejected.

Starting at 10am, there was just time for 13 speakers to have their say before closing time at 5.30pm. Subjects ranged over a wide field and there was something for everyone.

Tony Constable did all the work to arrange it and thoroughly deserved the vote of thanks from those attending, as did Gerry Wells for putting up with such a big invasion and for laying on refreshments.

Following this successful first venture we look forward to organising further similar meetings, at venues which could hold the greater number of people who no doubt will wish to come. **(PL)**

Hertz anniversary

Ralph Barrett also reports that a special call-sign was allocated to commemorate the Hertz anniversary: GB2HZ. The station was used on 2nd February to celebrate the centenary of the demonstration of electromagnetic waves by Hertz in 1888 (the publication of the experiments was made on 2nd February of that year by the Berlin Academy of Sciences).

A hitherto unpublished picture of Herr Hertz resting after cerebration. (Cartoon by Norman Jackson).

The temporary station operated from the old Langham hotel in London (now a listed building) where Hertz stayed for four days in 1890 during his only visit to Britain when he was awarded the Rumford medal of the Royal Society. The commemorative transmissions took the form of a discussion of the life and work of Hertz.

Titanic event

BVWS member Ralph Barrett is conducting an historical week-end about the R.M.S. Titanic on 8-9-10th April '88 at the Crest Hotel, Southampton.

There will be four dissertations, including the "Rescue by Wireless", when a 1912 Marconi magnetic detector of the Titanic type will be in operation.

The Week-end will include a tour of Southampton monuments and a visit to the Titanic berth 44 in Ocean Dock. All menus will be those of the Titanic 14th April 1912. There will also be music of the period.

The hotel has baths and a helicopter pad, so is 4 star, so the price is £93 per person, single or other rooms.

A detailed programme can be obtained from Crest Hotels, Bridge Street, Banbury. OX16 8RQ. (0295 69645) or ring the hotel direct on 0703 619700.

Feedback

Letters *continued from page 27*

holding the back and access plates are fitted and any grub or sunked screws sealed with a hard setting wax like good old sealing wax. Araldite is a little extreme, for someone else may have to remove it at a later date. Sets for AC only with a mains transformer mostly have only two core mains leads as very few homes had three pin plugs to provide a safety earth. Such sets often have easy access to the chassis metalwork so safety is solely dependant on the transformer insulation and the quality of the aerial and 'mains aerial' capacitors. Capacitors are easily replaced but transformer insulation is decidedly suspect after 50 years or so. I consider that all two core leads should be replaced with 3 core so that all metalwork can be safely earthed. Fabric covered leads can be made to match the original by using bootlaces as sheathing. **Don Turner.**

Melba's broadcast:

I am not sure as to whether the information below is relevant or of any real assistance but I am stirred into action by the most interesting article in the current BVWS Bulletin about Dame Nellie Melba's Broadcast by Tim Wander.

In my collection I have a 12 inch single-sided HMV Red Label record with an early picture version of the Fox Terrier 'Nipper'. The record is number 03369 and the title of the recording is – "Comin' thro' the Rye" (Old Scottish Ballad) sung by Nellie Melba. Dame Nellie is described as an English Soprano and is accompanied on the piano by Prof. Gabriel Lapierre. **Stanley Casperd.**

Melba's broadcast (2):

Was a record made of Melba's broadcast? The confusion may arise from "Scrapbook" type programmes in which her contemporary commercial records (HMV) have been played to accompany accounts of the broadcast.

Even if a wax record had been made (a possibility suggested by Tim Wander), it would not have survived more than a couple of playings and nobody would have dared to process it as pressings. A film would have been soundless at that time too. Luckily her voice was well recorded generally and pressings can now be obtained for a song. **Eliot Levin.**

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In 1879 James Clerk Maxwell developed a set of mathematical equations from which it could be predicted that oscillating electric currents would produce waves of electromagnetic energy. These waves would detach themselves from the electric circuits generating them and, would radiate freely into space with the speed of light. In 1888 Hertz generated and detected the predicted waves and systematically carried out all the essential measurements on them. He thereby gave birth to the technology of radio-communication.

The Hertz Experiments: A Centenary

by Anthony Constable

It is one hundred years since Hertz completed his experimental work to verify Maxwell's theories.

His laboratory at Karlsruhe was by no means ideal for carrying out measurements on radio waves. It was a lecture room, about 15m long and 14m wide. There were iron pillars down both sides of the room and there was the inevitable iron stove at one end. His area of work was restricted to about 12m by 8m and the stove was about 1.5m from his apparatus in at least one of his crucial experiments.

And yet in this inappropriate room Hertz carried out a series of experiments which must rank as one of the most outstanding examples of the verification of a pure theory in the whole history of science.

After obtaining his doctorate in physics in 1880 at the age of 23, Hertz spent three years as an assistant to Herman von Helmholtz in Berlin. He went to the University of Kiel in 1883 where he began his serious study of electromagnetism in general and the field ideas of Faraday and Maxwell in particular and became thoroughly conversant with the wave implications of Maxwell's theory. George Fitzgerald, Oliver Lodge, Oliver Heaviside and John Poynting were among the many scientists in Britain and Ireland who were also conversant with Maxwell's theory and convinced that it would eventually be experimentally verified. Lodge had given considerable thought to the possibility of producing "electromagnetic light" since about 1879 and was well advanced in his experimental measurements.

Parabolic reflector with dipole transmitter.

Hertz was under more pressure to verify the new theory than were his contemporaries from the British Isles where Maxwell was so widely accepted. His German contemporaries were still largely committed to the old ideas of instantaneous action-at-a-distance, a climate which would require meticulous experimental proof for any new ideas which attempted to challenge the old order. Verification was essential. So, surrounded by a healthy scepticism and himself in a suitably agnostic frame of mind, Hertz began his great task at the age of 28 in Spring 1886 six months or so after he was appointed Professor of Physics at the Technische Hochschule at Karlsruhe.

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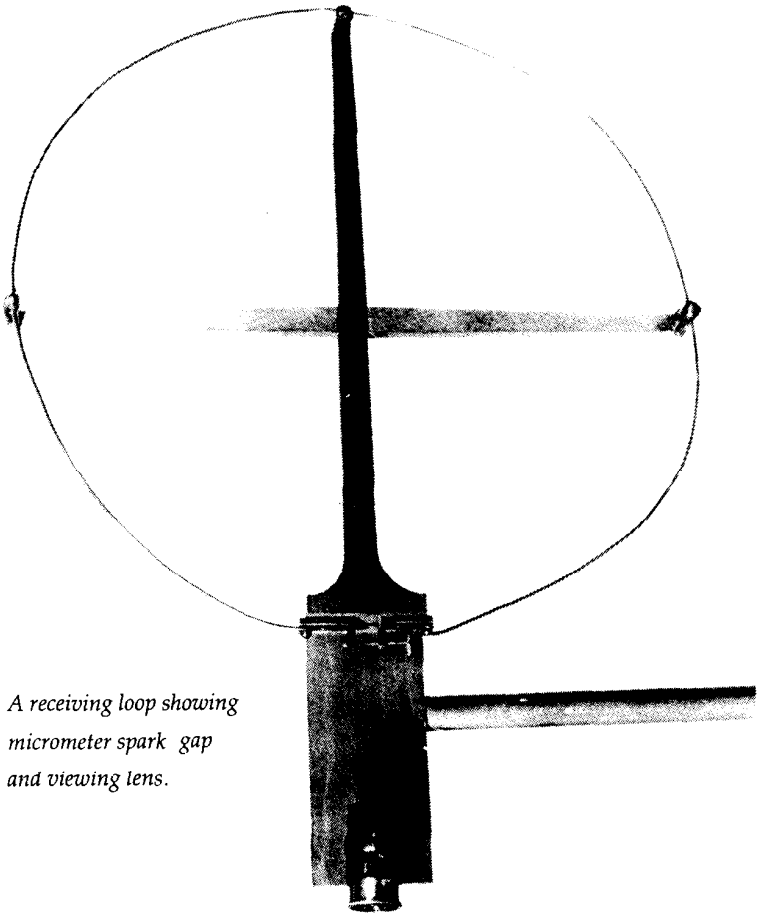
History

Hertz Centenary (continued):

He quickly learnt how to produce electrical oscillations of a suitably high frequency and published several papers on various aspects of these oscillations in 1887/8 (1). His crucial experiment was to establish the finite speed of the electromagnetic waves radiating from his oscillator. This work was carried out in late 1887 and early 1888, communicated to the Berlin Academy of Science on Feb 2nd 1888 and published in Wiedemann's Annalen in May 1888. It was an ingenious experiment in which the phase relationship was investigated between waves passing along a wire and those propagated through the air from the same source. At first his results were disappointing and he was forced to conclude that, contrary to all the implications of Maxwell, the velocity was infinite. After a little hesitation he convinced himself that, even if Maxwell had to be proved wrong, he must continue to refine the experiments. The end result vindicated Maxwell and brought the work of Hertz to international attention.

His work was instantly recognised by the "Maxwellians" in this country, whose correspondence with him has recently been published (2). There was no envy, no expression of "so what" and no partisan challenge to priority.



A receiving loop showing micrometer spark gap and viewing lens.

Later the same year, on Dec 13 1888, he presented the paper "On Electric Radiation" to the Berlin Academy and then published it in Wiedemann's Annalen early in 1889. This paper might be considered to mark the culmination of his experimental work.

In all his work he generated his waves from the intense spark produced with a Ruhmkorff induction coil. His detector was usually a single loop, sometimes rectangular and sometimes circular, with a small spark gap adjustable with a micrometer screw and sometimes viewed through a lens. The length or the brilliance of the small spark was used as an indicator of the strength of the waves at the receiver end. In his final series of experiments, he used simple dipoles in his transmitter and receiver and each was placed at the focal line of a parabolic reflector. With this equipment he was able to produce standing waves in air between the radiator and a large plane conducting surface and locate their nodes and antinodes. He measured the wavelength and calculated the velocity of the waves. He showed that they obeyed the same laws of rectilinear propagation, reflection, refraction and polarization which applied to ordinary light. He used a large prism made with more than half a tonne of pitch for refraction and a parallel wire array for polarization.

Hertz's experimental genius can be seen quite clearly when reading through his scientific papers. He took nothing for granted. He understood the theory he was trying to verify and set about the task in a remarkably systematic way. By reducing capacitance he was able to obtain much higher frequencies than had previously been achieved. He sometimes made mistakes in calculating the frequencies but without substantially affecting his experimental conclusions. He made the best possible use of resonance methods despite the multiple frequencies emitted from his spark source. He used the methods of interferometry for accurate wavelength and phase measurement. The scope and completeness of his work was audacious and impeccable.

We are well aware that most of the early practical achievements in radio were made with very long waves. As time passed they progressed from the very long waves (VLF) in excess of 10,000m through the standard long, medium and short wave bands and then into the VHF and UHF bands. It is perhaps of some interest to know that Hertz started in the VHF band with frequencies of the order of 60 MHz (5m) and later advanced into the UHF band at about 600 MHz (50cm wavelength). These figures are estimated from the dimensions of his equipment – particularly the size of his receiving loops. Hertz's own figures suggest he even went as high as 1200 MHz when he measured wavelengths as short as 25 to 30cm.

Whatever view we may have about who discovered or invented anything in the history of radio, there can be no doubt about Hertz's role. He discovered the waves themselves with completeness and also without equivocation.

He died of blood-poisoning in 1894 at the age of 37, not living long enough to see even the beginning of the technological and commercial success of radio nor even long enough to receive what he undoubtedly deserved – the first Nobel prize was awarded in 1901.

(1) The Hertz papers were translated into English by D. E. Jones and published under the title "Electric Waves" by McMillan in London in 1893.

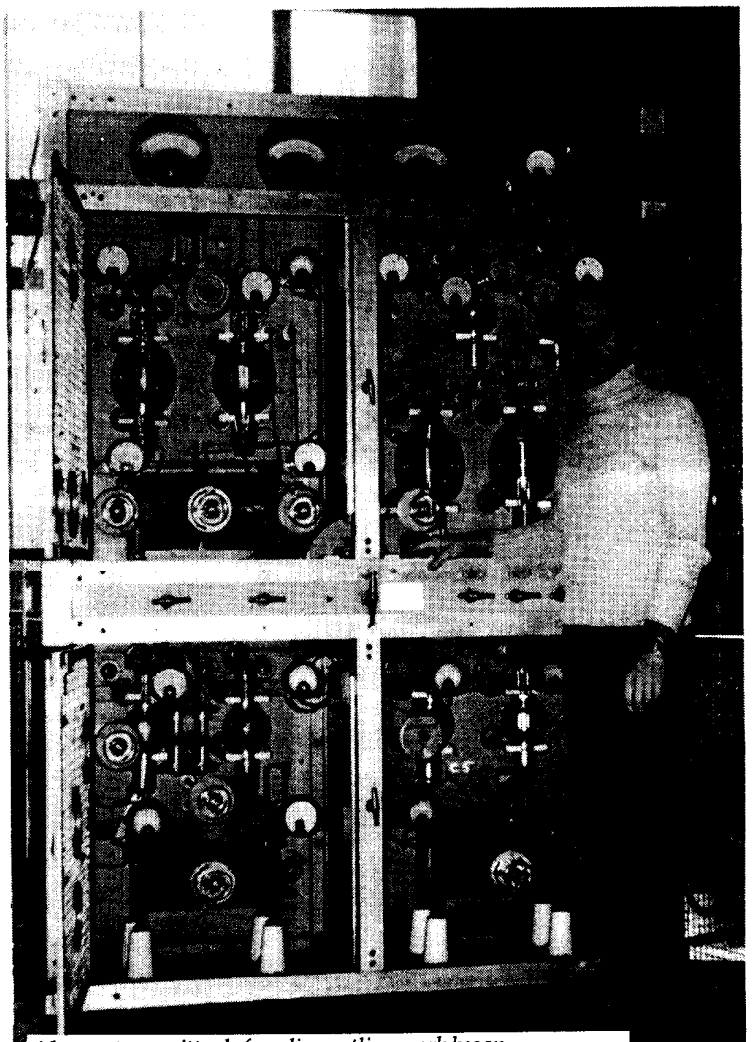
(2) Hertz and the Maxwellians by J. G. O'Hara and W. Pritcha, Peter Perigrenus & the Science Museum (History of Technology Series 8, Ed. Brian Bowers), 1987 154pp price £24.00

The photographs are taken from the replica equipment at the Science Museum, London and are reproduced here with their kind permission.

Transmitter saved from scrapheap

When BVWS member Bill Pozniac heard that the old Moorside Edge Transmitter was to be closed down by the BBC after more than half a century of service and scrapped, he sought permission to preserve part of it in his home. Told he could have one complete unit he set about the huge task of dismantling it, then re-assembling it in his garage. Here he tells how he went about the task, assisted by another Society member, David Leas.

By Bill Pozniac



Above: *transmitter before dismantling work began.*
Below: *Bill Pozniac and David Lees standing in the empty hole.*

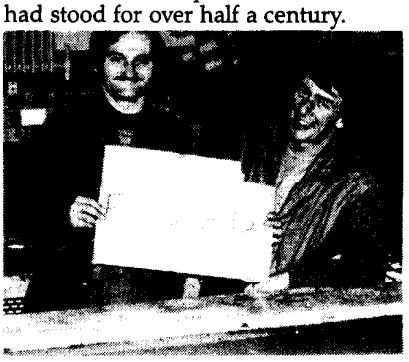
When I learned of the imminent closure of the BBC North Regional station at Moorside Edge back in 1981, I decided to pay a visit to see what steps if any were to be taken to preserve the equipment,as I was led to believe that this was the last transmitter of its kind left in existence.

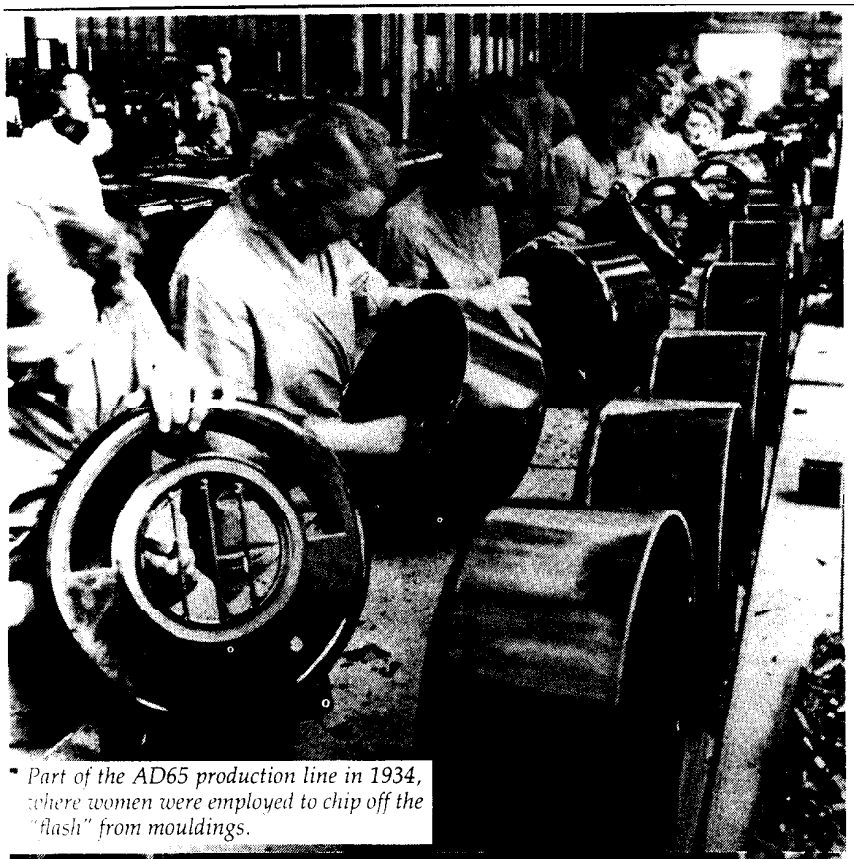
I called at the station during 1981 and was kindly given a complete tour of the site. The first thing that impressed me was the excellent condition of the two original Marconi transmitters even though they were used only as standby in case the later main Tx's were to fail. It was also nice to see that all the original power plant was intact and operational, from the huge 345hp 6 cylinder Ruston diesels to the English Electric 12KV generators along with the 20v 1300 amp filament generators.

The gigantic control panel situated in the main transmitter hall was the biggest switchboard that I have ever seen, being some 40ft in length with rows of traditional copper knife-switches and evenly spaced meters which seem to have come right out of a Frankenstein horror movie.

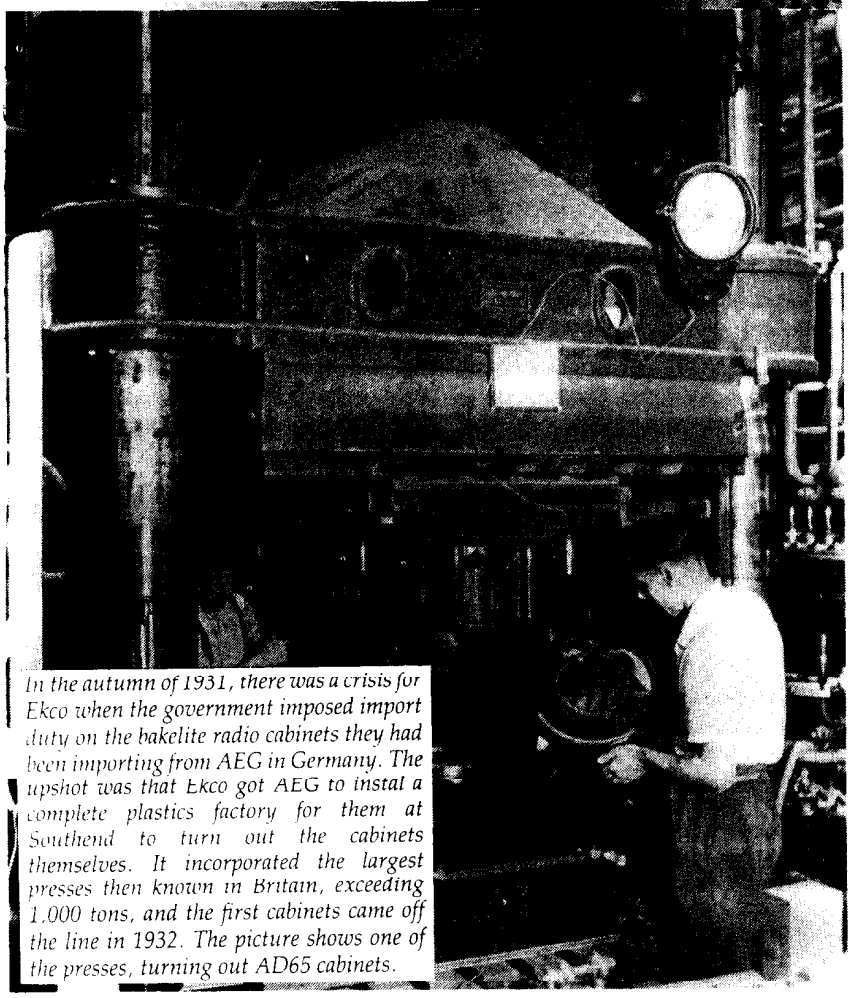
After having a chat with the chief engineer I was horrified to learn that the BBC had no plans to preserve anything at all as the licence payers would not take it kindly if their money were to be used for the preservation of "junk". So all the equipment was to be broken up for scrap and the entire site cleared, then landscaped.

I felt that something had to be done before it was too late. As it was impossible for me to preserve the station as a whole. I decided to rescue one of the ten Marconi units with the intention of keeping it in one piece, so the obvious choice was the heart of the transmitter: the master oscillator, this being known as the "A" unit. This was the smallest, measuring 7' tall 5' wide and 4' deep. I bought the thing for a very modest fee and removal work began on the 6th Nov, 1984, the last piece being shifted on the 13 Jan, 1985. The dismantling went without a hitch and was fairly easy as all the bolts, screws etc, were soaked in oil which had been seeping from the high voltage capacitors over the previous 53 years. The whole unit with the exception of the side panels was transported to my home in my Morris 1000 traveller, which made a total of 19 trips. The two huge tuning coils from the "D" units were also salvaged at a later date along with a pair of marble segments from the main control panel. The BVWS salvaged many items from the rest of the units. One other piece of good news is that one complete diesel engine and two dynamos were taken away by the Wortley Forge museum near Sheffield and are to be re-built in the near future. Although I have no immediate plans to reassemble the "A" unit, the idea was to acquire it first and worry about it later: before it disappeared forever. The site had been completely cleared by July 1985 and on a recent visit I found it impossible to locate the exact spot were the "A" unit had stood for over half a century.





Part of the AD65 production line in 1934, where women were employed to chip off the "flash" from mouldings.



In the autumn of 1931, there was a crisis for Ekco when the government imposed import duty on the bakelite radio cabinets they had been importing from AEG in Germany. The upshot was that Ekco got AEG to instal a complete plastics factory for them at Southend to turn out the cabinets themselves. It incorporated the largest presses then known in Britain, exceeding 1,000 tons, and the first cabinets came off the line in 1932. The picture shows one of the presses, turning out AD65 cabinets.

Ekco coloured cabinets

Most wireless enthusiasts will be familiar with the range of bakelite receivers produced by E. K. Cole, at a factory in Southend, Essex near the mouth of the Thames. Aesthetically innovative, the cabinet designs exploited the possibilities of the plastics, producing shapes that could not have easily been made in wood which was the material most manufacturers used for cabinets. The plastics designers wanted their chosen material used honestly, for the sake of its own beauty, and visualised their designs in bright modern colours. The industry and the public, in the main, lacked the courage of the designers and demanded a "simulated wood" look, producing an effect in the case of sets like the round Ekcos that was somewhat anachronistic. With only a few known exceptions, surviving examples of such cabinets are invariably in imitation "walnut" or "ebony" with chromium trim, but enthusiasts have dreamt of finding rumoured coloured examples. Recently Dr Tom Going of Southend Museums Service, who has for some time been building up information on the Ekco company which had its factory near Prittlewell where the museum is located, has unearthed some new information on coloured sets.

By Tom Going

As is well known, the bakelite cabinets for many EKCO sets in the 1930s were available in 'Walnut' or black-and-chrome (or black-and-ivory, in some cases), at a cost of about 5% extra.

Previously, I had understood that the coloured cabinets were produced only for exhibition purposes to display the possibilities of the ivory, green and red urea – formaldehyde resins with which the EKCO presses could also be used. The only exception to this seemed to be the AD65 (round) EKCO, for which the 'Wireless and Electrical Trader' book 'Receiver Specifications and Prices, 1935-1940' gives the following details:

". . . price 10½ guineas (£10.52) walnut, 11 guineas (£11.55) black & chrome, special coloured cabinets 2 gns (£2.10) extra".

Available colours are not listed, and no other model is listed as having the colour option available.

continued on next page

Radio cabinets and other mouldings on display on the Ekco stand at the British Industries Fair of 1935. Cabinets included ones in simulated walnut, green onyx, pearl ivory and black with chrome trim.

continued from previous page

Coloured Cabinet Sets from EKCO

However, more recently, I have had access to an EKCO trade price list which gives the following: (ca. 1935)

AD65: Walnut, retail £11.0s.6d (£11.03)
AD65: Black & Chrome, retail £11.11s.0d (£11.55)
AD65: Onyx green or pearl ivory, retail £13.2s.6d (£13.13)

AC85: Walnut, retail £13.2s.6d (£13.13)
B85: Black & Chrome, retail £13.13s.0d (£13.65)
B85: Onyx green or pearl ivory, retail £15.4s.6d (£15.23)

AD36, B54 and ADT95 and BT95, from this same list are given as having only Walnut & Black-&-Chrome options.

STANDS were available for these models as optional extras, as follows, the wooden ones in black *or* walnut finish.

AD36: Wood, £1.5s.0d (£1.25)
B54: Wood, £0.17s.6d (£0.88)
B54: Chromium, £1.15s.0d (£1.75)
AD65 and AC85: Wood, £1.9.6d (£1.48)

All these sets and stands were available on hire purchase on various terms. The former sales manager for the southern region has told me that he remembers and indeed sold some of the special finish sets, but that there was no great demand for them. I can imagine that the price differential would see to that, this being partly accounted for by the increased expense of the urea-formaldehyde resins, and some undesirable moulding properties, such as a tendency to 'gas' if overheated in the press, thus contributing to a lower production rate.

It does seem that colour was hardly a popular commodity in something intended to fit into the gravy-coloured décor of most homes in the 1930s. Michael Farr, in "Design in British Industry" (Cambridge University Press, 1955) states (p.77): *"What then is a 'piece of furniture'? According to most radio manufacturers 'a piece of furniture' is something which is bulky and solid, relieved by contrasting wood veneers (preferably walnut) but toned down again by a thick, dark brown stain, suggestive of treacle. The stain is finished with a high polish. The most commonly used powder for moulding plastic cabinets is dark, mottled brown, similar in appearance to burr walnut. In many wooden consoles and radiograms which are monolithic in character, there is a downward heaviness which appears to symbolise the force of gravity."*

Dr Going would be grateful to hear about any coloured examples found – if only for the record.

Books

Review:

Hertz and the Maxwellians by J.G.O'Hara and W.Pritchs, Peter Peregrinus & the Science Museum, 1987 154pp price £24.

This is an appropriate time to recall the outstanding experimental achievement of Heinrich Hertz. A hundred years after completing his brilliant work we continue to be impressed by his methods, the evolution of his understanding and the completeness of his contribution. Whatever we may have previously read about Hertz, few of us have had the opportunity to study what he and his contemporaries were saying to each other on the subject of electromagnetic waves.

We must therefore welcome "Hertz and the Maxwellians" as a useful addition to the literature. It is a collection of the letters which passed between Hertz and those British and Irish scientists for whom the theories of James Clerk Maxwell were just about taken for granted. George F. Fitzgerald, Oliver Heaviside and Oliver J. Lodge were the principal Maxwellians. They had a thorough understanding of Maxwell's equations and, through reformulated versions, had become quite familiar with the implications of electromagnetic waves in free space. Their experiments had already led them well along the path which Hertz was taking. But they carried out their work from the standpoint of "believers". Too much belief is not a good thing in science. Challenge comes from disbelief. Had they been more sceptical they might have gone as far as Hertz.

The correspondence shows how clearly the Maxwellians understood Hertz's achievement. Typical of the high praise which was given so readily by them was Fitzgerald's announcement on 12th Sept 1888 at the Bath meeting of the British Association. He clearly spelled out the great achievements of the young German and was emphatic of his importance in history.

Historians of science must always gain insight from the very personal thoughts expressed in the letters which passed between leading contemporaries. We are forever intrigued by the details of how new ideas emerge and these letters certainly allow us to get very close to the minds of the men from whom the ideas were emerging. The authors have done a very thorough job in gathering together such vital material. Their own comments are relevant and helpful in a historical sense only. They have resisted any temptation to "explain" the thoughts of Hertz, Lodge, Fitzgerald, or Heaviside in modern terms. The book stands on the merits of its historical content alone.

The letters relating to Hertz's visit to England to receive the Rumford medal of the Royal Society in December 1890 make fascinating reading. He met many important scientists during his short stay. He was not always happy with the constant attention he received from his host William Ayrton, but did manage to visit the National Gallery and to escape for long enough to take a two-and-a-half-hour walk through the City of London. David Hughes, George Stokes and William Crookes were among the many scientists to meet Hertz so one can't help wondering why Hertz's well-publicised results didn't prompt these gentlemen to recall Hughes' experiments (observed by Crookes and Stokes) in 1879/80 but which the world did not hear of until 1899. I was intrigued to read of this encounter as it makes the 'missed opportunity' of the Hughes story even more poignant.

The book is well set out and well indexed by author and subject. I strongly recommend it to all who are interested in the history of radio.

A.R.C.

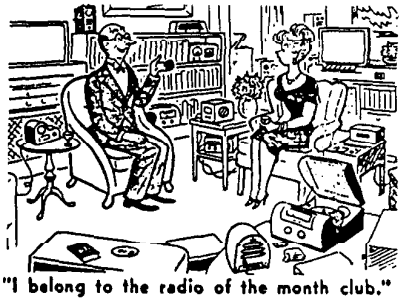
Review:

"Radios: the Golden Age" by Philip Collins. 120pp soft covers. Columbus Books, London, £8.85.

Radio aesthetes who are excited by the external apearance of apparatus rather than the "works" will certainly appreciate "Radios: the Golden Age" which has sumptuous colour photographs of more than 100 American plastics-cased receivers, some of which found their way to Britain from the mid 'thirties until just after the second world war.

Philip Collins, the author, was born in Blackpool but has worked for many years as a film executive in America where he became fascinated with such sets and began to collect them. His book is mostly pictures, but he does provide a short introduction concerning the social history of his "Golden Age" of radio in which he claims that Chicago Molded Products produced the first plastic cabinet in 1931 – for Kadette, but this is ambiguous – and surely the mid to late 'twenties ebonite and bakelite sets should be taken into consideration?

Famous designers of the age were called in to work in plastics like



"I belong to the radio of the month club."

phenolic, urea and casein to produce innovative shapes and colours which exploited the special qualitites of the new materials so that radio cabinets became artistic "objects" rather than simply boxes to keep the dust out or to disguise sets as items of sitting-room furniture. The designs reflected the technology and totems of the age: from step-sided skyscrapers and monstrous chromium-encrusted automobiles to streamlined 'planes. If they didn't exactly invent the "novelty radio" (the credit for that must surely go to the designer of the British "Old Tom" and "Felix" crystal sets of 1925 or the American Monte Blue?) they developed it to a high art, producing radios that doubled as geographical globes, whisky bottles, baseballs and pipe-racks or which sported effigies of Mickey Mouse, the Lone Ranger, Charley Macarthy and Rudolph the red-nosed Reindeer. These "Golden Age" sets are as eagerly sought-after by collectors in Britain as they are in the States. Many were sent across during the war when the British radio industry switched to wartime work, or were brought over by American forces stationed here. The sets are , of course, much rarer in the UK, partly because the number originally imported must have been quite small, but also because many must have gone up in smoke: most of the sets were designed for the American 110 volt system and consequently blew up when plugged into our 240 volt mains. Many were taken to small radio shops where they were fitted with lethal "line-cords" using a resistance-wire woven into a rubber and cotton "flex" which burnt up the unwanted extra volts in heat and sometimes caught fire.

It is the appearance of these sets which appeals to most collectors, for, in the main, they are not electronically innovative, although the designers were certainly clever in cramming so many components so tightly into small cases that the chassis, when removed, often resemble those compressed cubes on metal, rubber and glass which are exuded from motorcar crushing plants. **RSH.**

Books

Review

"The History of Roberts Radio" by Keith Geddes and Gordon Bussey, published by the company, price £5.95 inc. at Molesey Avenue, West Molesey, Surrey, KT8 0RL.

Appropriately bound in Royal purple with a "By Appointment" coat-of-arms on the front, "The History of Roberts Radio" is a splendidly presented account of a company which is only a decade older than Britain's broadcasting industry, having been started by an East End boy in a back room to become suppliers of radios to Royalty.

Co-authors Keith Geddes and Gordon Bussey have produced a well researched and nicely written account of how Harry Roberts and his partner Leslie Bidmead, young men enthused with the wireless mania that began in the mid-twenties with a capital of £50, set up a firm that has proved to be a survivor of a British radio industry crushed by competition from the Far East. Both men got a good grounding in the industry before setting up on their own with the business philosophy of making a top-quality product and selling it to up-market customers: a policy which has continued to the present.

Their first trade customer was Harrods the "Top people's store", then, with a production of three sets a week, they turned over £1,557 in their first year. In a few years they were boasting in their advertisements "the finest of all portables" and the healthy business was still expanding, building on their reputation for quality. By 1939 they had secured their first Royal customer, Queen Elizabeth (the Queen Mother) and their turnover for 1930-40 reached £20,000 when the war came and production was turned over to military requirements, some of it so secret that drawings were shown only briefly to technicians who then had to memorise the details for production.

The firm were quickly back into civilian production in 1946 when a Roberts set was one of the 22 British receivers chosen for display in the prestigious "Britain Can Make It" exhibition and soon after they exploited the new miniature valves and layer-built HT batteries which made possible the final improvement and miniaturization of portable valve sets.

The detailing of these developments really ends that "vintage" part of the history of the company. The book goes on to describe the continued growth of the firm to the present time. Alongside the more serious information, the authors throw up some fascinating and amusing titbits, such as how they made special radios with cases of solid gold and real mink and how they now market a special "MW/LW only" receiver for use in Her Majesty's prisons where inmates were banned from VHF/FM bands after a prisoner escaped with the aid of them.

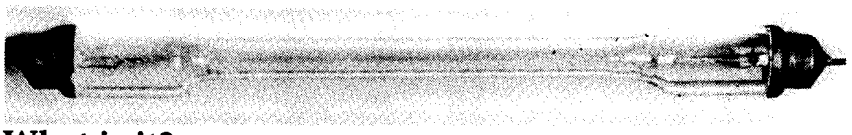
The book is excellently illustrated. There are photographs of the early weighty suitcase portables familiar to collectors, a selection of notable personalities from Royalty to film stars depicted with Roberts sets, plus some interesting vintage advertising material. A fascinating compendium.

RSH.

The Roberts Radio founders and their ladies listen-in to a 1933 portable.

A Roberts set of c1959, covered in real mink. Other coverings included leopard skin and jewelled suede.

King and Queen in 1948 listen to a portable.



What is it?

Ray Herbert has sent an answer to this mystery picture of a "vacuum tube for W/T" no.1188 marked "Osglim GEC Ltd.", sent by Alan Douglas and printed in Vol.12 no.2. It is a type of neon which was used by the Admiralty on their transmitters. Employed as an RF indicator, it was mainly used by operatives doing testing and experimental work.

Collections

Readers are invited to submit material for this feature, however large or small, general or specialised their collections are.

by Tim Wander

The crisis point had been reached: either I had to halve my collection to get into my house at all, or we must move to a larger house. Well, dear Editor, I enclose my address change for your files.

The collecting 'bug' started more years ago than even I care to remember, when as a schoolboy I plagued my father to help with a very dead Bush Dac 10 set from Grandma's shed and an equally sick 1950's valve set from the local junk store. Having already had my interest awakened in electronics by Heathkit and germainium diode crystal sets, the wonders of the glowing thermionic tubes with their peeling metallising and unique dust smell soon caught me, and I suppose that it has never left!

On the whole there seem to be three reasons for collecting anything. Some people collect as an investment for profit, with an eye to eventual resale; some collect to preserve for the future; and others do it simply because they enjoy it. There is obviously a place for all types of collectors.

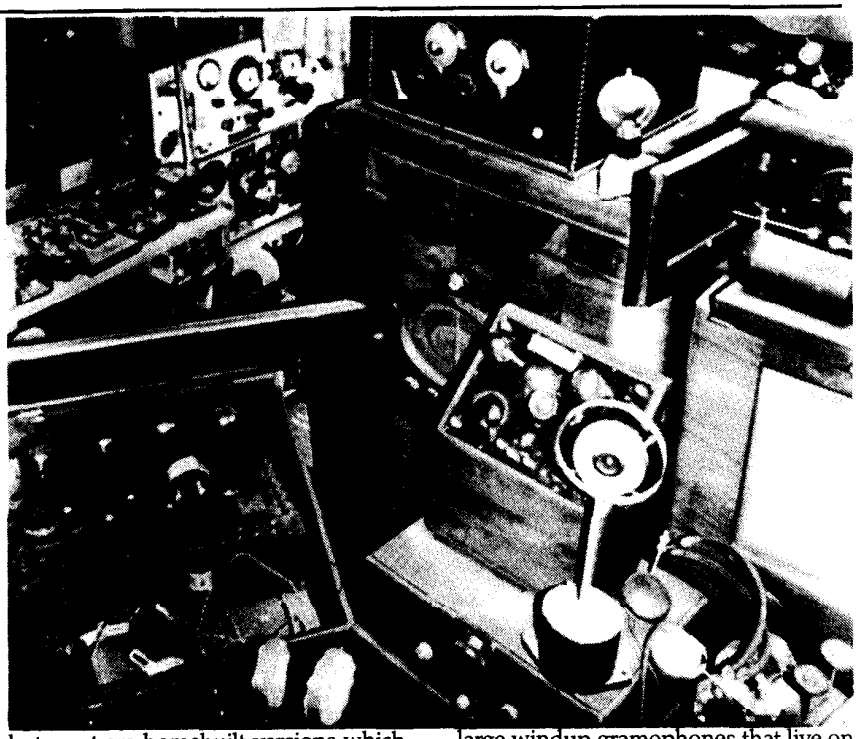
My kind of collector's nose usually seeks out a battered old set that needs restoration: I like the smell of wax and stain, which my wife tolerates, but she isn't keen on my brews of steaming vinegar for cleaning brass. My collection has grown enormously since my schooldays, when I used to have to sneak sets into my bedroom by the back stairs.

At University I quickly gained a reputation as the student who lived in a room full of "junk". Friends were always being enlisted to help lift large radios and boxes of bits up three flights of stairs. The 15-amp ring-main sometimes blew and the cleaners refused to "do" my room due to the festoons of wire and fearsome objects which terrified them, as well as notices on temporary hookups such as "Lethal danger: live chassis!"

Somehow, student life flew past and I found myself working for the oldest wireless company in the country, if not in the world. At Marconi's, my career strayed from wireless to things digital, but even my computers do have a connection with the subject. In my own home at last and with a little more money to spend, my collection began to grow still larger.

Most new collectors seem determined to grab anything in sight providing it is vaguely valved and wooden boxed, but that phase has passed for me. I also realised fairly early on that the more exotic collectors' items were to be beyond the reach of my purse, unless I happened to be very lucky.

The collection starts with perhaps the simplest form of radio; crystal sets, a few of which bear the coveted BBC marks,



but most are homebuilt versions which I often find more interesting (and far cheaper) as they are usually 'unique'. A fleeting passion for military sets, includes a mint (still in packing case) T1154 picked up for six pounds, a slightly modified R1155, three of four 19 sets of various marks, R1132A, 1226, 38, 12, 88, 52 sets, various morse tutors, and an excellent HRO with its full complement of coils.

The fascination for those glowing tubes, especially large transmitting types (and a few thyratons, Ignitrons and the like) led to overfull display cases which hold a few classics and cover some 71 years of technical advancement. One of these cases holds a collection of weird and wonderful tubes, everything from microwave/radar valves through to barretters, neons, reeds, crystals, relays and even an old petrol pump display element.

Numerous boxes of valves and bits keep friends going for television and radio spares, and the ten or so 1920's home constructor sets also have their box of spares. Recognisable faces would be the Pye Sunrise sets, Ekco people's sets, a Co-op Defiant, a slightly battered Osram Music Magnet, assorted horn speakers and a BTH crystal twin. Stacked on the 'functional' shelf arrangement there is also a Philips V7A (yes the tuning cord is broken), DAC 90A, Ekco U29, Philips "Monoknob" model 787, a couple of Murphys and even a handful of 'early' transistor radios. I wonder if OC71's and their ilk, or even microprocessors will ever become collectable I have a few hidden in a deep recess just in case.

But my collection isn't all radios: my party piece comes in the form of a couple of large windup gramophones that live on the stairs, a GEC prewar telly hides next to the radiogram that nearly became a drinks cabinet.

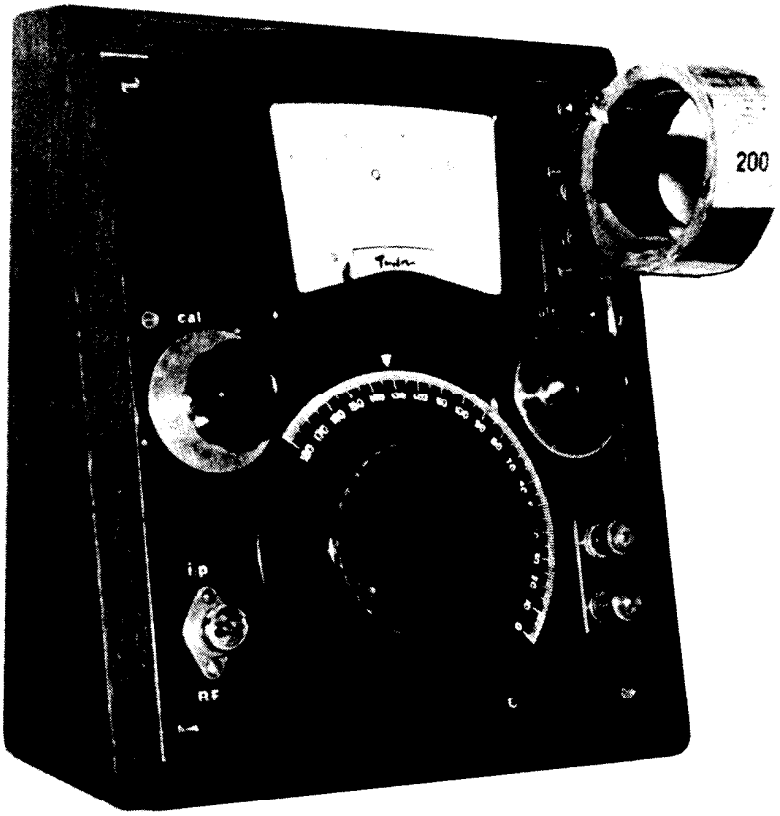
The CG1 405 television transmitter also lives there (see BVWS Bulletin Vol.4). The occasional summer's evening is spent plugging it back together although access is somewhat restricted: part of the garage roof had to come down to get it in. If there is a museum or other reputable party interested in preserving this complete and working TV transmitter they should contact me. Another monster in the garage came to me through an interest in "radio in pipes", that black magic art where aerials become dishes. Most people who want to understand radar visit the library, but I acquired a 20 KW (pulsed) Decca 606 marine radar, although its transmitting days are over (I've seen what a 5KW microwave oven does to a meat pie!). However, if anyone is interested in a working radar (with dish, rotator and PSU) then please contact me.

In a brief period of time compared with some collectors, I seem to have acquired a fair number of 'interesting' devices. A collection of headphones (remember when they were 10 pence a pair from the local junk store?) lives alongside boxes of early computer core-store memories. A couple of vintage tape recorders hide behind a selection of valve boxes, topped off by several bookshelves of radio books, mainly about the birth of broadcasting in Britain. In the middle of all this is a stray 'black box' modern amateur radio set that has also found a niche. Not exactly vintage, but it does work extremely well and on the rare occasions that I get to use it I can sit back and tell the station at the other end that I'm in the 'radio room'.

A Vintage Q Meter

by Ted Beddoes

This project arose out of a desire to classify the collection of plug-in coils acquired over the period of the last few years, so that I might know if they were useful or not, and what performance could be obtained from the obviously home-made items.



I am talking about the open basket-weave or wave-wound coils of the 1920s. Wave winding was adopted in order to reduce the self-capacitance of coils and achieve lower losses within the coil, and hence greater selectivity and amplification from the wireless using them.

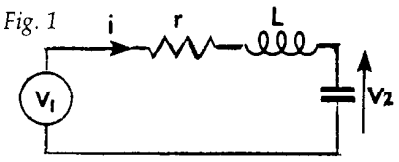
Some of the better ones, such as the Igranic coils, came with calibration curve attached showing the alleged tuning range with a .0005 μF tuning capacitor, and a number which seemed to bear some relationship to the tuning range, since small coils had a low number and large coils a high number.

The time had come therefore to construct a simple Q meter in order to determine the tuning range of each coil and the quality or Q, rather than continue to lash up a collection of components each time a coil needed to be checked out.

Theory

A word about Q first. Q is the voltage magnification factor of a tuned circuit. In simplified terms and referring to Fig. 1, if a voltage generator with a source resistance of zero ohms is connected in series with a tuned circuit, and the frequency of this voltage is adjusted to be the same as the resonant frequency of the tuned circuit, then the voltage V_2 developed across the tuned circuit will be Q times the input voltage. In simple mathematical terms:

Fig. 1



$$V_2 = QV_1$$

Hence $Q = V_2/V_1$ ---- (i)

This occurs because at resonance, the reactance of the inductance L cancels out that of the capacitance $1/\omega C$ leaving the current i flowing around the tuned circuit, where $i = V_1/r$ (or $V_1 = ir$). The output voltage is then $V_2 = i \times 1/\omega C$.

If we substitute these equations for V_1 and V_2 in (i) above we can see that in terms of the circuit components,

$$Q = \frac{i \times 1\omega C}{i \times r} \quad \text{or} \quad \frac{\omega L}{r}$$

$$\text{Since } \Omega L = \frac{1}{\omega C}$$

Q therefore is the ratio of the reactance to the intrinsic losses r of the coil.

Description

The project therefore was to build an extremely simple instrument based on Fig. 1 where L is the plug-in coil and C the .0005μF tuning capacity.

The difficulty is to do this without introducing additional resistive losses (thus reducing the accuracy of the measured Q) and without making the design too complex. In theory, a zero source resistance voltage generator and an infinite impedance voltmeter are required to make accurate measurements.

In practice, since simplicity was the keynote and the ability to check the tuning range of coils was felt to be more important than an accurate measurement of Q, a compromise was accepted.

For an instrument that is used infrequently, it is desirable also to refrain from using amplifiers which require batteries, hence the compromise circuit as shown in Fig. 2 which is totally passive was conceived.

*Note: The values of R_1 and R_2 can be modified to suit the sensitivity of the micro-ammeter, but should be as high as possible.

continued on next page

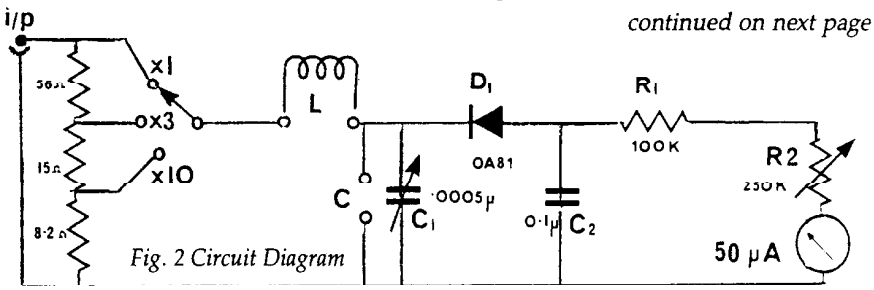


Fig. 2 Circuit Diagram

Project A Vintage Q Meter

continued from previous page

Referring to the circuit diagram from left to right, the RF signal, usually in the range 100kHz to 2MHz for the coils in question, is obtained from a simple 75 ohm signal generator plugged into the input socket. In keeping with good practice this is terminated in a 75 ohm load comprising three resistors in series. A switch reduces the input voltage to the tuned circuit in two calibrated steps of ⅓ and ⅒th respectively. This has the benefit of reducing the source resistance placed in series with the coil when measuring higher values of Q and the losses due to circuit imperfections must be reduced.

Next comes the plug-in coil, and the tuning capacitor. The 'C' terminals across the tuning capacitor allow a substitution measurement of small capacitors by noting the change in the required setting of C_1 to tune any arbitrary coil to resonance.

Note: As part of the calibration process to be able to measure capacitors it is necessary to connect a capacitance bridge across C_1 and, with no coil inserted, produce a curve of capacitance versus angular rotation for C_1.

Finally the voltage across C_1 is detected by the diode D_1, smoothed by C_2, and the resulting direct current flows through the meter via resistors R_1 and R_2.

Construction

Construction of the Q meter can take any convenient form provided the components are mounted in a reasonably rigid fashion and the wiring is kept relatively short.

It appealed to my sense of antiquity to give the unit a vintage appearance as shown in the photograph. The components were mounted on an aluminium panel sprayed semi-matt black, an old coil holder and control knobs being used. The wiring was done in the traditional point-to-point manner, using solid copper wire, the complete assembly being then mounted in a mahogany box.

The other components used were all from the spares box, and consisted of an old 'Ormond' .0005μF capacitor with shaped vanes, and a 100μamp meter from which the internal shunt was removed to obtain the highest possible sensitivity.

Operation

In operation a signal generator, in my case an old Advance, is connected to the input at its maximum output voltage (usually about 100mV) and set to the approximate frequency of interest. Switch S_1 is set to ×1 and the coil 'L' replaced by a short circuit. Then with C_1 set to minimum capacitance, the calibrate control R_2 is set to indicate the smallest sensible reading on the micro-ammeter (say 10% of full scale deflection). This reading represents a Q = 1.

The coil to be tested is now inserted in place of the short circuit and the tuning capacitor and/or the input frequency adjusted until a peak is observed on the meter. If this exceeds full scale set the switch S_1 to ×3 or ×10 as required to reduce the reading.

The ratio of the current indicated on calibration to that indicated on the meter at resonance (×3 or ×10 if the switch has been adjusted) is the Q of the coil.

$$\text{i.e. } Q = \frac{\text{I peak } (\times 1 \text{ or } \times 3 \text{ or } \times 10)}{\text{I calibrate.}}$$

In practice, Letraset can eventually be used to legend the meter directly in terms of Q for greater convenience. By the above procedure the tuning range of any coil can also be found by noting the frequency setting required on the signal generator to obtain resonance for the maximum and minimum setting of C_1, the Q at each resonance also being indicated on the meter.

I have now happily measured every plug-in coil in the spares box and each is suitably labelled.

In doing this I discovered that the number to be found on the Igranic coils is the nominal wavelength to which the coil will tune with a .0005μF fully meshed, but divided by ten:

e.g. 150 --- 1500 metres
30 --- 300 metres

This agrees closely with the calibration curve to be found on some of these coils, and hence it appears that the best of this type of coils may have been individually calibrated whilst the number gives only the approximate wavelength.

It is not certain that the above conclusion is consistent for all manufacturers, some of whom may have resorted to merely using meaningless type numbers on their coils.

However, I am now in a position to measure them all to my own satisfaction. I trust it may be of sufficient interest for some of you to want to do the same.

Feedback

Letters continued from page 27

Transmitter saved (1):

I was pleased to see the article in the Bulletin Volume 12 No. 2, relating to the ex-Sutton Coldfield CG1 Transmitter, and to learn of its final resting place with Gerald Wells in Dulwich.

Without however wishing to detract from the kudos rightly attributable to the team who acquired, transported and are now refurbishing the unit, I must bolster the egos of your members living North of the Intellect Equator (Bristol to the Wash) by leaking the news that there were two CG1s at Sutton Coldfield and we have the second one in store at Birmingham Museum of Science and Industry, pending an opportunity to complete our 'Communications Gallery' where it will be displayed.

Indeed, we have in store a quite comprehensive collection of Wireless apparatus covering the significant stages of communication history, and we hope soon to increase our displays of Radios by cramming some exhibits into smaller areas and concentrating our space utilisation.

Meanwhile, I apologise to visitors for the lack of equipment on display but assure you that Radio in the Midlands lives! **R. P. Hayward Member BVWS, and Keeper – Science, Birmingham Museum of Science & Industry.**

Transmitter saved (2):

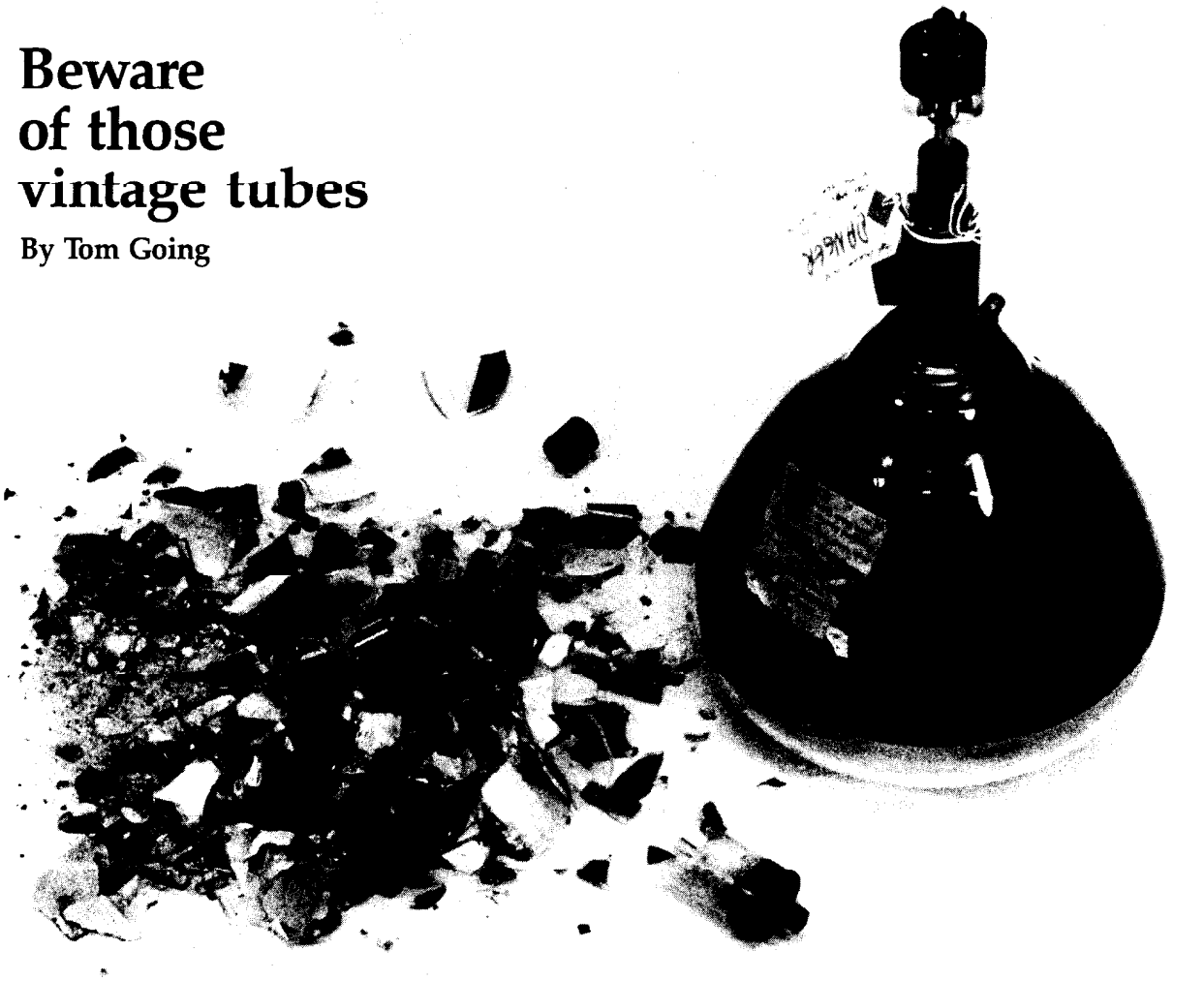
A propos Tim Wander's article on the 405 line transmitter he helped to save, BVWS members may be interested to know of another in preservation.

On a recent visit to the new transport museum at Dover I was very pleased to see that the volunteers there have preserved the old BBC channel 2 transmitter together with a couple of monitors and other oddments. All they need now is someone who can help them get it going again, probably at low level into a dummy load. The museum is housed in an old pumping station (complete with old pumps) in Connaught Road, in the shadow of Dover Castle and has plenty of road and rail interest, as well as sundry collections of vintage radio, lift and telephone gear. It is normally open Sundays and bank holidays 11am-5pm from Easter to end September (Tel: 0304-204612).

And talking of telephones, perhaps I may be permitted a brief plug for the Telecommunications Heritage Group, which does for telephones and telegraphs what BVWS does for radio. Membership is £6 a year and you can get details against an SAE sent to THG, PO Box 59, Renfrew Street, Glasgow, G2 1LR. **Andy Emmerson.**

Beware of those vintage tubes

By Tom Going



The picture here is of two CRM 92 cathode-ray tubes. The one in pieces was left intact in a cupboard box, in a nest of packing material. It had been examined the previous day. By the next day it was a mass of pieces, scattered round the room and piled up in the box. There seems to have been nothing that could have fallen on to the tube, and spontaneous implosion seems the only likely cause.

Because of the vacuum in cathode-ray tubes, they are under a distributed, continuous pressure of about one ton per square foot of surface. Modern tubes have very thick glass for the bulk of the bulb and implosion is now so unlikely that it is a rarely thought-of risk. But it was not so in earlier days, and the flying shards of glass were even known to spear through the cabinet walls of sets damaged in transit.

If you are handling tubes of early vintage, wear goggles, use gloves and heavy clothing and *do not* work alone and out of earshot of other people.

Let us leave the last word with Dr L F Broadway, one of EMI's original television development team:

"Then we were all scared stiff of the danger of implosion. C.S. Agate, the chap responsible for receiver design, asked me to come and see him one day. I went in and saw on his desk a magnificent CRT, 12 inches in diameter. I won't mention the manufacturer's name but the glass was quite thin and he looked at me and said: That's the way to make CRT's. You don't want those awful heavy things that you lot have been making. Look at this, quite light, thin glass, etc. I said, I'd as soon stay in this room with a time bomb on my desk as that thing - I'm going. So I pushed off and the next morning there was no tube on his desk and his office was littered with bits of glass and various bits of tin from the electron gun. So I didn't hear any more about that one. But if half a dozen of those things had blown up and wrecked somebody's sitting room that would have put an awful crimp in television generally."

- from Bruce Norman,: Here's Looking at You - The Story of British Television 1908-1939. London: BBC Royal Television Society 1984.

Replacement tubes:

by John Gillies
Chairman of BVWS
Vintage Vision Section

For those of us who restore pre-war or even post-war television receivers, the biggest problem is dealing with low-emission or otherwise faulty tubes. Quite obviously, good replacements are rarely available. One solution is to rebuild dud tubes but this presents a major problem compared with modern tubes, for replacement gun-assemblies will not generally be available. It is therefore interesting that a firm called Display Electronics of Uxbridge have successfully rebuilt a pre-war EMI 6/6 12" tube. An article on how this was done was published in "Television" Magazine in September 1987. The magazine regularly publishes material on vintage television topics and a recent article was on the design of a Band 1 modulator covering the original frequencies.

Layout and Design: Robert Hawes