# The Bulletin

Vol. 31 no. 2 Summer 2006 www.bvws.org.uk


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Spring 2007 (date to be announced)

# National Vintage Communications Fair

## Now at The Warwickshire Exhibition Centre

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Bulletin of the British Vintage Wireless Society
Incorporating 405 Alive
Volume 31 No.2 Summer 2006

www.bvws.org.uk



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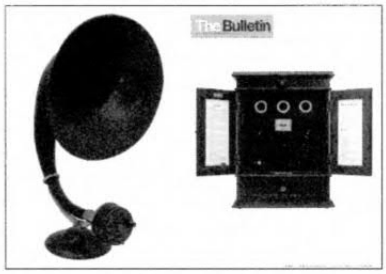



Front cover: Stirling 'Threeflex' receiver, Type R1590.
Rear cover: 'The Priory' horn loudspeaker.
photographed by Carl Glover

Graphic design by Carl Glover and Christine Bone

Edited by Carl Glover. Sub-Edited by Ian Higginbottom

Proof-reading by Mike Barker,
Ian Higginbottom and Peter Merriman

**Contents**



# From the Chair

Without keeping anyone waiting any longer, I can announce that the May 2006 NVCF was a great success and after all costs made a reasonable profit, certainly covering the losses of the previous year and leaving some over. The show will continue as a once yearly event run from within the Committee. This will ensure the show remains busy and special as the only Premier National Vintage Communications show.

I would like to thank everyone for their letters and emails of support for the new venue. I know that some apprehensions were overcome when the doors opened and the visitors piled in on mass. A couple of pre-opening teething troubles will be ironed out in time for the next show.

The Vintage Television display staged at the NVCF proved to be a very popular attraction, with many hundreds of people crowding into the small area where the display was staged to see the pre-war and post war sets working. Almost all of the sets soldiered on for the entire day without failure which goes to show just how well they were originally designed and how well they have been restored.

I would like to thank everyone who brought along their treasured sets for display and those who helped on the day.

Some time ago, I reported that the Historic Marconi collection had been presented to The Bodleian Library and the Museum of the History of Science, Oxford University and that a major exhibition was announced by the Museum for 2006.

I was lucky enough to attend the official opening of the Exhibition. Opening speeches were given by Lord Patten of Barnes, Chancellor of the University and Princess Electra.

The exhibition consists of 10 small cases of ephemera and objects. The ephemera relating to the Titanic disaster and patents, is very interesting and probably sufficient. One small quibble, a mention of Sir Oliver Lodge in relation to the 7777 patent would have been appropriate. Of the thousand or so photographs in the collection a total of 11 are displayed but with only their original postcard type captions, this unfortunately does them no real justice. The hardware display is a huge disappointment, 36 significant items only from the nearly 250 in the collection but inexplicably including 3 Rhigi dischargers and 3 V2 receivers. The captions are neither technically detailed nor visually arresting so neither the academically minded or the casual visitor will be satisfied. They give the impression of being written by someone unfamiliar with the subject and who doesn't, for instance, know what a wavemeter is. The first objects seen are the transmitter and receiver of the Salisbury Plain apparatus of 1896. An excellent piece to show, but one hopes that no one will attempt to remove the coherer (made by Marconi himself) which is within easy reach. This point worries me a great deal.

The display is in a narrow basement corridor and the case lighting is such that the lowest compartments are in near darkness which makes it hard to appreciate what is in them. This is surely not the full extent of the exhibition we were given to expect at the time of the donation and not the sort of effort befitting Oxford University. The Collection would be far better suited to a whole gallery in the Museum, where stagnant dusty displays could have been removed to make way. It is to be hoped that this will not prevent a serious exhibition being mounted in the near future and that those with expertise in the history of Marconi will be consulted.

Some BVWS members are given recognition within the exhibition for their efforts, but these are related to efforts outside of the exhibition itself.

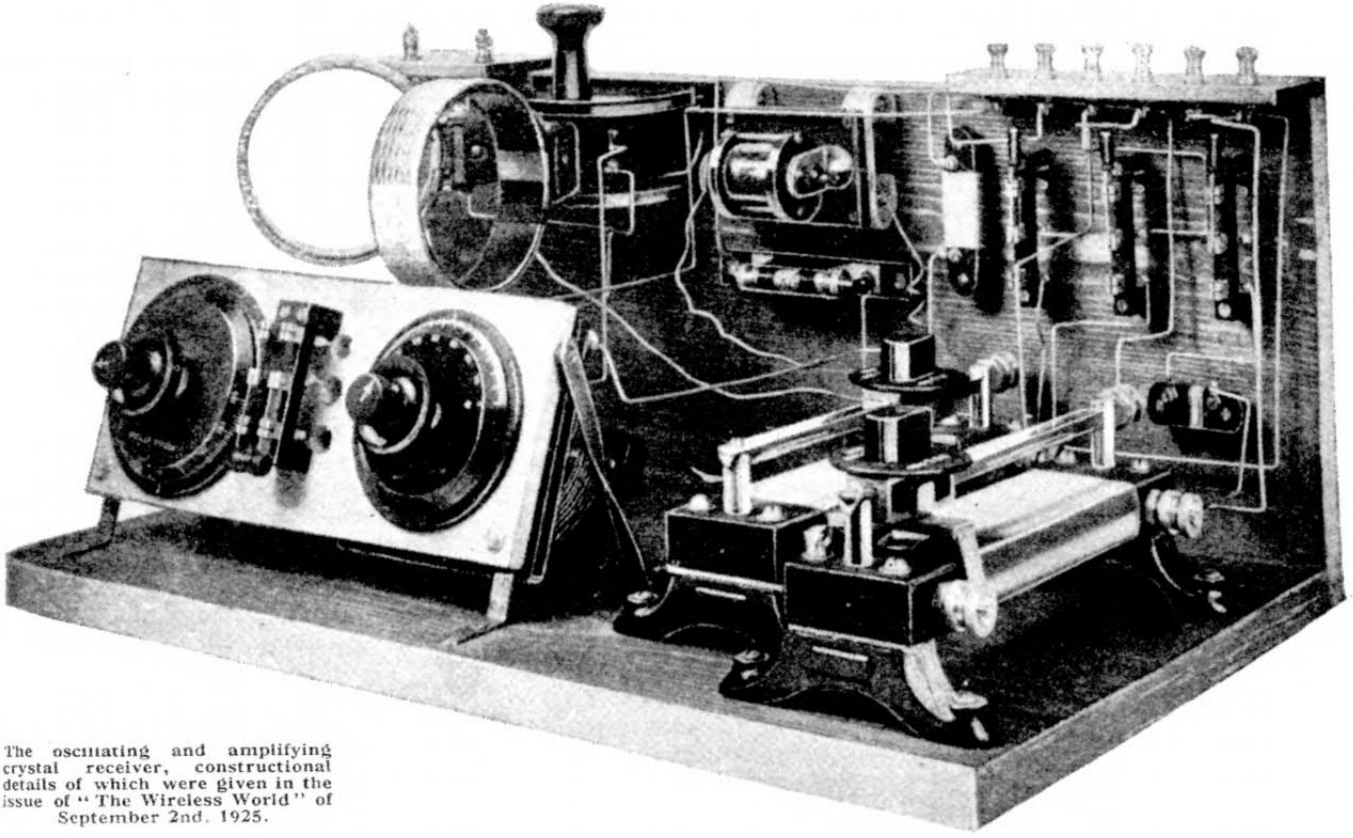
Photographs left to right: Mike Barker presents the Pat Leggatt award which went to Gary Tempest for his article on restoring AWA Radiolettes to Jeremy Day on Gary's behalf as he happened to be on holiday at the time. Right: Anthony Constable receives the Duncan Neale Award for Excellence in Preservation from Mike Barker.

# Amplifying Crystal Sets – The Crystadyne Circuit

by Ian Sanders

A young Russian wireless engineer, M.O.V Lossev has apparently succeeded in solving the problem of utilising a crystal not only for detecting, but also as a means of amplifying or strengthening received signals. This, it need hardly be said, is a discovery of the first importance, as it puts the ordinary crystal on a more equal footing as regards range and strength of reception, with existing valve receivers.

Amateur Wireless and Electrics, August 9th, 1924.



The oscillating and amplifying crystal receiver, constructional details of which were given in the issue of "The Wireless World" of September 2nd, 1925.

In 1923, the Russian engineer Oleg Lossev (1903-1942) succeeded in producing a high-frequency oscillator using a crystal detector. Pre-dating the true solid-state age by some quarter century, Lossev's discovery opened up the possibility, at least in theory, of crystal amplification without valves. The work was enthusiastically greeted as a breakthrough in the United States and, while generating considerable interest in Britain for a short time between 1924 and 1925, met with mixed reviews in the press; no doubt the skepticism was driven, at least in part, by the nationality of the inventor. In the event that the scheme had any merit at all, reports were quick to point out that the effect had already been discovered in Britain by Dr. W.H. Eccles and presented in a paper read before the Physical Society of London in 1910, although admittedly it had not been put to any practical application.

The first account of Lossev's results to be published in English appeared in a short and typically low-key editorial in the June 11th, 1924 edition of *Wireless World and Radio Review*. A more detailed article, based on an English translation of Lossev's own work, appeared a little over a month later in *Popular Wireless Weekly*. Modest enthusiasm was expressed about the possibilities of the concept, but the translator felt compelled to add the caveat that he *"was not responsible for the technical soundness of the scheme"*.

The most effective crystal arrangement for amplification was generally accepted to be a zincite crystal in conjunction with a steel point contact – this combination exhibiting what is termed a "negative resistance" characteristic. When a certain critical potential was applied to the crystal, a further slight increase in the applied voltage caused an actual decrease in the current flowing through the device. This negative resistance behaviour could effectively be used to compensate for inherent losses in a circuit and gave rise to the oscillating and amplifying properties of the crystal. A potentiometer was typically used to precisely adjust the voltage on the crystal to bring it nearly to the point of oscillation, under which conditions amplification could be achieved.

For the best results, treatment of the zincite was often recommended and this involved sprinkling the surface with manganese dioxide and then heating it in a fire until the crystal was white hot. On

**Crystals THAT Amplify!**

***A Discovery that Promises to Revolutionise Wireless Practice***

**"AMATEUR WIRELESS"** was early in the field with news of this important invention *(see our issue dated June 21)*

**Next Week** we shall publish a further article on the subject, illustrated by explanatory diagrams.

Opposite page, main picture: Just a crystal set? *The Wireless World and Radio Review*, September 2nd, 1925.

Opposite page, Lower right: *Amateur Wireless and Electrics*, August 2nd, 1924.

Right: Although a little optimistic for its day, this American editorial did accurately predict the coming of the transistor age. *Radio News*, September 1924.

Far right, top: A "practical" application of the oscillating crystal circuit. *Popular Wireless and Wireless Review*, September 11th, 1926.

Far right, centre: The best arrangement for amplification was a zincite crystal and a steel needle, although other combinations were possible. *The "P.W." Crystal Experimenter's Handbook*. Presented free with *Popular Wireless*, October 3rd, 1925.

Far right, bottom: *Popular Wireless and Wireless Review*, October 3rd, 1925.

Below: Oscillating crystal detectors were still being advertised in 1927. Popular Wireless, July 9th, 1927.

## A Sensational Radio Invention

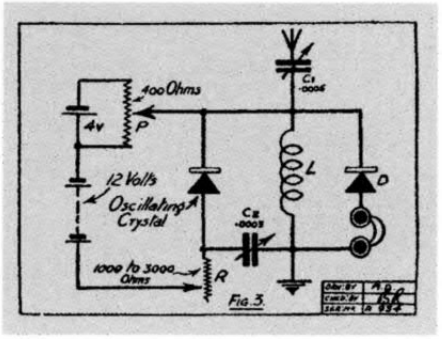
Hugo Gernsback

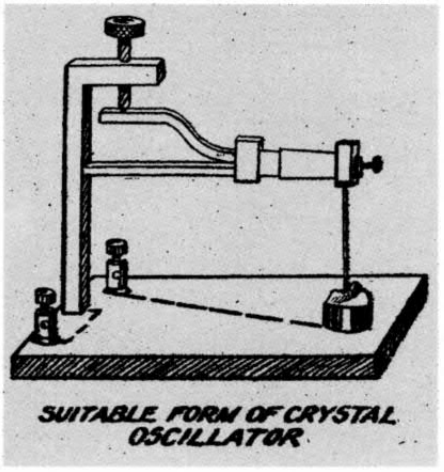
A special form of crystal in a special arrangement is now made to oscillate just exactly as does a vacuum tube... THE CRYSTAL NOW ACTUALLY REPLACES THE VACUUM TUBE.

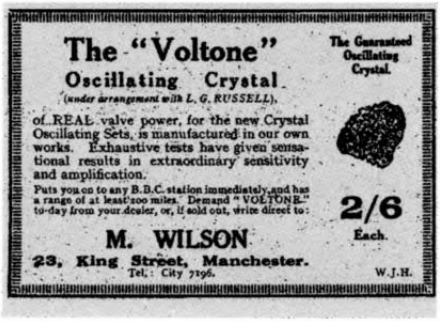
...it will be understood now that the oscillating crystal which Radio News has termed the Crystodyne Principle can be used in exactly the same manner as any existing vacuum tube. We can not only detect with the crystal, but can also amplify with it. We may use any number of them in various circuits in order to bring in great distance or to obtain greater power, the same as we do now with multiple tube sets. In a short time we may speak of three or six crystal sets, the same as we speak now of a three or six tube set...

That the radio industry is due for an entire revolution through this invention there seems to be no question. But like other revolutionary inventions, the revolution, as a rule, does not come over night. It will take many years for the Crystodyne Principle to be adopted in our radio sets. Three to five years may be necessary before that is brought about... Future improvements of the Crystodyne will probably be along the following lines: perhaps in some form of synthetic crystal or perhaps some crystal arrangement in a vacuum that is just as fixed as is the present day vacuum tube. There will then of course be no necessity for cat's-whiskers and adjusting means.

The future Crystodyne receiving set will therefore be rather small...all the battery voltage being taken from small flashlight batteries which fit right in to the set.





cooling, a dark red piece of the treated crystal with a clean surface was to be selected. Variously referred to in the literature of the day as oscillating or amplifying crystal sets, receiver designs based on the concept developed by Lossev were often known as *Crystadyne (or Crystodyne)* circuits – a term coined by Hugo Gernsback, the editor of the American journal, *Radio News*.

In a classic scramble to be first with the news of a potentially revolutionary breakthrough, the journal *Amateur Wireless* published some of the earliest practical circuit designs in August 1924. Use of the oscillating crystal as both a high-frequency and low-frequency amplifier was described, although very few details of how the circuits actually operated were provided. In the former, a single zincite crystal was used and the circuit resembles a conventional crystal arrangement employing a biased carborundum-type detector. The latter design employed a standard cat's-whisker/galena detector as rectifier and a transformer-coupled low-frequency zincite crystal as an amplifier. These were followed shortly afterwards by a series of basic designs published in *Wireless World* in early October.

Development of the concept continued during 1925 and about a year later a flurry of so-called practical *Crystadyne* circuits appeared. These included a very detailed description published in the September 5th, 1925 edition of *Popular Wireless and Wireless Review*. In this rather complex design, a switch allowed the oscillating zincite crystal to be set up with an independent tuned circuit by attaching headphones to this circuit and then adjusting the potentiometer biasing the oscillation crystal. After stable oscillations were achieved, the switch was thrown placing the oscillating crystal into the receiving circuit, and the headphones were now plugged into the actual receiving socket. The usual galena/cat's-whisker receiving crystal could then be adjusted and the set tuned to the local station by means of a tapped inductance and variable condenser. A second tapped inductance control allowed the oscillations to be damped for undistorted (and presumably amplified) reception.

Constructional details of perhaps the most imposing crystal set using the *Crystadyne* principle were presented in the September 2nd, 1925 issue of

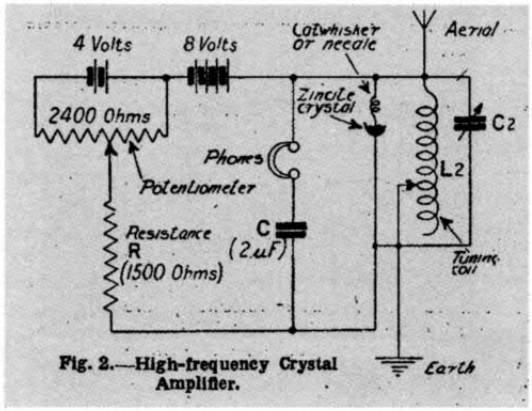



**Fig. 2.—High-frequency Crystal Amplifier.**

Above and below: Two of the early amplifying crystal circuits published in the journal *Amateur Wireless*.

*Amateur Wireless and Electrics*, August 2nd, 1924.

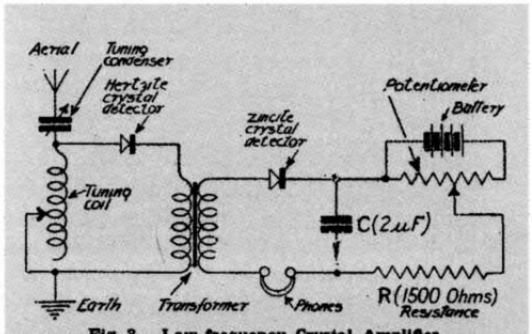
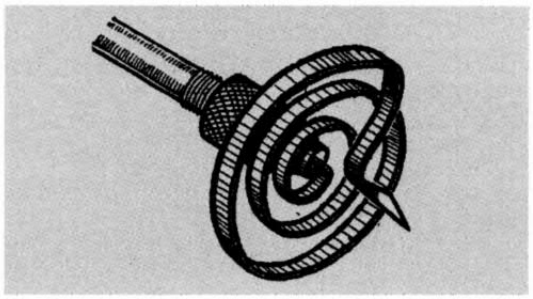
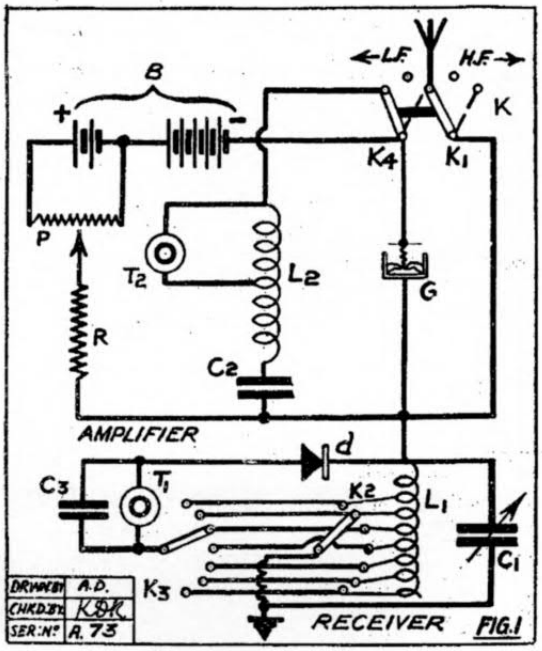



**Fig. 3.—Low-frequency Crystal Amplifier.**



*Wireless World's* design for a steel contact to the zincite crystal adapted from a clock hairspring.




Complex Crystadyne circuit requiring two headphone connections (T1 and T2) for independent optimisation of the oscillating (G) and receiving (d) crystals.

*Popular Wireless and Wireless Review*, September 5th, 1925.

## Reaction with a Crystal Set

"CRYSTAL CRAZY" (Slough, Bucks) – Is it really possible to oscillate and obtain reaction with a crystal set? If so how is it done?

It is quite possible to obtain reaction and oscillation effects, using for that purpose a crystal instead of a valve. A specially chosen "Oscillating Crystal" has to be used, in an additional circuit that includes resistances and batteries. Such an arrangement can be added to an ordinary crystal set which has the tuning condenser in series.

*Popular Wireless and Wireless Review*, November 27th, 1927.

*Wireless World.* Components were mounted on a large wooden baseboard with a similar wood board serving as the back panel. The oscillating crystal was of the usual zincite type, but the cat's-whisker contact was particularly novel, being adapted from the hair-spring of a small clock. In all, five controls (two variable resistances to bias the zincite crystal, two condensers – one for tuning and one to bring the zincite crystal to the point of oscillation – and a pair of loose-coupled tuning coils) were needed for successful reception. Not to mention that two sensitive crystal detectors had to be brought into adjustment and maintained in that condition. A challenge for even the most skilled operator and definitely not a job for the average BBC listener!

By 1926, interest in the Crystadyne seems to have declined. Nevertheless, *Popular Wireless* had not given up completely and a so-called "practical" oscillating crystal set design was featured in their September 11th, 1926 issue. Some simplification was achieved in that the rectifying crystal was now a Radio Instruments permanent-type detector and there were no loose-coupled coils to adjust, but operation of the circuit was still very intricate, with its two variable condensers, two potentiometers and oscillating crystal contact to be kept in fine adjustment. To tune the receiver, a suitable contact was made with the cat's-whisker on the oscillating crystal and the voltage across the crystal was adjusted by means of a pair of potentiometers until a "mush" was audible in the headphones. The tuning condensers were then carefully adjusted until the oscillations ceased when a station was tuned in. Properly adjusted, the set was reported to give strong loudspeaker signals at ten miles from 2LO, with headphone reception of several continental stations.

As 1926 drew to a close, so did efforts to further develop the *Crystadyne* concept. Despite all the early promise, it could never be simplified sufficiently for any reasonable commercial application. While the general principle behind the amplifying crystal was theoretically sound, practical limitations imposed by both the quality of the components available at the time and the formidable skill that would have been required to make the circuits operate correctly just could not be overcome. Certainly there is no record of any commercially manufactured set having used the concept, and within a few years the *Crystadyne* was relegated to the category of a scientific curiosity.

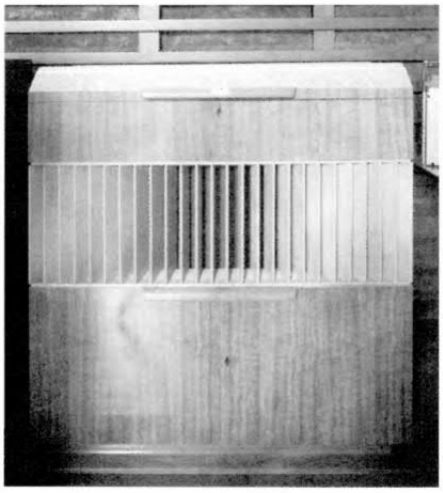
Note: A short article by Desmond Thackeray on the oscillating crystal principle can be found in the Bulletin of the British Vintage Wireless Society, Volume 14, No.2.

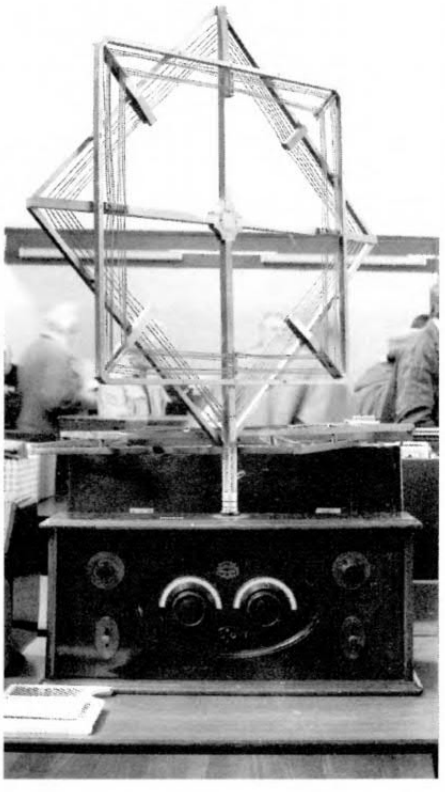
The term "Crystodyne has been trade-marked by RADIO NEWS in the United States as well as in Europe. Manufacturers and the trade are cautioned not to use it on any merchandise without the consent of RADIO NEWS.

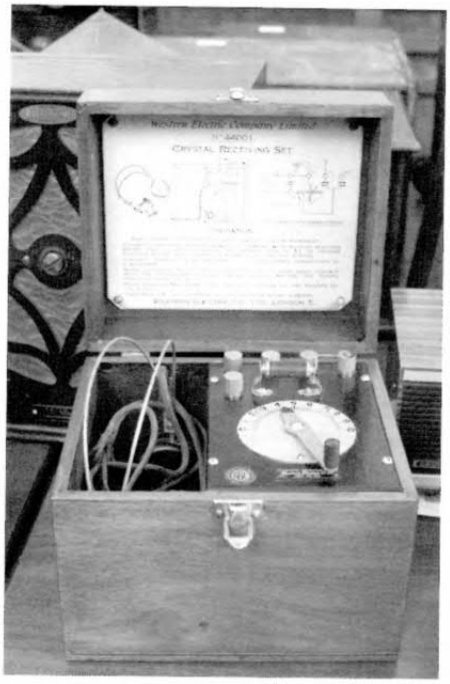
*Radio News*, September 1924.

# Harpenden Auction and AGM March 5th 2006

Photographs by Carl Glover

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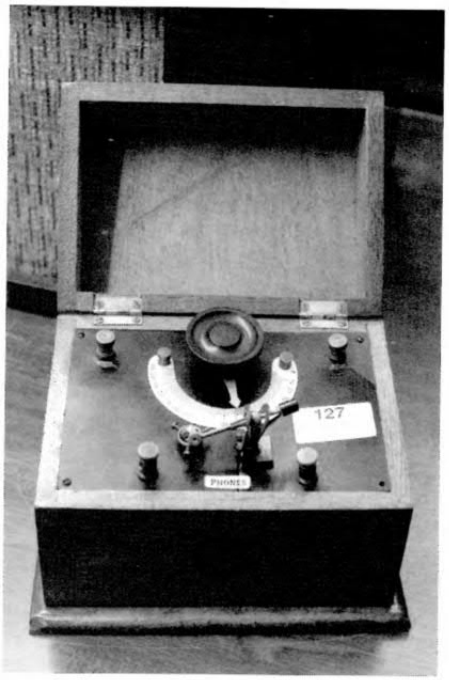
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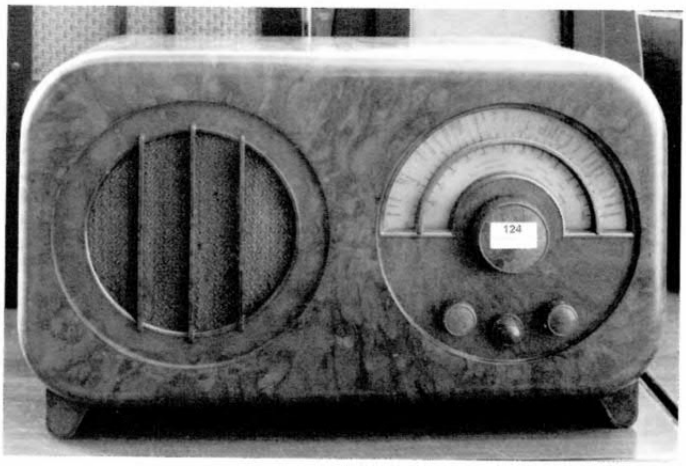
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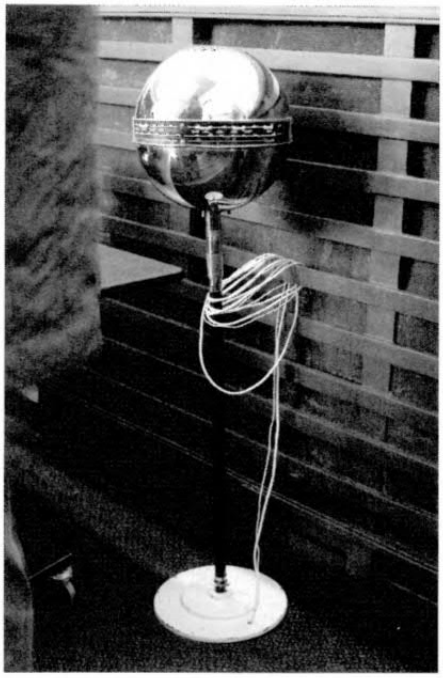
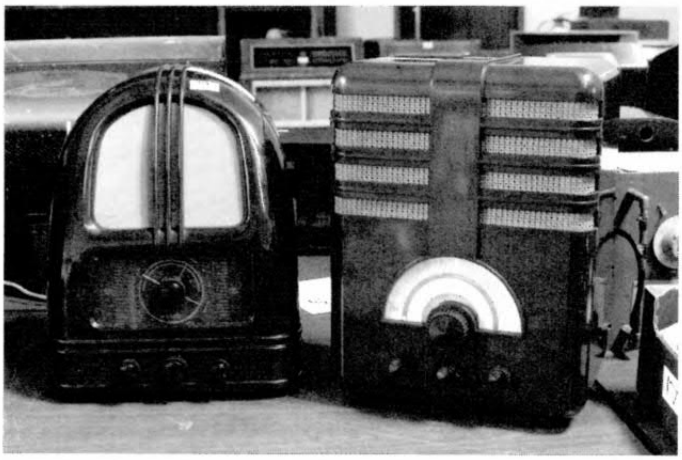
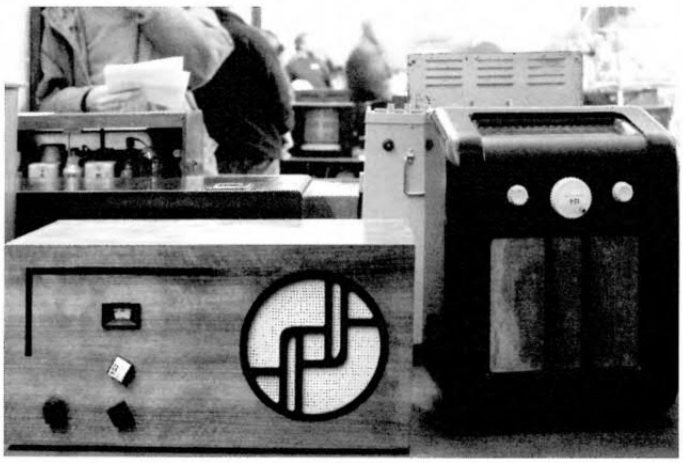
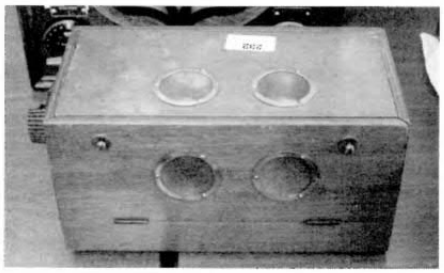
SONY

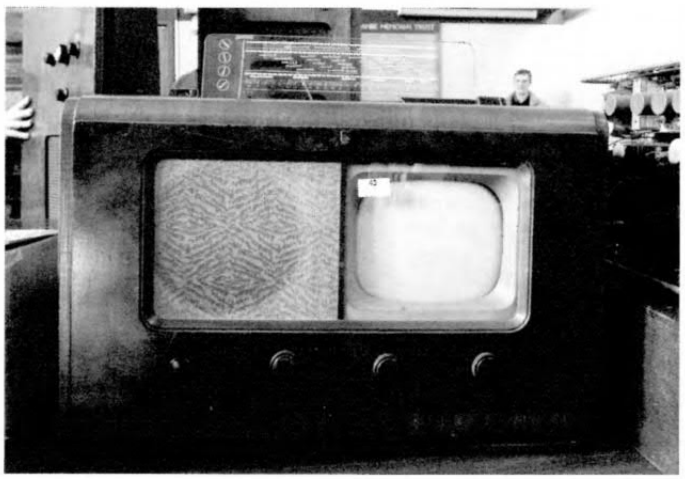

Mullard







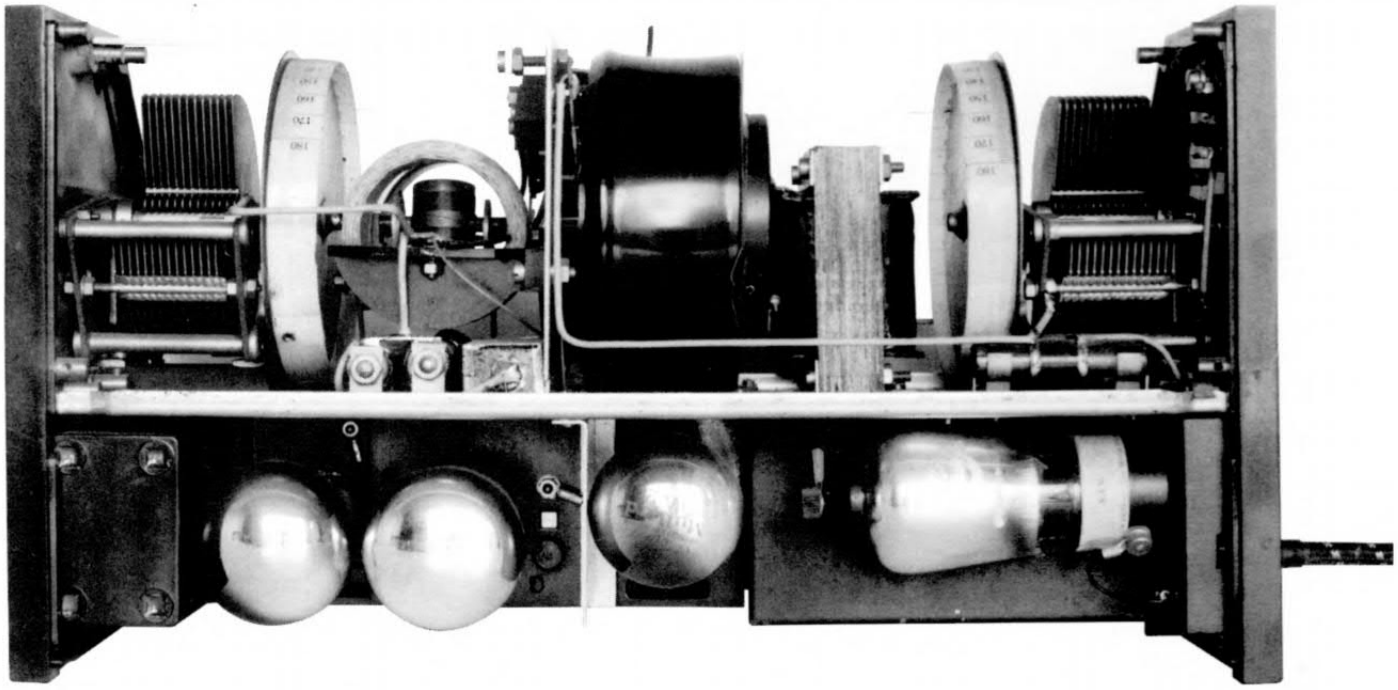




# How did you React? by L Williams

**It ain't what you do it's the way that you do it.**

You are a newcomer to vintage radio and have acquired an old radio which the vendor assures you, works. Assuming you know enough to supply it with HT and LT of appropriate voltages and a reasonable aerial and earth, you are now ready to give it a try. You tune around and find a couple of stations not very loud, and that is all. On the panel is a control marked 'reaction', but if it's earlier than 1930 it probably isn't a volume control as we understand that function. You give the knob a clockwise twist and the speaker emits an ear–piercing screech.



If it's the first time you have pushed an early radio into oscillation you may think that there is something seriously wrong. If you were fortunate enough to obtain the operating instructions for your set it may say 'turn the reaction control clockwise until a rushing sound indicates that the set is oscillating, then tune. When you hear a whistling sound, move the tuning slowly back and forth causing the whistle to rise and fall in pitch. Set the tuning so the whistle is at its lowest pitch then reduce the reaction slowly until the whistle stops and you can hear music. Now very carefully adjust the tune and reaction controls alternately for best reception'. If the set has a good reaction system and the signal is too weak this works fine. You may have a set with a less refined reaction system and have read the standard advice that in order to receive the weakest signals critical reaction must be applied – critical being defined as a setting as close as possible to the point at which oscillation starts. You tune carefully and hear a faint distant station. You cautiously advance the reaction and the strength increases. Just as you reach a comfortable listening level, the set bursts into oscillation so you reduce reaction until the oscillation just ceases and your signal is barely audible. You have conditional stability in which, when oscillation has started it is maintained to a slightly lower setting than was required to start it. You make a note of the exact setting where oscillation starts and very slowly come within a whisker of it and your weak signal is fully audible. You have critical reaction. Now you wonder if you are perfectly tuned in and as soon as you touch the tuning control the set either bursts into oscillation or goes very quiet. The tuning and reaction control are interacting. It can be worse. Your set may be subject to hand capacity and having adjusted to perfection you take your hand away from the knob and either it oscillates or goes quiet. There was even a musical instrument called the theremin, which was played by waving your hands around the oscillatory circuit.

If you spend much time operating early receivers you will sooner or later meet all the above phenomena but it doesn't have to be like that. From the earliest days of

Above: Interior of Philips 2514. The rotary reaction coil assembly is left of centre between the left tuning capacitor and the toroidal aerial coils.

Left: 2 valve detector + LF with Myers valves showing universal reaction coil holder 1924.

From the earliest days of triode valve detectors, reaction was applied to enhance performance.

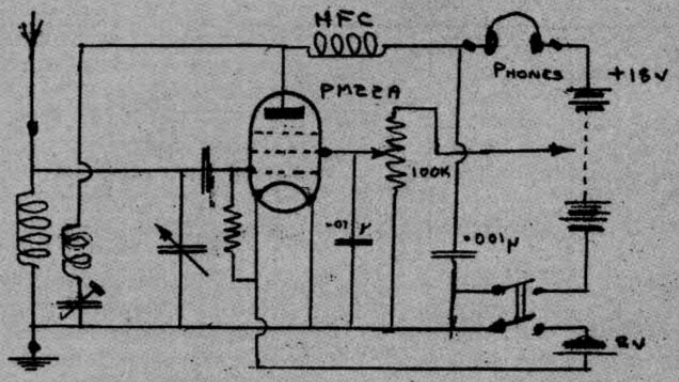



Fig 1: The low voltage short wave set

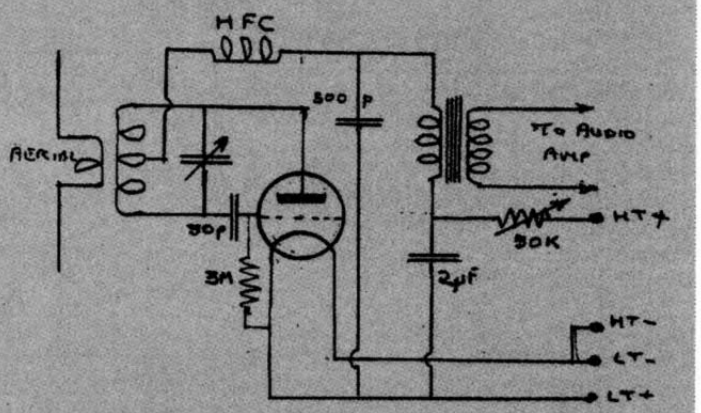



Fig 8: Self-quenching super regenerative detector

triode valve detectors, reaction was applied to enhance performance. To understand what ideal reaction would do if you could obtain it, I need to introduce a very simple formula. I promise it will be the only one, but if formulae put you off, just skip the next bit. If we have an amplifier circuit which amplifies a signal A times, take a fraction of the output B and feed it back to the input so that it adds to the input signal, the amplification now becomes $A^1$. Where $A^1 = {}^{A}/_{1-AB}$.

The significant thing is that if the factor AB = 0.9 the amplifier now has an amplification ten times greater; at AB = 0.99 it will be 100 times greater; at AB = 1 the amplification will be infinite. We therefore have the theoretical potential to obtain as much sensitivity as we wish from the very simplest circuitry. Add to this bonus that if the circuit is a tuned circuit, energy fed from the amplifier output can replace the losses in it, raising the Q factor which makes it much more selective. I am not going to explain Q because I said 'no more formulae'. It will suffice to say that it is a measure of the quality of a coil or tuned circuit. When the signal is fed back so that it assists the input signal, it is called positive feedback which I much prefer, but since we are vintage, I will use the old terms 'reaction' or 'regeneration'. As I have shown, reaction can in theory improve the sensitivity and selectivity of a simple set to a very great extent for very little additional complexity. It is not surprising that reaction was popular. In the thirty or so years in which reaction was common, with very few exceptions, no commercial set ever realised more than a small fraction of its potential but it was possible to do much better.

One of my earliest ventures into radio construction in World war II when I was about 13 years old, was a one valve shortwave set that could receive weak signals from all over the world at good phone strength using only a bit for an aerial. It came about like this: I had a lot of parts from old sets that were given to me (now highly collectable). I also had one small lead acid accumulator which I could charge or use, but not both. The problem was HT batteries; these were around 10/6d or six months' pocket money. I subsisted on old ones thrown out because the voltage had fallen too low to operate the set properly. If you had a 150v one, the top part between the 90v and the 150v taps would have a bit of life left because part of the set ran on the lower voltage taps so that the top cells supplied less current. I came upon a construction article which gave some circuits for running valves on low voltages enabling the HT battery, which was often bigger and heavier than the rest of the set, to be replaced by grid bias batteries. This, with a small jelly acid (unspillable) accumulator made possible phone–portable one and two valve sets that you really could carry in one hand. In those days Woolworths was still a 3d and 6d store and they sold grid bias batteries. If it worked, my HT battery problem was solved. The circuits used a PM22A valve which was contrary to everything I thought I knew about radio. A power pentode as a detector? When I was much older and no longer knew everything it would have been seen as a very good choice for operating on very low voltages. Eventually I managed to scrounge a PM22A and made a one valve grid leak detector with reaction. The article said voltages 15 to 30. I had two 9v grid bias batteries. It worked well and with the two batteries I could experiment with any anode and screen voltage from 1.5v to 18v. In fact it would work down to 9v anode and 4.5v screen.

Soon after came something which helped shape the future course of my life. I was given an RSGB Amateur Radio Handbook, the 1941 wartime edition. I still have it. It was an Aladdin's cave, packed with every aspect of radio, receivers, transmitters, aerials, instruments and techniques. I couldn't wait to grow up and do some of this. Short waves I had to have. There was a section on simple straight sets which I glanced quickly through. This book was for things like 10 valve superhets and transmitters. I knew all about simple radios – I had made one. I took my PM22A one valver and replaced the long and medium wave coils with self supporting air spaced coils in heavy gauge copper which the book said was best. The 500 pF tuner was replaced with 100 pF with slow motion like the book said. I remembered that it said that the secret of getting weak signals with a simple receiver was very smooth reaction and that this was helped by operating with the lowest practical anode voltage. Good! That was all I had. It also said that it was better to use a pentode or screened grid valve, set the reaction capacitor so that the oscillation was just starting and then leave it fixed and use a screen potentiometer as a fine reaction control.

I put a 100k Ohm potentiometer on the panel where the reaction capacitor had been and put a preset capacitor for coarse reaction. A bit of experimenting with screen volts and the reaction preset and I had found the holy grail of one–valvers. Near perfect reaction.

My one valver used the circuit of Fig 1, but as I knew when I was older and no longer knew everything, the right circuit helps but it is only half the battle. You are trying to balance the operating condition on a knife–edge, in the region where a tiny increase in feedback produces a huge increase in amplification. The bit where it goes from a hundred–fold at AB=0.99 to infinite at 1.0. To do this not only must the circuit have very fine control but the component types and layout must be dead right and mechanically rigid. Controls must have no free play in bearings and have no stiction. The whole assembly including the valve must be free of microphony and have stray couplings minimised. You cannot eliminate strays and I suspect a very good set may just fortuitously have strays which cancel out. You could experiment for weeks and never quite get it perfect.

I wasn't a clever lad; I got lucky. That is why commercial radios did not have perfect reaction and why reaction passed its 'best before' date in the mid 1930's when superhets gave high sensitivity and good selectivity plus AVC without need of skill from the operator. Reaction did however survive for at least another decade as the province of the home constructor and experimenter and of course for short wave listeners who could not afford a good superhet communications receiver. With proper refinements like variable gain HF amplifiers and with careful design and construction, a cheap receiver which wasn't

as good as a set costing a year's artisan wage but could give quite a good account of itself if the operator was skilful, was possible.

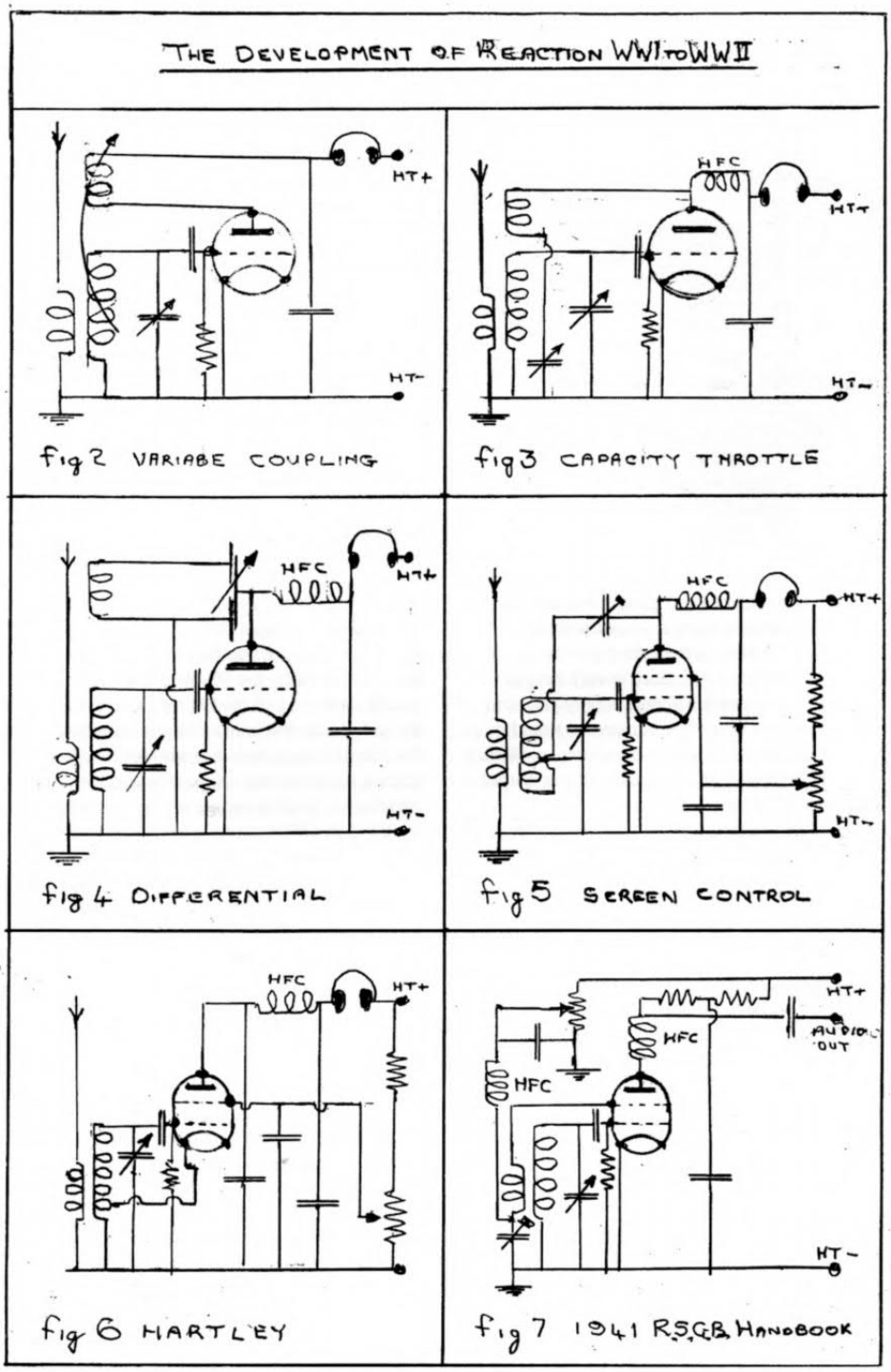
Now is the place to briefly cover what I could have learned about the subject when I was thirteen if I had read it up properly. The earlier methods of controlling reaction consisted of varying the coupling between anode and grid circuits. All these methods are prone to interaction. In the earliest period (you will often see this in 1920's broadcast receivers) the favourite was some method of moving the reaction coil with respect to the grid coil–Fig 2. Most popular with home constructors and experimenters were arrangements of sockets for the popular ranges of 2–pin plug–in coils. These had the virtue that you could easily change to a coil with more or less turns. Coils were made to swing past each other, move closer or further apart or rotate. There was a universal version which did all three. Other methods included concentric coils which slid together like a telescope and an arrangement popular with set makers in which the reaction coil rotated inside the grid coil like a variometer. Often these rotated 180 degrees allowing the reaction effect to be reversed to prevent overloading on strong signals. The Philips 2514 of 1928 did this. Because the full range of reaction from zero to maximum occupied only 90 degrees of rotation, fine adjustment was difficult. All of the above were fairly complex and expensive to make. Early broadcast receivers also used other methods to control reaction. The Gecophone smokers' cabinet (early version) used eddy current damping by means of an adjustable brass disc, (Vol 8 No 2). Have you ever pondered upon how the Marconiphone V2 regenerator block works? One answer is, not very well! (Vol 1 No 4 and Vol 8 No 1).

The next fashion (circa 1930) was to fix the reaction winding and to control the HF anode current flowing through it with a series capacitor throttle (Fig 3). This was probably used on more sets than any other arrangement. It was simple, cheap to make but just as good (or as poor, depending on how you view its shortcomings), as the moving coil arrangements.

A step forward was differential reaction (fig 4). This required a special capacitor having two stators 180 degrees apart with a common rotor with semicircular plates. Thus when the shaft is rotated to increase the capacity of the rotor to one stator, the capacity to the other is reduced by an equal amount and the total capacity to the two stators was constant. The differential capacitor divided the HF component of the anode current between a direct return to HT – and return via the reaction coil. The HF impedance at the valve anode was therefore more nearly constant, reducing some of the problems of earlier arrangements.

There was a superior strategy for varying reaction which was to fix the coupling between anode and grid circuits and vary the amplification of the valve. I have seen one and only one circuit which did this with a triode valve. The amplification is not strongly dependent upon anode voltage and it would therefore be necessary to provide means to preset the coupling to enable oscillation and use the anode voltage as a fine control. The preferred method is to use a screened grid or pentode valve and vary the screen voltage as in Fig 1. Best control may require very low screen voltages and the potentiometer may be padded with fixed resistors at either end to get the best conditions and very fine adjustment. Because the coupling is fixed, a separate reaction coil is not required (Fig 5). Another variation is the Hartley circuit (Fig 6). This is preferred for shortwave use but is excellent at any frequency. It has the advantage that both screen and anode are bypassed at HF so that they operate at HF earth potential. In this case the HF component of anode current is obtained from the cathode, and ideally this will be DC heated to avoid hum modulation. For best operation the cathode tap should be carefully selected.

There is another form which appears in the 1941 handbook (Fig 7). In this arrangement feedback is taken from the screen which functions as the anode of a triode formed from cathode grid and screen. This forms a low gain triode with a fine control by screen voltage variation so that an auxiliary capacitor control is needed to bring the circuit close to oscillation before final adjustment with the screen control. I'm not sure about this one. The screen cannot fulfil its normal function of shielding the grid from the anode because it is not held at HF ground potential and the anode had no HF bypass. It did however appear in a handbook of good repute. I did once try a version with an anode bypass and resistors instead of HF chokes which is better practice because chokes can cause



problems. It worked very well indeed.

There is a member of the regenerative detector family which, although it looks simple, works on a principle totally different to any other kind of detector and acheives ultimate sensitivity without any critical adjustment. it is called a super regenerative detector and there are three principal types called separate quenching logarithmic, separate quenching linear and self quenching. The complete understanding of their operation involves some serious maths and has been the subject of several PhD theses. Fear not. I shall leave the first two for anyone interested to do their own research and attempt a simple exploration of the self quench circuit which was much used in the 1940's for work on wavelengths shorter than 10 metres. You will understand its appeal to short wave listeners when you see the very few components used and hear of its incredible sensitivity (Fig 8 [page 11]). It had its moment of glory near the end of World war II when it probably saved the lives of many Londoners. I will tell that story after I try to explain its mode of operation which is quite unlike any other form of circuit. If you are familiar with circuitry, figure 8 is just a very ordinary form of oscillator but the grid capacitor is small and the grid leak resistance is at least 50 times too high for proper operation, typically 3 MΩ, but can be 10 MΩ and returned to HT+. When oscillation starts it quickly builds up to a high amplitude producing grid rectification. The rectified current rapidly charges the grid capacitor to a high negative potential cutting off anode current and stopping oscillation. Then the negative charge on the grid slowly leaks away through the grid resistor until another burst of oscillation is produced. The whole cycle repeats 20,000 to 30,000 times per second in a typical self–quench circuit. In every cycle there must be a point as the negative charge at the grid decays when a minute change, in principal the removal of just one more electron, will trigger another burst. If a tiny signal arrives at the grid as this trigger point is neared, the circuit will trigger early, reducing the interval between bursts thus raising the quench frequency. Since the average anode current in each burst is the same, the mean anode current rises in proportion to the amplitude of the signal so that if it is an AM signal the anode current follows the modulation envelope and the audio is easily filtered out.

The circuit has incredible sensitivity. In the absence of a signal a rushing sound is heard. The set is detecting thermal noise. Only receivers of the very highest sensitivity can do this and no receiver can be more sensitive than this because thermal noise is always present above absolute zero. As soon as a signal is detected , the noise disappears. The circuit has some vices. It is very unselective and since it is quite a powerful oscillator tight coupled to an aerial, it transmits wide band interference. I had one of these built at the end of the war for the 56 MHz Amateur band. When this band was closed to enable the Sutton Coldfield TV transmitter to occupy it, I listened to TV sound on it. If my neighbour had a TV it would have wiped a picture out, which is why this device is no longer used.

In the last phase of World War II British air superiority made it almost impossible for German bombers to penetrate as far as London, giving the city a much needed respite. The Germans began to launch the V1 flying bomb against London and it was causing a lot of damage and loss of life and a great deal of disruption. Worst of all, there was almost no defence against it. Its form was a very small aircraft propelled by a pulse engine with a simple auto pilot. Apart from fuel, the rest of the internal space was filled with a ton of high explosive. After flying a preset course for a preset time, the fuel was cut off and it fell on whatever happened to be below. It was not very accurate but London covers a huge area so it couldn't miss. Being a very small fast moving target, it was very difficult to hit. In the 1940 blitz with huge numbers of conventional bombers, the guns defending the city fired 80,000 rounds in one day without destroying a single aircraft and the officer commanding them ordered them to stop wasting ammunition. Churchill overrode him ordering the guns to fire so that the population hearing them would believe that they were being protected. Over the next four years the kill rate for anti–aircraft fire was much improved but nowhere near enough to have any impact on the V1. By this time, small portable radars developed for aircraft had been coupled to computing devices and servo mechanisms arranged so that when a target was acquired by the radar, a Bofors 40mm quick firing light anti–aircraft gun would be pointed to where the aircraft would be at some future time and the gun fired at exactly the same moment so that the shell and target would arrive in the same space at the same time. With a shell travelling at perhaps 2,000 feet per second, and a target moving at say 400 feet per second, to get close you need to point to an accuracy of a tiny fraction of one degree in two dimensions and time within one millisecond. Putting a shell within a few feet of a V1 didn't do much; it could pass within a few inches and go harmlessly on its way.

From World war I anti–aircraft shells were fitted with a fuse which burst the shell after it had travelled a preset distance. The intent was to fill a large space with metal fragments, so increasing the chance of damage. The fuse had to be set manually before the shell was loaded so it was very unlikely that when it was fired the setting would be anywhere near right, even if the gun were pointed accurately enough to the correct distance ahead of and above a moving target, which was equally unlikely. No wonder that in 1940 it took thousands of shells to destroy one plane even when the sky was full of them.

Enter the self quench super regenerative detector. I said that one of its shortcomings was that it transmitted short pulses of radiation. If one of these pulses were reflected from a metal object it could arrive back at the detector a short time later when it was becoming very sensitive and it would detect the echo of its own signal. It was a one valve radar set. The brass nose cone of a 40mm shell which housed the fuse was replaced by a hollow black bakelite moulding which would allow radio signals to pass through, and inside in a conical space less than one and a half inches across the base and two inches high was packed a self quench super regenerative detector built with a miniature layer type HT battery, a tiny dry charged LT cell with the electrolyte in a separate compartment and a relay. The LT and HT could be tiny because they only had to power the circuit for a few seconds.

When the gun's radar acquired a target, the gun was automatically trained and fired with sufficient accuracy to put the shell within a few feet of the V1. The shock of discharge injected the electrolyte into the LT cell, powering up the filament and by the time the filament was fully heated and the oscillations started, the shell was well on its way and clear of any ground reflections. As it approached the target, the reflected signal became rapidly stronger causing the anode current to rise to a value large enough to close the relay and explode the shell only when it was within lethal distance. It was a proximity fuse.

Batteries of radar–aimed Bofors with proximity fused ammunition were placed on the south coast under the V1 flight paths. The official figure is that on average it took eight rounds to destroy a V1. In four years, the application of the resources of the radio industry had improved anti–aircraft fire from almost no chance to almost certain kill. The eight rounds figure does the system an injustice. A Bofors, as I recall from hearing them shoot, could fire at a rate of about forty rounds per minute. All the guns which were in range would continue to fire until the target was destroyed. Probably the first shell sometimes did it, but by that time several more were in the air, After these guns were fully operational hardly any V1's ever reached London. The electronic age had begun and there would be no stopping it. Now it impinges on every aspect of daily life. If you don't like our computerised world, blame it on the early radio industry.

The self quench super regenerative detector was a mini marvel and with minor modification could perform all sorts of tricks. One writer called it 'multum in parvo'. By adding a second miniature valve and using layer batteries and a dry cell, a hand–held two–way radio was produced, but it could only be used on frequencies where interference was acceptable. That was its problem. Predictably it reappeared in the early transistor era in the separately quenched form with an RF stage in front to reduce radiation, but then it had lost the virtue of simplicity. I think that we may not see it again.

What this article is about is the application of a very important fundamental principle – positive feedback which can magnify tiny effects until they are useful. It's much older than radio. Humans have applied it to various devices for perhaps thousands of years. I think that on this world a single cell discovered it about two and a half billion years ago, but star formation and perhaps the big bang were also driven by positive feedback. It can produce a very violent reaction.

# Aurora Standards Converter with RF Modulator

A review by Jeffrey Borinsky FIEE C.Eng.

At the end of 2004 I reviewed the original Aurora standards converter. This unique design could take PAL or NTSC and convert to any standard from 819 lines right down to 30 line mechanical. The only thing it lacked was a modulator.

The new Aurora converter has a multichannel modulator but sacrifices multistandard operation. If you thought the original Aurora was small you will be amazed at this tiny package, just over 2.5" (66mm) square and 1" (25mm) high!

**A note about prices**

In all my previous reviews of standards converters I have always had to include a note to explain the comparatively high price. Something like this: prices of £300 to £400 may seem high but the economics of small scale production make it inevitable. Darryl Hock, the designer of both Aurora converters has now achieved what seems impossible and made his new design available for just $260, about £150. He has done this with a mixture of modern technology and a keen sense of value engineering. I still don't really know how he has managed it.

**Different versions**

The new Aurora is available in several different versions. My review sample delivers 405 line output and has a system A modulator covering all 13 channels. Other versions are for European 50Hz standards on 441, 455 and 819 lines, also US 60Hz standards on 343 and 441 lines. Each version has a modulator that covers all the channels appropriate to the standard. All versions have almost identical hardware and rely on different programming of the FPGA.

**Technology**

Like the original Aurora, this converter uses a Xilinx FPGA. Part of the secret of the low cost is using the very new ultra low cost Spartan 3E series. This contains all the logic and video memory. A new and better decoder replaces the SAA7113 and a standard SPI serial flash memory holds the Xilinx boot data. Another flash device holds a stationary test picture which can be acquired from the video input. There is not much more than that! A few power regulators, a novel discrete DAC and that's it. The modulator is also a new design. David Robinson pioneered the Freescale (was Motorola) MC44BS373CA as a System A modulator. Darryl has used two of these devices to make a flexible multichannel modulator.

**Power supply**

This is not supplied. The new Aurora requires an external power supply of around 9V at 250mA. A low cost "wall wart" is entirely adequate. The design is fully protected against reverse polarity. The decision not to include a power supply saves shipping costs. I used an old wall wart from my junk box which was supposedly regulated and delivered about 9V on load.

**Video Performance**

Just like its older brother, it is hard to fault the video performance of the new Aurora . It has excellent high frequency response, performs well with all sorts of input signals and has excellent interpolation. Each output line is interpolated from 3 input lines. This gives interpolation quality which is theoretically better than anything except the BBC CO6/509 which used four lines. Although it does not use a framestore, the output line sync is always continuous and stable. This is kind to your vintage TVs.

It has switchable equalising pulses. You can turn EQ pulses on for best interlace or off for complete authenticity. The original 405 standard did not have equalising pulses. Although this should not be a problem with good receiver design the fact remains that many sets suffered from poor interlace.

The comb filter decoder ensures that maximum monochrome resolution can be obtained from any video input. In this respect it improves on the earlier Aurora.

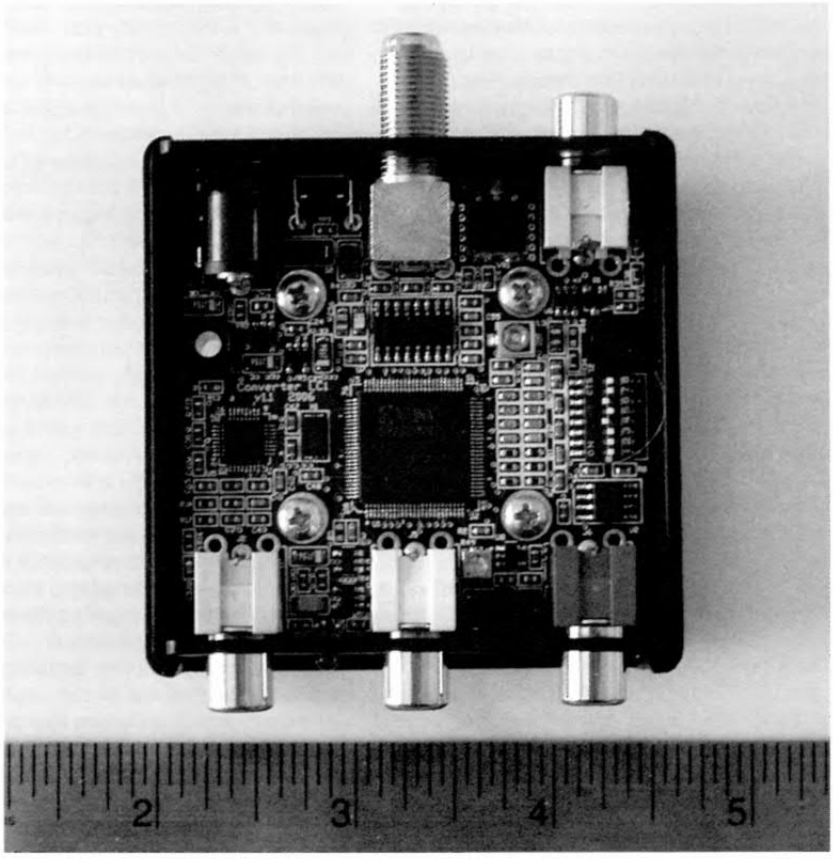
The built-in test pattern generator can capture frames of still video to use as test patterns. These are acquired via the analogue video input. I would have liked to have seen some digitally derived test patterns pre-programmed in the flash memory but this is really me being a bit too fussy.

**Sound**

Unlike its predecessor, the new Aurora does not use a framestore. As a result the video delay is minimal so there can never be any lipsync errors due to the converter. The sound modulator can accept a wide range of input voltages. Modulation depth is controlled by a small preset potentiometer. I don't have facilities to measure the performance of the sound modulator but there's no obvious distortion or other problems.

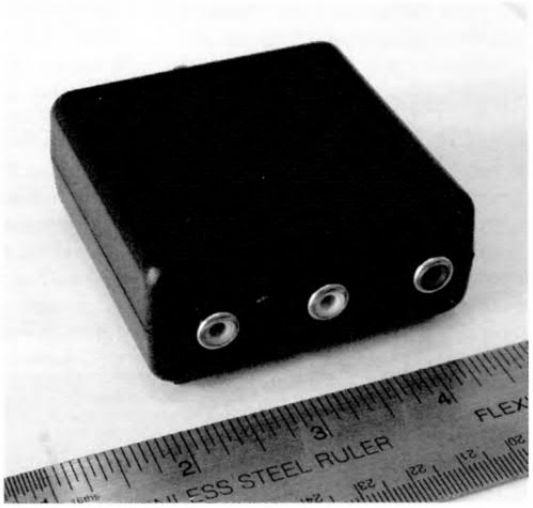
**Modulator performance**

The modulator can be switched to any of the 13 System A channels. Other versions have a full set of channels appropriate to the output standard. Most conventional modulators have had a very high output. This is useful when restoring a deaf old set but could also overload many TVs and required an attenuator in most situations.




Internal view of Aurora converter

Darryl Hock, the designer of both Aurora converters has now achieved what seems impossible and made his new design available for just $260, about £150. He has done this with a mixture of modern technology and a keen sense of value engineering. I still don't really know how he has managed it.





The Aurora's modulator output is specified as 76dB with respect to 1uV. This is about 6mV, enough to feed one or two sets but not enough to cause overload. There is no VSB filter. This is not important since all sets should be equally happy with a double sideband signal. The output has a lot of harmonics. On channel 1 the 3rd harmonic is 11dB down while the 5th is 18dB down with further harmonics visible all the way up to the 500MHz limit of my spectrum analyser. There is also a low frequency spurious on the modulator output around 1.3MHz, about 27dB below peak vision carrier. This should not cause any trouble but a very simple high pass filter would remove it. The harmonics don't matter for most users but you really must respect the warning in the manual and not connect the modulator output to an antenna as you could cause significant interference to non-vintage radio and TV reception. If you intend to use multiple modulators in an ambitious vintage system you will need to use decent filters before combining their outputs.

I don't have access to a monitoring grade receiver so it was sometimes difficult to distinguish between modulator performance and receiver performance. I was able to try the converter with a number of receivers ranging from pre-war to 1960s dual standard. I am satisfied that there is minimal intermodulation between sound and vision, any buzz on sound was due to the receiver. I am not entirely happy about patterning on vision and the cause is difficult to establish. Channels 1-3 were clean but higher channels suffered variable amounts of patterning. The patterning was worse if I attenuated the signal which suggests external interference. However I could not find any obvious sources of interference across most of Band 3. Winding the aerial cable a few times through a ferrite ring had little effect which means there is unlikely to be a common mode or earthing problem with unwanted signals travelling on the outer of the co-ax cable. I cannot find any in-band spurious signals and the harmonics are unlikely to cause this sort of patterning. For all channels it was possible to get a clean or almost clean picture using good quality co-ax cable and taking care with the connections. Channel 4, which is important because it was used on a number of single channel sets, is easy enough to get clean. Some of the higher channels, especially 10 and above, are not so easy.

This is the only significant criticism I have made of the new Aurora. For most users, who are likely to use channel 1, there is no problem at all.

The 75R output matching is satisfactory. This aspect of RF equipment is usually specified as Voltage Standing Wave Ratio (VSWR) which varies between 1.1 and 1.4 over the frequency range.

A word of caution when working on vintage TVs generally. A failed aerial isolator could put live mains on the inner and/or the outer of the aerial socket. This will not do any good to you or the Aurora. Until you are sure about a receiver it's a good idea to connect an extra aerial isolator to the output of the converter or run the receiver via an isolating transformer.

This is the only significant criticism I have made of the new Aurora. For most users, who are likely to use channel 1, there is no problem at all.

**Radio Interference**

The converter contains high speed digital circuitry which is a potent source of RF interference. The plastic case does not inspire confidence but the use of a multilayer PCB with continuous ground plane should help. I do not have facilities for proper EMC tests but I did not notice any obvious problems while testing. It also contains a modulator which is a deliberate source of RF and has many harmonics. If you connect this to an antenna of any kind you may interfere with other services. In the UK this could include DAB which is broadcast on some of the old Band 3 channels and UHF TV services.

**Poor Quality Inputs**

While I cannot test the unit with all possible poor quality signals I can state that the input AGC copes well with low amplitude down to at least –10dB. Note that the input video and sync amplitudes must be in the correct 7:3 ratio since the AGC measures the sync amplitude. Slightly noisy off air and ordinary VHS replay are fine too. It is always possible that really bad VHS replay could cause tearing or other effects but I have not seen this happen.

**Some minor problems**

**DC offset**

This is a very minor criticism and is of no real importance to users. In professional practice the black level of a video signal is at 0V with the sync tips at –300mV. This cannot be achieved without split +/- voltage supplies. In this design the sync tips are at about +0.2V which will not cause any practical problems. Please note that the absolute DC offset of the signal will not cause the displayed picture to have incorrect black level because the signal will always be AC coupled and DC restored or clamped in a monitor or modulator.

**Modulator sync tip level**

System A specifies that the sync tips should be at zero carrier. The Aurora's modulator puts them at 10%. This will affect the black level slightly on many sets but is not serious as you can easily adjust the brightness control.

**Video input and output impedance**

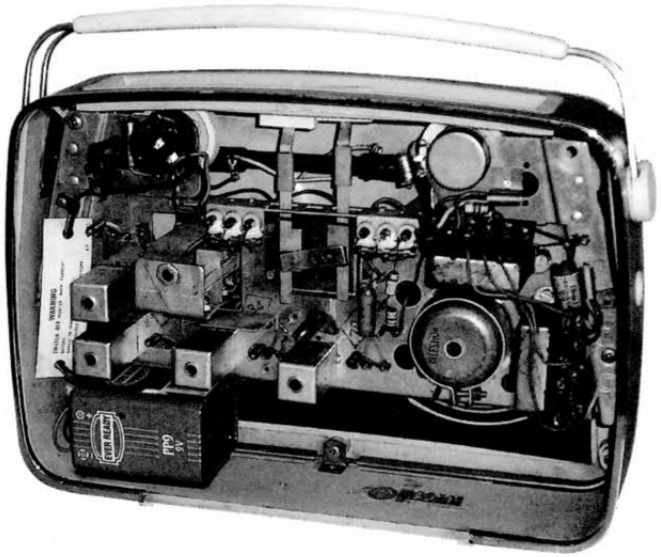
This is a bit technical but please bear with me. Video and RF are normally carried on co-ax cables which have a defined impedance. For video this is always 75R. Video inputs and outputs should both be accurately matched to the cable. This prevents too much signal being reflected from a video input or output. In the RF world this



Continued on page 33

# Bush TR82C by Paul Stenning

I bought this radio at the Radiophile Shifnal exposition in autumn 1998, for £10. It was sold as non-working, but appeared complete from a brief look inside before buying.

The interesting thing about these sets is the style of construction. Unlike most transistor sets, this model is built on an aluminium chassis with the transistors, IF cans and transformers on one side and most of the small components on the other side. The chassis is mounted vertically in the case, with the transistors visible when the back is removed.

The TR82 is easy to disassemble because all the components, including the speaker, come away with the chassis. The only tricky bit is removing the tuning dial knob. The manufacturers recommend the use of a kitchen sink plunger, but I was able to remove it by carefully easing it away with my fingers. The pointer is simply pulled off. The chassis is held in place with four screws (only three in my set!), and is then lifted out. The speaker is fixed to the chassis with a capacitor clip around the magnet.

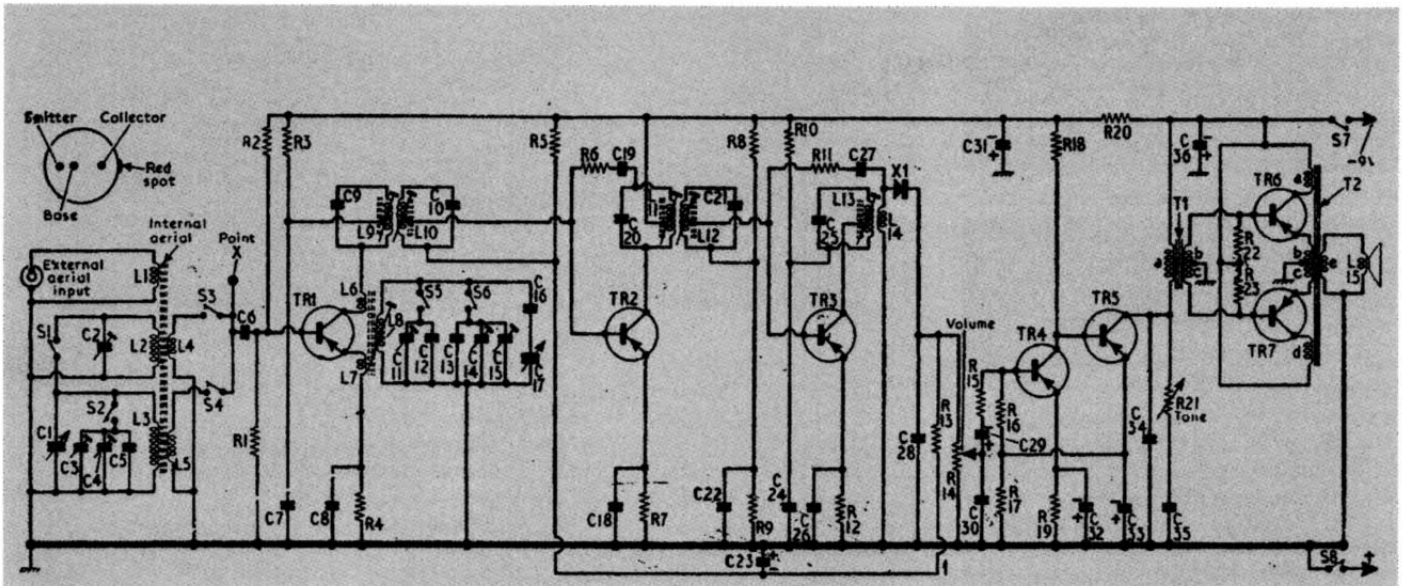
**Electrical Repairs**

On test, the set popped when switched on, but nothing else happened. A meter in series with the battery showed that it drew around 70mA, whereas it should draw less than 20mA quiescent. My initial thought was that this would be due to a problem with the output stage, but a few voltage checks proved that this was OK. Further checks showed that the problem was with the driver stage, the driver transistor being turned hard on, so around 60mA was passing through the driver transformer primary. The driver stage actually consists of two transistors in a DC coupled circuit, and the Trader sheet diagram is shown here.

TR5 was turned hard on, because the base of TR4 was not driven. This is supposed to be biased from the voltage drop across TR5 emitter resistor (R17 - 330R), which is decoupled by C33 (500uF). Further voltage checks showed there was no voltage drop across R17, despite the high current flowing through the primary of T1 and TR5. The rather surprising cause of this was that C33 was completely short-circuit. I say surprising because it is rare in my experience for low voltage electrolytics to become short-circuit (normally they just become a bit leaky and low in capacitance). The original was a small can in a clip under the chassis. I had no good vintage capacitors of this value, so I had to fit a modern replacement. Naturally, this was much smaller, but I was able to modify the existing clip to hold it in place. I double-checked the polarity before connecting it, because the positive wire goes to the chassis.

This brought the set back to life, but the performance was definitely below par. One of the OC45 transistors in the IF stage had been replaced by an unknown alternative by a previous repairer, so this was an obvious place to start. I had intended to change it anyway, since it stood out by its odd appearance and untidy installation. Fortunately I have a small stock of germanium transistors that I have salvaged from scrap sets, and was able to find an OC45 of similar age and case style as the remaining devices. This improved the performance considerably.

The only problem now was that the volume, tone and waveband controls were very noisy, and a shot of contact cleaner sorted this. There were signs of other previous repairs under the chassis, including a 100uF capacitor mounted on the full length of its leads and flapping around in danger of shorting to other components. Fortunately the component itself was serviceable, and just needed fitting tidily. The OA70 detector diode had been replaced by an OA91, but since it was working OK and I did not have any OA70s, I left it alone. I was tempted to unsolder it and fit it more tidily, but its leads had been left fairly short and I was concerned that the heat from the soldering could damage it. I replaced the wax-paper capacitor across the volume control because the wax had gone soft and was coming away. This component is visible when the back is removed, so I fitted a good vintage component salvaged from a scrap set.




*Circuit diagram of the Bush TR82B together with a diagram of the transistor base connections. Waveband switches* **S1**, **S3** *aad* **S5** *close on M.W., connecting* **L2** *and* **L3** *in parallel. Switches* **S2**, **S4** *and* **S6** *close on L.W*

**Cabinet**

With the electronics now working, it was time to turn my attentions to the state of the cabinet. The main problem was that it was filthy. I decided against washing it however, because I was concerned that this could affect the outer trim and tuning scale. Instead I dismantled the cabinet as far as possible (the front and top panel can be separated from the surround by removing a few screws) and cleaned the individual sections with foam cleanser, paper tissue and an old toothbrush. In the process of cleaning, the "H" from the "BUSH" name came away. This pleased me because the chrome finish on these letters was coming away and I was wondering how I was going to repaint them without getting paint on the case. I removed the other three letters by pressing their fixing pegs from inside the case, and put them to one side for attention later.

After the cleaning, the case looked much better, but the vinyl trim on the sides looked rather dull and lifeless. I had bought a bottle of Greygate Plastic Polish at a Radiophile exposition some time ago but never used it. This seemed an ideal time to try it, and I was very impressed. The polish is applied with a cloth, allowed to dry, then polished off with a clean soft cloth. The buffing requires some effort, but this is effort well expended. I then removed the switch buttons and control knobs, and cleaned and polished them the same way. To remove the knobs the ferrite rod aerial must first be released, but like everything with this set, it's a simple job.

As I mentioned earlier, one of the chassis fixing screws was missing - this is because the clip inside the case that it was supposed to screw into was also missing and the plastic it was fixed to had broken. The other fixing for that side of the chassis was also loose due to crumbling plastic, so I secured this with some Araldite (epoxy resin).

I then returned to the B U S H letters. They were originally chrome plated, but much of this had worn away leaving a rather dull cream plastic. I visited a few local DIY, car accessory, and art shops, looking for some sort of chrome paint, but the only thing I could find looked (from the colour of the cap) more like silver than chrome. I decided the only option was to paint them with silver enamel paint - although it does not match the chrome, it does look better than the dull plastic. The paint could be removed fairly easily if a better option becomes available in the future. While I was painting, I repainted the tuning scale pointer with white enamel paint. Although enamel becomes touch-dry within a few minutes, it needs several hours to set fully. The Araldite used to repair the case also needed 24 hours to set fully, so it was time to put the job to one side for a while.

**Reassembly**

A few days later I returned to the job. It was really just a case of putting everything back together and making sure it all worked. The B U S H letters were pressed into their holes and secured from the inside with a small amount of plastic cement (the type used for plastic model kits).

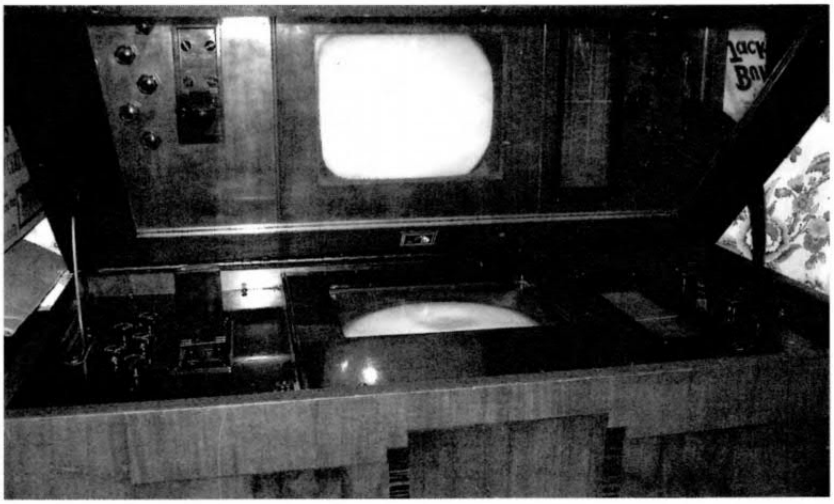
The chassis had to be tried and removed a few times while I got the loudspeaker (which had been removed to change the capacitor earlier) and the volume and tone knobs positioned correctly. With the chassis finally fitted, I fitted the tuning pointer but not the knob yet. I connected the battery and tested the set, and in the process made sure the tuning pointer was accurately positioned relative to the wavelengths on the scale. Once I was happy, I fitted the tuning knob and the back. Job complete!

The set is now on display in our lounge, and since it is fitted with a battery, it has proved useful in the event of power failures. Of course, it also gets the opportunity to play for a few hours every couple of months, like my other sets!

# The early range of EMI prewar TV receivers

by Michael Usher

The author is fortunate in possessing a Model 900 HMV Radio and TV Receiver and, at the time this was produced in 1936 the price was about the same as a small town cottage. For other owners of prewar TV sets, the following observations should be of interest.



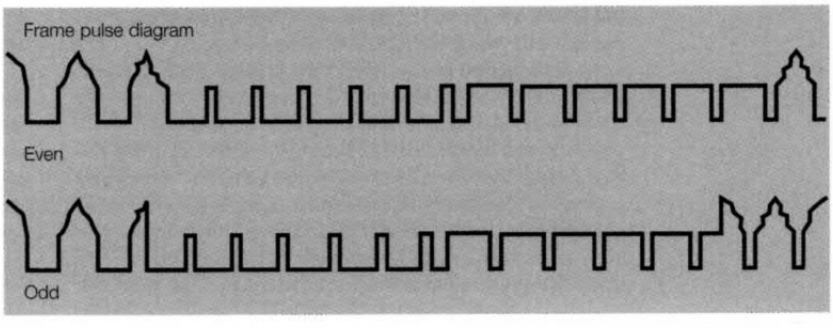
It should be remembered that in the early 1930's any experimental home TV reception from the Baird system made use of a mechanical model scanning disc with the number of holes increasing with each later model. When the race between Baird and EMI began following the BBC decision to transmit a regular TV service, EMI decided to develop electronic pictures in place of the mechanical disc having heard from their connection with RCA of developments in the USA by Zworykin. The head of EMI's development directed his senior engineers to develop a cathode ray tube for both TV transmissions and receivers for domestic reception. There was little for them to do technically. Electronic tubes with deflecting electrodes were known for oscilloscopes but they made a decision to use magnetic deflection for picture production. This was an easier tube to produce with its simpler internal electrode design: it relied on external coil winding which EMI was quite familiar with. Also it was found that the magnetic tube had less defocussing of the picture than the electrostatic tube. Similar principles were applied to the TV camera electronic image tube – the Iconoscope, although its physical form is different. These tubes were manufactured in the EMI factory at Hayes by a comparatively small number of workers who, as part of the process, cleaned the internal glass face of the tube by washing with marble chippings before the next stage of pouring in the fluorescent coating as a liquid which was then allowed to settle and dry. The rest of the manufacture of electrode assembly, pinch, base sealing and exhaustion followed normal valve manufacture except the higher vacuum necessary in the picture tubes.

The 12 inch face diameter of the cathode ray tubes produced a very long neck (overall about three feet long) which had to be accomodated in a cabinet which viewed the picture via a 45° mirror (see photograph).

The radio receiver in EMI's combined Radio/TV consoles was their best at the time, featuring LW/MW/SW, multi valve stages and an RF stage. The audio side was used as TV sound output by the wavechange switch. In the cheaper EMI sets a simple TV sound receiver was used consisting of a TV sound demodulator and triode amplifier feeding a normal sound output valve. The receiver for TV vision and sound was different from the design of the radio receivers due to the bandwidth of 2.5 MHz required and operation at much higher frequencies. The bandwidth requirement resulted in a low gain pre–valve stage and required a total of 5 valves to produce a suitable voltage at the demodulator. Also at this RF frequency of 45 mHZ the problems of maintaining stability were severe. At that time there were no valves available (especially for TV RF amplifier usage), it was too early for the international range, and a straight (as opposed to variable mu) 4 volt heater RF pentode, the MSP4 from the Marconi–Osram factory at Hammersmith, was used. This has a comparatively low slope (2.4 mA/Volt) compared with the later specially designed TV valves such as KTZ41 (a slope of 7.5 mA/Volt) which were used in their later sets. For stability the valves were individually screened in screening cans with their associated RF components. EMI introduced a small phenolic (?) black coil former with an iron core for their TV receiver RF circuits instead of their usual paxolin coil formers for their radio circuits for better long–term stability. Coupling between the valves was a bifilar coil inductively tuned with stray capacities with damping by the RF flow resistances of the anode and grid circuits. Extensive anode decoupling was used for resistors condensers and heaters also.

To improve picture quality in areas of high signal strength, some stagger tuning could be used. Conversely, at some distance from Alexandra Palace (30–35 miles) a narrower bandwidth could be used. The valves were mounted in a straight line, thereby separating the inlet from the output and assisting maintaining stability. In practice I found no difficulty with stability.

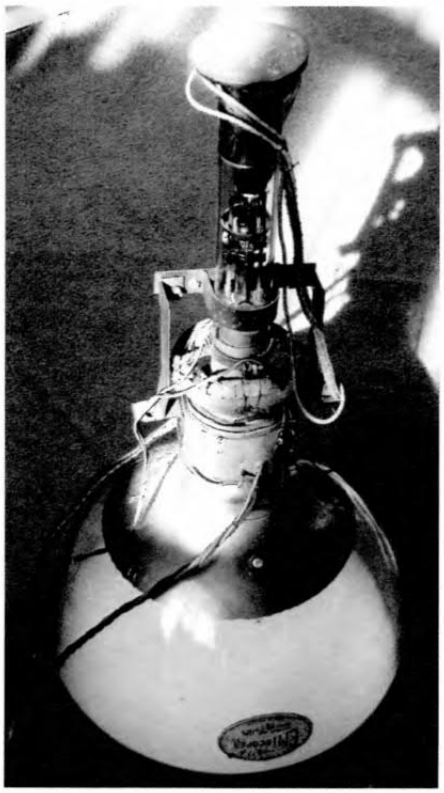
The demodulator for vision was a RF transformer coupled to a special TV frequency diode type D42, also in a separate screened compartment. The primary of the RF transformer was also screened within the screening can seperately. Naturally this area of the circuit was extensively decoupled with RF chokes and condensers. From this diode the vision signal was connected through a compensated contrast variable resistor control to the CRT grid and also the synchronising signals for the horizontal and vertical scans to the synchronising unit where these signals are amplified separately by individual straight RF MSP4 valves. At this point the difficulty arises of the 'interlaced' scan where each successive picture is followed by the next in between the lines of the previous one to give improved picture quality and definition (see diagram).



The TV sound was transmitted at 41.5 MHz from Alexandra Palace and although the TV vision carrier was at 45 MHz, the TV vision was the upper sideband and was down to half–power at carrier frequency (vestigial transmission). This helped to separate the TV sound from the TV vision. In the receiver design the TV sound signal is taken from a coil tap in the third stage. This became the input to the radio receiver selected by the wavechange switch. With the cheaper sets it became the input to an X41 frequency changer and single IF stage as it is much easier to obtain sufficient amplification at TV sound RF.

The last valve in the vision RF strip is an updated MSP41 valve: a higher screen voltage gives a slope of 3.3 mA/volt. With this valve the voltage obtained at the vision diode is enough to drive the CR tube directly. The 'sensitivity' of the RF strip is controlled by a variable resistor at the 'earthy' end of all the RF valve screen grids varies the 4th RF valve cathode voltage, dealing with the line frequency (10.250 KHz) called 'Hi Synch'. The circuit of the line frequency pulse transmitted at the end of each line is separated from the vision signal by the MSP4 valve which is biased off until the line pulse arrives. The voltage level is set by a preset control at the input. The amplified pulse is fed to a blocking oscillator which then initiates the cycle of oscillation at line frequency by the overcoupling and biasing off of the blocking oscillator valve MS4B – an SG valve. Frequency of oscillation is controlled by a variable resistor in the grid circuit called 'line hold'. This valve, in turn feeds a sawtooth waveform to the line output pentode, which is a low power audio output pentode type N41. Magnetic deflection is used and the coupling to the line coils which are fitted around the neck of the CRT is by means of the step–down transformer fed by a low frequency choke in the anode circuit which is sealed with bitumastic wax inside a metal container. The line width is controlled by a 'width' variable resistance which provides some linearising feedback as it is not decoupled. Additionally, there is further feedback from the primary of the output transformer. A further damping circuit is provided on the secondary to damp out the end of scan oscillations which is variable by a 'form' potentiometer. An important point in this circuit design is the high voltage developed at the end of scan reflected back through the transformer to the anode of the audio valve when this is cut off at the end of each line scan. This voltage must not exceed the maximum anode voltage of 250 volts on the N41 pentode.

The frame or 'low sync' is similar to the line sync but slightly more complex due to the difficulty of interlacing. A similar input is provided with the MSP4 valve fed from the connection strength control varying the sync signal level. The frame signals occur at the end of the 405 line picture with a difference in the frame pulses between odd and even line sequences. These pulses are wider than the line pulses and are integrated to provide a short pulse to control the blocking oscillator producing the frame drive to the output valve. This blocking oscillator valve is also a straight RF pentode MSP4 with frequency adjusted by the variable resistor in its grid circuit 'frame hold'. A separate diode is used to integrate the pulses from the anode of the sync separator valve and this diode output is fed to a winding in the blocking oscillator transformer. There was no ignition interference limiter for either of the sync separators and proper interlacing required careful adjustment of the 'strength' and 'frame hold' control. The output of the blocking oscillator was fed to the output valve – another N41, with resistance load coupled to the output transformer. This transformer is also covered in bitumen inside a metal case. This construction is also used for both the blocking oscillator transformers. Feedback from the primary is provided with a variable resistor to the cathode as well as being used primarily for 'height' with a



separate circuit to the output valve grid, which altered the form of the frame sawtooth wave–form. A separate circuit from the frame output primary connected to the CRT cathode to provide end–of–scan blanking.

This general design was used for all the EMI TV sets with variations only in the output stages. For instance, in the 902A the N41 circuit valve was replaced by the special TV line output valve KT44, a 4 volt version of the KT66 with the anode brought out at the top of the valve bulb to allow for higher peak voltage feedback from the line output transformer together with different feedback from the anode to grid and additional damping on the transformer secondary line, which was controlled by varying the HT on the blocking oscillator valve anode. In this same sync unit the frame output valve N41 was coupled directly to the higher frame coil inductance. At that time the alternative to the blocking oscillator was the gas triode as the generator of the sawtooth waveform. The third alternative was the multivibrator which was used in post–war TV sets. EMI considered that the blocking oscillator gave a more reliable interlacing than the gas triode and continued its use in their sync circuits until they gave up TV manufacture in the late 1950s.

The last unit is the power supply which produced two basic supplies namely for the TV receiver and sync unit at 280 volt and the high voltage supply at 5000 volts using a U16 rectifier.

The transformer had separate heater winding for the tube and also for the sync unit to reduce hum pick up. The 5000 volt tube supply was provided with a protective metal cover and a 'bleeder' resistance chain to avoid dangerous voltages when the receiver is switched off. The whole unit is protected by an EMI heat fuse. The CR tube 'focus' control is achieved by a variable resistor in the earthy end of the 'bleeder' network varying the final anode potential.

In the immediate post war period when TV transmission was resumed from Alexandra Palace a number of improvements were made to these circuits including an interference suppressor and extra wide bandwidth by fitting RF transformers and stagger tuning on either side of the mid vision band ie 46 mHZ. Sensitivity was then between 250–500 μV for 5V output at CR tube. To centre the picture a 'push–about' coil placed around the tube neck was produced.

The original design also allowed for the reception of the Baird 240 line 25 frames–per–second system to be used. This was naturally deleted in subsequent production and by local service engineers.

It consisted of a triode MH4 connected to the screen of the blocking oscillator valve for line frequency and an additional feedback condenser for the line output valve grid.

Some changes were made to the circuits in models HMV 903 and Marconi 704 in respect of the RF circuits and synch circuit.

An X41 triode Hexode was used as a frequency changer, the IF frequency was 10.5 mHZ with sound IF of 5 mHZ. Only 4 IF MSP4 valves were then used. The demodulator diode was replaced by an MSB4 used as an anode bend detector to give the additional amplification now required. The sound IF was taken from an acceptor circuit in the 3rd IF stage valve cathodes. Single coils inductively tuned were used with damping by anode resistors to give the required bandwidth.

The sync circuits were amplified with a single sync separator valve as before using one MSP4 RF pentode. For the line frequency an oscillatory circuit using the secondary winding as feedback to the grid of the MH4 was used with an MKT4 as line output to the line coils through a line output transformer. The effects of a lack of ignition suppression on this circuit operation could be quite severe.

For frame sync, the frame pulses were fed to a double diode D41 with choke coupling between diode anode to give sharp frame



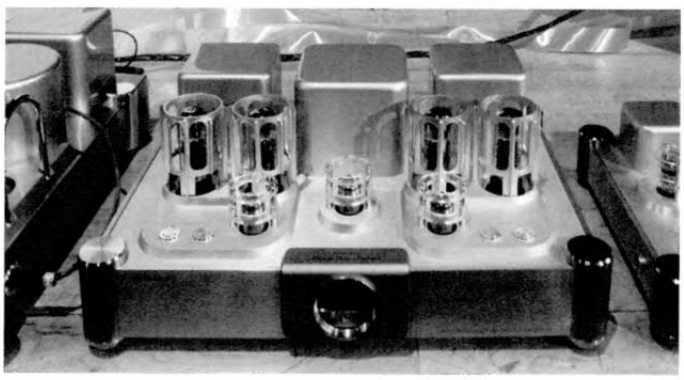
Continued on page 39

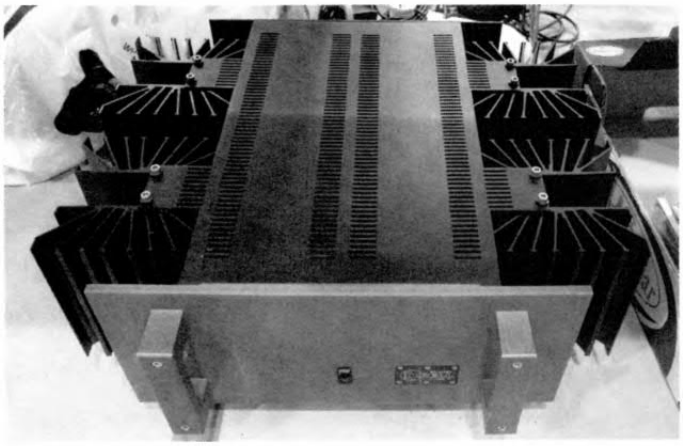
# Audiojumble 12th February 2006

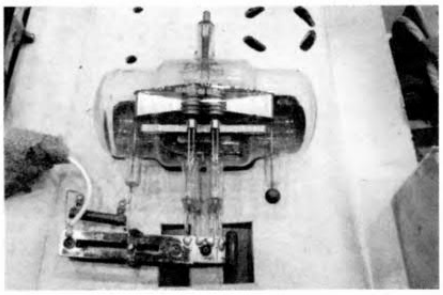
photographs by Carl Glover

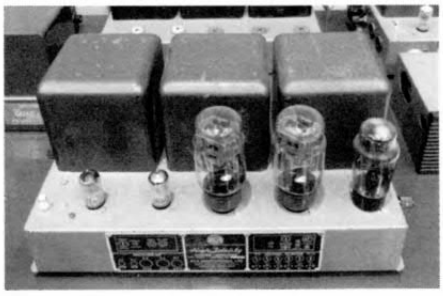

Valves
Tested
Today.


SUN SINGLE E
8 WATT PER CHA
TAMURA TRANSF
MESH









## Valveman film premieres in West End

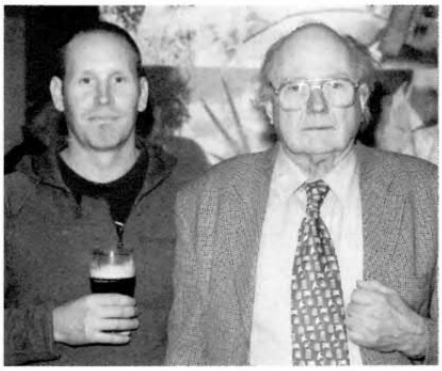
Valveman: a film based on the life story of Gerald Wells was shown publicly for the first time at the Curzon Soho before a specially invited audience of film crew, press and friends and colleagues of Gerald.

The film deals with Gerry's lifelong obsession with wireless and blends in the history of mass communication with memorable events in his life.

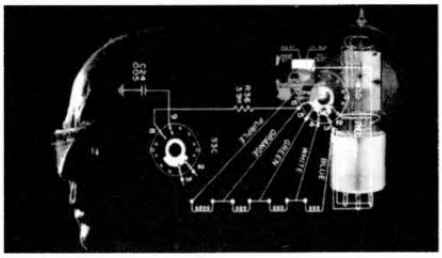
The film took 3 years to make and was directed by Simon Pattison who spent a great amount of time getting to know Gerry. He also spent quite a bit of time helping him with his garden.

The use of various graphic techniques to help explain and depict the astounding progress of mass–communication techniques shows that the world is still changing around us at an incredible pace. The effects were designed by Graham Roberts who worked very closely with Simon Pattison.

For more information please visit the website: www.valveman.co.uk.



Simon Pattison with Gerry Wells at the premiere

Above: stills from the film 'Valveman'

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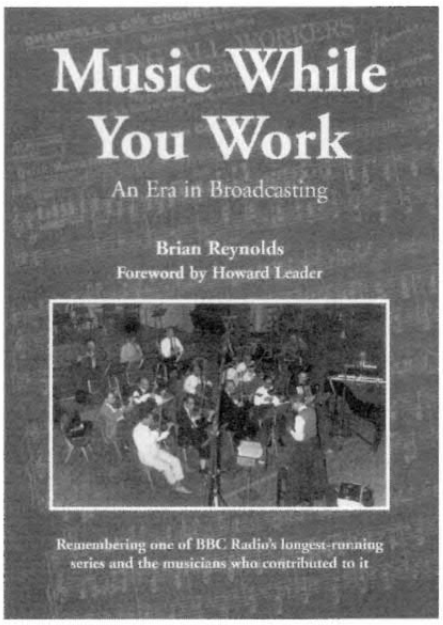
Book Review

# Music While You Work

## An Era in Broadcasting

by Brian Reynolds. Reviewed by Tony Clayden.

Published late March 2006 by Book Guild
ISBN 1 84624 004 2 (25pp) £17.99




The publication of this book makes the culmination of Brian Reynolds' lifelong interest in the 'Live Light Music' which was such a feature of BBC Radio's Golden Age. The author who is *the* acknowledged expert on this subject, has amassed an amazing collection of off-air recordings of MWYW and similar programmes, including *Bright and Early* and *Morning Music*; he has even given much of this material back to the BBC Recorded Archive!

In today's world of 'personality presenters' playing interminable pop records, it may be difficult to appreciate that there once existed a very different broadcasting environment where live music in general – and MWYW in particular – was ubiquitous. Not only did the latter make an immense contribution to the whole institution of Radio for twenty–seven years, but it has effectively become a piece of Twentieth Century social history.

Reynolds charts the course of the programme from its inception in the dark days of 1940, when it was conceived as a morale–booster for wartime workers, especially those making munitions. Thousands of factories were equipped with sound–reproducing systems – another thriving industry – and the immediate result was a substantial improvement in productivity. Conversely, failures by managements to remember to 'switch on' were reported to have caused near–riots! The number of editions reached a peak of three per day, seven days a week, with some even being repeated at breakfast time under the title *Music in the Morning*.

There evolved a sizeable corps of orchestral players, conductors, composers, arrangers and 'fixers'. For more than a few, it was the principal source of their livelihood and it necessitated the creation of its own dedicated administrative bureacracy at the BBC, which was convinced that all this made a real contribution to the winning of World War II – a claim which is probably well–justified.

The post–war years saw the acquisition of additional home–listeners, (a figure which rose to some 4 million), whilst its popularity in the workplace, even by 1962, was found not to have diminished. However, MWYW did begin to experience competition from commercial companies selling 'piped music', although not all establishments found this to be as effective as the original product. Eventually, it was abruptly and unceremoniously axed, the innocent victim of a fundamental change of policy, in 1967. This caused an expected backlash from industry, but curiously almost no reaction from domestic listeners – notwithstanding that, by then, the great majority of the audience was in the home.

There were, however, some in the corporation who continued to champion the programme; this resulted in several periods of revival in the 1980s and 1990s, before its final demise. A measure of MWYW's importance lies in the fact that, for many years, the morning edition was transmitted simultaneously on the Light Programme and Home Service, and thus constituted the *only* output on BBC radio between 10.30 and 11.00 am. No wonder then that a whole generation, (including Brian Reynolds and myself) grew up listening to and enjoying the programme; how fortunate we were to have been born in the right place at the right time!

Within its 255 pages, the volume contains the biographies of over fifty musical directors who helped MWYW's success, and who in turn became 'household names'. Sadly, many were rapidly forgotten (and in a number of cases suffered severe hardship), after the BBC mandarins 'puled the plug' with the advent of Radios 1 and 2.

Well produced in hardback format, the book is considerably enhanced by the inclusion of eighty photographs and a comprehensive index. There are over one hundred programme 'menus', together with a complete list of all participating musical ensembles and instrumentalists; this reads like a veritable *Who's Who* of the then–current music profession.

With a foreword by journalist and broadcaster Howard Leader – who was its prime instigator – Music While You Work – An Era in Broadcasting has been meticulously researched and authoritively written by a passionate devotee. It undoubtedly deserves a place in the library of every Light Music lover and student of radio broadcasting history.

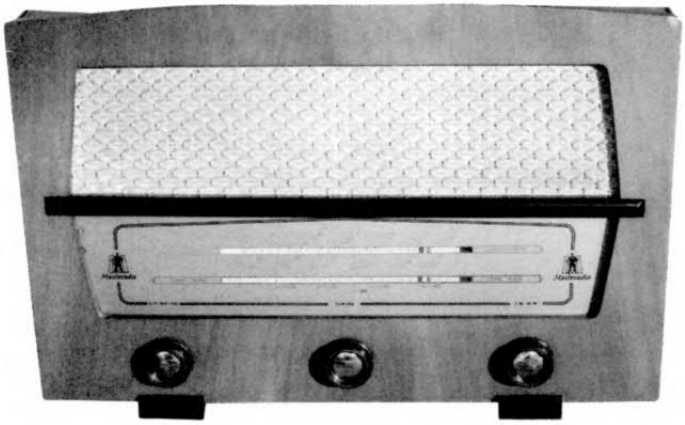
Reviewer's Postcript: Book Guild (the book's publishers) have kindly donated an autographed copy to the library of the British Vintage Wireless and Television Museum, Dulwich.

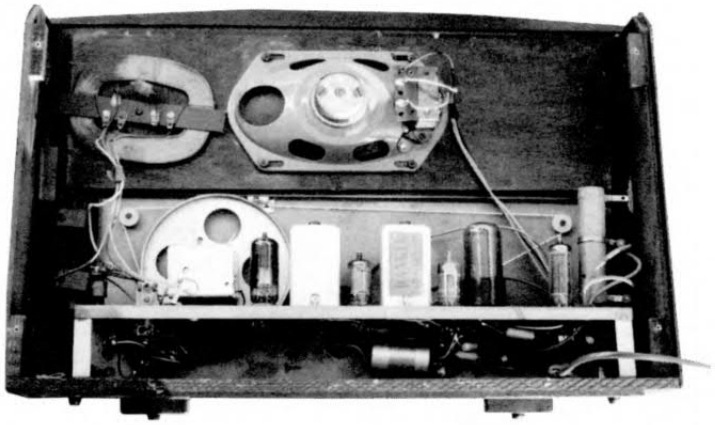
Music While You Work is available through all good booksellers or by telephoning 01825 873133.

# The Mastereradio Mantelpiece Masterpiece

by Peter Nash

Masteradio is one of those names which produced a number of radio related products from the 1920's to the 1960's, but by about 1970 had virtually vanished. Certainly, the Newnes servicing books carry details on around 60 Masteradio products over a 17 year span, covering everything from car radios to colour television. From this, one would expect to meet Masteradio products more often than appears the case today.





Some time ago at the local car boot sale, I spotted an old wooden radio which from a distance looked like a conventionally styled 1950's receiver. In the bright sunlight, it looked very imposing with a rich brown veneer, gold coloured dial and gold coloured speaker cloth. The shape of the speaker cut–out mirrored that of the dial about a bold black horizontal bar across the front. However, as I approached the set, it became clear that its dimensions were rather unusual, there being more front than anything else! After seeing that the radio was actually complete, I bought it. Carrying it back to the car it felt just the same as carrying a framed picture! This unusual radio turned out to be a Masteradio D155 from around 1955.

The radio measures roughly 19 inches wide by 14 inches high and less than 5 inches (including the knobs) front to back. This makes it eminently suitable for those who are volumetrically challenged in the home. Indeed, it will now sit comfortably on a mantelpiece no wider than 5¼ inches. Let us now take a look to see how slimlining was achieved and what, if any, sacrifices were incurred.

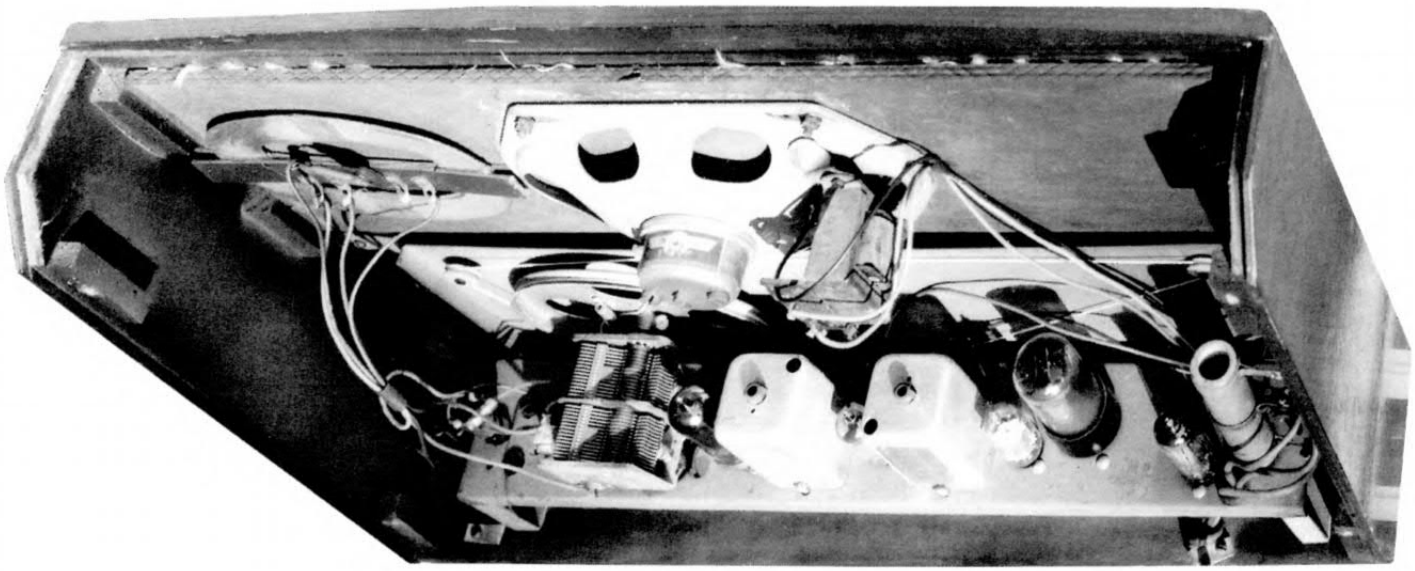
Removal of the back cover reveals the major components linearly disposed in a logical progression from left to right on a slim chassis. On the left we start with the RF coils and on the right we finish with the mains dropper, just like the circuit diagram. Below decks, it is seen to be very open and accessible, plenty of room to carry out many repairs without needing to remove the chassis. However when the set is further dismantled, say to replace the tuning drive cord, an appreciation will be gained of how tight some of the internal clearances are. For one thing, the space between the front of the chassis and the rear of the scale plate is very narrow. Into this space sits the pulley for the tuning gang. If the pulley does not rest perfectly square within this space, the outer flanges will foul either the chassis or the scale plate. This will result in a horrible scraping noise whenever the tuning is adjusted, also increased loading on the system. Again, too much tension on the drive cord will tend to pull the pulley out of true, resulting in the problems mentioned. Therefore, if the dial drive is to be re–strung, the pulley position needs to be checked under load, quite apart from the other considerations of getting everything to move! Another point to watch is the siting of the dial lamp. If this is pushed too far forward (in an attempt to improve the illumination) it will foul the cursor travel and cause a bump near Oslo! There are a couple of other points that it is worth being aware of. The dial glass is held to the cabinet by four small plates screwed to the woodwork. The screws are only just long enough to have just enough bite into the limited thickness of the front panel. Finally, the knobs are low profile. With the chassis correctly sited in the cabinet, there is just enough shaft for the knobs to lock onto them without being hard up against the cabinet front. I mention these points because they illustrate how important it is for everything to finish up at the correct place after re–assembly. Once this is seen, the Masteradio is actually a very good radio to work on due to the openess of design.

The valve lineup from left to right is: 12AH8, 6BJ6, 12AT6, 35L6 and 35W4. The pilot lamp is a MES type rated at 6.2V 0.3A.

**The circuit**

The circuit itself is standard AC–DC 5 valve, 2 band superhet, economy version. There are no extras or frills here. In fact, the receiver is a very good exercise in how much a circuit can be pruned back without degrading the performance. There is a dial lamp fitted, but this also doubles as a fuse since it is unshunted. The receiver covers MW and LW but the Newnes information reveals two variants where the LW band has been dropped in favour of the trawler band and standard shortwave respectively. Presumably, the variants were intended for the export market, especially as there is a facility to operate the receiver on 110 volt supplies. This latter feature is also helpful in keeping the heat dissipation to a minimum. The receiver has been designed to operate with a fairly low HT line of just over 100 volts, even with a 240 volt mains input. To achieve this, the anode feed for the rectifier is supplied from a tapping well down the resistive chain on the mains dropper. Certainly the fact that the cardboard back remains unscorched on my example (despite proximity of about an inch to the dropper) demonstrates cooler operating conditions.

Let us take a look at some of the economy measures used here. The first involves the automatic gain control. Despite a double diode triode valve being fitted, the same single diode is used for both audio demodulation and derivation of agc voltage. This reasonably common ploy saves the use of one or two more components. Further



economies are also evident in the AF amplifier. Many contemporary designs incorporated a small capacitor between the triode anode and chassis (unless a tone control was fitted). This would kill off any residual IF currents and, if the value of said capacitor were high enough, impart a measure of top cut. The Masteradio dispenses with this component altogether. HT decoupling arrangements are pretty rudimentary too. HT smoothing and decoupling is carried out by a diminutive 40 + 40 uF electrolytic can tucked beneath the chassis and that is all. The screen grids of the frequency changer and IF amplifier valves are taken directly to the HT line with no further decoupling in sight. Of course, this is perfectly permissible as the low HT line voltage is about that needed for the screen grids anyway.

So, we have a fairly basic superhet. Let us see what work will be needed to restore my example to working order.

**Repairs**

When I first acquired the receiver, it was open circuit across the mains input, the dial drive had broken and there was a small chip of veneer missing from the top right hand corner. The set was also thickly coated in nicotine. The repairs required to restore the receiver to full working condition were routine. The mains dropper was open circuited, also the dial lamp had turned silver suggesting there had been a gross overload. The overload was attributed to a heater to cathode flashover within the output valve or rectifier, as the insulation was suspect and all other possibilities were eliminated. Replacement of mains dropper, dial lamp, output valve and rectifier together restored the heater circuit. The AF coupling capacitors and mains RF bypass capacitor all had poor insulation resistance so were replaced. The triode load resistor for the AF amplifier was way out of tolerance so this also was changed. The dial drive cord was replaced. Now we had a fully functioning receiver. Turning attention to cosmetic matters now, a small shaving from an odd piece of wood was carefully needle–filed to fit the profile of the piece that was missing. This was then glued into place and stained to provide some sort of match to the rest of the cabinet. This was quite tricky because the stain generally dries to a lighter colour. The radio was then given a very thorough clean and polish. Underneath all that nicotine the radio was in good condition. It would seem that nicotine is better at preserving radio cabinets than it is for preserving humans. Over the last fifty years the speaker cloth would have faded slightly, but nicotine exposure would have put the missing colour back in, so it is probably as it looked originally. The original brown, oval section PVC mains plug completed the now smart appearance. I like to try and keep a good stock of older style bakelite mains plugs for the purposes of matching to restored radios.

**Conclusions**

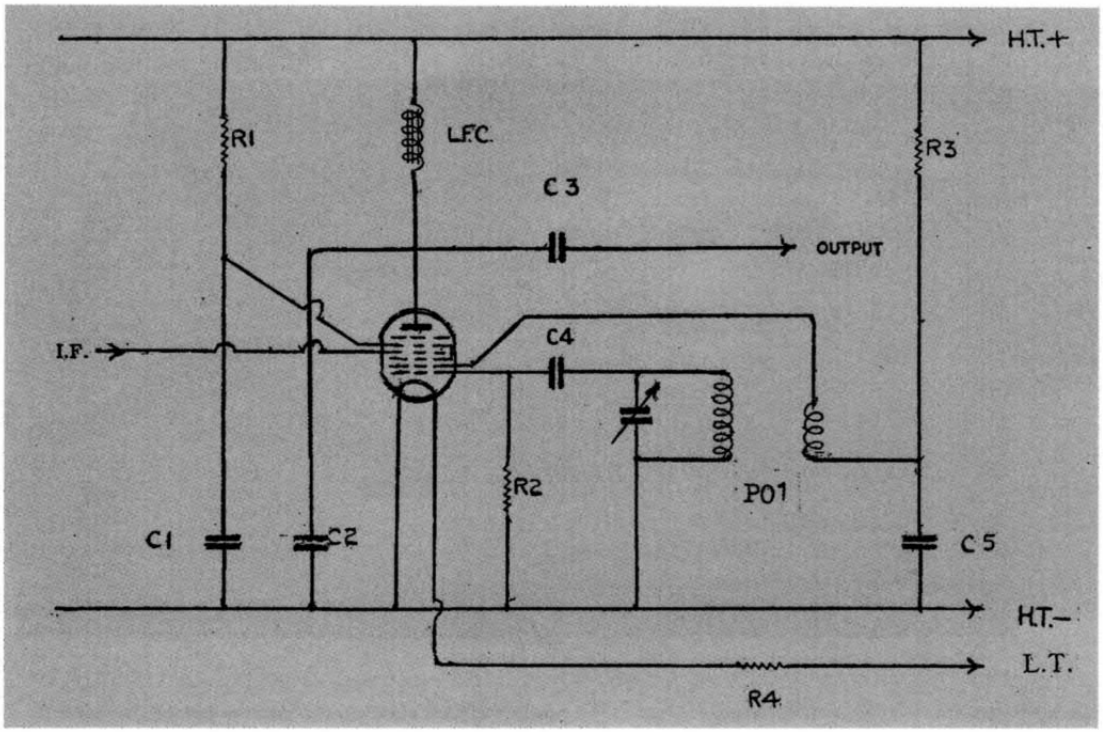
So, how does the Masteradio measure up in use? The tonal quality is very bright but is a touch down on the bass. Given the necessarily restricted loudspeaker dimensions and minimal top cut in the amplifier, this would be expected. It does, however, render speech very clearly at low volume settings. There is plenty of gain available, the volume control not normally needing to be advanced more than about 30% of its travel for most listening. On the RF side, sensitivity is up to par, fed as it is by a compact frame aerial mounted beside the loudspeaker.

Selectivity is adequate, not knife edged. The pass–band enables reproduction of the higher audio frequencies that are broadcast. The dial illumination is one area which some people may be tempted to 'improve' upon. While it is possible to read the wavelength markings in a darkened room, most of the light is concentrated in a compact glow in the middle of the long wave scale. This is caused by the oblique angle of the lamp to the scale. There is insufficient room to change anything. Far better then, to accept it for how it was designed to be.

The footprint of the Masteradio compares favourably with many of its diminutive contemporaries. This includes the Murphy U198H (only just!), the KB FB10 'toaster' and Ekco U159. Where other receivers will physically fit on such a narrow shelf, the rear ventilation would be seriously compromised to the point of danger. There is plenty of headroom inside the Masteradio for the heat to escape into and I think that this helps. Thankfully, the speaker is mounted well out of the airflow from major heat producing parts, so in theory it should not be prone to problems like a warped cone.

So, this would be an interesting set to look out for; only trouble is they are not very common. Full marks to Masteradio for this 'full sized midget!'

# A Quart from a pint pot part 2 by Anode Current




Left, fig 5:
R1 27000 ohms
R2 56000 ohms
R3 4000 ohms
R4 6 ohms (2 x 12 ohms in parallel)
C1 .05 mfd
C2 .00015
C3 .02 mfd
C4 .0002 mfd
C5 .05 mfd

Note: .00015 mfd is the same value as 150 mmfd and 150 pF

LFC see text. DC resistance 3700 ohms

Measured currents are:
Octode anode = 1 mA
Screen G3/G5 = 1.3 mA
Oscillator anode G2 = .7 mA
Oscillator grid G1 = .014 to .05 mA. This will depend on the degree of feedback and on tuning capacity.

It is always enjoyable listening to the local radio amateurs' chatter on 80 metres. Some of these are situated low in valleys at Frome, Bath and Bristol to name a few. The writer's location is in a narrow valley with the aerial below the horizon. Clear reception is difficult. The AC power supply comes via an overhead 11,000 volt 3 phase line for some miles across country. A pole transformer – a field distant – reduces it to household values.

On the way, it picks up – so it seems – every bit of interference going, and brings it to the receiver. A plea to the Radio Investigation Service elicited a request for £21 upfront and consequent lack of further action here. The recent fitting of a coaxial AC feeder to the house seems to make little improvement.

A few years ago, at a Portishead meeting, a brand new boxed battery valve was spotted. Three pounds was given to a well–known BVWS member and an Ever Ready K80A was purchased. The gold metallising was perfect and the pins still had shiny plating. Here was the solution; a battery receiver would be built, free of mains supply and its interference.

And there's the rub; HT and LT batteries are in short supply, so drain must be kept to a minimum.

The task then, was to build a small superhet, with as few valves as possible, capable of receiving the local amateurs. To do this it must be able to resolve Single Side Band signals. A reacting detector will do this, but is a 'fiddle'. The K80A octode, used as a detector with separate tuneable BFO seemed the answer.

A look at the contemporary data books gave disturbing information. Ever Ready and Mullard were identical, here. Mullard's own catalogue for 1936 gave the RF anode and oscillator anode (grid 2) 150 volts maximum. The usual screen (grid 3) and auxiliary screen (grid 5) were 70 volts max. All other valve books agreed with this.

Unfortunately, most lists gave no currents for the oscillator anode (grid 2) and screens (grids 3 and 5). When they did, it was a combined drain of 3.75 mA for all three grids together. But since the oscillator anode would need a much higher working voltage than the other grids an unforeseen problem had turned up.

These old components are in short supply and need careful conserving – so caution here!

In its heyday, the usual 120 HT battery would have intermediate sockets for 60, 90 and other voltages etc. All that was required, was to put the wander plug in the right voltage socket for the electrode. Easy to do, nothing more required.

It was decided an HT 'bus of about 100 volts would be reasonable and also practicable. Often published data gave this lower operating values in their details. Resistors (or should I say resistances?) would provide decoupling against feedback.

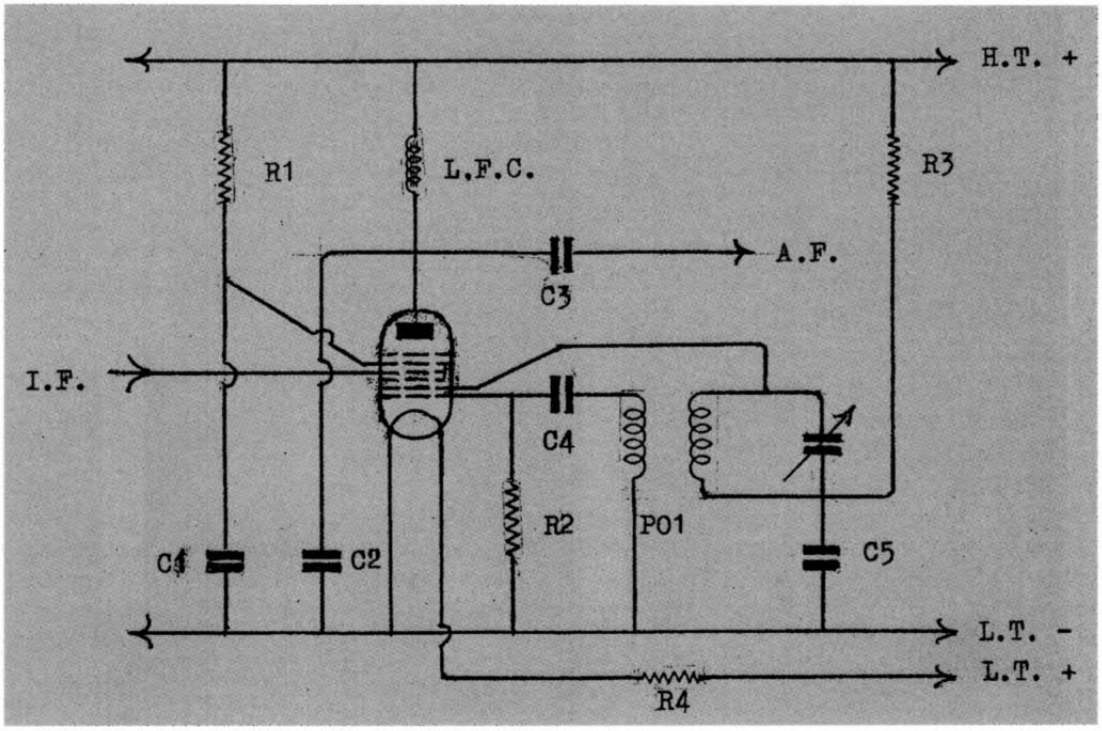
The oscillator, which uses a separate electrode at the maximum HT – as can the octode anode – so no lower. These grids joined together will have a big influence on the valve's performance. This is similar to the screen in pentodes. Apart from the oscillator grid (grid 1) the screen is next to the filament and its effect is strong. Its solid plates focus the electron stream into four beams, two for the oscillator and two for the mixing part of the frequency changer. Pre–war electron optics to valve construction here, – no less!

Estimating that grid 2 current would be 1 mA, or more the final circuit used a safe high valued resistor and later decreased this until 60 – 70 volts on the grid in question was reached.

The circuit proved to be straightforward (Fig.5). Since it is mandatory to keep the final octode anode at a voltage positive to the screens, and also to get maximum audio output from the limited HT available, a high inductance choke instead of the usual resistor load was chosen.

A few years ago, at a Portishead meeting, a brand new boxed battery valve was spotted. Three pounds was given to a well–known BVWS member and an Ever Ready K80A was purchased. The gold metallising was perfect and the pins still had shiny plating.

Left, fig 6:
For further details, please refer to Fig 5




Using a random length indoor aerial (about 15 feet long), three Midland amateurs in the 40 metre band (January) and many (February) covering the areas: Suffolk, Kent, Wales and the North were enjoyed.

Because of the valve's high anode impedance (about 1MΩ) the inductance must be very high.

Pre–war US constructors had available 'couplers' of 500 Henrys or more, suitable for pentodes. Here it was decided to use a small intervalve transformer and to use the larger secondary winding. The inductance value of a milliamp, or less, should make little difference.

A Wearite P01 oscillator coil, which was introduced just before the last war, would be ideal for the valve. These 'P' Type coils often turn up for sale at BVWS meetings.

With an inductance of 390 microhenrys (μH) a total tuning capacity of 310 mmfd (or 310 pF) would be required for an oscillation of 465 Kc/s (KHz).

Messrs. Wearite suggest a tuned anode circuit with feedback from grid 2. This allows the tuning condenser frame to be earthed to the chassis. Both arrangements work equally well (Fig 6).

The P01 coil by itself may not modulate a strong IF from the receiver. If this proves so, a small half inch piece of a dust iron core can be fixed in approximately the centre of the two P01 windings. This improves the magnetic coupling, but of course the tuning capacity needed will then be smaller. The later, improved FC2A will not need this.

The unit was placed close to a short–wave receiver 'on tune' and a common chassis connection made. The receiver had one IF stage and octal valves. Removing its second detector allowed easy access to the IF output, and to the power valve (a 6F6) input.

A short flying lead from the K80A top cap (control grid) to bring in the IF and another to take the output to the receiver was plugged into the empty valve socket. The K80A oscillator grid was shorted to prevent oscillation and HT supplied.

The signal came immediately and with 'hands off' as soon as the filament warmed up. The AF performance was roughly equal to the valve it had replaced. Note: the usual grid leak and condenser is not required because the valve is acting as an anode–bend detector (plate detector in US terms). Care must be taken to ensure the IF coil used (the last one, of the receiver) has an earth return back to the K80A filament.

Because the valve has a high input impedance and so long as the flying lead is short, the IF stage will not be unduly loaded and no retrimming was found necessary.

Allowing the oscillator to operate showed that morse code reception would be possible and SSB signals were immediately received. These required very delicate tuning of the main receiver. Fixed tuning capacities for the the P01 coil of between .0001 and .0005 mfd can be tried, to suit the receiver's own intermediate frequency and to allow for a dust iron core, if used. The addition of a .00002 mfd (20pF) variable condenser made resolving these signals easy.

Substituting a Mullard FC2A required no alterations to the circuit and gave about equal performance. Because the frequency of the unit is low in comparison with the receiver's high frequencies the whole circuit proved stable.

Using a random length indoor aerial (about 15 feet long), three Midland amateurs in the 40 metre band (January) and many (February) covering the areas: Suffolk, Kent, Wales and the North were enjoyed.

**A Quart from a Pint Pot,**
**– or should it be called**
**Putting a Quart into a Pint Pot?**

The unit, built on a small chassis can have two 'D' size batteries fitted in, with a switch for LT. The HT current of just over 3 mA can be provided by purchasing ten to twelve low–cost PP3 batteries. Alternatively a battery eliminator can be pressed into service, though this defeats the original purpose of the project. Note: the K80A's small HT drain may allow the eliminator's output voltage to run high. Remedy: apply Ohm's law, and decouple.

# Notes from the Past – An unofficial history of broadcast television Part 6 A Licence to Print Money

by John Holloway

As has been explained in previous episodes of this unofficial history, the notes from which it is based were in the most part the work of an unknown student and the reminiscences of an ex BBC staffer, Charles Parrott. Unlike the reality, the coming of ITV has little impact on the notes themselves but when set against the changes in BBC output detailed in the notes one can see a huge change in the thinking of the BBC. Typically, like the country in which it operated, it needed a crisis to start to provide a more thoughtful, entertaining adventurous output.

77 Sunset Strip

Adam Adamant Lives! BBC 1965

Callan ABC 1967


Cool for Cats Associated Redifussion 1956

Coronation Street Granada 1960

Doctor Who 1963

The stimulus of competition from ITV brought forth a raft of classic programmes which ranged across the schedule. But, before we begin to look at this new development in more detail, here's a test of memory. By the time ITV was fully established there were franchises allocated across 14 ITV regions. Some areas like London, Manchester and Birmingham had more than one station operating weekdays and weekends. Others covered two distinct areas. Can you name them all and the areas they covered? I've listed them all at the end of the article.

As already stated, the BBC had begun to take the advent of commercial television very seriously. The next few years would see an increase in the level of high quality current affairs programming, drama, live entertainment and outside broadcasts. It had also been arguing for another channel but in 1956 Government deferred that request for two years and it wasn't until much later that BBC2 took to the airwaves.

Still in the spirit of pioneering television, June 1956 heralded an OB transmission from 'The Queen Elizabeth' and an even greater technical feat, transmission from a submerged submarine. Earlier that year Radio Times carried the unusual imprint 'Printed in France by Societe,Cofosco, 28 rue d'Assas, Paris' The magazine had to be printed in France as a printing dispute threatened to deprive the public of their favourite magazine.

The BBC was intensely interested in developing colour television at this time and had begun a series of experimental transmissions in October 1955 from the London TV station, but it would be another 7 years before a limited service was available to viewers. By 1956 the BBC had 14 transmitters covering 97% of the population. The ITV network was gradually coming on stream with independent companies serving the various areas under franchise agreements handed out by the government.

Wednesday 18th April 1956 was an extremely busy day for the BBC. In Monaco the wedding of Prince Rainier and Grace Kelly took place with coverage relayed via the Eurovision network and commentary by Richard Dimbleby and Audrey Russell. Cameras were also at Victoria Station for the arrival of Marshal Bulganin and Nikita Kruschev and in the evening the Prime Minister, Harold MacMillan spoke for the Government on the Budget. I suspect overtime payments for that day were quite spectacular.

Apart from the general effect of providing an alternative viewing choice the impact of ITV also changed the daily viewing time. In order to maximise revenue ITV wished to operate during the early evening. Up to this time BBC television had not been on the air and to fill it 'Tonight' was created. The first edition went out on18th February 1957 and the programme was to go on to become a fixture in the schedules and launch a number of careers including Cliff Michelmore, previously host of radio's 2 Way Family Favourites. With him came Fyfe Robertson, John Morgan, Trevor Philpott, Derek Hart, Polly Elwes, and of course, Alan Whicker who went on to present Whicker's World from 1959 to just about the present day. The first editor was Donald Baverstock. By 1961 Tonight was pulling a nightly audience of 7 million viewers.

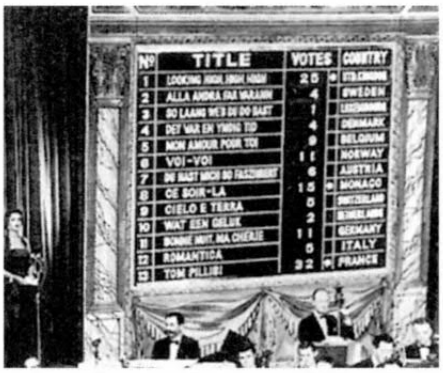
1957 also heralded the start of the Eurovision Song Contest with the lovely Katie Boyle who had already established herself as a compere with a programme featuring the orchestra of Ray Martin and a very young Ruby Murray. Also that year a young, slim Patrick Moore took up the challenge to host a programme which is still running today with the same presenter though a shade heavier.

However, ITV was working hard to catch up, and at this time was looking to the field of light entertainment and the growing area of popular music. Cool for Cats hit the screen in 1956 hosted by Kent Walton who later went on to become the resident commentator on Saturday afternoon wrestling. There were also quiz shows from Michael Miles and Hughie Green which delivered huge audiences for the 7.15 commercial break on Thursday and Friday evenings.

Gerald Beadle, Director of BBCtv delivered a report on the first year of rivalry between the BBC and ITV. By the end of 1956 about one fifth of homes in Britain were equipped to receive both services. Commercial TV was viewed 62% of the time in one fifth of homes. The top 39 programmes were all BBC with the 40th spot occupied by Sunday Night at the London Palladium. Perhaps it's a significant fact that on 4th February 1957 Panorama had an audience of over eleven million people, around the same figure that Big Brother gets today.

Emergency Ward 10 opened its doors in 1957 and began to draw large audiences along with such shows as The Army Game. Pinky & Perky, later to move to ITV, arrived at the BBC complete with tug

Emergency Ward 10 1957




Eurovision Song Contest 1957 BBC

Grandstand 1958 BBC

Juke Box Jury 1958

Maigret 1960 BBC


News at Ten 1967 ITN

A young presenter named David Coleman hosted a Saturday afternoon programme called Grandstand which was to become a firm favourite with sports fans to the despair of wives wanting to go shopping.

boat and a way of delivering a number that held a strange fascination for younger and not so young viewers alike and of course 6.5 Special for the real trendies! On the serious side, Brian Inglis hosted What the Paper's Say for Granada, the first of many fine current event programmes to come from that station.

The Royal family began to embrace the new service with the Duke of Ediburgh presenting 'Round the World in 40 Minutes' in May 1957 and celebrating the International Geophysical Year with The Restless Sphere in June. And later that year the Queen was first seen broadcasting especially for television in a tele-recording of her address to the people of Canada. Following this her annual mesaage to the Commonwealth was televised simultaneously with the radio broadcast.

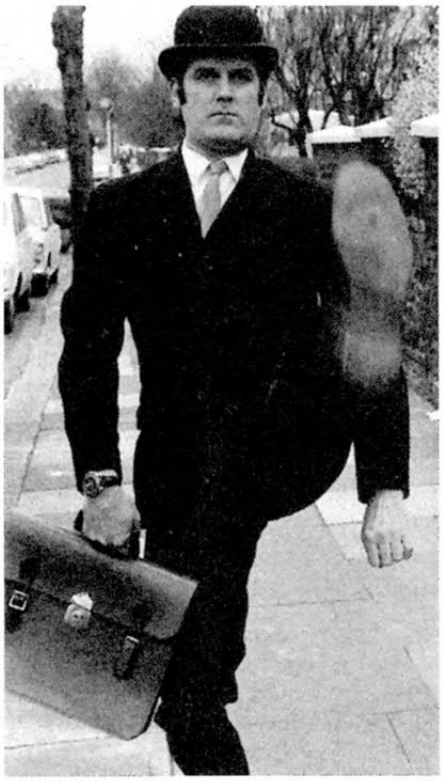
1958 saw ITV begin the first dramatisation of H.E. Bates' The Larkins with David Kossof and Peggie Mount as Ma and Pa Larkin and the BBC hit back at Cool for Cats with Juke Box Jury hosted by David Jacobs, countered by Oh Boy with Cliff Richard from ABC Television.

The arts programme Monitor started under the leadership of Huw Weldon in 1958. Described at the time as a 'Panorama' of the arts it brought an in-depth look at all aspects of music, art and literature to a far wider public than ever before and gave many young directors their first chance in the medium. The programme pioneered the idea of a documentary dealing with an aspect of art or its practitioners and certainly contributed to the 500,000 feet of film the BBC film Department were handling each year. 1958 also saw the arrival of Blue Peter which was the first of its type to engage and encourage its viewers to participate on a regular basis.

The third Quatermass serial bridged the year from 1958 to 1959 this time starring Andre Morell dealing with nasty goings-on underground. Raymond Francis in No Hiding Place was one of many tv detectives keeping the street safe along with George Dixon and others.

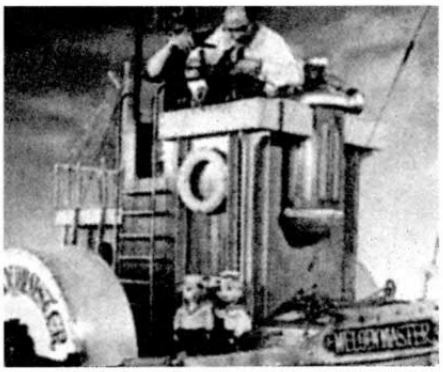
A young presenter named David Coleman hosted a Saturday afternoon programme called Grandstand which was to become a firm favourite with sports fans to the despair of wives wanting to go shopping.

The highlights of 1959 included the first use of a transatlantic telephone cable to transmit tv film. Invented by the BBC Technical Department it was first used officially when the Queen opened the St Lawrence Seaway. Staying with technical developments the new Post Office cross channel radio links came into service located at Tolsford



Monty Python's Flying Circus BBC 1969

No Hiding Place Rediffusion 1959



Pinky and Perky BBC 1957, later Thames


Ready Steady Go Rediffusion 1963

Steptoe and Son BBC 1962


That Was the Week that Was BBC 1962

The Army Game Granada 1957

The Avengers ABC 1961

Hill near Folkestone and at Fiennes near Calais. They were first used for the coverage of President Eisenhower and the Prime Minister. Finally, Patrick Moore was able to show the first picture of the reverse side of the moon taken by Russia's Lunik 3 probe.

The General Election once again stretched the corporation. Using 37 cameras and hosted by Richard Dimbleby it set the standard for the seemingly effortless coverage of a countrywide event. Look at the viewership research after the event, which ITV also covered. Party Political Broadcasts from Conservative and Liberal parties drew 50% of their audience from each channel. However, Labour drew 55% from ITV and 45% from BBC coverage.

1960 saw the opening of the TV Centre at Wood Lane in west London. At that time it was described by the Director of TV as the largest, best equipped and most carefully planned factory in the world dedicated to the production of television programmes and was clear proof that television had become one of the world's great industries.

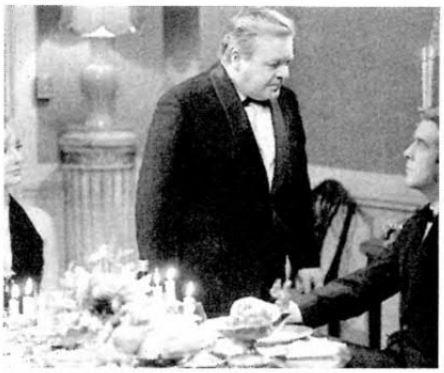
Television Centre and the start of the 60s was literally the start of a new era of increasingly sophisticated programming and more importantly programme scheduling. Programmes were strategically designed and formatted to compete with what was on the opposing channel. It had its benefits and its downside for the viewer. No home recorders to allow us to time shift!

The decade got off to a flying start with Coronation Street, 77 Sunset Strip, Danger Man, Maigret, Points of View, Compact and in 1961, The Avengers. Like the previous decade, the 60's developed its own identity and both channels settled down to outdo one another with the BBC looking as aggressive in terms of programme development and scheduling as the commercial channels.

In the first few years of the decade the Pilkington Committee reporting on the future of broadcasting criticised the existing structure of ITC and recommended that the independent companies should produce the programmes and that the Independent Television Authority should in turn schedule the programmes and sell the advertising time. The government White Paper that followed strengthened the role of the ITA but left the selling of air time and scheduling to the individual companies but with guidance and content monitored by the Authority.

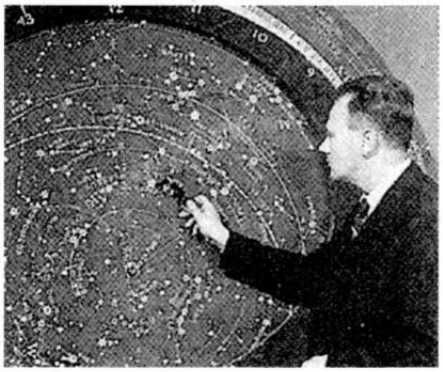
More important for the future of television as a whole the report also recommended that line definition should be changed from 405 to 625, the general standard being used in Europe, and that the transmission should be shifted to the UHF bands as soon as possible. It also recommended a third channel for the corporation, but that would take forty odd years and the advent of digital to materialise. It was agreed that by 1964 the BBC should launch a second TV channel on 625 starting in the London area and then being rolled out across the country. In fact trial transmissions started

The Larkins ATV 1958



The Plane Makers ATV 1963

The Saint ATV 1962



The Sky at Night BBC 1957

Till Death do us Part BBC 1966

Tomorrows World BBC 1965

Tonight BBC 1957

Top of the Pops BBC 1964


University Challenge Granada 1962

in January 1964 with a full service for London and the south east starting in April of that year followed by Sutton Coldfield in 1965 with some 60-70% of the country covered by 10 UHF station by the end of that same year. As most people know, the launch date was forced back a day by a massive power failure.

Meanwhile the ITV network was increasing its coverage around the country with Westward, Border, Grampian coming on stream during 1961 followed by Channel Television and Wales West and North in 1962.

The 1962 White Paper also encouraged the development of colour transmissions. Following two months of tests within their 625 line transmissions from Crystal Palace the BBC in November 1962 began some 7 hours of colour each weekday. Initially using the NTSC in 1963 the BBC began testing the French Secam in co-operation with the GPO, the ITA and the industry. There was also interest in the system developed by Telefunken which was based on the NTSC system.

The mould of television and indeed broadcasting in general was broken by the arrival of That Was the Week That Was in 1962 developed and produced by Ned Sherrin who had cut his teeth as part of the Tonight team. It outraged and entertained and broke the respect that political and world figures were held in by the rest of the media and the public at large. It was the first of many anarchic programmes which continue to the present day and are now considered mainstream by the majority of viewers.

Alongside TW3 came pure factual programmes explaining and exposing the stories behind the news. Granada's, World in Action and Rediffusion's This Week began to seriously challenge the BBC in producing a programme every week of the year on important topics.

Police drama took on a new look with Z Cars in 1962 and the home grown adventure series took on a new gloss with the arrival on ITV at 7.30 on Sunday evenings of Roger Moore as The Saint. Not so much gloss as dust entered the nation's living rooms with Harold Steptoe and his awful father and Bamber Gascoigne put the students and the nation to the test with University Challenge from Granada. Also in 1963, kids started diving behind the sofa with the arrival of Dr Who and slightly older ones were looking in at Ready Steady Go from Rediffusion. Finally, The Planemakers starring Patrick Wymark grabbed us with its storylines of hard headed British business men forging their way to the top regardless of the machinations of politicians and rivals. If only!

In 1964 Lord Hill the chairman of the ITA, formerly the Radio Doctor, announced changes which ensured a still tighter watch over ITV programmes and advertising and that no change would be made to the franchises until 1967 when it was expected that a second ITV channel would be launched. Programme schedules would be drawn up in consultation with the ITA and all advertisements would be screened

What the Papers Say Granada 1956

World in Action Granada 1963

Z Cars BBC 1962

before transmission to ensure propriety.

The Cross Roads Motel opened its rather flimsy doors at Associated Television Studios in 1964 with Top of the Pops from the BBC arriving on our screens in the same year. Another long running show which started at around the same time was Tomorrrow's World which picked up from a much earlier programme called Inventor's Club.

In early 1964 the International Radio Consultative Committee (CCIR) was still undecided on a colour system for Europe. The British delegation had come out in favour of NTSC but most of the European delegates pressed for further study. Disappointed, the BBC pressed on with various test transmissions and demos and, during this period, revived an earlier proposal utilising the German PAL system which would also facilitate the transfer of BBC 1 and ITV from 405 to 625 line transmission and open up availability to both networks to provide a colour service.

A year later the government banned the advertising of cigarettes on television and the ITA ruled that between 8.00pm and 8.55 Monday to Friday there should not be more that two out of five programmes of American origin.

The BBC, ever hopeful of finding a competitor to ITV's Avengers, discovered Adam Adamant bricked up and cold-stored in 1966 complete with Edwardian dress suit, cloak and swordstick. It set him off on a series of wild adventures with a modern female partner.

But by now, a new type of hero was emerging. Len Deighton's Harry Palmer in the Ipcress File had started a trend toward the shabby, slightly suspect hero. Not a team player fighting by the rules and certainly not out of the top drawer, Callan typified the disillusioned main character,a type which was to become a central theme in this kind of show.

Midway through 1967 ITA announced the new independent companies who had been awarded contracts for the next six years replacing the original franchise holders. The London Television Consortium which would become LWT from August 1968, serving the London area at weekends; Thames Televison, which was an amalgamation of Rediffusion and ABC Television with ABC having the controlling interest from July 1968; Telefusion Yorkshire which would become Yorkshire Television also from July and the Harlech Consortium which would become HTV and replace TWW from 4 March 1968. The remaining existing contractors had their contracts renewed.

July 1967 also heralded the start of a limited colour service on BBC2 with some 5 hours a week with an officially launched service starting just before Christmas in the same year.

Following the growing moves in bringing more detailed news to the viewer, the decade saw the start of ITV's News at Ten in 1967 and the rise of the newscaster or presenter hosting a show bringing in reports from correspondents around the world. A couple of years later Nationwide, on BBC, was to do the same thing at a national level.

The arrival of satire with TW3 brought about its own change in programming with the advent of anarchic shows like At Last the 1948 Show, Do Not Adjust Your Set and ultimately Monty Python's Flying Circus in 1969. Sitcoms like Steptoe and particularly, Till Death do Us Part, broke new ground as part a new found freedom and creativity. As ever of course, others saw this as the start of the moral decline of the country and a champion arose in the form of Mary Whitehouse who dogged the broadcasters who dared to try more adult themes.

Despite the shake up of ITV, the beginnings of BB2, the shift from 405 to 625 and the advent of colour the medium consolidated as it had done in the early 50s and became a truly established part of the fabric of the country. It was to continue this consolidation for some years until the next big shake up which was the arrival of Channel 4.

Here the notes from an unknown student gathered all those years ago end. It's been an interesting exercise for me transforming them into a series of articles totalling some 20,000 words and finding the pictures to accompany them. I hope that they have rekindled some memories for older readers and given younger ones an insight into the beginnings of television in this country from a slightly different and perhaps broader perspective. Apart from this unknown student I'd also like to thank an old friend of mine Jeff Cottis, who worked with me at Southern Television in the early 60s, and who was invaluable in providing the additional background information about ITV.

How did you get on in the quiz?
Associated Rediffusion: London, weekdays
Associated Television: Midlands, weekdays and London, Saturday and Sunday
ABC Television: North and Midlands, Saturday and Sunday
Granada: The North Weekdays
Southern Television
Television Wales and the West - Cardiff & Bristol
Westward
Wales West and North
Anglia
Tyne Tees Television
Scottish
Border
Grampian
Ulster
Channel (Not part of the original allocation of regions)

Today the picture has changed with only Ulster Television and Channel TV remaining fully independent. Granada and Carlton merged, to become ITV Plc, which now owns all the Channel 3 licences for England and Wales. For the record these are Anglia, Border, Carlton, Central, Granada, HTV (now known as ITV Wales) LWT, Meridian, Tyne Tees, West Country and Yorkshire. Scottish and Grampian are now owned by SMG the Scottish Media Group. So, independent television is looking decidedly less independent as the years go by. With the coming of digital, quantity and not quality, coupled with recycling, seems to be the order of the day.

parameter is measured as VSWR but in video it's customary to use return loss. This is simply the ratio of useful voltage to reflected voltage. If return loss is too low, the reflections can cause ghost images or frequency response errors.

The output return loss is around 15dB and it did not vary much with frequency. This would not be acceptable in professional equipment but it's perfectly adequate here. Responsibility lies with the simple emitter follower output stage. This is a good example of how Darryl has employed value engineering to reduce cost while not affecting practical performance. The input return loss on my review sample was poor, between 5dB and 10dB at higher frequencies, depending on whether the converter was in bypass mode. This is bad enough to cause picture quality problems which might not be immediately obvious. Darryl has now modified the design and the input return loss will be satisfactory on all future units.

**Connectors**

Maybe I'm in a minority but I have never liked using phono (RCA) connectors for video. The review sample had phono connectors for video but buyers are offered the choice of phono or BNC.

The modulated output is an F connector, commonly used for satellite feeds, so UK users will need an adapter from this to Belling and Lee co-ax plug. This is a minor inconvenience. For very early sets there was no standard aerial connector and the unit is intended to be used in several countries, each with its own standards, so I suppose an F connector is as good a choice as any. Inevitably I would have suggested a BNC here too.

**Alternatives**

What are the alternatives to the new Aurora? There are several possibilities. The Domino is still a very fine piece of equipment and I stand by my original review. It may no longer be available by the time this review is published because its price tag of about £400 means that it cannot really compete with the new Aurora. Also its modulator is fixed to a single Band I channel. The original Aurora still gives ultimate multistandard flexibility but does not have a modulator. At the time of writing Darius's analogue design has now progressed to a kit with PCB. It probably won't be any cheaper than the new Aurora but it could be interesting to those who are keen on a DIY approach. A very different DIY method has been developed by Kat Manton. Her innovative PC based solution requires very little hardware construction and may appeal to Linux enthusiasts and those with a spare PC doing nothing. At the time of writing she has announced her intention to make an easily installed distro (sorry about the Linux jargon!) called *Fool on the Hill TV Linux.* David Robinson's design, the only one so far to produce 405 NTSC colour, remains as a single prototype with no intention to make it available either as a kit or a complete unit.

**Conclusions**

The new Aurora stands alone as the only 405 converter which has a modulator with switchable channels. It works very well and the price is a bargain. Most of the criticisms I have made are of little practical importance to users. The only real cause for concern is the possibility of patterning on the higher channels which can usually be minimised. If you need full multistandard capability then you should buy the earlier Aurora. Otherwise this new product can be highly recommended.

**Thanks**

I would like to thank Gerry Wells, Graham Davis and John Thompson who provided TV receivers and generally helped and encouraged me to do this review.

The Aurora is only available directly from its designer: Darryl Hock
http://www.auroravideosys.com/converter/
darryl@auroravideosys.com

There are further pictures on the web site. The full Aurora manual can also be downloaded from the web site Price $260 including delivery to the UK and Europe. This is about £150 at the time of writing. The sterling price will vary with exchange rates. You can pay by Paypal or credit card. My review unit was charged almost £30 by UK Customs and Excise which is VAT on the declared value plus a handling charge. You may have better luck!

## British Vintage Wireless Society **Statement of Accounts 6th April 2005 to 31st December 2005**

| | **2005** | **year ended 31st March 05** |
|---|---|---|
| **Receipts** | **£** | **£** |
| Subscriptions | 5,603 | 29,567 |
| Sale of publications | 2,649 | 3,119 |
| Meetings | 3,400 | 8,223 |
| Miscellaneous | 1,278 | 670 |
| Museum Appeal | - | 12,939 |
| NVCF startup loan repayments | 3,500 | - |
| NVCF profit | - | 4,189 |
| Estate sales receipts | 18,545 | 23,938 |
| Bank interest | 289 | 541 |
| **Total receipts** | **35,264** | **83,186** |
| **Payments** | | |
| General expenses | 8,500 | 15,396 |
| Meetings | 1,869 | 2,369 |
| Bulletin costs | 13,998 | 25,565 |
| Other publication costs | 734 | 758 |
| Subscription refund | - | 21 |
| Estate sales payments | 8,893 | 21,264 |
| Museum Appeal | 1,678 | 11,200 |
| NVCF purchase from J. Hill | - | 14,000 |
| Support costs for NVCF | 1,000 | - |
| **Total payments** | 36,672 | 90,573 |
| Deficit for the period | -1,408 (movement) | -7,387 |
| Total assets at beginning of period | 37,180 | 44,567 |
| Total assets at end of period | 24,784 | 37,180 |
| **Assets** | | |
| HSBC current account | 7,725 | 7,415 |
| HSBC deposit account | 17,059 | 18,777 |
| **Total assets** | 24,784 | 37,180 |

Note: The latest accounts reflect nine months trading only. This is due to the resolution carried by the committee to move the financial year end to December, as stated in the BVWS constitution.

During 2002/2003 the Society acquired the rights to the National Vintage Communications Fair at a cost of £21,000,00.

Following a disappointing 2005 the National Vintage Communications Fair is now considered to have no assets or liabilities and management of the NVCF is to be taken over by the British Vintage Wireless Society.

The accounts of the Society reflect the receipts and payments on a cash basis and do not reflect any prepaid or accrued income and expenditure. As an unincorporated club, all surplus is passed to members by way of bulletins, supplements and events. At the same time a prudent asset balance is maintained in order to provide for the unexpected.

Treasurer

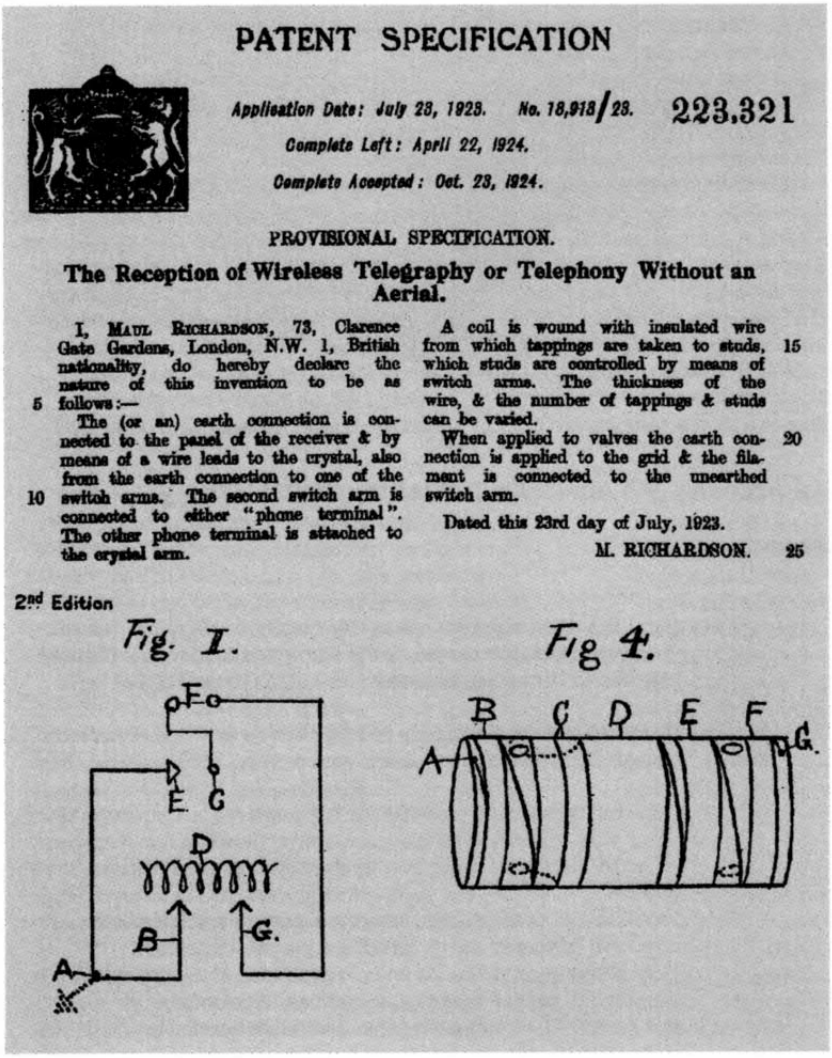
**Auditors report to the members of the British Vintage Wireless Society**

We have examined the above Accounts for the period ended 31st December 2005 together with the accounting records and supporting documents and vouchers and confirm the same to be in accordance therewith.

Keens Shay Keens Limited
Chartered Accountants
Christchurch House
Upper George Street
Luton Beds
LU1 2RS

# Aerial-less Crystal Sets by Ian Sanders

On July 23rd, 1923, one Maul Richardson of Clarence Gate Gardens, London N.W.1. filed a patent application* for a crystal set which worked without an aerial. He claimed a *"crystal receiver for wireless signals, in which no extended or frame aerial is used, the input circuit comprising a coil inserted between the earth connection and one of the telephone terminals and a lead from the earth connection to the crystal."* In fact, the design appears quite unremarkable and basically consisted of typical tapped inductance circuit with the aerial connection omitted. A British patent, however, was subsequently issued to Richardson on October 23rd, 1924 and included designs for both crystal and valve receivers that, it was asserted, could operate satisfactorily without an aerial.



PATENT SPECIFICATION

Application Date: July 23, 1923. No. 18,918/23. 223,321

Complete Left: April 22, 1924.

Complete Accepted: Oct. 23, 1924.

PROVISIONAL SPECIFICATION.

**The Reception of Wireless Telegraphy or Telephony Without an Aerial.**

I, MAUL RICHARDSON, 73, Clarence Gate Gardens, London, N.W. 1, British nationality, do hereby declare the nature of this invention to be as follows:—

The (or an) earth connection is connected to the panel of the receiver & by means of a wire leads to the crystal, also from the earth connection to one of the switch arms. The second switch arm is connected to either "phone terminal". The other phone terminal is attached to the crystal arm.

A coil is wound with insulated wire from which tappings are taken to studs, which studs are controlled by means of switch arms. The thickness of the wire, & the number of tappings & studs can be varied.

When applied to valves the earth connection is applied to the grid & the filament is connected to the unearthed switch arm.

Dated this 23rd day of July, 1923.

M. RICHARDSON.

2nd Edition

Fig. 1.



Fig 4.



Richardson manufactured his designs under the name of the Vinco Wireless Company with premises in Baker Street, London and actually advertised a complete range of *Aerialess* crystal, crystal-valve and valve receivers during 1924. While the valve receivers may just have been acceptable under the most optimum of reception conditions, the performance of the crystal sets would certainly have been marginal at best, even where the receiver was literally within a mile or two of a transmitter. Nevertheless, two versions of the company's *Vinco Aerialess Crystal Receiver* were produced – the second, later model bearing Richardson's patent number engraved on the panel. Both featured tapped inductance tuning, but the later set incorporated a socket with a shorting switch for a long-wave loading coil. A single socket on the side of the case was provided for the earth connection, which – according to the instructions provided with the set – could be made to a water or gas pipe, the brass base of an electric light-bulb or the telephone or doorbell wiring. In what would seem to be an act of optimism, the early model had provision for two pairs of headphones to be connected directly to the set.

No records exist of exactly how long the Vinco Wireless Company survived, but it was probably no more than a year or two. As far as is known, no other firm dared to offer a commercial aerial-less crystal set.

The subject of aerial-less crystal receivers did continue to surface from time to time in the press, and amateur journals would print reports from readers of successful crystal set reception without the use of an aerial. Special aerial-less designs were occasionally

Top left: British Patent No. 223,321 awarded to Maul Richardson on 23rd October, 1924 for an aerial-less crystal set.

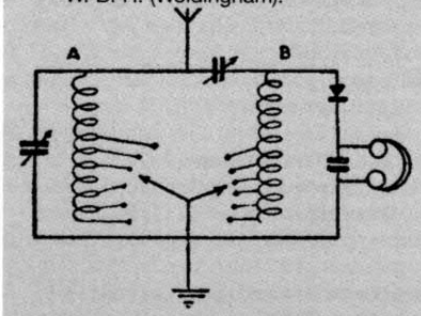
Above and opposite page: Two versions of the *Vinco Aerialess Receiver.* The model on the right carries the number of the patent awarded to Richardson engraved on the panel.


Detail of *Vinco Aerialess Receiver*.

**Crystal Reception**

SIR, – You may be interested to know that with the crystal circuit given in AMATEUR WIRELESS No. 76, using Igranic coils 35 and 100, I was able to get 2LO without aerial or earth.

– W. B. H. (Woldingham).




**An Experimental Crystal Circuit.**

*Amateur Wireless and Electrics*, December 1st, 1923.

**AERIALESS RECEIVERS**

**"VINCO" WIRELESS.**

It is not only claimed, but it is a **Fact**—that **"VINCO" Aerialess Receivers** are:—

1.—**REALLY AERIALESS.** They require no aerial whatever, hidden or otherwise; they have no aerial inside the cabinet.
2.—There are no adaptors and no adaptors are required.
3.—They are non-directional.
4.—They have no Variable Condensers, Reaction, Reflex (or dual) Circuits to control and confuse you. 4a.—Simple to control.
5.—Quite lightning proof.
6.—The B2 Model is the **only** 2-Valve Receiver Aerialess, and without Reaction or Dual Circuit, on the market that will operate a loud-speaker suitable for any sitting-room.
7.—There are no "messy" accumulators. All batteries and sets are in the **one** cabinet—self-contained.
8.—All **"VINCO" Receivers** are **Aerialess**, the Crystal Receiver included, and with this Receiver no aerial, adaptors, or batteries exist, or are required.

**"VINCO" Aerialess Receivers** are manufactured in six models—i.e.,

**A1. Crystal Receiver** ...£4 4 0 **B1. One Valve** .....£8 8 0
**A2. Crystal & 1 Valve** 10 10 0 **B2. Two Valves** ..... 15 15 0
**A3. Crystal & 2 Valves** 12 12 0 **B3. Three Valves** ..... 17 17 0

A3, B2, and B3, each operate a loud-speaker—**without distortion.**

***These Prices include all respective Valves and Batteries.***

**Best quality Telephones**, 4,000 ohms (perfectly matched), £1 2s. 6d.
**Best quality Crystal**, 1/3 (post free.)

***Cash with Order. Orders dealt with in strict rotation.***

Protected by patent, all British parts used. Approved by P.M.G.

**Demonstrations Daily during Broadcasting Hours.**

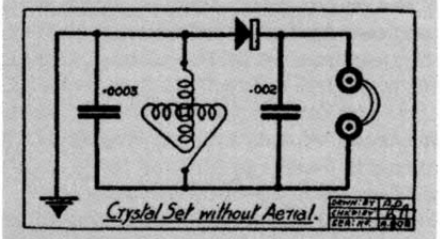
**VINCO WIRELESS**
(*M. Richardson*),
**49, Upper Baker Street, London, N.W.1.**

*Popular Wireless Weekly*, March 22nd, 1924.


**Crystal Set Without Aerial**

To the Editor, POPULAR WIRELESS.

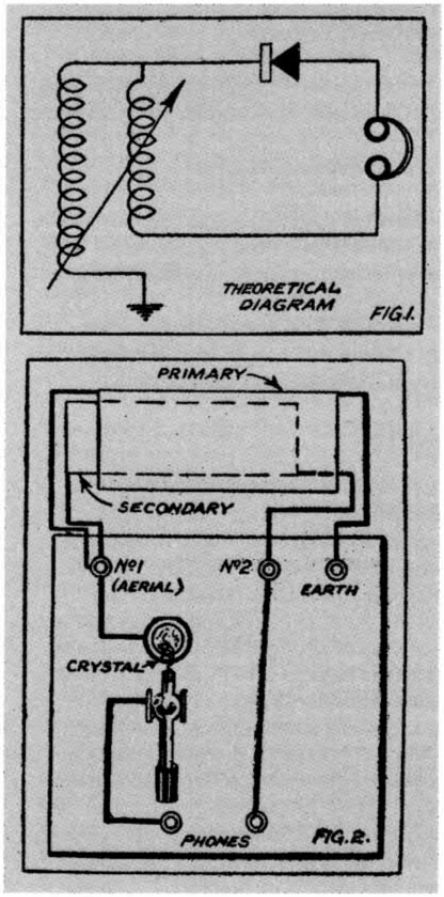
Dear Sir, – I noticed with interest the recent letter of Mr. Farley on crystal reception, and am writing of experiments




which I made in a similar direction. About two years ago I had an ordinary cardboard tube variometer crystal set, which I considered very inefficient. One day I put a fixed condenser, .0003 mfd. in parallel with the variometer, and I found I could receive 2LO fairly well, using only an earth connection. (See diagram). I also tried a variable condenser in place of the fixed one, with no appreciable difference in results...

G.L. Ashman.
22, Kentish Town Road, N.W.1

*Popular Wireless and Wireless Review*, June 12th, 1926.




*Aerialless Crystal Set - Popular Wireless Weekly*, July 26th, 1924. Circuit (top) and layout (above) showing the loose-coupled tuning coil. In fact, it was just a conventional receiver with the aerial terminal left off!

published – an article appearing in *Popular Wireless Weekly* for July 26th, 1924, for example, described an *Aerialless Crystal Set* in which the author, located near the Glasgow station, 5SC, claimed *"quite decent audibility at 5 miles range."* The key to the circuit was stated to be strict adherence to the loose-coupled type tuning coil design, both in the number of turns and the gauge of the wire specified – viz. 80 turns of No.20 wire on a larger former (6 x 2 ¾ inches) and 100 turns of No.28 wire on a smaller, concentric former (4 x 2 ¼ inches). In reality, other than striving for an efficient tuning circuit, there was nothing particularly unusual about the design.

Aerial-less crystal set reception from the local BBC transmitters was no doubt possible in exceptional situations, and there would have been a greater chance of success for some listeners after the opening of 5XX, the BBC's high-power transmitter at Chelmsford, in June 1924. But, for most of the crystal set population, despite the confident articles and so-called advanced designs, there was no getting around the fact that, for anything approaching adequate performance, an efficient aerial and a good earth would have been absolutely essential.

* Thanks are due to Chris Simmonds for bringing the author's attention to the existence of the Richardson patent.

# A brief resumé of British (and several overseas) finished goods & component manufacturers (as at May 2005) part 9 by Dave Hazell

**ICW** – Industrial Capacitors (Wrexham) Ltd, Miners Road, Llay Industrial Estate, Wrexham (in 2001) – tel. 01978 853805. Established in 1974. By 2003, owned by Sevcon Tech Ops Inc (USA).

**ILP Electronics Ltd**, Graham Bell House, Roper Close, Canterbury, Kent (in 1980). Maker of toroidal transformers and audio modules.

**IMF Electronics Ltd**, Westbourne Street, High Wycombe, Bucks (in 1977). Monitor loudspeakers.

**IMI**. Imperial Metal Industries (Kynoch) Ltd. A metal bashing firm, based in Witton, Birmingham. In the 1960's and early 1970's, IMI made the sectioned metal housing and cover for many British made UHF tuners.

**IQD** – Interface Quartz Devices Ltd, 29 Markey Street, Crewkerne, Somerset (in 1979). Crystals.

**IR** – see International Rectifier.

**IRC**. Brand of the International Resistance Co, 401 N. Broad Street, Philadelphia, Pa (in 1955). Maker of resistors (mainly wirewound types?).

**ITA** – Industrial Tape Applications, 5 Pratt Street, London, NW1 (in 1974). UK agents for Revox (Germany) and Otari (Japan).

**ITT**

The International Telephone & Telegraph Corporation, USA. Founded circa 1924 by Sosthenes Behn (from the US Virgin Islands). Prior to this Behn and his brother Hernan had co-founded The Puerto Rico Telephone Company. ITT bought International Western Electric from American Telephone & Telegraph in 1925. In the UK, Westerm Electric therefore changed its name to Standard Telephones and Cables Ltd (STC), in 1925.

In 1951, ITT bought a controlling stake in the Kellogg Switchboard & Supply Company (founded 1897). The following year it took over Kellogg completely and renamed it ITT Kellogg. ITT then merged another of its subsidiaries, Federal Telephone and Telegraph Company, with ITT Kellogg and renamed the merged entity ITT Telecommunications. In 1959, Harold Geneen was elected Chief Executive Officer of ITT and under his leadership. ITT became a very diverse group, with interests far removed from telecommunications and electronics (e.g. "Sherleys" pet care products, "Avis" car rental, "Rimmel" cosmetics, Hertford Insurance, Continental Baking Co and Sheraton hotels). ITT Semiconductors encompassed its various subsidiaries in the US, UK (STC) and West Germany (Intermetall). In the UK, circa 1975, ITT also acquired Erie Electronics (and thereby Hunts capacitors) and Daly Condensers. See the entry under STC. Geneen left ITT in 1977.

By the mid 1980's, ITT had divested itself of most of its telecoms interests, including the sale of most of its European telecoms interests to Alcatel (of France). However, in the UK, ITT set up its Standard Telephones & Cables subsidiary as a plc and sold shares. A few years later, it sold all its shares and this led to STC's takeover by Northern Telecom of Canada. In 1995, ITT split itself up into three separately quoted companies: ITT Industries (industrial, including "Cannon" connectors), ITT Hartford (insurance) and ITT Corporation (leisure).

**ITT** "TAG" range of resin dipped, solid tantalum bead capacitors. (1970)

**ITT** Components Group Europe, Equipment Products Division, Thornton Ind Est, Milford Haven, Dyfed (in 1975). For example, pneumatic wire stripper.

**ITT** Components Group Europe, Capacitor Division, Brixham Road, Paignton, Devon (in 1970). Formerly the valve and capacitor divisions of STC.

**ITT** Components Group Europe, Valve Product Division, Brixham Road, Paignton, Devon (in 1970).

**ITT** Components Group Europe, Power Components Division, West Road, Harlow, Essex 9in 1970). Maker of reed relays, etc.

**ITT Consumer Products Services Ltd**, Footscray, Sidcup, Kent. Tel Footscray 3333. (late 1960's to mid 1970's).

**ITT Consumer Products (UK) Ltd**, Theaklen Drive, Hastings, Sussex (in 1973 and 1979). Colour TV factory. In the 1950's, the factory was owned by L.P.S. Electrical Co Ltd. A firm called Knightshades Ltd (probably an STC company) made lightshades at Silverhill Works, Theaklen Drive, St Leonards-on-Sea, Sussex, in 1968 – same place??? It is not clear when KB/STC/ITT took it over. In 1973, there was also a test/assembly plant at Radlett Works, Colney Street, St Albans, Herts (in 1972, ITT Mobile Communications Ltd was at this location – ITT "Starphone" mobile radio handsets). By 1978, also at Chester Hall Lane, Basildon, Essex (in part of an STC factory). The Hastings factory closed in June 1980 (last set made was the 16" CP340 (CVC40 chassis). Thereafter, ITT-SEL designed sets were assembled at Basildon, from kits imported from Germany. Production at Basildon ended in the mid-1980's. Thereafter, complete sets came from Bochum (Standard Elektik Lorenz) in Germany. With the sale of ITT's European businesses, Nokia acquired the consumer electronics operations and the ITT brand was eventually displaced by Nokia – in the same way that ITT displaced KB in the late 1960's. In 1996, Nokia sold its consumer operations (except for satellite receivers) to Semi-Tech (Global) Company Ltd – a subsidiary of Semi-Tech Corporation of Canada.

**ITT Creed Ltd**, Hollingbury, Brighton, Sussex (in 1974 and 1980). Maker of teleprinters, etc.

**ITT Electronic Services**, Edinburgh Way, Harlow, Essex (in 1970). The "big yellow book" – component distributor.

**ITT Mercator**, South Denes, Great Yarmouth, Norfolk (in 1978). New name for Erie Electronics Ltd – as the UK distributor for Erie (North America) professional and military components (filters, resistors, feed-throughs, crystal oscillators, etc.).

**ITT Semiconductors**, Footscray, Sidcup, Kent (in 1970).

**ITT Sealectro Ltd**. Matrix panels and connectors.

**ITW Paktron (in 1973)**. Plastic film capacitors. ITW Electronic Division, 263 Farnham Road, Slough, Berks (in 1973).

**IVC** – International Video Corporation, 675 Almanor Avenue, Sunnyvale, California 94086 (in 1972). VTR and other broadcast TV equipment maker.

**Igranic**. Igranic Electric Co Ltd. (Igranic Works, Elstow Road, Bedford) in 1925, 1946 & 1957. In 1920/30s, they had a London office at 149 Queen Victoria Street. Made coils for radio sets in the 1920's. Maker of jack plugs and sockets, potentiometers, rheostats (in 1950). Became part of the Metal Industries Group circa 1957 – as did Avo and Taylor, later on. MI Group was later taken over by Thorn. Merged (in the 1960's?) with Brookhirst Switchgear Ltd of Chester, to form Brookhirst Igranic Ltd. BHI was later taken over by, or sold to, Cutler-Hammer Inc, of the US. C-H were in turn taken over by the Eaton Corporation. Today (2002), Igranic Ltd, is restored and based at the same Bedford location.

**Imhof (Alfred) Ltd**, 112 New Oxford Street, London, WC1 (in 1947). Maker of equipment cases, cabinets and racking. In 1965, at Ashley Works, Cowley Mill Road, Uxbridge, Middx. By 1969 it was a subsidiary of Parnell Investments Ltd. In 1969, it was merged with Bedco Ltd and re-named Imhof-Bedco Ltd. By 1976 Imhof-Bedco Standard Products Ltd, Ashley Road, Uxbridge, Middx. Taken over by BICC-Vero Electronics Ltd, in the 1980's.

**Imperial** – brand name of German radio, radiogram and dictating machine maker Continental-Rundfunk GmbH, Stassfurt, W. Germany. In 1955, Jason Finance Co Ltd, set up a new company, Continental Radio & Electronics Ltd, to market their products in the UK. Continental Electronics Ltd, 3 Farringdon Road, London, EC1.

**Indesit Ltd**, 292 Streatham High Road, London, SW16 (in 1964). UK offices of the Italian domestic appliances and (one-time) TV manufacturer.

**Industrial Instruments Ltd**. In 1965 & 70, sales and development at Stanley Road, Bromley, Kent (factory at Ponswood Industrial Estate, Hastings, Sussex in 1970). Maker of "Transipack" Uninterruptible Power Supplies, regulated power units, etc. In 1961, Transipack, 29 Burnt Ash Hill, London, SE12. In 1982, there was a firm called WK Electronics Ltd, Napier Rroad, Bromley, who made Transipillars (spacers) and

Transiblock (insulated mounts for heatsinks.

**Industrial Electronics**, 229 Hale Lane, Edgware, Middx (in 1947) and 99 Grays Inn Road, London, WC1 (in 1950 – office?). Maker of test equipment (e.g. oscilloscope) and industrial controls.

**Instanta Ltd (in 1947)**. Maker of Instanta relays. Acquired by Magnetic Controls Ltd, 48 Old Church Street, Chelsea, London, SW3, in the same year.

**Insulators Ltd**, Leopold Road, Angel Road, Edmonton, London, N18 (in 1965). Injection, compression and fibreglass mouldings for the consumer electronics, electrical appliance and other industries. They made the plastic case for the Bush TR114 radio.

**Insuloid** See Hellerman

**Intel Corporation**, 365 Middlefield Road, Mountain View, California (in 1971). Semiconductor maker – inventor of the microprocessor. Set up by Gordon Moore and Robert Noyce, after they left Fairchild Semiconductor.

**Intermetall GmbH**. A German semiconductor manufacturer. By 1965, it was a subsidiary of the Clevite Corporation (USA). In the same year, ITT acquired Clevite's US based semiconductor businesses, as well as Intermetall and the semiconductor interests of Brush-Clevite, Southampton, UK. The UK Brush-Clevite interests were transferred to STC (ITT's UK company)

**International Aeradio Ltd** (IAL), 40 Park Street, London, W1 (in 1953). Maker of avionics.

**International Computers Ltd** (ICL), Cavendish Road, Stevenage. Herts (in 1969). ICL was formed by merger of International Computers & Tabulators and English Electric Computers, in 1968. Later taken over by STC (1984), then sold to Fujitsu of Japan. International Computers Ltd, Kidgsgrove, Stoke-on-Trent, Staffs (in 1970). Fujitsu dropped the ICL brand in the 1990's.

**International Computers and Tabulators** (ICT) was formed, circa 1958, by the merger of British Tabulating Machine Company and Powers-Samas. ICT absorbed the computing interests of GEC (1961), EMI (1962) and Ferranti (1963). ICT merged with English Electric Computers, in 1968, to form International Computers Limited (ICL).

**International Marine Radio Company Ltd**, 1 Peall Road, Croydon (in 1966 & 73). An STC, then ITT company. Maker of marine radio comms equipment.

**International Rectifier**. International Rectifier Corporation, 1521 East Grand Avenue, El Segundo, California. An American semiconductor company established by Leon Lidow and his son, Eric, in 1947. Initially, they made metal rectifiers but progressed onto silicon devices and transistors. They opened a UK factory at Hurst Green, Oxted, Surrey, in 1958. Initially, this was in partnership with Lancashire Dynamo Holdings (who were taken over by Metal Industries in 1960). Hence, in 1965, the UK company was part of the Metal Industries group. By Jan 1966, the "MI" logo disappeared from I-R (UK) advertisements. In 1966, they were offering solid-state, plug-in replacements for recifier valves. In 2004, run by Alex Lidow (son of Eric) and still an independent company.

**Intersil Inc** (in 1976). By 1982, Intersil-Datel.

**Invicta Radio Ltd**, Radio Works, 37 Parkhurst Road, London, N7 (in 1944 & 52) – a radio manufacturer. At 100 Great Portland Street, London, W1 (in 1960 & 62). Established in the 1930's (by C O Stanley, of Pye). Certainly a Pye subsidiary by the 1950's. Invicta was Pye's wholesale brand.

**Irish Cables Ltd**, Castlewellan Road, Newcastle, Co Down, N Ireland (in 1957). An associate of Wandleside Cable Works Ltd. Maker of TV aerial downlead coaxial cables.

**Iskra Ltd**, Redlands, Coulsdon, Surrey (in 1977). UK arm of Iskra Kranj, Yugoslavia, the electronic component manufacturer. Previously known as Guest International Ltd.

**J B Manufacturing Co**. (Cabinets) Ltd, 86 Palmerston Road, Walthamstow, London, E17 (in 1952). Radio cabinet maker. Opened a new, large factory at Howard Way, Harlow, Essex, in 1956.

**J Langham Thompson Ltd**, founded by the man of the same name in 1946. Acquired by Camp Bird and then Ether Engineering Ltd, in 1962.

**JV Radio Ltd**, 23-25 William Street, Plymouth (in 1956). In 1948, at 84 Embankment Road, Plymouth. In 1957, J V Radio & Television Ltd, Brunswick Works, Brunswick Works, Cattedown, Plymouth. Makers of TV preamplifiers and a Band 3 converter.

**JVC. Victor Company of Japan**. Originally, the Japanese subsidiary of the US Victor Talking Machine Co. The US Victor company was taken over by RCA in 1929. In 1954, Matsushita Electric Industrial Co buys a majority stake in the Victor Company of Japan. In the 1960s, their brand was JVC-Nivico.

**Jackson Brothers**. Jackson Brothers (London) Ltd, located at Kingsway, Waddon, Croydon, Surrey (in 1948 and 1974). Established in 1923 as "Jackson Brothers" (see ad in WW Apr 1974, page a32) by Leonard Fillmore and based at 8 Poland Street (off Oxford Street), London, W1. It became a limited company in 1932. In 1932, they relocated to 72 St Thomas Street, London, SE1. This factory was detsroyed by bombing in 1941 and the firm moved to Waddon, Croydon. Leonard Fillmore died in 1971. His son John took over. In 1980, they acquired the "Polar" variable capacitor division of Wingrove & Rogers Ltd. In 1989, John Fillmore sold the firm to new owners, headed by MD David Ryland. Manufactured tuning capacitors and slow motion drives. The firm was still going in 1994, although diversifying into other other areas of precision engineering.

**Jackson (The) Electric Stove Co Ltd**, 143 Sloane Street, London, SW1 (in 1948). Maker of electric cookers and washboilers. Later to become a Tube Investments Ltd company.

**Jackson (J D) Electronics Ltd**, Egglestone Works, Lombard Street, Newark-on-Trent, Notts (in 1968). Manufacturer of TV picture monitors.

**Jason Motor & Electronic Co**, 328 Cricklewood Lane, London, NW2 (in 1957). In 1958 & 60, at 3-4 Great Chapel Street, Oxford Street, London, W1 (sales office?). Maker of "Jason" FM and AM/FM tuner units (also HiFi amplifiers). In 1961, Jason Electronic Designs Ltd at the same address and offering a transistor radio kit. Jason Electronic Designs Ltd (in 1971) – ceased to wholesale stocks of Dansette and Perdio spares. In 1962, the company was at Kimberley Gardens, Harringay, London, N4 and went into receivership. In 1964, at 23 Wardour Street, London, W1.

**J-Beam Aerials Ltd**, Cleveland Works, Weedon Road Industrial Estate, Northampton (in 1952 & 55). In 1957 & 64, "Westonia", Weston Favell, Northampton. In 1963 & 64, they were a member company of the Associated Aerials Group (at Knight Road, Strood, Kent, in 1964). By 1965, J-Beam were a separate company, and based in Norrthampton. In 1969, J-Beam were the UK agents for "Stolle" (W. Germany) aerial rotators. Also J Beam Engineering Limited, Rothersthorpe Crescent, Northampton, tel 0604 63531 in 1968 & 73. Directors B. Sykes, JL Neal, VR Hartopp, MJ Wilkins, RJ Hasler, Secretary KF Tibbits. In 1975, Jaybeam Ltd was taken over by Jones-Stroud of Nottingham. In 1976, Jaybeam was at Moulton Park Ind Est, Northampton. Maker of TV aerials, later amateur radio and comms types only.

**Jean Renaud**, of France. In 1972, a maker of rotary and pushbutton switches. Later ITT Jean Renaud.

**Jermyn**. Jermyn Industries, Vestry Estate, Sevenoaks, Kent (in 1965 & 70). Makers of IC sockets, semiconductor mounting pads and insulating bushes and covers, etc. Jermyn also marketed electronic kits at one time (including light dimmers for the home – very 70's!). Later on, they operated an electronic component distribution business – bought by Lex Services Group in the 1980's. Seems to have either been sold on, or closed down.

**Jerrold**. Jerrold Electronics Corp, 2214 Chestnut Street, Philadelphia 3, PA (in 1955), Maker of cable TV equipment (CATV/MATV). Established in 1950 by Milton Jerrold Shapp, who developed the first coaxial cable TV distribution system in the Eastern USA. Taken over by General Instrument later in the 1950's.

**John Logie Baird Ltd**, 4 Upper Grosvenor Street, London, W1 (in 1947). Maker of TV receivers and combined TV/radios. J L Baird died in 1946, aged 57.

**Johnson & Phillips Ltd**, Victoria Works, Victoria Way, Charlton, London, SE7 (in 1946 & 64). In existence since at least 1919. They made cables, electrical switchgear and, in the early days of radio, transformers and other components for radio sets. Later taken over by Enfield Standard Cables.

**Jones**. An American style of flat blade multi-pin male and female connector. Also popular in the motion picture industry. Made, from 1947, in the UK by Painton, thence Plessey Connectors.

**Jones Sewing Machine Co Ltd**, Stamford Works, Sheapley Street, Audenshaw, Nr Manchester (in 1964 & 73). UK distributor for Japanese made audio and radio sets made by Brother of Japan? Later known as Jones+Brother. Now simply Brother UK Ltd?

**Jordan-Watts Ltd**, Benlow Works, Silverdale Road, Hayes, Middx (in 1978). Loudspeaker manufacturer. Operating since at least 1966. Was Mr E J Jordan one of the co-founders?

**K-A Products Ltd**, Myron Place, London, SE13 (in 1954 & 59). Maker of TV aerials. In 1964, "the aerials division of Kimber-Allen Ltd" at Broomfield Works, London Road, Swanley, Kent.

**KB**. See Kolster-Brandes.

**KEF Electronics Ltd**, Tovil, Maidstone, Kent (in 1962 and 1973). Founded by R E Cooke in 1961, after he left Wharfedale. Loudspeaker manufacturer. Since 1992, owned (together with Celestion) by the Gold Peak group (of GP batteries fame).

**KG (Holdings) Ltd**. In 1958, Bonochord, Tellux and W S Electronics were subsidiary companies. In 1961, their subsidiary WS Electronics Ltd was bought by Ultra Electronics Ltd.

**KLB Electric Ltd**, 335 Whitehorse Road, Croydon, Surrey (in 1964). In 1964, KLB were UK distributor for Paco test gear and they also made their own equipment, such as a component bridge.

**Kay Electric Co**, Fairfield, New Jersey, USA (in 1965). Maker of "Pinlite" miniature filament lamps and "Midgi-Lites" seven-segment (filament) numerical displays.

**Keith Electrical Industries Ltd**, Thorburn Street, Upper Brook Street, Manchester 13 (in 1948). Maker electric tabletop cooker.

**Keithley Instruments Ltd**, 1 Boulton Road, Reading (in 1980). UK office of US test equipment manufacturer. In 1965 & 67, Keithley Instruments Inc, Cleveland, Ohio.

**Kelly Acoustics Ltd**, Enfield, Middlesex (in 1963). Loudspeaker manufacturer.

**Kelvinator Ltd**, New Chester Road, Bromborough, Cheshire (in 1964). Maker of refrigerators. In 1914, the US parent introduced the first fridge, made in Detroit.

**Kelvin & Hughes Ltd**, Winchester Road, Basingstoke, Hants (in 1957). Marine radar and depth finding equipment. Taken over by Smiths Industries by 1959. In 1967, 70 & 1980, Kelvin Hughes division of Smiths Industries Ltd, New North Road, Hainault, Ilford, Essex.

**Kemet** – brand name for tantalum capacitors. Initially made by Union Carbide. In 1970, Union Carbide UK Ltd, 8 Grafton Street, London, W1A 2LR.

**KEMET Corporation**, as we know it today, was officially formed on December 21, 1990. It was originally established by Union Carbide corporation in 1919 in Cleveland, Ohio, as Kemet Laboratories. The name "KEMET" is a blend of the words "chemical" and "metallurgy." One of KEMET's first products was "getters," an essential element in every vacuum tube. It is estimated that over 80% of the vacuum tubes used by the Allies during World War II contained KEMET getters. The business continued to grow and prosper until the early 1950's when the transistor began to displace vacuum tubes in electronics. Transistors utilized another new invention, the solid tantalum capacitor, which complemented the use of low-voltage transistors (semiconductors) in electrical circuits. Since Union Carbide had experience in the fields of high-temperature metals and alloys, the solid tantalum capacitor was chosen as KEMET's "new product" to provide the vehicle for future growth.

By 1962, the capacitor business had experienced very rapid growth. A new 50,000 square foot plant in Greenville, South Carolina, designed from inception as a capacitor production facility, started up in late 1963. By the late 1960's, KEMET was clearly established as a major U.S. capacitor producer, with the leading market share in solid tantalum capacitors. In order to expand KEMET's product scope and enable its continuing rapid growth, the decision was made to enter the multilayer ceramic capacitor business in 1969.

In April 1969, a manufacturing facility was opened in Matamoros, Mexico, to further expand KEMET's production capabilities. The Cleveland Plant was phased out in early 1971, and all personnel and equipment were transferred either to Greenville or to the newly constructed Mauldin, South Carolina, plant. Today, KEMET also manufactures capacitors in Shelby, North Carolina; Fountain Inn, South Carolina; Monterrey, Mexico; and Ciudad Victoria, Mexico.

In 1986, Union Carbide announced its decision to divest itself of businesses that no longer fit its business plans. On April 1, 1987, the existing management group bought the company from Union Carbide Corporation and renamed it KEMET Electronics Corporation. While Union Carbide still retained 50% of KEMET's stock, KEMET was now a stand-alone company with David E. Maguire as its President/CEO. This proved to be a very successful venture. During its first few years, KEMET demonstrated continued rapid growth with superior financial performance. On December 21, 1990, a group of inventors including KEMET Senior Management and Citicorp Corporation purchased the balance of KEMET stock, and KEMET Corporation was born. This sale ended all ties with Union Carbide Corporation. On October 21, 1992, KEMET Corporation completed its Initial Public Offering (IPO) with additional offerings in June 1993 and December 1999. Proceeds from these offerings were used to repay debt and redeem preferred stock. KEMET continued to grow and prosper, and the company's Board of Directors announced two-for-one stock splits in September 1995 and May 2000.

Today (2003), KEMET leads the capacitor industry in producing high-performance solutions, including the world's most complete line of surface-mount tantalum, ceramic, and aluminum capacitor technologies provided with near-perfect quality and on-time delivery at competitive prices to customer locations worldwide. KEMET capacitors are fundamental elements used in every type of electronic equipment, including computers, telecommunication, automotive electronics, military electronics, medical electronics, and consumer electronics. "High-Reliability" versions of our capacitors have shared in every important military/aerospace effort from the first Telstar to Viking, the Apollo moon landing, the Patriot missile, the Mir and International Space Stations, and the Pathfinder/Sojourner exploration of Mars. Production is measured in the billions of pieces per year.

**Ken-Rad**. Brand of USA made valves imported into the UK in the 1930's. Ken-Rad Tube & Lamp Corp. Inc.

**Kent (George) Ltd**, Biscot Road, Luton, Beds. Maker of instrumentation (e.g. water meters, process control). By 1981, Brown Boveri Kent.

**Kent Mouldings**, Footscray, Sidcup, Kent (in 1964). Tel. Footscray 3333 (the STC/KB 'phone number) – so, a division of STC?

**Kenton Recorders Ltd**, 4 Tottenham Court Road, London, W1 (in 1955). Tape recorder manufacturer.

**Kenwood Manufacturing Co Ltd**, Hipley Street, Old Woking, Surrey (in 1958) maker of food mixers, fan heaters, rotisseries, etc. In 1954, Kenwood Electrics Ltd, 26 North Audley Street, London, W1 – introduced their "Steam-o-matic" electric iron. Kenwood Manufacturing (Woking) Ltd, New Lane, Havant, Hants (in 1964). Started by a Mr Ken Wood, in the early 1950's? Later taken over by Thorn. In 2002, again a separate company, largely manufacturing in China.

**Kertron Inc**, Florida, USA (in 1973). A maker of power transistors.

**Keyswitch Co (The)**, 191 Kensal Road, London, W10 (in 1954) In 1957, 126 Kensal Road. In 1961, 2 Irongate Wharf Road, Praed Street, London, W2. In 1963 & 69, Keyswitch Relays Ltd, 120-132 Cricklewood Lane, London, NW2. In 1972, Keyswitch Relays, Bendon Valley, Garratt Lane, Wandsworth, London, SW18 – the former Hunts capacitor factory? P.O. Lever key switch and P. O. relay type maker. By the mid-80's, Keyswitch-Varley Ltd (a Thorn company). Later sold by Thorn

to FKI Industries and relocated to Tom Cribb Road, Thamesmead Industrial Estate .... Sold on by FKI and now (in 2002) called Signature Industries Ltd (incorporating Burndept).

**KGM Electronics Ltd**, Bardolph Road, Richmond, Surrey (in 1960 & 66). At Clock Tower Road, Isleworth, Middx (in 1976). Maker of edge lit displays, CCTV cameras and CRT monitors.

**King (Gordon J) Enterprises Ltd**, 6 New Road, Brixham, Devon (in 1964). The prolific technical author – also the "King Telebooster"?

**Kingshill Electronic Products Ltd**, Torrens Street, London, EC1 (in 1970). Maker of power supplies.

**Kingston Lamp Co Ltd**, Hull. Lamp manufacturer, using the Kingston brand. In 1965, Philips gained control of the company.

**Kirksaeter**. A German HiFi manufacturer (in 1968). Distributed in the UK by A C Farnell Ltd, Leeds.
KLG Sparking Plugs Ltd. In 1958, they made a range of telescopic aerials for TV and radio use!

**"Knight Kits"** – home build electronic kits from Allied Radio, 110N Western Avenue, Chicago, Ill (in 1955). Marketed (from 1967) in the UK by Electroniques (prop. STC Ltd), in the 1960's. In 1967, Electroniques (Prop. STC Ltd), Edinbrugh Way, Harlow, Essex – also marketed aerial rotators, "Qoilpax" RF stages, electronics hobbyist components, etc.

**Knowles Electronics Ltd**, Victoria Raod, Burgess Hill, Sussex (in 1967). Manufacturer of sub-miniature microphones and receivers.

**Kolectric Ltd**, Sinclair House, The Avenue, Ealing, London, W13 (in 1965). In 1961, at 73 Uxbridge Road, Ealing, London W5. Maker of coil winding machines.

**Kolster-Brandes Ltd**, Cray Works, Footscray, Sidcup, Kent (in 1957, 62 and 1970). TV and radio manufacturer ("KB"), part of the STC/ITT group (from its creation). In 1945, P H Spagnoletti became chief engineer of the company, becoming general manager in 1947. He joined STC in 1929. The company was formed by the merger of the Kolster Radio Corporation and Brandes Ltd, to form Kolster-Brandes Ltd (in the UK), circa 1930. In March 2004, a pair of headphones, circa 1923, made by Canadian Brandes Ltd, was sold on Ebay – they were marked "made in England". Circa 1962, K-B's parent, STC, acquired the Regentone, RGD, Argosy and Ace brands, which they merged with KB, to form the "Consumer Products Division" of STC Ltd. Circa 1967, ITT (STC's parent) took over this division and formed ITT Consumer Products (UK) Ltd, which was the UK company of its European radio, TV and audio group (which included Schaub Lorenz, Graetz and Oceanic). With this change, KB products were branded ITT-KB for a few years, then just ITT. See ITT and STC enties.

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HMV TV article continued from page 19

pulses fed to the blocking oscillator valve MS4B and then to the audio output triode ML4. The output from the ML4 anode is anode resistive load–connected to the high impedance frame coils through a condenser. Linearity feedback to the ML4 grid is through a variable resistor (form). In the case of the line output stage, no feedback is employed. Width and line frequency are controlled by variable resistors in the MH4 anode and grid circuits. Centring of the picture on the CRT is provided by a voltage from the 280 volt HT line controlled through a pre–set variable resistor. At this time there were no ion traps and so the CR tube suffered from ion burn which showed up as a darkening of the picture after some periods of use.

The television sound receiver was a very simple double–diode demodulator and triode amplifier MHD4 to an audio output pentode valve KT41.

Apart from the use of a single transformer for all supplies, the power packs used similar valves to the other power circuits.

When table model TV sets were produced in 1938 the special valves referred to earlier became available, namely KTZ41 special high slope 4v heater RF pentodes and the X41C, a triode Hexode with ceramic valve base. The special high output line output valve KT44 (a development of the KT66) had already been used in some models.

The original design also allowed reception of the Baird 240 line system. A change of condenser in the frame circuit was used to accomodate the 25 frames–per–second Baird frequency. Some changes were made to the circuits in models 903 for HMV and 704 for Marconi sets in the RF circuits and the sync circuit generally.

Of the console circuits, although the circuits of the TV only table models were very similar in principle their circuits had important differences but will not be discussed further in this article.

The EMI engineers including the remarkable Mr Blumlein have to be admired for the way in which they developed, in very few years, a succesful electronic system for the Alexandra Palace transmitter subsequently adopted by the BBC rather than the Baird (240 line) system. Much of their work was fundamental and lasted until the first and last 405 line system at Alexandra Palace and throughout the country was shut down after about 50 years service when VHF and finally UHF with colour arrived.

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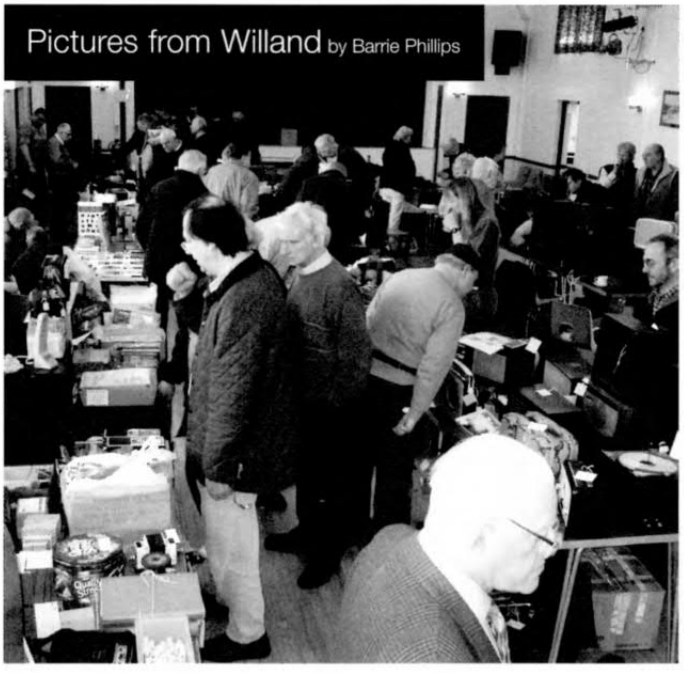
## Pictures from Willand by Barrie Phillips



# Letters

**Dear Editor**

I would like to draw your attention to the fact that the Dutch Radio and Electricity Museum twice a year organises a big international convention for historical radio and electricity techniques at the Museum in Hoenderloo, with participants from Germany, France and Belgium. These conventions always are on the first saturdays of June and August – this year on June 3rd and August 5th. Usually there are about 80 participants. For people who would like to take a long–weekend trip to Holland it is certainly worthwhile to visit this convention and at the same time get to know the Dutch Radio and Electricity Museum, which is of course open to visitors on those days. Hoenderloo is situated in the middle of a beautiful part of central Holland, between the cities of Arnhem and Apeldoorn and from Hook of Holland. It is about 1.5 miles by car. In Hoenderloo there is also the entrance of The National Park with the world–famous Van Gogh Museum. The organisers of the convention and of the museum have English–speaking assistants. It would be a great pleasure to me to meet members of the BVWS at the convention and in the museum. I kindly ask you to mention this fact in your magazine. For more information you can phone the museum at: 055 3782128. The address is: Nederlands. Electriciteits. en Radio Museum, Krimweg 21, 7351 AS Hoenderloo NL. www.electriciteitsmuseum.nl

Yours sincerely,
Marcel Ritmeester
Director NEM

**Dear Editor**

**Standby your sets**

We're told that leaving our televisions on standby takes the output of a power station over the land. It's all to do with instant gratification – why wait for your cathode ray tube to heat up to produce a picture, when it could be kept warm on standby?

Vintage radio has always had this problem, but listeners have put up with it. At one end you have the famous round Ekco, where you could go and make a cup of tea as the CY1 rectifier valve gently simmered into action in about 90 seconds. Transistors solved that problem with instant music. Battery valve sets also gave near instant startup.

If the powers that be have their way, tungsten filaments may be taxed because they are much less efficient than fluorescents. Does that mean that valves in vintage radios should be taxed every time they are sold? I have a 1923 Harmsworth Wireless Encyclopaedia which has a design for a dining room set suspended from the ceiling, where the bright emitter valves double as cosy dinner table lights and the set serenades the diners. Taxing tungsten harks back to the days of the BBC Company, where sets were

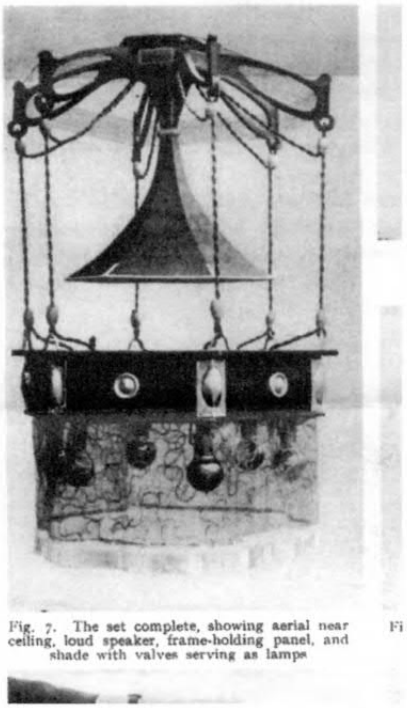


Fig. 7. The set complete, showing aerial near ceiling, loud speaker, frame-holding panel, and shade with valves serving as lamps

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sold without valves and a Marconi royalty of 12/6 (63p) per valve had to paid as an extra. How about levying a semiconductor tax of 1p a junction? It could be a nice little earner for Gordon Brown as silicon insects proliferate.

Yours sincerely,
Tony Hopwood

**Dear Editor**

I enclose some photos which I hope may be of use for the Bulletin. These were taken at the Hoswick Visitor Centre in Shetland. Most of the exhibits are from the collection of Cecil Duncan GMOEKM. I hope that these are of interest.

Yours sincerely,
WJ Williamson

**Dear Editor**

The membership is informed (The Bulletin, Winter 2005) that the NVCF event is running at a loss. As a member I would very much like to see the account balance sheet published for this event as I am in a dilemma as to why this should be so.

I did oppose the purchase of this from JH at the time, in writing and am concerned as to whether the debt has yet been fully paid off?

I know other members have similar feelings on this issue as any Society debt will be borne by the membership.

Yours sincerely,
Alan Stubbings

**Dear Editor**
**The Bulletin, Winter 2005**

Amazing photos of most surprising sets of all ages! Even music. Oh that (even a modest) 'show' would occur 'in a day's journey'.

'Germanium Crystal Triodes' – as one who ventured over Offa's Dyke in 1949 and remained at EMI's cutting edge until 1954 – I was privileged to read (and often get patiently explained) the sacred (and expensive) pages of Wireless World. I recall some excitement about these germanium devices ('we' used silicon crystal diodes – 'ex government' lend–lease and up to date BTH ones, inside 2x1 brass Waveguide) not even trying Germanium

ones (GEC GEX55/1) at enormous expense! until Coronation year, in a coaxial rat race and as far as my snowy thatched 'bone dome' can recall there was a do it yourself article, giving a recipe for turning two BTH Diodes into one 'crystal valve' – both cat's whiskers being fitted into a polystyrene plug atop one of the crystals – still left in its base (appropriately sited for its eventual name! Each needed different 'cooking' instructions, via resistors from a grid bias battery, until current flowed, its ability to oscillate, and frequency range determining its 'alpha' and Ft. As two such diodes would have cost me most of a week's pay, the fiddly work was economically left to others, with perhaps the attempts producing squeeks and howls!

I'm amazed at Mr Grant's concrete–mixing to get the weight right! As for the accumulator, even the highly inflammable celluloid case and the filler cap are identical to a pair I acquired in my school days.

Relieved to read that others, too, suffer from UV (is it being concentrated 'up there' by unmeasured tons of $CO_2$?).

Mr Burns'/IEE tome on technology will be on my request list for the monthly visit of the mobile library (having just returned Skues' 'Pop went the Pirates' and Dr Reich's 'Principles of Electron Tubes'). Bill Williams' recreation is magnificent! With the preamble about Faraday's forged iron ring, somewhere (?) I've read that the 'wire' was a hand sheared Z pattern of an Admiralty 'copper–bottom' sheathing sheet, wrapping with oiled cloth! Litzendraht wire became as thin as the (doubled) current–penetration into the metal at the 'working' frequency – a couple o' thou! As for fathoms even Marconi quoted wavelengths in feet! As late as 1950 some boffins at EMI made a thing of capacity in centimetres (sphere–equivalent) with lots of them in 'jars' (more like tumblers from my schoolboy memories). Then in like vein, cylindrical coils whose length be only 1/e of the diameter exhibit best Q (in handfuls of hundreds) borne out by the proportions of the 100kW (STC) CM10's output coils at WA–X. Curiously in the 1931 vintage Marconi 50kW standby transmitter (for three frequencies) optimum Q would have narrowed the bandwidth for the high quality audio of the programmes then broadcast. So the two foot diameter tank–coil was about twice as long, made of 3/4" diameter high–conductivity copper tube on a horizontal axis held by ceramic bobbin insulators on a Plain wood frame. The tapping for higher frequencies used a hefty copper crocodile clip having an inch diameter Litz 'Rope' to the far end, the hapless junior shift engineer having to crawl inside, often still hot from previous service. There was an example in Chester's (upstairs) Rows Wireless Museum. As for TRF, my mini thesis to REME in 1965 confidently declared that prior to ITA there had been over 2 million TRF single–channel TV 405 receivers not surprisingly copying CH (11 meters) RADAR, with which I got involved during 1954–7.

As for toroids, only about 3/4 of the ring should be occupied to keep the ends of the coil reasonably apart, the red painted (type 2) iron–dust mix covers MW up to about 4MHz. Incidentally, Radio III's 150 kW transmitters used Knockenhauer spirals!

As mentioned in Mr Taylor's letter, voltage–gradients along valve filaments do have effects; it is worth consulting Reich's book or commercial receivers (McMichael and Pye) using power–grid detectors using two high–value (2 Meg) grid–leaks to either ends of the filament, while American diodes and some Hivac 'bottles' were produced with 5/8 volt filaments. According to Scroggie/Cathode–Ray the circuit loading on tuned circuits by half–wave rectifiers is that of about 1/3rd of the grid–leak during the conducting half–cycle.

Thanks again for a good read.

Appreciatively,
Wyn Mainwaring

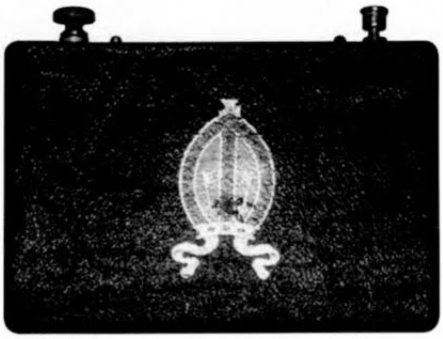
**Dear Editor**

In my article on the Lotus 3 valve Band Pass AC receiver I asked the readership if anybody knew of other examples of this set. I don't know if anybody has contacted you directly, but I have had the following information, which may be of interest to readers. John Gibson, who now lives in California, has a Lotus with serial number A8630 so we are speculating that some 5000 of these sets were made. He also very kindly sent me a copy of the original handbook for his set which contains a circuit diagram that I was able to compare with the one I drew out. He also found three other people who own a bandpass three, so we know of at least 5 sets still remaining. It seems probable that mine may be the first production set of this particular model. Jeffrey Borinsky has confirmed that the set he has contains only a 2 gang tuning capacitor, so the band pass set was a more expensive refinement presumably to improve selectivity, though both models appear to share the same chassis and cabinet. It does seem however as though not too may Lotus receivers have survived and details of the date of the demise of the company are hard to find.

Graham Dawson

**Dear Editor**

Several Harpendens ago I bought a slide-contact tuned crystal set housed in a Rexine covered cardboard box for a few pounds, which, on closer inspection at home, turned out to be very badly-made out of odd bits and pieces. The transfer on the side of the box included the words "Typewriter Specialists" and so I concluded someone had knocked up a crystal set in an old typewriter spares box, possibly fairly recently, as the



enamelled wire on the coil looked modern. I relegated the set to the attic as probably not worth the few pounds I paid for it. Recently, however, I was looking through vol. 1 of "Tickling the Crystal" and noticed that the upright tubular set pictured on page 217, in the "Unknown Manufacturer" section had the remains of the same transfer as the box I have. This has the following words "W.Peters & Son 59 Ship St Brighton, Typewriter Specialists", the set in the book looks genuine enough, so this firm must have made crystal sets in the 20's, and the box I have may have been for one of these sets. The photo shows this transfer.

Yours Sincerely,
Mike Butt

**Dear Editor**

Bill Williams' letter in Bulletin 31/1 about a Rosetta Stone for future generations to help them get a grip on past technology makes a good point. The best analogy I can offer is if you showed two drawings to a great engineer like Brunel. A drawing of a jet engine would be understood as some sort of turbine, but a crystal set would be like Egyptian hieroglyphics as the technology did not exist in his day.

Bill points out that the basic notation has changed for radio symbols over the last 80 years.It's worse than that – there is no consistency across the electrical spectrum. I have a car where the service manual for the electrics bears no relationship to international electrical standards! As a technology book and vintage electronics collector, I think his point about documentation obsolescence is well made. At least books stay readable if kept dry and bug free over hundreds of years while format changes for electronic media make things impossible to read in a few decades!

Bill also touched on 'museumitis'. Museums are always short of funds and space, so offering them a collection is not often a good idea. At the same time, their existing collections are not really accessible to researchers, often languishing in damp basements because they say they can't legally sell them to raise much–needed cash, despite having never displayed them for decades. I can offer many horror

stories of stuff that has gone to wrack and ruin in museum stores, or disappeared without trace, even if catalogued.

Yours Sincerely,
Tony Hopwood

**Dear Editor**

**Philips were always different!**

Following Gerry Wells' article on Philips radio receivers makes me wonder if Philips would not have preferred mechanical television to electronic, since they always looked for a complex mechanical solution to solve simple electrical problems.

Gerry mentioned the notorious mono knob receiver, but there are numerous similar examples of Philips doing things the difficult way. Why build a radio with the tuning scale mounted on top of the cabinet with the pointer coming up through a slot in the top, which was very vulnerable to damage? They used an aluminium bar aerial on some sets rather than frame coils like everybody else. They tried permeability tuning with complex assemblies moving coil slugs, when everyone else used ganged capacitors. They used large quantities of nuts and bolts rather than spot welding or self- tapping screws, and they loved switches driven by levers, pulleys and Bowden cables.

But for sheer unworkable design the prize must go to the N1500 VCR with its loading mechanism of nylon cord, springs and pulleys driven from a drum on the end of the motor gearbox. Coupled with the flimsy reversing and stop micro-switches adjusted by bending the contact strips or slotted holes in the switch brackets, it took them years to change to a gear ring driven by a worm on the motor shaft, which was not only reliable but much simpler and cheaper too !

So while I admire Philips innovative engineering, I still wonder why they made life so difficult for themselves and the service engineer in designing their equipment.

Yours Sincerely,
Graham Dawson

**Dear Editor**

The extent of my interest in vintage wireless has never extended as far as actually considering a restoration project, that is, until recently when I was *given* a 1949 Ekco A52 complete with users' instructions and the original purchaser's receipt to the sum of £34.9s.11d.

It was in a rather bad way, but I was intrigued and I couldn't do any harm by dusting it off and generally seeing what was under the muck, could I? So that is what I did, and then gaining confidence I removed the chassis and decided to give the glass tuning dial that was almost black, a wash in clean water.

I now have a bowl of alphabet soup and a headache.

Apart from getting a kick up the backside. What on earth happens next?

Yours in sorrow,
Sid Denney

**Dear Editor**

**Marconi Exhibition, Oxford**

I have received several complaints about aspects of the above exhibition implying I had a role in organising the event.

I wish to make it clear that I was not involved in arranging this exhibition. I offered certain advice but was kept at arms length by the Museum of Science who told me that it was their job to organise and mount the exhibition. My first sight of the results was, with others, at 6pm on the 24th April at the exhibition preview.

My name appears on a board at the museum on which special thanks are awarded to me. When I queried this acknowledgement I was told it was for getting the Marconi Collection to Oxford University (nearly two hundred and fifty artefacts to the Museum of Science and many thousands of papers to the Bodleian Library) and nothing to do with mounting the exhibition.

Yours Sincerely,
Gordon Bussey

# Eddystone User Group to Close but Eddystone User Group Website is born

The Eddystone User Group, dedicated to enthusiasts of the UK's most famous communications receiver manufacturer, and founded in 1990 by Ted Moore G7AIR is closing down in April 2006 as a membership organisation. This is not because interest in this world-famous marque has declined in recent years; in fact , since 1997 under its organiser, Graeme Wormald G3GGL, its world-wide membership at nearly 400 has never been higher. No, we have decided to close it at this high point because Graeme is now in his 70's and deserves his retirement. Running a membership organisation and producing the bi- monthly newsletter is a very time consuming task and Graeme's enthusiasm and dedication have taken the newsletter to new heights, making it one of the most popular vintage radio magazines in the UK.


During its lifetime the EUG has published some 96 newsletters (latterly known as "Lighthouse") and numerous supplements charting the history of these famous radio receivers, which were manufactured in Birmingham from its inception in 1925 until 2000. The last newsletter will be published in April and whilst EUG as a membership organisation will cease, EUG as an entity will continue via a dedicated web-site www.eddystoneusergroup.org.uk. Here everyone will be able to access the mass of information the EUG has built up over the years. This will eventually include copies of the newsletters and supplements, the histories of the group and company, personalities, picture libraries, forums, etc etc. This list is almost endless. Most of this information will be freely available to those who require it. The EUG assets are being placed in a trust which will be responsible for managing the web site. Although the information on the site will be free to access, the trust will be seeking donations and sponsorship from those who wish to continue to support the trust devoted to the UK's most famous communications receiver manufacturer

Chris Pettitt
Patron of Eddystone User Group 1990 – 2006
Formerly Managing Director of Eddystone Radio Ltd (1984-1998)

# Minutes

**Minutes of BVWS Committee meeting held on Thursday 16th February 2006 on the conference telephone starting at 7.30 pm.**

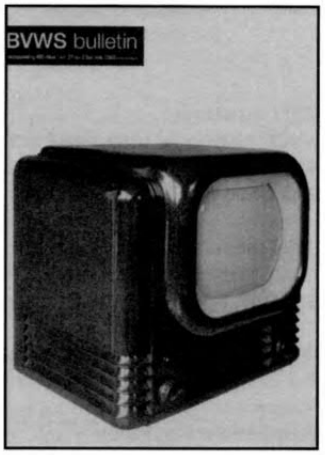
Present: Mike Barker (chair), Graham Terry, Ian Higginbottom, Carl Glover, Guy Peskett, Paul Stenning, Terry Martini, Jeremy Day, Jon Evans, Martyn Bennett.

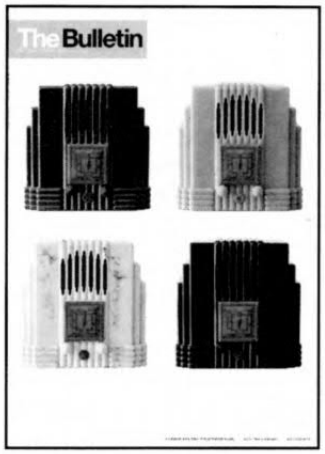
1. Apologies for absence: none (all present).
2. The minutes of the meeting held on 16th December 2005 were accepted as a true record.
Matters arising: -
Item 7 MB has contacted Robin Reynolds about use of BBC copyright material but no response yet. DVD minus BBC material has been produced by JE and is about to be sent out.
3. GT reported that the renewed membership stood at 1340 leaving 366 yet to renew. This is a faster rate of renewal than last year.
4. JD reported that the the Societys balances stood at £27,059 (deposit) and £11,540 (current) and that the position was satisfactory. The accounts for the year ended December 2005, which will be presented at the AGM, are being audited.
5. CG reported that the spring Bulletin was at the proof reading stage. The summer issue was two thirds full and he planned to complete it before leaving to work in Japan for up to two months this summer.
6. It was resolved to present the Duncan Neale award for 2006 to Tony Constable for his contribution to preservation by founding the BVWS 30 years ago.
7. NVCF: The Warwickshire Exhibition Centre has been confirmed as the venue for the Sunday May 7th event and a deposit paid. Stall application forms have been distributed at the Tunbridge Wells Audiojumble and mailed to the previous stallholders who are not BVWS members. Forms for members are being sent with the February mailing of membership cards and Members Ads. Details of the organisation of the event were discussed.
8. BVWS 30th anniversary: The anniversary will be marked by special events at Society meetings throughout 2006. The first of these will be an exhibition with a television theme at the NVCF. The hall has been booked for setting up on Saturday 6th May.
9. The forwarding paths for Committee email were discussed.
10. AOB:
(i) PS reported a forum thread in which members were offering to help the Society in unspecified ways. It was agreed to ask volonteers to help with the scanning project.
(ii) JE initiated a discussion on the practicality of the Society manufacturing batches of parts such as Amplion horn gaskets. The general conclusion was that although individuals were willing to spend large amounts of time making parts for themselves the economic unit costs for sale to others would be very high. The matter will be kept under review.
11. The next meeting will be on the 11th May and will be a telephone conference.
The meeting closed at 9.38 pm.

# Heritage Radio Weekend at Greyfriars Worcester

For the third year a Heritage Radio Weekend will be held at the Greyfriars Worcester on the 28th to the 30th July inclusive. Times are from 1 to 5pm with last entry at 4.30. Exhibits will cover radio from the 1920s to the 1970s, with working examples in room settings and two exhibition rooms. A quiz and radios to 'listen in' are available for children.

For further information please contact Mrs Rachel Bannon: The greyfriars, Friar Street, Worcester WR1 2LZ. tel 01905 23571 or email greyfriars@nationaltrust.org.uk



# Back issues

**Vol 10** Numbers 2, 3 & 4 Inc. The KB Masterpiece, Extinct Species "A Monster Defiant".

**Vol 11** Numbers 1, 2, 3, 4 Inc. BTH VR3 (1924) receiver, Marconi's 1897 tests, Origin of the term 'Radio', Baird or Jenkins first with TV?

**Vol 12** Numbers 1, 2, 3, 4 Inc. the Emor Globe, The Fultograph, Ekco Coloured Cabinets.

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

**Vol 14** Numbers 1, 2, 3, 4 Inc. Cable broadcasting in the 1930's, The story of the Screen Grid.

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

**Vol 16** Numbers 1, 2, 3, 4 Inc. The Stenode, The Philips 2511, Inside the Round Ekcos.

**Vol 17** Numbers 1, 3, 4, 5, 6 Inc. Wattless Mains Droppers, The First Philips set, Receiver Techniques.

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

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

**Vol 20** Numbers 1, 2, 4, 5, 6 Inc. Radio Instruments Ltd., Japanese shirt pocket radios, Philco 'peoples set', notes on piano-keys, the story of Pilot Radio, the Ever Ready company from the inside, the Cambridge international, the AWA Radiolette, this Murphy tunes itself!

**Vol 21** Numbers 1, 2, 3, 4 Inc. Marconi in postcards, the Defiant M900, GPO registration No.s, Personal portables, the transmission of time signals by wireless, the Ekco A23, historic equipment from the early marine era, the birth pains of radio, inside the BM20, plastics, Ferdinand Braun, pioneer of wireless telegraphy, that was the weekend that was, the first bakelite radios, BVWS - the first five years, the world of cathedrals, Pam 710.

**Vol 22** Numbers 1, 2, 3, 4 Inc. Another AD65 story, the Marconiphone P20B & P17B, listening in, communication with wires, the story of Sudbury radio supply, French collection, Zenith Trans-oceanics, Farnham show, Alba's baby, the first Murphy television receiver, AJS receivers, Fellows magneto Company, Ekco RS3, Black Propaganda.

**Vol 23** Numbers 1, 2, 3, 4 Inc. Sonora Sonorette, Bush SUG3, RNAS Transmitter type 52b, North American 'Woodies', Why collect catalin, Pilot Little Maestro, Theremin or Electronde, The Radio Communication Company, Early FM receivers, an odd Melody Maker, Black propaganda.

**Vol 24** Numbers 1, 2, 3, 4 Inc. The Superhet for beginners, Triode valves in radio receivers, History of GEC and the Marconi - Osram valve, KB FB10, Great Scotts!, Riders manuals.

**Vol 25** Numbers 1, 2, 3, 4 Inc. Repair of an Aerodyne 302, Henry Jackson, pioneer of Wireless communication at sea, Zenith 500 series, Confessions of a wireless fiend, RGD B2351, John Bailey 1938 Alexandra palace and the BBC, Ekco during the phoney war, Repairing a BTH loudspeaker, The portable radio in British life.

**Vol 26** Numbers 1, 2 Inc. How green was your Ekco?, The Amplion Dragon, Crystal gazing, The BVWS at the NEC, Installing aerials and earths, novelty radios, Machine-age Ekco stands of the 1930s, Volksempfänger; myth & reality.

**Supplements:**

1 'The story of Burndept'.
2 'WW 1927 data sheet'
3 'Seeing by wireless' the story of Baird Television
4 Reproduction Marconi catalogue

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

Postage: for individual Bulletins add 50p, for 2-5 bulletins add £1, for 6 or more add an extra 20p each.
23 Rosendale Road, West Dulwich
London SE21 8DS
Telephone 020 8670 3667.

Cheques to be made payable to 'The Vintage Wireless Museum'.

# News and Meetings

**GPO registration Numbers**
Martyn Bennett has the role of custodian of the BVWS list of GPO Registration Numbers. As many members will know the project of assembling this list was started in the early days of the BVWS and, more recently, has been enthusiastically carried on by Pat Leggatt. Members are strongly urged to help build the list, whenever they get the opportunity, particularly as it is something that will help with the identification of vintage wireless in years to come. The list is by no means complete and the GPO no longer have a record of the numbers granted to wireless manufacturers. The BVWS Handbook contains the current listings - one in numerical order and one ordered by name. Please let Martyn have any additions, or suggestions for corrections, by mail or over the phone.

Martyn Bennett, 58 Church Road, Fleet, Hampshire GU13 8LB telephone: 01252-613660 e-mail: martyB@globalnet.co.uk

**2006 meetings**
**2nd July** Wootton Bassett
**9th July** Workshop at Vintage Wireless Museum
**23rd July** Radiophile *Summer Special* at Sambrook
**18th August** 'Friday Night is Music Night' at British Vintage Wireless and Television Museum
**3rd September** Table top sale at British Vintage Wireless and Television Museum
**10th September** Radiophile *Exposition* at Shifnal
**1st October** Swapmeet at Harpenden
**15th October** Southborough
**22nd October** Workshop at British Vintage Wireless and Television Museum
**22nd October** Radiophile *Exposition* at Cowbit
**12th November** The Leeds Vintage Audio and Retro Fair
**3rd December** Wootton Bassett

**2007 meetings**
**NVCF** (date to be announced) at Warwickshire Exhibition Centre
**1st July** Wootton Bassett
**2nd December** Wootton Bassett

**2008 meetings**
**NVCF** (date to be announced) at Warwickshire Exhibition Centre
**6th July, 7th December** Wootton Bassett

**Workshops, Vintage Wireless Museum:**
For location and phone see advert in Bulletin. 11:00 start.

**Harpenden:** Harpenden Public Halls, Southdown Rd. Harpenden.
Doors open at 10:00, tickets for sale from 09:30, Auction at 13:30.
Contact Vic Williamson, 01582 593102
**The Leeds Vintage Audio and Retro Fair.**
The Corn Exchange,Call Lane (off KirkGate), Leeds. Doors open 10:00.
Contact Andy Wilcox, 0113 273 2323
**West of England Vintage Wireless Fair:**
Willand Village Hall (J27/M5). Doors open 10:30.
Contact Barrie Phillips, 01392 860529
**NVCF: National Vintage Communications Fair**
See advert in Bulletin.
www.nvcf.co.uk
**Wootton Bassett:** The Memorial Hall, Station Rd. Wootton Bassett.
Nr. Swindon (J16/M4). Doors open 10:30.
Contact Mike Barker, 01793 536040
**Southborough:** The Victoria Hall, London Road.
Southborough, A21, Kent. Doors open 10:30.
Contact John Howes, 01892 540022 (between 8 and 9PM Only please)

**For more details with maps to locations see the BVWS Website:**
www.bvws.org.uk/events/locations.htm

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*South Kensington, 7 November 2006*

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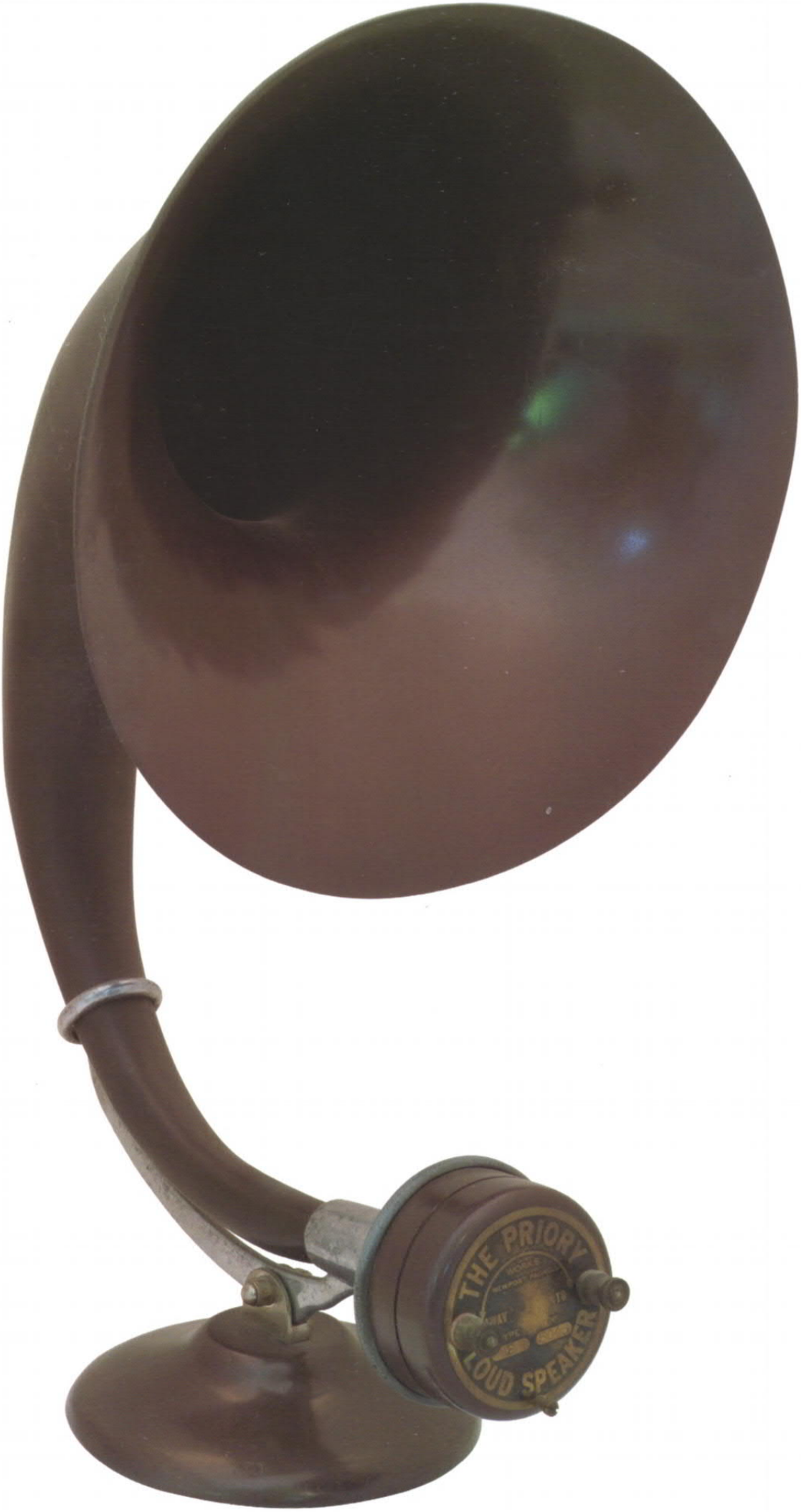
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