

# BVWS bulletin

Incorporating 405 Alive / vol. 27 no. 1 Spring 2002 [www.bvws.org.uk](http://www.bvws.org.uk)



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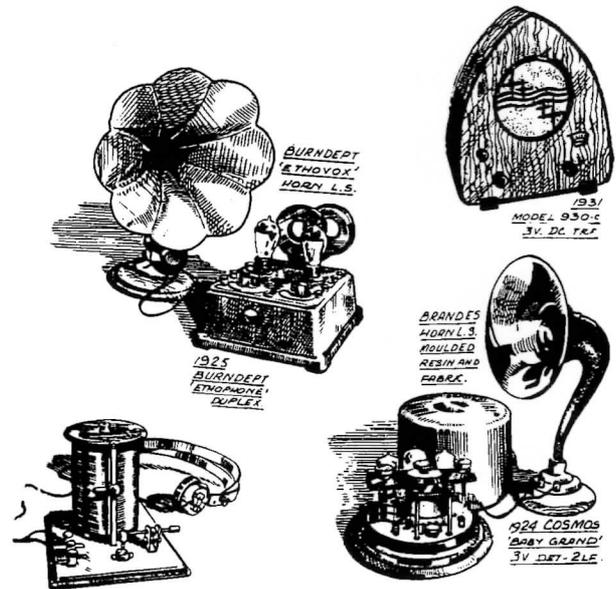
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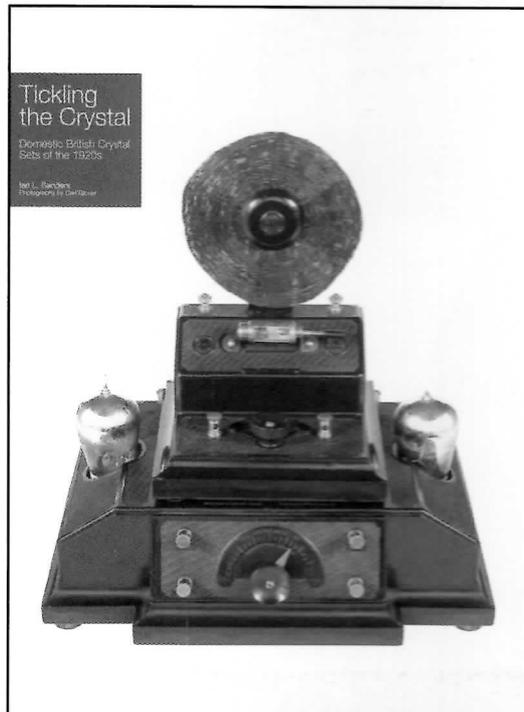


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## From the chair

Bulletin of the British Vintage Wireless Society  
Incorporating 405 Alive  
Volume 27 No.1 Spring 2002

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Separations and Printing by Apollo

### Honorary Members:

Gordon Bussey | Dr A.F. Constable  
Ray Herbert | Jonathan Hill  
David Read | Gerald Wells



Front cover: 'Felix' novelty crystal set

Rear cover: Rear of 'Felix' novelty crystal set

Front and rear cover photography by Carl Glover  
Graphic design by Carl Glover and Christine Bone

Edited by Carl Glover.  
405 Alive edited by Andy Henderson

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Welcome to the first Bulletin of 2002. Another packed edition with lots of radio and television related articles. The Vintage Wireless and TV year is just getting started and what better way than with another regional meeting at Easton-in-Gordano, Bristol. Once again this was a very well organised meeting with a warm welcome at the door from John Horne and his wife who laid on refreshments to keep us all going. The event went very well and those members who did not attend really did miss the bargains.

Lots of Valves, Radios and curious items appeared, even a radio hot water bottle. I purchased a partially working scope, identical to another I have for spares at a very competitive price. The miniature Bakelite radios had definitely come out for the day and bargains were to be found on every stall. I even found some WB valvholders for Bernard!

The BVWS stall also had a huge stock of 1920's components, mostly brand new and boxed. The proceeds of which will be going to a children's Charity on request of their prior owner. All in all a really good and friendly meeting, the next is planned for September so make a note now. I'd like to thank all our members who put pen to paper and write for the Bulletin. You make the Bulletin what it is! Without the articles we would be lost for material and the Bulletin would get very stale, so keep the articles flowing in and if you have never written one, well NOW's the time to start.

We print everything that comes in. An article in this issue appeared on 12 separate sheets of

## Talking About Wireless

This year we are presenting our biggest ever programme of talks about wireless.

**TAW Special - Harpenden 9th June 2002**  
Dr Jim Lewis will talk about the history of electronics in the Lea Valley. Did you know that this was home to Ferguson, Ediswan and Alexandra Palace? Jim has spent most of his career in the consumer electronics industry, apart from a three-year spell in the RAF. He worked for Thorn EMI Ferguson for many years. He now, writes, broadcasts and teaches industrial history for the WEA. He has written two books about the Lea Valley.

**TAW Special - Harpenden 1st September 2002**  
Simon Vaughan, archivist of the Alexandra Palace Television Society will be giving a very special talk.

Here's Looking At You: BBC Television as seen through the lens of Desmond Campbell. Campbell's television career began with Baird and the 30 line system. He joined the BBC Television

hand-written type. We have converted it (Thanks Jim) and the article is here for everyone to read, so please don't think its not good enough for the Bulletin, as if you take the time to write it, we'll print it. Remember that all TV articles should be sent to Andy Henderson and everything else to Carl Glover.

Of recent months our Harpenden organiser Terry Martini has found it increasingly more difficult to handle the amount of work from running his business and dealing with the organisation of the Harpenden meetings. Terry has informed us that the June Harpenden will have to be the last he organises. This leaves us with the problem of finding a new organiser for the Harpenden event. This may be easier to handle if the job was split into "pre-event" organiser and "on the day" organiser, so if anyone feels that they would be interested in taking either or both of these jobs on, please let me know.

Now that it is almost spring the usual huge heaps of mail have slowed down and our Membership Secretary, Steve can allow his fingertips to heal after all the renewal updates on the computer. This has not been an easy time for Steve or Dilys since Steve has been quite ill and the heavy burden of the renewals cannot have made this any easier, so if you have been waiting for answers to questions or membership cards etc. Please be patient they will eventually be dealt with.

Mike Barker.

Service in 1932 and remained with the Corporation until his retirement in 1961. Campbell shot cine film, some in colour, as well as taking many photos of the early TV service. Simon will present the first public showing of this archive. Highlights include Margot Fonteyn dancing for the pre-war TV service.

**TAW - Harpenden 24th November 2002**  
We are planning a pair of talks to continue our regular TAW series. Watch the Bulletin for details.

## Wireless and the Titanic

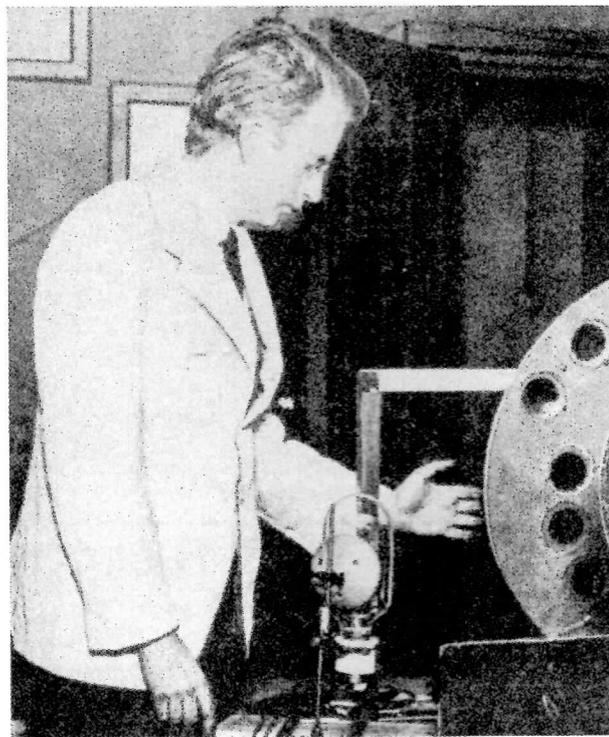
Gordon Bussey will be on television talking about the importance wireless made in the saving of human lives during the sinking of the Titanic. The programme is 'Timewatch', it will be shown on Friday 19th April, BBC 2 9.00-10.00pm. It will mark the 90th anniversary of the disaster.

# Television is Born

Images, Opinions and Historical Facts assembled

and presented by David Newman

With the resurgence of interest in early television and the Society's commitment to keep 405 alive, it seems an appropriate time to take a step back in history and look at some of the developments and people involved in working towards the television service that we are accustomed to today. The invention of television certainly can't be attributed to one man, indeed many people around the world were involved in a separate race to develop a viable television system! This short series of articles is intended to give those members not previously involved with television a flavour of how things developed during the pioneering days of television development. It is not meant to be an exhaustive account, merely a potted history of the struggle that these early pioneers faced.



On the 27 June 1923 The Times newspaper carried the following advertisement: 'Seeing by Wireless'. Inventor of apparatus wishes to hear from someone who will assist (not financially) in making a working model. Write to Box S. 686.'

The man lurking behind this box number was John Logie Baird. Within two and a half years he moved from the personal column to the news pages: on 28 January 1926 The Times reported that 'Members of the Royal Institution' and other visitors were invited to a laboratory in an upper room in Frith Street, Soho, on Tuesday. They saw a demonstration of an apparatus invented by J. L. Baird, who claims to have solved the problem of television. Noting that the transmitted image was tainted with an orange glow and often blurred, the newspaper commented: "It has yet to be seen to what extent further developments will carry Mr Baird's system towards practical use!" Ten years later, the British Broadcasting Corporation, in collaboration with Baird and EMI-Marconi, opened what was claimed to be the first regular high definition television service in the world!

Baird's story is an appealing one, and it is no wonder that subsequent generations of British school children have been taught that he 'invented' television. But he was not alone in the race to develop a regular television service for all.

He was certainly not the first person to have had the idea of seeing at a distance. In 1879, George du Maurier drew a cartoon for Punch which showed a mother and father watching, on the wall of their English home, a tennis match in Ceylon in which their daughter was playing. They were also able to speak to her over a long-distance telephone.

Progress towards a viable television system early in the 20th century had proved to be difficult, as valve technology that would be essential to provide the necessary amplifiers for the transmitter and receiver was in its infancy. In addition at the time, the only system that was available for turning the light reflected from an object to be televised into electronic impulses or signals, which were essential for the transmission of pictures, was based on the element selenium. Selenium was discovered in 1817 by a Swedish chemist (Berzelius in waste products from a sulphuric acid works. Selenium's relevance to the development of television was only realised in 1873 after a letter submitted to The Society

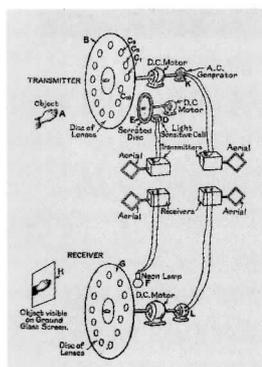
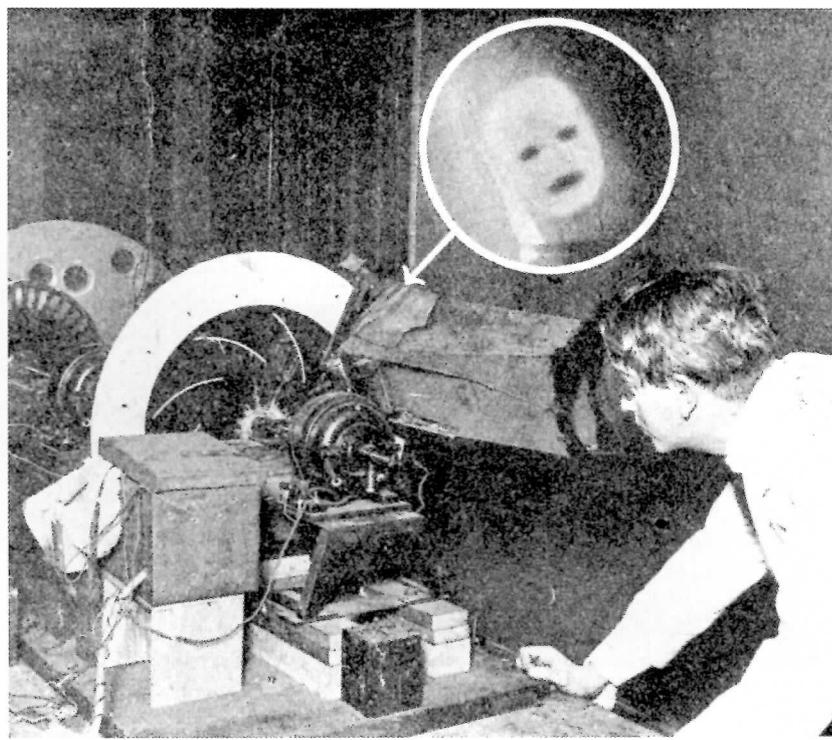
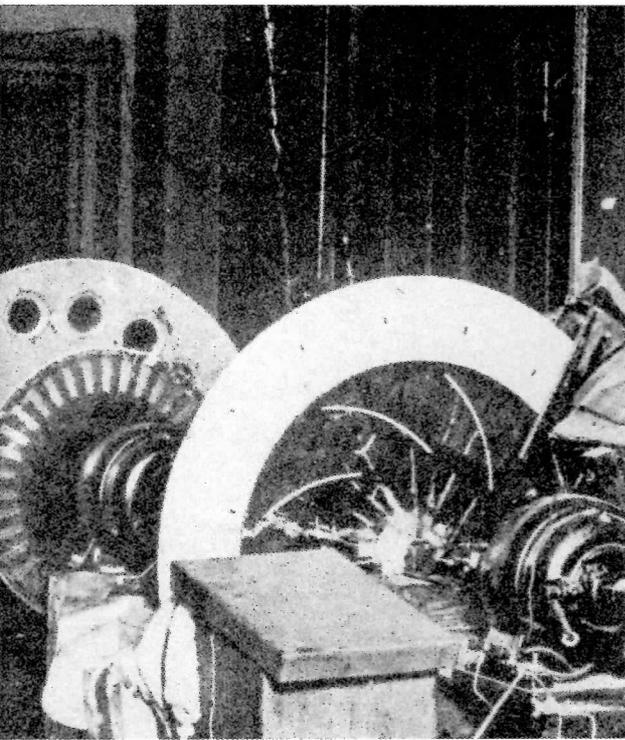
of Telegraph Engineers in London by the British scientist Willoughby Smith in 1884. Willoughby Smith had been in charge of the electrical department responsible for laying an 1852 mile transatlantic submarine cable. He had been experimenting with selenium, with the aim of taking advantage of its high resistance properties. During the course of these experiments he noted with interest that the resistance of the material appeared to alter in relation to the ambient light levels. His letter was published in the Journal of the Society of Telegraph Engineers. The article caused great excitement at the time as to the causes and the possible uses of this phenomenon. It would, however, later be realised that the inherent problem of using selenium apart from its lack of sensitivity would be the time lag in response to rapid changes in light and shade but at that time it was all the pioneers had to work with.

It was in 1881 that Shelford Bidwell first made a 'breakthrough' using selenium based devices as a medium to transmit a scanned image, albeit only a silhouette. By today's standards it used a very 'Heath-Robinson' method of scanning an object, using a pinhole type camera on a rotating cam. The receiver also employed a photographic type technique using a synchronously rotating drum with a piece of paper soaked in potassium iodide upon which the received image was traced out. In reality this system was in fact more akin to facsimile than television.

The next breakthrough came in 1884 when a German scientist, Paul Nipkow, patented his invention of a metal disc spirally perforated with small holes through which a strong light shone. When rotated, the disc could scan an object by breaking its image into small pieces. The different strengths of light reflected by the object and its background were then turned into electronic impulses of varying strengths by photo-sensitive selenium cells. By using another scanning disc that had to be synchronised with the transmitter, these impulses could theoretically be converted back into an image of the original object.

Although he had devised the theory of scanning, Nipkow could not use any kind of amplification to boost the signal from the insensitive selenium cells and consequently suffered very poor results. However, a number of other scientists began to interest themselves in the possibility of television. Not all of them approved of Nipkow's system. Its main drawback was that the





Before turning his attention to television, he had had several other entrepreneurial adventures. These included making artificial diamonds from carbon, marketing 'Baird Undersocks' which kept the feet cool in summer and warm in winter, producing jam in the West Indies and finally, selling soap in London.

scanning disc had to be rotated mechanically, limiting the speeds that could be achieved and therefore, the definition of the picture. There were also many problems in synchronising the motorised disk in the transmitter with that in the receiver.

The two pioneers of an alternative method were A. A. Campbell Swinton, a British scientist and Boris Rosing, a Russian, working independently. Campbell Swinton concluded that the mechanical scanning disc should be replaced by an electronic 'cathode-ray tube' in which the image would be picked up on a thin plate coated with a photosensitive substance. The plate would be bombarded with electrons from a 'gun' at the other end of the tube. This apparatus, sweeping from side to side and up and down, would provide electrical impulses matching the image being received on the plate. These impulses could then be transmitted. At the other end of the apparatus, the image-receiver, i.e. the television set, would convert the impulses back into a picture on a fluorescent screen.

A German named Karl Braun had invented the cathode-ray tube in 1897, but it was Campbell Swinton and Rosing who showed how it could be used for television. Rosing's method was actually inferior to Campbell Swinton's, since the Russian envisaged the tube being used only for the receiver, not for the scanner.

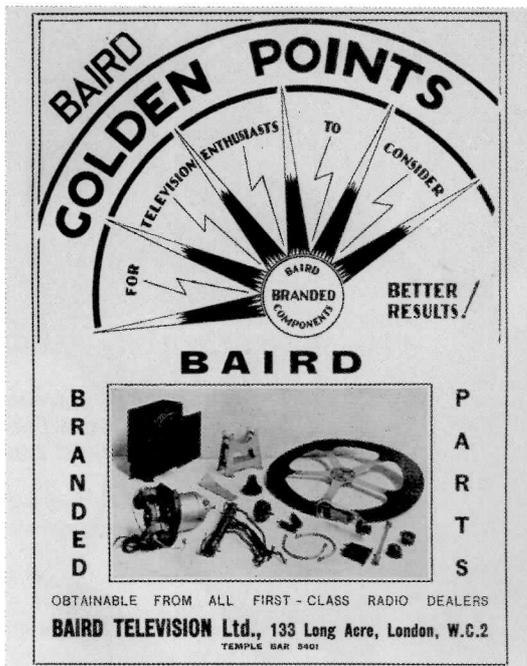
Rosing filed a patent for his system in 1907. In 1908, unaware of this (since the patent had not yet been published in England), Campbell Swinton wrote a remarkable letter to Nature magazine, revealing his proposals and concluding that 'distant electronic vision will, I think, come within the region of possibility'. What makes this even more prophetic is that Swinton's vision of television was devised nearly 100 years ago, yet the system described in Nature is, with many refinements, still the basis of television today. So Campbell Swinton has a strong claim to be accepted as the true inventor of television, albeit he could not put his principles into practice due to the huge amount of time and the development costs that would be required. He always imagined that a large corporation would pick up his ideas and develop them into a practical television system. Unfortunately, he died in February 1930 so never lived to see his prophecy come true.

John Logie Baird's great strength, although rather shy, was his ability to be an outstanding showman. He had a

fanatical belief in television as a practical reality, not merely something to be written about in the pages of scientific journals. His tragedy was that when he began to experiment with television in 1922, he used the Nipkow disc, even though it had been superseded by the work of Rosing and Campbell Swinton. As the evidence accumulated that he ought to change to electronic scanning, he still obstinately refused to do so. This perhaps was because he was not as technically gifted as legend would have us believe. This is borne out by a statement made by a colleague who worked closely with Baird during his experiments. Apparently Baird burst into the workshop and shouted, "Quick, I need a piece of wood about this long." He held his hands apart by about 18 inches to demonstrate the crude measurement he had just made, using no more than his hands to gauge his requirement. This is not to say that Baird was unintelligent; he just was not terribly practical. He had always been something of an 'oddball' and often suffered from poor health. Before turning his attention to television, he had had several other entrepreneurial adventures. These included making artificial diamonds from carbon, marketing 'Baird Undersocks' which kept the feet cool in summer and warm in winter, producing jam in the West Indies and finally, selling soap in London ('Baird's Speedy Cleaner'). Then aged thirty four, he retired to Hastings in Sussex, to address himself to 'The problem of Television'.

As has already been noted, and not what one might expect, Baird was not a practical man. "He was no good with his hands," according to Norman Loxdale, who was a thirteen year old schoolboy in Hastings at the time. "He could describe what he wanted, but he couldn't make it himself, and that's where he got other people to make things for him". Loxdale was soon enlisted to make Nipkow scanning discs by breaking up old tea chests.

Another assistant was Victor Mills, a local wireless enthusiast. Early in 1923, he recalls, there was a ring at the door and my mother came back and said to me, "There's a strange man at the door. He says he would like to speak to you as you know something about wireless, so you should know something about resonance." Baird told Mills that he had built an apparatus for transmitting pictures and he said, "I can't get it to go, it's making a terrific noise." When Mills went



down to Baird's workshop, he was unimpressed: "He had a collection of junk, that's what it boils down to; no, quite truly, I wouldn't have given two pounds to sell the lot." He quickly discovered the cause of Baird's problem with 'noise'. His selenium cells were too big!

On his next visit to Baird's workshop, Mills took some of his own wireless equipment, "because I couldn't trust anything that Baird had got". Once Mills had switched on the system, he put his hand in front of the apparatus to check the illumination. "I decided it was about right," he recalls, "but in the meantime Baird had yelled out 'It's here, it's here'! And that was the first picture he'd ever seen, "it was a true picture of my hand."

It was, of course, a rudimentary picture; the hand was shown only as a silhouette, without any gradations of light and shade. None the less, it was enough to convince Baird that he was on the right course, and soon afterwards he placed his advertisement in *The Times*. The publisher W. J. Odhams saw the notice, but after witnessing a demonstration of Baird's equipment he told the inventor that he could see no future for "a device that can only send shadows". Others however were more excited. Baird gave demonstrations to journalists in 1923 and early 1924, which led to enthusiastic articles in *Cinematography Weekly* and the *Radio Times*. By May 1924 Baird had been granted a patent for his 'System of Transmitting Views, Portraits and Scenes by Telegraphy or Wireless Telegraphy'. Greatly encouraged, he moved to London. Victor Mills declined to go with him, as he was already convinced that Baird ought to be experimenting with cathode-ray tubes instead of Nipkow discs. Baird worked on alone in his new room in Frith Street, London. He was very short of money by then; he seldom ate and never bought new clothes. Those who met him in this period remember him looking like a tramp. He had a brief respite from destitution in 1925 when Gordon Selfridge, owner of the famous department store in Oxford Street, paid Baird to demonstrate his apparatus.

Elizabeth Wood, who was then a schoolgirl, missed a hockey game to attend the first demonstration. "It was a little disappointing really, because of black lines wiggling across," she remembers, "and it jumped up and down and you could only see part of the thing." Eventually, after fiddling with the equipment, Baird produced a picture of a man's face, "but we couldn't see any face, only the outline". At the end of the demonstration, Gordon Selfridge made a speech of thanks saying that television was going to be "very great" in the future.

"And then we all clapped rather politely," Elizabeth Wood says, "because we were all rather frightened of television. I think the trouble was that we believed that, if they could make this film, they could see into our houses. We could see them, they could see us."

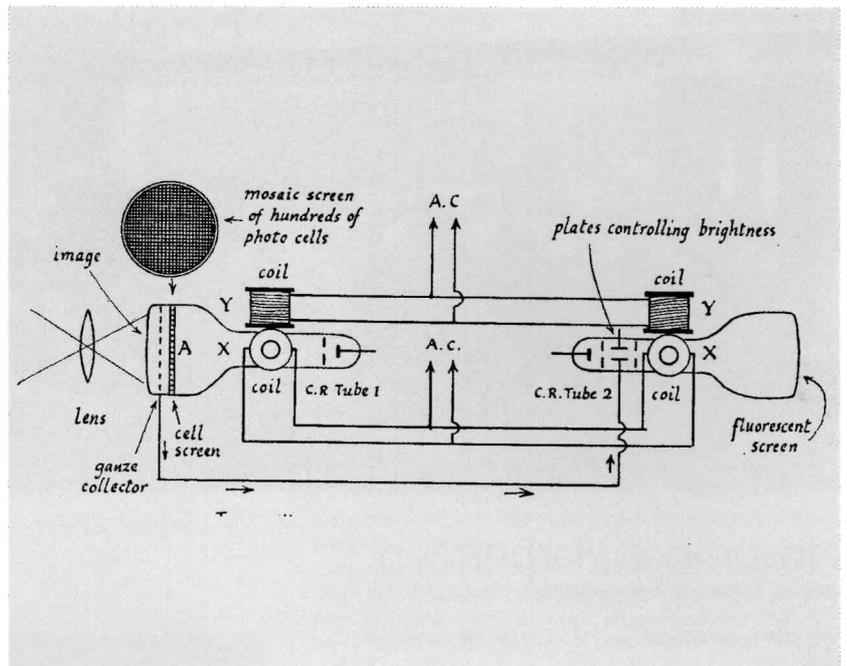
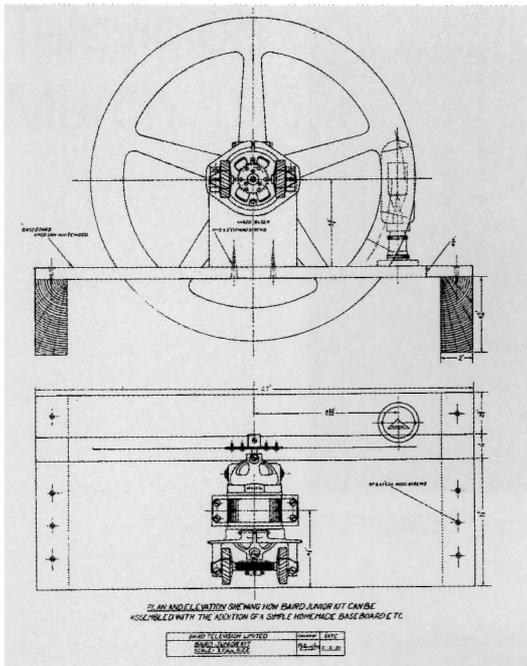
Baird had many problems to overcome with his system of television, not least was the insensitivity of the selenium cells, as any subject that was being scanned would have to endure extremely bright arc lighting to obtain a decent picture. As no human was likely to be able to suffer this for hours on end, Baird's solution was to use a ventriloquist's dummy, which he nicknamed 'Stukey' as his subject.

The first human face to be transmitted by Baird was that of a young lad named William Taynton who worked in an office adjacent to where he was experimenting. In a moment of excitement after he had received a successful image of 'Stukey,' Baird rushed out of his workshop in search of a human subject to transmit. The first person whom he came across was William, who was then press ganged into the workshop and placed in front of the very bright lights of the transmitter. Baird then rushed to the receiver to see what the image was like but was disappointed to find that the screen was blank. Returning to the transmitter to see if he could find out what the problem was, he was dismayed to find that young William had moved out of the brightly lit area and away from the scanner. This was due to the intense heat that the lights produced. Somewhat miffed at his subject's lack of appreciation at being the first person to be televised, Baird bribed William with half a crown to sit in front of the scanner. This did the trick and William's image appeared on the receiver's screen.

Baird's apparatus operated in the following manner. A lens was mounted in front of the Nipkow style disk which had 30 holes cut in a spiral pattern around its circumference and was spun at 600 RPM. This scanned the subject which was illuminated from behind by a very bright light source. The reflected light from the subject was channelled through the lens where it passed successively through the spiral of holes as they spun. Once beyond this disk the light was chopped by a second serrated disk, spinning at 2000rpm before it finally fell on the selenium cell.

On 1 October 1925, Baird experienced "the one great thrill that research work has brought me": for the first time, Stukey's head appeared on the screen not as "a mere smudge" but as "a real image with details". Inspired by this achievement, Baird arranged his

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At least the Russians had the sense to pursue electronic television almost straight away, instead of going through a 'mechanical' stage.

demonstration for members of the Royal Institution on 26 January 1926; it was reported in The Times two days later, although the reaction of the distinguished audience was not recorded.

While Baird was transmitting images in London, other people were working along the same lines elsewhere in the world. They included a Hungarian called D. Von Mihaly who, like Baird, was committed to mechanical scanning; but instead of the Nipkow disc, he preferred a revolving drum which contained mirrors tilted at different angles. Gerhardt Goebel, a German who saw Mihaly demonstrating at the Berlin Radio Exhibition in 1928, remembers "dark red television pictures the size of a rail ticket." His programme consisted of a pair of scissors or pliers opening. Baird himself later adopted Mihaly's mirror-drum, but although its pictures were of better quality, it still suffered from the fundamental defects of all mechanical television systems. Mihaly, like Baird, was transmitting 30-line pictures. To give some idea of how poor these were, it is worth noting that the Selsdon Committee in Britain, which reported in 1935, recommended that television should have at least 240 lines for its pictures to be satisfactory.

In Japan during 1927, a young lecturer in engineering named Kenjiro Takayanagi managed to transmit the Japanese character 'I'. Meanwhile, in the Soviet Union, scientists at the Leningrad Polytechnic Institute were under the impression that they were inventing television. At least the Russians had the sense to pursue electronic television almost straight away, instead of going through a 'mechanical' stage. One Soviet inventor, Boris Grabovsky, claimed to have made the first electronic broadcast as early as July 1926. Ivan Philipovich went to Leningrad where, under Professor Rosing's guidance, cathode ray tubes were being built. The first experiments that were carried out resulted in the transmissions of pictures of a bright spot and the movement of a hand.

Not to be outdone, the Americans were experimenting with television too. Charles Francis Jenkins had started experimenting in 1923, using Nipkow discs. In 1925, shortly after Baird's demonstration at Selfridges, Jenkins conducted a similar exhibition in the United States. Corporations involved in radio and telephones were also sponsoring research into television. At General Electric, Ernst Alexanderson was working on mechanical scanning. At Westinghouse, Vladimir Zworykin, who had experimented with television in Russia before emigrating in 1919 was more interested in electronic scanning, though his employers were none too sympathetic. Like

Campbell Swinton before him, Zworykin understood the need for some kind of charge storage system using a mosaic grid. This grid could then be scanned by an electron beam, thereby turning light reflected from a scanned object into the electronic impulses that would be needed for transmission. This was indeed a very courageous avenue of research back in 1925 when all but Swinton were proposing television scanning by mechanical methods. In an interview some years later, he described how a manager at Westinghouse perceived his equipment: "He seemed very impressed. So finally he asked me a few questions, like How long did I work with this system?" and so on, then departed saying a few words to the director of the laboratory. Later on, I found out what he said was, "Put this guy to work on something more useful."

David Sarnoff of RCA had no such doubts. In 1923 he predicted that "every broadcast receiver for home use in the future would also be equipped with a television with the capability to see as well as hear what would be going on in the broadcast station". Once the American press took up the new medium, television fever became contagious. On 7 April 1927 the American Telephone & Telegraph Company (AT&T) gave a public demonstration of the apparatus that had been developed in its Bell Laboratories. In the course of it, the US Secretary of Commerce, Herbert Hoover, gave a speech which was broadcast from Washington and watched in New York by an invited audience of business executives, editors and bankers, that incidentally made him the first politician to appear on television! On the following day the event was the lead story on the front page of the New York Times. The newspaper could hardly contain itself: "FAR-OFF SPEAKERS SEEN AS WELL AS HEARD HERE IN A TEST OF TELEVISION"

The audience in New York saw two broadcasts. The first, in which Hoover spoke, was transmitted by wire from Washington. The second, and perhaps more significant, was sent by radio from AT&T's experimental station in Whippany.

At this point we will take a pause. The next instalment will describe the loss of interest in mechanical methods of scanning by most pioneers as the possibility of electronic television stood a distinct chance of becoming a reality.



## November Harpenden

reviewed by Robert Chesters, photographs by Carl Glover

The queue outside the Eric Morcombe Memorial Hall seems to get longer every time I go to a meeting. I think that this reflects the growing membership of our society. It also has something to do with its increasing diversity too. The meeting this November included a great many different vintage communication forms including televisions and telephones - I must admit that if one has an interest in one of these things then it is often the case (as with myself) that one is also curious about another. Today's wireless society is successfully offering its membership a great and valid diversity that is to be proud of. After all; we have managed not to just survive 25 years through fashions and fads but to have a foundation in the history of radio and to be able to start to look towards the future as a busy and vibrant society committed to the encouragement and communication of ideas and information about a vital element of history post 1850.

This communication of ideas has very successfully taken shape with the "Talking about Wireless" lectures that came into being recently. November saw two topics; firstly, the history of the development and design of the radio coil and secondly, what Marconi may actually have heard during his first transatlantic transmission.

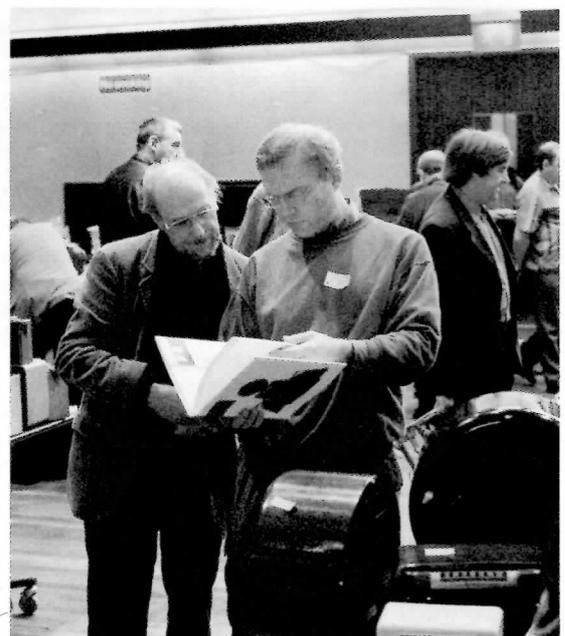
Both of these lectures were fascinating. I admit that I was not expecting to be engaged by the subject of the coil and its development but I was pleasantly surprised as it is a topic that one all too easily takes for granted

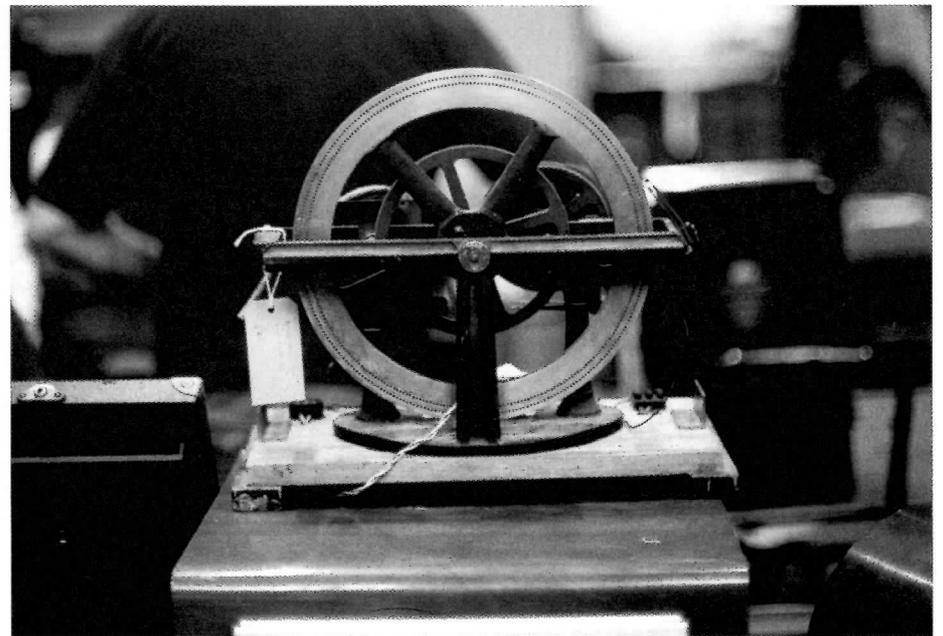
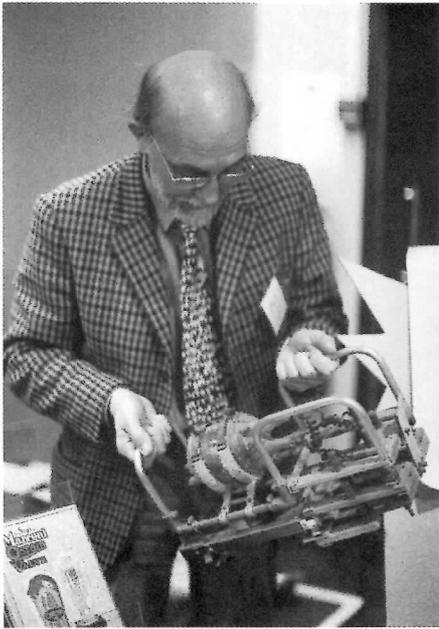
and was pivotal in the evolution of the wireless as a precision instrument. No one would have much of a clue what "the wild waves" had been saying if they couldn't filter out one station from another!

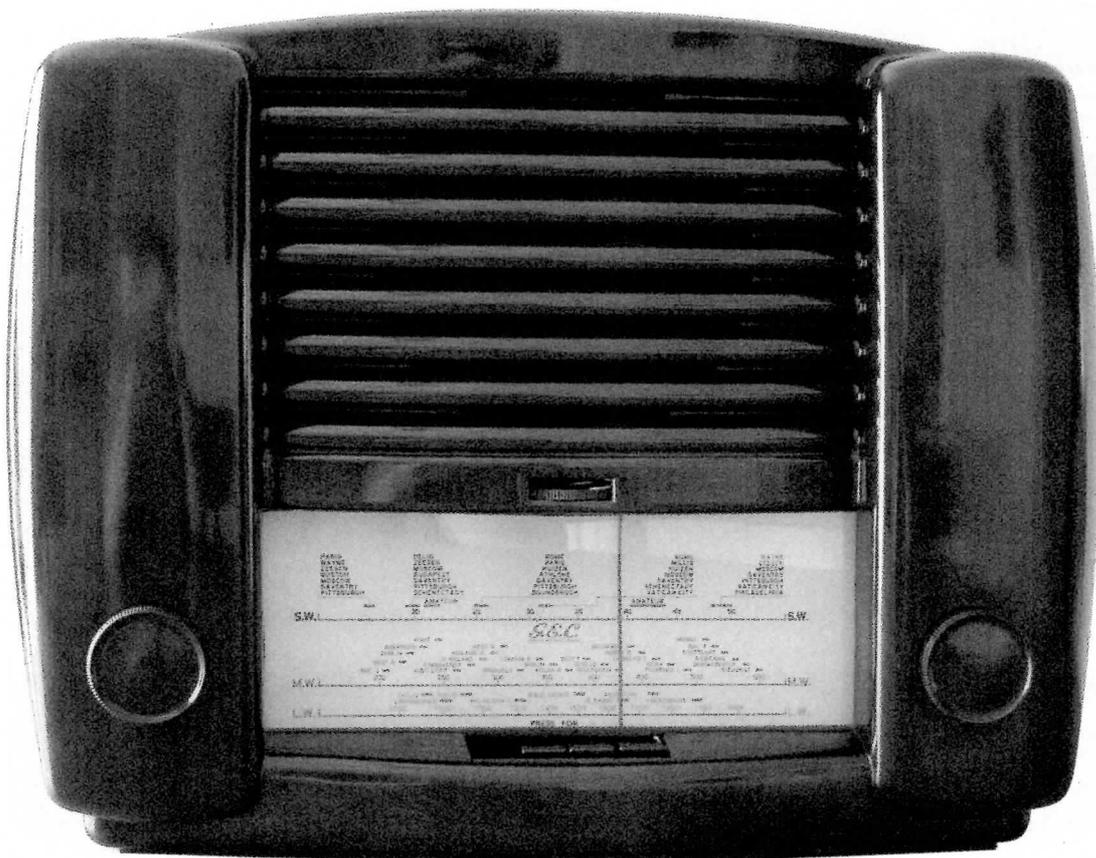
The second lecture displayed a greater sense of theatre and was based upon the article published recently by Dr Constable on the transmission of wireless signals across the Atlantic Ocean. I have always wanted to know what the coherer actually did and not having one myself I was unlikely ever to find out. A trip to Harpenden for Talking about Wireless sorted that out though and I now know. I was very intrigued by the bell loosening itself off - is that something that might have happened to Marconi on the event of his demonstration or is it the effect of there being so much wireless and electrical interference in the modern world?

If you are wondering what I am talking about then you should have been there!

The ordinary meeting offered a range of quality radios and if you were on the look out for something a bit special (not very special) then this could have been your lucky day - I saw an AD65 on a stand, some nice telephones, a few decent American consoles and the odd cute little US midget. Oh yes, and I do believe that I saw a DAC 90! The 1920s were thin on the ground but this is now usual; if you keep going, they turn up.







## Restoring a GEC BC4850

By Jeremy Day

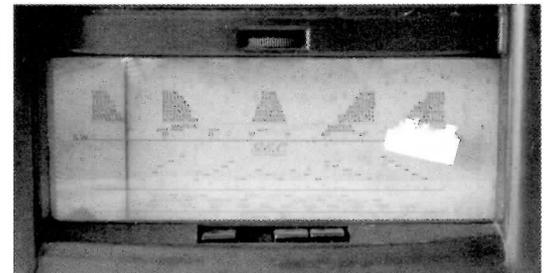
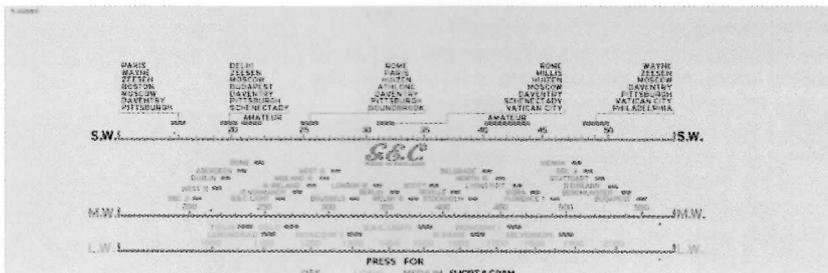
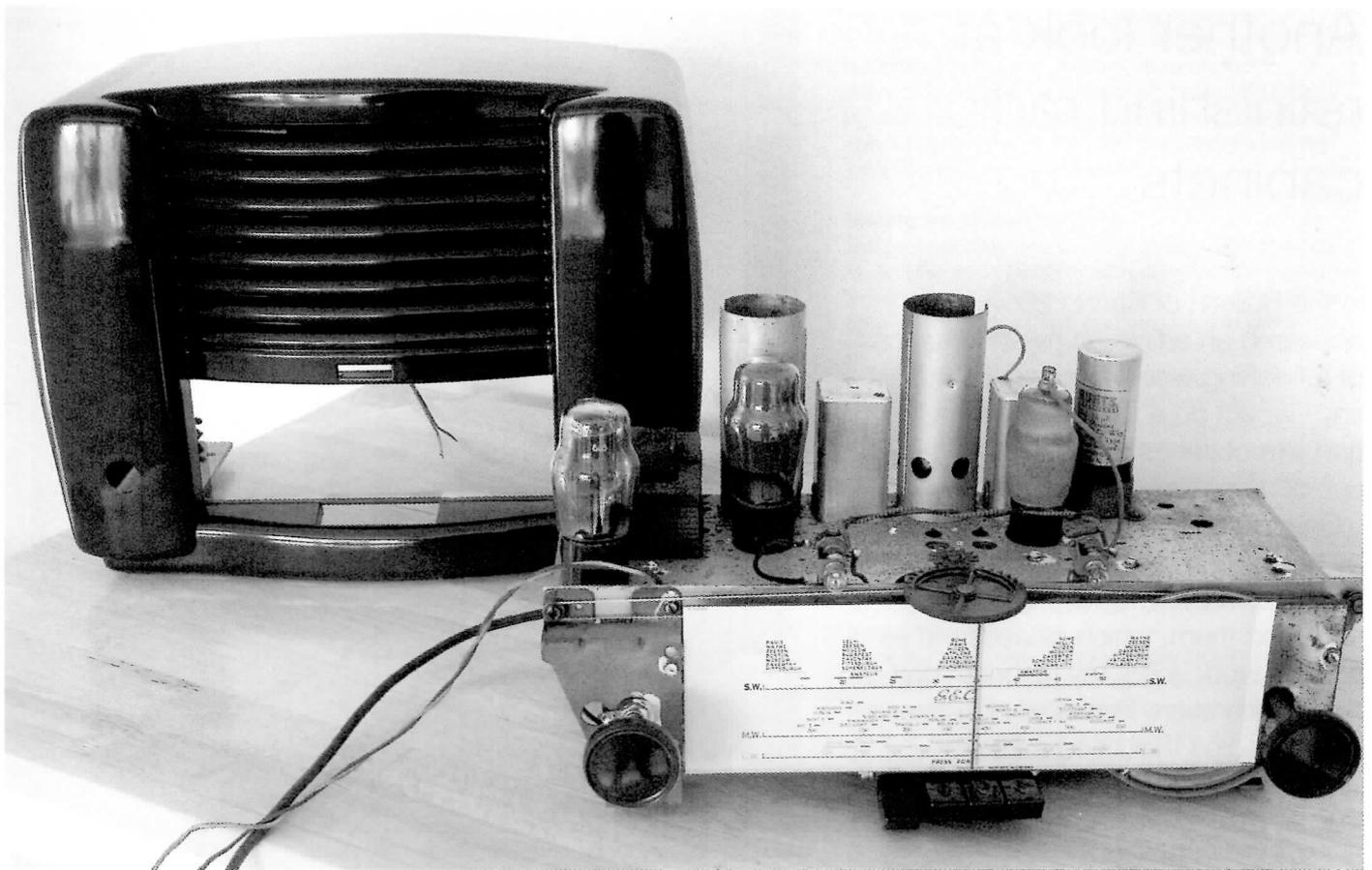
Towards the end of a recent Radiophile auction I purchased a GEC BC4850 without really knowing how I was going to restore it. This was because the tuning cursor hardly moved and worse, the paper scale was faded and badly marked due to rusting of the scale mounting plate, possibly by the adhesive used or storage in a damp garage.

I secured the radio for a modest £18.00, which incidentally is very near to what it originally cost to buy new in 1947 at 18 guineas. I was delighted to find that the radio was in totally original condition, the attractive curved cabinet showing no signs of any cracks or chips, and all the push buttons worked nicely.

As regards restoration, dealing with the cabinet and knobs was fairly straightforward with the usual washing in tepid water and a mild detergent to remove surface grime. An old toothbrush worked wonders on the knobs. I then used Bake-O-Bryte to buff the items, so that together with a light application of a natural wax polish, they were restored to their former lustrous glory.

After replacing a badly perished mains lead with a suitable cotton covered alternative I powered up the set to see what would work. This I normally do with a Variac to reduce the possibility of surprises. In this case I wasn't to be disappointed - purple ionisation from the U50 rectifier, at around 200V, which although spectacular to look at was of little use, especially as the valve had an open circuit heater. With the valve replaced, HT restored and all the heaters apparently working, I deduced that the transformer was good and that I might have the bones of a working radio. I was aware of a slight hum from the loudspeaker so the AF stage was working, and I could hear various local stations on the Medium wave at low volume.

I had noticed that a multi-section smoothing capacitor, fitted beneath the chassis, was slightly warm to the



touch and on closer inspection had a small hole at one end where it had been leaking, so a replacement was fitted. Many of the other capacitors were oozing their contents so, as a precaution, all were replaced with axial types of a similar size. With all this remedial work completed the gain of the set had increased significantly, but the performance could only be described as barely adequate. It was still short of what would be considered acceptable from a 4-stage plus rectifier receiver.

A few voltage checks revealed the cause of the problem: 0.7 Volts on the anode of the detector and AF pre-amplifier, V3 (DH63). According to the Trader sheet the anode should be at around 65 Volts and is strapped to the HT supply via a 4.7K and a 100K resistor chain. After eliminating the valve, I checked and found the 100K apparently open circuit. As I cut out the offending part, I noticed that at the valve base end the solder joint was completely devoid of solder and had just relied on the mechanical joint for a connection since new. Who knows how many years of frustration the previous owners had to put up with due to this intermittent fault. With a new resistor in place the performance improved to what I considered normal. An alignment check of the receiver then followed but was found to be reasonably good with little adjustment necessary.

With the electronics now working satisfactorily I set about the problem of the scale. It was doubtful that I would be able to buy a reproduction, as this isn't a radio that is expensive or considered rare and highly

collectable. It was a case of DIY and so I scanned the original scale into my computer and used this as a template to create a replacement in Adobe Illustrator. This program does have some useful features, such as allowing the tracing of freehand complex shapes, such as the GEC logo. It took me quite a considerable time to complete the artwork, as apart from the complexity, many of the station names were difficult to read due to fading. I then printed a scale, onto good quality paper, using a conventional colour printer. Once I had removed the old scale and treated the rust behind it, it was glued to the original mounting plate.

Finally, I set about cleaning the topside of the chassis. Unless condition dictates otherwise, I rarely restore to 'new' condition. To me, leaving the patina of age is preferable and more authentic. A careful cleaning, including screening cans and valves, removed fifty years of grime and produced a very pleasing result. The tuning cursor slide was degreased and re-lubricated, as were all the pulleys, and restored a far smoother operation after adjusting the cord tension.

So many radios tend to be overlooked if they have cosmetic damage. In this case a little ingenuity and effort has allowed a radio to once again look pristine and be displayed with pride and with minimal financial outlay.

By the way, if any one has the same radio and needs a new scale then by all means contact me.

# Another look at refinishing radio cabinets

by Gary Tempest

In the Bulletin of Spring 2000, appeared an article on my experiences of refinishing wooden cabinets. I did say I would do a follow-up, as I still had lots of things to try, namely the use of other toners and lacquers.

On-reading the article I am surprised by how much my methods have changed in the interval. I have simplified them, which pleases me as cabinet work is not my favourite part of radio restoration. Perversely I still keep buying radios that need a lot of it.

## Materials List:

Most of the items listed in the first article are still used. However, gone are the following:

- Gel type paint remover
- Disposable brush
- Methylated Spirits (Denatured Alcohol in the USA)
- Acrylic lacquer
- Shellac or Briwax Shellac Sanding Sealer
- #400 wet and dry abrasive paper
- Spring clothes peg!
- I still have pumice powder, lemon oil and rotten stone, but seldom use them now and won't replace them.

## Items added to the list are:

- 3M Spray Mask
- Anti Chill Thinners
- T-Cut car body restorer
- Metal polish, such as Solvol Autosol
- #220 and #400 silicon carbide paper
- #600 wet and dry paper
- #1000 or #1200 wet and dry paper
- Low peel masking tape
- Plastic gloves (disposable). I bought these at a motor factors. A bag of 100 was only a few pounds; they are much thicker than surgical gloves and do last longer.
- Two rubber sanding blocks
- David's Isopon Smooth Paste filler or Plastic Padding – Flexible.

## Safety

I still try to take as much care as described in the first article but now take even more precautions not to inhale fumes. Buying a proper spray mask, from a motor factors, really helps. It only costs around £12 and is good for 30 hours spraying before disposal. It is very effective. Coupled with that, I now spray almost exclusively outdoors. It is sold with head straps but I found it more convenient to remove these. When spraying, I clasp it firmly to my face with one hand whilst operating the aerosol with the other.

## Stripping cabinets with paint stripper

This is no longer part of my procedure. It's messy and



1934 Columbia with paper trim

with the subsequent washing off, is hard on the cabinet. It loosens up glue blocks and worse, veneer, particularly small pieces used as trim. I washed a cabinet down with White Spirit (Mineral Spirit in the USA) and then wondered what would happen if I washed it with Cellulose Thinners. It was soon apparent that there is no halfway house. All the lacquer needs to be taken off. The easiest way is to dip a piece of fine steel wool in the thinners and scrub gently with the grain, mopping up the mixture as you go. Although the entire surface finish comes off, some remains in the grain, which is helpful. This job must be done outdoors and is best carried out on a good breezy day. Wearing a double layer of plastic gloves, I find that they just about hold out from the attack by the thinners.

## Preparing the cabinet

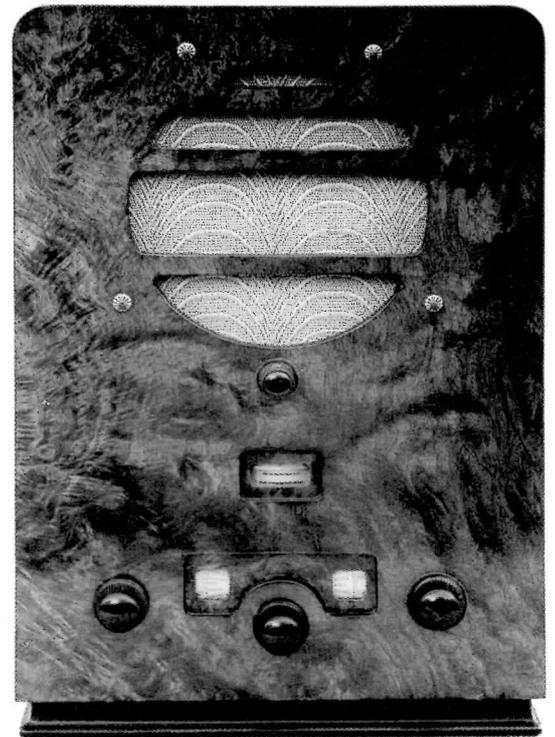
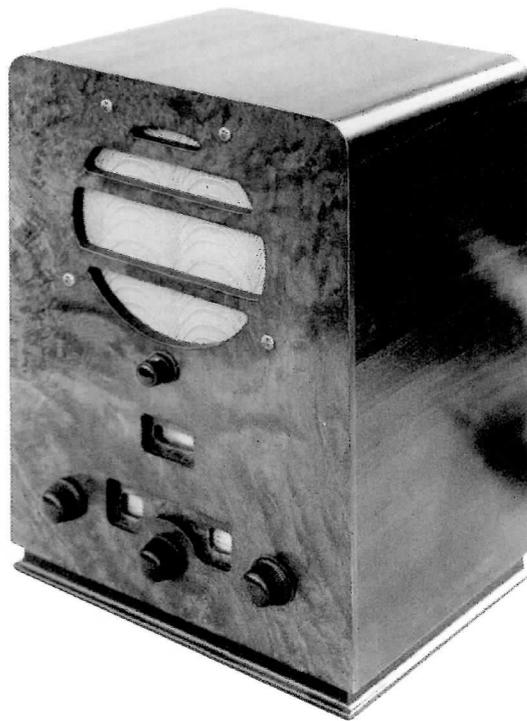
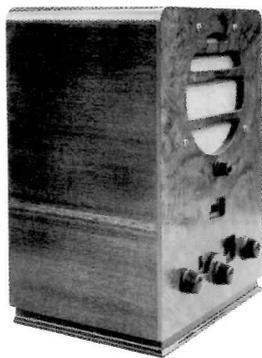
I now continue much as described in the first article, but with some modifications, so I will list the steps I take.

Firstly check the cabinet very thoroughly, looking for loose veneer and internal wood blocks. For veneer I normally use thin super-glue also for blocks that are difficult to remove. For those that can be moved then the surfaces will be cleaned and the blocks refitted with quick set epoxy. I sometimes add additional wood blocks and if the surfaces are quite clean use PVA wood glue. Now the cabinet will get a light sanding down with # 400 silicon carbide paper, used on a sanding block. I bought mine in Halfords and they have a completely flat surface with grippers to hold a cut strip of paper. They are good to use, having a better balance and feel than a simple block of wood.

On flat surfaces and away from edges, Rustins Wood Stopping has given me no problems. At edges or on curves it may not always adhere and I prefer to use car-body filler, such as David's Isopon or Plastic Padding. Do scrape the wound carefully with a blade to give as much adhesion as possible.

I also reckon to leave many minor blemishes, especially if they are on curved areas. Unless you are a superb artist they cannot be made invisible, so why bother? Similarly, on edges, if these have taken a sharp V shaped knock then this is very hard to fill successfully. Better just to smooth its edges, touch up with paint and

1933 Ferranti Arcadia. Beautiful burr Amboyna veneer to the front



I read that an American restorer finishes all his projects by beating them up with a piece of wood. Yes! He actually goes over the surfaces dinging here and there to artificially put back what he has taken out. Seems weird to me: I just couldn't do it.

leave. Let's face it, a few knocks and scratches still showing through the new finish adds character. I read that an American restorer finishes all his projects by beating them up with a piece of wood. Yes! He actually goes over the surfaces to put back what he has taken out. Seems weird to me: I just couldn't do it. Once any filling has dried overnight, it can be rubbed down with #220 and #400 silicon carbide paper.

Next step is to tack rag before grain filling using Rustins filler. I make this thicker than I used to adding only enough White Spirit to give the consistency of single cream. After overnight drying, comes rubbing down and staining. I rub down with #400 silicon carbide paper until the cabinet looks and feels (use the pads of the fingers lightly) nice and smooth. It will also have a slight sheen when viewed against the light. Any excess grain filler must come off the surface and because it clogs, you need to tack rag constantly as well as scraping off deposits from the paper. The surface filler can be seen and felt but a sure way of knowing when no more is present is when the paper comes away clean. At this time, if you haven't already done it, it is a good idea to gently rub over the edges of the cabinet. This can be done a little more heavily where the sides and front meet the bottom. If these edges are slightly blunted you are much less likely to 'catch an edge' and pull up the veneer.

For staining, if the cabinet is very pale, then light oak gives a pleasant golden tone. Very often a 50:50 mix of walnut and light oak will be right for a darker cabinet, through to walnut alone for the very dark. Of course, staining the front a different colour from the top and sides is an option. Once staining is completed one can stand back and immediately see something of the final result, which is hopefully encouraging.

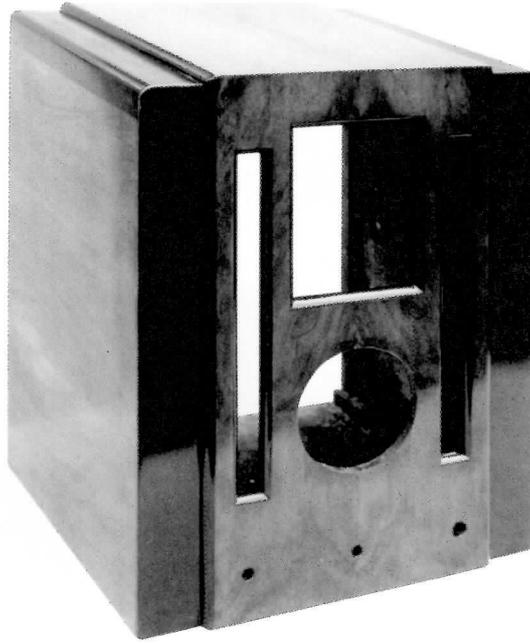
Now for the artistic bit. The car body filler and the stopping have to be touched in with acrylic paint. If these areas are small I would normally use paint from a spray can. A few shades of brown and some black will cover most eventualities. I spray a little into a lid and then apply with a small brush. A quick rub with a finger often helps to make the paint less distinct; sharp edges do show more. If the wounds are bigger then I would use artist's water based acrylic paints. Don't rush out to

an art shop and buy the major brands. If you shop around, less well known makes can be bought cheaply. Useful colours are Raw Sienna, Raw Umber, White and a colour called Transparent Brown. This has a reddish tint to it and adds warmth where needed. Oddly, Black is not used a lot but it is worth having. These paints do mix together nicely on a palette. Alas, they don't cover very well, so it's a case of getting the right shade for the wood and putting on a couple or more coats. It's strange: a lot of time can be spent and then all of a sudden the right mix of colours will be found and immediately the fake starts to blend in with the real. Having got the tone of the area right I would use other shades to match in the grain. I'm not a good enough artist that such touch-up work will ever be invisible. How much this matters obviously depends on where the damage is. If it is right in the middle of the front then nothing short of re-veneering is likely to be good enough. However, for sides and even front corners it is certainly acceptable. I have just been working on a cabinet which had stood in the wet, such that the outer layers of the bottom, side and front corner had completely rotted away. After getting rid of and treating the damage it was filled with car body filler which was sanded smooth with the two surfaces. In instances like this the filler may be reinforced, by knocking in some veneer pins, criss-cross fashion, across the hole. Now, having solid smooth surfaces, I could have tried to patch these places with veneer, but this would not have been invisible either, so blending it in with paint is no less effective. After the water based acrylics had had a day or so to dry fully, I gently rubbed down with fine abrasive paper. As I was not happy, I had another go with the paints, achieving a better result. It will now wait for toner. As the damage is mainly to the side it is less important and being at the bottom helps. It gives me the option to mask above the bottom first inch of the cabinet and tone this quite heavily to further obscure the repair. It means the rest of the front and sides can stay light with just this dark band. It would not be original, but such shading was done all the time on many radios and I know from experience that it looks quite attractive.

After doing the 'artwork' I will also paint any exposed edges which show raw plywood. Normally I use Rover



left: 1934 Philco 118. Most of its finish had fallen off



Right: 1937 Beethoven 77. It was covered in Polyurethane when I got it

Opposite right: Pye ? I did the cabinet for a friend.

Far right: 3M Facemask

Maple Brown but sometimes Krylon Walnut, if I want a more bold statement. These edges can be painted with a brush but it's a better result if they are masked and sprayed. All the major DIY stores now have several makes of low tack tape, which makes removing it less hazardous.

The cabinet will now get left overnight and from here it is off to the spray can. I choose days which are warm and dry, when there is almost no breeze, and can normally find some part around the back of the house and shed that is sheltered. I have an old small but heavy table and to this I 'G' clamp two pieces of 2" x 1" timber. I space these so that they protrude from the edge and allow me to hang the cabinet upon it. This way I never have to lay it down on a sprayed side, where any new finish will always be damaged. Spraying the front by laying the cabinet down on a piece of clean board works fine. From this you can see that I now spray all surfaces with them horizontal.

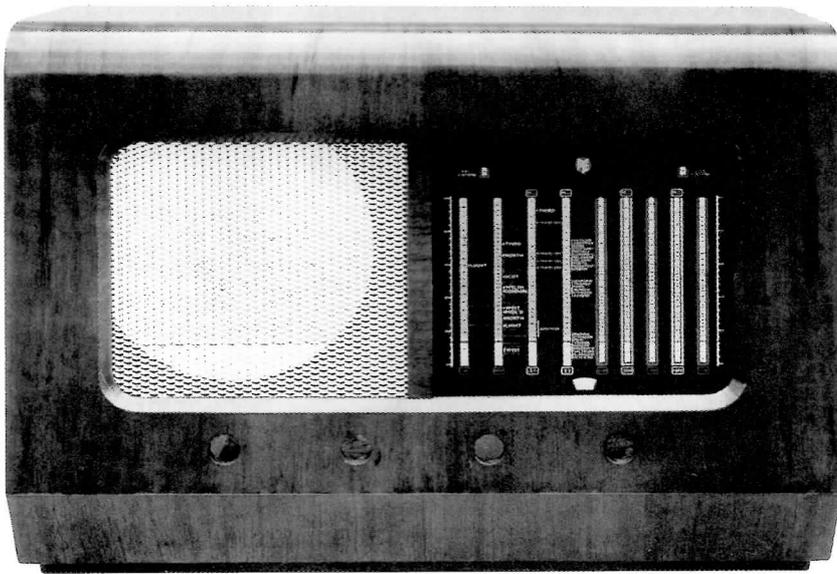
I have changed from my initial coats being a toner spray, believing now that it is best to put on a light coat of lacquer. Once this has dried and with some gloss or sheen, look at each surface against strong light. What you are looking for, is to me, the worst problem in refinishing; fortunately it has only occurred to me once. This is even worse than woodworm and is veneer bubbles. I will have been looking for them from the moment I started on the cabinet but they don't show up well until you get some lacquer on. The bubbles look like shiny bumps in the surface, some may be no larger in diameter than half a pea and a few thou' high. If you don't believe what you are seeing then press them with the stick of a cotton bud when the reflected light from them will change. Congratulate yourself on finding them at an early stage. I have read about people who inject them with glue using a hypodermic with a large needle. As yet I have not tried this and my method is to slit them with a scalpel and dribble in super-glue from a container with a small nozzle. Then I cover with clean paper and 'G' clamp a pad of smooth wood over the spot. If clamps can't be used then weights will do the same job. A downside of using super-glue is that it will attack the lacquer that you have already applied. This means wiping off all the finish, previously applied to this surface, with Cellulose Thinners. If you are careful it can be done without affecting any other surfaces and any spray applied to raw ply edges. This panel can be speedily

restained, touched up and re-lacquered. Again go over the cabinet looking for those bumps. I had a cabinet, which is still not finished, where they kept appearing. It was fortunately confined to one side only, which may have been on the damp side of the shed. After wiping it off and starting over on it four times I then removed the veneer and will re-veneer it as the only effective solution. I have obtained some self-adhesive walnut veneer (peel off the backing paper) from Rockler in the US (<http://www.rockler.com>). Very reasonable at about £10 for a 2 foot by 2 foot sheet.

I have read about another method of dealing with poorly fixed veneer that has not worked for me in the past. However, when removing the veneer from my problem cabinet I think I found out why. What you are supposed to do is to reactivate the original animal glue, by heat and steam, and then clamp or weight down the area until the glue resets. It was apparent that I had just not used enough of either. To melt the glue, for veneer removal, I had to use a very hot steam iron, steaming away on top of a soaked double layer of towel. I needed to leave the steaming for 1 or 2 minutes before the glue was soft enough for me to ease the veneer off with a wall paper scraper. So maybe this method will work and I will try it again should I be unfortunate enough to have this problem.

Once past this bump stage (hopefully there weren't any!) I then tone the cabinet. Mostly I use Morrells Walnut or for occasions where I want a more golden effect, then Teak (I don't think they do Light Oak). Dark Oak is handy where you want a dark colour without the reddish tint that a heavy coat of walnut gives. Incidentally, if you live near to a Morrells distribution centre, and are prepared to put in a reasonable order (say a minimum of half a dozen cans), you can order by phone and they will deliver free of charge. Rarely does a cabinet not need toning somewhere. It may be just the sides and top, due to damage, leaving the front as light and attractive as possible. Shades can be varied by the amount applied, using only a little on areas that were originally a light colour. On darker parts or lighter ones with visible damage that you have not been able to hide, then a little more toner is appropriate. Do go easy though: toner is seductively easy to keep putting on, "just one more coat and I won't see..." This is the road to having shelves full of dusky maidens. I like to spray

Rarely does a cabinet not need toning somewhere. It may be just the sides and top due to damage, leaving the front as light and attractive as possible.



Initially, the finish may still look less than ideal but as it dries out it just gets better and better. Next day you may really be quite surprised. For many the result may be as far as they want to go, but just how good it looks depends so much upon the conditions. Also, strangely, a light cabinet will always look better than a dark one.

toner in completely still conditions, keeping the can a uniform distance, say 12" to 15" from the surface, and constantly moving. Failure to do this will give a patchy appearance at certain angles. It is more likely to be noticeable where only a light toning is required. I have learnt that you can never patch an area with toner.

So, say you have a piece where the toning is not uniform, can it be saved or must that side be wiped clean and done again? The good news is that I have found a way out. Leave the cabinet for a day or so and then get a large pad of fine steel wool. Now rub with the grain, removing toner in the areas where it is too dark, or bring the whole of it down to the lightest area. Removal is slow, which is good, as it allows plenty of time to wipe down, stand back, squint from all angles and adjust the area to be worked on.

Once happy with the toning I reckon to leave the piece for a few hours. I don't want it to reflow when I put on more lacquer. When it comes to this I put on around 3 light coats, leaving half an hour or so between each. I generally gently rub off any nibs with fine steel wool between coats. I have not said yet what lacquer I use and how I have completely given up using acrylic. With cellulose, I did buy two types from the USA, as I said I would in the last article. One was Mohawk, from AES (Antique Electronic Supply, Arizona), and the other by Behlen. The Mohawk lacquer and their toner worked the better of the two. However, in a complete reversal from the last article I now use exclusively Simonize from a motor factor. Yes! It still comes out with a lot of orange peel but the right technique gets over this. Its advantage is that it is the cheapest. I buy it by the box of a dozen cans and bought at the trade counter it works out at about 60% of the cost of buying it at motoring DIY shops. As for the acrylic to me it just seems too darn hard. I have one cabinet that will have to have part of it refinished. This is because some of the lacquer has flaked off. I think it is because it is so brittle and since I have not had this problem with cellulose I am happy to stick with that.

I would reckon to allow a few days for the initial thin coats to harden. This time depends upon the weather: if it is really nice for spraying then I might continue later the same day, particularly if the cabinet needs little or no rubbing down. Sometimes the thin coats will go on very well, conditions play a big part, and then I will only lightly

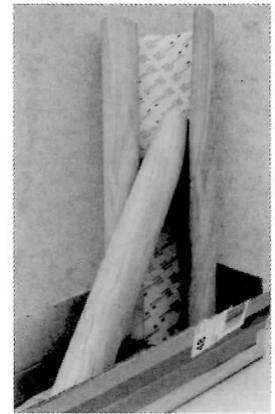
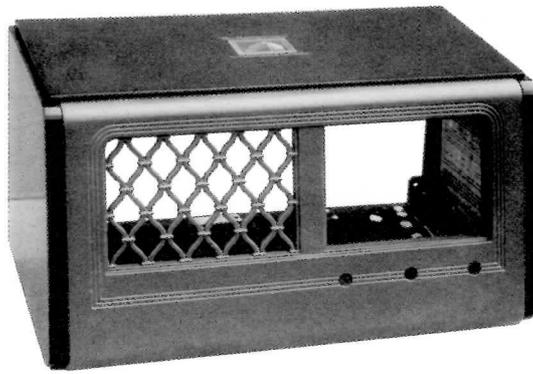
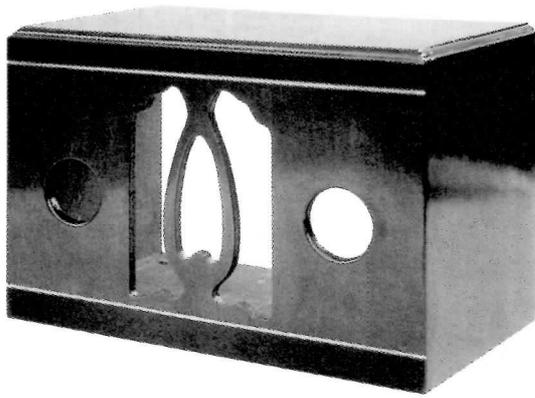


rub over with # 600 wet and dry, used dry. If the finish is very 'orange peel' then I will leave the cabinet longer and use the paper wet. With the wet method take care, particularly at the edges, it is a disaster if you go through and remove toner. Remember this cannot be patched. A damp leather is handy for quickly wiping off to see how things are going. Having made the cabinet look reasonable, flatter than it was but still not smooth, is good enough for me; it's worth while wiping down with a lint free cloth and white spirit. This removes any oil and perspiration that has transferred from sticky hands. After the cabinet has dried I set it upon the spray table, tack rag carefully and prepare for the orange peel beating coat. I spray each surface horizontally, covering it uniformly with lacquer until it wets out. This is hard to describe, looked at against the light most of the surface will suddenly go from peppery to looking glassy wet. At this point STOP. There is a fine line between being wet and running and you don't want the latter. Now I go away, drink some tea and come back in fifteen minutes. Then it's rotate the cabinet and do another surface, continuing until all have been covered. When rotating the cabinet, don't finger any sprayed surface; it is best to move the cabinet holding the bottom and with one hand inside for stability.

Where a radio has a top which curves into the front, then it is necessary, when doing the top to spray around the curve. Obviously you can't put on as much lacquer here as it would run. Next spray the front, again, applying lacquer around the curve blending the two surfaces together. On sharp cornered cabinets, spraying around and over the corner will happen automatically with the spray action.

Initially, the finish may still look less than ideal but as it dries out it just gets better and better. Next day you may really be quite surprised. For many the result may be as far as they want to go, but just how good it looks depends so much upon the conditions. Also, strangely, a light cabinet will always look better than a dark one. Personally, I would at the least leave the cabinet for a week and then rub down with fine steel wool and a good liquid wax (no silicones). This is where the other sanding block comes into its own. I buy steel wool from a motor factor: they have it in rolls and it unwinds so that a piece can be cut off and placed in the grippers of the block.

If the cabinet is special then I would flat out the



lacquer first, using #600 wet and dry paper used wet. As the coat was heavy I can rub out a little more confidently than before. The ideal cabinet would come out as a flat uniform grey, dull surface with no glints of lacquer that the rubbing down has not reached. A lot of compromise is needed here. Achieving that ideal is not likely at this stage, the risk of rubbing through into the toner is just too great. Doing this is simply awful so I err on the side of caution. This is the reason I have changed from using #400 to #600 grade paper. The #400 just removes material too fast, one moment happiness the next gloom. Now there are choices: accept as is, and burnish with fine steel wool and wax or respray. If I choose the latter then I try to have the patience to wait at least three weeks before proceeding exactly as before. I have not found any instance where I went through this cycle more than twice. On the second time the cabinet should flat out close to the ideal.

Finishing with wire wool leaves a low shine finish, which looks good on most radios. Sometimes you may want more shine or even a high gloss, if the set is a McMichael. I then use T-Cut or metal polish on a soft cloth wrapped around a wood block.

#### Variations and tips

I am still experimenting. Sometimes I will spray two heavy coats within a few hours of each other. This gives more lacquer to rub out and it is rarely necessary to have to spray again. It really is all about trying to make the most of good conditions. I am cautious about applying much more lacquer than this. I had one bad experience where cracking appeared in the lacquer coat. It looked like short unconnected cracks that didn't necessarily go with the grain but strangely all went in the same direction. OK if you want the piece to look prematurely antique but not favoured by most of us. Maybe beyond a certain thickness the lacquer gets unstable, but the most likely cause is that cracking occurs due to different layers drying at different rates and setting up stresses. I'm sure that you could probably build up thicker coats if several weeks were allowed to elapse between coats. It is for this reason that I do two of the heavy coats close together or allow 3 weeks or more between them. Some spray cans confirm this. On Hammerite they say spray all coats within 3 hours, whence curing starts. After this re-coating cannot be done for 6 weeks. Fortunately lacquer does not seem quite as critical as this, but the longer you wait the safer the result must be.

Another variant that I use is to grain-fill twice. This is such an important step that it is often worth repeating. If the grain is really filled then you have much less chance of seeing those glinting lacquer diamonds which no amount of rubbing down can reach. I have tried a product that I bought from the USA called Lacquer Sanding Sealer. Sounds great doesn't it, just spray a coat of this and all those pits and canyons are filled. It actually contains soap that is used as the filling medium. When it is rubbed down it is quite strange, having a really soapy feeling. It has had some bad press because it is a soft coating and

some worry about the adhesion of the lacquer that follows. I must endorse this as I had a bad experience, where the lacquer just came off, in one place. I then found that I could scrape off more with just a fingernail. Needless to say I have stopped using it: I still have a couple of cans so if someone out there wants to try it...

One American product that is really useful is satin lacquer. I have not found it for sale in the UK. It apparently contains fine silica (it must be incredibly fine to pass through the nozzle) which gives a satin finish directly without having to rub out. It's really the only way for intricate cabinets with mouldings or sculptured veneer. I used the AES Mohawk product and it gave a good enough finish without further treatment. However, the result is not as good as one that can be rubbed out; this is still my preference, where it can be done.

Another technique that I have used on a few occasions is so called Japanning. This, that I'm sure you must have seen, is a solid lacquer finish where the grain and the surfaces are completely obscured. The traditional finish is black but I have also tried it in walnut, which looks very nice. If you go for black you will need to get some black toner. I have tried just a satin black paint under the final lacquer finish but it is not so effective: it just does not have that dense rich look that toner gives. However, it is good to start with black spray paint, or brown if it is to be walnut. It takes an awful lot of toner to get complete obscurity without it. I would advise leaving the work for 3 weeks or more once the Japanning has been achieved and applying the finishing lacquer. Two reasons for this: the toner will reflow if a heavy coat of lacquer is applied too soon and secondly it is necessary to guard against the cracking problem.

I have mentioned several times how conditions play such an important part in the result after applying lacquer, and even more so with toner. Toner suffers from 'blush' more readily than lacquer. 'Blush' is the descriptive American name for water vapour being drawn into the spray stream and being trapped behind lacquer. You will know it as soon as you see it because the surface goes opaque and in a bad case milky white. I have had it occur even on a warm day simply because there was a cold draught. In these conditions it can normally be fixed by immediately getting the surface exposed to the sun. It is also a good idea to have a hot air gun handy as well; this blown over the surface (keep it moving and at a distance) is effective. It is a real relief when you see the surface magically clear. Of course if it doesn't, then later it can be re-flowed (see below). Another good idea, that I have used, is to put the fan heater on in the conservatory and get it to a nice Caribbean temperature. Then spray outdoors, but adjacent, and as soon as the surface has enough lacquer on it rush it into the warmth and leave for say 20 minutes.

There is a small Columbia radio, shown in the pictures, which has a decorative band all the way around the front. This is the Greek key pattern, in black on a gold ground. I made it on my PC, with a drawing package,

Left: Unknown Mantle, with LW

Middle: HMV 1115

Above: Rockler self adhesive veneer

I have mentioned several times how conditions play such an important part in the result after applying lacquer, and even more so with toner.

and Laser printed it onto gold paper bought from an art shop. I cut it out, using a scalpel and a straight edge, and used 3M Spray Mount to carefully glue it to the cabinet. I have not said that I did not remove the finish from the front of this one, only flattening it down a little. Unfortunately the bottom edge had abrasion damage that had gone through the original lacquer and toner, and even into the veneer. The trim nicely covered this. This is not such a bad cheat as many cabinets originally used such paper embellishments. Afterwards I toned and lacquered the cabinet.

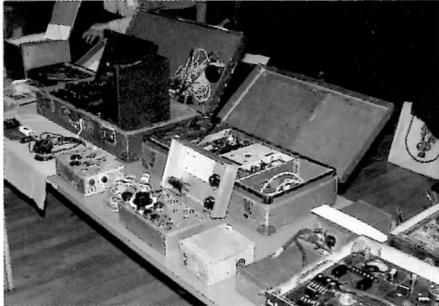
If you have been extremely observant you will have noticed that I have not mentioned using Anti Chill Thinners which I have added to the materials list. This is needed for the so called re-flow technique. I have used it on cabinets where the finish is all present but broken down into a crazed surface with light scratching and a few not too significant dents. The Anti Chill Thinners is mixed in the ratio of one part to three parts of Cellulose Thinners. There are two grades of Cellulose Thinners available by the way: Standard and Premium. I have heard the Standard referred to as 'gun wash', so maybe the Premium should work better for re-flow. Obviously both will do as well for cleaning off but since the Premium is twice the price it would be a little silly to use it. I have tried both for re-flowing, and to me there is no difference, so stick to the cheaper Standard. The mixture needs to be applied with a soft wide (1 1/2 inch is what I use) varnish brush, not a paintbrush. It is applied in single strokes, which should completely wet the surface, with each overlapping the previous. The Anti Chill Thinners prevent immediate evaporation of the mixture and allow it to solve and flow out the old lacquer, re-

amalgamating the finish and filling scratches and minor wounds. If you overwork the brushwork then the original toner will be disturbed, literally building up at the bottom of the brush stroke. Nothing for it now but to get out the Cellulose Thinners and wipe the cabinet clean. If all goes well then I would recommend leaving the cabinet for a few days before rubbing down, then maybe applying a little toner and then fresh lacquer. It is an occasionally useful technique that shortens the refinishing process as well as preserving the original colour. The down side is that Anti Chill Thinners are expensive: around £20 for 5L. However, if you can split a can with a fellow restorer it's not so bad.

I have tried to be consistent throughout this article and to put down accurately what I do. Some of it was actually written whilst I was doing cabinets. However, I do vary precisely what I do according to circumstance. This cannot be learnt and only gained, and is called experience. Most important is patience. This is easier if you are doing several cabinets and they are at various stages, then there will always be one to be getting on with. A main point to be thinking of: Is this the right time to put on another coat? Has what is underneath not already started to cure or has it cured enough?

Finally, a simple great tip. Don't fit, and remove any mains plugs that you have already put on. Never could anything have been invented that was so perfect for mutilating a nice finish, that you have spent hours applying. Far better to have a few of those Safebloks (connection blocks with crocodile clips and a safety lid), wherever you play your radios.

Most important is patience. This is easier if you are doing several cabinets and they are at various stages then there will always be one to be getting on with.

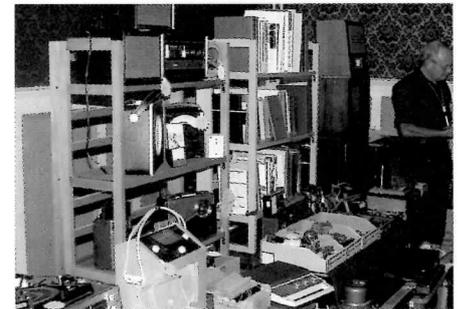


## Pictures from Southborough

Photographs by Terry Martini

Sunday 21st October at the Victoria Hall in Southborough was a busy day for its organiser John Howes. As you can see from the photographs below, the small hall was packed with eager punters intent on finding an item that they could not refuse to buy.

Expanding one's collection was not the only reason to visit Southborough; besides the opportunity to meet fellow collectors there was also the chance to view John Elgar-Whinney's collection of clandestine sets, many which have been featured in the Autumn 2001 BWWS Bulletin. Needless to say, the pleasure of seeing these items 'in the flesh' exceeds what photography can offer. All in all a good way to pass a Sunday morning.



# The "Felix" Novelty Crystal Set

by Ian L. Sanders



More information concerning the "Felix" novelty crystal set has recently come to light. In fact, it is now believed that there were actually three different models of the *Felix* crystal receiver, inferred from an illustration included on the product literature supplied with a newly unearthed and hitherto undocumented model. Each sketch depicts the cartoon character in a different pose. It appears, however, that there are surviving examples of only two of the types. One of these - the only previously recorded model - portrays *Felix* in side profile and was photographed in Robert Hawes' book *Radio Art*. This model was illustrated in a short article appearing in the June 28th 1924 issue of the journal *Amateur Wireless* and, since it is the only one shown, was previously believed to be the only version of the set. The latest discovery portrays a full-face and rather contrite-looking *Felix*. A third style, revealed in the manufacturer's product sheet, and representing *Felix* in a more formidable face-on pose, has yet to be uncovered - if, indeed, it was ever produced.

*Felix the Cat* was the creation of the New Jersey cartoonist Otto Messmer, and debuted in a short film of the early 1900's called "*Feline Follies*". The character was soon syndicated to hundreds of newspapers around the world and became an international celebrity. Indeed, the very first experimental television image transmitted by engineers at RCA Research Laboratories featured a Felix doll as a test model!

Although promoted as "not a toy", the *Felix* crystal receivers were clearly intended for children and were manufactured by *Engineering Supplies Limited* of Upper Thames Street, London, also known by the initials "S.J.E.". The sets were quite crudely constructed from black-painted three-ply wood with terminal connections marked by simple pre-printed, stick-on paper labels. The *Felix* crystal sets carry the BBC approval stamp, and were manufactured during the first half of 1924, although it is not known exactly how long they were in production.

The recently discovered model is mounted on a base

The Latest Wireless Novelty

"FELIX"  
PATENT APPLIED FOR

The Film Cat which appears exclusively in Pathe's  
Eve and Everybody's Film Review.

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NOT A TOY.  
Guaranteed Range 25 Miles.

Something New, specially for the kiddies. Equal to any  
Crystal Set costing treble the amount.

Universal Jointed Crystal Detector.

Try any of "Felix's" Real silver whiskers! They all work.

Finest possible present for the kiddies. Foolproof and  
practically indestructible.

A CHILD CAN OPERATE IT.  
Pleasure and Economy combined.

Take one home for the kiddies and enjoy yourself  
with them.

Shaw's "Hertzite" used on all sets.

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British Made Sole Inventor and Patentee S.J.E. London



# The Telefunken Kavalier

by P J Nash

“Go on”, said friend, “See if you can get that for £15”. My friend was referring to a slightly grubby looking portable radio on offer at an antiques market. I hesitated because I probably have enough radios, but this one was unusual (aren't they always!).



It was obviously German judging by the scale markings. It covered LW, MW and UKW (VHF), had variable tone control and a nice, classic late 50's styling. At this point, the vendor approached and pointed out the two retractable aerials which pulled out from the top corners of the back cover. These were not the more usual telescopic rods but were more similar to steel tape measures, each arm extending about 2 feet and forming a 'vee' shape. He also said that it was only just possible to pick up stations on it but it was “very crackly”. Smitten with the radio by now, money changed hands and home it went.

Until the radio was opened up, I wasn't even sure whether it would be a valve or early transistor set. It turned out to contain seven valves of the 1.4 volt D90 battery series. Apart from a mains lead which had been repaired with sticky tape where it emerged from the set, and a small coil which was only hanging on one thin wire, it seemed in reasonable internal condition. For instance, there was no corrosion evident from old leaky batteries. Deciding to give the radio a quick try, a multimeter was connected across the filament connections of the DK96 valve: I always monitor the L.T. voltage present at the DK96 valve base. The reason for this is knowing how susceptible that valve is to any kind of overload on its filament. If the valve is part of a series chain, just measuring the total L.T. doesn't take into account the actual voltage distribution within the chain. I have always found the DK96 to be most unforgiving with even short-term overloads. This results in a complete lack of oscillation and a very silent set once the normal L.T. voltage is restored. The other valves in the line-up, eg. DF96, seem more robust.

Power was applied and the L.T. rose slowly, creeping past 1 volt, gradually a moderate hum was heard. After a few more seconds, the L.T. struggled up to 1.4 volts and by now a very crackly hum was heard. The good news was that the crackly hum was controllable by the volume and tone controls, so at least the audio stages appeared to be in reasonable order. With medium wave selected, only about two or three of the strongest signals could be discerned through the raucous crackling. I say 'discerned' because there was no chance of actually hearing the programme content, only of knowing that there was a programme there! At this point I noticed that the L.T. was still rising, it was almost 1.7 volts by now. The mains plug was hurriedly withdrawn. Something smelt warm too, although the

transformer was cool to the touch. Now a strange thing happened, there was still L.T. voltage present but it was dying away very slowly! I had accounted for the initial slow rise in L.T. to be a probable leaky electrolytic on the smoothing circuit for L.T. If that were the case, then the L.T. should have dropped like a stone the second the mains was disconnected and not as slowly as it took to rise. Things were not making sense!

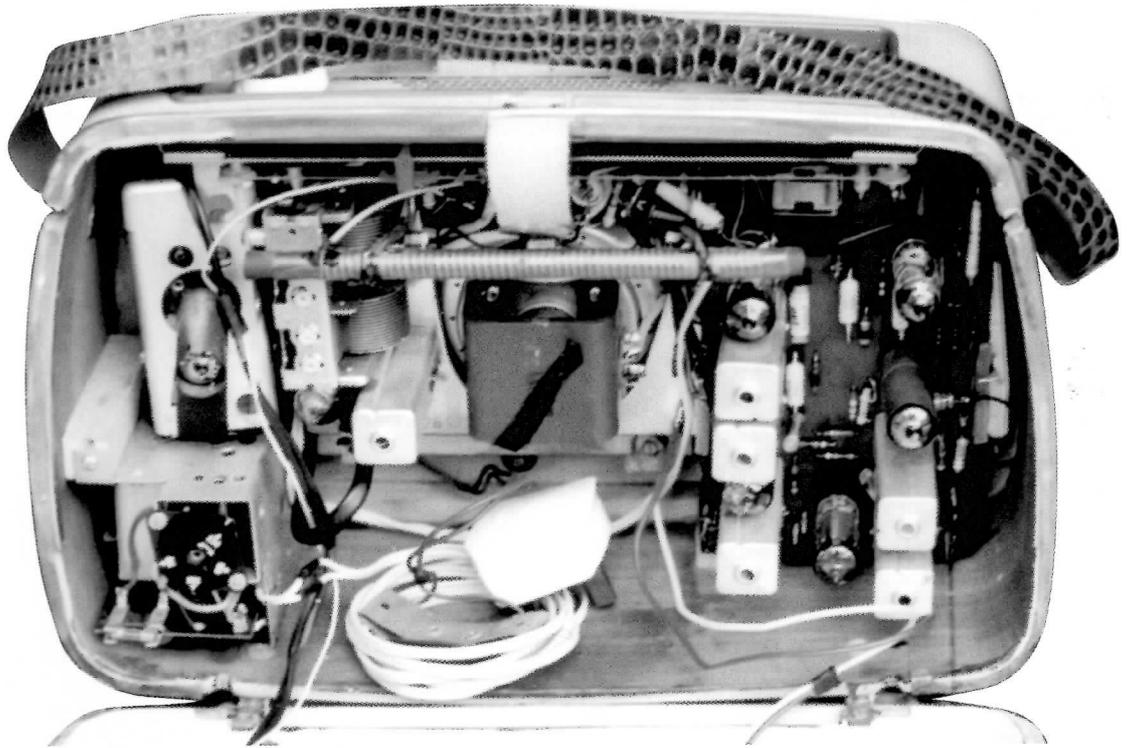
Then I discovered, hidden in a corner behind the chassis, a ni-cad cell bearing the name 'Deac' and permanently wired across the L.T. supply (via the on-off switch). Things were beginning to make more sense now. The ni-cad cell was being used on mains operation as a voltage regulator and smoothing capacitor rolled into one, with the added advantage of holding a charge too! I had never met that idea before, but suppose that in the late 50's it was the most cost-effective way of providing an adequately regulated L.T. supply. The ni-cad, after 40 years or so, had understandably grown a little tired and was now hardly holding any charge, causing havoc with the L.T. supply.

As much as I believe in originality and dislike modifications, the ni-cad had to go. I didn't really consider fitting a new one, not least through the difficulty of finding a modern equivalent. Far better to wire in a simple stabiliser along the lines of a couple of forward biased silicon diodes in series. This would give a voltage very close to that required. Also, there wouldn't be the worry over the state of charge of the ni-cad if the radio had not been used for a long time. That decided, the ni-cad was removed and a simple stabiliser circuit was clipped across the connections to allow further work to progress. Needless to say, future operation from batteries was not envisaged.

Now that the L.T. was reasonable, the H.T. was found to be low and ripply. A replacement H.T. reservoir removed the raw hum and brought up the voltages nicely but there was still a continuous crackling masking reception and there still was something burning. One or two leaky capacitors were identified and replaced, including the A.F coupler to the output valve but this did nothing to improve matters. Also, looking at that coil which was dangling on one wire, I wanted to know where the other wire should go.

By now, there was a list of questions regarding the power supply and battery charging arrangements. Where that coil connection was supposed to have been and what should the voltages around the rest of the set be? The construction of the radio was very good, with a

The ni-cad cell was being used on mains operation as a voltage regulator and smoothing capacitor rolled into one, with the added advantage of holding a charge too! I had never met that idea before, but suppose that in the late '50's it was the most cost-effective way of providing an adequately regulated L.T. supply.



It is up to the usual standard that one comes to expect from German receivers. Using a decent size and quality of speaker it does give more apparent power than 270mW would suggest

separately detachable mains unit. The rest of the radio was partly wired chassis and partly p.c.b, so that tracing the circuit was very tedious. I had to have a circuit diagram. My enquiries led to Bob Schut in Germany, who very kindly managed to obtain for me a complete copy of the Telefunken service manual: he had also translated enough of it to make sense to me! Now we could really see what was going on!

The first job was to cure that awful crackle. With the aid of the circuit diagram, it now became a simple matter to identify a decoupling capacitor in the anode supply of the DK96 as the culprit. The capacitor was one of those skinny little ceramic tubes that one sometimes meets in Stella and Philips sets. This one was almost short circuit. The very low voltage reading across it fluctuated in sympathy with the crackling. This was also the cause of the burning smell where it was causing the H.T feed resistor to overheat, the latter still being in good condition.

A new capacitor was slipped in and... Hey presto! Nice clean signals could now be received throughout the medium wave. The dial calibration was very good and the sensitivity fair. Long wave however, remained completely dead. That loose coil was pushed back into its position on the switch back and secured with a drop of Araldite. The position of the broken wire was ascertained and carefully reconnected using a short length of tinned copper wire to extend the connection slightly. This removed the tension from the fragile wire. We now had full LW and MW coverage.

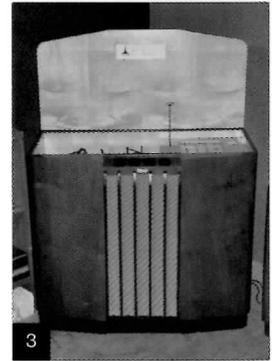
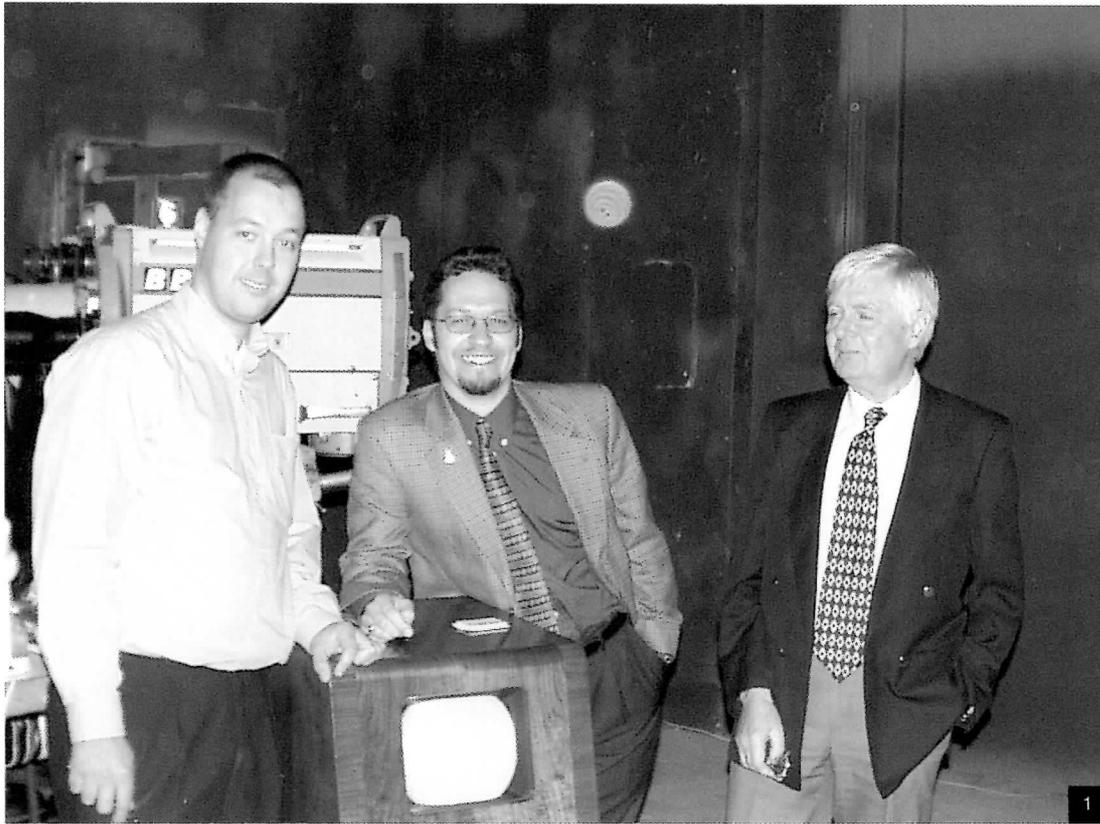
There were still no results obtainable from the VHF band. In a mains set, the first thing to check would be the 'VHF valve', typically a double-triode like the ECC85. In a battery set, the equivalent would usually be the DCC90. However, in the Kavalier a single triode, the DC90 (they are not very common). I wanted to see if the oscillator was functioning. Possibly the quickest way of doing this that seems to work in most cases is to bring alongside another VHF portable radio, tune it to a 'quiet' channel and listen to the white noise. Next, sweep the tuning of the radio under test up and down the band. Hopefully, if the oscillator is working OK the weak carrier wave it produces will be picked up at some point by the listening receiver, whereupon the white noise will be replaced by a silent background. For example, assuming the 'listening' receiver

is tuned at around 104 MHz, and the set under test has a standard I.F. of 10.7 MHz, then the listening receiver would pick up the oscillator signal when the radio under test was tuned to around 93 MHz ( $93 \text{ MHz} + \text{I.F.} = 103.7 \text{ MHz}$ ). This assumes that the tuning of the set has not drifted too badly off alignment. Even so, you may still hear a harmonic frequency. It is a very rough and ready test but it does prove if the oscillator shows any signs of life!

Using this method, all that could be detected was a strong carrier which remained at the same frequency regardless of where the tuning was set. Trouble was found within the tuner unit, where perhaps the inductance cores had become detached from the drive cord. Inspection did indeed reveal the drive cord had broken. When replacing the cord, it needed some experimentation to attain the best tuning range: the cores needed critical setting along the cord. Eventually the tuner was refitted and realigned and bingo! A new DC90 valve was later fitted and what a difference that made! Sensitivity was much improved.

Now that the Kavalier was once more working, it was time to tidy up that temporary repair to the L.T. supply. A closer look was taken at the distribution of L.T. and it was seen that all seven valves were arranged in parallel on VHF. On AM bands, the first two valves were switched out, causing the voltage to rise slightly. Certain valve data books will tell you that ideally, D90 series battery valves although nominally rated at 1.4 volts, should be arranged to have slightly less voltage on the filaments for mains operation (1.3v is commonly quoted). Below is a point by point description of the work carried out in an effort to provide a nice, steady L.T. supply.

- 1 Removal of the ni-cad and connecting in its place two series connected silicon diodes, type 1N4003, wired in the forward direction. A capacitor of 1,000 $\mu$ F 2.5v was placed across the diodes. This formed the basic stabiliser.
- 2 Increase of the L.T. smoothing capacitor from 250 $\mu$ F to 470  $\mu$ F.
- 3 Slight increase in series resistance before and after the diode 'stabiliser'.
- 4 By utilising an unused contact on the VHF selector switch, it became possible to arrange for a bleed resistor to take the place of the two valves switched out when AM reception was selected. The L.T. loading was now more or less constant, thereby aiding voltage stability.



## 405 line television returns to Alexandra Palace

By Terry Martini, pictures provided by Terry Martini  
With additional notes by John Thompson.

BVWS member and prominent Alexandra Palace campaigner, John Thompson asked me to help out with a vintage TV display that he was asked to stage for The Test Card Circle event held on the 10th September 2001, at Alexandra Palace. I immediately agreed. The current uncertainty and future of AP and the fact that a number of sections in the building are very unsafe, means that very few people are allowed any form of access into the old BBC studio complex at all.

The day came and after arriving a little before 9am and after reporting to reception and signing in we were shown through a set of double doors and into the lift to take us upto the 2nd floor. The main studio is a short walk down the corridor behind a very well worn door with a large padlock firmly attached to it. Once the door had been opened, I was immediately struck by the ambience still evident in the studio after all these years. The main studio has in fact not suffered so much

neglect as I had often thought and it appeared that some repairs have been carried out fairly recently to the walls and ceiling. The rest of the complex was however, strictly out of bounds.

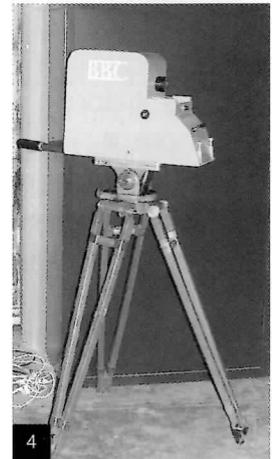
The Thorn EMI Industrial Heritage Group have their collection semi - permanently housed in the Studio along with other television related artefacts, some of which were found in the basement long after the BBC had departed in the early 1980's.

The TCC event as it turned out was a most interesting one and started at 10.45am with 40 or so people in attendance. The guest speakers included Simon Vaughan from the Alexandra Palace Television Society (APTS) who gave the audience an insight into the Television wing and also spoke about the future of A.P. and likely preservation.

Jim Lewis, from the Thorn EMI Industrial Heritage Group, gave an illustrated talk on local industry and Thorn Ferguson history (a company he worked for as a senior engineer for many years). The lecture is one I think BVWS members would find very interesting, and I hope can be arranged for a future T.A.W. at Harpenden if Jim agrees to do it for us!

Broadcaster Tony Currie was also at the event and interviewed ex - BBC Newsreader Richard Whitmore and Presenter Sue Cook who both reminisced about working at AP and "live television" which went down well with the audience, whilst TCC organiser Martin Allen chaired the morning's activities.

Our very own John Thompson provided a very informative talk on vintage television and on the sets put out on display from his own collection of restored working examples, including a prewar HMV 907. Suitable vintage programming made at AP back in 1936 was shown on the sets, the highlight being the Campbell footage that has only recently been discovered, having been originally shot on 16mm film in colour. The significance of these was that they were filmed alongside the original live Emitrons at Radiolympia in 1937 as the broadcasts were being transmitted, and serve as one of the only surviving examples of prewar television as it happened. John's presentation on vintage Television was





1: John Thompson, Simon Vaughan and Jim Lewis pose with John's pre-war HMV.

2: John Thompson demonstrating his pre war HMV as part of his talk on vintage TV.

3: One of the Ferguson radiograms on display.

4: Model Emitron camera made for the television production "Fools on the Hill" now forms part of the display.

5: A Baird television.

6: Part of the Ferguson table-top gram collection on display

7: The Alexandra Palace Television Society display stand

8 : Ex BBC newsreader, Richard Whitmore and BBC presenter Sue Cook reminiscing about their days at Alexandra Palace.

9: Some of Ferguson's more recent products along with a specially made mirror lid colour television to commemorate 50 years of BBC TV.

10: EMI 203 studio camera on display. Apparently found in the basement of AP.

very well received by the TCC audience and for me, one of the highlights of the morning's activities.

Unfortunately, the television wing at Alexandra Palace is not generally open to the public or organisations for the reasons given above. It is hoped however that at some stage in the future, the Palace Management will lift some of the restrictions currently in place. A lot of repair work to the fabric of the building still has to be undertaken before it is deemed a safe area, particularly the Baird studio ("B") which is in a considerable state of disrepair. Until then, it is a case of the birthplace of the world's first high definition television station being kept under lock and key: well, for the time being anyway.

## A positive Future for Alexandra Palace

By John Thompson

The Test Card Circle event was certainly a successful day. As well as giving attendees the opportunity to see areas of the Palace which are very rarely open to the public, it also demonstrated the Palace's management team's flexibility to allow the event to be staged. This was the largest event to be carried out for a number of years and it is encouraging for the future.

I strongly believe that this successful event and the demonstration of public interest by the petition, signed by many BVWS and 405 alive members, may help to ensure a more positive future for the ex BBC areas at Alexandra Palace.

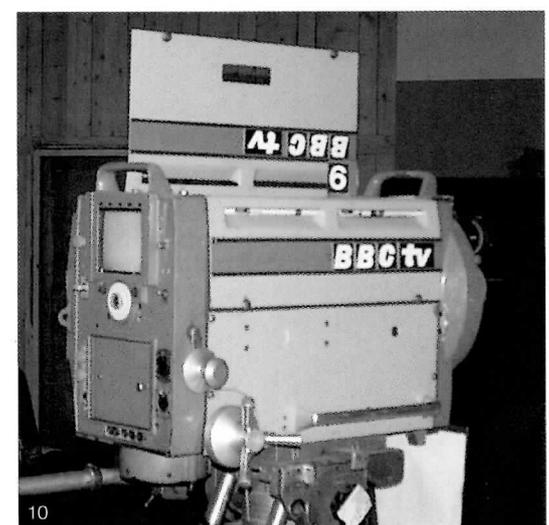
It has become apparent that AP's previous reluctance to encourage private events has been overcome by positive working relationships with Simon Vaughan, of the Alexandra Palace Television Society and Jim Lewis, of the Thorn-EMI Industrial Heritage group.

In September, I was invited to attend a committee meeting of the Thorn-EMI Industrial Heritage group. After many private discussions prior to the meeting, I formally suggested that the group extend their remit to cover the preservation of the BBC areas. This was unanimously agreed by the meeting. The committee decided, after lengthy discussions, to rename the

organisation The Alexandra Television Group.

Simon Vaughan and myself were asked and immediately agreed to join the group. As an action from the meeting, Jim Lewis has written to Keith Holder, the General Manager of AP to arrange a meeting to inform AP of the group's objectives. Jim feels confident that AP will encourage the group to take an active role in future decisions that may affect the BBC areas and to work alongside AP to protect its broadcasting heritage. I truly believe that the Alexandra Palace Television Group contains people with the levels of skill, foresight and enthusiasm to ensure the ex-BBC areas have the best possible future.

Once again, many thanks to the BVWS committee and its members for their support.



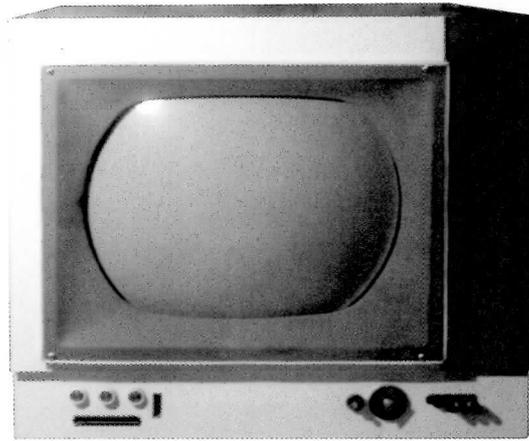
# An early Colour Receiver for UK transmissions

by Graham Dawson

Much has been written about the early days of television transmissions in this country before the war, and articles still frequently appear from people who were involved, or details of painstaking restoration of early sets.

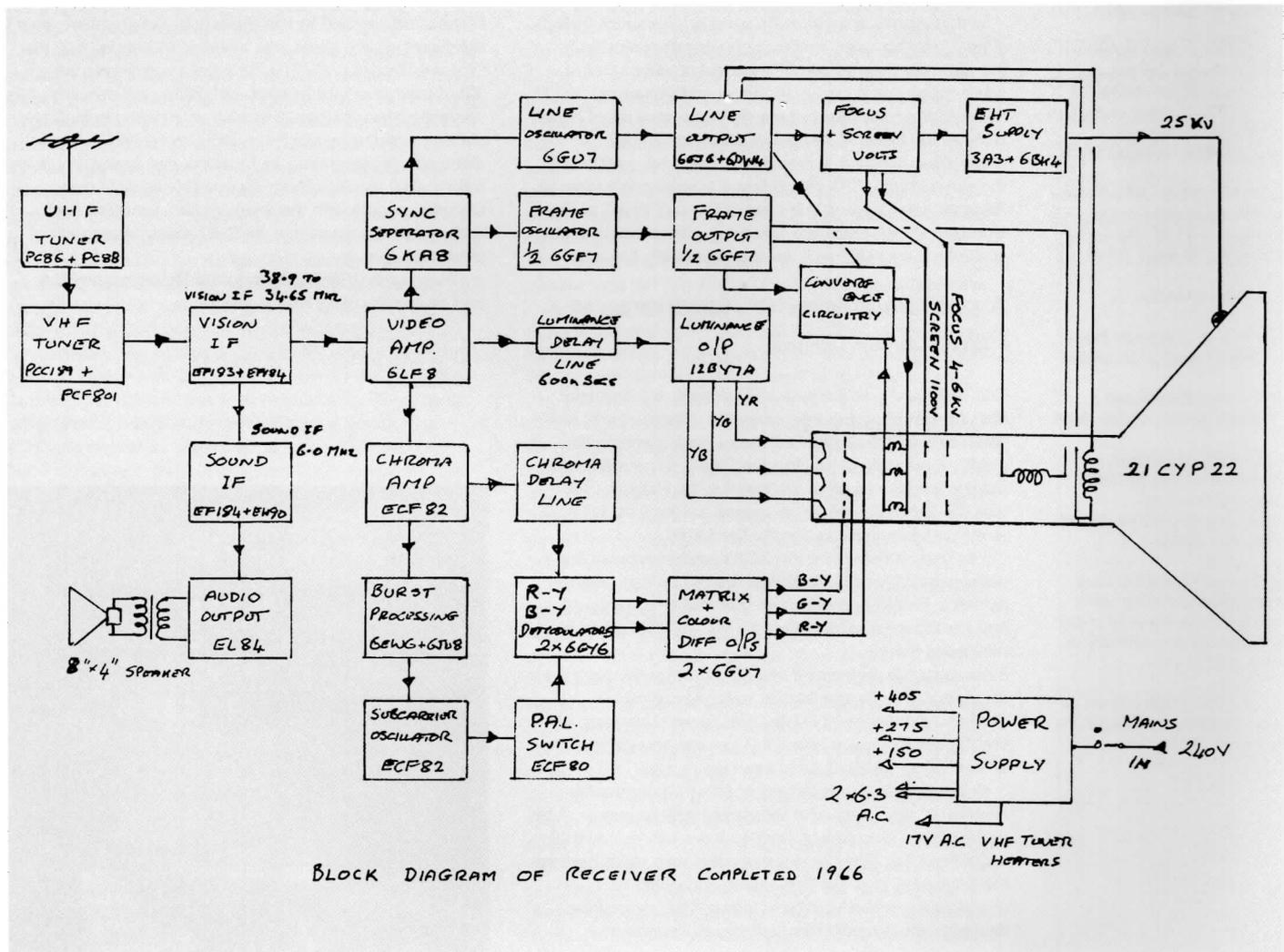
However very little has been written about the early days of colour in this country, except perhaps in connection with Baird. The BBC did transmit some colour pictures about 1957 on 405 lines, to prove that the National Television Committee System (NTSC) system could be successfully adapted to our then existing black and white standard. The trials were limited to reception by a few BBC engineers using specially adapted colour monitors, and mainly carried out to see what effect the signal would have on existing home monochrome receivers.

Indecision about line standards for the future greatly delayed the start of a colour service in this country, and even when the government had decided that all future



services would use 625 lines, the transmission standard chosen was not compatible with the rest of Europe. We used 6.0MHz intercarrier sound, while most of Europe used 5.5MHz. BBC 2 started in 1964 in the South East of England from Crystal Palace on 625 lines, and anybody who wanted to watch it had to buy a new dual standard receiver. Consequently the number of viewers was very small at first, just as it was when the BBC started 405 line transmissions in 1936.

Colour television was by then firmly established in the USA, and both BBC and ITV were keen to add this new dimension to their services. The problem was that the Postmaster General would not give permission to add colour to 405, and even on 625 the government was not



My interest in colour television stemmed from a demonstration I had seen at the BBC by a friend who worked there.

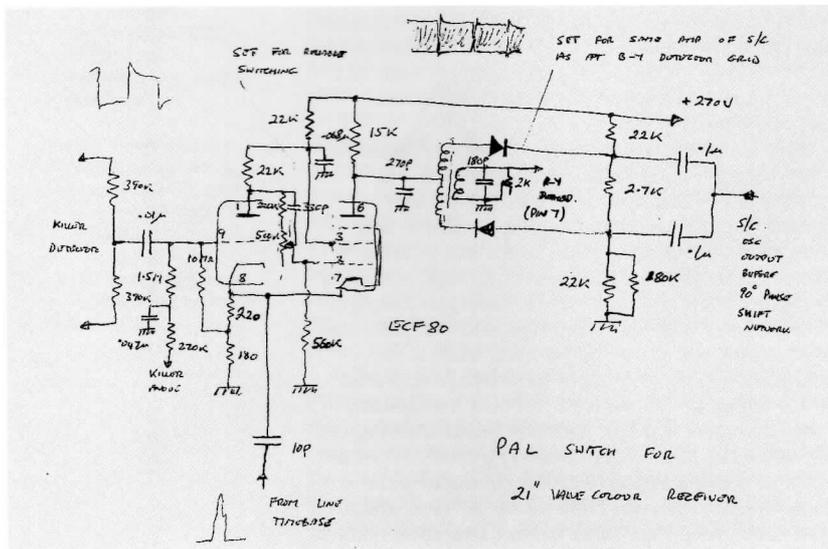
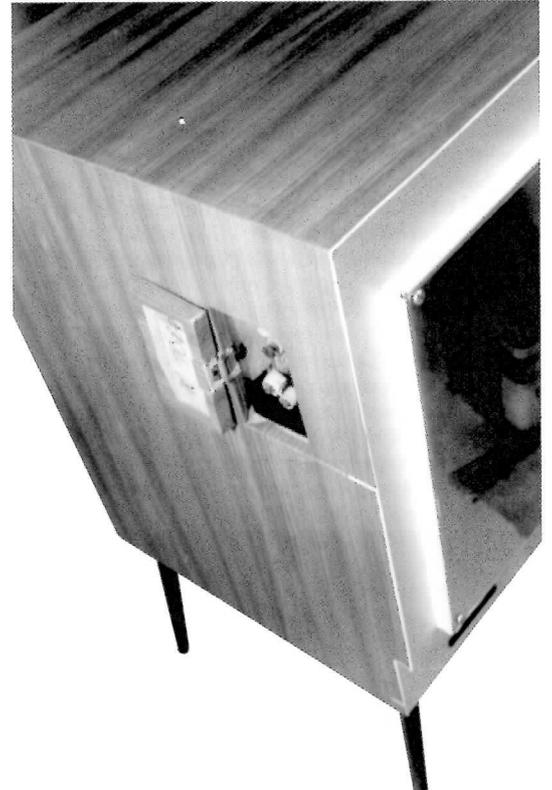
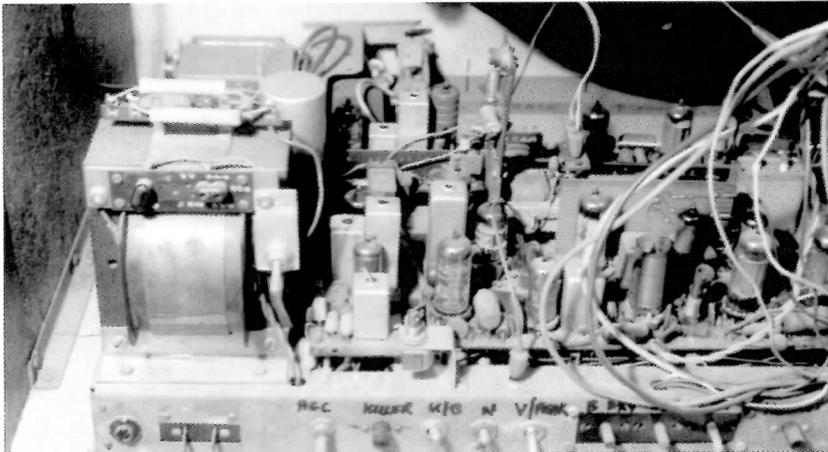
sure what system to adopt. There were misgivings about the quality of colour on NTSC (which unjustifiably earned it the nickname Never Twice the Same Colour) and the Germans had invented PAL, while the French favoured Secam. Governments are not noted for making speedy decisions on matters such as these, even when the choice seems obvious to all but the select committee appointed to decide such things. That is why nothing had been decided by the time BBC 2 started the new service. The BBC were keen to try NTSC colour on the new 625 line transmission standard and started experiments on BBC2 right from its outset. Every day colour tests would include the new Test Card F, and colour bars, slides and 35mm films were originated from Lime Grove both morning and afternoon. In the summer of 1964 I started work at the UK premises of RCA Great Britain in Sunbury on Thames, Middlesex.

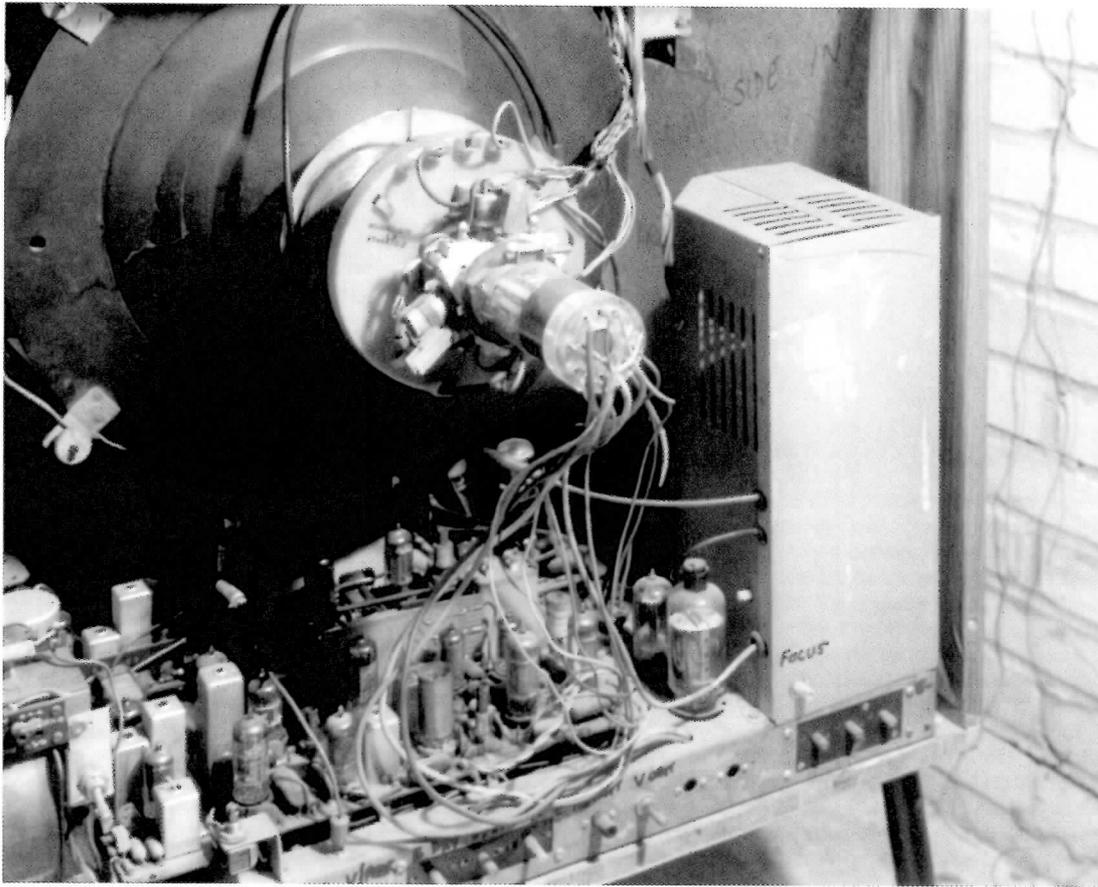
My interest in colour television stemmed from a demonstration I had seen at the BBC by a friend who worked there. I was a part time TV service engineer and keen radio constructor, and interested in the various colour TV systems, and this is what got me a job at RCA. It was RCA who developed the shadow mask tube and they were one of the largest manufacturers of receivers in the USA. They clearly hoped colour TV would take off in the UK and were experimenting with converting American receivers to work on British 625 line signals, in readiness for a production operation as soon as a service was authorised. At that time the BBC were transmitting colour tests on NTSC using a subcarrier frequency of 4,429687.5 MHz, and this was what RCA were modifying domestic receivers to work on. The sets were all valved except for power supply diodes, signal diodes and the UHF tuner which used a Nuvistor. The tube was

a 21" round shadow mask type fitted in a metal cabinet with various simulated wood finishes. Conversion of the power supply transformer for 240 volt 50Hz, and IF and Chroma boards to work on 625 was done in the laboratory and aligned on special equipment, culminating in a bench test on BBC2 for two or three days to make sure everything was stable and reliable.

However in early 1965 the government announced the likely adoption of the PAL system for future colour services and the ending of the 405 line transmissions after full duplication of BBC1 and ITV on 625 was achieved. This meant all the receivers we had converted to date would need changing to PAL and extra circuitry would be necessary to achieve the subcarrier phase switching. This, in an all valve printed circuit boards set, meant transistorised circuitry for ease of fitting and some prototype sub-boards were built with different configurations. In fact some receivers had been sold to technical colleges with an NTSC colour bar generator for training service personnel, and very few came back for modification.

At about this time I decided I wanted to build a set of my own. Colour receivers were not yet being manufactured in the UK, pending the Government's decision, and when they were, the obvious requirement was for dual standard working, causing much extra complication and expense. In 1965 rectangular colour tubes in 19" and 26" sizes were just starting to appear in the USA, but sets were still very expensive, so I decided to build a set with the existing 21" sized round tube. Colour tubes of any size were like gold dust at this time over here, but one of my colleagues at RCA had an older version of the current tube which he agreed to sell to me for £10.





The phosphors had less light output, but the colourimetry was much better.

The acquisition of the tube for a TV is a bit like having the engine for a car. All you have to do is build the car around it. It sounds simple if you say it quickly. Of course I was very lucky in that various discarded components were all around me at RCA and I was able to buy or "borrow" quite a few of the vital bits which could not normally be obtained anywhere in the country at this time. Transistor technology was still in its infancy for TV work, so I decided to follow the tried and tested route of valves. A discarded prototype dual standard sound and vision IF amplifier, fed from a monochrome dual standard set VHF and UHF tuner, formed the basis of the front end. An old NTSC decoder board that had been cannibalised was repaired, to form the colour decoding section. To this was added a PAL switch and delay line plus audio amplifiers which were built onto the chassis rather than a home made printed circuit board. The timebase oscillators were from an early RCA set long since discarded. The transformers I had to buy as new components but at replacement part trade prices.

Once I had all these parts I could plan the chassis layout. I made the chassis to take the parts, not make the parts fit the chassis. By today's standards the sets of this time were huge. The chassis measured some 30" by 15" and was about 3" deep. I made it of 20 gauge galvanised steel so some parts could be soldered directly to the metal and for strength. Again I was lucky in that I was permitted to use the sheet metal shop to bend the sides and rivet the corners after work. However cutting all the holes to take boards, pots, transformers, tag strips, valve holders etc. etc. took literally weeks. Anyone who has ever constructed a chassis from scratch will readily appreciate just how much effort is involved (whether it's for a car or a radio). I had certainly underestimated the work involved in this preliminary stage of construction, and no assembly could begin until all the parts could be mounted in or on the main chassis. I also wanted to make a decent job of it; no string and ceiling wax with bits stuck on here and

there like early Sony sets! Actually, I was later to be very thankful for this decision, and for once my haste to complete a project was over-ruled by the desire to make in the words of Frank Murphy "A first class Job". This philosophy included such things as large dropping resistors mounted well away from other components, potentiometers with high volts on them mounted on paxolin subboards and not directly on the chassis, and care to insulate high voltage parts and provide proper power supply fusing for safety. In this respect RCA were not too good, and I learnt from the problems on their sets, determined to improve matters on my own design, as cost was not the major consideration in a single set.

In the late summer of 1965, with construction of the set progressing slowly, and still no sign of a start date for colour on BBC2, RCA decided to wind down its colour lab and transfer some of the staff to the USA. I was offered a job with ABC television at Teddington, so resigned my position at RCA near the end of the year. By this time I had virtually all the parts I needed to complete the set, so the change of job would not mean abandoning the project. ABC were keen to start colour transmissions, and kept lobbying the government, but as we know they lost their franchise in 1968 before colour started on ITV.

Work continued on the set and it was completed for initial testing by June 1966. The cabinet was constructed of chipboard, with a thick multi layer plywood front to take the tube. Steel angle iron was fitted at all corners for strength, and it was possible to stand on the cabinet with no fear of damage, such was the rigidity of the finished product. Testing and aligning of circuits was undertaken in stages until the fateful day when power was applied to the tube. Much to my amazement an out of focus skewed picture appeared after a few seconds, and within 2 hours a reasonably pure, converged test card from BBC2 was showing, but the colour decoder was not working properly. Alignment of colour decoders needs a colour bar signal and a decent oscilloscope and I had neither at home. But at least I could take the chassis to work one weekend and

And for once my haste to complete a project was over-ruled by the desire to make in the words of Frank Murphy "A first class Job."

The BBC started gearing up for colour in the spring, and some films were transmitted from a colour telecine, but with the burst switched off. One night in May I was watching "The Virginian" and could see sub-carrier on the picture, so I rang telecine at Lime Grove and explained I had a colour receiver and could they switch the burst on please.

try my luck there. However ABC had no RF signal generator, so I had to modify the set to accept 1 volt composite video for alignment purposes. Remember at this time there was no service engineer's test equipment available as a colour service had not started, nor were there any sets on sale requiring it. These things are the hurdles a lone constructor has to cross to reach the end of the course.

Without going into great detail about exactly why the decoder did not work, suffice it to say that the valve PAL subcarrier switch needed modifying to make it switch equal amounts of subcarrier on alternate lines. Once this modification was made, in conjunction with correct burst phase alignment, the decoder performed satisfactorily and worked well even on noisy off air signals. It would be wrong not to thank the engineers at ABC who helped build the colour bar generator which made this alignment possible. They ended up with a useful tool and I finished aligning my set. The completed receiver could now be tidied up and fixed firmly into the cabinet and the outside of the cabinet could receive some cosmetic treatment to make it more like a piece of furniture and less like a huge wooden box.

In fact while the styling chosen looks very dated now, it was the height of fashion at the time and not immediately apparent as a home made product. One or two innovations were included which most sets of the early colour period did not have. The convergence controls were accessible through a door at the side of the set, so it was easy to set up while looking directly at the screen from the front. All secondary controls were mounted on the rear of the chassis, so it was not necessary to get inside the set to adjust height, picture centering, linearity, contrast or grey scale tracking. Of course having a mains transformer meant the chassis was not live, so there was less danger of electrocution while setting it up or servicing. Finally the extra effort in detailed construction paid off, as it worked for nearly 10 years without a single breakdown, and is still in working order even today, though some repairs were carried out when it was "salvaged" from the shed 5 years ago.

I make no claim to any original circuit design features. The parts used dictated American practice and RCA circuitry of that period. To the best of my knowledge no

valve colour decoder was ever manufactured commercially in this country, as transistor circuits were used in the first sets of 1967. Neither was a round tube ever fitted in this country, as 19 and 25 inch rectangular tubes were being produced for the first sets. That makes this receiver unique in many respects. The set used 26 valves and consumed some 350 watts of mains power. Due to the large size of the cabinet it did not get very hot inside, but ventilation slots were cut in the base and back to assist convection cooling. As already stated it proved extremely reliable, in contrast to many of the early colour sets which seemed to go wrong every few months. I believe being single standard with a conventional and generous power supply helped in this respect.

Completion by September 1966 meant it was now possible to watch BBC2 in black and white and the colour test films during the afternoon. By the end of the year the go-ahead for colour was given to the PAL system, and the BBC announced it would start limited colour transmissions in the summer of 1967, thus giving setmakers a target for initial production. At one point I had toyed with the idea of making the set dual standard, as the IF's were dual standard and the set had a VHF tuner. However the extra complexity of switching the line timebase and convergence without any prospect of there being colour on 405 lines, decided me against it at an early stage.

The BBC started gearing up for colour in the spring, and some films were transmitted from a colour telecine, but with the burst switched off. One night in May I was watching "The Virginian" and could see subcarrier on the picture, so I rang telecine at Lime Grove and explained I had a colour receiver and could they switch the burst on please. By the time I got back from the phone the picture was in full colour and to the best of my knowledge this was the first scheduled programme transmitted in colour on BBC2. Shortly afterwards they ran studio material after the end of regular programmes at night and Wimbledon tennis for 1967 was all in colour on BBC2. But by then I was no longer one of the few people with a colour set, and I started thinking about a 25" rectangular tube set for the start of BBC1 and ITV. But that's another even longer story.

Telefunken Kavalier continued  
from page 20

So, now it became possible to maintain the L.T. supply at a sensibly constant level (actually just in excess of 1.3v). Also, thanks to the extra smoothing, there was no hum breaking through on VHF as before. The few extra components added in the set were more in keeping than if a solid state I.C. type voltage regulator were fitted instead.

Most of the valves in the set were found to be low-emission. With a new complement of valves installed, performance drastically improved, especially on the audio side. The valve line-up contained a couple of surprises. In the VHF tuner, as mentioned, the DC90 functions both as an oscillator and an aerial input stage. The slight disadvantage of this arrangement is the fact that the dial calibration varies slightly according to how far the tape measure aerials are extended. However, it does give an adequate performance on its own aerials but there is provision for an external dipole if needed. There follows I.F. amplification by a DF96. The DK96 has a dual function, on AM as the frequency changer and on FM as a further I.F. stage. Two more stages of I.F. amplification follow by means of two DF96 valves, the first one being capacitively coupled to the second. FM demodulation is carried out by a pair of germanium diodes. AM demodulation is performed by a diode within the DAF96, which also handles audio amplification. The output valve is a DL94. One would normally expect a DL96, which would fit in with the scheme of using low-consumption battery valves. At the expense of filament current, a DL94

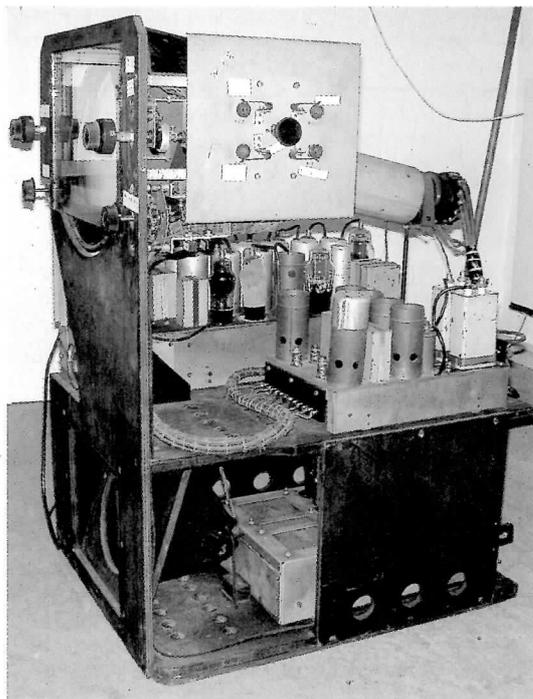
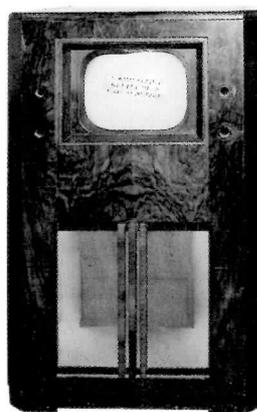
has probably been chosen because it can deliver 270mW of output as against the DL96's 200mW.

The radio was given a thorough clean, internally and externally. The cream coloured 'leatherette' was cleaned using soap and water with an old toothbrush. Afterwards it was rubbed over with wax furniture polish to get some gleam back in. The brass piping and tape measure aerials were cleaned with chrome cleaner. The tape measures were lubricated. Now, when the little button at the back is pressed, they retract at a positively dangerous speed! The only thing that the radio never had was its original leather handle. I've fabricated one from leather-look vinyl which isn't very good and is more for looks than use; one day something better may turn up.

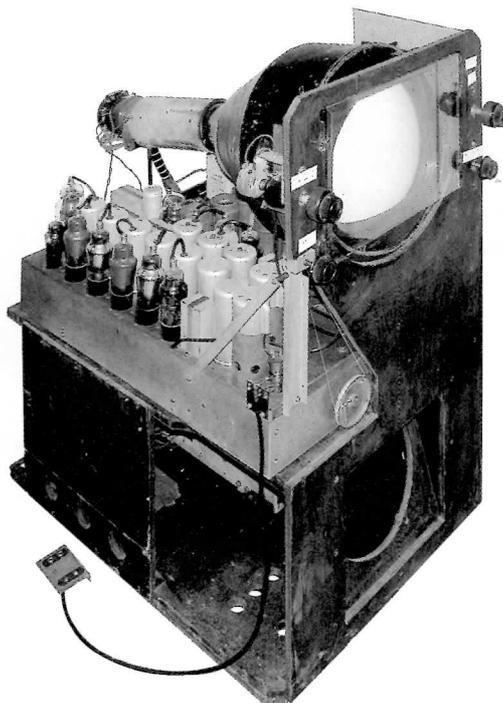
To sum up, the Kavalier has been a very satisfying receiver to work on. It is up to the usual standard that one comes to expect from German receivers. Using a decent size and quality of speaker it does give more apparent power than 270mW would suggest. Aided by a tone control with a very ruthless top-cut, it has a reasonable bass response for a portable. Valved mains-battery portables that cover VHF do seem to be in a very rare class, judging by how they never seem to turn up very often. Certainly a German portable in England is even more unusual. Finally, I must offer my thanks to Bob Schut in Germany for his very kind assistance and finding the service manual for me. Without Bob's help this repair would not have been possible!

# A Rare Television Receiver at Pitstone Green Museum

by Norman Groom



Some years ago the Beds & Bucks Engine Club, of which I was a member, worked at the museum installing a 1914 Crossley Gas Engine. The museum occupies the site of an 1831 farm in which vast quantities of artifacts had been collected and stored by the Local History Society. During this time I ventured into the many barns and lofts and discovered several vintage wireless sets and electrical equipment dating from the 1920's, all in a very poor condition. I spent many hours restoring them and eventually acquired a small room at the museum and set up the first Wireless Room. The room was small and the collection had grown, with sets donated by the general public. Radiograms and TV's were banned due to limited space but then a gentleman in the nearby village died and some items were donated to the museum. Included in these was a television receiver and I was asked if I could incorporate it in my wireless room. My first reaction was no, but pressure from those above forced me to at least have a look at it. The set turned up in the back of a pickup truck. It was a floor-standing model and required four people to lift it down. It was scratched and full of dust and dirt but on removing the back it did look interesting. The tube was a 12-inch electrostatic with a base identical to the military VCR97 I was familiar with. There was an internal wooden support structure that carried three metal chassis, the upper two with fitted with large valves (23 in all) and cans, obviously the RF and time base circuits and the lower one containing two massive mains transformers (no fly back EHT here). Later we weighed the unit, less



case, and it weighed in at 56 Kg

The next job was to find some information on the set. It was a GEC model No BT 3701 and I could find little information on it. My knowledge of TV was somewhat limited: I had changed the line output valve in various sets and understood the basics but that was all. I did however realise that it was probably pre-war and on searching through some old Wireless Worlds discovered a picture and some details of the set in a report on the Olympia Radio Show of August 28th 1936. The article stated that these sets could be purchased with or without sound and more importantly they were dual standard, capable of picking up the Baird 240 line transmissions as well as the Marconi 405 line transmissions.

This I found fascinating and then it was back to the set to see if I could find the magic switch, and yes! There it was. The switch consisted of a number of toggle switches with notches in the toggles, all being operated by cams. In this case the cams had been unscrewed and rotated away from the switches leaving them in one position, presumably the 405 one. As stated earlier the set was in dirty condition and sprouted several relatively modern electrolytic capacitors. Also in the bottom of the case was a separate EHT power supply, which appeared to replace the original one. Enquiries about the set from family members said that the owner had continually maintained the set and kept it going up until the end of the 405 line transmissions. The next step was to clean up the chassis and trace out

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The TV now sits as a display object, it has been removed from its case and the case displayed separately. It is unusual in that it was only made for a short period during 1936 during the Baird Transmission, which ceased soon after.

the circuit diagram, to identify the later mods and try to restore the set to its original condition. Tracing the circuit proved relatively easy, the only problem being manoeuvre ring the heavy chassis about. Fortunately most of the original unused components were just disconnected and there were no surplus holes drilled anywhere. The heavy rubber covered wiring on the power chassis had perished into a sticky mess and had to be replaced with modern copper cored ignition cable, which was about the same physical size. Holes in the chassis indicated that the original reservoir capacitors were the wet electrolytic type. Old ones, one having an original label were obtained from Mike Lewis, one of our Society Members and replica labels created on a computer. The insides of the wet electrolytics were removed and replaced with modern components and then fitted back in the chassis. Eventually the set was back into as near as possible the configuration it was in when sold in 1936 and it was time to apply power, the first time for many years. All systems eventually worked, the time base scans were present, the switches adjusted to give both the 405 and 240 scans. The sound and vision strips responded to an RF oscillator and the supplies were what one would expect from the transformer voltages, but no raster!

The EHT was extremely low, some 2000v only but it appeared to be correct to circuit, which is probably why

a replacement EHT unit was fitted to increase the brightness. Eventually it was realized that the tube was exhausted and even a spare tube that came with the set gave no better results. Several months passed and finally a wartime radar tube of the right dimensions and base was acquired from someone who had heard of our plight. The tube was fitted and a raster appeared but it was apparent that the set could only be used in a darkened room. In order to generate a picture a CCTV camera was modified to give either a 240 line or a 405 line picture. Some results were achieved but it became obvious that it would not be possible to demonstrate it to members of the public in the bright lights of the wireless room.

The TV now sits as a display object. It has been removed from its case and the case displayed separately. It is unusual in that it was only made for a short period during 1936 during the Baird transmissions, which ceased soon after.

Unusual items still come to light at the museum. Clearing some stables of years of stored material unearthed some early electrostatic generating units (circa 1800) that predate the Whimhurst machine, plus a set of six Leyden Jars all in poor condition but an interesting restoration project.

Details of Pitstone Green Museum can be found on the museum Website at: <http://website.lineone.net/~pitstonemus>

WT regales us with another amusing tale....

## Delia Smith, eat your heart out!

Unlike peaches and cream, water and electronic equipment are definitely not complementary as Al and I discovered one Saturday morning on throwing the main switches in Studio E apparatus room. A series of flashes and bangs followed together with realisation that the place had suffered a deluge during the night and on investigation was still suffering from water dripping through various points in the ceiling.

By Murphy's Law the various points of ingress were directly above the equipment bays. The Tannoy intercom unit, being untouched, was used to summon the house engineers, who were quick to identify the problem as a leaking pipe that they quickly sealed off.

The next problem was ours; we had to have the studio working by 13.00hrs, when the production staff and operational crew were scheduled to arrive. No water vacuum cleaners in those days but buckets, mops and floor clothes purloined from the cleaners' cupboards were our arsenal and we set to work assisted by two of our colleagues from Studio D next door.

Thirty minutes saw a majority of the water

removed and electrical heaters were brought in to dry the place out. Studio E was equipped at that time with Marconi cameras, each one driven from separate power packs housed in the equipment bays and it was these power packs that came close to being our nemesis.

Each power pack had a large mains transformer and although on the surface they appeared to be dry, it soon became clear that the dampness still remained within. The consequence was that every time we switched on, the fuses blew. Oh happy days. We pushed the heaters as close as we could and waited but still the fuses blew. We opened the engineering store looking for spare transformers but there were none.

Time was running out... we had to find an answer, a move to another studio, a possibility being investigated by maintenance shift leader. Studio D was in use, Studio H too small, the only one suitable in Lime Grove was Studio G and that was in the progress of being recommissioned.

A faint memory of a similar incident that had occurred many years earlier in my days with Etelco and a possible solution petered through my thick skull.

"Bake them," I said. "Bake them!"

"Bake them? What do you mean, bake them?" came the incredulous response.

"Take the transformers out, take them to the canteen and bake them in the oven."

Al looked at me as if I was mad but then started to grin. "I like it," he said.

He called the maintenance shift leader playing it safe; he got paid more, let him take the decision.

"Bake them, what do you mean bake them?"

First Al, now the shift leader. I listened to Al explain, beginning to wonder if bake was a word unknown to Londoners.

Finally Al finished explaining and the decision was taken to bake one transformer and see what happened. Using a 60-watt soldering iron, we unsoldered the connections, removed the first transformer and then we were on our way.

The canteen manageress took some

persuading before finally agreeing to our request. Food partially cooked was removed from one of the ovens and in went the transformer.

"Lowest setting, ten minutes?"

"Agreed, that should give us time for a coffee."

Now part of the catering staff, we sat talking to the manageress as we drank our coffee, the cooks threatening to call a strike if we failed to give them the recipe for baked mains transformer.

The smell of hot resin varnish started to permeate the canteen and rude remarks came thick and fast from the customers. Al and I nonchalantly ignored the comments, we were no longer mere engineers but creative artists in our own right. For the first time ever, baked transformer a la Carte was on the menu at Lime Grove.

"Right, that should be long enough," said Al, looking at his watch. We opened the oven door, not without some trepidation I must hasten to add

"What do you think, is it done?"

"Done to a turn, nicely browned!"

We carried it back to the studio on a tray and waited for it to cool before reinstalling. Then the moment of truth. "Switch on!" Al stood back as he gave the order. Nothing happened: for a moment despair, followed by relief as we remembered we hadn't replaced the faulty fuses.

Five minutes later Camera 1 was up and working. Then back to the canteen with the other transformers. At 12.45hrs it was all systems go. We had made it and were singing a popular song of that era, "If I knew you were coming I would have baked a cake" when the operational crew arrived.

I have worked on cookery programmes with a variety of television cooks: Philip Harben, Fanny Craddock just to mention a few and they have cooked all kinds of plain and exotic dishes but never since has baked transformer appeared on the menu.

# The 'Telly Doctor'

by Wyn Mainwaring

Greetings from my retirement cottage in 'Wild Wales' where we have no television, email or computer CRT to irradiate our ancient eyes; we only wear specs. for driving! They'd be impractical in our 100 inch rainfall and impossible when handling and/or milking goats!

As you may guess I'm an old pro. whose earned a few bob at this wireless lark since the end of WW II (in those halcyon days, lads were eager for their 14th birthdays to start full-time work, even wear 'proper' boots!)

My inclinations were more in keeping with being the school bus prefect and being top in physics, part of my matric studies. Coming in from the countryside, my familiarity with a.c. mains gave me quite an edge on d.c. 'townies'! At least I had installed and played with bell-transformers (still have one!), its 8v winding, off centre tapped at 3v (or 5v!) can be useful – ex Woolworths, as was my 1/6d (eighteen pence) electrician's handbook, backed by strong ambidextrous hands.

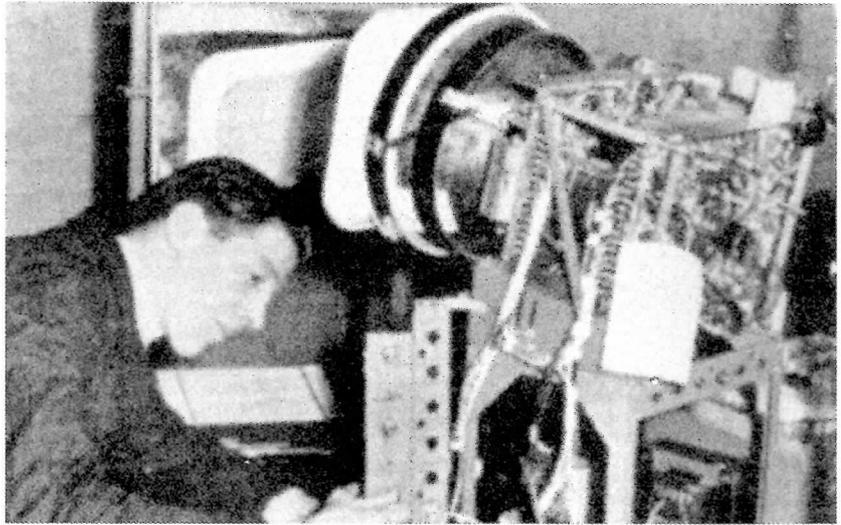
Returning from war service (wounded) – I found old boys of the school had started a wireless society class/club. One was in need of a battery boy at his newly opened shop (d.c. mains with in-line Robertson lamps to limit/indicate current), another took me servicing in his two-tone blue 'Sobell' van, out in the uncharted N.Carns & Preseli hills, - far too good a grounding for my next 'appointment' at E.M.I.

Before the TV signal 'came up' each day, we had to sort out radio, battery, stores and customer problems and were expected to offer service quite late on a couple of nights each week: 48 hours for a 'tenner'.

## 405 live

Having served my time at E.M.I. Research, in the same R.C. section as one Blumlein (a few years before) at pitiful wages amid contractual restriction of conversation (especially with colleagues at the 'tech', to which I had been obliged to cycle a hundred miles each term week), I was relieved to enter the RAF to become a RADAR fitter (B), serve as a fitter (A) then re-train to become a G.C.A. unit half way out to the windy Atlantic. Reluctantly, demob found me in a S. Wales steel-making town (that I'd known well) with little else to do but 'bash' tellies.

I had much to learn – and fast! Gone were the accurate standards of cutting-edge research, the top quality construction of service equipment and discipline, to find ac/dc live chassis, cardboard backs and bottoms and... wait for it ... d.c. mains! Negative earth one side of a town street, but polarity reversed on the other! From a 3-wire system that powered trolley-buses. All this I remember from my first two jobs in the trade; battery re-charging and wireless mending during the late 40's. Not much had changed in a decade! The odd row of works houses would be connected to the huge dynamos 'next door', with local acceptance of 200V d.c. during certain stages of the steel process and sudden return to the nominal



250V. An early contract entailed the bulk purchase of Woolworths two-pin plug tops, 2 amp size, for the long terrace had been wired with 5amp versions: both the bakelite mouldings and (best brass) metalwork were identical except for the pinholes' diameters. Thus 'odd legs' were easily made up, giving a little peace of mind, less frustration and also confusing any competitors.

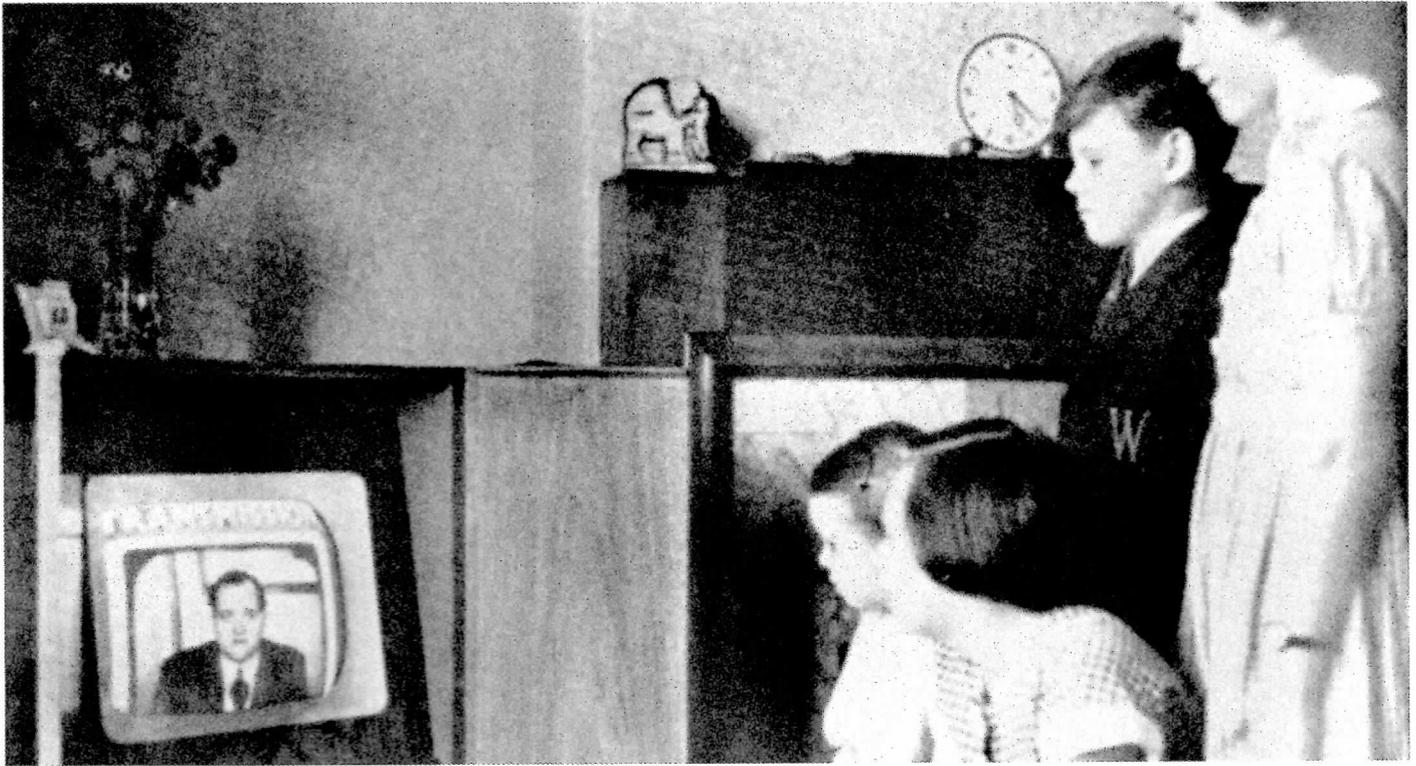
Out in the countryside, mains a.c. at 230 V rms was remarkably steady in villages. Farms, being along lanes/tracks through fields peppered by cows needed the services of a dog to clear a path for my trusty 1936 Morris 8 - a service readily provided once the crafty canines got to know I carried dog biscuits!

Childrens' programmes seemed to coincide with the times for evening milking, the heavy electrical loads of the milking parlour bringing the mains down below the range of vertical hold. Frantic twiddling soon wore the tracks to unreliability with heart-rending pleas from the charming youngsters leading to a search and wearing of my 'finkin ead'. Some goodex-Government triple secondary filament transformers were acquired, secondaries connected in 'series aiding' when selected by an ordinary two way lighting switch screwed to the stout cardboard box the WD had stored them in, labelled: 'milking times – other times', with two twin leads, plugged and socketed for insertion in the TV set's lead, working a treat, with the youngsters knowing just when the work had been completed to flick the switch back. The odd unit would buzz at the pulsating load, to the concern of the house dog lying attentively, nose on paws, ready for whatever was likely to appear in 'his' house.

Children often got me embroiled in birthday parties: many a time churning out 'happy birthday' etc. on a wheezy harmonium, or neglected de-tuned piano always a ready volunteer to squeeze in (with the dog!) into the front seat (the back being well laden with home produced groceries (spuds, carrots, eggs etc), to open the gate to the road and close it after me.

The odd model would endure low mains (or H.T. anyway) with fortitude, recalling a small Sobell with a postcard sized picture, beautifully focussed – a tribute to the use of the two parallelled (valve) rectifiers of course. The odd lonely lady would encourage a little dalliance, while more mature housewives provided 'cuppas', snacks, even a hot lunch! Much appreciated in cold weather. I have a vivid memory of a veritable pyramid of

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At one nice bungalow, a very young lady (all of 3 years old) looked me up and down, noticing my bulging satchel, turned and announced to her mother, "mami! telly doctor is here!" Both telly and teddy felt much better in half an hour.

chopped stick beans, filling a dinner plate, with a generous blob of home churned butter melting down its sides like lava on a volcano. Once and only once I accepted a small glass of home-brewed wine! Only to brush both wings of the solid old Morris at successive swerves in the country lane! I had to make a hasty stop to sober up and consume sandwiches.

A small hill village was ruled by a 'matriarchal' old lady, having an accident-crippled husband in an armchair fitted with castors. This charming old gent dearly wanted to know all about television, but in Welsh! So aided by an old photo frame and strong grease-proof paper stuck to it, 'lines' were drawn with a very soft (6B) pencil on the 'inside', he got the idea of interlacing and synchronization while lunch was being prepared. Anticipating a large gathering for Christmas, could I shift the TV to the other side of the bay window? I could hardly refuse, but lacking flex, staples and a hammer – a fellow from the front door had half the lads of the village gathered, eager to scrounge whatever was needed!

My old leather school satchel had been fitted with a stout handle back in my cycling days and its 'drawing set' compartment housed my home made test meter, - using a Woolworths lunch box, RS strip sockets, a Sentercel diode, a few carefully selected resistors, a no. 8 cell inside a B7G can enabled a sealed ex-govt. mA F.S.D. meter to give very good and reliable readings in the field.

A wooden handled Adcola soldering iron, fitted with cambric covered flex and having a length of iron water-pipe to live (good heat absorption) and a wondrous selection of mains adaptors – mostly round-pinned, but some wondrous new types were coming out: 13A flat pins, plus tools, coax-plugs and sockets – the B & L ones being far the best, - TV cable was preferred to have a seven strand inner, both for flexibility and the ability to have a small dressmaker's pin thrust into the hollow pin in the interests of maintained good contact, after all signal levels were down to the tens of microvolts (not that any of my ex-electrician competitors appreciated that!). Not actually listed among the tools were my 'asbestos fingers' – for wee valves run very hot!

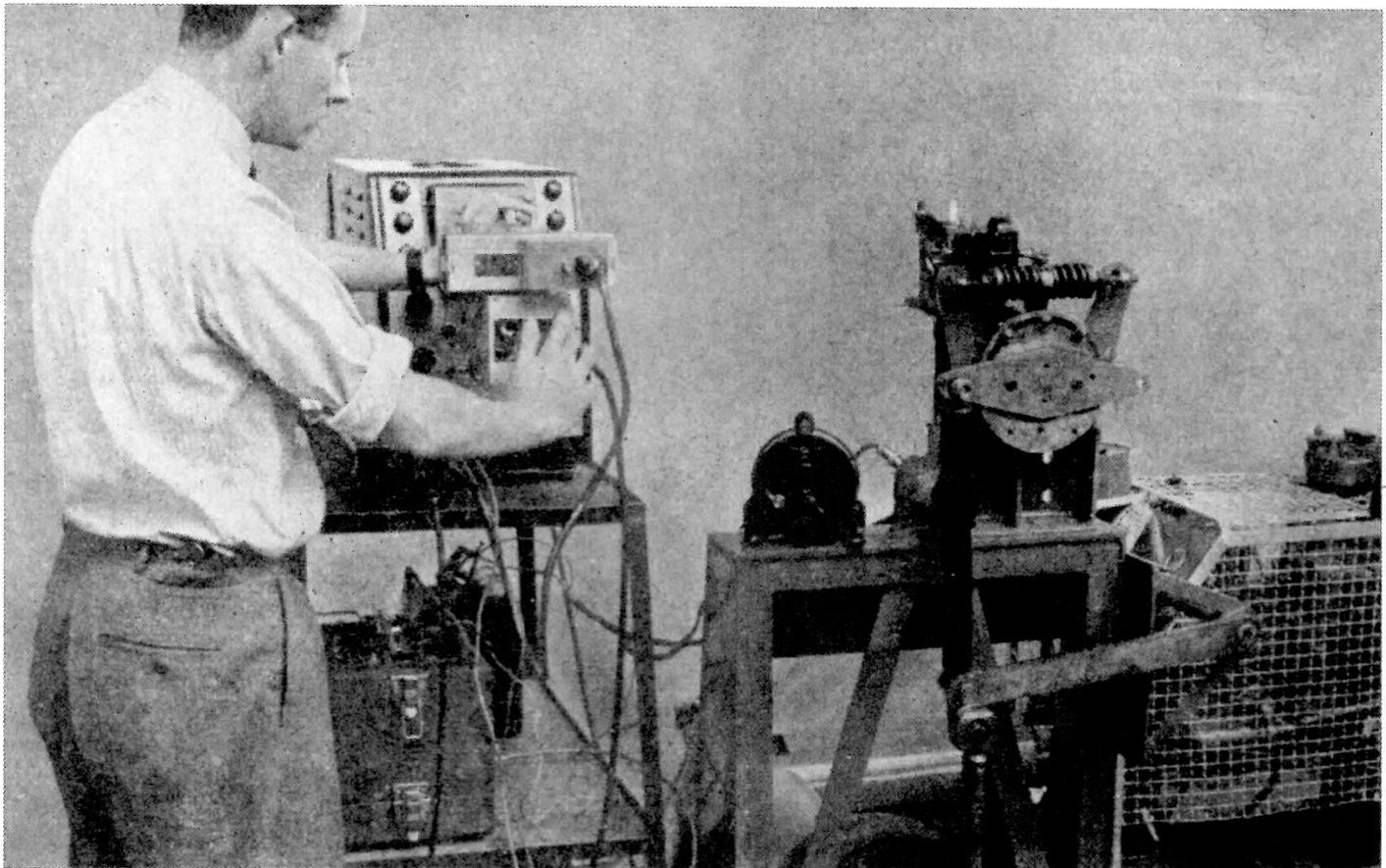
Aerials varied, from 'X' to 4 element monsters, needing double chimney lashing (or saddle girths around an oak tree for one, very 'public' public house) – foam polyethylene dielectric, coaxial cable, well cleated and weather looped ensured the best for my clients, who

often had to be talked through a wondrously described bunch of symptoms, aircraft flutter, (there being a RAF station along the coast) thundery weather, cloud variations, and once a '4 O'clock effect', - which I enjoyed watching, carefully 'nursing' a 'cuppa' in a gold rimmed china cup – sure enough – 'puff..puff..puff puff puff' with the sound of the local steam train's whistle from down the valley, bringing the children home from school! – just in time for their own 'educational' programme. Sadly, new D.M.V. railway stock cleared this interesting phenomenon.

A rival firm preferred to use 'cellular' coax! – imagine my glee, when recognising the type asking for a large cup! to 'accumulate the charge' of a very different sort of current – rain water! from the half dozen long tubes within the coax. Once I unscrewed the plug at the set end - even 'clean' the water's huge dielectric constant would lower the impedance of the cable. Areas looking across estuaries had to live with dismal tidal effects which were destined to get worse.

At one nice bungalow, a very young lady (all of 3 years old) looked me up and down, noticing my bulging satchel, turned and announced to her mother, "Mami! telly doctor is here!" Both telly and teddy felt much better in half an hour. Another household was ruled by a 'sailor beware' mother-in-law, who loudly disputed my call-out fee (representing a half day's pay plus the cars 'mileage') and even more at the 21/- 6d (including purchase tax) for the valve I had 'so easily' changed (with considerable skill, using my asbestos digits) in five minutes'. Winks were exchanged with her hen-pecked husband; then I swapped the 'bottle' back, returning it to the three dozen selection that seemed to cover all makes, before offering this hefty cardboard carrying box to the self confident lady of the house with an invitation to try her skill, her husband loudly affirming that ensuing damage would be paid for. She visibly wilted and shrank before skulking off to her domain. The grinning husband eventually saw me to the door, having paid the bill and thrusting a £1 note into my top pocket "for the best day since I've lived here", chauvinism indeed!

A row of 5 cottages by the sea seemed to be populated by many females from grandma, great aunt, a few 'mams' and scuttles of excited little girls! A week before Christmas was not a good time to 'diagnose' ion-burn with serious (gas) defocussing, but the local Co-op



shop manager had spoken well of the family commune, so I changed the CRT on a packing case in the Co-op's store room, then 'forgot' to bill them for a couple of months - but no more, else they would have to forego their meagre 'Divi' at the Eastertide 'clurring'.

Two elderly folk were volubly debating which model to have in a packed shop on a busy Saturday afternoon. Obviously needing a Celtic 'referee' - I offered my services by asking them to imagine the set at home. There was a long pause, then agreement! Really, as to which side of the fireplace it would 'live', being well aware of local hearths that consumed tons of Welsh coal annually (mostly during the wintry evenings - TV time) all I had to say to the astute octogenarians was the model which had its hot side, which would best be kept away from the fire, it led to an instant sale - cash too! "Could I follow the 5 o'clock bus?" They accepted help with the transportation of their shopping (only after the bus had disappeared) but staunchly plodded up their mountain track ahead of my old Morris, - just as they'd always done, - hitherto carrying a 'bottle' (a 2 volt accumulator for their 'wireless' set) - but recently mains electricity had arrived.

As tea was being prepared, the old chap and I set up the 14" TV, attached the extension to mains lead etc. and soon enough there were clear pictures! Asking if they needed deferred payment, - the word was an awful thought to them! "nól y hosan!" said the proud old gent, his good lady going to the bedroom of the tiny cottage and bringing out an old fashioned hand knitted winter sock! Long enough to rise above the shepherd's knees, stiff to a sausage shape with £1 & £10 notes! He counted out the £98 for the purchase and one for my services! When I remonstrated with them for keeping so much money in the house and for showing it to a stranger, - they told me they'd made enquiries about me "boybach" - such trust!

The variety of households was amazing, I recall a gaunt, shabby council house with brown paper stuck to the modern, large window of the 'big room'. It had no furnishings at all, merely a 12" console in the corner next to the only power point, and a crescent of orange boxes

for children to sit on. The rented set had been run "flat out", to combat daylight and the comments of its young, volatile excited 'circle' audience! Only a street away there was a doctor's residence (with the consulting/waiting rooms for both husband and wife), My first call was answered by a maid who was capped and aproned, "would I kindly call back at 10.50, - at the front door." A couple of calls later I was shown into a 'drawing room', to have (real) coffee with a lovely lady doctor until 11 o'clock, then I was allowed into the spacious lounge where the nice console TV was, while she returned to the waiting patients. The maid accepted my bill which was paid by cheque (it was quite rare then).

And then... ITV came to St. Hilary. A rash of converters came too. Mostly self-contained, nicely-boxed 'set-top' types, costing about a week's wages, *plus* the quite extensive Band III aerials needed: at least a 6 element on an X (I advocated changing the single down lead, even in 'good' areas. Cable losses at three times the frequency being higher with 'foam' cable being cheap and well worth the 'running'). Way-out installations needed double arrays from twin 6 elements up to unwieldy bird and wind-conscious double 11 elements needing vaseline sealing to 'combiners' and fat ultra low loss coax cable. The converters got the blame for patterning, fading and ghosting, even ballooning and 'white out!' The latter were most prone at 'posh' locations looking eastwards along miles of Swansea Bay towards St. Hilary.

The effect puzzled all the Swansea people, so a resident kept a diary for me, - for one month! I recall drinking several cups of coffee in a pleasant bungalow overlooking the bay whilst watching the expanse of sand getting wetter by the wave and having one eye on her TV with set-top converter. Sure enough, once the Mumbles electric railway sand-shields were awash, the picture 'whitewashed' fairly quickly. The coax cable from the modest-bell was taken out, unscrewed, and the tip (centre) only 'offered' to the converter. It reproduced a clear picture before actual contact - so I snipped off the inner wire, reassembled the plug and got adequate coupling via the .25pF or so from the proximity of cut wire to the rear of the plug. I had a

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The other sort of 'converters' were 'in-set' – calling for delicate cabinet drilling (card templates were provided, but large diameter cabinet maker's bits needed careful negotiations and the loan of razor-sharp bits and a hefty hand holding a lump of wood. Two leads, having valve base type plugs on them, superseded the first two valves in the luckless set, drawing both the filament (heater) power and H.T. and squirting down an I.F. equal to the local band 1 channel; one third the frequency in our case, causing a lively wood-grain pattern on the screen, varying as the two harmonically related signals varied in phase – oh dear!

long wait for the beach to dry out, but sure enough, there was still enough gain to maintain picture/sync levels, day or night. The trouble was the '20dB gain' in the set-top box of tricks; later models had either crude attenuators or bias 'pots' on the R F amplifier.

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Letters and phone calls produced no help at all – something the boffins didn't think of. Worth bearing in mind that most televisions in the band 1 (only) era, were trf! Each stage had its tuning arrangement along the screening box of each coil, usually well insulated wee knobs (live chassis) – too fine a tune-up would lose the sync pulses (their edges needing about 2.5 Mc/s bandwidth, - the test card was best not looked at) while folk did not really want to see the news-readers' eyelashes – about the closeness to the preacher-man on Sundays was comfortable enough. CRT's were mostly round. A few 9" (Bush bakelite cabinets and the PYE I had for 'ghost hunting' having a heavy mains or vibrator transformer, 12 volts which did mean the care and carrying of an early 'scooter' battery) and 12" units for several bands. All were susceptible to ion burn of the phosphor thus the 14" (diagonal measurement) brought two benefits. At least the original 5:4 picture – aspect ratio could be buried in favour of the (older) film industry 4:3, by the very curious shape of the C.R.T.'s bulb. Also the electron gun was squashed slightly, needing an unsaddled wee magnet to restore the direction of the electrons (far more so than the very much heavier ions) to the axis of the glassware. Of course saddle girths would snap and lose most or all of the picture so we had to restore the status quo by bending the soft iron/mild steel curved poles of the wee magnet to grip the glass neck of the C.R.T.

Fortunately by 1957, the generation of several KV of EHT had gone through the teething stages of mains generation and RF types to the ingenious 'fly-back' method, using the old spark coil principle used in cars; that of 'grabbing' the magnetic energy in/around the yoke of the line (horiz) output transformer, as current in its primary (output pentode supplied) winding was shut off to allow the scanning beam (spot fluorescing) to return to the starting position for the next-but-one line (during which interval the frame deflector coils had depressed the beam'n' path by about .5% of the height of the picture!)

The yoke material was a suitable grade of Ferrite, fairly brittle and in a hollow square – allowing for the careful winding of thousands of turns, on a quite separate bobbin, with a few turns of heavily insulated wire for the modest filament of the wee (single) diode needed to catch this collapsing magnetic field's energy, transformed up in the voltage by the ratio of primary (HT sort of voltage) to the many more turns of the discrete overwind.

Very neat and virtually safe, this was OK for 14" tubes, but more EHT was needed as picture sizes grew, thus a second diode was introduced to boost the anode supply voltage to the line output pentode's anode, - later versions having the cathode of the 'booster' bottle brought as a top-cap, right next to the pentode's anode cap. A case of 'hands clear' – 450-500V d.c. being decidedly non-user friendly.

A poor batch of E.H.T. rectifier diodes, brought one shop to its knees; its whole 'fleet' of hired out sets used these 2V filament bottles! - and the set makers failed to provide spares, ditto the original valve makers. Consternation reigned as the shop and 'my' shelves filled with waiting-for-the-valves-to-come sets! A close

friend dearly wanted to see the tennis so something had to be done. Most other sets used a smaller bottle for E.H.T. but it had a 6.3v filament; much less current, about the same power, so a foot or so of the inner wire of coax cable was wound in lieu of the 2v winding, about 3 times as many turns, the springy thick polythene needing tying with waxed string before being soldered to the little valve. A second valve was fed from a (6v) lantern battery, - supported nearby to compare glows of the two experimental units.

Cross fingers, lights out, switch on. Bingo identical colour, temperature and beautiful picture. Not only the shop's stock, but the entire town's reserve of 6v diodes were purchased (for us by friends!) while I had a busy week, rewinding and labelling each of our 'steady-earners' bringing the manager and his serviceman to a lasting friendship which enabled us to outsmart the owners, with their heavy-handed methods: perhaps they knew there was a slump coming in 1959 but it was hardly our fault. Within a year of our 'summary' dismissal, the shop had closed.

The Co-op were good people to deal with, each shop having its own 'patch' and acting as agent etc. taking 2.5 % (6d in every £1) for prompt payment of my account, vetting customers, even providing transport at times, and always a warm welcome, usually in the secretary's office, but the lads too. The organisation started marketing Defiant brand sets, lovely cabinets (perhaps by Co-op furnishers?) and chassis (I think by Plessey. Oh boy! Weird ideas loose there! No wonder they needed bailing out by Siemens & G.E.C. a few years later. Both 14" and 17" used the same chassis, the Band I channel being pre-ordained by an internal cam-shaft mechanism, while Band III was front panel tuned by the customer. And they worked well; no more noisy than other makes who had changed over from (quiet) t.r.f. to (mixer induced) superhets.

Except in Carmarthen town, shielded from St Hilary, it needed a 'booster' which it had but, in the interests of coax cable losses (at 200 M c/s) – the ITV signals were piped around town at channel I frequencies (45 M c/s vision) OK for people with click clunk 'biscuit' turrets but not much help for hundreds of Co-op people – all clamouring for the new programmes, and adverts. Suitably wine and dined I got some stout tin plate from my brother's tinsplate works, he made chemical grade sheets, and fashioned a pair of 'tinsplate templates' to fit the rear of the two (14" and 17") models, with which I was able to hand drill, accurately, the plywood back boards of either model, fit a Radiospares insulated diameter shaft extension – release the band I locking system, replace the back, slip a 2" diameter brown felt washer over the protruding plastic extension shaft, and fit a RS 2" diameter brown knob, pressed snugly to the felt washer, to get sufficient friction to retain the knob, whether at its original position, or, by a daft left-handed half turn, to the other extreme for channel I, - bingo, - all in 1 hour per set. I made enough (non 'servicing') cash to buy my modest first home down town.

Happy days indeed; hundreds of homes would welcome me (and indeed did subsequently) for the 1959 slump virtually closed the TV trade, with yours truly (after a couple of food delivery jobs) being obliged to get up in the wee small hours to journey way out west to an ROF to look after, among other things, three closed circuit 405 TV 'chairs' which kept an eye on bombs and large shells being dismantled carefully. There were 625 line systems as well, the comparison often showing up Blumhein's fundamental error of frame dividing by 7, - too low down the exponential curve when only modest 'integration' circuits were in use.

When ROF 'ceased trading' I got moved to a gas turbine testing place – using 405 cameras in horrendous locations to see what fell off such engines, eventually that place closed down.

It's the people I miss, old, young, rich, poor, there was always a warm welcome for the 'Telly Doctor'.

# An Invisible Eliminator

By Peter Kyne

Those who are interested in restoring or using vintage battery sets will understand the value of a battery eliminator.

When I say vintage battery sets I'm not referring to the personal portables, which appeared after the war and used a 1 1/2-volt dry cell to feed the filaments of their miniature 7 pin valves.

What I mean is those sets that needed a lead-acid accumulator, a HT battery that weighed as much as a small child and a grid bias battery just for good measure. These sets needed batteries because there wasn't anything else for them to run off. Even by the beginning of the 1930s only about a third of homes had an electricity supply.

My interest is home constructed receivers that use 2-volt dull emitter valves. Currently my main domestic receiver is a replica of a 1932 John Scott-Taggart design. Those of you who have seen my previous article entitled "A Golden ST300" may have noted that I threatened to write something about its purpose built eliminator. This is it.

There have been a number of good designs for battery eliminators in the pages of the BVWS Bulletin, some intended to operate portables, some for the workshop and others for no specific situation. All of those that I have seen fall into the category that might be headed "Should be heard but not seen".

My need was for an eliminator which could be used, in a domestic setting. Now, a scratched aluminium box covered in bits of Dymo tape is fine for the workshop or den. It's also fine if you're going to tuck it away in the back of a set in the space allocated for the HT battery. Any aesthetic shortcomings it may possess are academic if it can't be seen. However, as the sets I like tend to be housed in "American style" cabinets this kind of concealment is not possible.

My wife tolerates what she sees as my rather eccentric interest in vintage wireless. She also tolerates the presence of presentable vintage sets in the home. However a scratched aluminium box with many wires issuing from it, sitting atop a polished mahogany bookcase, is one thing that I am sure she will not tolerate.

What was really needed was an eliminator, that took up no space and was invisible.

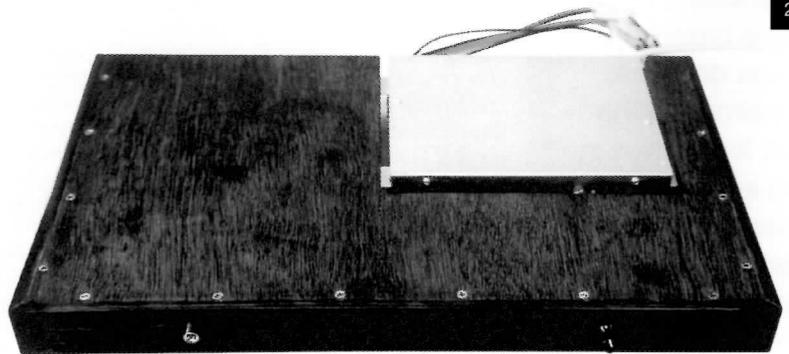
## Invisibility and zero size - hmmm?

On the basis that the readership has reached a stage in life when they no longer believe in Father Christmas and have long since given up hope of the Philosopher's Stone being discovered, you have probably concluded that the above two criteria are not actually achievable.

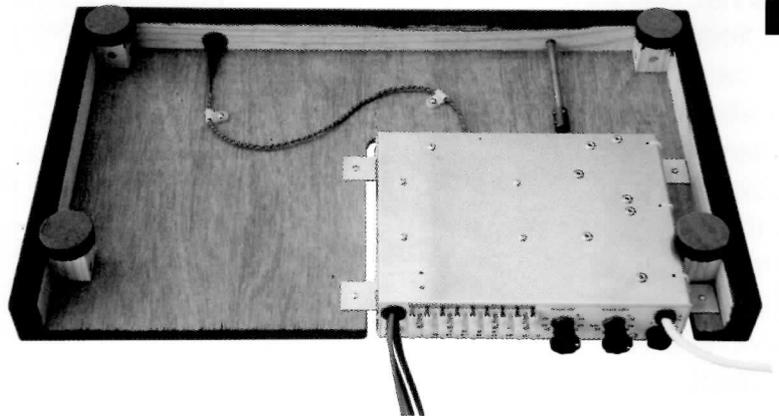
I won't go into all the possible avenues I explored in arriving at the final "design solution", suffice it to say there are three basic ways forward:



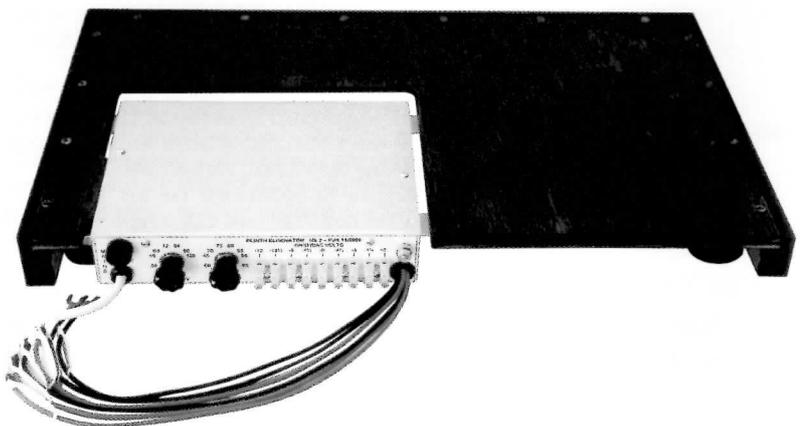
1



2



3



4

Figure 1: Here you can see the plinth with the ST300 for which it was made.

Figure 2: Showing the topside of the plinth eliminator.

Figure 3: An underside view of the completed plinth with the eliminator supported within the cut-out in the plywood plate.

Figure 4: Rear view of the plinth eliminator showing how the supply outlets are provided.

- put it where it can't be seen (hide it)
- make it look like something else (disguise it)
- let it be seen but not particularly noticeable (make it unobtrusive).

After a certain amount of cogitation I took the latter approach, as on balance it seemed to have the most merit.

### A Plinth!

No my computer doesn't have a lisp, I said plinth. Actually this was not a blinding flash of realisation for me as I had built one of these for a previous set. However, in that instance it was a rather chunkier affair. The Mk 2 plinth was to be slimmer, simpler in appearance and easier to make.

Figure 1 shows the plinth with the set for which it was made. As it sits under the set it takes up no more space on the surface than the set does. It's not particularly obtrusive (I think) and has the added advantage that the mains on-off switch and pilot lamp are readily accessible.

### The Design brief

It's a good idea, when you are going to make something, to be clear about what you are trying to achieve. I find it helpful to set out some design criteria to keep me on track.

The unit is to be composed of two parts i.e. a plinth and an eliminator. Together I wanted them to meet the following requirements:

- the plinth should have as low a height as possible and be simple to make
- therefore the eliminator should have as low a height as is practicable within the other constraints..

The eliminator should:

- be safe and reliable (when used with normal common sense)
- operate most 3 valve sets using 2-volt battery valves
- provide all of the necessary supplies for the set
- provide low impedance outputs, which are stable and to all intents and purposes ripple free
- be made only from new, currently available parts so that the design is repeatable
- have as low a cost as possible
- be simple to make.

### Constructing the Plinth

The key to the plinth's construction is a 1/2 inch thick plywood plate. This forms the top surface of the unit, holds all the other parts together and gives rigidity to its structure. The front and side pieces are made from planed timber 1 5/8 inches wide and 3/4 inch thick. This is rebated on the top edge to accept the plywood top and mitred to form the front corners. Figure 2 shows the topside of the unit and illustrates these points.

Small blocks are fitted to the inside of the front corners to prevent gapping and there are two additional blocks fixed towards the rear. The four blocks serve as fixing points for the round wooden feet. These are 1 1/4 inch disks cut from 1/2 inch ply using a hole saw mounted in an electric drill. All wooden parts were glued and screwed together.

After rubbing down the plinth was coloured with Jacobean Dark Oak, spirit-based stain. To seal the surface I used two coats of button polish, applied with a good quality varnish brush. The feet were finished-off by glueing on circles of felt.

Figure 3 shows the underside of the completed plinth with the eliminator supported in a "U" shaped cut-out through the plywood plate. A length of 1/4 inch brass rod and a spindle coupler extend the shaft of the rotary mains switch through a 1/4 inch clearance hole drilled in

the front of the unit. A second hole, counterbored on the back, is fitted with the bezel for the LED indicator lamp.

### The Eliminator

The eliminator is housed in an aluminium case with no ventilation holes, this stops dust (or anything else for that matter) from getting in. The case is connected to mains earth and forms the heatsink for the main heat producing components i.e. the mains transformers and the LT regulator, which are attached directly to it. A silicone rubber washer insulates the regulator tab from the case.

Heat is a key factor in the failure of electronic circuitry. The design of the circuits in this unit is such that they dissipate a minimal amount of heat and thus the lack of ventilation holes is not a problem. However it is necessary to mount the case about 1/2 inch clear of the surface which supports the plinth to allow a free flow of air to the underside. This is the purpose of the plinth's feet. The physical form of the plinth causes the warmed air to flow out at the rear. This draws air at room temperature in from the front and sides. In use the eliminator runs cool, barely reaching hand temperature after several hours of operation.

The HT and LT supplies exit via six flying leads, which issue through a single grommet on the rear of the case. These terminate with crimp-on spade connectors (actually soldered on) with the joints strengthened by heatshrink sleeving. The screen grid and detector HT potentials are selected by two inexpensive rotary switches, which can be set to 0-volts if these supplies are not needed.

A 5-amp mains connector block, cut down to 9 sections, provides the grid bias outlets and the case is fitted with a projecting 2 BA bolt, which can be used as an auxiliary earth connection if required. Figure 4 shows how the outlets are provided.

This approach to terminating the outlets has two distinct advantages:

- the eliminator case can be smaller, as the rear face does not have to accommodate a multitude of binding posts and wander plug sockets
- there is a net cost saving of around £15 (connectors are expensive things!).

### The Specification

The key data for the eliminator unit is as follows:

<b>Size</b>	Length – 8 inches, Depth – 6 inches, Height – 1 5/8 inches.
<b>Main HT</b>	Potential – nominally 120 volts (no load = 130V, at 20mA = 110V) Load – max = 20mA Ripple – low (calculated to be about 80mV p-p at full load).
<b>SG HT</b>	Potential – 60V to 95V switched in 5 volt steps with 0V parking position Load – max = about 2mA (drops under load, adjust to correct for this) Ripple – very low (about 3mV p-p) decoupled.
<b>Det. HT</b>	Potential = 36V to 108V switched in 12 volt steps with 0V parking position Load – max = about 2mA (drops under load, adjust to correct for this) Ripple – very low (about 3mV p-p) decoupled.

All HT outputs are via a common 50mA, slow fuse.

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## List of components for Plinth Eliminator Mk 2

6

Components	Details
C1	0.022µF - capacitor Class X2 275v AC Maplin SC90X
C2, 3 & 4	3 x 22µF 250v 180 mA ripple rating RS 228-7186
C5	100µF 25v
C6 & 7	2 x 2.2µF 250v RS 228-7158
C8	4,700µF 16v 1,500 mA ripple rating Maplin VH57M
C9 to 16	8 x 47µF 16v
D1 to 4	4 x 1N4005 - 600v 1A
D5 to 10	6 x 1N4003 - 200v 1A
F1	125 mA anti-surge (T)
F2	150 mA anti-surge (T)
F3	50 mA anti-surge (T) RS 157-9670
F4	1A anti-surge (T)
IC1	LM317T - 1.5A regulator
L1	Mains transf'r 6VA 115v pri. used as choke RS 231-8145
LED1	LED green 5mm 120° viewing angle
R1	15KΩ
R2 to 8	7 x 4.7KΩ
R9	27KΩ
R10 to 16	7 x 2.2KΩ
R17	10KΩ
R18	330Ω
R19	270Ω
R20	220Ω
R21	1KΩ
R22 to 29	8 x 1.5KΩ
S1	Rotary mains switch double pole 4A 250v AC
S2 & 3	2 x rotary switch 12 way single pole adjustable stop - Lorlin
T1	Mains transf'r 6VA 230v pri. 20v + 20v sec. RS 804-925
T2	Mains transf'r 6VA 230v pri. 5v + 5v sec. RS 804-868
VR1	200Ω cermet variable resistor 3386P top adj. RS 186-693
Z1	1N5352B zener diode - 15v 5watt RS 314-9035
Z2	BZX79 series zener diode - 12v 500mW RS 283-738

### Notes

Components listed are those selected for original circuit  
 All capacitors have radial leads (PCB mounting)  
 Except for C1 all capacitors are electrolytic  
 All resistors are 0.6watt metal film  
 For components which are commonly available I have not specified the source  
 Mechanical parts, connectors, fixings etc are not listed  
 All RS component were obtained via Electromail tel 01536 204555  
 Maplin order line tel 0870 264 6000

regulated output. This is both unnecessary and specifically recommended against by the regulator manufacturer. The manufacturer suggests that a decoupling capacitor with maximum value of 10µF may be used if the load generates sharp current transients. This is not the case here as the load presented by the valve filaments is purely resistive.

### Making the Eliminator

The priorities here were to make construction as simple as possible whilst keeping costs down and producing a reasonably professional-looking result. Of course all the other criteria such as size, performance and safety had to be met.

The circuit was made up on a piece of perforated stripboard with a 0.15 inch hole pitch, which I prefer to the 0.1 inch standard board. It has several advantages as the track is more substantial, the strip spacing is larger and the board is stronger making it more suitable for power supplies.

With the exception of those parts carrying mains potentials, the regulator IC, smoothing choke, LED and resistors R1 to 17, all other components were mounted on this board. Circuit board pins were used for the wire termination points.

For the case I used an inexpensive aluminium box from Maplin measuring 8 inches x 6 inches and 2½ inches deep. This was cut down to give an internal depth of 1½ inches. The angled pieces, which had been removed in this operation, were trimmed and refitted using pop rivets. All necessary holes were drilled and the case was put aside for the later final assembly.

A label was created for the rear face of the unit using a computer with a standard word-processing package. I got this laminated at my local stationers and fixed it to the case using high-tack double-sided adhesive tape.

Final assembly was straightforward. The regulator was attached to the floor of the case using a standard insulated fixing kit; the board was affixed with M2.5 nuts, bolts and nylon spacers and wherever wires or components needed to be anchored, nylon cable ties were used. The transformers and choke were attached using pop rivets. Figure 7 gives the rear view of the completed eliminator unit prior to securing the cover plate.

### Costs

The plinth was made from scrap wood left over from other jobs. The glue, screws, stain, polish etc I already had so it's difficult to cost but I guess £5.00 would cover it?

I costed out the eliminator in detail because I was interested to see how cheaply it could be done using all new parts. All parts and materials were covered including solder, wire, nuts, bolts, rivets, fuses, mains plug – everything – even the cost of the piece of paper to make the label!

The cost was just over £42 at the prices current in November 2000.

### Fellow Constructors

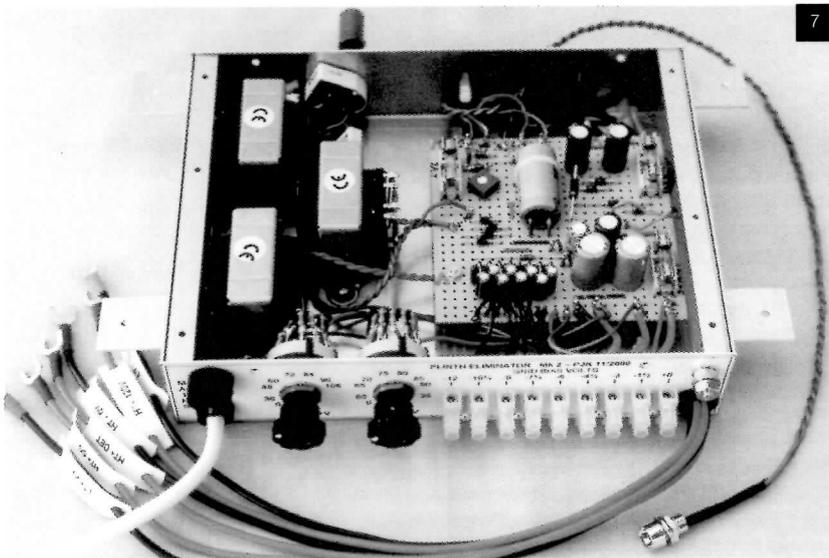
For those readers who might like to use this design, or an up-rated version of it, as the basis for building an eliminator, the later sections headed Hints & Tips and Up-rating the Output may be of interest.

In the meantime here is a section entitled Some design Considerations.

### Some design Considerations

When I started, a few years ago, putting together eliminators for my sets I realised that my theory had got a bit rusty. This forced me to do a bit of re-learning and for those who may be interested here are some of the points, which I worked through.

Mains Transformer(s) – These of course are essential to isolate the eliminator outputs from the mains supply



7

The values of C5 and C9 to 16 are chosen, in conjunction with the chain configuration used, to enable the grid bias potentials to be rapidly established at switch-on and maintained during HT decay at switch-off.

LED1 is the on-off indicator. It is connected by a flying lead and inserted through a small bezel in the front face of the plinth.

D9 & 10 are to prevent voltage reversal on the pins of the regulator IC; this is recommended by the IC manufacturer so goodness knows why they didn't design it into the chip? VR1 allows a very fine adjustment of the 2 volt output.

There is no smoothing capacitor connected to the

(which is a fundamental safety consideration) and to provide the appropriate ac potentials for the eliminator circuitry. However beyond this there are a number of other considerations, which affect cost, performance, size and reliability.

Reference to the circuit diagram in figure 5 shows that there are two mains transformers. The reasons for this are:

- the overall height of two small transformers is less than one large one
- the secondary voltages can be selected individually from a standard range
- it is easier than winding your own transformer. And cheaper than a transformer kit.

I could have used a toroidal transformer, which has the advantage of a low magnetic field and hand wound on an additional secondary for the LT supply, as Gary Tempest did in his design (see volume 24 number 3 of the Bulletin). However the secondary voltage I wanted for the HT supply is not readily available in a toroidal transformer and my solution is cheaper and gives a slightly lower overall height to the unit.

When using standard transformers in close proximity to a receiver there is the possibility of significant hum being produced in the speaker of the set. With this type of receiver there are two main potential causes. One is through electrostatic radiation from the mains input to the transformers being picked up by the grid circuit of the leaky-grid detector. This is prevented by encasing the eliminator in an earthed metal box. The second is through magnetic radiation (leaking from the mains transformers' imperfect iron core) being picked up by one or more LF transformers in the set. The solution to this is to place the mains transformer(s) as far away as is practically possible and to ensure the orientation of their cores is at right angles to those of the LF transformer(s).

In practice I have experienced no hum problems using conventional transformers in this design.

**Derating Mains Transformers** – Most people can work out the appropriate secondary voltage to give the required raw dc supply, normally it approximates to the peak voltage, which is 1.414 x the rms value. However when it comes to choosing the current rating it all seems to get a bit more mysterious.

If the transformer secondary has a purely resistive load e.g. an ordinary incandescent light bulb, then it's very straightforward. The current, which the transformer is capable of delivering, must be equal to or greater than the current drawn by the load.

This though is not the situation we are considering, as in a power supply the transformer's load is non-linear due to the rectifier circuit and reservoir capacitor. For most of the ac cycle no current flows at all, it is only as the voltage approaches its peak value that the rectifier conducts to top-up the potential in the reservoir capacitor. The current flow is in short pulses, which are of a surprisingly high value.

If you measure this current with an ordinary meter it will give you a mean or average reading which may seem modest. However the heat generated inside the transformer is equal to the instantaneous current value squared, multiplied by the resistance of the windings, averaged over time.

So the transformer must be bigger than you might expect and to help us estimate how much bigger there are current derating factors. The value of the derating factor depends on the type of rectifier circuit used, these values can be found for example in the RS Components catalogue and I will reiterate some of them here.

For circuits where the rectifier is coupled directly to the transformer secondary and the reservoir capacitor (with no other intervening components which can limit the instantaneous current) then the following applies:

Rectifier circuit	Derating factor
Half-wave	0.28 x secondary current rating
Full-wave	1 x secondary current rating (of each secondary)
Bridge	0.62 x secondary current rating

Bearing in mind that a full-wave rectifier uses twin secondary windings in series then it can be concluded that for a given supply voltage the bridge rectifier circuit allows the most efficient use of the transformer's current delivery capability.

Example – manufacturers specify the "size" of a transformer in VA (volts x amps). If a transformer has a 24 VA rating with a 12 volt secondary then it can deliver 2 amps into a resistive load. If instead it is used to feed a large reservoir capacitor via a bridge rectifier then it is only safe to draw a dc current of 1.24 amps, i.e. 2 amps x 0.62 = 1.24 amps. If a half-wave rectifier is used the current drawn can only be 0.56 amps (2 amps x 0.28).

**Derating for voltage-doubler circuits** – I could find no information on this and had to resort to carrying out a series of experiments to establish a figure. This cannot be done by using ordinary bench meters, as it is necessary to measure the "true rms value" of a non-sinusoidal current waveform.

Good quality multimeters do have ac current ranges but they do not measure "true rms". A moving coil meter reads "mean" or average current and the shunts inside the meter adjust this by a factor of 1.1 to represent the rms value. This 1.1 factor only holds true for sinusoidal waveforms.

My tests used the heating effect in an electrical element. In these I obtained consistent and very similar results for two different types of voltage doubler; both gave a derating factor of around 0.21 x secondary current rating.

Example – taking this eliminator's HT supply as our example. The transformer has a 6 VA rating with a 40 volt secondary (2 x 20 volt windings in series).

Thus the current the secondary can deliver is:

$$\frac{6VA}{40V} = 150mA$$

Derated for a voltage doubler circuit the maximum HT current is 150mA x 0.21 = 31.5 mA

Personally I prefer to run transformers at no more than about 80% loading (this keeps temperatures down) so we will draw no more than 25mA. The two potential divider chains for the SG and Detector HT supplies together take about 5mA leaving 20mA available for the main HT supply. This is plenty for a typical battery set, which would have been designed for economical use of the expensive HT battery.

**HT smoothing** – In this design it is by traditional choke and smoothing capacitor. The reason for using this method is that it is electrically efficient, maximising the output from a given size of mains transformer and dissipating very little heat. Smoothing chokes are expensive if bought new and a much more cost-effective approach, when the current is low, is to use the primary winding of a 120 volt mains transformer.

The one used here has a 6VA rating and of course the secondary windings must not be shorted or connected to any other circuit, as this will dramatically reduce the inductance of the primary winding being used as the choke. The inductance is about 20 henries and the cost is about half that of a commercially made choke.

At this point I fear I hear loud mutterings of "core saturation" as purists throw up their hands in horror. Well technically they are right.

An iron-cored inductor that is intended to carry a dc current is normally designed with a minute air gap in its magnetic circuit. This is done by assembling the iron "E" and "I" laminations together in two separate blocks and

Good quality multimeters do have ac current ranges but they do not measure "true rms". A moving coil meter reads "mean" or average current and the shunts inside the meter adjust this by a factor of 1.1 to represent the rms value. This 1.1 factor only holds true for sinusoidal waveforms.

When using standard transformers in close proximity to a receiver there is the possibility of significant hum being produced in the speaker of the set. With this type of receiver there are two main potential causes. One is through electrostatic radiation from the mains input to the transformers being picked up by the grid circuit of the leaky-grid detector. The second is through magnetic radiation (leaking from the main's transformers imperfect iron core) being picked up by one or more LF transformers in the set.

placing a thin paper shim between them before they are clamped together. The effect of this is to reduce the magnetic flux in the iron and prevent saturation of the core, which would otherwise cause the inductance to reduce significantly.

However it's all a matter of degree, i.e. how much current, through how many turns on what size core. I have used this trick in a number of eliminators and it works very well providing the transformer used has a primary of around 120 volts.

#### Hints & Tips

These suggestions include the "safety factors" which I normally apply. If I have stated the obvious please excuse this.

**Electrolytic capacitors** – Radial lead types for PCB mounting are available with long leads (30mm) and are significantly cheaper than those with traditional axial leads.

For reservoir capacitors in voltage doubler circuits:

- voltage rating should exceed voltage doubler output
- ripple current rating should be  $4\frac{1}{2} \times$  dc current drawn.

For reservoir capacitors in bridge rectifier circuits:

- ripple current rating should be  $2 \times$  dc current drawn.

**Transformers for voltage doubler circuits** – The dc output voltage will be approximately  $3 \times$  total secondary rms voltage, the current rating of the secondary winding should be  $6 \times$  the dc current drawn.

**Transformers for bridge rectifier circuits with a reservoir capacitor** – The dc output voltage will be approximately  $1\frac{1}{2} \times$  the secondary rms voltage, minus the voltage drop across two rectifier junctions (about  $1\frac{1}{2}$  volts for silicon rectifiers). The current rating of the secondary winding(s) should be  $2 \times$  the dc current drawn.

#### Up-rating the Output

The following modifications are suggested for the circuit shown in figure 5 to increase the current that can be drawn from the LT and HT outputs.

#### To increase LT output to 2 volts at 1 Amp –

Component	Amended details
F1	200mA anti-surge (T)
T2	Mains transf'r 12VA 230v pri. 6v + 6v sec. RS 804-953
F4	2A anti-surge (T)
C8	Still 4,700µF 16v, ripple rating increased to 2,000mA RS 205-1713

#### To increase HT output to 120 volts at 45mA –

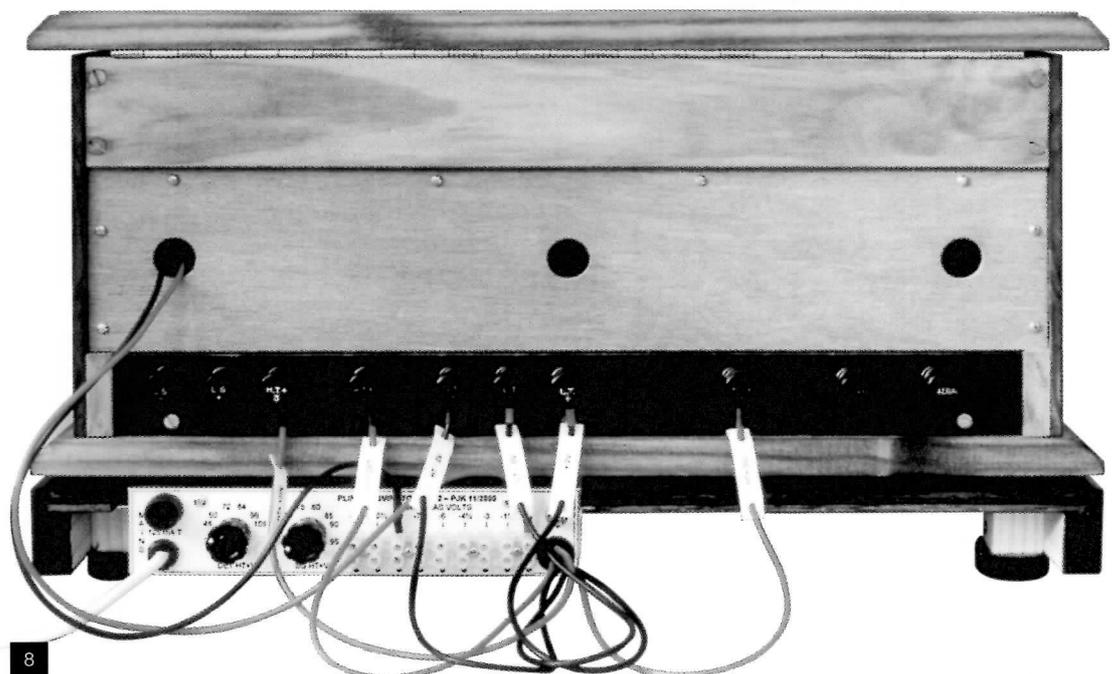
Component	Amended details
F1	200mA anti-surge (T)
T1	Mains transf'r 12VA 230v pri. 20v + 20v sec. RS 805-007
F2	300mA anti-surge (T)
C2, 3 & 4	$3 \times 47\mu\text{F}$ 250v ripple rating 300mA RS 228-7209

Due to the larger size of the transformers either of these modifications will increase the overall height of the unit by  $\frac{1}{2}$  inch.

#### In Conclusion

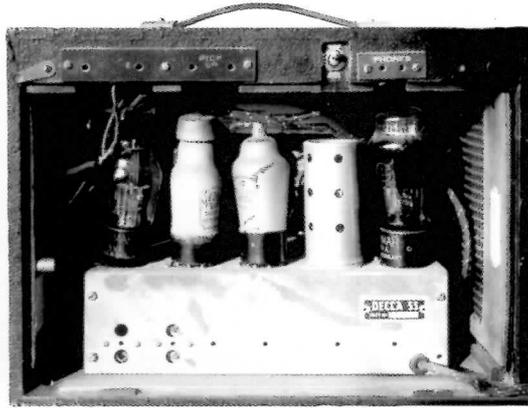
Well that's it. The eliminator has been powering up the ST300 for about a year now. Radio 4 and the World Service roll in with no problems, as do the foreigners when I go on the occasional search around the dials. Figure 8 probably provides a fitting conclusion.

Figure 8: So that's the back of that project!



# Decca 55: Hot Distinctive Design

By John R. Sully, Photography by Leslie K. Chatterton.



Pictured above is the Decca 'Triple Range All-Wave Universal Five-Five' from 1937. A rather long title for a radio it could be said, but nonetheless it is a quite distinctive and sought after model. As its name suggests, the receiver provides a short-wave band, a feature not normally found in portable sets, as well as the more usual medium and long waves. The short wave band tunes continuously across 19 – 49 metres. The receiver is altogether quite well specified for a set measuring only L13 $\frac{1}{2}$ ", H10 $\frac{1}{2}$ " and D7 $\frac{1}{2}$ ". Features included sockets for a gramophone pick-up, as well as sockets for using a pair of phones or external speaker, and a switch to silence the internal speaker.

The set featured four valves plus rectifier plus barretter, which as you might imagine generates much heat in such a confined space. In fact this might account for why these sets are not too common now, it is said many succumbed to fire or serious scorching and therefore lack of confidence by the owner. When operated on AC mains, HT current is supplied by a UR1C half wave rectifier. When operated from DC mains the filament of the rectifier behaves as a low resistance, and the current is regulated by a C1 barretter supplying the four valves whose heaters are connected in series, between them dropping 89 volts. The line of valves can be seen in the rear view (above), and the barretter is situated further inside the set out of sight behind the 7D6 output pentode to the far right of the chassis.

With such a limited amount of space in which to dissipate heat it is perhaps extraordinary that according to the "Trader" service sheet Decca chose to utilise a 250v 15w mains lamp to illuminate the scale. It is uncommon for dials to be illuminated by mains voltage lamps, particularly in pre-war receivers, and it is surprising that perhaps one of the sets least able to dissipate resultant heat finds itself utilising mains illumination to light the dial. Also included in the scale is a further 6.3v lamp to highlight the waveband selection. However, once

production commenced perhaps Decca perceived impending heat problems from the 250v lamp as it has been removed on my receiver, and is not present on another chassis I checked either.

Ventilation is provided on the left side and back by cut-outs in the ply cabinet which are infilled with thick fibre mesh. When I first obtained the example shown, the fibre mesh insert was missing from the rear of the set, suggesting that the original owner had removed it in an attempt to improve ventilation. Needless to say, leaving the chassis exposed for all and sundry to poke fingers into is hardly safe practice, particularly in a Universal set. (The other set I examined was in fact missing its entire back panel). Sound is delivered from a speaker on the right hand side of the cabinet. The cabinet is covered in rexine, and was available in maroon, blue and black. The example featured is the black version.

The degree to which the components have been squeezed into the cabinet is illustrated by the image (right), where the rectifier is pictured. Note that the output transformer, which is mounted on the speaker itself, is a "hairs breadth" away from the top of the rectifier valve. At first I thought the speaker might have been wrongly positioned, resulting in the transformer being perhaps 90° mis-orientated, but in the service instructions it is clearly stated that the transformer should be at the top facing towards the rear of the cabinet. The outcome is that it seems difficult, if not impossible to change the rectifier valve without removing the chassis! The speaker is encased inside a cloth bag just to make sure that fire risk is maximised from the close proximity of the rectifier!

The tuning scale is particularly notable in this set, and is probably what makes it appear so attractive. The oval glass scale is domed, a feature I have only seen utilised elsewhere by UK manufacturers Belmont and Regentone Radio. The lower half of the dial features a Mercator view of the globe, with countries in the British Empire defined in red, and the rest of the world shown in black. Over the years the red pigment has faded in the sun, perhaps an allegory for the decline of the Empire during the intervening years too.

The key to why the set is so well specified lies in the fact that the chassis was also available in a large, fairly anonymous walnut cabinet, with the speaker mounted above the tuning scale. This set, designated model 66, has plenty of space to dissipate heat and the owner would perhaps be more likely to utilise the features like Gram Pick-Up. Indeed, one must wonder if Decca would have been better off omitting some of the luxuries provided in the portable. For instance, why would external speaker sockets and a speaker cut-out switch be useful – surely the very point of a portable set is that one would simply move it!

The model 55 portable set cost £9.9s.0d, whilst the



The speaker is encased inside a cloth bag just to make sure that fire risk is maximised from the close proximity of the rectifier!

continued on page 43



## Dear Editor

I much enjoyed Denis Tabor's article about Valve Testers. I still use an AVO 2-piece job, as in the attached photograph.

I have instructions which "imply" that it is circa 1935; however, I'd welcome more detailed information. If it is of any interest, I could try to get a better photograph; but Denis refers to a "later article" for which he probably



has adequate information and illustrations. I look forward to it!

Best wishes

Bill Jarvis,  
Edinburgh  
GM8APX

## Dear Editor

Does anyone know if there is a book, or information of any sort, tracing the history of the firm of SG Brown, based in Watford originally?

Although I remember the firm, this letter is mainly intended to relay a request published in the readers' letters column of the Watford Observer.

Martin Reed.

## Dear Editor Safety

I have thought about the issues raised in Colin Bogis's letter for some while.

I assume that anything we sell at an old radio auction will avoid an unfortunate legal outcome. Purchasers there should be expected to have the expertise to assume all risks. However, if I repair or restore a radio, for someone not connected with our hobby, I would expect any legal outcome to be unfavourable.

Personally, what matters to me is not hurting such friends or acquaintances with a radio worked on by me. To this end I make modifications that mean the set will no longer be original but safety must come first. For AC only types, where needed, I always replace or re-sleeve the transformer lead out wires and then do an insulation test at 750V. If all is well I fit a 3 core mains lead and earth the chassis. On radios with a 2-pin rear connector I have removed this to fit a permanently attached lead. I fit a 2A fuse in the mains plug and mark the plug accordingly. Any rubber covered, or poor wiring is replaced. For AC/DC sets, I like the mains switch to be two pole to break both lines of the supply. Also, I have converted these to isolated chassis (see Radiophile No. 63, 1996), as was the practice for many US radios. All sets that I have to rebuild, in order to deal with rusty metal work, get converted.

Likewise. I always make sure that radios have a proper back secured with a full complement of screws. If any safety labels are worn or illegible then I make new ones, on the computer, and glue these on. For AC/DC, (even those that are converted) all exposed metal parts are covered and screw holes wax filled. Finally, I do an insulation test at the mains plug. I also hope that this is thought enough for me to avoid a knock at the door or a solicitor's letter.

Gary Tempest

## Dear Editor Data mystery

The Ever Ready K80A is a battery frequency changer. It is an octode, and with other types was manufactured for Ever Ready by Mullard. It is the same as the Mullard FC2.

I have Mullard's own valve book of the mid-thirties - first time round, and this gives the operating voltages for the various electrodes. It does not give the anode and screen currents. The standard H.T. battery of the pre-war period had several voltageappings, and a suitable screen voltage could be selected and more or less maintained over a range of current drain.

I wish to supply a K80A screen at its correct potential through a dropping resistance from the H.T. rail and so I need to know its current.

Here's the problem. The Wireless World supplements of 1936 and 1937 give anode and screen currents of 0.6 mA and 0.75 mA. (They have 0.95 mA for the FC 2).

Iliffe's Wireless World Radio Valve Data of 1949 and the doughty 1966 version give 0.95 mA and 3.75 mA - a big difference.

The Radio Valve Guide of 1953 (which has several errors) agrees with the last two.

Helpful members of the Society have supplied me with photocopies from various serious compilations, and these usually confirm the later Wireless World information. Never is the first source of the data given, though the W.W. does include a list of addresses.

I would be grateful if someone could send the definite characteristics from a Mullard own valve book. I doubt whether Ever Ready did this.

I do know that the characteristics of some valves changed over time, viz. the upgrading of the PX4 etc. and this could explain the differing data. I shouldn't think however, that this happened to the K80A since it was quickly replaced by the K80B: better for short wave.

Over the years I have met books where the information good and bad has been copied up without check. Even the '66 Wireless World has an error of ten times too small for the anode impedance for the PM12M compared with the '49 edition.

Can anyone help?

Bernard Litherland  
The Old School House  
North Wraxhall  
Chippenham  
Wiltshire  
SN14 7AB

## Dear Editor A letter for '405 ALIVE'

With reference to the two recently discovered 'lost' Dads Army episodes, ('Operation Kilt' and 'The Battle Of Godfrey's Cottage') I'm told that they scrapped on transmission at the last minute the 'added' laughter track, meticulously

re-recorded recently in TC Studio 8. As reported in the BBC's staff magazine Ariel-18/12/01-, the original 1969 studio guffaws were too 'restrained' for modern ears and so had to be 'sweetened'. In any event, I couldn't detect any obvious additions, unlike previous clunky attempts (vehemently denied) which infused stereo NICAM chuckles onto a mono optical audio track. Very classy. Even though these two old shows had been restored using digital help, the much publicised 'restored to an original video look' wasn't evident to me. It all still looked like a tele-recording (film recording), albeit a very good one (unusual for the BBC). Although the 'clean up' was excellent, I noticed they'd fiddled with the titles adding 'Episode one' etc. Ho hum. Also, elements of confusion are starting already. In the Ariel report (note this is the BBC's very own house journal) the air-head reporter states that it was a can of TAPE, discovered in the garden shed!! This confusion between film and tape is growing. The uninitiated perceive everything on tv as video and assume it's all camcorder tape. Also, it doesn't help when cheap taped soaps and documentaries are 'flickered' to give a film effect, even down to adding 'grain'. The stupidity of this is that future 'restorers' will have one hell of a time 'cleaning up' old stuff recorded on digital tape, video disc, rubber bands or whatever fancy future storage medium is in use. Finally, It must be a great strain for the broadcasters to use the correct aspect ratio for all this 'classic' tv! Wide screen and Paint Shop colour next for Dad's Army?

Dicky Howett

## Dear Editor

In the Bulletin Volume 5, Number 2 on page 21 (the original of which I possess) Mike Kemp has listed British wireless magazines pre 1939.

I can add to these 'Radio Contact & Television, which is the in-house magazine published by Graham Farish Ltd. They made complete sets and components. It was printed by the Amalgamated Press Ltd. Volume 1, number 1 was 3d and numbers 2 & 3 were 4d or post free 5 1/2d. It came out in 1935. It is believed that these were the only issues published.

The Telsen Radiomag was 3d for volume 1, number 1 and has a colour picture of the new Telsen factory on the back cover. Telsen ceased trading, having built the new factory at Aston, Birmingham, in 1935/36.

I have an 'odd ball' 3435v serial no D12593, 1935? with I.Fs about 175/180 k/cs and some other (coils) components which must have been 'bought in' to complete part-made sets lying about the factory. These were factory fitted and not put in after manufacture (see Tr Sheet 592, Oct 1942).

Regards

Chris Price

## Dear Editor

### A cautionary tale - valve testers

Some time ago, and before the M32 was built, and on Newfoundland Road, was a radio repair shop.

As a greengrocer puts out his wares to catch the customer's eye, so the proprietors, professional men, put out their pieces.

In the window, on the right, was a home-



very good likeness of a Philips 930 made by a local caterer. As you will see, the 'dial' was tuned to '70' for the occasion. The cake tasted good as well! Details of caterer supplied on request.

Yours truly

Philip Rosen

**Dear Editor**

I would like to thank all the BVWS members that helped in the making of the CD ROM, 'BVWS Bulletin: the First Twenty Years', not forgetting the original authors. Only days before the CD I had unsuccessfully tried to buy the Bulletins from one of our older members - he refused much to my relief. I have been having a look at some of the first issues and it has made me realise just what a lot of effort the founder members must have put in, writing two or three articles for each edition. Then putting it all together on an old typewriter (no word processors in those days). May I also take this opportunity to thank all the BVWS members that have helped me during 2001.

Best wishes for 2002

John Clappison

**Dear Editor**

I don't know if this is of any interest but recently I had hoped to make up a two-crystal detector (I could not get zincite) nevertheless I thought that I had located one in a 'junk box' at the NEC recently.

As you can see from the photographs it appears to be an adjustable resistance, in the M2s.

I realise it could be an instrument and not an early wireless. The discs alternate with brass ones, the individual discs do not appear to be carbon. If this is not of interest I may be able to adapt it into a two-crystal detector, if I ever find a source of zincite.

Hoping that this might be of interest.

Yours sincerely

Harry Harrison

made amplifier, finishing with a single PX4. This was the central piece, and was not for sale. Nearby was a Philco cathedral receiver. Younger eyes would see that the cabinet was well endowed with woodworm holes. I still have one of the control knobs for the enthusiast who just can't find one.

Behind the left window and for the most of the left wall were rows of narrow uncovered deal shelves. Sitting on them, and out of their cartons was the entire stock of valves, about wartime style. The effect was that of an Edwardian grocer with jars of condiments on neat racks, behind the counter. No plastic packaging here.

No feminine hand, it seems, had done the dusting, and the valves had stood, rarely disturbed, through the years of Bristol's coal burning days.

Close inside the door was a short counter, with a panel on the right, but on the left a large and impressive wall mounted - as I remember - valve tester. Long leads and heavy round cast iron meters did the trick. The meters would not have looked out of place in a small generating station. Above and nearby was a large specimen transmitting valve.

The owners were two elderly gentlemen. No names, no pack-drill, so I'll call them H and H. The demise of the valve receiver and the influence of the High Street electrical chain stores had meant that trade was slow: exceedingly slow. But should a customer ask for a valve an opportunity for great professionalism presented itself. Much talk and many references to the valve tester provided them with rare pleasure and self-satisfaction.

It happened that at the time I was hoping to make a complete collection of all the UX valves that had actually been marketed. This started with(2)00 and up to 112. A few blanks were there and I needed a type 45 (145, 245 etc). So a trip to Bristol was on hand. Parking being

no problem in those days.

Yes, they had one. Beaming they lifted one down. By now it was black with grime and the nickel plating totally tarnished by the sulphur.

A coarse wire brush appeared, the sort used by decorators for removing rust from spouting etc. Despite desperate protestations (honestly) the old men proceeded to rasp off the tarnish from the pins stating quite firmly: 'No valve tester - no valve'. It was their moment of glory.

I gritted my teeth and kept a smile.

I kept the valve for a short time afterwards, no name, no number, no nickel.

To date, I still have difficulty getting valves whose pins and top cap (especially) have not been scratched by valve testers.

Yours sincerely



Anode Current

**Dear Editor**

For my recent 70th birthday, my wife had a

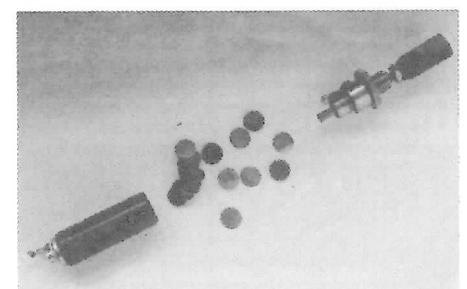
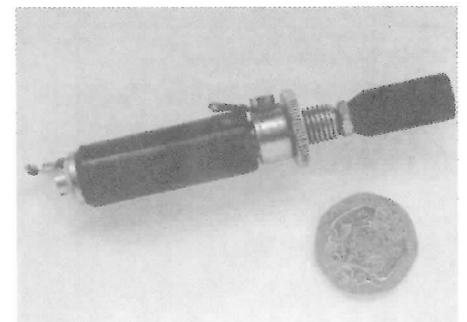


table model 66 set cost £10.10s.0d, so the portable version was in fact only about 10% cheaper to buy than the veneered household "pride and joy". Decca sets seem to have a reputation for poor reliability. However the set pictured did not come from a wireless enthusiast/collector source, and to its credit was working on arrival and has continued to work for the twenty or so years I've owned it, without electrical renovation or repair.

The final indication that suggests more time

could have been spent on design is the method of fixing the back panel. Whilst some pre-war mains sets used small hand levers to allow removal of the back, probably the majority used screws to hold the back in position. In any event, a large, heavy receiver on a sideboard would be unlikely come to much harm from the inquisitive hands of children. However the 55 is a portable set that could be placed anywhere, and yet the back is held in place solely by two 1" levers (seen top left and right of the rear view

picture page 39) that could be opened by any child, thereby providing open access to the chassis! Ironically I checked the back fixing on the table model 66, and you guessed it – it is restrained by woodscrews!

So a generously featured set with a distinctive cabinet, but one cannot help thinking we would see more about at swapmeets today if just a little more thought had gone into the finer details of design.

## Minutes

### Minutes of BVWS Committee meeting held on Thursday 13th September 2001 at 5 Templewood, Ealing

Present: Mike Barker (chair), Jeffrey Borinsky, Ian Higginbottom, Guy Peskett, Terry Martini.

1. Apologies for absence: Carl Glover.
2. The Minutes of the meeting held on Thursday 19th April 2001 at Templewood were accepted as a true record.  
Matters arising; none not covered by agenda items.
3. MB reported that the membership stood at 1467. He also reported that agreement had been reached with "405 Alive" that their authors would write for the Bulletin and that their 337 members who were not also members of the Society would become associate members of the Society until their existing subscriptions to 405 Alive ran out. He hoped that most would then apply to join the Society as ordinary members. The work of incorporating the 405 Alive membership data base into the Society's data base was proceeding.
4. JB reported that current balance stood at £18,500 and that the projected balance at the low point of the year (just before the subscriptions come in) would be not less than £7000. He tabled a paper on methods of paying subscriptions which was discussed. It was decided to keep the existing credit card facility for overseas members renewing for three years and to actively pursue setting up a direct debit facility for all the coming renewals. If this

could not be done in the time it was decided to open the credit card facility to all members renewing for three years.

5. TM reported on the last Harpenden meeting which had included a "Talk about Wireless" by Don Mclean entitled "Restoring Baird's Image" and participation by the Telephone Heritage Group. Terry was congratulated on an excellent meeting. TM reported on plans to improve the health and safety and security aspects of the auctions. JB reported that the Tesla Coil Builders Group had expressed an interest in participating in one of our meetings. It was agreed that the TCBG should be asked to send us a detailed proposal including a consideration of safety and fire risk issues.

6. A long discussion was held on the conference telephone with Andrew Henderson of 405 Alive. The main points to emerge were that AH would act as editor for the Bulletin articles submitted by authors who had originally written for 405 Alive, technical articles probably coming to him via David Newman. Pictures and plain text would be passed to Carl for scanning, design and layout.

7. TM reported that the CD ROM to be issued this Christmas would comprise a set of Bulletins complete up to issue 20 and an index. He reported that about 50% of the scanning had been done although he was not happy with some of the quality and the rest of the scanning and some repeats would be done by the beginning of November. Paul Stening is writing a PC front end, MACs will be able to read the PDF files but will not have full functionality.

8. Items for the next meeting's agenda

- (i) Financial projections and subscriptions
- (ii) Broadening the Society's objectives

9. AOB

(i) It was agreed to advertise the free meetings of the IEE relevant to our objectives  
(ii) With the approaching Winter in mind alternative entry arrangements at Harpenden were discussed. Some may be introduced on a trial basis.

(iii) TM reminded the meeting that uncirculated proof copies of the Marconi £2 coin were available from the Mint, major post offices, and the RSGB. The coin would be issued in October.

(iv) MB stated that the Bulletin print run should be increased to 2200 and that 1800 copies of any inserts would be needed.

(v) MB reported that with the influx of members from 405 Alive there were insufficient membership cards for the rest of 2001 and for 2002. MB will obtain costs for substitute cards for this year, for 400 extra cards of the 2002 design, and for a completely new set of cards for 2002.

10. Next meeting

22nd November at the Vintage Wireless Museum.

The meeting closed at 00,40

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**Swapmeet**  
Colbury Hall, Nr Ashurst Hampshire  
**Sunday May 19th 2002**

Jnc. 2 M27, A326, take A35 (Lyndhurst)  
Colbury Hall is on the left at 2nd roundabout.  
Doors open 10.15 Stallholders from 0900hrs

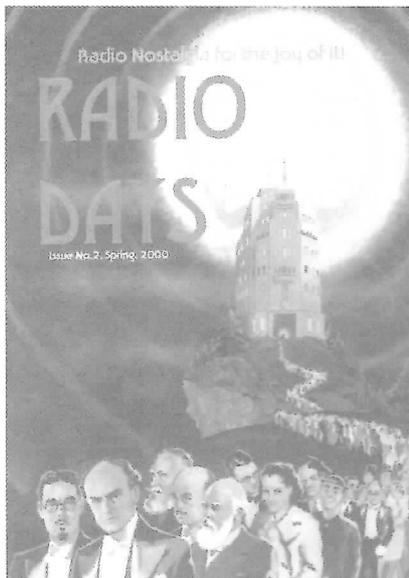
Stalls £12  
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## Back issues

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**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, Cohersers 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 phony war, Repairing a BTH loudspeaker, The portable radio in British life.

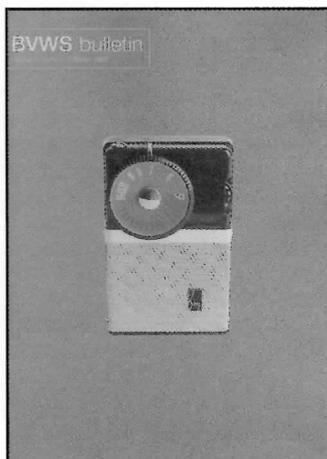
**Vol 26** Numbers 1, 2 Inc. How green was your Ekco?, The Amplion Dragon, Crystal gazing, The BVWS at the NEC, Installing aerials and earths, novelty radios, Machine-age Ekco stands of the 1930s, Volksempfänger; myth and reality.

### 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 0181 670 3667. Cheques to be made payable to 'The Vintage Wireless Museum'.



# News and Meetings

## The keeper of the list

Martyn Bennett still has the role of custodian of the BVWS list of G.P.O. 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.



## Contact address:

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

## MARCH:

3rd Harpenden AGM, Auction  
17th Leeds Radio Meeting

## APRIL:

7th Shifnal (Radiophile)  
14th Workshop at Gerry's  
28th Cowbit (Radiophile)

## MAY:

5th NVCF  
19th Ashurst, Hampshire

## JUNE:

8th Garden Party at Gerry's  
9th Harpenden  
23rd Workshop at Gerry's

## JULY:

21st Wootton Bassett plus auction of the Norman Richardson Collection.  
21st Sambrook (Radiophile) (same day as Wootton)

## AUGUST:

11th Workshop at Gerry's

## SEPTEMBER:

1st Harpenden  
15th NVCF  
22nd Easton in Gordano, Bristol meeting

## OCTOBER:

6th Shifnal (Radiophile)  
13th Workshop at Gerry's  
20th Cowbit (Radiophile)  
27th October BVWS Southborough Regional Swapmeet. Victoria hall.  
Bookings/enquiries 01892 540022

## NOVEMBER:

24th Harpenden

## DECEMBER:

1st Wootton Bassett

## FEBRUARY 2003

16th Audiojumble Angel Centre, Tonbridge. Enquiries 01892 540022

## New Articles

If you have anything interesting to say concerning Wireless, Television, Broadcasting, Collecting etc. please send it to the Editor for future publication in the BVWS Bulletin. Your article can be just a few paragraphs long if you think it conveys its message to your fellow members. Also if you have any photographic material that would look good in the Bulletin, don't hesitate to post it to the Editor. The chances are that I will definitely use it!

Please send to: Carl Glover, 33 Rangers Square, London SE10 8HR.  
Tel: 020 8469 2904 email: choris.b@virgin.net

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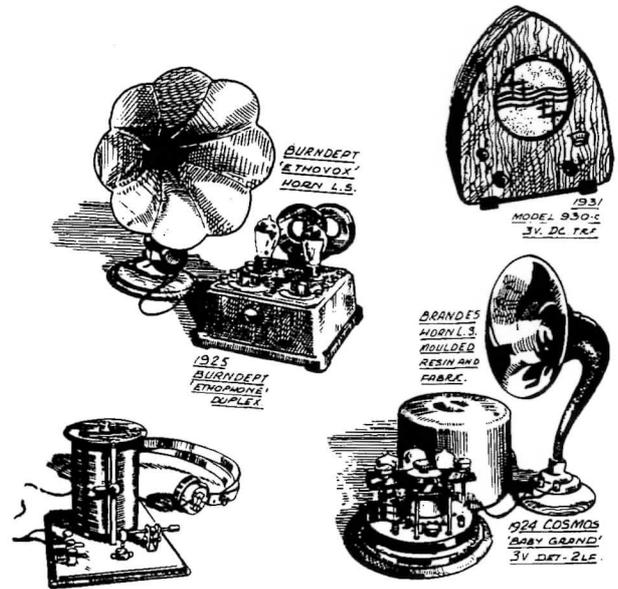


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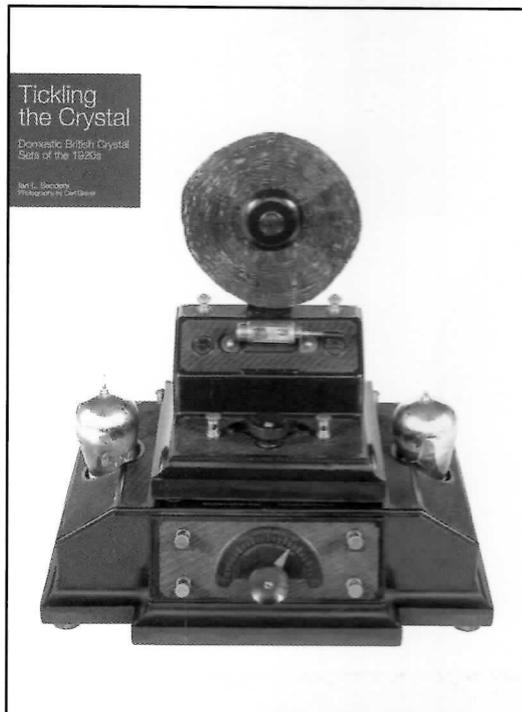


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