The Bulletin

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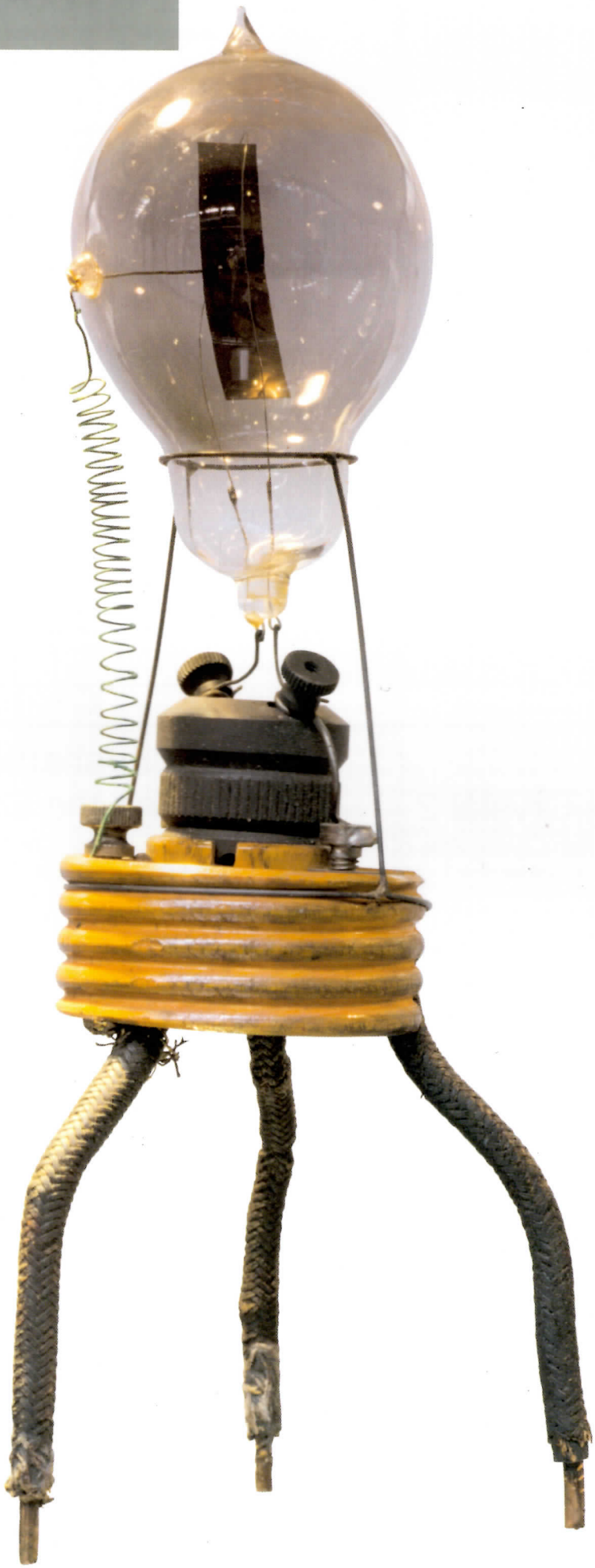

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Incorporating 405 Alive
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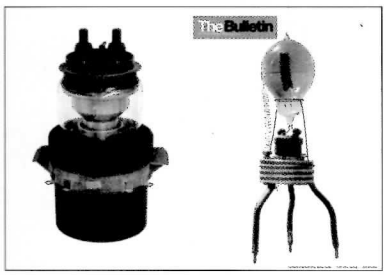
Separations and Printing by Apollo



Front cover: Fleming diode
Rear cover: 50 kW 'Blast-cooled' triode

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From the chair

We are all part of this country's Museums!

This is a pretty broad and bold statement to make, but I say it to make a point, a point that has become more real to me in recent months. Those of us, who have collections of Radio, TV, Audio equipment or anything else of social importance, make up a very large part of this country's collection.

We may not necessarily hold the most historically important items, although there are highly significant items in private hands, but we do hold the very best variety and have the greatest diversity within our collections.

The National Museums services are tied up in issues of public health and safety, both in storing an item and showing it. They appear to be driven by cost first and everything else second. Every person that steps inside a Museum has a cost per head. Well the Swindon Museum, for example, will not incur any costs from me, as nothing much has changed there since I was a nipper, so there is no point in going. If there is anything happening, it certainly does not get advertised. You can no longer just donate an item to some Museums, as they have to do a cost analysis on storage and preservation of the item, determine if there is another one anywhere in the Museums service and then decide if an item should be admitted or rejected. We certainly get calls asking us to dispose of items, being told that it was offered to the local Museum first and they rejected it. Most things are common and of little value, but there was one occasion where an entire collection of Crystal sets were refused. Then what of the item if admitted? Will it ever be seen again? Well it costs money to put on exhibitions, change displays etc. However, on the other side of the coin there is the fact that Museums are forever. The items are kept in near perfect conditions of preservation, which in itself costs a small fortune to maintain. Well, until a Museum is closed, when more of the items get banished into permanent storage, only to be seen on rare occasions, - if at all. I know all this must be most frustrating for Curators who would happily do more if they could.

The National Museums Security Advisors make the rules and advise on many matters to ensure that the national collections, be whatever, are preserved for everyone. It however, should not be forgotten that Museums and their contents belong to the Nation.

More funding for Museums would certainly allow much more to be done with exhibitions and other activities, but we find ourselves in times where schools and hospitals are closing and priorities are surely and rightly going to favour those before Museums. As such the role of the private collector, is now perhaps more important to the preservation and display of our heritage than ever before, as accessibility to their collections is much easier.

I can now report that thanks to the many BVWS members that responded to the recent Vintage Wireless Museum roof appeal, a huge amount of work has been completed and the buildings and roofs should see another twenty-five trouble free years. We would like to personally thank everyone for their kind donations but the list of names would be endless. So we are taking this opportunity to thank you all. We were overwhelmed and delighted with the response.

The Vintage Wireless Museum is like an old-fashioned corner shop. Whatever you need, parts, advice, or just a cup of tea and a chat, you will find it there. It's the centre of the Vintage Wireless and Television community so take advantage of this unique 'British Establishment', it is there for us all to use and enjoy.

I'll sign off by wishing you all a Merry Christmas and a happy New 'collecting' Year!

Mike

Editor Speaks!

2005 beckons, heralding ten years in my role as Editor of *The Bulletin*. It seems like an eternity ago when Gordon Bussey and I (working under the title of *Interim Production Editor*) assembled volume 20, number 1 together over a weekend. It was only sixteen pages in those days. This issue of *The Bulletin* has a humbling 72, Mainly to do with the simple fact that articles are much longer these days, which is a good thing.
I doubt very much that I could ever put this issue together in a weekend and retain my sanity.

A change that has been very welcome over the decade is the advent of email where articles can be sent very quickly indeed (and rough proofs of the articles *in situ* can be sent back rapidly) making production of *The Bulletin* faster.

Needless to say, there are many people that are responsible for the progress of *The Bulletin*; the most important being the authors of the articles which appear within these pages. Ian Higginbottom, the eagle-eyed Sub-Editor is responsible for spotting and correcting most mistakes. Mike Barker and Peter Merriman are part of the final filtration process, Mike with a technical eye and Peter with a grammatical one.

Finally, I'd like to thank all of you who have been involved in any way, shape or form with *The Bulletin* in 2004. See you next year!

Carl

Andrea's Andrea (Model 1-A-5)

by Gary Tempest

This Andrea radio was made in 'US America' according to its still excellent label. It came to me from a lady of the same name who had had it bought for her at a local antiques centre, many years ago. Now she was 'downsizing' into a flat, albeit with a sea-view, and many of her 'collectables' had to find new homes. I am really happy that the radio has come to mine.

Frank Angelo D'Andrea formed Andrea Radio Corporation, after FADA his first company got into difficulties and was sold off in 1934. A Rider's schematic I obtained for the set. It has a date of September 1934, so the radio was probably sold during 1935.

The label lists the model as 1-A-5 but also 'registers 'A-5-L'. Perhaps this was the model variant, as the chassis has been converted for export to Britain, and has a long wave band (hence maybe the 'L') and a transformer with taps to 250V. I am told that the US version is very rare so this one must be even more so. Has anyone got or seen another?

The radio ominously had a mains plug fitted, and Andrea told me it had been tried over the years "but it never made a sound, although it lights up". When I investigated, the reason it was so silent soon became apparent. The primary of the speaker output transformer was open circuit as was the electromagnet field coil. But worse was to come! When I removed the field coil and its pole-piece, the speaker voice coil promptly disintegrated. The reason for this was that it was unusual in having the winding set back on the former. In the intervening space, the former had been punched with a ring of small holes. These promptly perforated, possibly as I was not careful enough or the thin cardboard was now so weak.

I considered the radio in quite good condition. The nicely deco cabinet had no worm and a finish that I hoped would 'touch-up' rather than having to do complete refinishing. The chassis had a little rust, mainly at the rear. The attractive dial was excellent.

The original mains transformer had been replaced, with one of those green painted Elstone ones. This was highly dangerous as the mains connections are on top, which had been left completely exposed and the set has no back cover! The voltage selector, mounted on the chassis top, had also gone. The 'bodger' of a repairman had used the hole to feed the mains wiring to the transformer.

The chassis has a bottom metal cover with 'tappings' for the chassis fixing screws. A neat method of chassis suspension is used along with these. The cabinet has rebates on either side, that run from front to back, and are about half an inch wide. Into these sit strips of rubber, proud of the surface that the chassis pulls down onto. Now rock hard of course and so I made replacements.

Under the cover things looked mostly original apart from a couple of replacement R.S. tubular electrolytics. Where the originals were mounted I don't know. They must have been large, being 8 micro-F at 475V. It so happened that I had a period electrolytic, of the single screw thread and lug type. This conveniently fitted the hole left by the voltage selector. I re-stuffed it with new components, bringing out their connections as 'fly wires' through the hole left by removing the lug.

The electronics are unusual in that it is 'supie', with an IF of 470 k c/s, and yet uses a complex bandpass filter on long and medium waves. Most manufacturers, once they had got away from IF's of around 100 k c/s and their image problem, dropped the bandpass filter. This made a nice cost saving as simple aerial coupling transformers, tuned on the secondary side replaced it. This is done on this chassis's SW band. The Andrea engineer must have been very fussy as an IF trap is also fitted, in series with the antenna input.

As the last figure in the model number indicates, it is a 5 valve set, comprising the normal frequency changer, an IF amplifier, a 6B7 with detector diodes

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The build-quality under the chassis was not that high. Most of the components were just strung together with a minimal use of tag strip.

and audio pre-amplifier, an output valve and an 80 rectifier. When I had the radio working, I could not help thinking, how much better the sensitivity could have been if they had used the 3 gang tuning capacitor with another valve, as a tuned RF amplifier, rather than just in a bandpass filter. Another model in the range was the A7, in various versions. This indeed has the tuned RF amplifier.

Chassis Cleaning

The chassis was very dirty and nicotine stained, so I started by taking almost everything off the top. Only the RF and oscillator coils were left, hanging on their wiring. Their cans were difficult to remove, as they were held by under chassis nuts on studs. Many of these were positioned under parts of the wave-change switch.

Having plenty of access, cleaning and treating the chassis rust was time consuming but straightforward. Afterwards, I degreased it with Methylated Spirits, before masking off the coils, and spraying with a couple of coats of shellac. This is a product new to me called Zinser's Bullseye Shellac. With a name like that; American of course, but obtainable over here from Decorating Direct (www.decoratingdirect.co.uk). They say that the shellac has excellent adhesion to difficult surfaces. It can even be used as a primer for metals such as aluminium and zinc, where ordinary primers won't bond. In crude tests, made by me, the adhesion claims would seem to be true. I sprayed a piece of aluminium and gave the Zinser a fair time to harden off. Then I tried pulling the coating away with masking tape and it didn't budge. Next, I scrubbed it around the concrete garage floor. As expected it scratched but without any sign of peeling. Anyone who has worked on EMI radios, where they used shellac as an inspection and locking medium, will have found that 60 years later it is still difficult to remove.

Zinser shellac does not atomise that well and so some care and practice is needed not to get runs. Another minor thing is that it dries to a high gloss, which looks wrong. This can be got over, after leaving for a few days, by spraying with a light coat of matt acrylic lacquer.

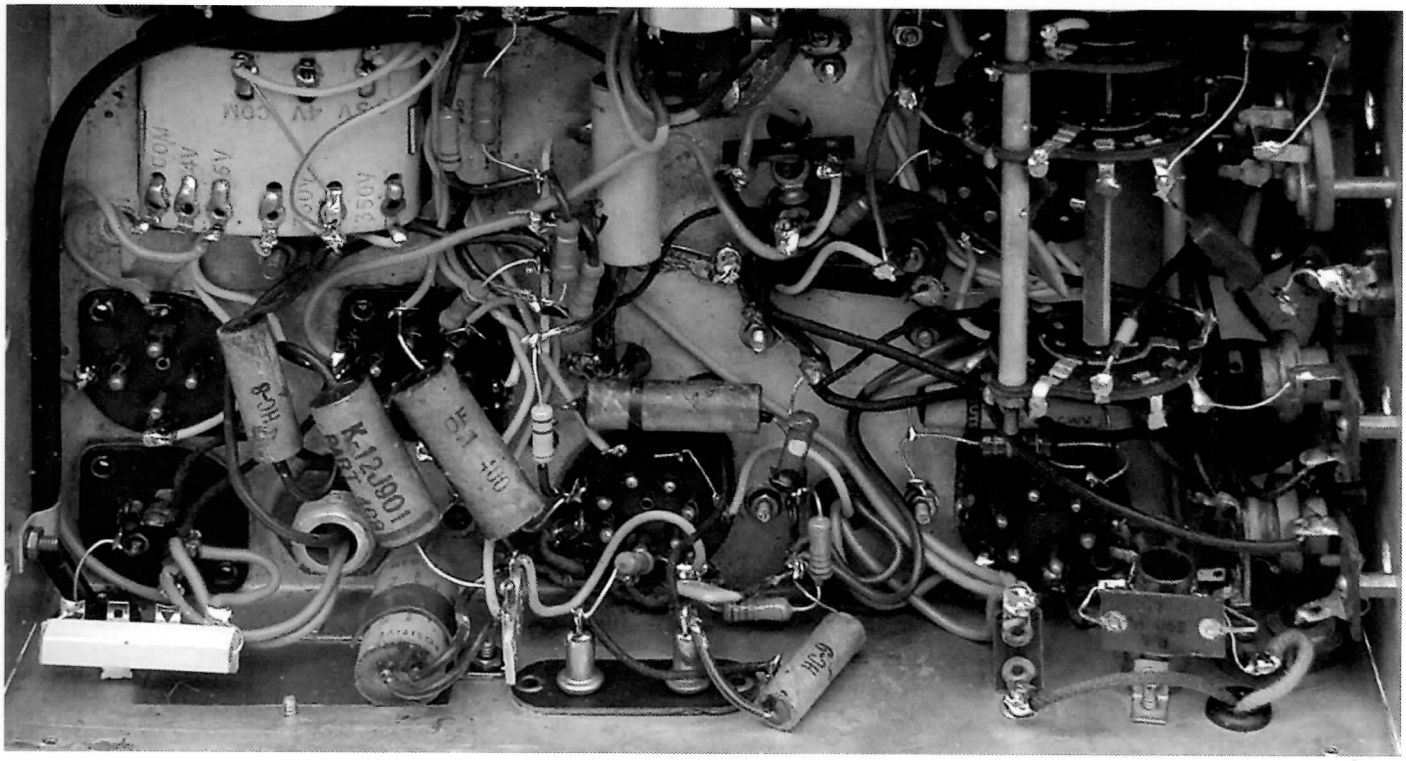
Component Replacement

The build-quality under the chassis was not that high. Most of the components were just strung together with a minimal use of tag strip. In the end I virtually rebuilt it, from the RF end back, and added new tag strip for a neater and more reliable outcome. I re-stuffed all the old wax paper caps and tried to keep the layout approximately the same. I had to change some of the mica capacitors, simply because they had suffered physical damage, with split or chipped cases.

All the 'topside' components were then replaced, including the transformer which I had sprayed satin black. I also fabricated a top cover for the mains connections, from aluminium sheet.

The Circuit

The circuit intrigued me, particularly that for the bandpass filter. It was clearly different from any I had seen before. Unfortunately American circuit diagrams are some of the worst to follow. Nothing for it, if I really wanted to know more rather than just make



the set work, but to re-draw it. It took a long time, crawling over the Riders diagram and tracing and measuring coils and connections on the chassis. But what a difference to understanding it makes.

I have included a simplified diagram of the filter, only used on LW and MW. It is unusual, as the input and output are both on the same side of the filter. I would describe it as being bottom capacity coupled, via C2, with a half link coupling using L2. The LW coils and trimmers, including those for the oscillator, are not screened and are what I would call 'later edition add-ons'.

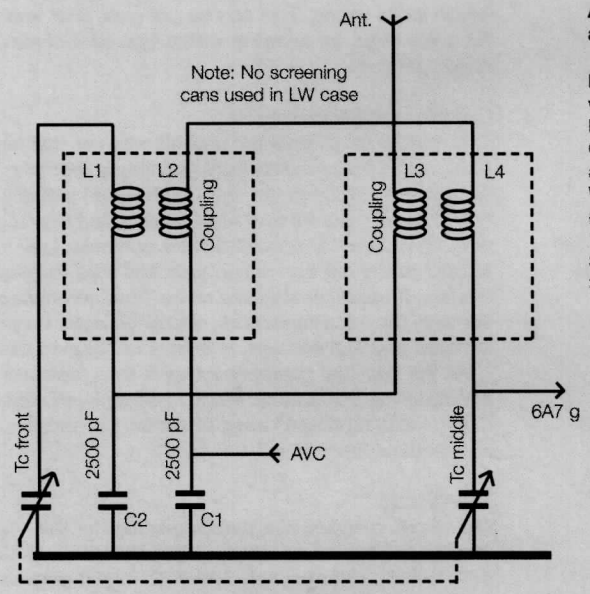
Missing items

I was missing a couple of items. One was a valve can and the other a knob for the volume control. The can was easily sourced from Gerry but I imagined the knob was going to be difficult. In the event it wasn't, thanks to the Internet. I posted some pictures, along with the dimensions, on the Antique Radio Forum in the US. Within a couple of days I was e-mailed by someone who had 'thousands of knobs' and had found the one I wanted. He said, 'I actually remembered having it because it is unusual, being turned from hardwood'.

Loudspeaker Repair

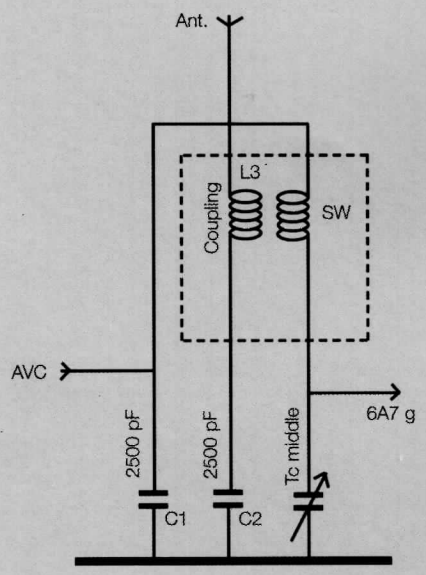
I was now at the stage where I needed the speaker. I had a replacement output transformer of the same size and knew I could wind a field coil. But, what about the voice coil? It was obviously best to start with this.

After disconnecting the voice and hum bucking coil connections, and the cone-centring device, I could set about freeing the cone from the frame rim. The cardboard filler simply prised away and I used Acetone to free the cone. This is best done by keeping the speaker tilted and soaking the paper at

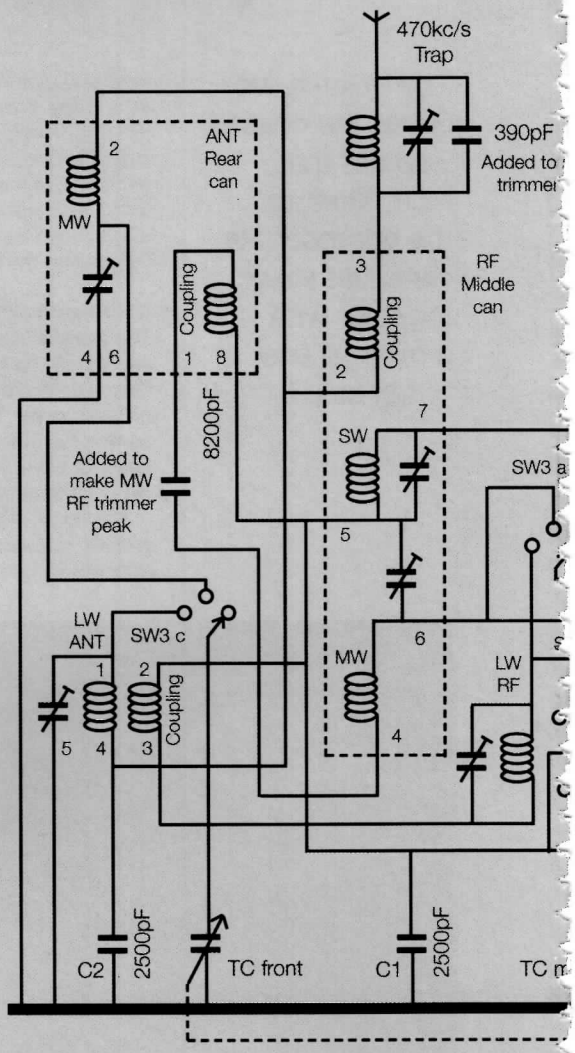


Andrea Bandpass Filter LW and MW

Bottom capacity coupling via C2 with half a link coupling via L2. L3 provides antenna coupling. C1 is convenient for the AVC feed and keeps the circuit symmetrical. With a wobbulator antenna input (no power to radio) shorting C2 'kills' the output to 6A7 grid. Shorting C1 reduces the amplitude 3 dB and alters the wave shape.



Andrea Input Filter SW



ANDREA 1A5 (1934)

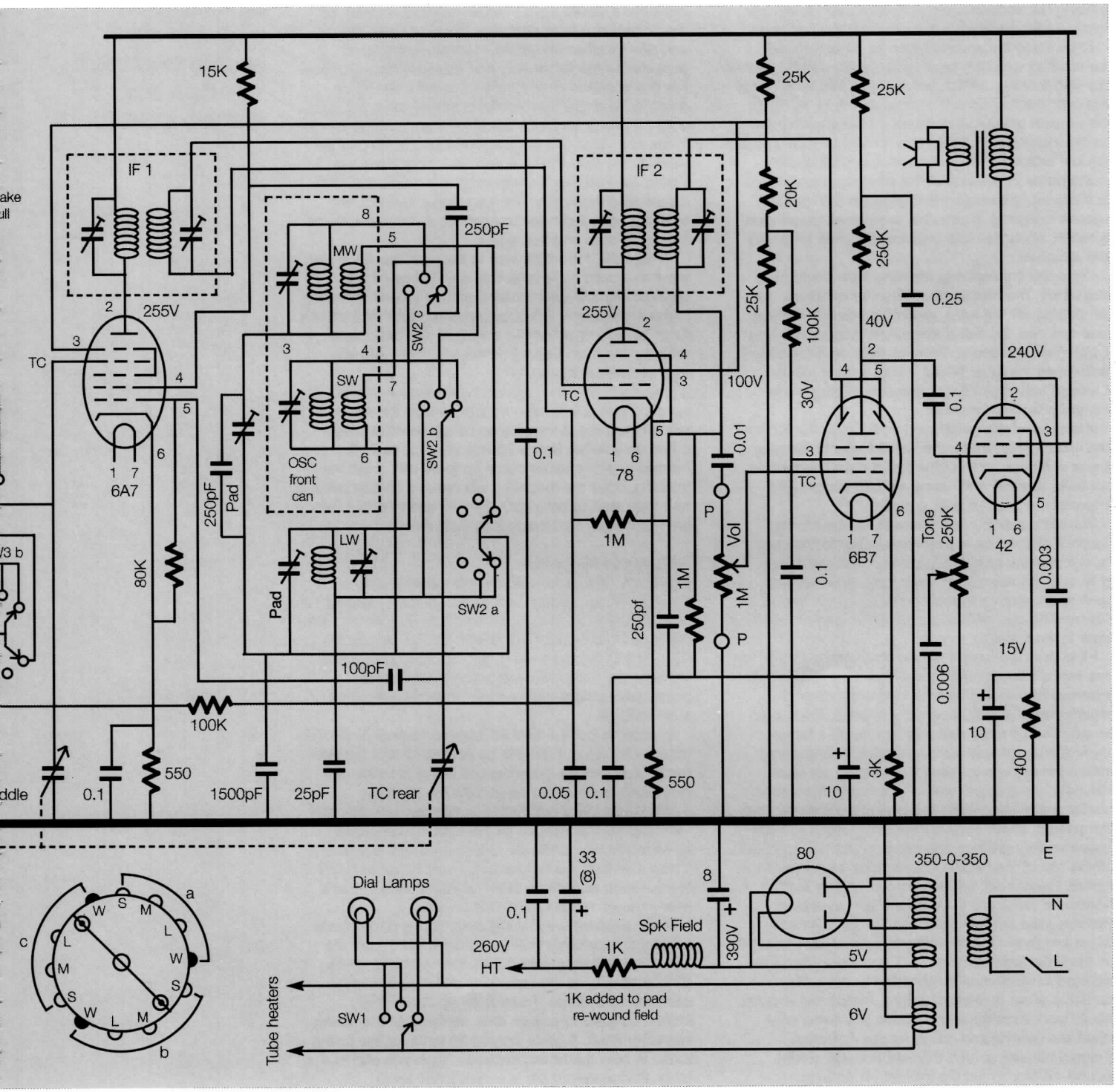
DRN: GNT 30/3/04

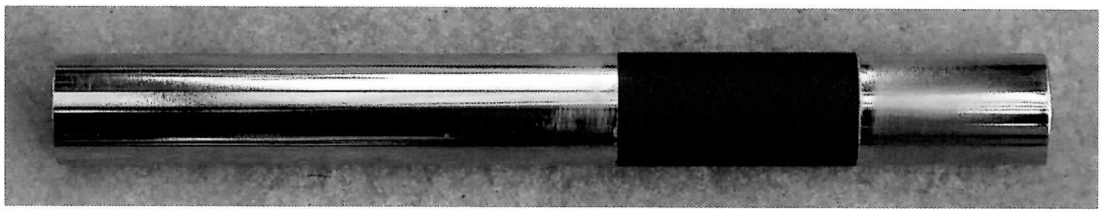
SW1 = front
SW3 = rear
Viewed from the rear

the bottom of the frame, using an artist's brush. Once it starts to come away the speaker can be rotated to work on a section at a time. Once I had the cone out, I could again use Acetone to remove the unusual rear mounted centring device and the remains of the voice coil former.

Now to making a new former. Firstly I measured the magnet pole piece and this was 3/4-inch diameter. Luckily I had a piece of chrome plated steel tube of exactly the same size. Of course I needed to build this up to create some clearance for the former. I did this using that excellent cardboard, intended for transformer insulation, and sold by AES in Arizona USA. I cut a strip one and a half inches wide. It is stiff and not coiled to the right diameter, so it needed soaking for a few minutes in warm water. Then it was wound into a coil slightly less than the tube diameter and secured with a turn of copper wire. I left it to dry in the airing cupboard and then super-glued a single turn (no overlap) around the tube. Next day it was polished with fine emery cloth. It gave approximately 0.4 mm clearance, to the former, on the pole piece (excuse me for mixing units but that's the way my vernier calliper is). I had ascertained that this was about right, by measuring the clearance on a couple of other speakers I had in store.

Then I started making formers. My initial attempts used board that was simply too thick; there just isn't room in the gap. What I did in the end was to get a large brown paper envelope and cut a side out of this. I decided to spray the smooth side with a couple of coats of lacquer. This was so that the grease (white lithium) I was going to use on the built up section of the tube (mandrel) would not be absorbed into the paper. I then cut a strip (one and a half inches wide) and made a single turn over the mandrel with the smallest gap I could achieve. It was secured using a turn of masking tape at each end.





Speaker Voice Coil Mandrel

The coil, of 3/16 inch length, was wound (38 SWG) in the middle of the paper strip. To hold the start I used a tiny drop of thin super-glue and did the same at the end. This was because I needed a second layer coming back the other way. Initial attempts were wound too tightly with the result that I could not get the coil off the former! So, I tried a looser wind, but then the second layer pushes the turns of the first outwards. I got over this by butting a turn of low tack masking tape up against each edge of the first layer. It is quite difficult to see what is happening when winding the second layer. I improved things by just lightly rubbing a black spirit pen over the first layer.

Once I had the second layer on, I then 'doped' the winding with thin super-glue (which can be stroked out with a cheap artist's brush). I actually tried doing this over the first layer, on some attempts, to hold the wires in place, but in the end I became real mean on not increasing the diameter. Once the glue was dry, the low tack tape was removed and glue applied to the paper either side of the winding. It is vital not to apply any glue near the tiny gap in the former. Again it becomes impossible to remove. Super-glue is readily absorbed into paper and makes for a very stiff structure.

Once dry the securing masking tape could be peeled off. The former could then be removed, but not directly off the tube, assuming you are working near one end. Do this and you are likely to collapse it with finger pressure. The trick is to do it the other way, along the tube. Whilst it was there, I rolled it around with slight finger pressure to make sure it was perfectly cylindrical.

It was fairly straightforward now. Once the former and winding had been checked for size in the gap, it was slid back on the tube and the excess former cut away at each end, using a sharp scalpel and a turn of low tack tape as a guide.

The cone actually had a recess for the former. So once aligned by eye (perpendicular to the cone face) it was super-glued in place. I also put a little glue over the tiny gap in the former. After leaving overnight I gently sanded off any glue nibs and fitted the centring device, leaving the cone ready for putting back in the frame.

Field coils are normally easy to rewind but this one was a little different. It had been made without a former, by winding on a jig, and then holding together with tape and possibly shellac. There was no way I could copy that and so I made a former. My first attempt was not successful; it simply was not strong enough to resist the winding pressure. The next one worked, with a tube made from good quality super-glued card and end cheeks made from thin paxolin sheet. I wound the coil using a variable speed battery drill and just allowing the wire to spool off the top of the bobbin. I knew that, because of the former, I would not achieve so many turns but the resistance came out a lot lower than I expected. Perhaps I did not wind it so tightly either. It came out at just over 1k Ohm rather than the value quoted on the Rider schematic of 2k Ohm. Since the turns increase in resistance towards the outside, I'm probably down by around a third. I knew the speaker would work satisfactorily because mA–turns only affect the volume and do not cause distortion. It would be easy to pad the field out with a wire-wound resistor to get the correct HT voltage.

It was now that exciting time to re-assemble the speaker and see how it would work.

I put the field and hum bucking coils on the pole piece and mounted the keeper plate and its nuts and bolts. Before tightening these I adjusted the plate for a uniform gap, by eye and with feeler gauges cut from thin cardboard.

The cone could now be put back. At one time I used to be apprehensive about doing this and make up shims to centre the former on the pole piece. But this is not easy; they just seem to get in the way. In this case it would have been impossible anyway, as the cone has a front dust cap. Now I'm more relaxed and don't bother with shims. I simply apply UHU adhesive to the frame only and drop the cone in place. For this speaker, I had to align the centring device, and then spend a few moments flexing the cone, and adjusting its position for the least scrape of the former in the gap. Then the cone surround could be pushed down firmly onto the glue and left to dry. After this I fitted the bolts for the centring device and adjusted it such that the former did not scrape. Getting near to trying now; just need to connect all the wires to the frame tag strip and that was it.

What I did, for a test, was to connect the voice coil input to a solid state amp with a CD player. I was pleased with the performance and so thrilled at having made a voice coil, 'I had to phone a friend' and let him listen to it. I know nothing is new in 'old radio' and others must have done it before me, but I was still very satisfied with myself.

The field coil was supplied from a bench power supply. Having a variable voltage source for the field coil allowed me to vary current and see what effect it had on volume. Below 25 mA this dropped off markedly, with a flatter curve up to 60 mA. It set me thinking, does the magnetic flux reach a certain point and then start to saturate? It would seem so but ears are notoriously bad measuring instruments.

Testing and Alignment

Eventually I got to connecting the speaker to the chassis and applying power. It was quickly working with the correct voltages. I then did an alignment with just a few problems. I had to add 390 pF across the 470 k c/s IF trap trimmer to get it to null. These early US sets use trimmers having many plates, and consequently have high values. This one measured over 1000 pF.

In order to get the MW RF trimmer to peak I needed to lower its value. I did this by adding 8200pf between the RF coil and the coupling coil in the antenna can (effectively adding it in series with the trimmer).

Why were these additional components necessary? I don't know the answer, as the coils are air-cored, so change of permeability of ferrite is not the problem. Could it be that the adjustments were never correct? Many radios must have been 'shipped' with a 'that's near enough' remark under the breath.

On a reasonable aerial the radio works and sounds excellent. It certainly makes enough sound from the less efficient loudspeaker. Even the SW band is not difficult to use, as the reduction drive to the tuning capacitor is so large. There is an epicyclic drive, friction coupled to a large disk, screwed to the tuning capacitor shaft. It gives around 30 turns, of the tuning knob, to take the tuning capacitor from one end to the other. Fortunately, there is a concentric knob

Field coils are normally easy to rewind but this one was a little different. It had been made without a former, by winding on a jig, and then holding together with tape and possibly shellac.

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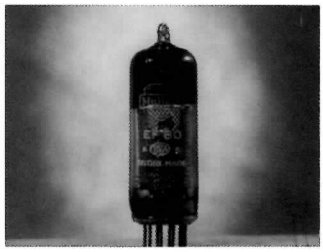
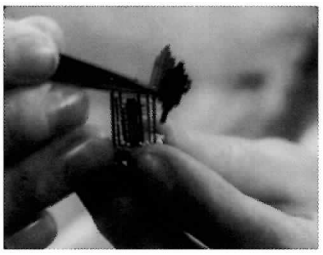
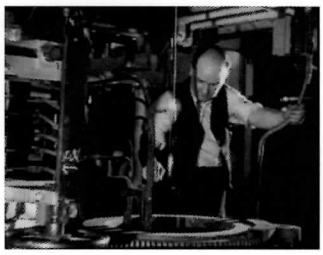
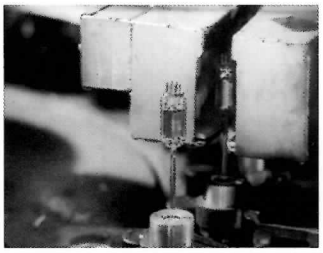
The BVWS DVD: Two Valve films

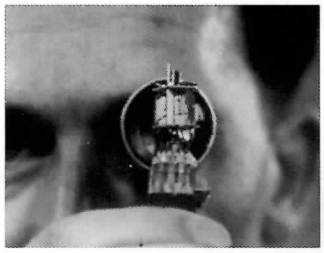
Terry Martini

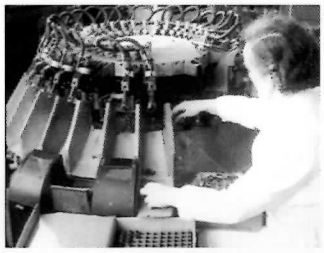












This year has seen us celebrating the one hundredth birthday of the Thermionic valve. It is fitting therefore that the society's first DVD production should concentrate on such an important and revolutionary device. The DVD (or Digital Versatile Disk as it is known) has been with us for only a comparatively short space of time. It has already changed the face of video production commercially, and in time it is set to displace the home video recorder as a preferred choice for viewing the latest blockbuster. (In addition the technology has dramatically increased data storage capabilities and thus allows for all sorts of possibilities). At the same time it has also become possible to record directly onto DVD using a fast computer and over the last year or so the hardware and software needed to facilitate this has dramatically fallen in price, just in the same way that CD recording technology did, and with which we were able to produce our first trader CD Roms, a few years back.

The two films the society has issued in this new format are the first of what is hoped to be on a differing technical theme (depending on copyright clearance and availability), starting with two films looking at the making of a valve. The first, made by Mullard is entitled the Manufacture of Valves, and looks at the production from start to finish of the humble EF80, a device to be found in so many wireless and television applications (and rolling around by the dozen, unloved in many a spares box). The film was produced during 1957 at a time when Mullard were the most active in this arena. This firm made many similar technical films over the years and had their own busy film library and thriving educational department. These films would have been hired out for screenings to various technical bodies, institutions and organisations. (or perhaps at one of the regular public lectures given at the Conway Hall in London) The fact that we have a copy of this film today would probably suggest someone forgot to return it to the Mullard library and then in turn the film ended up on a dusty shelf, forgotten. This particular print is in fact one of the best I have seen and posed no trouble in the transferring of it into the digital form suitable for replay from DVD. This film incidentally is also endowed with a narrated soundtrack (Optical sound).

The second offering is valve manufacture at the GEC - OSRAM factory at Hammersmith in London, and shows what appears to be an MS4 in production. This particular film was unfortunately in very poor condition, with the film base having shrunk quite badly along with various other faults, quite common in a film of this age. The material also posed the problem that it was also extremely fragile. Normal telecine methods would have damaged it beyond repair. It was decided therefore, that the best way to tackle this was to telecine the film a small section at a time, slowed down to 16 frames per second and capture the results onto Digital Tape (DV) then reassemble the whole lot, speeding it all back up to 24fps in the production software used on my dedicated computer. Where there were shortened titles due to damage or missing frames, one sample was digitally captured and then timed out to match the good ones. (This digital trick is used on the first two titles at the start of the film and also further on into the footage.) The final results are very good indeed, given the multitude of defects apparent with the original footage. The film dates from the very early 1930's and is *silent*. (The GEC probably had similar aims in promoting their products in the same way that Mullard did, albeit on a smaller scale, film wise) It is highly likely to be the only surviving copy in existence, and a most fortunate find by BVWS member Bob Smallbone, who kindly entrusted both this and the Mullard film with me for transfer.

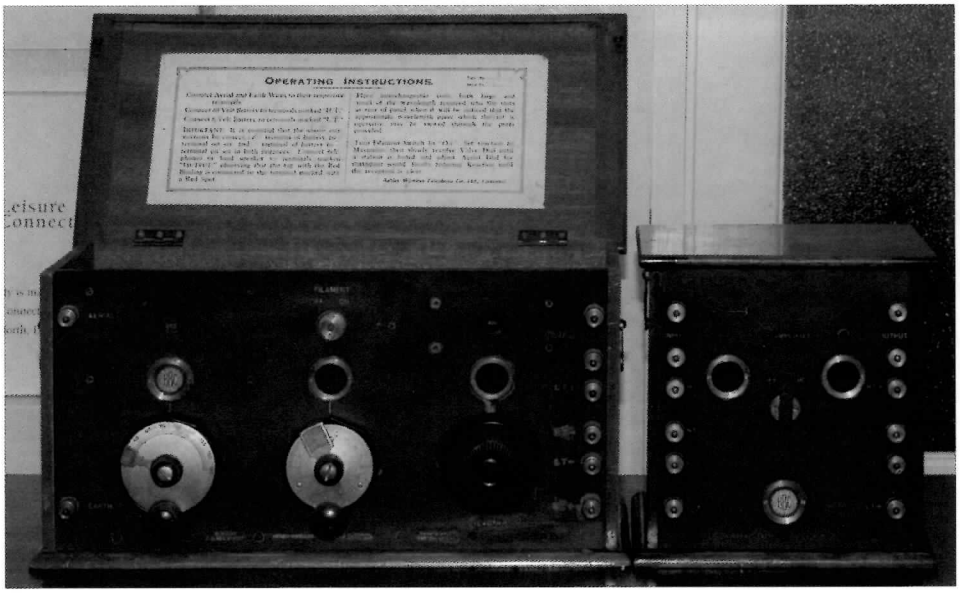
The DVD will replay in a stand-alone player in conjunction with a conventional television set, or with suitable software installed on your computer such as Win DVD. It will however need to be at least a Pentium 3 or equivalent based machine. The disk will not play in a normal CD Rom drive of the type used to access our previous disks unless it is a 'combi drive' that is to say DVD/CD. The fact that you can by a DVD player in some outlets for as little as £30.00 these days gives you some idea of how the price of new technology can tumble in just a short space of time. This first society DVD publication is, I reckon a good enough reason to invest in one. The society is not able to provide any technical support in relation to the DVD due to the multitude of equipment and software combinations. The master DVD, however, has been tested on a number of different systems and players. Regrettably, due to the time involved and additional costs, this presentation will not be made available on video cassette.

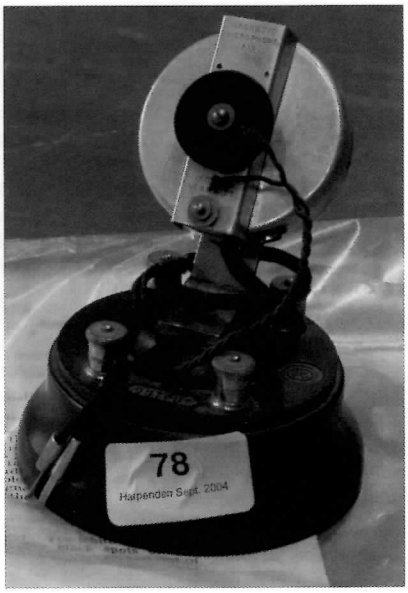
The society would like to thank Bob Smallbone for allowing us not only to transfer these treasures onto such an accessible medium but also to archive them for others to enjoy in the future. We would also like to especially thank The Philips Company Archives for granting us permission to use the Mullard film on this DVD.

I would also very much like to hear from any member with interesting film footage, of a similar technical nature for possible future use, and you can get in touch with me at the usual address. I can accept material on 9.5mm, 16mm and 35mm gauge film. A 2nd generation video copy will also be acceptable as a bare minimum. The footage will be re-mastered on to DV tape and a master viewing copy will be provided along with the return of your original material.

Harpenden, September 2004

photography by Carl Glover



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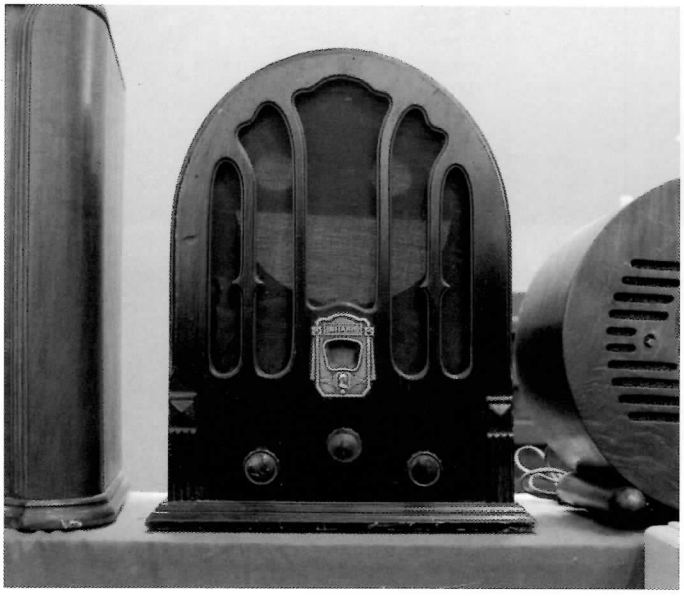
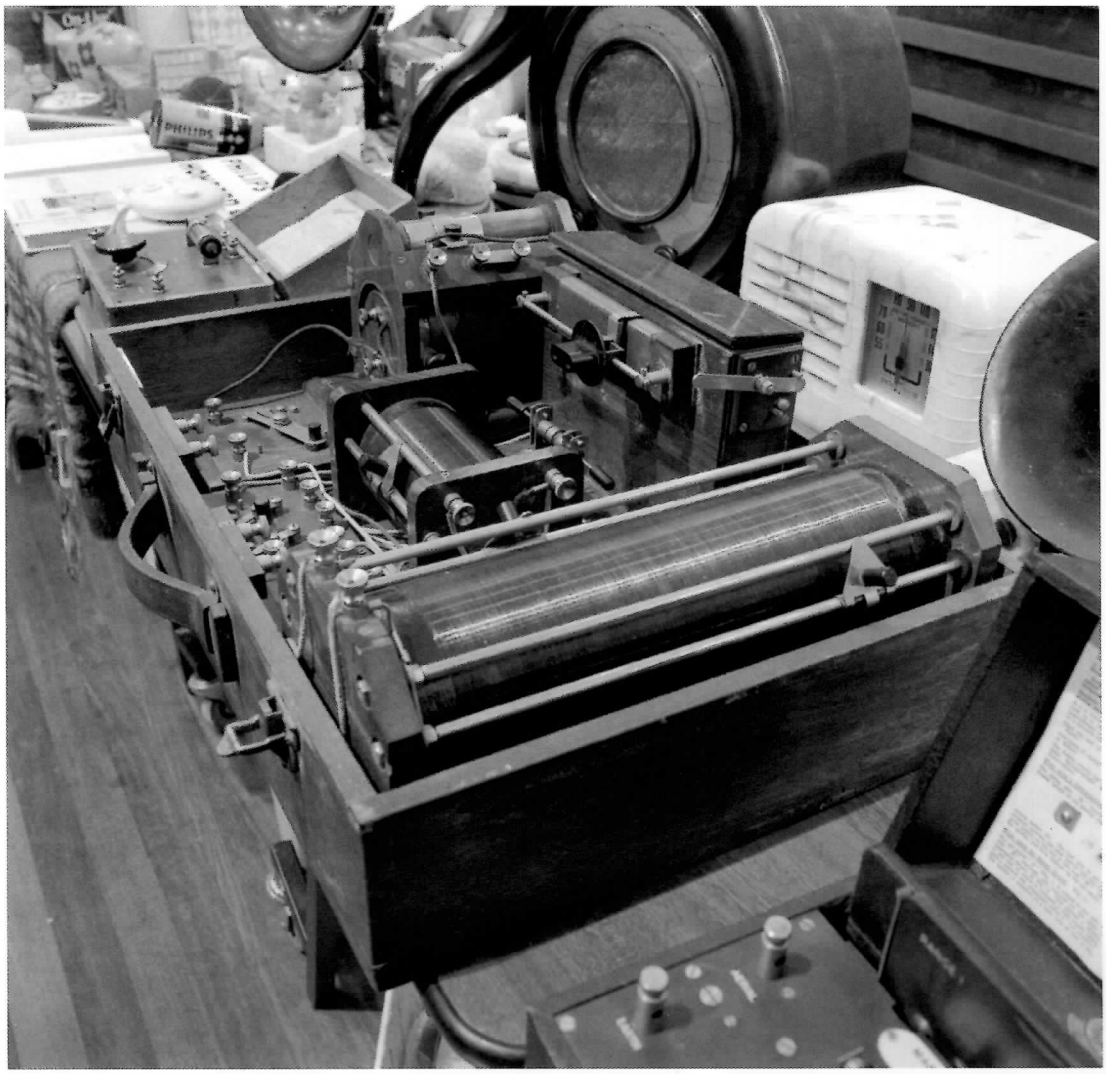
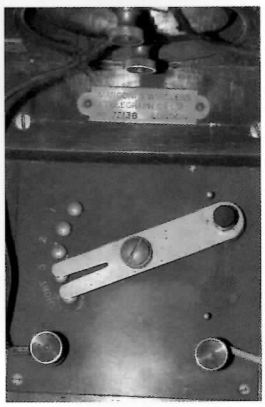
MATRONTRONE V 7

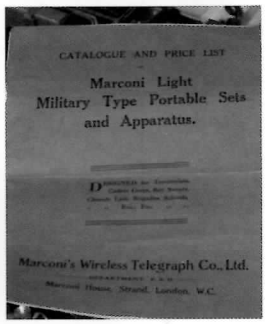


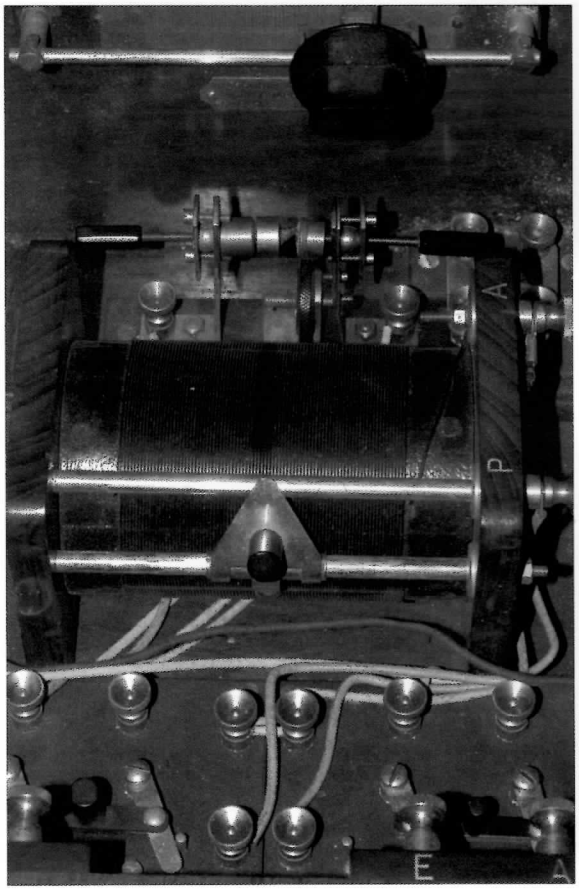

TRANS-OCEANIC
ZENITH

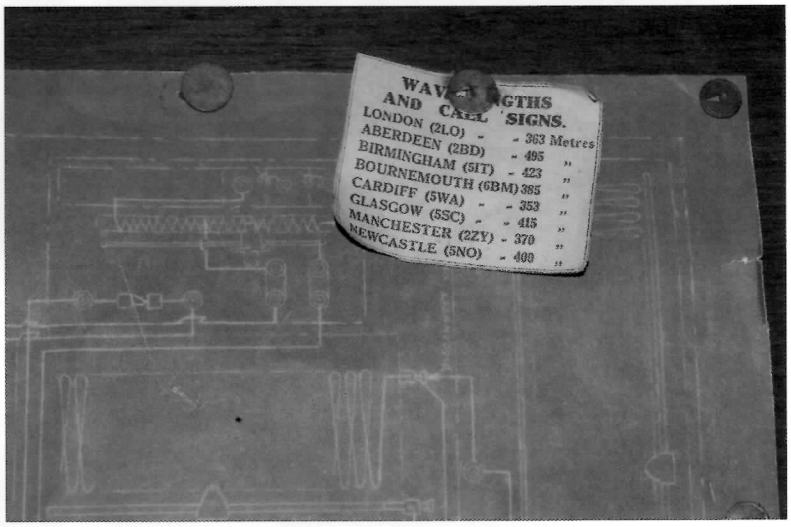
Left: Impressive piece of Marconi apparatus spotted at Harpenden, all other pictures on this page are details of the set.

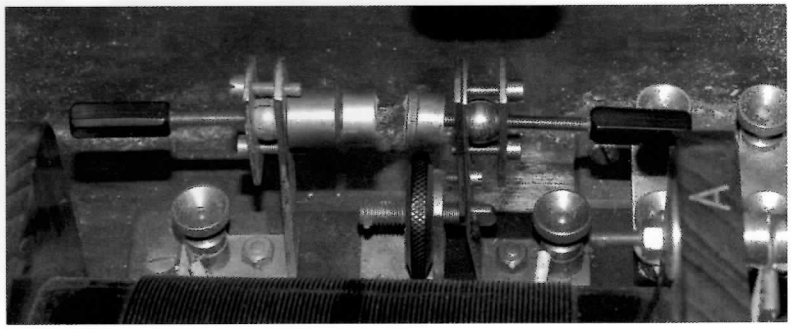












The Amplion Dragon Wooden Flare Horn Loudspeaker

By R.J.Grant

Purchased from the Harpenden "bring and buy" stall for fifty quid, a bit steep for one in such bad condition but such is life, the challenge was to bring this 'worst case' back to life and while away the winter months with an interesting project.

The Horn as it was when purchased

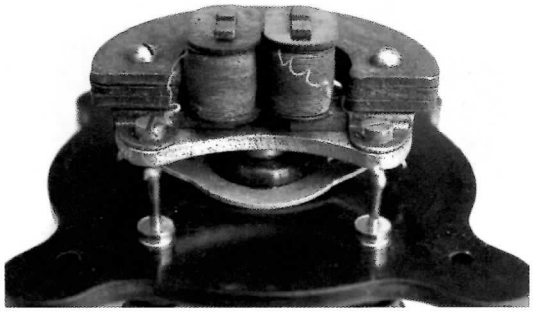
The wooden flare part of the horn had six of its ten ribs split or completely broken and all of the petals were de-laminating to a greater or lesser degree. This was due to damp penetration and a previous owner had badly re-varnished over the top of this damage. The metal part of the horn had a good frosting of rust, the rubber bits perished, the base and nickel plated parts were very heavily oxidised with some of the plating missing and just for good measure, the drive unit was open circuit.

First thing was to get it in bits; the drive unit unscrewed from the perished rubber gasket in metal part of the horn, the gasket was removed quite easily. This moulded rubber gasket still retained its basic form, this could be very handy later. Removing the wooden flare was fun as it was quite firmly attached by the larger now very hard rubber gasket, but this gave up after wobbling back and forth with the metal part of the horn between my knees and applying rotational pressure to the flare, trying to unscrew it and at the same time avoiding any further damage. The metal part of the horn was tackled first. The metal work was quite rusty, the rust seemed to have gotten under the original paint and needed rubbing down to bare metal with Scotchbrite. The other Amplion horns I have in my collection have a wrinkle finish paint although with this one it was difficult to tell what it was originally, I used wrinkle finish paint from Halford's and it's come out quite well. I found it a little over glossy so I over sprayed it with satin black.

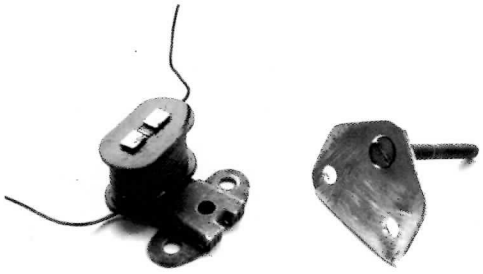
The drive unit was tackled next. The whole assembly is held together with four nickel plated brass studs. The bolt head end is squared off and recessed in the bakelite rear plate; the threaded end has four blind, semi-domed threaded heads with no visible means of removing them. In this case a previous owner had cut screwdriver slots in two of these blind heads; he must have got lucky with the remaining two, removing them by friction alone, but they were now stuck fast. Two small holes (1/64 inch) were drilled each side of centre so that a small pair of pointed pliers could be inserted, rotated, and the heads removed. Once out, I cut some screwdriver slots in these two to match the others and make the drive unit serviceable in the future. The drive unit splits into three pieces, behind the front plate are the diaphragm and a pressure spring, then the main body followed by the rear plate housing the coil assembly and terminals. Both the coils were open circuit. After removal I very carefully unwrapped the over–wound green cotton covered lead out wire and empire cloth covering, hoping to find a break near the join; no such luck. Several turns of the coil wire were unwound only to find it very brittle and the lacquer flaking off; the rest was cut off with a modelling knife after noting how full the bobbin was. Some of the old wire was measured with a micrometer and it was just over .002 inches (47 SWG). The only wire I had in stock at this time was just under .002" (48 SWG) but near enough. The bobbin is mounted onto an "L" shaped laminated core with a force fitted mounting plate, this core has been splayed over and machined flat at the pole end so the bobbin is not going to come off. The coil is offset from the centre axis of the core assembly making rewinding very difficult, so I made a brass face plate to match the coil mounting plate and offset a 4BA countersunk bolt to fit in my coil winding hand drill: the coil former now rotates about centre axis. I still use a hand drill mounted horizontally in a bench vice for coil winding. I find this gives me a great deal of control especially when using very fine wire. I don't have the luxury of a coil winder. After fitting a new piece of stranded lead out wire held in place with a small piece of masking tape I whizzed away winding for ten minutes or so

The interface

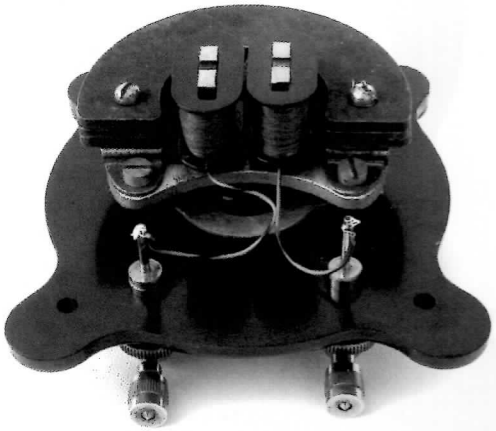
The original grommets



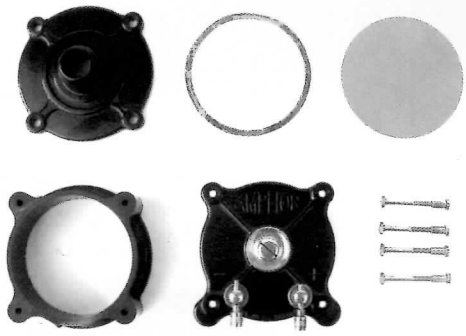
The original drive unit



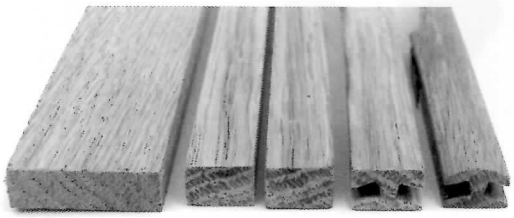
The rewind rig



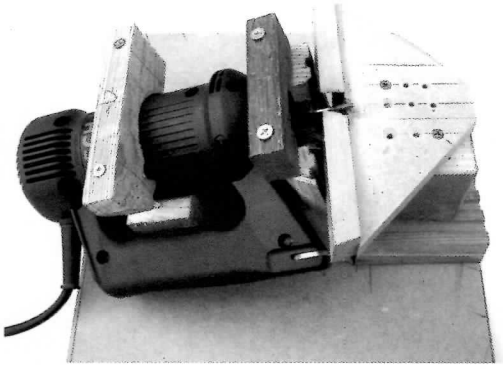
The drive unit rewound



The drive components



Shaping the ribs



The router set at 18 degrees

checking the level of the winding as I went. When the bobbin was full to the mark I stopped and checked its resistance; it read 1150 Ohms the coils should be about 1k each. I had failed to note the thickness of the empire cloth and number of layers over the original lead out wire in the centre of the bobbin. That and the slightly thinner new winding wire accounted for the extra resistance. I decided this was near enough, a bit more impedance might be useful so and finished off with another piece of thin stranded lead out wire. This was fitted and over wrapped with paper masking tape. The coil was then over-wrapped with a layer of green thread just to make it look more like the original and protect the new winding. The second coil was re-wound the same as the first. The phasing was checked and the coils were re-assembled back onto the permanent magnet assembly. The diaphragm had a good frosting of rust and had to be rubbed down and treated before a very light coat of aluminium spray paint was applied, just to make it look a bit better cosmetically.

The nickel plated bits were all removed and thoroughly cleaned and polished with Brasso. After re-assembly the drive unit was tested using a valve output transformer wired backwards to a transistor radio and with some fine tuning of the coil/diaphragm gap, it sounded very good.

The nickel plated weighted base stand was in quite a bad way. Some of the nickel plating missing altogether, the rest very heavily corroded and oxidised. I tried cleaning the better bits with Brasso but this wouldn't touch it so I took it along to my local electro-plating firm. This is a very dingy brick-built shed behind some shops that looks derelict; a knock on the door brings forth the plating man. I showed him the piece and asked if he could re-plate it in nickel and what measures would I need to take to clean it ready for plating. He said he could re-plate it, no problem, but it would need to be fully electrically stripped and to leave it to him, 'It'll be ready on Tuesday' he said, and then disappeared.

A little worried that I had forgotten to enquire about the price, I was pleasantly surprised on Tuesday when he only charged me eight pounds and apologised for a small dent that he could not remove, I thanked him kindly for the excellent job; the base stand was now like brand new.

Now for the difficult bit; a complete re-manufacture of the wooden flare, the original was too badly damaged to do anything with. The rivets retaining the metal interface were drilled out and kept for future reference. The interface itself appears to have been galvanised, this was cleaned and re-sprayed satin black with no problems. The larger interface gasket, once removed, also seemed to shrink back to its original shape and has become a bit more pliable with the work to remove it. Both grommets were put aside for re-work later.

On a previous repair to one of these horns I made three new ribs from Ramin mouldings from my local DIY store, the new profile was shaped from two pieces of this Ramin with a modelling plane, steamed together to the curved shape and then these two pieces were glued together, stained to a colour to match the other seven ribs and finally glued into the flare. This method proved to be very successful.

This time I thought I would try and make the new ribs in one piece like the originals, but found all the DIY stores now only stock wooden mouldings made of pine and not a lot of use for this purpose. I eventually found some oak strip. This was as close as I could get to the original wood, which looked something like Indian rosewood.

The oak strip about 1 inch by 3/8 inch by 7 feet long, was cut into lengths about 1 inch longer than the ribs I was going to replace, (about 12 inches) then cut in half length ways with a band saw and the sawn edges planed to the exact width of the original ribs. There was enough in this length to make 14 new ribs plus a few extras to experiment with.

I purchased a good quality 3mm bit for my router, as this oak is very tough. I built a make-shift jig out of odd scraps of MDF and set the router angle to 18 degrees, (360 divided by the number of ribs, 10, divided by two, half the angle each side of the rib) and cut the angled slot into each side of these new ribs.

The outer faces of the original ribs are rounded off. I achieved this using a 4 inch length of stiff plastic tubing about 1 inch diameter cut in half length ways, this was drilled, counter sunk and screwed to the bench, this was then lined with coarse aluminium oxide cutting paper held in place with some tough double sided tape (the carpet fitting variety).

The ribs were run back and forth through this piece of tube a few times until the flat bit on the outer face disappeared and formed the rounded shape required. This was a bit laborious but worked well with plenty of control over the shape. These new straight ribs needed to have the curve steamed into them. Another makeshift jig was manufactured, this was made from a scrap piece of 3/8 inch alum-inium sheet (rescued from a skip), and this formed the base plate. A piece of 1/2 inch marine plywood was cut to the shape of the curve of one of the original ribs and hollowed along its edge to accommodate the rounded shape of the outer face of the rib, with a large round rasp (Surform). Two pieces of 1/2 inch square brass were cut to about 1/2 inch long, drilled, threaded and bolted through the aluminium base plate just in from the ends of the rib to be steamed. These were left finger–tight so they could rotate as the rib took up the shape of the curve. Another piece of 1/2 inch square brass about 10 inches long was drilled about 1/2 inch in from each end and tapped for the pressure screws. Two more holes were drilled and tapped 1 inch in from each end and at 90 degrees to the pressure screws to bolt it to this base plate. The pressure screws were 0BA bolts about 4 inches long. A similar piece

of brass was placed to the rear of the plywood die as an interface between the wooden die and these pressure screws.

A rib was placed in between these brass end keepers and the wooden die and the pressure screws tightened just enough to hold everything in place. A Black and Decker wallpaper steamer was placed over the rib with an old T–shirt wrapped around the outside to keep the steam in and left to steam away for several minutes until the rib became supple.

The pressure screws were then tightened forcing the rib into the shape of the plywood die, the steam then re-applied for a few minutes to relieve any remaining stresses.

The whole thing was then left to dry, (This didn't take long as it was quite hot from the steam) then placed in the airing cupboard overnight to fully dry. The next day the rib was very easily removed from the jig as there was no tension left in the rib and a slight shrinkage left it almost loose.

On the first attempt I found that the slots had closed up slightly in the steaming process and made it difficult to fit in the petals, so 1/8 inch wide pieces of 3mm plywood were cut from scrap left over from the new petals and fitted into the slots prior to steaming on all the other ribs. This solved the problem and the plywood strips were easily removed when dry. The rib then needed a light rub over with some fine sandpaper to get it smooth again as the steaming process tended to raise nibs in the wood.

The Petals were much less work. A piece of 3mm Beech plywood was purchased from my local model shop, stained to remove the bright whiteness of this Beech wood and get it to a similar colour to the original petals.(A reddish brown after removing the varnish). This was cut into petal shapes using an original as a template. I tried using scissors or shears on this thin plywood but best results were obtained on the band saw.

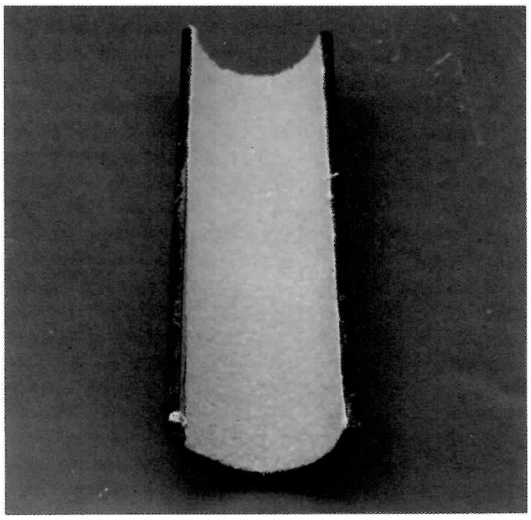
A scrap piece of 4 x 2 about 12 inches long was cut in a curve, the same as an original petal. The new petal was lightly steamed for a few minutes then clamped between these two pieces of 4 x 2 and left overnight in the airing cupboard. When the clamp was removed the petal sprang back slightly losing about 10% of the required curve; extra steaming didn't help as on one occasion a petal was left steaming a little too long while I answered the phone and the plywood completely delaminated. The small error in the curve proved to be useful later when fully assembling the flare as this light tension helped lock all the parts together and made it self-supporting without any glue.

With ten ribs and petals now manufactured I realised that gluing twenty components together at once and keeping it symmetrical was not going to be easy, so yet another makeshift jig was made. This was an MDF baseboard with an outer petal retaining ring, 14 1/2 inch internal diameter and 1 inch wide, made in four quadrants from odd scraps of MDF. A central mushroom 9 1/2 inches high, with a 3 1/4 inch diameter top support disc to secure the narrow end of the flare while the glue sets. The flare was fully assembled in the jig before gluing, a sort of dress rehearsal and the petals masked off with tape along the rib edges. This served two purposes. One: ensuring the petal was fully engaged in the slot, now easily seen when dismantled before glueing and Two: any surplus glue squeezed out of the slots goes on the masking tape and not on the petal. The outer flare rib ends were roughly trimmed before gluing to avoid interference with the petal-retaining ring.

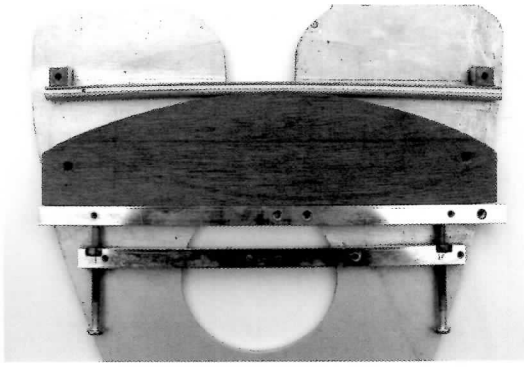
PVA glue was applied to the slots in the ribs one at a time and a petal fitted and fed round the inside of the petal-retaining ring. When all ribs and petals were fitted into the jig and having made sure all the petal edges were up against the retaining ring, a wire band was placed around the narrow end of the flare to hold it all together close up against the top support disc, and the glue left to set overnight. With the flare still in the jig, and the jig turned through 90 degrees to the bench surface, the small end of the flare was trimmed off flush using the band saw (cutting table removed). The outer rib ends, only roughly trimmed prior to glueing were now finished using a piece of coarse sandpaper wrapped around a 1 1/2 inch piece of dowel. Then the whole assembly was sanded ready for the final colour match stain and varnishing. After matching the colour of the petals to the ribs, mixing several different colours of stain as the natural colour and absorption rates of the woods are quite different. The flat surfaces of the flare were rubbed down with wire wool to remove the nibs bought up by the stain and get it smooth again and finally two thin coats of light oak polyurethane varnish were applied.

The next task was to find a replacement for the rubber gaskets as the originals were in too bad a condition to use. I tried several rubber seals and trims but nothing came close to the real thing so once again re-manufacture seemed to be the only answer. I have worked with latex rubber in the past, mainly for making moulds for knobs and thought this might be a good place to start. The main advantage of using latex is that no nasty chemicals, injection moulding equipment or heat processes are needed. The original gaskets have a complex shape, a thread inside and a rounded outer lip. Both the gaskets are the same shape, just different diameters, so two different sized moulds were made simultaneously. I started off with a bit of research about making moulds and colouring the latex black, and, after several trips to different hobby shops and a good search on the net, I set about making them. The originals were in too bad a state to get a cast from so I had to make new positive models to make negative moulds to get final positive gaskets.

First I tackled the inside thread. I made a clay impression of the interface and the drive unit threads. I dusted them in French chalk to stop the clay sticking and to allow these pieces to be unscrewed from the clay impressions. When dry these impressions were filled with Plaster



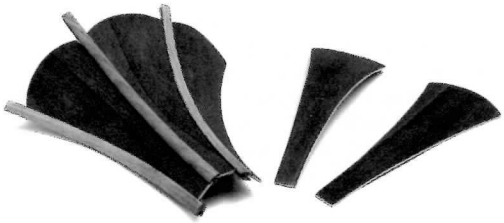
The rounder tube



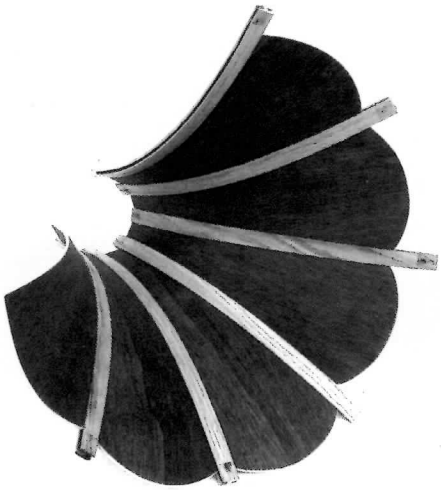
The steamer rig pre-steam

The steamed rib

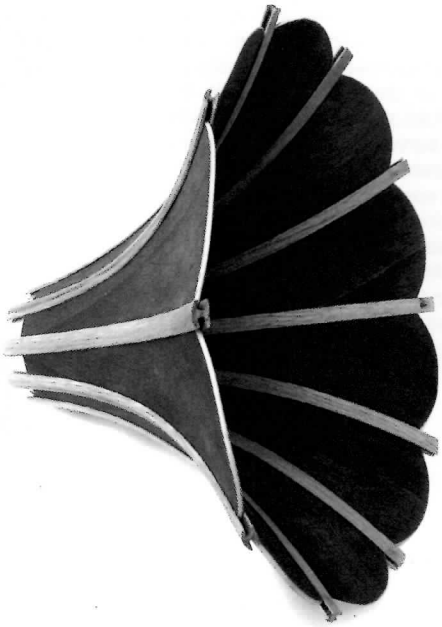
The petal steaming rig



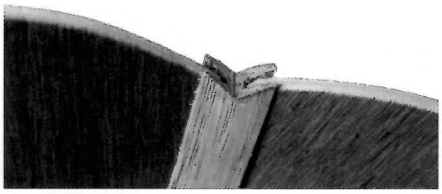
Flare parts



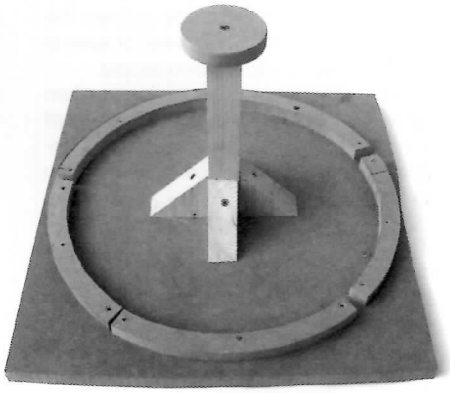
Flare assembling



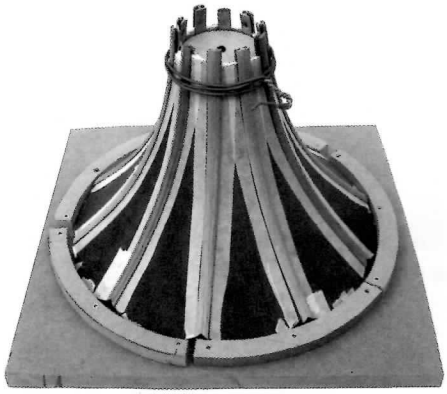
The flare pre-gluing



Pre-gluing trim



The gluing rig

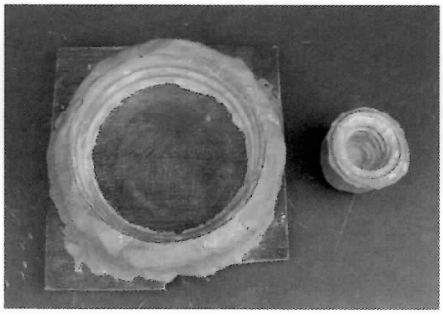


Gluing

The flare glued and trimmed

The flare finished

The drive and interface threads



The clay inner thread casts

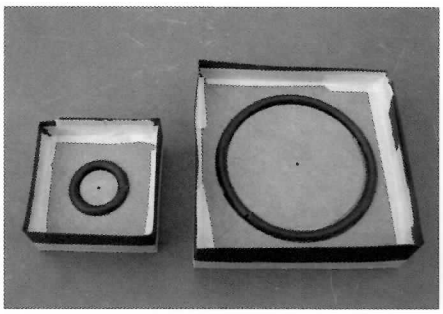
The Plasticine cast

of Paris which will form the inside surface of the final mould for the rubber. The large one turned out OK but the small one had several large air bubbles and had to be re-done. The clay impression having been destroyed in this process I tried this time with Plasticine, wetting the surface to stop it sticking. This proved a lot less messy than modelling clay.

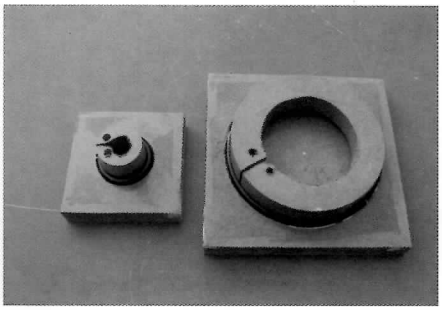
The round outer lip of both gaskets resembles 7amp three core mains lead, so I used some of this as a model. I took a scrap piece of 1/4 inch MDF about 5 inch square and routed out a 4 1/2 inch diameter semicircular groove to half bury a piece of this mains lead and glued it into this position. I then sprayed this mould surface with lacquer to stop the Plaster of Paris sticking to the MDF and when dry boxed off the edges with card and filled it with plaster of Paris. This forms the outer part of the lip and the inner thread mould would be glued to the inside of this ring to form the lower part of the mould. The face of this mould was rubbed flat on a piece of fine sand paper on a flat surface to ensure a perfectly fine flat face to marry up to the other half of the lip mould.

Using the same positive model I added a disc also made from MDF and sprayed with lacquer to the middle, half covering the wire ring. This will make the outer part of the mould. I cut a slot in the edge of this disc and filled the gap with a matchstick. When the plaster had set the match was removed and the gap allowed the disc to be compressed for removal. A shallow concave shape was cut into the outer surface of the mould to match the shape of the metal horn with medium sand paper and the face of this mould was also rubbed flat as before.

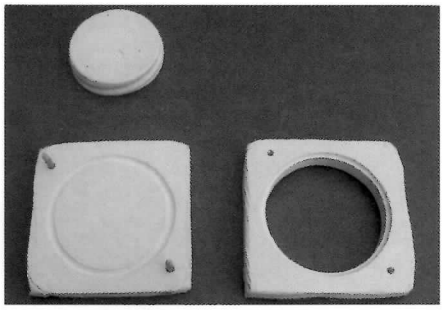
Another piece of the original wire used as a model was placed in the lower half of the mould and the upper half placed on top, ensuring alignment of the two halves of the lip. Two holes were then drilled in the corners of this final mould and alignment dowels fitted, ensuring a perfect match when the model wire was removed. The inner thread section of the mould made earlier also had its joining surface rubbed flat and glued in place in the middle of the lower part of the mould (PVA glue). These two large and small mould



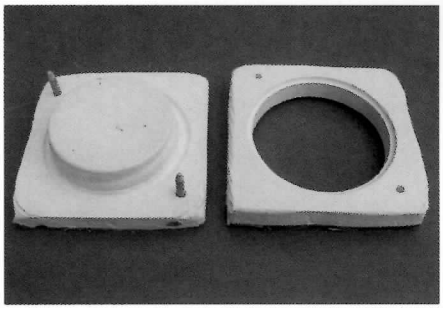
The outer lip model



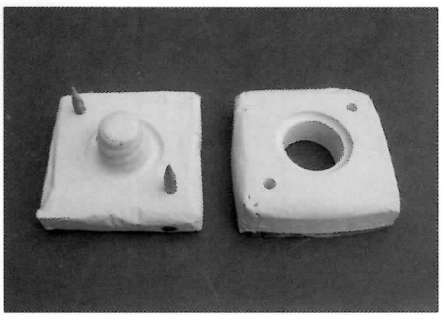
The upper mould



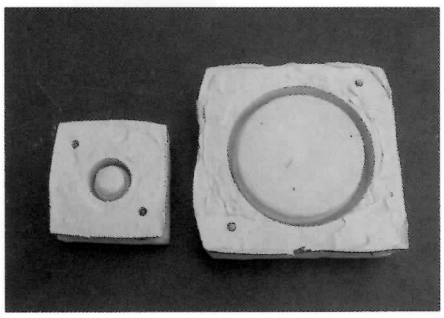
The large mould components



The large mould



The small mould



The moulds ready for rubber

The 8% larger thread mould

The new grommets

The new large grommet installed

assemblies made at the same time were now ready to be filled with rubber.

The latex was mixed with the colourant (at this prototype stage I used black ink, about 5%, but later acquired the proper colourant also mix ratio 5%). I filled the small mould first, no point in wasting latex if it doesn't work. The two halves of the mould were held together with masking tape, then it was filled and placed in the airing cupboard to cure over night. After an hour or so I checked on its progress and noticed that the latex had shrunk leaving a deep hollow in the middle. This was topped up and left for the rest of the night. Next morning I removed the dowels and unscrewed the lower half of the mould from the middle thread and pulled this new gasket from the top half of the mould. It looked very good and fitted reasonably well. Some adjustment of the mould to increase the barrel shape to match the metal horn was needed, its depth increased by rubbing some plaster away with sandpaper. Subsequent gaskets fitted spot on. With this success I then filled the large gasket mould, this also shrank and was topped up twice over the next two or three hours and left for a full 24 hours to cure as the large gasket is quite thick. On removal from the mould it too looked quite good but on fitting to the horn I found it had shrunk. (The information on the use of latex did warn of this but having got away with it on the small gasket, I pushed my luck!) It hung loose in the horn and the internal diameter was too small to insert the interface.

Back to the drawing board: I left this large gasket for several days to make sure it had finished shrinking, then cut through it and placed it in the horn and measured the gap and it was one inch short. I then laid it out flat to measure its circumference. It had actually shrunk by about 8%. I added this 8% and routed another piece of MDF and made a new upper and lower mould, the upper part this time modified to increase concave surface to match the shape of the inside of the metal horn. The inner thread was a bit of a problem. I solved this by cutting a hole in a piece of 1 inch MDF 8% larger (Circumference) than the widest part of the tapered thread in the interface. This in turn was screwed to a base board and sprayed with lacquer to avoid the Plaster of Paris sticking to the MDF. The outer surface of this hole was lined with Plasticine and the interface placed inside and rotated in a motion like the glass on an ouija board pressing an impression of the thread into the Plasticine, wetted to stop it sticking to the interface. The surplus Plasticine squashed out of the top of the hole and an impression of the original thread 8% larger was obtained and then filled with Plaster of Paris. The new mould was completed the same way as the first and another new gasket manufactured.

The outer rivet

When removed the next day and offered up to the horn it appeared to be a little bit too large. What was required now was a little patience and after a few days full shrinkage had occurred and it fitted perfectly.

Now that the gasket manufacture was complete, the interface was no longer needed as a model, could now be refitted to the wooden flare. Originally this was held in place by five mushroom head brass rivets. The mushroom heads were on the inside of the flare and the outside was splayed over to form a flange. I had some copper rivets of the right diameter and head shape but these were not hollow and I didn't have a splaying tool. Finding the right rivets and a tool was going to take time so an interim solution was found. I

The finished horn rear view

The finished horn front view

found some brass shoe-lace eyelets with an inside diameter that fitted over the copper rivets. The interface was fitted onto the flare and the holes drilled; the copper rivets were cut to length, just under size and fitted through the flare. The eyelets were then push-fitted over the rivets and soldered in place. The inside of the eyelet was clean brass and the rivet being copper the conditions for soldering were ideal, and the solder formed a concave 'dimple' in the middle of the eyelet as the end of the copper rivet was a little lower than the flange of the eyelet. Any surplus flux was then removed with solvent and the rivets puffed in with satin black spray paint, the heads inside the flare touched in with a paint brush. This process proved so successful I stopped looking for the correct rivets.

A touch of French chalk was wiped round the threads of the large gasket now installed in the metal part of the horn and the new wooden flare screwed in very smoothly.

This restoration is at last complete, and my Amplion horn is as good as new and sounds fine connected up to my homemade 'Three Valver'. I feel that I have achieved my objective, restoring this horn to its former glory, using only tools and materials readily available from DIY and Craft shops available anywhere and repeatable by anyone with reasonable DIY skills.

Now 'Tooled up' for the re-manufacture of these parts I decided to produce a few spares. There a lot of these horns around and most of them need new rubber gaskets and some have irreparable wooden flares as this one, I later found Ramin mouldings back in stock at the DIY stores. I tried using some of this but found it unsuitable for one piece ribs, it tended to kink in the steaming process.

The filling of the gasket moulds could be quite difficult, as the latex liquid shrinks it forms hollow pockets. (I was lucky the first time around, the hollows were accessible and refilled) the liquid latex exposed to the air at the open part of the mould sets before the middle and traps hollow bits underneath. The problem was solved by covering the open part of the mould with cling film so the moisture in the liquid latex is only lost through the porous Plaster of Paris keeping the top-up surface live allowing it to sink as it shrinks. The shrinkage rate is about 20%.

Andrea's Andrea continued from page 8

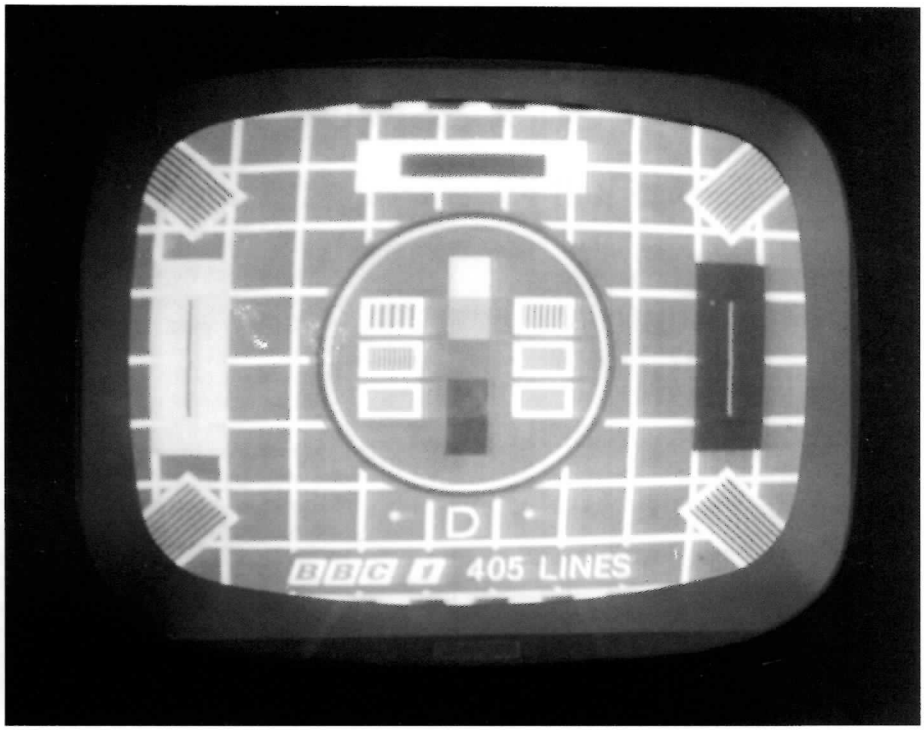
arrangement, which bypasses the epicyclic drive for quicker tuning.

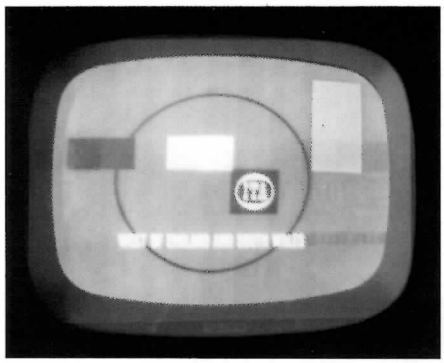
I think it is now a very attractive radio with a lovely dial. This is illuminated in split fashion, with the top half being lit for MW and LW and the bottom for SW.

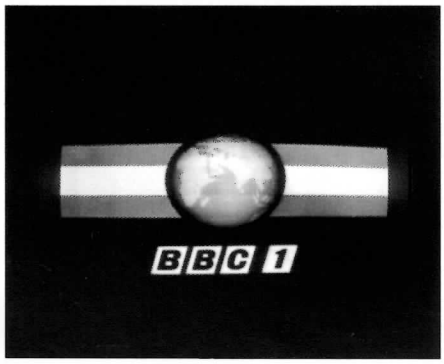
Alas, the cabinet touch up work broke down. I ended up refinishing the radio but the colours achieved closely match the original. I used stain for the sides and front. The side moulding and plinth were done with dye based toner (Mohawk Ultra Classic). The top needed the grain totally obscured and I used Mohawk Tone Finish Toner. Finally the whole cabinet was spayed with Mohawk semi-gloss cellulose lacquer.

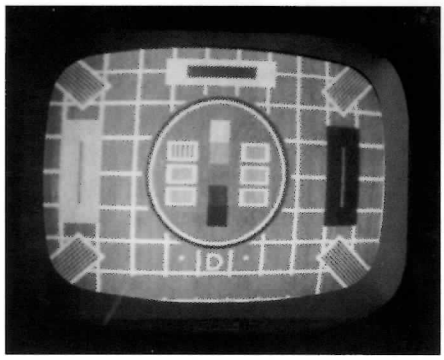
Lost images from 1968

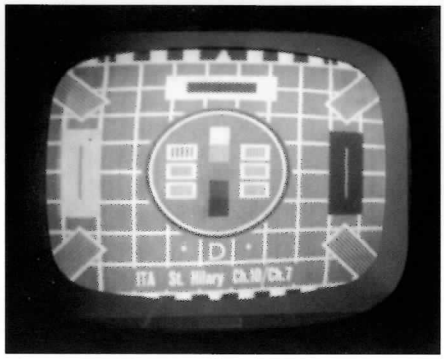
by Dominic Catt











Dear members, I feel it is high time that the photos included in this article saw the light of day.

They were taken in the Bristol area around 1967-68 when I was 13-14. I must have used a tripod as you can see the reflection in the plate glass screen. Amazing, I've only recently noticed this. The camera was a Halina 35mm. The exact exposure details I've forgotten, but must have been around one fifteenth of a second, stop f/4.

I have no records as to whether they were taken on one occasion, or over a period. Certainly the Harlech presentation would be post March 68 (405 Alive issue 28 p62) or post 30th July 68 (405 Alive issue 6 p34) whichever is true. Perhaps someone could confirm.

The test card with no ident is interesting, I seem to remember this was the "3rd Channel", probably Westward. Reception was very good on this occasion.

The youthful Michael Aspel needs no explanation. The TV set itself was a Peto Scott 1416 chassis with a 17" tube. I remember the Saturday night when dad put the bigger tube in. I was told not to touch, and of course I did and got a very nasty shock. Ever since then I have always respected high voltages! The mask probably came from an old Ekco.

Around this time a friend and I used to go to the local TV repair shop with a wheelbarrow and bring home monstrous old TVs. We used to strip them down and dad would end up using most of the bits! My interest in restoring old TVs probably originates with these early experiences.

The original set in this cabinet was the Premier magnetic TV kit. The console also contained a Premier 7 valve all wave radio kit, both of which my father built. There was also a Collaro R/C 500 record player and 12" triple cone speaker in the bottom drawer. I still have the original bill from Premier Radio in Edgware Road, a princely £66 18shillings and 4 old pence in August 1950!

I hope the photos will be of interest to other members and bring back some long lost memories.

Notes from the past – An unofficial history of broadcast television: Part 1 In the beginning

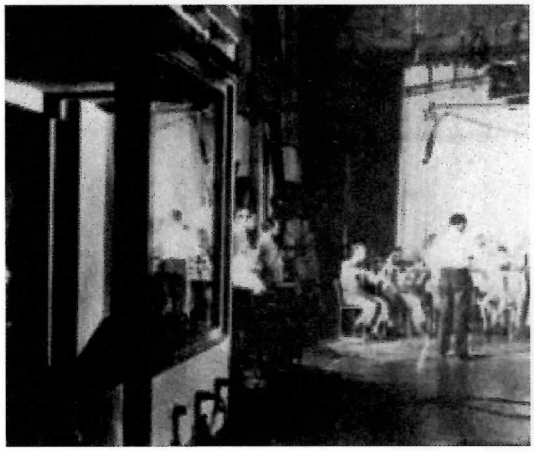
by John Holloway

Some time ago, having just published an article in the Bulletin on one of the pioneer employees of BBCtv, John Bailey, a file was discovered during a routine clearout in the archives of the company I was helping to run. As it was known that I had an interest in early TV and radio it was passed to me. I was told it was the work of a young student some 30 years ago who was studying at the London College of Printing. It turned out that the owner of the company had lectured there at that time. When I retired a year or so later I decided to look at the file in a little more depth and this is what I found.

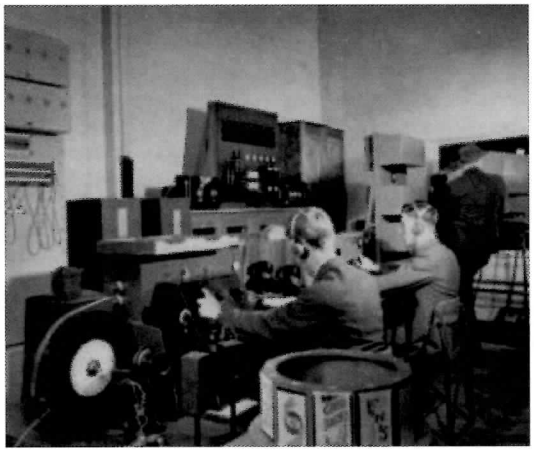
The name of the student was nowhere to be found amongst the papers contained in the file and unfortunately nobody could recall his or her name. As I started to read the file I realised it was based on a first hand account of the beginnings of television. Unlike the usual historical account or memories recalled many years on, this material appeared to come directly from someone closely connected with BBCtv and who had left fairly recently or was still part of the Corporation. In addition there was an intimate knowledge of overseas developments before the war, something I found fascinating. Further investigation turned up the name of Charles Parrott (I'm not even sure whether this is correct spelling of his surname) who was at the London College of Printing at the time in question and who, it is understood was at Alexandra Palace before and after the war. Perhaps other members can fill in some background on him.

It is impossible to check every single detail and I would ask the reader to take this piece as an attempt by the original writer to set out what he or she was being told.

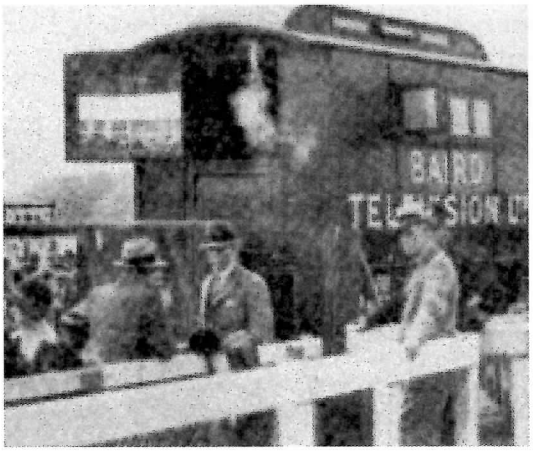
Much of the British detail tallies with what we already know. The information from overseas must be more problematic though a recent programme transmitted by Channel 4 on 'Television in the Third Reich' showed just how advanced television was in Germany before the war and the extent to which it was continuously used during the conflict. A

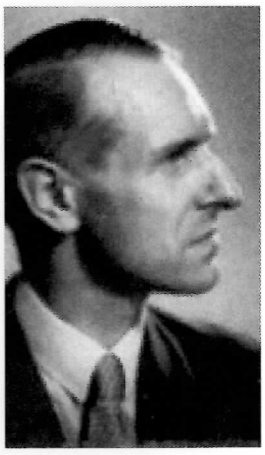


Above: Studio 'B' Baird at AP. Below: Control room at Portland Place



Above: Intermediate film camera. Below: Baird's OB at derby day 1931





Norman Collins

Gerald Cock

By 1933 things had moved on apace and the BBC decided that the future of transmitting television signals lay within the ultra short wave bands and not where they were currently operating, namely the Medium Wave frequencies. It's clear that the potential of nationwide coverage and high definition were becoming uppermost in people's minds.

subsequent programme on Baird aired this year (2004) also provided additional information.

Having skimmed through the material I decided that comprehensive though it was it needed organising and re-writing in order for it to be a readable document. I have tried to keep my own opinions submerged and let the material come out in its own right. However, being human I have fallen by the wayside from time to time and slipped in the odd comment and for that I crave your indulgence. In any event, I believe it is a useful addition to the store of knowledge and I hope it will prove to be interesting to the reader and any debate will provide more accurate information. As you will see, the notes concentrate on the actual personalities in front and behind the lens as well as some of the technical developments

We'll skip the well-known early days of experiments in Soho with the ventriloquist dummy and the office boy William Taynton from the film distributors downstairs, and cut to July 14th 1930 the date of transmission of the first TV play. It was –The Man with a Flower in his Mouth and starred Gladys Young and Lionel Millard. Val Gielgud was also due to appear but was taken ill (First night nerves?). The production was by the Baird company though with some co-operation from the BBC. Baird's producer was Sydney Mosely while the BBC's man was Lance Sieveking. Also involved were George Innes and Brian Michie.

Make up comprised yellow for the face, dark blue or green for touching up the lips and eyes and the prominent lines of the nose, chin and temples.

The production was mounted at the Baird Studio in Long Acre near Covent Garden and broadcast by the BBC. In order to make the event as widely available as possible, in addition to the press and guests assembled in a tent on the roof of the Long Acre studio, watching the programme on a large screen display, some 50 radio dealers were offering special facilities for viewing the production.

On the other side of the Atlantic in the same year a curious trio of subjects were parts of the early experimental transmissions. Sport was already being identified as a suitable subject for the new medium with one of Primo Carnera's fights being televised. Interestingly, the wedding of a Miss Grace Jones and a Mr Frank Duvall was also covered and finally the live relay of a surgical operation by a leading surgeon at one of New York City's major hospitals to students in another part of the hospital. This latter application of the new medium was to be taken up many years later under the sponsorship of the teaching hospitals and drug companies to help train doctors in new techniques.

Commenting after the wedding, the then Commissioner of the Federal Radio Commission commented 'I believe television is destined to become the greatest force in the world. I think it will have more influence over the lives of individuals than any other force'. He also urged tight controls of the pictures being used in order to avoid, as he put it, 'immodest broadcasts'!

Back in the UK Baird was televising the Derby relaying back to the Metropole Cinema in Victoria on a screen 8' x 10' and later that year artistes at the BBC studios in Savoy Hill were televised. A little before Christmas, Jack Payne's band became the first televised programme put out by the BBC.

In the early part of the following year a party of radio and television experts were receiving a transmission from the BBC's Brookmans Park Transmitter on board a train travelling at 70mph. A 4 valve portable receiver connected to a Baird Televisor was all the equipment needed.

By now the BBC were impressed enough by the possibilities of television to order from the Baird Company all the necessary equipment to establish their own studio and to staff it with their own creative and technical staff. Space was found in Broadcasting House using Studio B, an area originally intended for Henry Hall's Dance Orchestra. As far as public service television broadcasting in the UK was concerned, it could be said that this is where it all started.

Douglas Birkenshaw, who had been appointed some time earlier as Research Engineer, which incidentally was the first recognised appointment by the Corporation specifically concerned with television, was charged with the job of supervising the installation. Birkenshaw was a Cambridge graduate and a brilliant engineer and he subsequently persuaded D. R. Campbell and T.H. Bridgewater from the Baird organisation to join him at the BBC.

June 1932 saw John Stuart, the first British film star to make a 'talkie' in the UK, take part in a tv show with Heather Angels staged at the Baird Studios in Long Acre London and viewed by a large audience at the Metropole Cinema in Victoria. Commenting afterwards Mr Stuart said that he would rather appear in movies as the flicker and dazzling light made him feel unwell.

By 1933 things had moved on apace and the BBC decided that the future of transmitting television signals lay within the ultra short wave bands and not where they were currently operating, namely the Medium Wave frequencies. It's clear that the potential of nationwide coverage and high definition were becoming uppermost in people's minds.

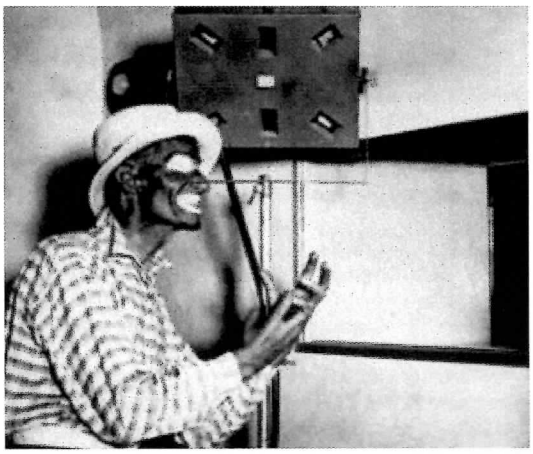
A public demonstration of ultra high frequency transmission by the Baird Company from their Studios in Long Acre to the roof of Selfridge's department store in Oxford Street was given and the BBC subsequently used this method from the top of Broadcasting House. The BBC chose the Autumn of 1933 to announce that it was to terminate its exclusive agreement with Baird when it expired at the end of March 1934.

The BBC also announced that it was to begin experiments with high definition tv with the Baird system kicking off and from January 1934 the EMI system. The existing 30 line transmissions from London were to continue until the expiry of the original arrangement with Baird.

Experiments were now being carried out with 60, 90, 120 and even 180 lines with the Corporation taking the view that at around 120 lines, television became a worthwhile proposition.

Then as now the Government looked to a specialist commission to help it come to a decision. Unremarkably, the TV Commission's report to The Postmaster General recommended that in view of the close association between sound and television broadcasting the authority that was responsible for sound should also be entrusted with TV.

The commission also recommended that a start should be made on establishing a service in London with two television systems alternating from one



Scanning image by spotlight

crew and guests of 'Picture Page'

transmitter with Baird and Marconi-EMI being give the chance to supply the necessary equipment. In point of fact both companies preferred to build their own vision transmitters rather than share a single radio-vision one. They did however share the aerial, high frequency feed line and sound transmitter.

With Baird organisation already installed in the South Tower of the Crystal Palace in South London and the BBC at Alexandra Palace, the BBC closed down 30 line transmission and for a few months in 1935 there were no transmissions while Alexandra Palace was made ready for the next phase.

At around this time the then Post Master General, Sir Kingsley Wood, thought it necessary to assure people that television did not involve the possibility of looking into viewer's homes. TV cameras were not Peeping Toms. How times have changed. About 6 or 7 years ago I was using a camera mounted in a necktie with the pinhole lens as part of the pattern of the tie!

Both Baird and EMI installed their equipment at AP under the hawk-eyed gaze of Douglas Birkenshaw who in addition to supervising the technical side of the operation also kept peace between the parties involved. Essentially there were three systems on offer: intermediate film, where the action was filmed and processed while running with the wet negative being scanned. This gave a delay of 64 seconds and also meant that the 'camera' was severely limited in its movement. Because of the delay, sound had to be recorded onto the film with subsequent loss of quality.

There was also the spotlight scanning system that produced good close up pictures but was again limited as a production tool as the studio had to be in complete darkness whilst the spotlight was in use. The third system on offer utilised the cathode ray tube. At this time all three systems could produce a picture of 240 lines.

The Baird company had concentrated on the mechanical and intermediate film systems and though they had a CRT based camera their level of development in this area did not equal the rival EMI model.

Professor Walton of Dublin University had already said in 1931 that 'if television is to be done successfully it must be by using cathode ray tubes, the mechanised methods are doomed to failure.' Walton made these comments to J.D. McGee who at the time was working on nuclear physics at Cavendish Laboratories in Cambridge. He subsequently joined EMI when they were starting to assemble their team in 1932 specifically with television in mind. Four years later McGee and his colleagues under James Chadwick had developed the Emitron tube which delivered the death blow to Baird's dreams of being not just a pioneer of television but a part of a successful television service. A year later the Super Emitron came along which enabled Outside Broadcasts to be made in available light.

Apart from the technical differences, the three systems demanded different types of make up for those appearing in front of the camera. The intermediate film called for a thick yellow-based foundation with grey eye shadow and red lips. The spot light system again required a yellow base but with bright blue lips and eyelids. The CRT based cameras needed light ochre face with brown lips eyelids and eyebrows. These days, one is lucky if there is enough money in the budget to powder someone down!

Although providing by far the best overall pictures and allowing Directors and Producers to begin to develop a fluid style of production the Emitron tubes were by no means reliable. In fact, EMI had to run a shuttle service from Hayes to AP in order to be able to replace tubes at short notice. The Emitron also suffered from tonal graduation problems and had a high sensitivity to red and infrared light. But, like all periods of intensive scientific development, there is usually someone ready to come up with a solution that puts the seal on a new technique. This time it was Dr Leonard Klatzow who provided the answer, a photosensitive mosaic that had little infrared sensitivity.

The first BBC Director of Television, Gerald Cock, told his new staff in August 1936 that they had several months before they needed to actually produce programmes but then took the lightning decision to televise from AP for the benefit of the trade who were holding their exhibition at Radiolympia. He recognised that the public needed to be wooed towards the new medium and what better way than a captive audience already looking to new and exciting technology? Cock handed the job of producing 20 programmes, two per day for the run of the exhibition, to Cecil Madden. He went on to become the father of television production and to hold many senior posts with the corporation.

Among all the artistes and musicians booked for this opening extravaganza was a young second

violinist in the Television Orchestra, Eric Robinson, who went on to be its conductor and, after the war, a personality in his own right presenting music programmes featuring singers and dancers from around the world.

Earlier in the year two women announcers, chosen from a mountain of applications, joined Leslie Mitchell in mid –1936. They were Miss Elizabeth Cowell and Miss Jasmin Bligh. The job description specified a super personality, charm, tact, a good memory, a mezzo voice, as acceptable to women as well as men, must photograph well, must not have red hair and be unmarried. As Miss Cowell lived in Chelsea and Miss Bligh was the niece of the Earl of Darnley and lived in Upper Berkeley Street we can safely assume that they met the criteria in spades!

The opening of the Radiolympia exhibition was on 26th August 1936. Both women announcers were absent. Elizabeth Cowell was suffering from a throat infection and Jasmin Bligh had just been operated on for appendicitis. It was left to Leslie Mitchell to announce the show, the first transmission of which was by Baird. From then on the two companies alternated in relaying the shows. During the exhibition a film of the Arsenal – Everton game at Highbury was transmitted, becoming the first football match to appear on a public tv screen. A few days later on 5th September, without any real planning, the first Outside Broadcast took place between 12.05pm and 12.10pm. It consisted of a broadcast of the BBC premises at Alexandra Palace.

At this time Baird, with his showman's instinct equipped a KLM airliner with a Baird Televisor and the crowds at Olympia saw Paul Robeson and Charles Laughton broadcasting from four thousand feet while travelling at around 170miles per hour. In achieving this Baird had now added aerial transmission to his successful demonstrations from a train and from the Berengaria liner in mid Atlantic.

The effect on the buying public of all this activity on the part of the broadcasters was to make the demand far greater than most of the manufacturers had believed possible. They now set their factories to work, producing sets selling between ninety and one hundred pounds. Or would it have been guineas?

After the exhibition there was a partial suspension of the service in order for everyone involved to take stock and reflect on what they had learned from the experience. In October Gerald Cock announced that as from November 'we shall start regular TV programmes for 2 hours daily. There will be variety turns including dancing and skating. Informality will be the keynote of the TV programmes'

The transmitting range of the Alexandra Palace transmitter was about 25 miles at this time and on 2 November 1936 Major G.C. Tryon, The Post Master General, officially opened the BBC Television Service.

The BBC team was:
Gerald Cock, Director
Cecil Madden, Programme Organiser
Leonard Schuster, Administration
Douglas Birkenshaw, Engineer in charge
D.R Campbell, Lighting
T.H. Bridgewater, Senior Maintenance Engineer
H.W. Baker, Senior engineer, transmitters
H.P. Bowden Senior engineer, transmitters
Peter Box, Chief Designer
George More O'Farrell, producer
Dallas Bower, producer
Stephen Thomas, presentation
Donald Munro, presentation
Leslie Mitchell, announcer
Jasmin Bligh, announcer
Elizabeth Cowell, announcer

These names represented a formidable array of talent many of whom were to see television through well into the post war period. Perhaps the best known of them, Cecil Madden became what might be called the father of television operations. As early as that first year his active mind was proposing programme formats that would run and run. Picture Page is perhaps the most easily remembered and set the pattern for magazine programmes and talk shows that continue through to the present day.

A telephone operator who 'plugged' the viewer in to the stories and celebrities taking part linked the various items that made up the programme. It ran for some 260 shows until close down in 1939 and reappeared after the war hosted by Joan Gilbert. The first show was transmitted on 8th October 1936 and among the guests were racing tipster 'I've gotta horse', Prince Monolulu, and the then model, Dinah Sheridan who years later starred with Kenneth More in Genevieve.

Cecil Madden had a rare talent for spotting a good idea and stars in the making. Ten years later in June 1946 Madden introduced the Beverly Sisters to a peacetime television audience starved of glamour after five years of war.

In part two BBC Television becomes a regular service and, from 1937, with its own supplement listing programmes in the London edition of Radio Times.

The Cream of Radios

by Chris Rees

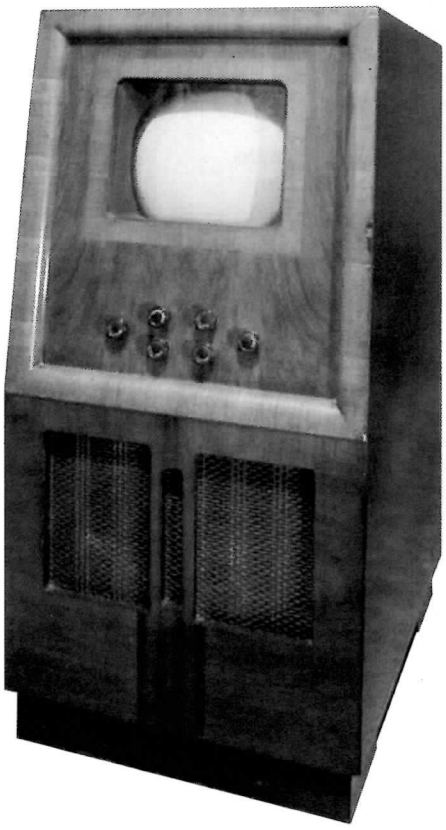
Returning from the 'Ham Radio '04' event in Friedrichsshafen last June, we stopped over in Zürich, lunching in a randomly chosen restuarant.

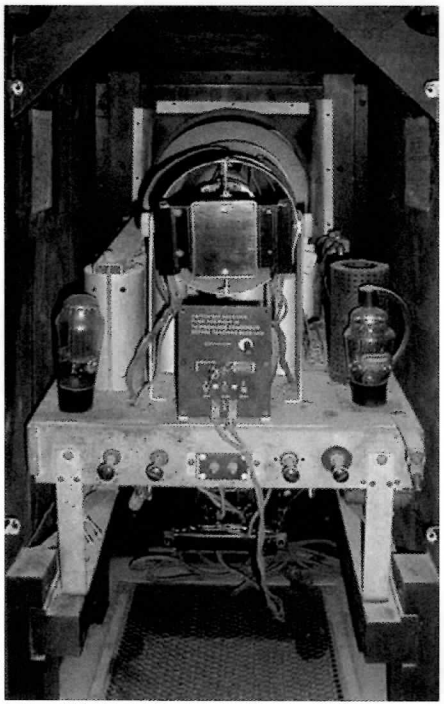
The cream pots accompanying our coffee featured classic radios on their foil tops (see illustration on left). A search of the restuarant kitchen revealed 10 different sets. I guess that they were probably 'overs' from a batch produced for an earlier exhibition in the city. The meal was rather good too!

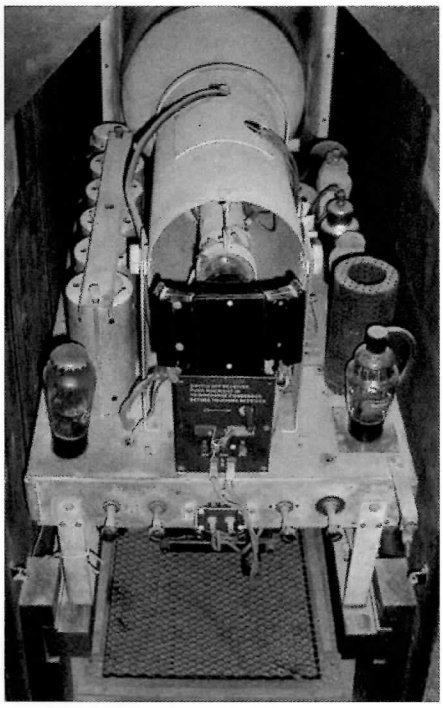
The Marconiphone model 704 television – a rare pre-war model

by Ken Brooks

Pre war televisions have always been rare – but not always collectable. Here's the story of one that came my way several years ago







In an age of affordable technology we take for granted instant worldwide communication such as powerful computers and consumer gadgets that just a few years ago might have existed only in the realms of imagination. Although still evolving, television is a familiar technology and we accept it as normal. This includes lavish studio productions or the ability to see live programmes from across the world. Life was not always thus. In the few years just before World War II, the BBC commenced high definition television broadcasting with a service available in the London area only.

Prices of receivers were very high in real terms, with a basic vision only set costing about £25 and a tasteful console set costing perhaps two to four times this amount (all at a time when incomes were just a few pounds a week). Consequently, reception would have been the preserve of the better-off and makers' brochures played on the exclusivity of television. They illustrated their sales brochures with sketches of well-to-do viewers dressed in evening wear, gathered in rapt attention around their televisions for the evening's viewing. In 1983, I had a phone call from BVWS member and friend the late Roy Sonnex:

"Ken, you like old TVs don't you?"
"Yes", I cautiously answered.
"There's this pre war set going begging and looking for a home, do you want it?"
"Yes please", I answered, dropping my guard.

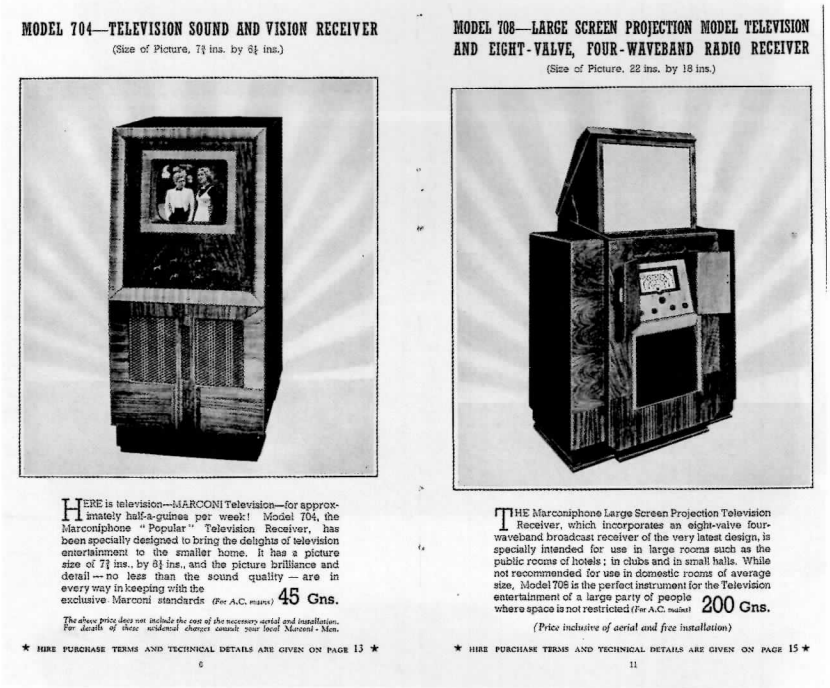
This seemingly surreal conversation took place when just a handful of collectors cherished TV sets, my interest having been fuelled by searching for a mirror lid set, and obtaining an HMV 900 (1) three years earlier. Arrangements were made to meet Roy at a BVWS Swapmeet in Romsey. Roy transported it in suitable style in his Series 2 Jaguar XJ6. The television turned out to be a Marconi 704 (a 9" direct view console receiver made in 1938). On bringing it home, it underwent a brief inspection and clean. This confirmed everything was original and apparently untouched over the years. An acquaintance who got to hear of my interest in these things asked if I could loan a very old television as a prop for an advertisement. As a result of this enquiry it acquired brief fame by appearing in an advertisement for BT – with a superimposed screen shot showing the 1937 Coronation.

Time to have another look at the set. The Cathode ray tubes used in early televisions were very long and often mounted vertically (to be viewed through a mirror.) This one uses a conventionally mounted tube resulting in a very deep cabinet (670mm). EMI Service kindly supplied some data revealing that this set was a little different from many receivers of the time. Although many of the valves and components looked familiar, it was not a straight TRF set like most of its contemporaries, but a superhet. For the technically minded, the circuit uses an X41 oscillator/mixer to produce Intermediate Frequencies of 9 and 5.5 MHz for vision and sound. This is followed by three stages of I.F. amplification using MSP4 pentodes. The sound

It acquired brief fame by appearing in an advertisement for BT – with a superimposed screen shot showing the 1937 Coronation.

is taken from the third stage cathode to an MHD4 double diode-triode and then to an N41 output valve providing over a watt of audio. After separation of sound, the video path continues through a further I.F. stage and a tetrode detector. This modulates the cathode of the Emiscope tube. Both line and frame timebases use hard valves to drive the magnetic deflection coils.

Pre war TVs are characterised by transformer derived EHT voltages. Besides adding to the set's massive weight, the system has some interesting safety features. They are quite unlike later line flyback systems which deliver minuscule currents thereby reducing the risk of electrocution. These old warhorses have big reservoir capacitors and can deliver current - lots of it. A 3.5 kV d.c. shock could be fatal. Nowadays, something like this



MODEL 704—TELEVISION SOUND AND VISION RECEIVER

(Size of Picture, 7¾ ins. by 6¼ ins.)

HERE is television—MARCONI Television—for approximately half-a-guinea per week! Model 704, the Marconiphone "Popular" Television Receiver, has been specially designed to bring the delights of television entertainment to the smaller home. It has a picture size of 7¾ ins., by 6¼ ins., and the picture brilliance and detail — no less than the sound quality — are in every way in keeping with the exclusive Marconi standards (For A.C. mains) 45 Gns.

The above price does not include the cost of the necessary aerial and installation. For details of these incidental charges consult your local Marconi - Man.

★ HIRE PURCHASE TERMS AND TECHNICAL DETAILS ARE GIVEN ON PAGE 13 ★

6

MODEL 708—LARGE SCREEN PROJECTION MODEL TELEVISION AND EIGHT-VALVE, FOUR-WAVEBAND RADIO RECEIVER

(Size of Picture, 22 ins. by 18 ins.)

THE Marconiphone Large Screen Projection Television Receiver, which incorporates an eight-valve four-waveband broadcast receiver of the very latest design, is specially intended for use in large rooms such as the public rooms of hotels; in clubs and in small halls. While not recommended for use in domestic rooms of average size, Model 708 is the perfect instrument for the Television entertainment of a large party of people where space is not restricted (For A.C. mains) 200 Gns.

(Price inclusive of aerial and free installation)

★ HIRE PURCHASE TERMS AND TECHNICAL DETAILS ARE GIVEN ON PAGE 15 ★

11

A recent enquiry to EMI revealed that little information was available on the 704 other than that the model was introduced in 1937 and retailed at 45 gns.

would probably be completely sealed to mitigate product liability claims, but in those pioneering days the safety warning simply advised "the use of rubber gloves" when making internal adjustments! A rather dramatic protection measure used on the slightly earlier Model 900 comprised a spring loaded plunger switch which shorts out the EHT if the cabinet back is removed. This was clearly intended to prevent curious boys of all ages eliminating themselves from the human gene pool, but if not disabled is likely to have inadvertently damaged the EHT circuits when working on the set. The technique used on the 704 is rather less drastic, simply consisting of a manually activated shorting bar to discharge the capacitors after power has been removed.

The television was in relatively good condition when received, with just some evidence of having been in long term storage. With few electrolytic capacitors the set was soon prepared for running and displaying a raster. A suitable modulator and video source enables pre-war programmes to be enjoyed and one can experience the magic and excitement that must have been felt in those pioneering days together with the ever present fear that something expensive or irreplaceable might fail.

The 704 did not seem to feature prominently in the literature of the time and I began to suspect it had been produced in low quantities. EMI (2) have confirmed that the block of serial numbers allocated for the 704 was 13001-14000. Looking at the range of numbers issued for other models this is by no means unique and gives little clue to production quantities. This example is H/13096 suggesting that a fair number were made. A recent enquiry to EMI revealed that little information was available on the 704 other than that the model was introduced in 1937 and retailed at 45 gns. The chassis was shared with the HMV 903, an identical model electrically but branded by its slightly different cabinet, and of course, HMV transfer.

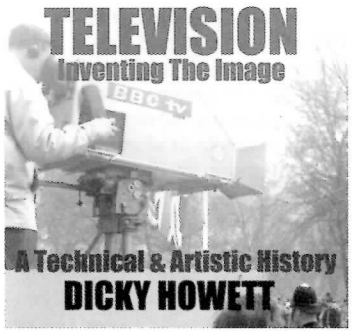
The BVWS Bulletin (3) published a list of some 134 surviving pre-war televisions, confirming this 704 as the only known example, together with a single companion model HMV 903. This seemed to mark the 704 as special but further analysis of the list shows single model survivors occurring much more frequently than any other grouping. It is also significant that no more than ten examples of any pre-war model (HMV 905) exist. Why do so few exist? In relation to perhaps 20,000 sets produced, a survival rate of less than 1% isn't very impressive and the rate for wireless is probably better. There could be several reasons for this marked difference. Wireless sets were, of course, cheaper, made in much greater numbers and not reliant upon a single programme source limited to a small geographic area. They were usually much smaller so domestic pressure to move them on when life expired would not have been as great.

After all, who wants to keep a television the size of a chest freezer in their living room when smaller, better models come along? The survival rate for HMV 905's, a modestly sized combined TV/Radio, appears to support this hypothesis.

To conclude, the 704 is certainly unusual. My guess is that a relatively small screen in a large cabinet is not well suited to either large or small rooms and without a radio its usefulness, and therefore chances of survival, were correspondingly reduced. However, if anyone is inconvenienced by such incompatibilities I would be pleased, as before, to offer similar orphan televisions a good home!

References:

1. The HMV Model 900 Television - Ken Brooks, BVWS Bulletin, Volume 9, Number 1.
2. Schedule of pre-war televison serial numbers – EMI private communication.
3. Pre war television listing - BVWS Bulletin, Volume 23, Number 3.



New TV history book out now

Now published is a TV history book by Dicky Howett 'Television-Inventing The Image'. This new book, designed as a media primer, charts 50 key television innovations, (zoom lenses, tele-recording, outside broadcasting, video tape, electronic image tubes etc). The book presents also the history of several mechanical systems, including film. Featured are Nipkow, Baird and Zworykin plus equipment manufacturers, Houston-Feerless, Philips, Ampex and Vinten. Dicky's book is fully-illustrated with over 100 photographs, most never before published. For more details contact the publishers www.kellybooks.co.uk Tel: 01884 256170

Compact Receiver design from Valve to Transistor. Part one.

By Jim Duckworth

Introduction

Compact or miniature Radio Receivers have captured peoples' imagination since the earliest days of radio broadcasting. There were matchbox Crystal sets in the 1920's and innumerable Home Constructor articles on 'Pocketable Receivers' between the 1930's and 50's, along with one or two commercial designs, but all for use with headphones.
The 'Holy Grail' of a truly compact loudspeaker receiver came closer to reality in 1939 with the introduction of the 'All Glass Button Base' valve series in the USA, released in the UK in 1945 and known as the B7G series. Many designs for compact 'Personal Receivers' resulted around the world, using these valves along with a 67.5v battery for HT and 1.5v for LT.

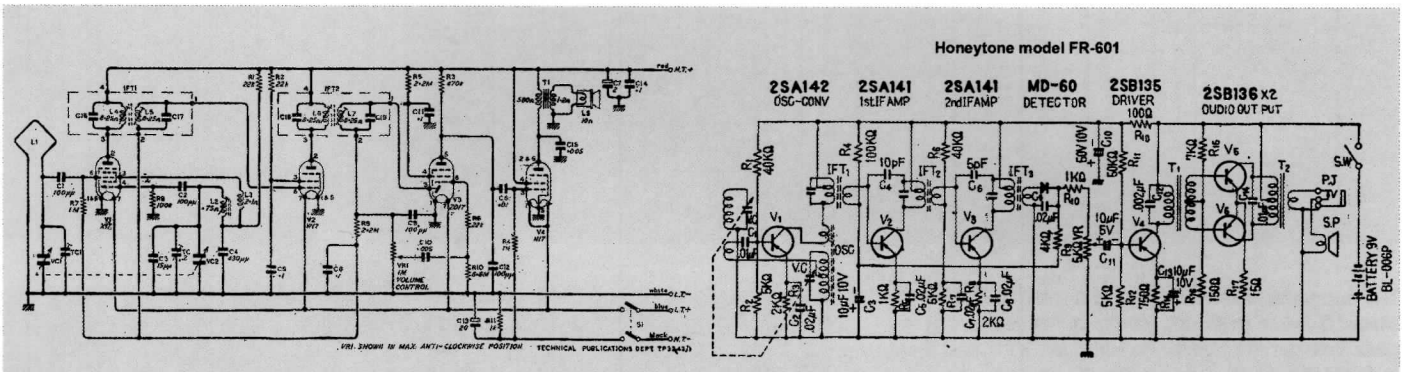
Fig 1

The USA had a head start with production sets appearing from RCA and Emerson among others in 1939 and for variety, compactness and electromechanical excellence were to stay in the driving seat all the way through to the transistor age. In particular they exploited the switchover from Frame Aerial to Ferrite Rod by introducing slimmer sets without the former clamshell type lid and fully exploited further reductions in size made possible by the US Eveready slim 67 volt battery, no 477. The Bulova 'Adventurer', a genuine '(Over!) coat pocket radio, was a good example of what was possible prior to the arrival of the Transistor.

The UK like the rest of Europe had to wait until the end of the Second World War to start Personal receiver production and 1947 saw the introduction of the Ever Ready model 'B', the Marconi P20B and the Vidor 353. These sets were the best of a 'limited bunch' as the 1950's saw the emphasis switch to the larger 90 volt plywood and rexine attaché case models typified by the Vidor lady Margaret etc, etc with similar offerings from Ever Ready and Pye. The trend to more compact ferrite rod 67 volt models was largely ignored. However elsewhere in the world, entrepreneurial manufacturers who had already encouraged the trend from 'one set per household' to 'one per room' (US Midgets), began to scent the possibility of 'One per person'. This came closer to reality with the introduction in the autumn of 1954 of the Regency TR1 – the world's first Transistor pocket loudspeaker radio. This 4 transistor superhet was the result of a bold pioneering partnership between Texas Instruments and the Idea Corporation of Idaho who designed and brought it to market when no commercial transistors or other suitable miniature components existed. This resulted in a rather insensitive and 'noisy' RF performance and limited

Fig 2

Slide (1) **Valve versus Transistor - Design differences**



Item	Valve	Transistor
General	Voltage driven with very high input/high output impedance but low Gm. Simple interfacing – no coil taps at MW Broadcast + IF.	Current driven/high Gm device with low input/output impedances. The input consumes power and needs matching for maximum power transfer. Complex interfacing with coil taps.
Frequency Conversion	Multigrid 1R5 allows multiplicative mixing and AGC application without disturbing the Local Oscillator (LO). 1R5 is a variable mu valve.	Single input (Triode) device means additive, non – linear mixing. Combined mix/osc means compromise Collector current (Ic) value and no AGC - would stop the LO.
IF Gain/BW	High: Gm X Rl. But 1T4 Gm of only 0.8Ma/v means high Q/high dynamic impedance (Rd) coils essential to realise gain of around 65X (37 Db).	Lower – (approx 30x versus 65) due to low input/output impedances and insertion loss from tapping into the IFT tuned circuit to preserve BW.
Stability	High – Very low Cga means no neutralising.	Low – Cbc of approx. 10pf needs neutralising in IF

AF output, which was compared unfavourably with the 'Compact 4 tube portables' of the day. But it *was* the first, a great effort and sold around 140,000 units in an eighteen month production life.

One year later in the Autumn of 1955 Zenith of Chicago introduced model 500 (Owl eyes), a high end 7 transistor pocket radio which defined new standards of RF and AF performance, achieving 100mw undistorted output via a push pull circuit powered from 4 penlight batteries. From this moment on, there was no need for unfavourable comparison with valve personal portables and the range was continuously developed over a five year period, selling more than one million units.

1957 saw the introduction of the first shirt pocket loudspeaker receivers such as the Sony TR610, based on a new generation of subminiature components which were mostly designed and manufactured in Japan.
The 'One per Person' market had truly arrived and flourished world wide with an abundance of colourful little sets of a standard six transistor design with cabinets generally reflecting the spirit of the Elvis and Sputnik age and lasting until the early to mid 1960's.

The Talk About Wireless (TAW) Presentations
The first one, given almost four years ago, concentrated on the RF and IF side of compact valve and transistor set design and the recent one of June 6th 2004, on the AF side including several case studies. To present a unified and consistent account, material has been combined and condensed from both and comments have been added to accompany each slide and generally reflect what was said at the time. As the whole is too big for one issue it has been split up into a new part one and part two.

Slide Notes and Commentary - part one
The scope of the Talk About Wireless or TAW presentations included the 67 volt Valve Personal Receivers and the first 'epoch making' Transistor pocket radios only i.e. not valve and transistor radios in general. This should be born in mind when reading the material.

Slide (1): Valve versus Transistor - design differences

• Valve General: The 'low Gm' refers to the fact that the Gm of the first three valves 1R5, 1T4, 1S5 is below 1 Ma/v. The 3S4 is 1.45 Ma/v.
• Transistor Frequency conversion: The compromise value of Collector current could be avoided by using separate mixer and oscillator devices, which also allowed AGC to be applied. The 'sweetspot' for low noise non-linear mixing was around 250-500 micro amps whereas the oscillator benefited from 1-1.5 Ma for high and even voltage injection across the band. This issue is revisited in the transistor case studies – Zenith 500.
• IF Gain: In the expression for gain, Gm X Rl, the load Rl consists of the dynamic impedance (Rd) of the IF Transformer in parallel with Ra, the Ac output resistance of the 1T4. This damps Rd by some 15-20% which is taken into account in the gain figure of 65X. The valve anode 'sees' both resonant circuits in parallel so the actual load is half of the dynamic impedance of either and the gain half of that of a single tuned arrangement. The 1U4 valve had a higher Ra allowing more IF gain to be squeezed out and was used as standard in American compact portables of the 1950's.
• Transistor pocket sets used single tuned IFT's both for space and cost reasons but also to avoid the 6Db insertion loss referred to in the above context – they needed all the gain they could get. When the AF115/117 diffused base generation of VHF transistors arrived, the combination of very high output resistance and low feedback capacitance allowed much higher gain and the return of double tuned IFT's in sets large enough to take them.

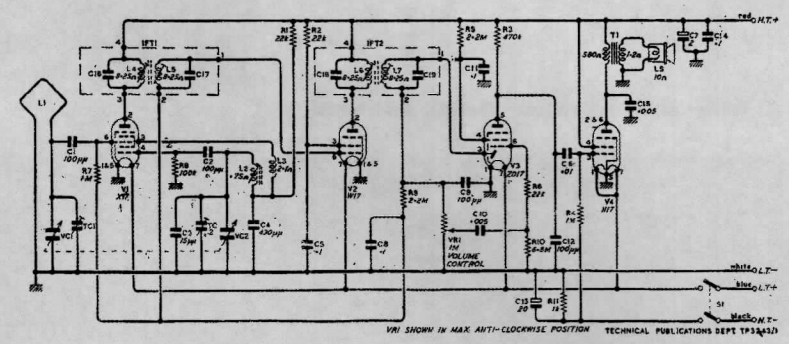
Slide (2): 4 Valve Personal Superhet AF output design considerations

The topic now turns to the 4 valve superhet audio frequency stages and in particular to the output stage. What power is it capable of? How is it produced and can we easily estimate it from given data? For Class A stages we usually can as the valve (or Transistor) is 'pre-charged' with the peak voltage and current values. Slides (3) and (4) use the Eveready model B/ Marconi P17B as a case study to answer these questions.

Slide (2): 4 valve Personal Superhet AF output Design Considerations

A 200-300uv Rf input produces around 75 Mv of Af at the volume control. The 1S5 amplifies it to 5v Rms (7vpk) at the 3S4 input – sufficient to drive the 3S4 to maximum output.

- Output is taken between Anode and chassis and peak output power is given by Vpk x Ipk.
- Vpk is equal to the battery volts less 'subtractions' – OPT loss, Auto bias volts, Anode knee volts.
- Ipk is approx equal to the Dc steady state Anode current and swings symmetrically about it.
- The anode load chosen to convert Ipk to max undistorted volts swing (Vpk), hence Pk power.
- Output power is based on Rms voltage and current values = Vpkx.707 x Ipk x .707 = Vpk.Ipk/2



The approach taken is first to estimate the Peak power figure in milliwatts, given by the product of the peak voltage and current swings, Vpk x Ipk and then to halve this figure, as explained for output power. Whereas the peak current swing is easily obtained, being approximately equal to the steady state Anode current, the peak voltage swing has to be arrived at by a series of 'subtractions' from the 67v HT battery. Volts lost to the Output transformer and auto grid bias resistor are easily obtained in this case from the Marconi data – slide (3). Volts lost due to the 'Anode knee' however can only be obtained from the manufacturers output voltage/output current, (Ia/Va) characteristics as shown in slide (4).

Slide (3): Marconi P17B Specifications and Valve table.
We use the Specifications simply to note Marconi's claimed output power figure of 80 Mw meaning we are looking to find 160 Mw peak power.
The Valve Table gives us several useful bits of information. The Anode to chassis volts is 57v – so we have lost 10v already. The screen, which goes direct to HT, is 59v meaning the Output Transformer primary resistance has cost us 2v. The other 8v has been lost across auto bias resistor R11 in the HT- lead (Total HT current of 8Ma through 1k ohms), which also gives us a Grid bias value of –8v. The Anode current is 4.2 Ma which we can take as the peak output current swing. This is used along with the 57v and -8v to plot on the Ia/Va characteristics and determine the net output voltage swing and hence output power.

Slide (4): 3S4 Operation in the Marconi P17B
Marconi Data – Biased for economy. The 57v Va and –8v Vg, combine to fix our operating point. In this particular (Osram) valve data, the anode current Ia is plotted along with screen current so our 4.2 Ma is 'sitting on top of' a screen current of 1.3Ma, total 5.5Ma. However we can plot a 4.2 Ma peak excursion either side of this vertically, and locate it horizontally just inside the Vg = 0 (Grid current) 'No Go' area. A perpendicular can then be dropped down from this peak current value to the anode voltage (Va) axis defining the voltage swing minimum point. A load line can then be drawn through the central 57v/-8v point down to the –14v anode current cut-off line and a perpendicular dropped to locate the maximum voltage swing. We can now determine the peak voltage swing as 38v (taking the average of the Pk to Pk swing), and Peak power as 38 x 4.2 = 160 Mw. So the Marconi figure of 80Mw-output power checks out!

The biased for economy comment refers to Marconi's anode current value of 4.2Ma versus the Osram recommended values of 6ma/180 Mw. Perhaps they made the HT battery last another week or so by these means!

Summary Points. Study of the anode current excursions over one cycle shows that the average

Slide 3

MODEL P17B

SPECIFICATION

Voltage Supply.
Battery—Marconiphone Type B114.
H.T. 69 volts ; L.T., 1·5 volts.

Consumption.
H.T., 8 mA. ; L.T., 250 mA.

Wave Range.
200 to 560 metres (1,500 to 535·6 kc/s).
Intermediate Frequency—465 kc/s.

Rated Output.
80 milliwatts maximum.

Valves.
Marconi X17 Frequency Changer.
" W17 I.F. Amplifier.
" ZD17 Detector A.V.C. and L.F. Amplifier.
" N17 Output.

Physical.
Height... ... ... 2½ inches.
Width ... ... 5 inches
Length ... ... 9 inches
Weight ... ... 3 lbs. 10 ozs.

Loudspeaker.
This is a 3-inch permanent magnet moving coil loudspeaker. The speech coil has a D.C. resistance of 10 ohms.

VALVE TABLE

The following table indicates the approximate voltage and current readings obtained on each valve when the receiver is operating at maximum output. Variations of ±15 per cent. may be anticipated between models. A high resistance voltmeter should be used to measure voltages.

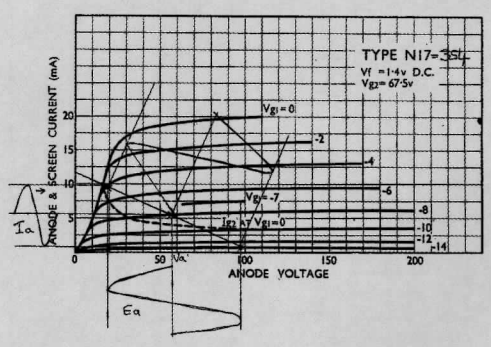
VALVE.	ANODE.				SCREEN.		CATHODE.	
	Volts to Chassis.		Current mA.		Volts to Chassis.	Current mA.	Volts to Chassis. (Pin 7.)	Current mA.
	Mx.	Osc.	Mx.	Osc.				
V1 (X17)	59	26	0·08	1·4	—	—	1·4	—*
V2 (W17)	52		1·25		35	0·5	1·4	—*
V3 (ZD17)	4·5		0·06		1·0	—*	1·4	—*
V4 (N17)	57		4·2		59	—*	1·4	—*

Total H.T. voltage, 59V. Voltage across R11, 8V GRID BIAS
Total H.T. current, 8 mA. Total L.T. current, 250 mA.

* Owing to the compactness of this receiver, it is impracticable to measure currents in the electrodes marked thus.

current is the same as the Dc steady state (the line through the middle!), therefore the same (peak) power is taken from the supply with or without an input signal. Clearly not the way ahead for compact or pocket receivers with limited Ma/h capacity on board. To the uninitiated, the surprising thing about this exercise is how little, 38v (55%) of the 67volt battery was actually available for output voltage swing. Things get better with 90v supplies due to the fixed nature of the overheads; also of course, power is proportional to the voltage squared. So although the ratio of 90v to 67v is 1.3x, the power ratio is 1.7x so our 80Mw becomes 135Mw. This is also the figure quoted by the valve manufacturers.

Compact 4 valve superhet examples: Figs (1-6)
Eveready model B (Marconi P17B) fig (1) - our case study set. I keep this one in my collection for nostalgic rather than practical reasons. The mechanical design was shoddy with the two thin metal strips acting as both lid restraints and frame aerial connections.



Slide (4): 3S4 Operation in the Marconi P17B

General– Ia/Va characteristics for the 3S4 made dynamic by adding the P17B load line.

No go areas: To LHS of Vg = 0, Grid current area.
Below Vg = -14, Anode current cut-off.

Marconi Data – biased for economy:
Va = 57v, Vg = -8v, Ia = 4.2Ma

Vpk x Ipk = 38 x 4.2 = 160 Mw. Output Power = 80 Mw

Osram recs for 67.5v: Vg = -7, Ia = 6 Ma,
Pk Power =180 Mw /10% thd.

Operation with OPT: Falling Ia in OPT primary creates back Emf opposing it but supporting Ea with voltage swing up to 2X Ea.

Summary:

P17B output power of 80 Mw is confirmed but:

Class A operation is not efficient as Peak current is drawn from the supply with or without an input signal.

67v operation not efficient as fixed losses of 30v means only 55% of battery available for output voltage swing. (of 90v:: 70% more output for 30% more volts

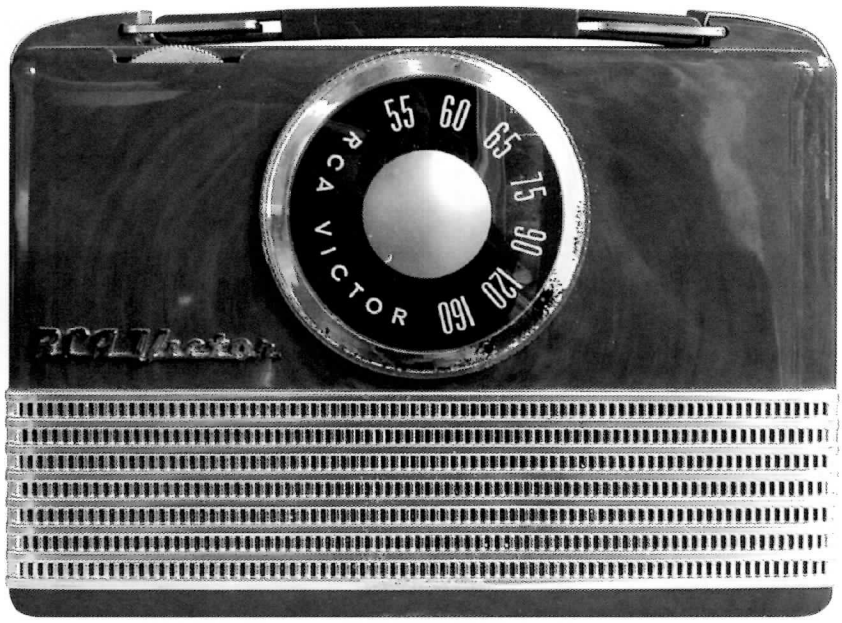


Fig 3

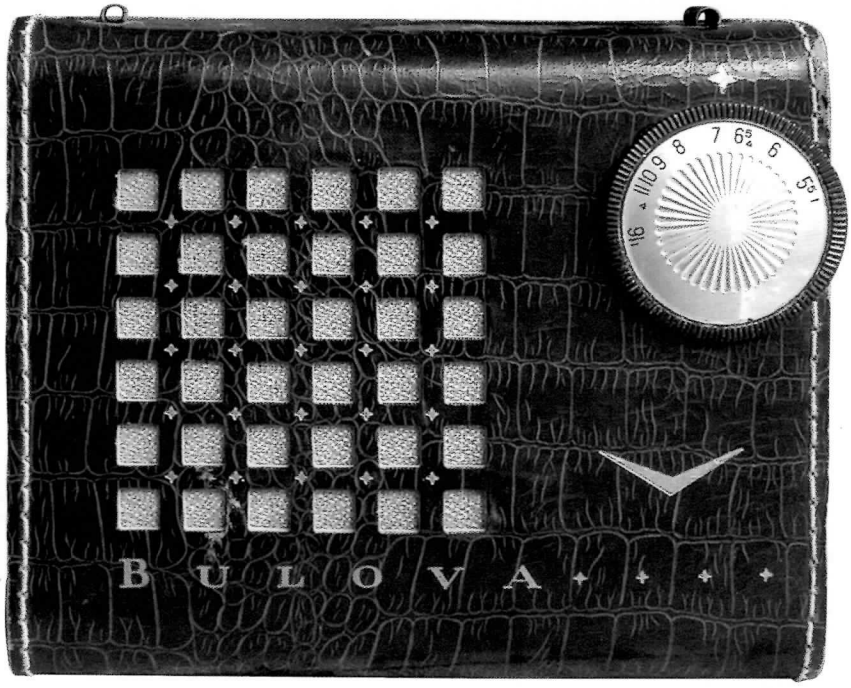


Fig 4

They were not up to either task so between 90-100% failure is usual after 55 years. Likewise the silly little lid release buttons normally break off and fall out. The paint job was poor and often just fell off the metal base in time. On the electronic side - the 'thin' impractical IFT adjusters make alignment very difficult without an EMI toolkit and unrewarding anyway as there ain't much Q left after all this time either. But, they did have excellent data enabling us to use it as a case study and track down the audio power figure! Emerson 558 Fig (2) – this was a good example of how a 'clamshell' set should have been made. It was very compact in size – only 75% of the Marconi, by virtue of using separate HT and LT batteries rather than the B114 combined one, and also a miniature gang condenser. It boasted a slide rule tuning scale with that very 'period' 1940's font and superb electronic and mechanical design.

The lid had separate restraints and frame aerial feeds; also they developed a standard brass catch using one each for the lid and the case back. I have never known any of these items failing with time. The hard enamel paint coating stayed put on the front panel and only sometimes showed wear round the tuning knob of a set which had a very busy life. Electronically it was excellent with a profiled oscillator section to the gang condenser giving almost perfect tracking across the band and high Q IFT's, easily adjustable and performing 'as new' after 55 years.

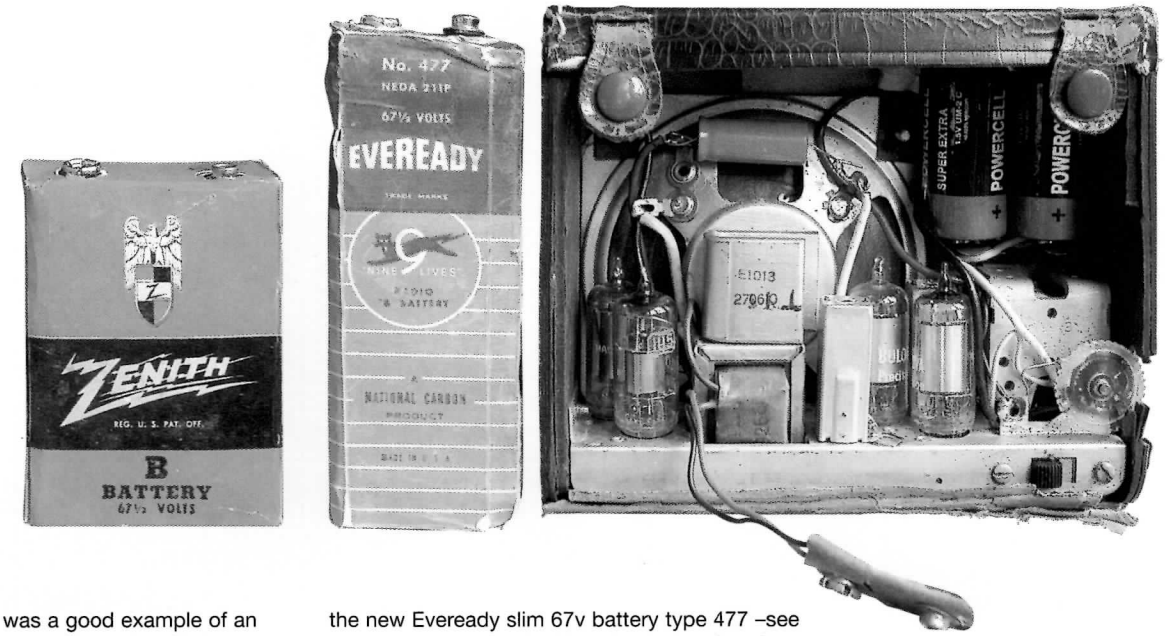
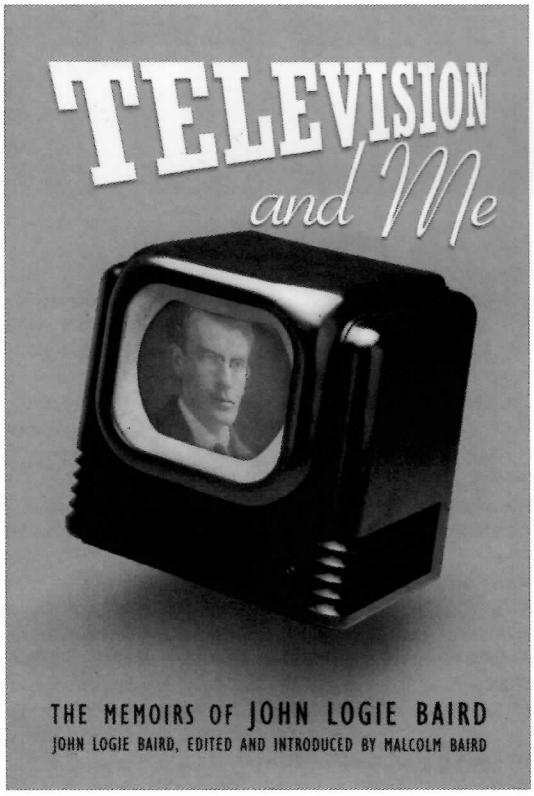


Fig 5

RCA B-411 Fig (3) – This was a good example of an early 1950's ferrite rod design, which eliminated the lid with frame aerial, thus allowing a thinner cabinet. RCA dominated this class of set in the same way Emerson had with the Clamshells and went to market also under the Westinghouse and Sylvania brand names. They standardised on a valve line-up using the 1U4 instead of 1T4 and 3V4 instead of 3S4. These two valves had respectively a higher Ra and GM thus squeezing the most out of a B7G 4 valve set. Also they developed a very compact early elliptical speaker which first appeared in a 1946 design and carried on through the 1950's. Once again the performance is very good and the brown 'swirled walnut' high gloss plastic (?) cabinet very fetching.

Bulova Adventurer Fig (4) – This shows how compact a 67volt 4valve superhet could get (it is only around 6 x 5 x 2 inches) prior to the Transistor era. Apart from the ferrite rod which nestles in the very top of the case above the loudspeaker, the secret was the new Eveready slim 67v battery type 477 –see alongside the set in fig (5) and compared to the standard 67v battery. Fig (5) shows the internal layout with several novel features. The low tension supply is provided by two 'C' size cells in parallel allowing the type 477 HT battery to sit over them lengthwise across the case. The IFT's are already of transistor style miniature cross section but tall enough to be double tuned. The volume control is the type used in valve hearing aids of the day necessitating a separate slide switch for on/off. The valve complement includes the 1U4 and 3V4 which drives a 4 inch loudspeaker! The gang condenser is very compact and as in the Emerson and RCA sets has an oscillator section profiled for constant tracking. All in all, a fine little set with excellent performance, but who made it? My guess is De Wald of New York, who turned out several similar looking radios in pseudo 'tooled leather' cases and thrived on OEM arrangements –
I also have the 'Firestone Tyre' version of this set.



Book review: Television and Me

Paperback
160 pages
isbn: 184183 0631
price: £9.99
Published by Mercat Press
www.mercatpress.com

How television was invented: Baird's Memoir Rediscovered
John Logie Baird was the first person to send and see recognisable television pictures, over a year before anyone else was able to repeat the feat. He devoted the rest of his career to developing television's potential, often funding the reasearch himself. He created the first fax machine, the first video recorder, the Telechrome system which is the basis of all colour TV sets today, and made astonishing demonstrations of 3D television. He tells the story of those extraordinary pioneering days, and forcefully states his claim to be regarded as the inventor of television, in his remarkeable autobiography, *Television and Me*.

The full story for the first time
It is not generally known that Baird wrote his own life story. It was only previously published in an incomplete form twenty years ago for the specialist readership of the Royal Television Society. The discovery of the original typescript in 2002, with revisions and additions by Baird and a previously unknown chapter by his wife, has prompted this new edition, edited and introduced by his son, Malcolm Baird. readers will be surprised to find that it is a vastly entertaining book, full of sharp character sketches and self–deprecating humour: a lost classic of Scottish and scientific autobiography.

The Shed Story

by Gerald Wells

I am starting this article by giving a huge Thank you to all the Members of the BVWS for the generosity they have shown. The money that they have raised has proved sufficient to replace all the rotten roofs of the Museum.

Parts of the Museum buildings date back to 1936.

I first got obsessed with shed building when I was about six or seven; my parents had given me the last twelve feet of the garden as a play area. It was under the trees, it was gravelled and it was dry. My neighbours on either side and over the back were always building sheds and were very friendly, they taught me how to use simple tools and showed me how to put down simple foundations.

My early efforts usually fell down. By the time I was ten I was able to build quite a useful shed, it even had an electric light. I soon filled up the first shed with all the radio and electrical junk that I could find. It didn't take me long to fill the whole thirty foot by twelve foot over with sheds. It was like a rabbit's warren, but it served as my first workshops for radio repairs.

By 1944 I had started to build amplifiers and by 1946 I was tucking into television repairs. I soon realised that I was getting bigger and the televisions were getting bigger as well. In 1952 I moved all my stock and business into the games room that I had built in another part of the garden in 1948. I then pulled down all my earlier efforts and built one big shed thirty foot by twelve foot.

I built them on parts of the old foundation that I had put down when I was a child. The trouble is that a seven year old may be quite bright but may not be very good at foundations; parts of the old floors are still intact, which accounts for the hill and dale effect when one walks across the floor in the service department.

In 1957 we added the machine shop, which later became the Daventry room, the HMV section and the schoolroom. 1978 saw the addition of the Droitwich room, the valve lab, woodwork 2 and stores 2. All this was on ground that I had bought from my neighbours. It gave me a nice paved quadrangle. I could only afford the cheapest building materials, unseasoned wood and chipboard (upgraded Weet-a-bix). The roofing felt was about the cheapest I could get; it was so thin that the cats, foxes and squirrels were ripping it up. It was a miracle that it lasted as long as it did.

In August this year we had the biggest rainstorms in years. One morning alone the water came in through at least twelve places and there were four inches of water in the quadrangle. Many radio sets were damaged. Mike Barker and the Committee came to the rescue, they made a very thorough examination of all the roofs and buildings and stated that they would all have to be replaced with heavy duty ply wood and covered with the heaviest grade of roofing felt obtainable. It had to be burnt on with a giant blowtorch.
Mike put out an appeal to the members!

John Thompson got a team together consisting of Neil Armstrong, (Eileen's uncle) Chris Rowe, Ian Johnson and of course Eileen.

The Appeal had almost immediate effect and enough money was raised to do a first class job.

I think there is enough left to do many needed repairs to window frames on the house and give them all a coat of paint.

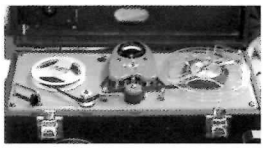
All we need now is good weather.

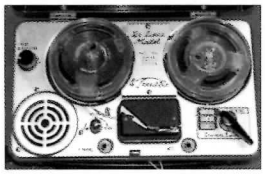
I can safely say that thanks to all of you, that everything went to SHEDule (Ouch!)

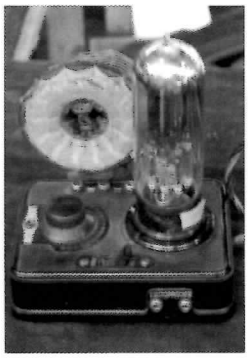
NEC October 2004

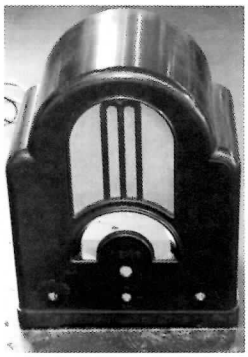
Images from the National Vintage Communications Fair and '100 years of the Valve' exhibition

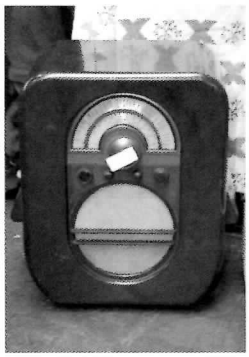
Photography by Carl Glover and Terry Martini

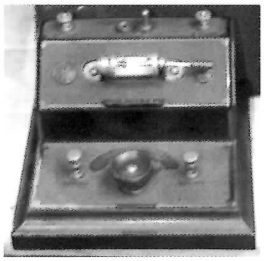


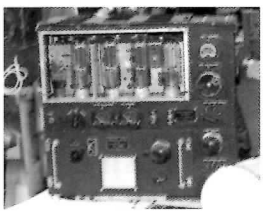






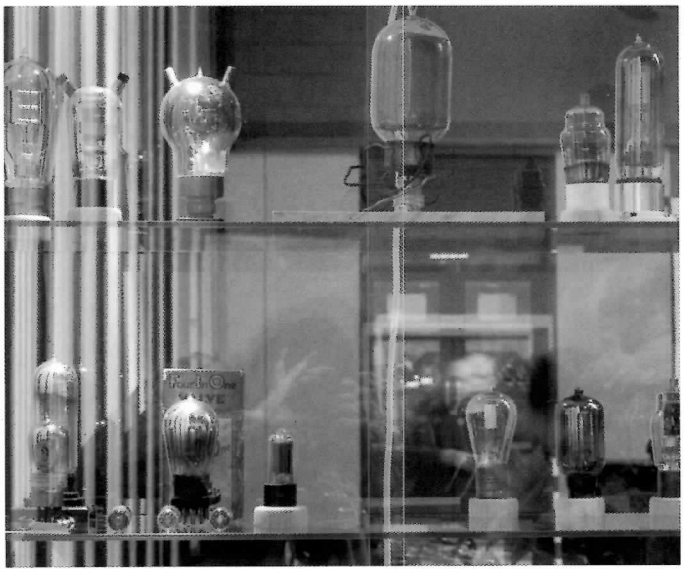







TRADITIONAL RADIO GRILLES


DVD1000

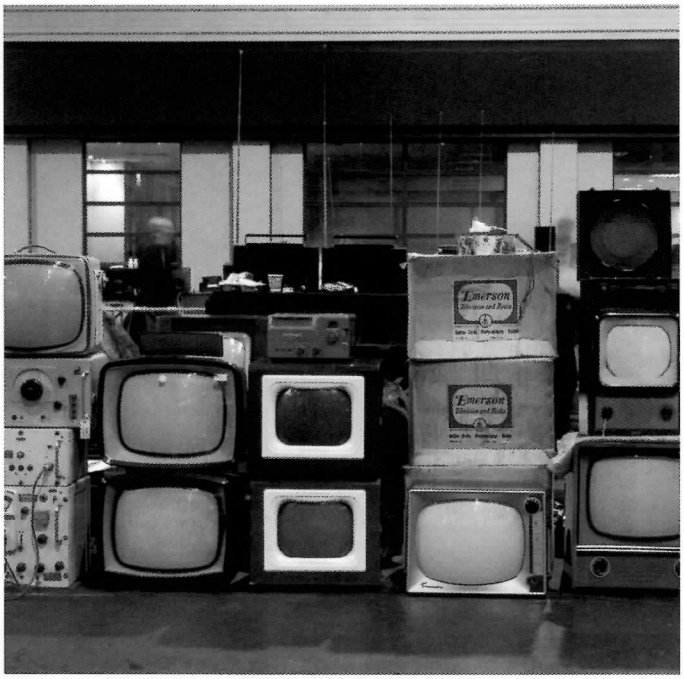



BAKELITE
ECCO
RADIO


高保真立体声功率放大器
HI-FI STEREO POWER AMPLIFIER
平穩記錄版

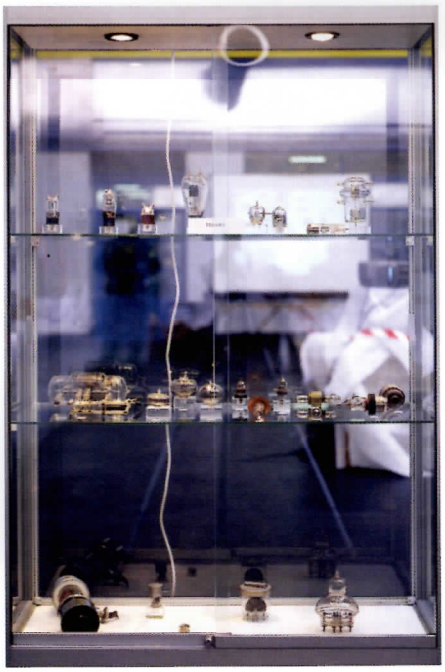

RADIO GRILLES

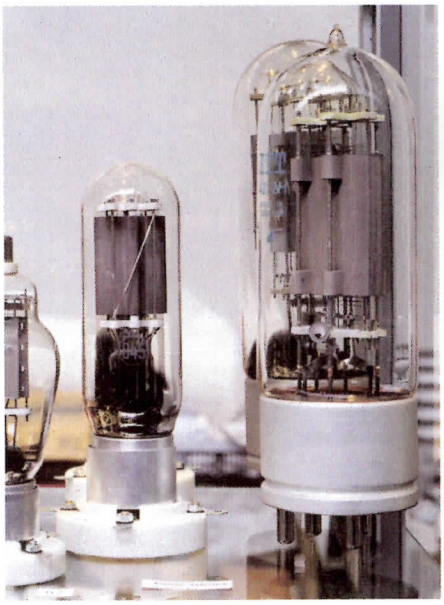

Liar's Moon

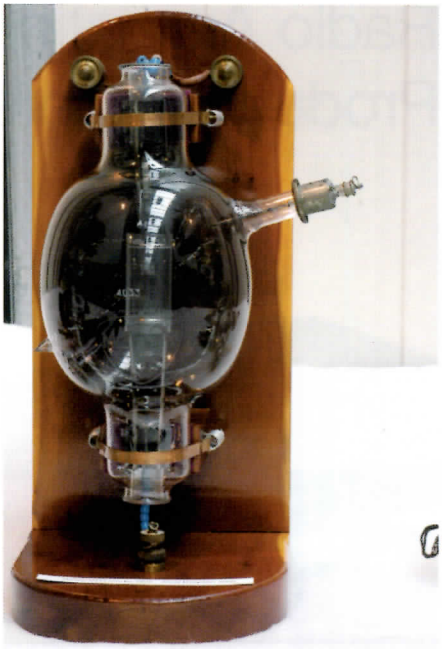

Emerson
Emerson

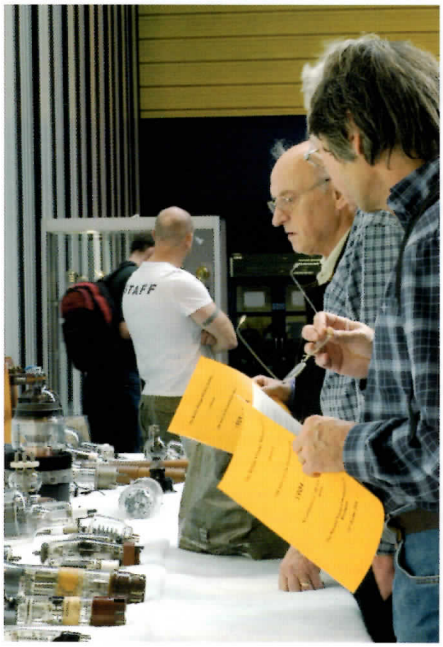

Restaurant
EXCO


Mullard

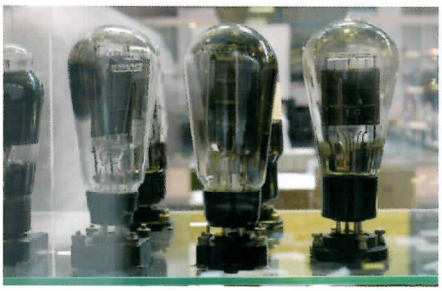




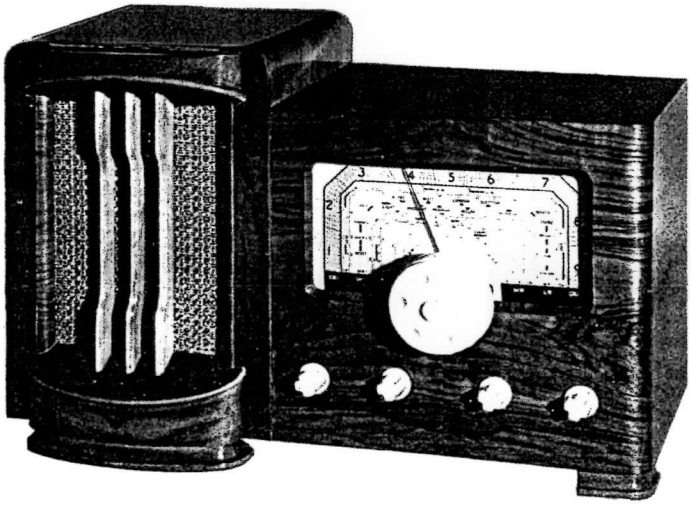


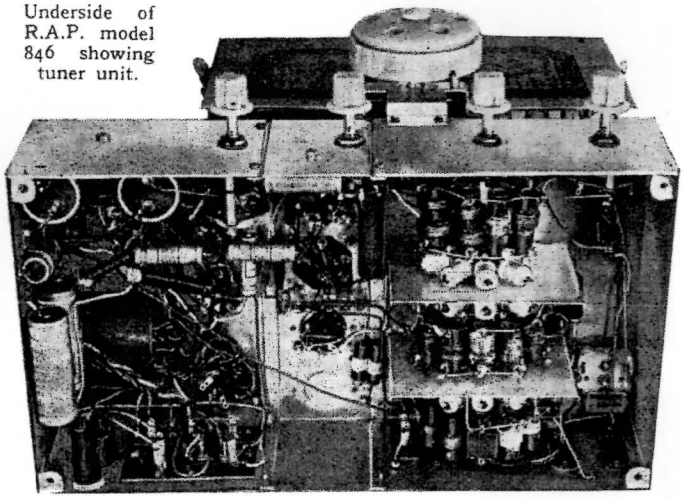



E.B. Myers Co. Ltd.



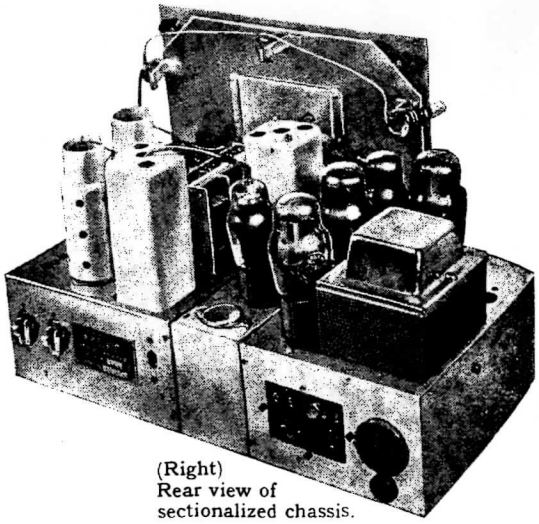
Radio Acoustic Products in Jersey by Brian Lucas





Underside of R.A.P. model 846 showing tuner unit.

Jersey's post war years of 1946 to 1950's produced a large number of radio engineers and businesses, but when considering the islands population and the only primary source of island entertainment, the Radio, its not so surprising. Although there was experimental reception of Television direct from England, with good results, Radio predominated for the time being.

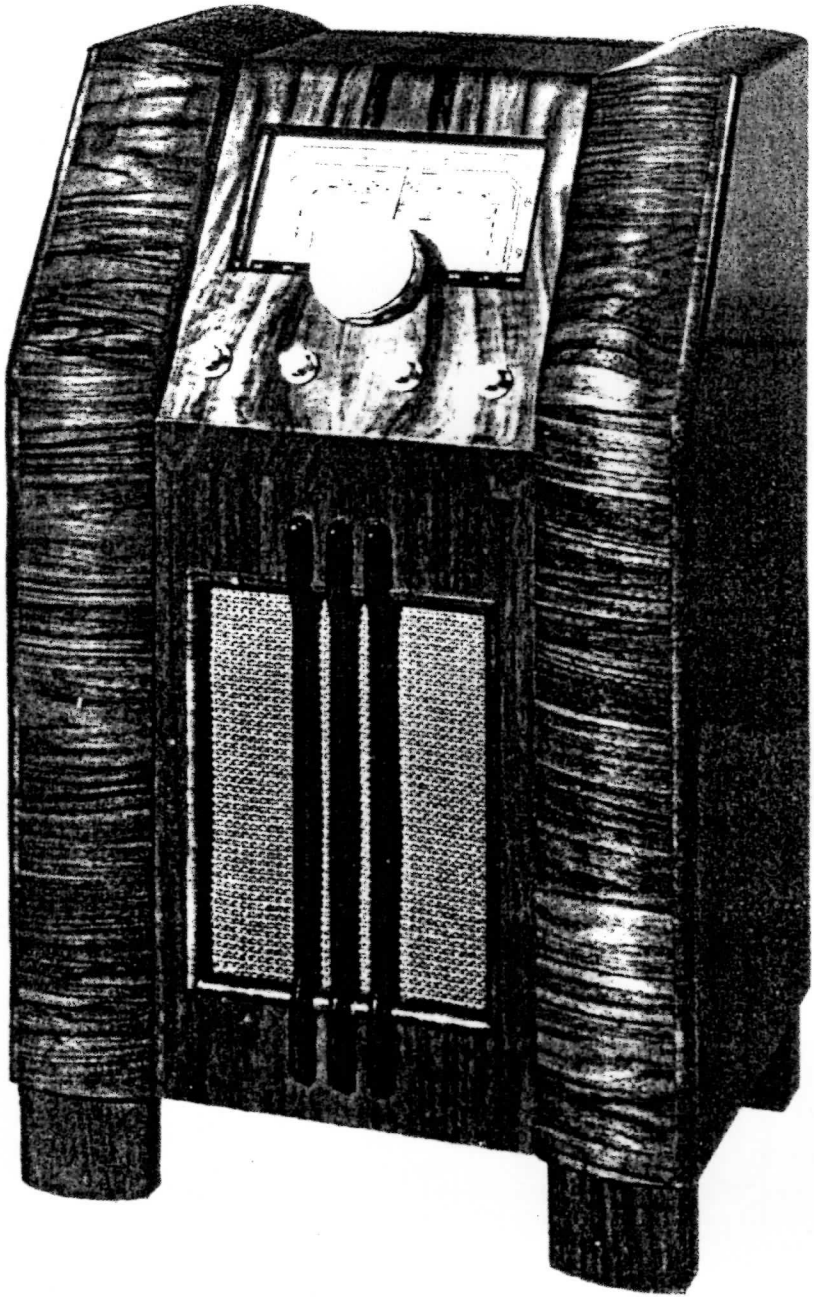


(Right)
Rear view of sectionalized chassis.

Trade advertisements in Jersey bespoke the virtues of many brand names e.g. Ultra, Murphy, GEC, KB, R.A.P, Sobell, and McMichael, the list goes on... however from the above list of trade names R.A.P, Radio Acoustic Products, stands out; their initial local history is based on renting radio sets of most unusual design. R.A.P. set-up business by registering the name on the 26th of January 1946, then running a number of advertisements through consecutive months up to March, announcing their arrival soon and sounding out the luxury of the radio's design, prior to the opening of their shop. Originally manufactured in England, then shipped over to Jersey in chassis and cabinet sections, they were assembled by the R.A.P. sub-company in Jersey, at number 4/5 Roseville street St. Helier.

It's quite possible the reason for shipping over radios in parts, may have been a way around the British levied Purchase Tax, being just single components, and not a finished product where tax could be applied. I understand from the information gleaned there was experienced engineering staff based at the shop, thus assembly and ongoing service of the radios gave the prospective customer reassurance, in the rental investment they might make. There were two models available, a table 646 and console 846; both had the same dial design and chassis, although there were a number of combinations that made variations possible between each model, using a three sectioned sub-chassis design. Each section was screwed together as sub-component stages; e.g. the centre I.F.1. chassis was standard for both models, two R.F. 1 & 2, and two Power 1 & 2; these are given further explanation later on.

Controls comprise four ivory white crossed bakelite knobs in-line, left to right...
(1). On/Off and two switched bass tone positions; (2). Volume control in switch level steps; (3). Wave change Sw1-Sw2-Sw3-Mw-Lw-&-Gram; (4). Tuning selectivity two position R.F. band pass switch... for a domestic receiver of this period, it was unusual to have these features, and wonder if the company had any contract war work, or just thought it was a good design idea, possibly taken from communication receiver designs of this time.



R.A.P. radios were advertised as a luxury receiver, they were the only radio at this time to have a brass chassis that was chrome plated. The 5 switched wave bands had a specifically designed television sound position on Sw 1. at 41.5 Megacycles; the remaining 2 short wave bands covered the 6 to 30 Mc/s spectrum... noteworthy is the dial scale and slow motion tuning knob, a vernier assembly. R.A.P. integrated the mechanical slow motion drive within the large ivory white bakelite knob, giving a coarse tuning on the outer diameter, with fine slow tuning from the front dimpled knob cover; this was essential for closely spaced stations, a really effective arrangement for tuning in short wave signals.

The rectangle fan dial scale arcs across a large window of 8.5 x 4.25 inches with an outer log dial numbered 1 to 9 in sections; each has a sub-numbering 0 to 9 providing a fine re-locate of any previously tuned station. The Jersey sets came in two versions, a table model 646 or floor console model 846; both having the same sub chassis format but there are permutations where the 646 had the Power 1 chassis and a one valve "Class A" audio output stage; plus R.F.1 single valve oscillator/mixer without any aerial pre-amplifier valve. However both models used the I.F.1 chassis intermediate frequency amplifier stage, so the 846 had a Power 2, with "Class B" two valve push/pull output, and one extra valve pre-driver for output pair. It also had an aerial amplifier valve R.F.2 stage, along with the oscillator/mixer section as standard; to further confuse the situation, the customer could order a model in any combination.

The overall range of designs I have found from 1931, to 1955 numbered 17 models; mainly radios.

The cabinet appearance is smooth, with boxed and rounded lines, the table and console cabinet variations have a plate glass back to view the opulent layout of the chassis, for pure admiration and sheer enjoyment of its engineered design. A unique and unusual radio for 1946, particularly from a company who seem to come from nowhere, with no apparent manufacturing history or military contracts to produce such a good engineered receiver. Thus beyond Jersey's shores, R.A.P's reputation is unrecognised, considered to be from an American design origin.

In the course of researching R.A.P, it turns out to be a company based on sudden expansion from start-up in 1931, with a manufacturing floor space of 2,000 square feet, to 24,000 square feet by 1934 with the ability to produce radio designs from concept, through to in-house manufacture and production from one site. This remarkable company was formed by a Mr. William Henry Berriedale-Johnson, with their factory based in England at Ferry Works, Thames Ditton, Surrey. At this time the company had eight UK branch showrooms, plus Jersey's Roseville Street.

The overall range of designs I have found from 1931 to 1955 numbered 17 models; mainly Radios, with two Radio/Grams and one combined Radio/Television/Gram console, called the Vis-O-Gram Transatlantic. The style is distinctively Art Deco in concept, combining a Television Radio, and Record Gram player all in one floor standing unit. The Vis-O-Gram appearance is of a pre-war model, but having the cabinet style and look of R.A.P, being of large wood walnut veneer, with a hinged top lid gram area, and sloping lower section cabinet front, that housed the television with a small Cathode Ray Tube screen. The whole physical line-up has large left and right half rounded vertical pillar columns, producing a solid furniture piece.

Working from the photocopies of R.A.P. product range, they state "Advanced Television, direct view screen" it is worth mentioning that the sloping television screen section is framed, with a beading that's centred within the front of the cabinet larger than the C.R. Tube, also the tube is to the right in close, and lower bottom of the beaded frame; one presumes there was a size problem to get the C.R.T. within the front area under the gram turntable and motor drive housing. The effect is to minimise the physical offset of the C.R.T, to the casual glance.

In the top hinged lid and recessed area, the gram record unit resides, with a balanced magnetic pickup arm, the first of its design type, by the renowned Mr. A. D. Blumlein. Below the sloping front television screen, the four band world radio is centred within the cabinet, with an aircraft round display dial; just under the dial, its four controls are placed into a diamond configuration. Finally, below the radio is the individually fluted wood five bar vertical grill, placed together and centred within

the large speaker recess; this became a feature of R.A.P, but with reduced vertical bars on later models. However five bars on the Vis-O-Gram console provides a unique style, for the only television designed by the company.

Going through the Jersey advertisements of this period, I have not found this console unit, I presume it was manufactured for the UK market, possibly in small volume numbers, or simply did not get off the production line, since the cost was touted as 39 guineas; quite a considerable price for a working family, with the well-to-do only able to afford this model.

Jersey's R.A.P. undertaking was registered on the 26th of January 1946, under the full name of: R.A.P. Rentals (C.I.) Limited. The seven company directors had three one pound shares from the £5.000 pound capital formation value, and were William Henry Berriedale-Johnson, English Radio Manufacturer; with Jersey–based William Hammond Black, company secretary; Charles Treston Brooks, gentleman, Robert Montague Galsworthy, English solicitor, Jack Edwin Percy Perrier, English solicitor; John Markwich Andrew, solicitor clerk; and Edward Falle Le Gresley, solicitor.

The local company seemed to do well opening their shop in March 28th 1946 to March 22nd, 1947, an advertisement stated the closure of the UK factory, but went on to ask customers for their indulgence through this difficult period, while R.A.P. Jersey covered their back order commitment. By 20th December 1947 the company re–formed as Channel Islands Radio Engineering Company Ltd. Advertising continued using the R.A.P. and C.I.R.E.C. company names, with products that were not R.A.P. In fact they had no branding at all, and no longer offered renting other than hire-purchase easy payment terms.

The ongoing years indicate a sporadic supply of R.A.P. branded products. Some of these were very large furniture items lacking style or design; I suspect the C.I.R.E.C. company was assembling or acquiring other designs, to increase their range of products... this was particularly so between the period 1947 to March 24th, 1951; again an advertisement reminded customers that the R.A.P. factory is now in Jersey! It's also interesting to note around this time, R.A.P's 646 and 846 models returned in their original cabinet styling. From photocopies of posters I have, there was an uncluttered plain design of cabinets that retained 1946 basic style but, reduced down to a box outline, the 846 consul was given this treatment, losing its Art Deco styling; unfortunately there are no dates to show the time of printing, it's possible they were concept line drawings, and never went into full production.

However (R.A.P. / C.I.R.E.C.) advertising and business policy found stiff competition from the 1951 start-up of Rediffusion Ltd in Jersey; their primary business was based on Wired Relay of Radio and In-Store Music Services. An article by the Managing Director Mr. Q. L. Cazalet, in the 17th February Jersey 1954 Evening Post replied to the Jersey Radio Traders who had concerns for the future BBC television service; Mr. Cazalet gave account for equal opportunity to carry on a parallel service, which had been the case from 1951 with three radio programmes. In the end, the States of Jersey granted to Rediffusion a Licence to distribute TV signals alongside their Radio services.

R.A.P. / C.I.R.E.C. entered into a war of advertising with Rediffusion, matching size for size, numerous half and full spread insertions; there is no indication of the cost this must have had for R.A.P. / C.I.R.E.C, but the company formally closed on 1st of June 1955. From 1964 my career in the radio and television trade brought me into contact with R.A.P. table and console models, raising my interest in their history, however asking for information from ex-engineers of R.A.P. / C.I.R.E.C, produced very little enlightenment, giving me a strong impression there was an acrimonious end to this unusual company and its employees in Jersey.

Audio Fairs and Anoraks by Gerald Wells

I had a little Gramophone, I'd wind it round and round and with a sharpened needle it would make a cheerful sound and then they amplified it, it was much louder then, so they sharpened fibre needles to make it soft again. I have taken the text for this week's sermon from Flanders and Swan, song of reproduction.

Have you ever been to an Audio Fair? If you haven't then you have missed the site of hundreds of men in anoraks with receding chins and pointed noses soaking up and possibly believing all the rubbish thrown at them by the hi-fi magazines and stallholders. Even if you only have slight knowledge of electric's you would realise that a gold plated peoples plug would not make any difference to the sound quality any more than the colour of the mains lead. As if Oxygen free cables for the loud speakers could possibly make any difference to the sound quality either.

In sixty years of being in the amplifier business I have found that figure eight clear plastic wire gives very good results and only costs 50 pence a metre. I will start with the loudspeakers. A good loud speaker needs to be in a fairly large box made of acoustically dead material i.e.: shuttering ply, chipboard or MDF. It needs to be lagged with something similar to old fashioned carpet underlay, the box needs to be one third deeper than the speaker, it needs at least two inches clearance between the edge of the speaker and the size of the box. The speaker needs to be two thirds from the bottom of the box. It is essential that the speaker can breathe; a port of some kind is needed in the back behind the speaker. A good tweeter can be mounted in the same cabinet if you feel that it is needed. It is nice to be able to please a passing bat. The size of the speaker is up to you, but I would recommend about twelve inches for average use.

This country still produces some of the finest speakers in the world. If you can afford a dual concentric I would recommend it; there are a few good makes to choose from. What you have to aim for is a speaker that will fill an average size room with about one-watt. A well-designed amplifier delivering about fifteen watts is more than enough for most purposes unless you are trying to run a disco, in which case you would not be interested in music. I believe in passive tone controls built into the main amplifier.

It was Flanders and Swan that said they had tone controls that at a single touch could make Caruso sound like Hutch.

I now come to the amplifier. Every thing has to be on one chassis i.e.: power supply, main amplifier, pre-amp and all controls. I'm horrified at the idea of separate units all strung together with multi leads and noisy plugs and sockets (that's why they call them DIN plugs!). A good amplifier can be built on a chassis twelve inches by twelve inches and two and a half inches deep.

I have found excellent output and mains transformers, supplied by Danbury Electronics of Chelmsford. I have used them for many years and have always found them very helpful. I do not use a smoothing choke but use an 8Mfd paper condenser for the reservoir and a 100Mfd for smoothing with a 1K Ohm wire wound resistor between the two, all the small decouplers are 4Mfd at 300 volts. All coupling capacitors are of the Mullard variety, but don't be fooled into thinking that a capacitor costing twelve pounds will sound any better than one costing twelve pence.

Many amplifier manufacturers let themselves down by using mucky valve holders. It is worth spending a little more on a decent holder.

Now I come to the choice of valves. Miniature valves are out of the question for a start. Most small valves get so hot that the heat travels down the pins and de-tempers the holder pins. A good example is the EL84. Valves such as the ECC range are too short lived and noisy. There are many useful octal and British seven pin valves available that will last for many years apart from EL34's and KT66/88's. You don't have to spend a fortune on matched pairs; any two valves of the same type will level themselves out after a few days use. Other valves, for the early stages, should be octal as well i.e. 6SN7, 6SL7 and 6SJ7. Forget transistors, we are building amplifiers not a chemistry set.

Try to get valves manufactured in the UK or USA even if they are second hand. It shouldn't matter as long as they are serviceable and of a good make i.e. Mullard, Osram or Mazda.

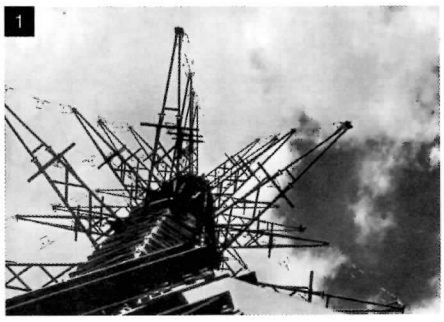
I have amplifiers that I made in the forties with their original valves that are still in working order. The amplifiers that I made for our internal broadcasting system at the Museum in 1996 still has the same four KT33's in it and it is never switched off. The amplifiers I designed are hi-fi; there is no hum and no hiss and they are bombproof. I am not prepared to describe the tone control circuits; after all I am entitled to some secrets. If you want to know more come down to the Museum and I will bore you to tears on how they work.

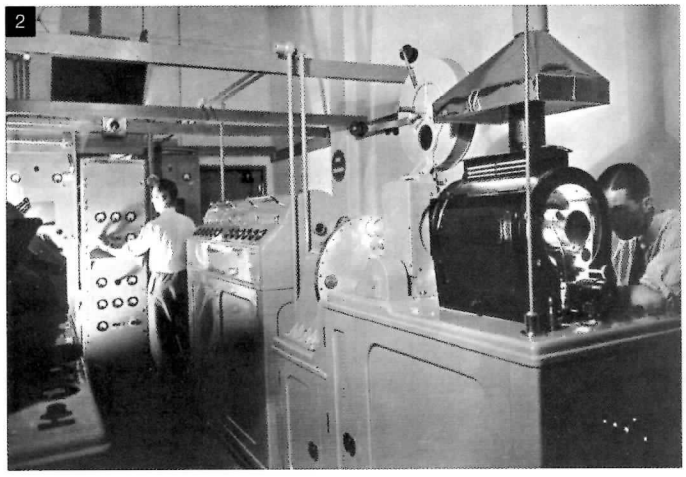
Incidentally you won't find me at the Audio fairs. Finally, to hell with the fidelity, it's the tune that counts.

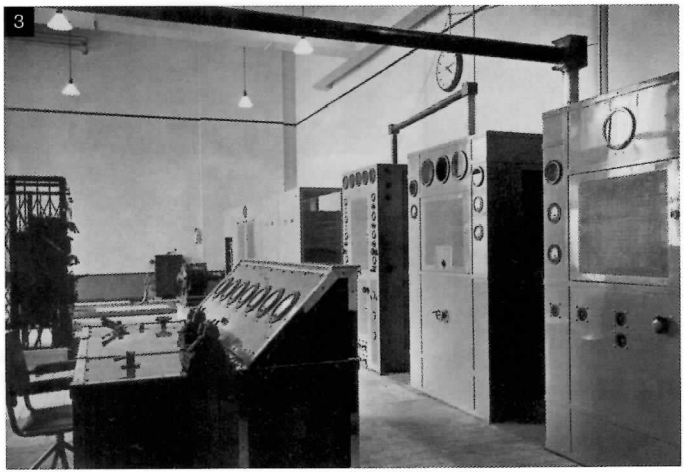
A well-designed amplifier delivering about fifteen watts is more than enough for most purposes unless you are trying to run a disco, in which case you would not be interested in music.

The Alexandra Palace story

by David Newman







The inauguration of the world's first public electronic Television service was a monumental undertaking. This is made all the more apparent when you take into account the relatively short time scales involved, from the acquisition of a suitable site in early 1935 to the full launch of not just one television service but two fully independent television systems. The dual standard service had been a recommendation of the 'Television Advisory Committee'; this was done to give a fair trial to the two contenders who were jostling for supremacy in the field of television broadcasting. The parties involved were J.L. Baird with his semi mechanical 240-line system and EMI with their all-electronic 405 line standard.

1: The Alexandra Palace sound and visual aerials.
2: Baird telecine machine
3: Sound Transmitter
4: Vision Transmitter
5: The Postmaster General opens the new television service
6: Left Pulse generators, right Emitron camera amps

There are probably not many people left that can tell the story of the construction and commissioning of the fledgling television broadcast station. Therefore, when I was recently passed some material that had been commissioned for release by the BBC in 1937, I was intrigued, never having come across such detailed information or pictorial evidence of the construction and day-to-day operation of the Alexandra Palace site. Therefore, I am sure that you will find the following material that was written using the BBC's original release as a reference, a captivating and informative read.

The Alexandra Palace site, which is situated in North London, some 6 miles from Charing Cross, stands on a hill 306 feet above sea level. During the development of this then disused building a 300-foot steel mast was erected on the southeast tower; this ensured that the highest part of the aerial system was 606 feet above sea level. As the 45 MHZ carrier signal used for the transmissions was considered then to be 'ultra-high' frequencies, reception at a distance from the station was thereby going to be greatly improved.

The allotted area of the Palace, in which the Television Station was to be established, had been leased from the Alexandra Palace Trustees by the BBC; it consisted of an area of approximately 3,000 square feet at the southeast corner of the building, including the southeast tower. A further area of 25,000 square feet, including a large theatre and the adjacent northeast tower had also taken with future development in mind.

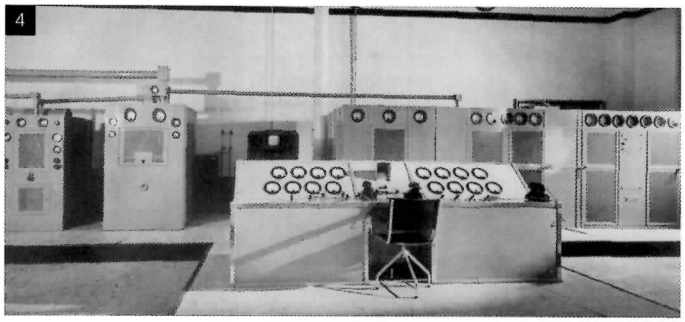
The main premises acquired by the BBC consisted originally of a number of large rooms arranged in two suites, one on the ground floor and the other on the first floor immediately above. Minor structural alterations enabled a very convenient arrangement to be adopted, the transmitters being accommodated on the ground floor with the control rooms immediately above them and the studios adjacent to the control rooms.

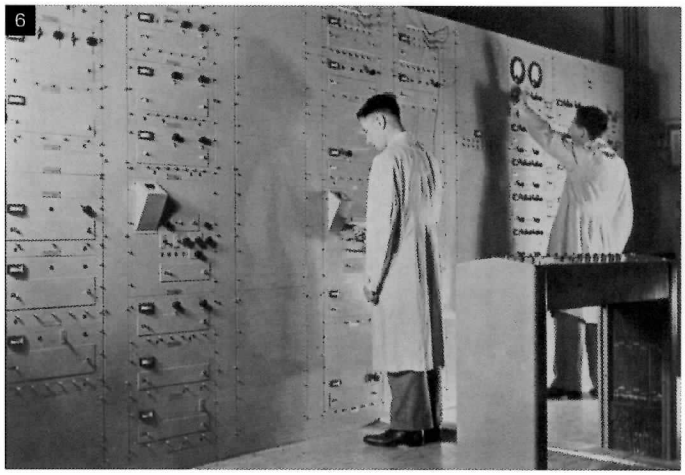
The southeast tower was converted into offices for the television staff and the pylon above it removed to make room for the steel aerial mast. This was accomplished by removing the existing floors and the windows on the south and east sides of the tower. Fire resistant floors and staircases were then built to provide five floors of offices; bay windows were added to increase the light and office space. The additional floors and staircase were supported by large steel girders; the brickwork of the tower had to be tied horizontally by steel bars to provide a solid pedestal on which to mount the mast.

As previously stated the aerial mast itself rose to a height of 300 feet above the ground, the actual height of the steelwork above the brick tower being 215 feet. The mast was square in section at the base and was tapered up to a height of 105 feet above the tower, the sides of the square being 30 feet at the bottom and 7 feet at the top of the tapered portion. At this point, to suit the special design of the aerial, the mast section changes to an octagon 7 feet from face to face; these dimensions were maintained up to the top of the mast.

During a gale, the force of the wind on the mast became very great, so special precautions had to be taken to transmit the loads back to the brick tower.

Four lattice-steel girders 30 feet long and 7'6" high were placed in the form of a square on top of the existing brick tower. The four legs of the mast were bolted to the corners of this square and each corner was then embedded in 17 tons of concrete to act as a counter-balancing weight to absorb some of the 100 ton vertical uplift which each leg was subjected to under extreme gale conditions. In addition to this a heavy angle shaped steel tie-bar, 50 feet long, was carried down the inside of each corner of the tower and after





being preloaded to a tension of 30 tons was secured to the brickwork of the tower with this tension still being maintained.

Two separate aerial systems, one above the other, were carried by the tower, the upper being for vision and the lower for sound. Both sets of aerials were of similar design and each set consisted of eight push-pull dipole elements carried on pairs of supporting arms projecting from and equally spaced around the mast.

A similar set of dipoles placed between the aerial and the mast were used as a reflector, which served to avoid induced currents in the mast structure and to assist with the equal radiation of signals in all directions. The RF carrier signal was fed to the aerials via screening trunks projecting from the sides of the mast, which were matched to the concentric copper tube feeders by impedance matching transformers.

The two special 5-inch concentric feeders, one for vision and one for sound, passed down inside the mast and on to the respective transmitting rooms.

Studios and 'Emitron' Cameras

There were two studios each 70 feet by 30 feet by 25 feet high. Now here is a frightening thought! The walls of these studios were covered entirely with sheets of asbestos compound! The asbestos compound had a high degree of sound absorption, and consequently the studios were rather more 'dead' than was general practice for sound broadcasting at that time. The reason for this is that the introduction of the scenery and apparatus required for television affects the acoustic characteristics of the studio.

As this asbestos compound had a rather rough surface, it was covered up to a height of 10 feet from the floor with a protective fabric, which was designed so as not to affect its acoustic properties.

The ceilings of the studios were treated with building board as was commonly used in ordinary broadcasting studios; the floors were covered with black linoleum, over which could be laid any type of flooring which may be required.

Several microphone points were installed in each studio; these were designed to enable the use of any type of microphone that might be required to suit particular act or play being broadcasted. The microphone was normally carried on telescopic 'boom', which was mounted on wheels so that it could quickly be manoeuvred into position.

The studios were equipped with a number of 'Emitron' cameras, which were connected to the control room by multi-core flexible cables. One of these cameras was mounted on a 'run-truck' which enabled what are known as' dolly shots' (in which the camera moves to and from the scene while in action) to be made, while the remainder were mounted on portable tripods. All the cameras were mounted on universal joints to aid flexibility.

The cameras carry out the scanning of the scene to be televised, thereby turning the object of their attention into low power electronic currents. As the distance between the plate carrying the mosaic of photoelectric cells and the end of the Emitron tube is 4.5 inches, the focal length of the camera lens must be greater than this. The lenses used at that time had a focal length of 6.5 inches with an aperture adjustable from f/3 to f/7 and having an angle of 30 degrees; these were used for both close up and long shots in the studio. For long distance shots out of doors, a telephoto lens having a focal length of 12 inches was used.

The very small currents from the electron tube were fed straight into the head amplifier, which was mounted in the camera close to the tube. This was a 4-stage amplifier, which after amplification fed the video signals to the control room via an armoured flexible cable, which contained a low-capacity concentric feeder line, the output stage of the head amplifier having been designed to match the impedance of this line.

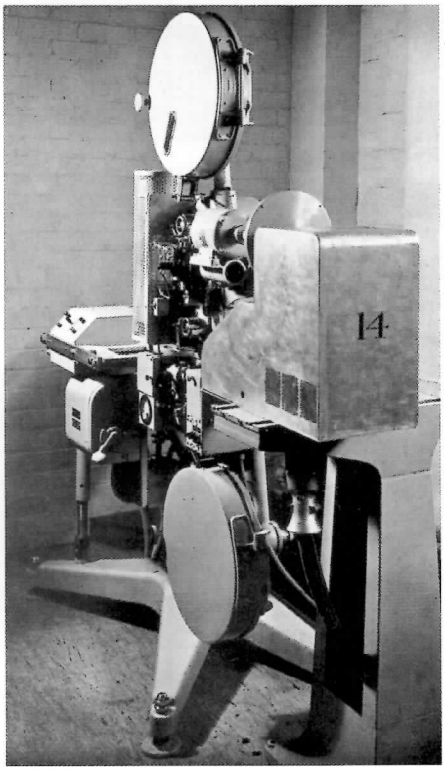
The cable contained 22 conductors altogether, and in addition to carrying the video signals to the control room, they also carried the sync pulses, grid control voltage for the electron tube, high and low tension supplies for the tube and the head amplifier. There was also a pair of leads connected to the headphones worn by the camera operator, by which he received instructions from the producer.

Each studio was fitted with two stages, both equipped with curtains and the requisite spot and flood lighting requirements as follows. The incandescent type lamps were mounted on a number of overhead battens each of which carried several lighting circuits; in addition, a lighting bridge was erected across one studio. There were also a large number of wall sockets fitted to allow for extra portable lighting in each studio.

Two large lighting switchboards were installed with provision for the separate control and dimming of each circuit. In addition, there were arrangements for pre-selective switching and dimming of any combination of circuits with the whole set up having been designed to give the maximum flexibility possible.

Ventilation had to be provided in the studios by means of extractor fans situated in enclosures formed on the adjoining colonnade. These fans extracted the air through a series of ducts ending in gratings fixed in the ceilings, the intake for fresh air being provided by openings in the upper part of the windows, which were fitted with filters to clean the air as well as deaden any extraneous noise from outside. The ventilation was sufficient to keep the studios at a bearable temperature when

Left: Cameras in action in the studio
Below: EMI telecine machine
Opposite top: Sound amplifiers and switch gear in control room
Opposite below: Alexandra Palace in 1937



full lighting was employed, which could reach a maximum of approximately 50 kW!

Heating for the station was provided by means of hot water radiators with pump circulation and been fitted throughout the station.

Control Room Apparatus

The control room was adjacent to one of the studios and contained the apparatus required for the control and monitoring of both sound and vision channels.

Along one side of the control room ran a gallery, and at one end of this gallery was a large observation window that enabled the whole of the interior of the studio to be seen. In front of this window were situated three control desks, one each for the sound and vision channels and one equipped with microphone and talkback circuits which enabled instructions to be given to artists and to the camera operators. By means of fade controls on these desks the output from any individual camera or microphone could be selected and the outputs from two or more cameras could be combined so that if required one picture could be superimposed on another.

Two cathode-ray tube displays were provided for monitoring purposes, one on which the operators could see the picture which was being transmitted, whilst on the other was visible the picture from the camera from which the scene to being transmitted was being scanned.

The gallery also contained a twin-turntable gramophone unit, which enabled musical or other effects to be added to the programme. On one side of the control room were situated a number of vertical racks containing apparatus for the control and correction of the video signals received from the studio cameras as well as the film machines. These were extremely complicated pieces of equipment. They included pulse generator circuits for the generation of a number of electrical pulses of various frequencies and shapes, which were required for correction of the video signal from the 'Emitron' camera, before it was suitable for transmission. Here also were added the synchronising pulses, which are necessary to keep the picture at the receiver in step with the transmission. This was all achieved whilst one camera was in use for feeding the transmitter; the output from the other was applied to a monitoring tube so that the picture of the scene next to be transmitted could be corrected. Then at the appropriate moment, the second channel was 'faded in' on transmission, the first channel then being used for monitoring the following scene.

The A amplifier and illumination correction unit

The video signals were fed from the camera cable into the A amplifier where the errors in illumination which occur in the Emitron are corrected (gamma correction), also compensation was introduced for the increasing attenuation of the upper frequencies as the length of the camera cable is increased. There were six such amplifiers, one for each camera channel. Gamma correction waveforms from the pulse generators were applied to the amplifiers and then careful control of the amplitude of these waveforms was manually applied by an engineer whilst he carefully monitored the vision signal, until he was happy with results achieved.

The Phase Reversal Unit

This unit is provided to allow for the use of positive or negative film. The unit contained six valves, one for each video channel, and the output from each valve can be taken either from the anode circuit or from the cathode circuit, thus providing phase reversal if required. No amplification occurred in this unit.

The Mixer Unit

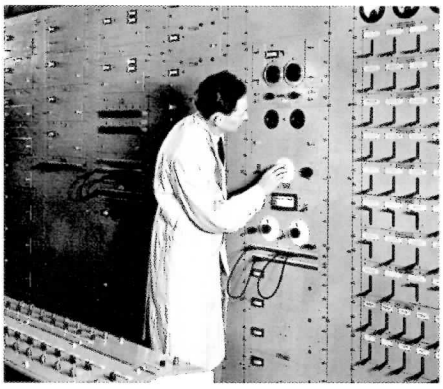
The six video channels next enter the mixer unit where the output from the required camera was selected, or the outputs from a number of cameras combined if desired. The unit was divided into two halves and had two separate outputs. From this point onwards there were two complete chains of amplifiers, which were interchangeable,

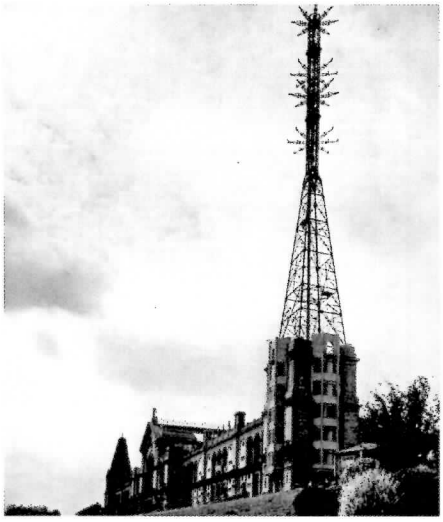
The B Amplifier

Each of the two outputs from the mixer unit were passed to a B amplifier, the functions of which were to amplify the video signals, to suppress transients set up by rapid fading in the mixer unit and to perform the first stage of interference suppression. This interference arose chiefly in the Emitron tube itself and took the form of spurious signals that were generated during the line and frame 'fly-back' periods when the electron beam was cut off.

The C Amplifier

The separate outputs from the B amplifiers were passed to the C amplifiers, which provided a further stage of interference suppression and signal amplification.





The Suppression Mixer
The outputs from the C amplifiers were fed to the suppression mixers of which there were again two, one for each video channel. Their function was to completely clear the intervals between lines and frames of interference before the introduction of the synchronising pulses. The picture signals with the interference partially eliminated by the action of the 'C amplifiers' are here mixed with special' interference suppression pulses' supplied by the appropriate pulse generator.

The vision signals with the interference completely removed were then passed to the video and synchronising mixer units. Alongside the vision racks was a monitor consisting of two cathode-ray tubes used for monitoring, similar to that provided in the gallery.

On the opposite side of the control room were other racks of apparatus concerned solely with the sound part of the programme. Here the sound signals from the microphones or film apparatus were given the requisite degree of amplification before being passed to the transmitter.

The Synchronising Mixer Unit
In this unit the line and frame synchronising Pulses, which keep the receiver in step with the transmitter, were added to the video signals. The mixed video signals and synchronising pulses were then fed to the output stage, where a portion of the output was tapped off and applied to two valve voltmeters, which were used as modulation meters.

The Distribution Amplifiers
The signals were now passed to the distribution amplifiers the function of which was to provide a number of separate outputs for feeding the transmitter and monitors. Each of the two amplifiers had an input stage and five alternative output stages designed to match the impedance of the lines that they fed.

The Line Amplifier
The 'transmitter output' from either of the distribution amplifiers was applied to the line amplifier, which fed the modulator stages. This amplifier contained one stage of amplification and a low-impedance output stage; it delivers to the modulators a signal having a peak amplitude of around 60 volts.

The Pulse Generators
From a consideration of the standards of the system used, it is evident that the various pulses required are all dependent upon the existence of 3 fundamental frequencies; namely, 20.250kHz, 10.125kHz and 50 Hz. The various pulse generators could all be kept in step if they were timed by one or other of these frequencies which must themselves be rigidly locked together with no possibility of mutual phase variation.

The method adopted to ensure this was to generate a master frequency of 20.250 kHz from which the two lower frequencies are obtained by division. A further requirement was that the frequency of 50 Hz obtained by division from the master frequency shall be precisely in step with the 50 Hz mains supply. The chief reason for this was to be able to operate the system with scenes, which were illuminated from the 50 Hz mains, and if this precaution were not taken, interference in the form of black and white bars would appear on the picture.

A mains-control unit was therefore provided which automatically effects an appropriate adjustment in the frequency of the master oscillator, if this should tend to vary, until the prescribed condition is fulfilled.

Two cathode-ray oscilloscope signal monitors together with their amplifiers and time-base units are mounted on the vision apparatus racks. One of these monitors could be connected by means of plugs and jacks to the output of any of the pulse generators so that the waveform and amplitude of the various pulses could be inspected.

The other monitor could be similarly connected to the output of the various amplifiers in the video channel to enable the vision signals to be examined.

The Vision transmitter Control Room and Power Supplies.
Filament current for all the valves in the control room apparatus was taken from the mains by means of transformers and metal rectifiers. The high-tension supply that was also obtained from the mains supply, DC was derived from hot-cathode type mercury vapour rectifiers.

It was essential that the high-tension supply to each amplifier be individually stabilised. In the case of the master oscillator, additional stabilisation was provided by a neon lamp stabilisation circuit included in the unit.

The Marconi-E.M.I vision transmitter was divided into two parts, the modulator and the RF transmitter, which were built into separate metal cubicles. The RF transmitter is of straightforward design but special precautions were necessary in designing the modulators in view of the wide frequency band to be transmitted.

By careful design a linear frequency and phase characteristic up to 3.0 MHz was obtained. The vision signals received via a concentric cable from the control room were amplified by the modulators up to an amplitude of about 2000 volts. The first stage, known as the sub-sub-modulator and consisted of a single amplifying valve feeding a low-impedance output stage using two valves in parallel. Between this stage and the sub-modulator was the 'black level' unit, which ensured that the signals were such that at the receiver the degree of black is maintained constant.

The sub-modulator consisted of an amplifying valve D.C. coupled to two output valves in parallel and fed the main modulator stage. This stage had to handle a considerable amount of power, actually of the order of 2 to 3 k W, which called for the use of water-cooled valves. The amplifying valve was a CAM3. It was D.C. coupled to the output valve, which was a CA T6. This operated with a high-tension supply of 5000 volts and handled a swing of approximately 2000 volts peak.

Alongside the modulator was the RF transmitter, which was divided into three units. The first of these contained the master oscillator, employing a pentode valve, the frequency of which was maintained constant to a degree of accuracy in the order of one part in 20,000.

This was accomplished by the use of a modern version of the Franklin temperature-compensated coil, in which expansion or contraction of the inductances mechanically varied tuning condensers in such a way as to keep the carrier frequency constant.

The output frequency of this unit was 22.5 MHz and this was followed by a single frequency doubling stage, using another pentode valve thus producing the desired carrier frequency of 45 MHz.

The oscillations at the carrier frequency were then amplified by two similar pentode valves in parallel followed by another stage using a triode valve, the output of which was applied to two triodes in push-pull.

The output voltage of this unit was of the order of 1200 volts peak and this was applied to the next unit, was known as the intermediate amplifier. This contained two water-cooled valves in push pull, the output from these was fed to the next unit containing the final high-frequency amplifying stage which fed the aerial.

Two water-cooled CAT9 valves in push-pull were used in this stage inductively coupled to the aerial feeder. The output of the modulator was fed to the grid circuit of the valves in this unit, and it is in this stage that the modulation of the carrier frequency by the video signals and the synchronising pulses took place.

As is normal practice, with AM transmission the power that the transmitter delivered to the aerial varied according to the modulation level. So in the case of the vision signal the transmitter was set up so that when the transmitter was radiating 30 percent of its peak output, this represented black level. The vision signals increase the output of the transmitter so that the peak value of approximately 17 kW was reached when a 'peak white' picture was being scanned. The synchronising signals were negative going, so

continued on page 59

Rupert Kinross – Unstoppable

by John Holloway

Some readers may recall a couple of articles written over the last few years: one by myself regarding the restoration of an HMV radiogram and another by Gerry Wells on the design of the Marconi 262 chassis which was initially designed to sweep away the backyard repair merchants who often did more damage to good sets than not. Unfortunately there was a misprint in Gerry's article and the design was credited to Rupert McBride. In fact the person who linked the two articles was Rupert Ivor Kinross, one of a legendary band of extremely able people who emerged in the early thirties to turn a fledgling business into a well researched and design led industry which could produce high quality products and stood the country in good stead in the conflict that was to come.

As my previous article indicated, my work in restoring the HMV 540 meant that I spent quite a few afternoons at Gerry's and so on a fine summer's day, having concluded business and drinking yet another cup of tea he announced that he had been presented with Kinross' archive by his son Tim and, giving me a quizzical look, said words to the effect that 'I was just the man for the job and wouldn't I like to catalogue it'. He sugared the pill by saying he was sure there was an article in it, thus pandering to my vanity I suppose and deflecting any demurring on my part. In the event, I found myself willingly agreeing and left clutching a large heavy box full of files and notebooks and a fair amount of dust.

Apart from common sense I had no idea how to catalogue properly but luckily a cousin had been chief librarian of the vast reference library at Birmingham so if anyone would know how I should go about this he would. No problem apparently. What you do is, using a soft pencil, take each folder or file and allocate a number to each sheet of paper within it and leave them in the order you find them. Then list each sheet with a brief description and allocate a number of subjects to which each sheet would apply. I have just finished the task and I can tell you there are some two thousand sheets plus a number of personal notebooks. These notebooks and some of the papers are in Rupert's own hand which makes them quite difficult to read, in particular the technical notes so in some cases I have had to leave them, for other researchers to decipher. As it is, it's taken about 12 months to read, list and type out the log of everything. I was helped by his family who contacted me after I put a message out on a website. Apart from other general material they also provided me a copy of his privately produced autobiography, which he wrote a few years ago so that his children and grandchildren would have a clearer picture of his life. This has been invaluable in both understanding his papers and subsequently writing this article.

I'm not complaining, for what has emerged is a story of an energetic and extremely clever man who kept busy all his life and was not afraid of standing up to authority when it was necessary and was extremely able at getting things done. Qualities today's managers could well take to heart.

As known, the Kinross story starts with Rupert's grandfather, Martin Rosenbaum who was born in Germany but as a young man went to the then Danish colony of St Thomas to work in an export business, which he eventually took over. He met and married a Danish girl while visiting London and they eventually moved back to London from St Thomas and set up house.

Rupert's uncle Albert was a good cricketer playing for Kent and was captain of 'The Author's Club'

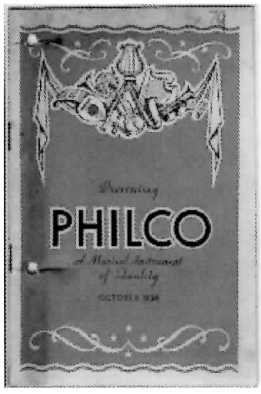
3 studies of Rupert Kinross
Top: 1938, above and right: in later years.

cricket team membership of which came by way of his articles in *Strand Magazine* and half a dozen or so novels. I managed to pick one of these up and though a trifle wordy by today's standards it was a rollicking good yarn. Albert was not interested in working in what had become the family export business and before making his mark as a writer was reduced to selling artificial eyes to the Swiss. Rupert's father Charles also wrote and contributed to the English Review and published one novel but he set up as a wholesale coal merchant supplying the French Navy and working out of an office in Paris.

Neither Albert nor Charles cared for the name Rosenbaum and, at some time during this period, which was the early part of the 1900s changed it to Kinross. Though born in Hull in Yorkshire on December 5th 1908, Rupert spent his early years in Paris first in the area of Bellevue in a house previously occupied by Rodin and then in a house near the Jardin Luxembourg next door to the painter Monet.

However the rumblings of the First World War were to end this privileged life style. Rupert's father had married Erna Hoppe, an accomplished painter who had been born in Schleswig-Holstein, which had been taken from the Danes when Germany invaded in 1865. Technically a German at a time when Germans were not welcome in France she and Charles, who as a supplier to the French navy had to stay in France, stuck it out until 1916 and then came to London where as a small boy playing in the garden he was promptly wounded by shrapnel! He was sent off to Elstree School as a boarder and then passed the common entrance to Rugby where he built his first wireless set much to the headmaster's dismay saying 'Why on earth do you waste your time with that sort of thing?'

Again the grim reality of the times caught up with the family as Rupert's father



Philco catalogue for 1938

5 Valve all wave superhet

Empire Automatic 5 valve S.het

Empire Six valve superhet

Top of the range

found himself without gainful employment and his son had to leave Rugby at 16 and get a job at thirty bob a week at an advertising agency. Again fate intervened as he broke his jaw riding a motorbike. Next came work with an insurance company for two or three months until he spotted a job as a lab assistant. Sherard Cooper Coles the inventor of Sherardising and located in Sunbury on Thames owned the company and Rupert was offered £3.00 a week, no mean sum in 1928. He started studying for a BSc via a correspondence course.

By 1929 the company was asked to look at the idea of a system which recorded and played back immediately and he was given the job of looking into this. His idea was to use a moving iron type loudspeaker, remove the cone and fix a needle on instead. For the record he used one of Cooper Coles electrodeposited sheets as the recording medium. Though pretty crude it worked well enough for his employer to arrange lunch at the Savoy to which Ralph Lynne and Leslie Henson, both big stars at that time, were invited to record their voices and hear them back. I wonder whether any examples of this early personal recorder are still in existence?

There were some moves to poach young Rupert from his employer and offer him a position with the person who had commissioned the research in the first place but as this individual was an undischarged bankrupt Rupert went off to seek his fortune in a more conventional company, joining HMV. On the day of his interview he cycled from Sunbury on Thames across what today is Heathrow to Hayes. As yet he still had no technical qualifications but he must have impressed his interviewer as he was offered a job helping to design equipment for testing the mass produced sets HMV were just beginning to manufacture on a large scale. The same person also advised him how to obtain formal electrical qualifications and recommended the Northampton Institute in St John's Clerkenwell. It was now November 1929 and in joining the Gramophone Company it would be the start of some nine years with that organisation. Times, which would serve him well in the years to come.

It would appear from reading the notes and correspondence of the period that Rupert was a diligent employee immersed in his work and determined to progress. I suspect he had a low boredom threshold as within a year or so he was requesting the opportunity to look at some of the existing models the company produced with a view to improving their circuitry. His far-seeing manager agreed and so he was allowed to devote some of his time to this task. Most of the popular sets at that time were TRF models. Superhets were six valve and thus very expensive. Rupert thought it might be possible to make the first valve act as a local oscillator, amplifier and frequency changer. After a great deal of experimenting he managed to build a 4 valve superhet which worked better and cost less than the current 6 valve models.

The receiver incorporated so many unique features that it was decided that Signor Marconi should see it and young Rupert was wheeled in to see the great man at his suite at the Park Lane Hotel. Within a very short time Rupert was in the design and testing department looking at ways to improve existing sets and designing new circuits including work on VHF and his special interest, reducing the effects of man-made interference. By 1938 work in his department was drying up. I suspect the level of knowledge within the industry had grown enormously in the previous five or six years and it was now a question of dressing up sets in new cabinets and ironing out minor problems rather than fundamental design concepts. As he was a fairly expensive member of staff (by now on £600.00pa) both he and his boss were sacked.

His boss went to Philco and offered him a job there but I think that he was beginning to champ at the bit again and with the enforced change he started looking round for either a bigger job in a smaller organisation or something of his own. There are also letters of application to companies like Telsen, Plessey and the Factory Inspectorate and others. With a personal friend he also looked at the possibility of starting an off shore radio station carrying advertising located on a ship registered in San Salvador. An early outing for the pirate radio concept, negotiations for this continued right up to the outbreak of war in September 1939. Suitable vessels were considered and aerial arrays designed to accommodate the special conditions on board and contacts were made through the British Embassy and his father's old contacts in the shipping business.

Despite all these plans and job applications including one from Marconi, he joined Philco and started to bring many of the skills learnt at EMI to bear on this company even to the extent of using a Hollerith punch card system to track spares. While at Philco he was approached by Owen Bruce Dick who owned Regentone. He asked whether Rupert would join them to look at how some £50,000 p.a was leaking out of the company. Philco agreed to let him go and said they would take him back.

Getting down to work at Regentone, he noticed that some of the production methods were less than efficient but he could not see where that sort of money was going missing. Not that is until he came to look at the number of valves that were being bought in and comparing it with the number of valve holders. In those days manufacturers could buy valves for approximately one and sixpence, (15p). Retailers were paying nine shillings and the amount the public would pay would be around twelve shillings. Not a bad mark up! The General Manager was ordering many more times the number of valves required for manufacturing and servicing and selling them off to the trade and pocketing the money. He was sacked and Rupert was offered his job but turned it down and returned to Philco as Materials Production Manager.

However, the problems at Regentone were not entirely confined to poor stock control and the company went into receivership owing our hero money, which he was still struggling to prise out of them a year later.

Sometime around the early to mid-thirties he applied to join the Inns of Court Regiment as a trooper. Whether this was in the light of the deteriorating position in Europe or to get some horse riding and general life experience outside of electronics I don't know but he had the sense to take the Certificate A exam that would mean that if war did come he would automatically get a commission. That said, he eventually was promoted to sergeant and used his knowledge of electronics to build and supply his troop with a radio communications system.

Inevitably war did come but first, because he was by now a Chartered Electrical Engineer, he was deemed to be in a 'Reserved Occupation'. However he was determined to serve and through a combination of family contacts, his technical experience, his record with the Inns of Court Regiment

and I suspect sheer determination he was offered a captaincy in the Army Corp of Signals who were looking to set up a Branch *MI8* for catching spies in the UK who were transmitting to the enemy via secret transmitters. However, not many were caught using the DF equipment. In fact the majority were picked up when they broke a leg landing by parachute or coming ashore from a submarine!

There was of course the hurdle of his mother's birth. As we've already seen, though Danish by birth that part of Denmark being under German rule at the time she was an enemy alien in the eyes of MI5. This had already proved a stumbling block to working at the Radar Research Establishment Bawdsey about a year before. This time however his C.O told MI5 that she was only 'German by aggression' and I suspect "didn't they have better things to do than stop worthwhile and useful people joining up" or words to that effect.

At some time during the early part of the war a chance meeting brought him into contact with the Head of the Army Radar Research Establishment at Christchurch who eventually offered him a post with his organisation. He then found himself privy to all the information that MI5 had stopped him seeing three years previously. With most of the work done with MI8 he transferred. He became heavily involved with the supply of materials for the production of equipment, often treading on sensitive toes in order to get the supplies that he knew were vital for the war effort. There are a number of instances in the files where he cut across bureaucracy much to the discomfort of others. But his superiors generally saw his point of view and, when someone was needed to help facilitate the supply and production of components for radar equipment from the Americans, Rupert was asked to join the Tizard Mission and spent time in the States where his technical knowledge as well as his organisational abilities gained at EMI stood him in good stead.

With the end of the war Rupert once more was back in the job market. He suggested to his old employers EMI that with his experience with American business they might be able to use him in a consulting capacity but they were not interested. He was also offered a temporary job reporting whether there was anything useful to be learned in Germany from captured equipment.

At about the same time he was offered a job with Rediffusion Cable. The company had built up a large business before the war in provincial towns distributing broadcast sound programmes to homes and factories by cable. After a short learning period he was offered the post of Chief Engineer for the South of England. The area covered included Margate to Plymouth and eventually included Southampton and the London area where the company had some cable systems in blocks of flats.

With television returning to full operations thoughts turned to piping TV programmes into people's homes as well as sound. The Chief Engineer at the BBC had told the Director of Rediffusion that distributing television along the length of a cable would be quite impossible.

This attitude spurred Rediffusion into designing a system for Montreal, which already had sound distribution but where there were as yet no TV transmitters. They set our hero up with a Design Department at Wandsworth where he selected 6 engineers and started to look at the many problems involved in designing a workable and economic system.

Not the least of their problems was the type of cable to be used. After some considerable research he came to the conclusion that there was no existing cable that would do the job. A special co-ax with a solid aluminium or copper outer conductor would have to be used. Copper was expensive but aluminium might corrode unless protected by an expensive plastic sheath. He discovered that the statue of Eros had survived without corrosion because it was 99.9% pure so no sheath was needed. However, to persuade a cable company to manufacture a few hundred yards of cable never before made with no guarantee that any large quantity would ever be ordered was not easy but a company called TCM came up trumps.

According to Ken Easton author of Thirty Years of Cable TV, this was the first solid aluminium sheathed co-ax ever produced and became the standard type of cable on TV systems in North America. Its installation in Montreal pre-dated its widespread use by some ten or twelve years. When Rupert returned to Montreal some 25 years later he found the original cable still in use and un-corroded.

Up to his retirement from Rediffusion in 1973 he progressed through the organisation becoming Managing Director of the research company, Director of Research and in a joint venture, Director of Rediffusion Rank. In addition as an acknowledge expert he was asked to give lectures to RTS, the IEE and other organisations in Europe and the rest of the world. He became a fellow of the IEE and President of the Society of Communication Engineering.

Output 4 Watts!

Miniaturisation - circa 1938!

Above: Unit with Nipper
Below, from left to right:
K L. Livingstone. Cabinet Designer,
C L Dyer. Managing Director

But to retire at 65 was not in his nature and after a couple of years travelling with his wife he took on some consultancy work through old contacts in North America and following another trip around the States and Canada returned to England and set about becoming a local councillor in Shepperton. Again judging from the correspondence in the archive he proved to be a pretty formidable operator to the extent that through his tireless efforts a long needed by-pass was eventually built. From the mid seventies until 1996 he continued to be involved with local council matters, his local political party and his local residents association, but in 1996 he decided to retire from all these at the ripe old age of 88. He passed away a year or so later.

It has been a rare privilege to have access to some of his personal papers and all his technical notes gathered over a working life that started in the late twenties. This country has seen a large number of men and women from many backgrounds, all of whom came through a learning system that prepared them for applying themselves. The system allowed them to progress by the combination of gaining knowledge in night schools and experience in the work place in the many technical careers that blossomed in the first quarter of the twentieth century. Companies encouraged their staff to go to night school and obtain qualifications that would help them progress within the organisations. Today it seems easier and cheaper to poach staff from rivals instead of investing in people

Despite a silver spoon childhood, Rupert Kinross, when times became hard and, just at a time when most young men from his background would have been looking forward to a good time, went out and started to earn a living. In doing so he contributed to the sum total of human knowledge in more than a few areas of electronics and that fact alone must have been a great source of pride to both him and his family.

A word about the archive. It is held at the Museum in twenty-six folders and contains some 2000 pages plus various notebooks. Each page is listed and numbered in an Excel programme, which can be sorted under subject headings. This data is contained on a CD, and on hard copy. Each group of folders has its own individual hard copy listing. This listing will show the general content of each page. For those interested in military hardware there is a notebook listing all radio and associated equipment in use by the military during WW2 and also the battery types. There are copious notes taken while at HMV/EMI on tests on various models. For those interested there is a copy of his autobiography lodged in the archive. It's about 70 pages long and is well worth a read. For those with the facilities a copy is also on the CD.

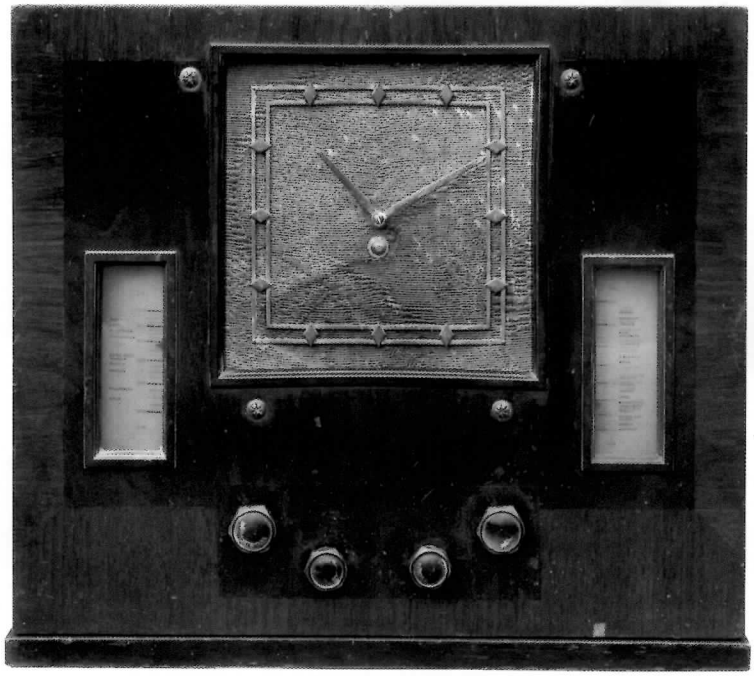
To those who would like to examine the archive in any detail please contact Gerry but please replace the individual pages in order in the appropriate folder so that the next person can find them easily.

Finally I'd like to thank Rupert's family, in particular his grandson Henry who picked up my early request off the web, Tim his father for providing the additional material, my wife Ann for typing from my original notes and finally Gerry for giving me the opportunity to look into an interesting life.

Ekco Clock Radios

By John R. Sully.

I intend to take a look mainly at Ekco clock radios in this article; the four receivers I will consider particularly include the A33 from 1947, the A222 from 1953, the A244 from 1955, and the A402 from the early 1960s. All the aforementioned radios utilise an electric clock mechanism to control the action of the associated radio receiver. Using a clock for switching a receiver on and off first became common in 1947 in the U.K. and was championed by two manufacturers, namely Goblin and Ekco.



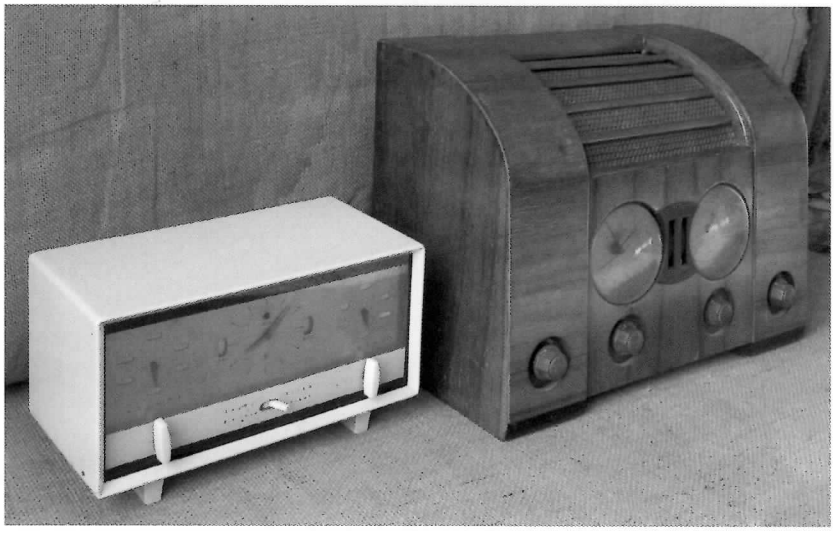


Fig 1: (top) HMV 439 'Greenwich Superhet 5'

Fig 2: (above) Ekco A33 'Radiotime' and Goblin 'Time Spot'

Several manufacturers had included clocks within their receivers in the 1930s, for instance in 1933 Ferranti marketed the 6 valve 'Gloria' receiver that could be supplied with a clock fitted within the speaker grille area. In the event that the clock was not specified the space was filled with the more usual ply fretwork type of design. The clock appeared again a year later mounted above the speaker grille area in the 1934 receiver, which by now also utilised one less valve. Both receivers were of the upright 'portrait' cabinet style, and mounting the clock above the speaker grille tended to make this receiver rather tall at 24 inches.

HMV also marketed a couple of clock radios, starting with the model 439 in 1933, shown in Fig 1. The cabinet and chassis in this set is the same as the model 438 which did not have the clock fitted. The clock is mounted in front of the loudspeaker cone but behind the speaker cloth, where there is just sufficient room for the mechanism. This is a very cost effective solution because a cabinet modification is not required from the standard model 438. This is because only the separate piece of plywood that provides the positioning for the speaker cloth needs to be different, inasmuch as it includes a 1 inch diagonal supporting section for the clock mechanism. The hours are indicated by antiqued bronzed metal diamonds mounted on a double rail affixed in front of the speaker cloth. These bronzed digits appear quite Art Deco in style, and very much complement the geometric shapes of the veneers and bakelite fixings of the cabinet. In 1934 another HMV radio appeared with clock fitted, namely the model 468, which was based on the standard model 467. There do not seem to be further examples of EMI combining clocks with table radios in the 1930s, so one presumes they did not sell particularly well (although clocks continued to appear for a couple of years in HMV top of the range radiograms). Surviving clock radios manufactured by EMI from this period certainly seem to be very rare, particularly when one considers that models upon which the chassis are based turn up so frequently.

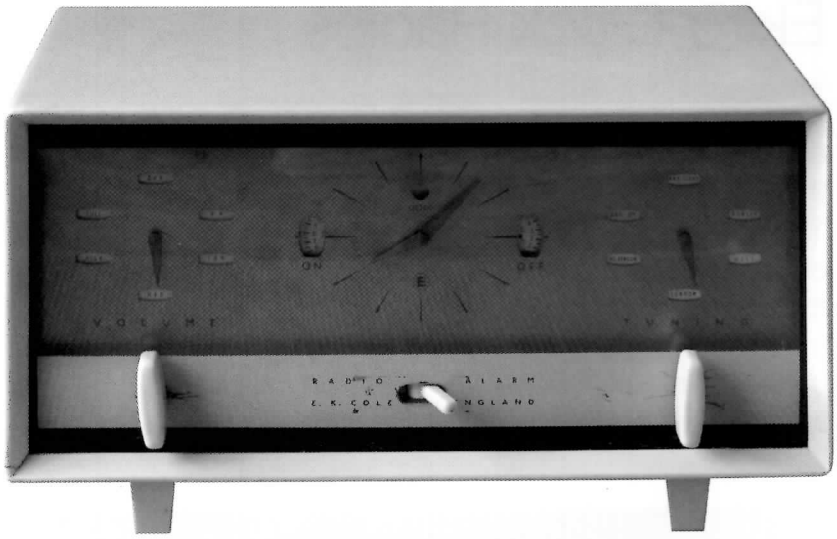
One must suppose though that generally none of these clock radios sold particularly well, as the idea appears to have faded away until 1938. The idea reappeared in 1938 when British Tempovox manufactured their RG3 receiver constructed in the shape of a 'grandmother', or long-case cabinet to give it its correct term. In this receiver the chassis was positioned behind the clock face towards the top of the cabinet, whilst sound emanated from a speaker grille midway down the case. Further details about this receiver may be found where it was considered in a Bulletin article Vol. 6 No. 1 from 1981. The same chassis was also available in a mantel clock case, designated model number R3. I don't believe British Tempovox were at the start of a new trend though, in reality they were a very small company who sold only a few specialist receivers.

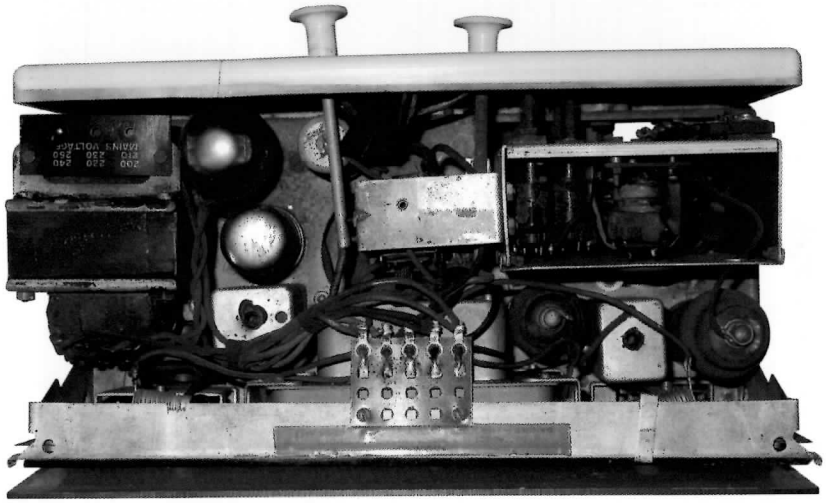
So now we can jump forward to 1947, when two manufacturers launched clock radios. These receivers differed from the pre-War sets in that the clock is able to turn the radio on or off at a pre-set time. Only two manufacturers offered receivers in quantity, and of them only Ekco was the household name with an existing sound reputation. The British Vacuum Cleaner & Engineering Co was the other manufacturer, adopting the familiar 'Goblin' as their brand name. The most often seen radio from them is the model with the circular clock face and tuning scales, and curved sloping top. They also made at least one other clock radio, also in a wooden cabinet but a little smaller and with a flat cabinet top and speaker at the front. Fig 2 shows the Ekco A33 Radiotime alongside the Goblin Time Spot CR. The difference in cabinet style is immediately obvious, one can scarcely believe they were manufactured in the same year. Goblin has opted for a large wooden veneered cabinet, which looks fairly dated even by 1947 standards. Ekco on the other hand has the clean white lines within an elegantly simple cabinet, in a style that one could easily believe was from the 1960s, not twenty years earlier. The Ekco cabinet was designed by Wells Coates of 'round Ekco' fame. Coates designed or influenced some of the classic Ekco receiver cabinets, most notably the 'round' Ekco's like AD65/36/76/22, and the post-war

P63 portable. However, whilst Ekco clearly had by far the most forward looking cabinet design, eminently suitable for placing on a bedside cabinet as opposed to the monster from Goblin, history has shown what the public desired. I'd hazard a guess that there are at least twenty times as many Goblin Time Spots remaining today as there are Ekco A33's. The Goblin can be seen at most swapmeets and is a regular on internet auctions, but how often do you see the Ekco A33 turn up? Part of this may be attributable to the fact that the Ekco cabinet is much more prone to breakage, as it is a lot heavier than its size suggests. Goblin also had the advantage of reception available anywhere on the LW, MW or SW bands, whereas Ekco offered only five preset stations on MW and one on LW. But the main reason must be that people felt the veneered wood of the Goblin would fit much better into the dark Walnut and lino homes of the late 1940s than the bright white of the Ekco. As this article is primarily considering Ekco clock radios only I will not dwell further on the Goblin. It should also be noted that at £24.0.0 +pt the Goblin was marginally cheaper than the Ekco A33, which cost 3 shillings more.

The A33, shown Fig 3 cost £24.3.0 +pt when released. The clock utilised in the A33 was supplied by Smiths Electric Clocks Ltd, and if a problem developed the clock unit was to be returned to one of four service depots (London, Manchester, Birmingham or Glasgow) for exchange or repair by Smiths. The Smiths clock mechanism was also independently available as a stand alone switching device housed in the form of a traditional bakelite mantel clock. The A33 clock hands theme is carried over to station selection and volume level, as can be seen by the pointers either side of the main clock. The pointers themselves are exactly the same as the hour hand of the clock, emphasising continuity of the design theme. To the left of the clock a normal continuously variable volume control including an on/off switch is provided. This is mechanically linked to the pointer above, which turns through six positions on the faceplate indicating the volume level. This feature is included pretty much entirely to ensure that the set looks symmetrical with the tuning control and indicators to the right. The top position is 'off', and then as the volume is increased the pointer passes via 'on', 'low', 'med', 'high' and finally 'full'. This feature adds nothing to ease of use or performance; it is a vaguely incongruous attribute entirely driven by aesthetic design and look of the cabinet. On the right hand side six preset stations are provided. Tuning of the presets is effected by adjusting the relevant oscillator coil to tune to the required signal, then adjusting the corresponding grid trimmer for maximum output. The stations identities are pre-printed, and a selection of common choices were printed onto a small disc; the appropriate station could be displayed by turning a small wheel from the rear of the receiver and moving the correct label into position. This feature removes the somewhat amateurish effect of paper cards seen for instance in some pre-war motor-tuned sets, and indeed one would never know there was a choice of stations such is the professionalism of execution of the idea. Rather like the volume level indicators though, this was all costing money to implement. Five medium wave stations plus one long wave station could be selected, in common with other receivers of the time each switch position had a fixed section of the bandwidth from which a station had to be chosen.

The radio could be programmed to switch on and switch off at a pre-determined time. Two knobs protruding from the rear of the cabinet moved small dials either side of the clock indicating the on and off times (Fig 5). The clock would be set into automatic action by moving the lever beneath the clock to 'Alarm' mode. Moving the lever left would leave the radio in 'Manual' mode, turned on by the switch ganged with





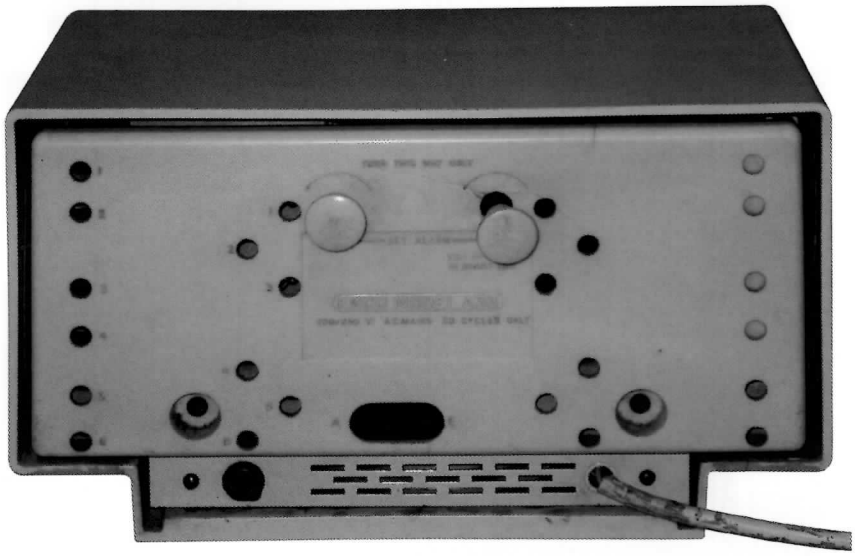


Fig 3: Ekco A33 Frontal view, notice raised elevation of cabinet

Fig 4: Ekco A33's Tightly packed innards

Fig 5: Ekco A33 Rear showing timer 'ON'/'OFF' controls

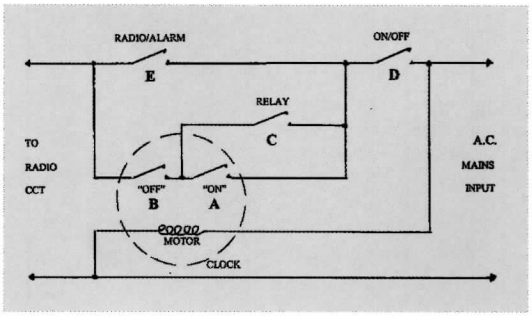


Fig 6: Ekco A33 Auto ON/OFF switching circuitry

Fig 7: Lawn Road, NW3 flats by Wells Coates

Fig 8: Ekco A222 And U195

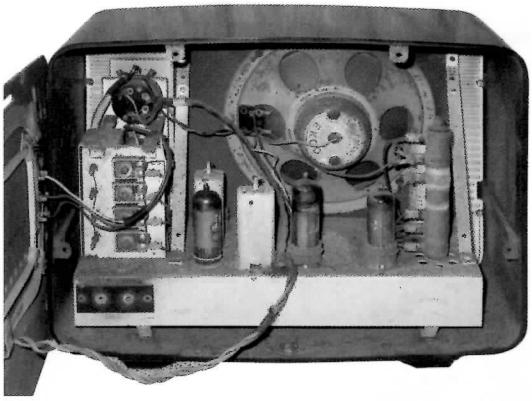
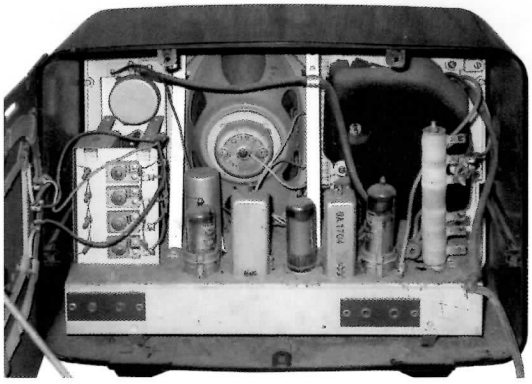


Fig 9: (above) Ekco U195 Internal, Fig 10: (below) Ekco A222 Internal



the volume control. The operation of the switching circuits may be summarised as follows:

The clock is permanently connected across the mains, so will always run when power is applied. The radio can be switched on and off automatically at times chosen by the owner, by means of the two controls protruding from the rear of the receiver. The actual preset times are viewable through small windows to either side of the clock face. With reference to the diagram Fig 6, the 'ON' time control is shown as switch A, and the 'OFF' time control is annotated as switch B. The radio can be operated independently of the clock timing by moving the lever under the clock to the left thereby closing switch E. Closing this switch provides a direct route for operating current bypassing clock timing switches A, B and C in the diagram. However switch E does not in itself switch the radio on; that function is performed by operating the left hand on/off/volume control, the switch element of which is shown as switch D in the diagram.

For 'Radiotime' (ie timed on/off) operation the lever under the clock is moved to the right thereby opening switch E; therefore radio operation will be determined by the position of the remaining switches. Switch D will already be closed so the radio will operate dependent upon the scenarios discussed next. Switch B will also already be closed in this situation by the normal action of the clock. When the clock reaches the 'ON' time switch A will also close, thereby switching the radio on. As the receiver warms up current flowing in the H.T. circuit energises a relay, which then operates and closes its associated contacts, shown as C on the diagram, in doing so providing an alternate current path to switch A. This secondary path is required as 'Timed' switch A will automatically open again after about 30 minutes due to the action of the clock, and if bypass switch C was not present the opening of switch A would switch the receiver off prematurely. (Ekco have made maximum advantage of the relay coil by also utilising it as an H.T. smoothing choke).

When the appropriate time has elapsed, the receiver will switch itself off at the time determined by the setting of the 'OFF' switch, shown as switch B in the diagram. Irrespective of the positions of switches A or C, this will switch the receiver off immediately. After about 30 minutes the action of the clock will automatically open switch B to leave it ready for the next timed 'ON'/'OFF' cycle. The radio section will not switch on again though because by this time the relay contacts (switch C) initially closed by current flowing in the H.T. circuit will by now be open again, causing the radio to remain switched off.

One potential weakness in relying on the A33 to wake the user the following day is the fact that the On/Off switch ganged to the volume control must be left switched On for the alarm circuits to work. A toggle switch at the rear of the receiver provided a choice of having a fixed tone alarm rather than radio reception at timed switch-on. In the event of the chosen station not broadcasting at switch-on time (we are all used to 24 hour broadcasting now, but it was not always the case), or the transmission failing the tone would operate to ensure the owner was still woken up or alerted. The alarm tone was provided by the triode section of an EF39 operating as a Colpitts oscillator in conjunction with associated capacitors and inductors. The oscillator generated a 300Hz tone, but only when there was no IF signal, or if the manual switch at the cabinet rear was in the 'Tone' position.

The circuit used four valves; as already mentioned an EF39 generated the alarm tone or operated as an IF amplifier as appropriate, the frequency changer was an ECH35, and the output valve was an EBL21 where the two diodes contained within are for demodulation and AVC. The mains transformer does not have a separate winding for the rectifier, so an EZ35 is incorporated which has a very high heater-cathode insulation characteristic, thereby reducing the risk of flashover of the HT to heater chain. The two scale lamps also derive power from this same winding.

The radio incorporates a frame aerial, but sockets were also provided for external aerial and earth. The loudspeaker is at the base of the cabinet pointing down, and is protected by standard speaker cloth of the type used in the black and chrome A22. As the receiver is elevated from the surface it is resting on by about 1 inch, the sound can hence be heard as if it had emanated from the front of the radio. Of course acoustically this is not entirely satisfactory, but it was not possible to have the speaker facing forward in the cabinet without increasing the width and/or height at the front of the radio.

The cabinet is the epitome of a forward thinking design. The pure white cabinet incorporating clean lines and angles with no fussiness anywhere looks good even now. I'd say most people who didn't know would guess this was a design from the 1960s, not a design from some 15-20 years earlier. Of course Wells Coates is known for producing designs that are simple and effective whilst at the same time challenging existing design idioms. One only has to think of his round Ekco series beginning with the AD65. Coates did not only concern himself with domestic apparatus design though, he also applied the same ideals to buildings he designed. Fig 7 shows flats he designed at Lawn Road, Hampstead in London. It is difficult to believe this building was constructed in 1933/34, like the A33 it features clean angular lines and is white rather than traditional brick or stone (Though I read recently that although the building has spent the majority of its life painted white, it was originally pale pink). This block is now English Heritage Grade

1 listed, and stands out in its surrounding area which consists of traditional Edwardian houses likely to be seen in any well to do suburb of that era, much as the A33 stands out like a beacon against the wooden Goblin and similar receivers of the time which were then so prevalent.

Ekco was presumably disappointed with the sales of the A33, because another clock radio was not to appear until 1953, when a generic clock with combined internal associated switching mechanism appeared on the trade market. Several manufacturers utilised this clock and switching mechanism, and the dial faceplate and digit surround panel was customised in wording, style and colour dependent on the radio manufacturer the clock mechanism was destined for.

Of all the radios I looked at during the preparation of this article very few of the clocks were still working, but I suppose that is to be expected after approximately 50 years. One thing that is evident, and perhaps contributed to the demise of many radios, is that the fixing method of the small control knobs was insufficiently robust. Some knobs were threaded, and others pushed on to a kind of split spline, but as the knob is so small and the force required to operate the mechanical switch is quite substantial, the corresponding tiny lugs in the small plastic knobs break or 'round off' as they act against the metal control shaft. This means the switches cannot be set, and the knob gets lost. More often than not at least one of the knobs is missing, and some sets turned up with replacement knobs affixed by grub screws.

For their next two clock radio receiver models Ekco merely took the generic clock mechanism, and married it together with an existing radio design (to all intents) already in production. In both cases the radio element of the circuit is not particularly interesting, so I'll only include descriptions of the cabinets. The first of the two is the model A222 from about 1953, left model in Fig 8 together with Ekco U195. This model incorporates 4 pre-set stations, three medium wave and one long wave. It looks as though Ekco did not even try to emulate the forward-looking design of the A33, this cabinet is as bland as they come. In fact the brown bakelite outer shell of the cabinet is the same moulding as that from the model U195, with a different cream plastic front panel. One might expect the chassis from the U195 to be used again within the A222, but this is not the case. This is surprising as the circuits are essentially similar, and it looks as though the only major component on the existing U195 chassis that would obstruct the inclusion of the clock is the H.T. smoothing capacitors can. I would have thought it would have been possible to relocate this component offset between the rectifier and output valve (UY41 and UL41, the two right hand valves in Fig 9). Whilst it must be acknowledged that these are the hottest running valves in the set, there is plenty of room and ventilation within the large cabinet, and after all, miniature sets of this era placed similar components at a much higher density within a smaller space. Certainly relocating that single component would have been easier than re-positioning all the valves and IF cans etc as actually occurred. In any event a smaller loudspeaker has had to be fitted to replace the 6 inch round Goodmans unit included within the U195. This becomes a vertically mounted elliptical speaker in the A222, seen in Fig 10. Some features from the U195 have clearly been transferred directly across to the A222, most notably the pre-set tuning and switching block. Fig 9 and 10 show rear views of the two receivers side by side. The A222 with its brown mottled bakelite cabinet is uninspiring, but must have been sufficiently encouraging for Ekco, as within the next year or two another clock radio appeared, this time in its own purpose designed and moulded cabinet again.

Shown in Fig 11 are the grey and cream versions of model A244, and Ekco have again produced

Fig 11: Ekco A244 Receivers

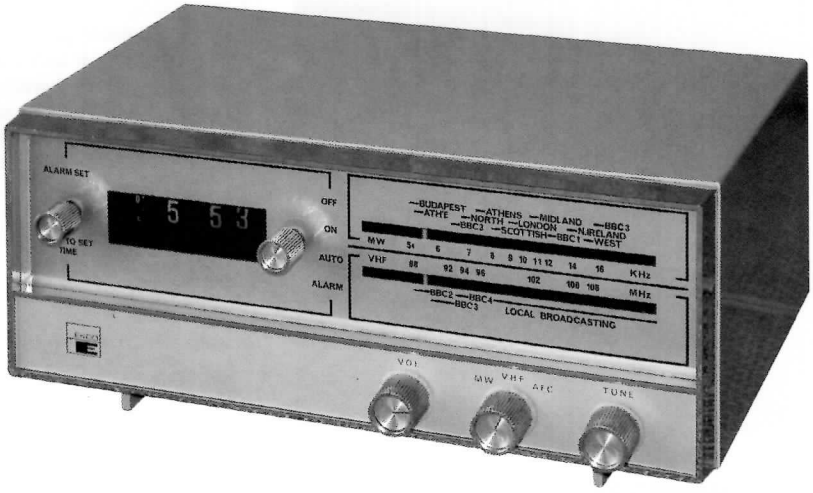


Fig 12: Ekco A402 Transistor clock radio

Fig 13: HMV 1127

something that looks modern and up to date. This receiver was released in 1955 and cost £23.2.0 incl pt. Also seen in the picture is a view of the receiver internals and the instruction manual. The A244 utilises the same clock mechanism as the A222, and the circuit and chassis this time are largely based on the U159 and U243 etc. However, like the A222 seen

Coincidentally this cabinet also features the bright chrome details at the front of the set so effectively used by the black and chrome Ekco receivers of the 1930s. (In fact, if this cabinet had been black instead of pale blue perhaps it might attract a value in the hundreds of pounds as enjoyed by the black and chrome 1930s Ekcos!).

already it clearly did not prove possible to directly utilise one of these existing designs, and the chassis within the A244 again has a slightly different layout whilst retaining some of the common features from the other receivers (eg lever wavelength switch). This cabinet incorporates the clean lines and angles pioneered in the A33 from almost a decade before, and is a very attractive looking receiver. This receiver is even elevated from the surface it is resting on by legs moulded within the cabinet, much like the A33. The A244 was available in two colours, cream and grey. The A244 also offered the feature of timed power switching. A socket in the rear of the receiver delivers timed mains voltage, and another appliance could be plugged into this socket so that it switched on/off at the same time as the receiver. The A244 has a particular design weakness in the lever that switches between medium and long wave. This switch seems very prone to breakage; I have come across several examples where this has occurred. The cabinet from the A244 appeared again in later years to house basic Ekco models without the clock.

Both the cream and the grey versions of the A244 have a tuning scale with block maroon colouring and white lettering. The outside and central section of the clock have also been sprayed the same colour to match. Any areas of the tuning scale without station legends are filled with stars (eg around the control knobs). This feature does actually look quite good, though the scale appears quite 'busy' as a result. There also seem to be minor differences between cabinets. This suggests Ekco were making the set in quite small batches and seem not to have anticipated the level of sales that ensued. This article was prepared with reference to five A244's - two grey and three cream versions. The Ekco logo beneath the clock is gold in some models, and white in another. Another cabinet does not have the logo at all (though it could conceivably have been rubbed off). Four of the tuning scales are maroon, but one is grey – yet the clock surround is maroon. I wonder if this example might have suffered some kind of bright/sun light related induced change of colour (photo-chemical?), but the colour is still strong as opposed to faded. I was curious that two of the five sets had a paper label pasted over the apparently identical makers name and voltage info etc printed on the card back. Closer inspection revealed that the two sets with paper labels were made in Ireland (instead of Southend-On-Sea) thereby necessitating the paper label, as the country of origin is required by law.

The final set, the Ekco A402, pictured in Fig 12 is perhaps a rather tenuous link to Ekco, as it was actually made in Japan. The clock in this receiver is a generic design available on the trade market, and is of the type where the digits are continuously revolving drums with numbers on to indicate the time (as opposed to the flip-type display). The radio section is also a generic chassis, utilised by other manufacturers. For example Prinztronic marketed a radio using these basic components in this country. Prinztronic mounted the radio section in their product 90° rotated from the Ekco A402, such that the three control knobs were at the right hand side of the (different) cabinet. The tuning scale itself was formed of rotating drums (similar to the clock display) rather than the slide rule type scale employed by Ekco. I've particularly included this receiver from Ekco to illustrate exactly how forward looking the A33 was from Wells Coates that had been designed some twenty or so years earlier, and yet the same ideas were still used in the A402. Straight away one can see the same clean lines and angles evident. Notice how the set is again elevated from the surface it is resting on by feet integrated within the cabinet, and the speaker is still mounted in the base of the cabinet projecting the sound down and thence out from the front of the set. Coincidentally this cabinet also features the bright chrome details at the front of the set so effectively used by the black and chrome Ekco receivers of the 1930s. (In fact, if this cabinet had been black instead of pale blue perhaps it might attract a value in the hundreds of pounds as enjoyed by the black and chrome 1930s Ekcos!).

But for all Ekco's efforts and attempts at producing a desirable clock radio, were they the most successful manufacturer in this field? Well, I'd say no. They were thoroughly outsold by the Goblin Timespot in the 1940s, and in the 1950s it looks to me as though HMV had the greatest success. Monitoring internet auctions and swapmeets in the two years leading to the preparation of this article, and using the numbers seen as a proportional indication of numbers originally sold, the clock radio I saw most frequently from the 1950s was the HMV 1127 (Fig 13). Costing £19.9.0 +pt it utilised the same generic clock mechanism incorporated by Ekco, but the cabinet could scarcely be made any more bland and uninspiring if you tried. A variable tuning knob is provided on the right hand side of the cabinet, and the speaker is at the left hand end. This set could also switch an external appliance on and off at preset times. It is smaller than both the valve Ekco clock radios, and that seems to me its only advantage, though perhaps that was advantage enough in view of the numbers still surviving. The other set that still turns up moderately frequently is the model 342A 'Music Maid' from Philips. This set again used the same basic generic clock mechanism, and could also switch an external appliance on and off. Unlike the HMV though it did not include a variable tuning capacitor, but had three medium wave and one long wave preset switches available. The sound quality is probably better than that of the HMV 1127 though, and was a couple of pounds cheaper at £17.9.9 +pt. To my mind though the cabinet is fairly mundane, perhaps not too dissimilar to the Ekco A222 in concept, but not as smart as the A244.

Of all the designs featured within this article you will now have deduced I think the most forward looking and attractive is the A33 by Wells Coates, and its design credentials seem to be confirmed as it is the only clock radio of the valve era included in the Victoria & Albert Museum collection I am aware of. What a pity they don't turn up very often these days.

References:

Radio! Radio! First Edition 1986, Jonathan Hill
Trader Service Sheets 853, 995, 1109, 1309.
Ekco Company Manual, A33*
ERT Service Chart 1041*
Ekco A244 Instruction Card
The Wireless Show, 1977, V&A Museum/HMSO
*By courtesy of Gerry Wells, Vintage Wireless Museum, Dulwich.

South Dorset wireless makers in the 1920s

by John Rose

The Weymouth/Portland area has been known for high-tech industry for the past hundred years. The increasing degree of sophistication required by the Royal Navy - which was based in Portland Harbour - and the Admiralty Research Establishments provided the impetus for a cluster of advanced technological companies to gather here. There was certainly some interaction with specialists in the district. This is an attempt to investigate the local response to the country-wide wireless craze of the 1920s, when almost every locality had its share of small retailers/ manufacturers. Most of these were on too small a scale and, being unable to compete with better organised national firms, had sunk into oblivion by the nineteen-thirties. Such a fate befell those under review here.


Wireless *without* Worry
If your Receiver is not satisfactory, bring it to
MARSHALL'S,
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For expert overhaul. Improved results guaranteed.
Have you heard our PORTLAND II.?
There is nothing to beat it.
Polished Oak Cabinet, Easy to Tune, Tunes from 300 to 3,000 metres, No Coils to change.
No Unsightly Wires outside, Loud and Clear.
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Demonstrations daily. Accumulator charging a speciality.
Valves, Batteries, and all Components in stock.

Left: Marshall's advertisement in Royal Manor Times October 1926

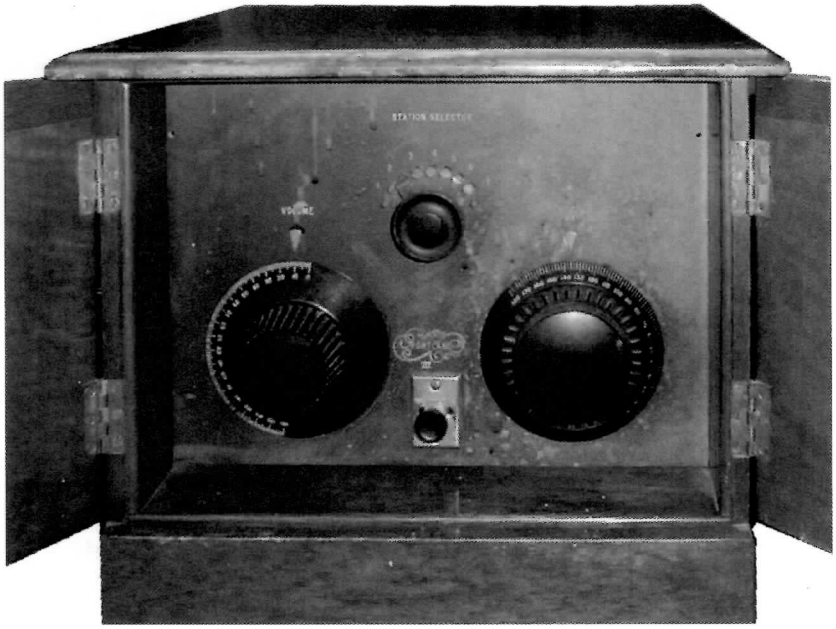
Below: Portland Three

Opposite page, top left: Portland Three circuit

Opposite page, top right: Portland Three chassis

Opposite page, lower left: Smith Sloper

Opposite page, lower right: Smith Sloper chassis



Weyrad, whose coils and kits live in the fond memory of many readers, are outside the scope of this article as they appeared much later.
Of particular interest are four three-valve wirelesses, two made by Smith's, and one each by Marshall's and Bennett's. Marshalls also made a two-valve set. The names were mentioned in a page in the Dorset Evening Echo in 1996; this paper is strong on memorabilia and receives nostalgia from older residents.

It was while I was working on the circuits of two of the sets that I began to ask deeper questions than 'how do they work?', because they seemed to be quite straightforward TRFs. Further investigation however revealed that each company had an individual approach to tuning the sets though their output stages were perfectly orthodox. They appeared to have such an interesting tale to tell that I realised that there would also be a fair amount of historical research involved.

Researching documents and books

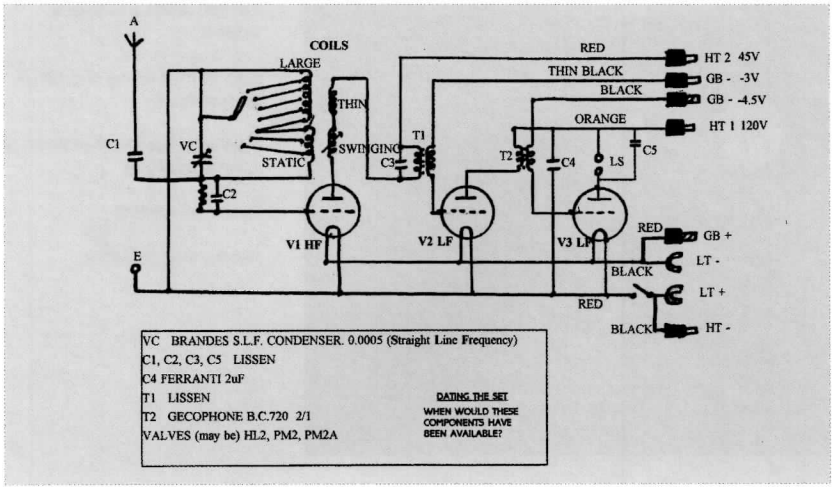
First stop was Weymouth library and Kellys Directories for the 1920s and 1930s. Kellys are the well established sources that contain personal and trade sections grouped under categories. A sequence of these can tell the life of a company from beginning to end.

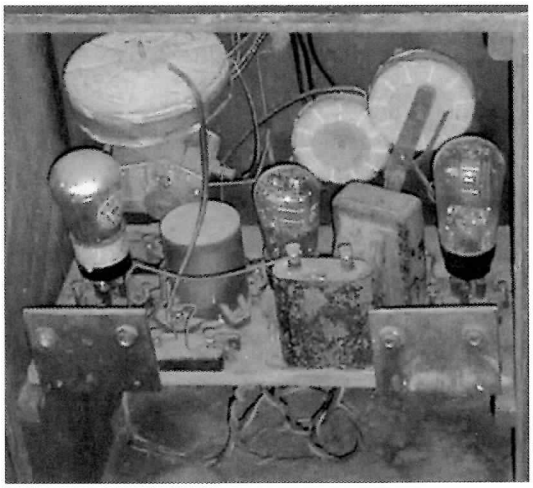
'Smith, W and Son, electrical engineers, 7 Royal Arcade' was listed in 1923, but they had already been a respected electrical company for twenty years. Their premises is now one of the tourist shops on the Esplanade. In 1929 they also described themselves as *'makers of the Smith Majestic Musical Equipment'* but by 1936 had reverted to simply 'electrical engineers'. That was the last entry for Smiths. Also in the 1923 edition, for the first time, is *'Marshall, Ernest, watch maker'* which was indeed his profession and why he opened a business in Portland. By 1927 he described himself as *'Marshall, Ernest, electrical, mechanical and radio expert and watch repairer'.* Entries for Marshalls continued through the 1930s.

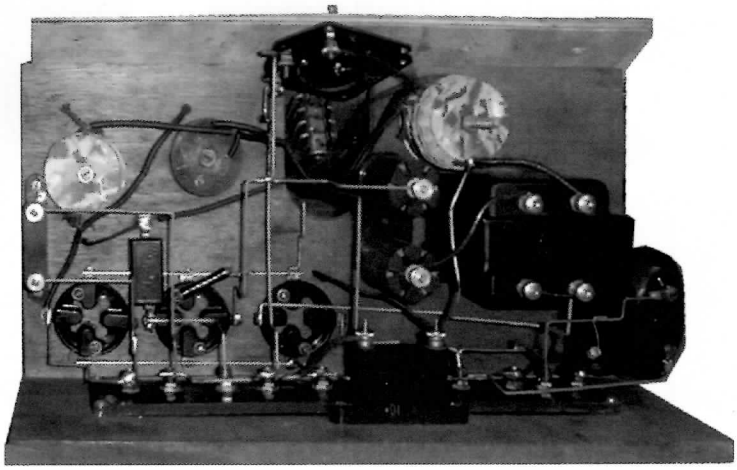
The first appearance of V.H.Bennett the Department Store, in this category, was in 1927 when electrical engineering was listed with other retail items. It was included in *'wireless dealers'* in 1932 but in 1936 'Bennett & Escott Ltd. Registered electrical installation contractors and wireless engineers' appeared. I had long suspected that they had devolved in their own right from the parent company. Verification came from an advert in the Southern Times dated September 6th 1924, announcing that Mr T.H. Escott 'will personally superintend all repairs and give free estimates for new work. Special attention given to Wireless installations'.

Trawling through the Southern Times of the 1920s was a long, neck-aching chore peering at an unreliable micro-reader, as the paper has been photographed onto this format.

I was hoping to discover when these wirelesses were introduced, as surely any self-respecting manufacturer/trader would want to inform people about their products. But no. I find it almost







It was quite a surprise to find that there had been a South Dorset Radio Club in the 1920s - they had their annual dinner in June 1924 when the guest of honour was Capt. P Eckersley of the BBC.

incomprehensible that there was such a lack of adverts; that the firms didn't bother to advertise at a time when this new and accessible technology was sweeping the country, and trade was there for the taking, but that seems to be the case.

My search did turn up some interesting other evidence though: at the time of the renowned South Dorset Radio Society's 40th year in 2001 I had investigated its early days, linking the SDRS with the Weymouth Short Wave *Club* of pre-war days. It was quite a surprise to find that there had been a South Dorset Radio Club in the 1920s - they had their annual dinner in June 1924 when the guest of honour was Capt. P Eckersley of the BBC. He was pleased to see so many aerials in Dorset, a sign of the growing popularity of wireless.

There was an advertisement placed by Fredk. Young, an engraver. He is known to have engraved radio panels for both Smith and Marshalls.

There was also a very slight hint that another company may have been involved: in June 1925 an advert by D.N. Menzies of Weymouth mentions sets with one, two or three valves at between £3 and £15, plus one called a 'Super III' at £17; tantalisingly, it doesn't say who made them - but one is tempted to suppose home-made, to order, by Mr Menzies. Considering that the shop did not advertise again, nor is there any further record of its existence, perhaps there was a problem. About the same time a Dorset correspondent to Amateur Wireless was quoted by 'Southern Times' columnist Radio Rex:

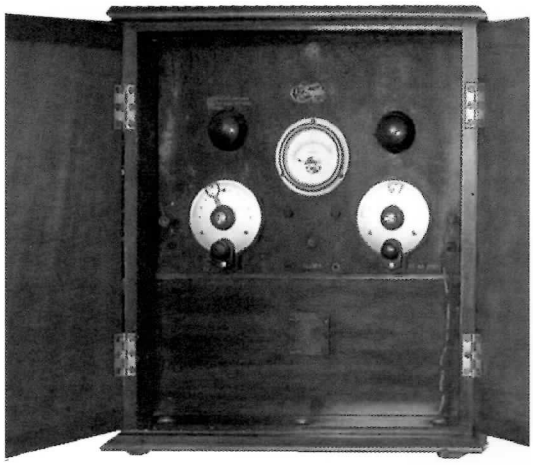
Hideous Disturbance

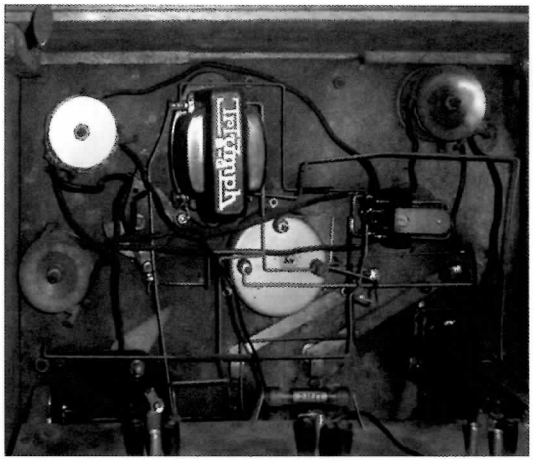
It is usual to saddle the hapless listener with the whole of the responsibility for the oscillation nuisance, and one who has become acquainted with the methods of certain 'manufacturing' retailers feels constrained to ask whether they have not got something to answer for. A single valve circuit evolved by a retailer.... was a vile contraption, bearing no indication of its origin, of course. The components were crowded on to a panel measuring about 3in by 9in and the circuit was probably never intended for expert eyes. Closer inspection of what appeared to be an innocuous variometer revealed a very crude form of reaction at the aerial, and a seasoned experimenter could not tune the thing without creating a hideous disturbance."

Research of this nature provided a good deal of background material; the radios that I could now investigate at first hand, and the personal sources still available to me, enabled me to piece together the history and technicalities of the local wireless industry.

Marshall's of Portland

This is a well known Portland electrical store, and has existed for as long as anyone there can remember. I made contact with Frank Marshall. Frank - still active as G2XQ – was a mine of information about the Portland sets in particular and local radio matters in general. Indeed, it was Frank the hoarder who had unearthed that wonderful animated movie





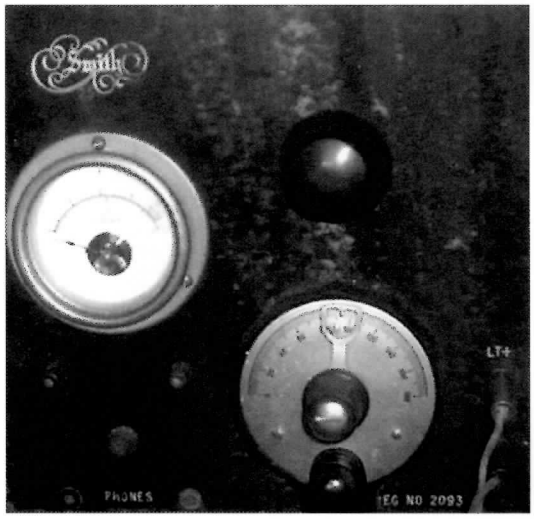
Far left: Smith 3 Smoker's cabinet

Left: Internal wiring of Smith 3 Smoker's set

Below, far left: Detail of Smith 3 Smokers cabinet

Below left: VHB 3

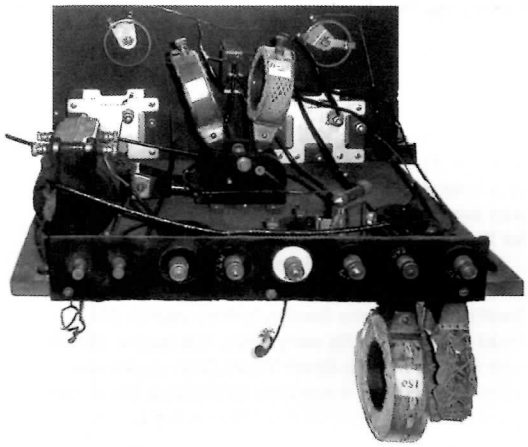
Below: VHB 3 chassis



by W. Heath Robinson advertising Amplion speakers. His elder brother was Harry, who with his father Ernest developed the Portland series of radios. Harry made some tape recordings of his memoirs which have been invaluable. Now in his eighties, Frank remembers that as a small boy - in the '20s - he helped to wind some of the coils that went into the sets his father and Harry had designed .

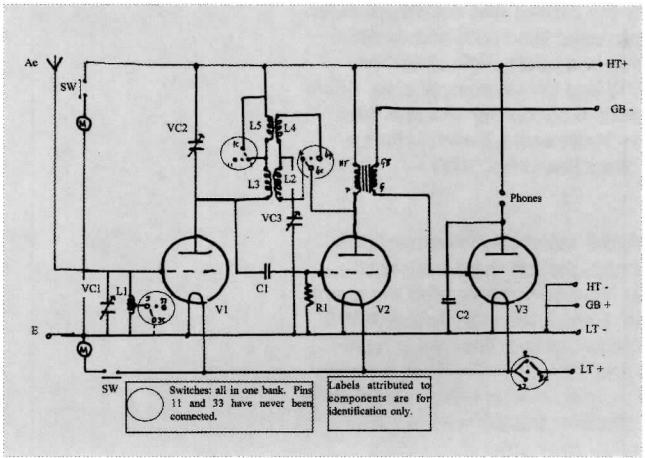
The circuit details of the Portland Three were described in Harry's tapes. It seems probable that the set was a development of a design in Amateur Wireless by R.W.Hallows. A detector valve was followed by two LF amplifiers - all triodes of course - (this configuration is described as 0-V-2); aerial matching was achieved by 7 tapped studs. The swinging reaction coil originally had 2 or 3 tappings with extra ones on the loading coil. Harry added another reaction coil in series with the swinging one which enabled good oscillation over a wide range including Long Wave - presumably in response to the popularity of the new Daventry station.

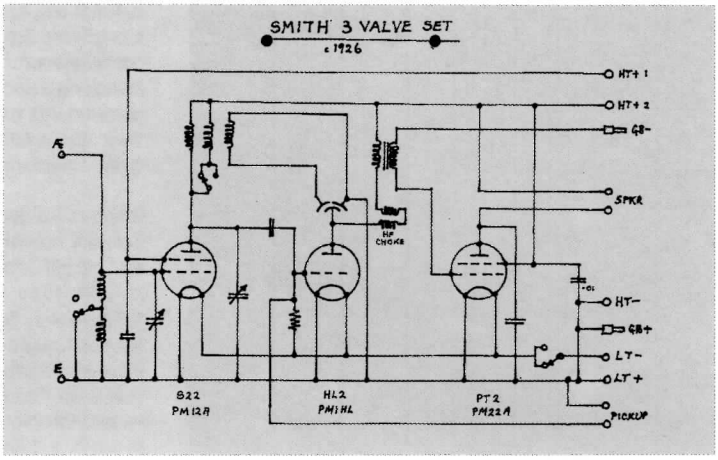
The controls were simple - once you tapped into the required band, you fine-tuned with a variable condenser, and used the reaction to set the volume. To general astonishment, it was very successful and achieved a good reputation locally. These sets often emitted 'hideous disturbances' to the annoyance of neighbours who would retaliate by setting their own sets in oscillation! The cost was £16, plus loudspeaker which could be from 30/- to £25 (Brown Super-duper was recommended). They were made to order in batches of about six. This so undercut Mr Smith's rival set that he wrote a sharp letter to Mr Marshall accusing him of infringing Marconi's conditions of licence by emitting too much radiation due to reaction acting direct on the aerial coil. Marconi, with whom Marshall took up the case, said there was no such regulation.

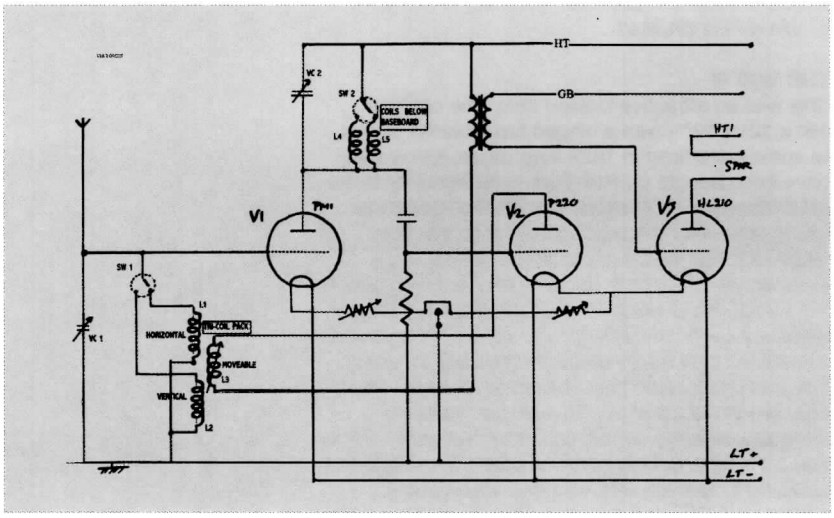


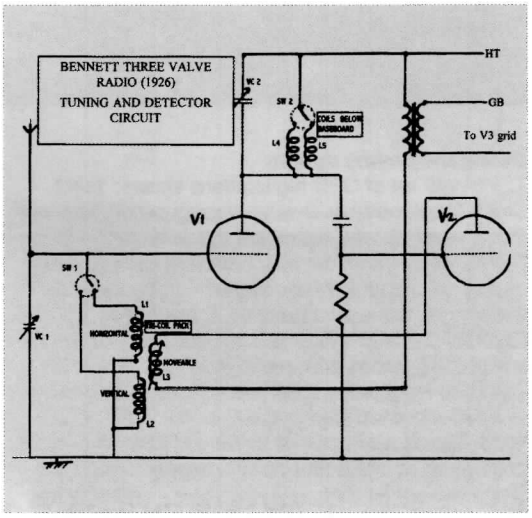
Although the centre of interest was the Portland Three, Frank also recalls that there was a long-ish set, perhaps a portable. We have no evidence of this so can only hope that one will turn up – as long as it has escaped the jaws of the skips!

Frank did not know anything about a Portland two-valve set - until I heard of a facsimile of a 1926 advert from the Royal Manor Times, a now defunct Portland local paper. There, clear for all to see, is mentioned a Portland II, complete with loudspeaker for £11-10-0: this vindicated Ray Henville's belief that two empty cabinets in his possession were for Portland 2s. Ray is a collector living in Blandford Forum, who has been both helpful and kind. In the end galloping technology, screen-grid valves, dual-ganged condensers and cheaper, better mass-produced sets rendered Marshall's enterprise uneconomic.









Top left: Smith 3 Smoker's circuit

Top right: Smith 3 valve sloping set circuit

Above left: VHB 3 circuit

Above right: VHB 3 tuning circuit

Dating the Portland sets

Harry in his memoirs is quite certain that the Smith upright set was on the market first and that it was the one with double doors. The relaxation in 1924 of the regulation that the reaction circuit should not cause the aerial to radiate may explain Marconi's reply following Smith's complaint. The date of the relaxation along with the probable 1924-25 date for the Smith III could help fix the Portland III at not earlier than 1925, i.e. after the ending of the GPO registration scheme, which would account for the absence of a number or stamp. Every indication is that the P-3 was Marshall's first foray into radio production. The advertised P-2 (October 1926) would have been an addition, or replacement. A further clue could be in the few recognisable components. When were a Brandes VLF tuning condenser (0.0005uF) and a Gecophone BC 720 ratio 2/1 transformer available at the same time? And, when was the R.W.Hallows design published in *Amateur Wireless*?

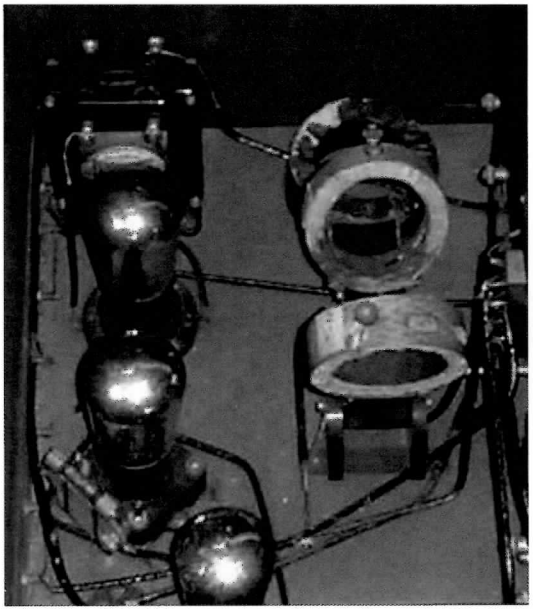
The Smith Three-valve radios

Only two sets made by W. Smith & Son are known to exist. The earliest is a model in the style of a smoker's cabinet, with full-length doors; there is also a sloping front model.

The Smoker's Cabinet Model (the Upright)

If ever someone was in the right place at the right time, this is an amazing stroke of luck. The South Dorset Radio Society's chairman a few years ago, Bill Young, filled time before an appointment by visiting a nearby antiques shop. That evening he told me he had seen an old radio there, bearing the name 'Smith'. My considerable eyebrows went into orbit with suppressed excitement and I think he understood that he should try to acquire it. If Bill hadn't visited the shop at that time, would we ever have known? Would some other customer ever have appreciated it? This proved to be a missing link. It is an upright model – similar in style to the Portland offerings, and by the same cabinet makers.

The circuit is a 1-V-1 using triodes. It was "too complex, but clever" (Harry), with abundant controls for dad to play with. Medium or long wave transmissions could be selected by switching in or out tappings on a coil on the HF valve's grid and pairs of coils in the anode circuit. All the tuning and reaction was accomplished with variable condensers (home-made, along with some other components), which had to be set independently and accurately. An audio transformer (Triumph B-G) coupled the output triode and 'phones or speaker were connected as usual. The dials were made by a firm called Ormond. Also, a centrally-located meter allowed voltage checks on HT and LT. The set was said to be heavily damped and stable but had poor amplification because in order to achieve selectivity the valves had to work at times with grids very positive. Trying to work out a circuit diagram by tracing the wiring was tricky, because some deterioration had taken place in this set, and to this end a digital camera was worth its weight in gold! (The technique is: print a light colour picture of the chassis wiring, use an analogue meter (not digital) to confirm the wire runs on the set, and highlight the same on the picture with coloured pens.) Not surprisingly, the set was expensive at £40, and the Amplion Dragon speaker was 5gns.



Dating the Smiths upright
The BVWS list of GPO registrations shows: *'2093 Smith (Weymouth) III. 3-valve sloping panel'*. I believe that it was Ray who submitted this information to the BVWS. At that time the only Smiths III he was aware of was the sloper in his possession. The new find, the upright, came as a surprise. It bears the GPO/PMG stamp which (assuming Mr Smith was a law-abiding trader) appears to date it to 1922-1924. The GPO registration 2093 would have been granted to a two-valve set (hence the 2) in late 1922 or early 1923. Timing is suggested by the registration number 2001 given to a Marconi V2 in November 1922. The Smith two-valver then gained a valve - probably the HF valve - but kept its GPO number and PMG/BBC stamp. If there was a two-valve set, it has regrettably gone for ever.

Marconi's reply to the altercation mentioned earlier between Smith and Marshall over the matter of oscillation suggests that the reaction ban had been lifted, which dates both sets to at least late 1924. A switch is labelled *push for 5XX and Paris* and *pull for local and other stations.* 5XX was the experimental station in Chelmsford which began in 1924 and transferred to Daventry in mid-1925 operating on long wave as a broadcasting station. The switch itself is a three-way rotary, with an off position and it looks very original. A blanked-off hole into the battery compartment may have been intended for an on-off switch. Clearly, the fascia panel was made before the modified switching arrangement, but how long before? And which 5XX was received in Weymouth - Chelmsford or Daventry? Why did the panel still bear the GPO number and the PMG stamp, as 5XX wasn't commissioned until well after the GPO scheme was history? The figure '25' appears below the Smith scroll: it is more likely to be a serial number than a date. It is probable that this set was made in 1925 using an old fascia panel from the stockpile; the 'advanced' technology enabled band selection by switch, rather than the usual coil-swapping.

The Sloping Front model
The three valves here are a screened-grid (PM12A), a triode detector (PM1HL) and an output pentode (PM22A) with a side cap. The whole circuit is mounted on a wooden baseboard and an angled fascia, being easily demountable for servicing. It seems very well made, the square-section wiring being bent and cut and soldered to a good standard. An oddity is the Pye Differential Condenser, which is mounted awkwardly, as if it was an afterthought or a development of a now defunct set, as clearly the cabinet was not designed for it originally. Smith again used fixed coils and variable condensers for reaction and tuning, with simplified switching selecting MW and LW via pairs of coils. Some components are labelled: a condenser 'Polymet New York' and another one 'Hydraworks Berlin' while the audio transformer is 'Bear Brand No. 1000'.

What is its date?
This set contains only the registration number 2093 and no BBC/PMG stamp, though there is a serial number 1059. It must have been made after the stamp scheme was dropped. Hence, the entry in the BVWS list itself might need to be altered. The use of multi-element valves puts it to 1928 at the earliest, a notion that is reinforced by the provision of a pick-up input to the detector grid. I believe this set was made in 1928 or 1929; possibly the former as by 1929 Mr Smith advertised himself as 'maker of the Smith Majestic Musical Equipment' yet there is no sign of this on the set itself.

THE VHB III
This was an attractive looking item. The cabinet - 16" x 12" x 12" - with a hinged top lid looks similar to some advertised in 1927 magazines; it may well have been bought in, and there is no similarity to the cabinets made for Marshalls or Smiths. Could the circuit itself have been bought in? It is not clear whether it was locally designed but if so it was probably by T.H.Escott. Its valve configuration was 1-V-1 using triode valves PM1, P220, HL210. Filament rheostats controlled valves 1, and 2 + 3. The wooden baseboard plus fascia slides out for easy servicing. The most noticeable feature is a tri-coil pack. These coils are in the aerial circuit, switched for band coverage, with the central coil tilting between vertical and horizontal, being energised from V2's plate and coupling inductively into V3's grid via an audio transformer. The switch also selects one of two coils (below the baseboard) in V1's plate circuit. The five coils are labelled 50, 58-60, 150, Atlas Patent 75 plug-in coil, Finston lo-loss No.75.

We wondered if this was a regenerative set. It appears, however, that the moveable coil was part of an *inductive neutralisation* circuit which prevented the circuit from oscillating. Normally, the inter-electrode capacity in the valves gave rise to unwanted oscillations - the 'Miller Effect'. It was possible to neutralise this by sending equal signals but in the opposite phase through part of the circuit. If the moveable coil is connected the 'right' way round, neutralisation is accomplished. Fine tuning is effected by variable condensers one of which is impressed 'Regd 71928'. The audio transformer is the reliable Ferranti AF3.

Dating the VHB III
This set is full of paradoxes. Dating is difficult, but 1926 seems a fair estimate. As it has no GPO or other markings it presumably post-dated the registration scheme – always bearing in mind that there were several 'pirate' builders in business who didn't belong to the BBC. But it isn't as straightforward: the tri-coil pack is similar to those illustrated in the Harmsworth Wireless Encyclopaedia which appeared around1923. When did these go out of use? This neutralisation circuit was also popular in the early twenties, and in those days technology and design progressed by leaps and bounds. As the vast majority of radios bought in the early twenties were crystal sets, and V.H.Bennett's electrical division was announced in 1924, this set is likely to have been designed some time in 1925 and manufactured in 1925-1926.
T.H. Escott's son Brian showed me a receiver his father had made in the early 1920s. I had hoped this would be a prototype, but it looked very home-made, and had three bright-emitter valves. There was no

resemblance to the VHBIII.

The fate of old wirelesses

Some sets, made by illustrious manufacturers, are sought after by collectors. The less famous – products of the many local firms countrywide – have little commercial value. They are, however, priceless in the context of their place in the local economies. They were a response to the immense interest in the wireless craze of the time. I would hope that wherever you are reading this, where some firm nearby but long ago had supplied their sets to their customers, there may be a few collectors aware of such wirelesses and pro-actively seeking them out. Don't let them find their way into skips. Acquire, cherish, pass on – to a museum if appropriate but ensuring that they will be looked after.

Those I have described are the only known surviving examples: it would be helpful to know if any others exist. Perhaps, under the auspices of a BVWS initiative, some of the surviving local sets, now scattered far and wide around the country, might find their way back to their home district. Alternatively, a register of such sets could be established, so that even if the present owners aren't aware of their origin, there might be somebody out there who can identify them.

Now for a personal 'want'. An HSP, made in the '30's by H.S.Phillips of Weston-super-Mare. Any offers?

Alexandra Palace continued from page 45

extended downwards from the black level, tending therefore to reduce the transmitter output to nearly zero.

The power supply requirements for the vision transmitter were many and all having a large current requirement. The high-tension and filament current supplies to the modulator valves were obtained from a motorised alternator set, having an output of 500 volts 100 amps. 500Hz.

Direct current for filament heating was obtained by the use of metal rectifiers, except in the case of the final stage which being at a high potential above earth, was provided with an insulated filament-current generator mounted inside the modulator unit. An additional high-tension supply at 5000 volts was derived from transformers feeding a mercury-pool rectifier.

Filament current for all radio-frequency valves other than the master oscillator was obtained from another motor generator set which had an output of 400 amps, at 24 volts.

The master oscillator filament was supplied separately from the mains via a transformer and metal rectifier. The 6000 volts high-tension supply for the output stage and the 4500 volts for the intermediate amplifier stage was obtained from the 50 Hz Mains by means of hot-cathode type mercury vapour rectifiers, while the requirements for all the smaller valves was obtained by the use of metal rectifiers.

Control Desk

The main controls were all grouped conveniently on one control desk from which the switching operations were effected by remote control.

A sequence-starting switch was provided to prevent damage to the transmitter by the application of power supplies in the wrong sequence, in addition apparatus was provided to ensure that sufficient time elapsed between the application of each succeeding voltage, to allow valves and other apparatus to warm up.

All the electrical apparatus had to be fully protected by interlocking circuits and water-flow monitoring devices. This meant that in the event of any failure of the transmitter's vital supplies, it would automatically shut down and could not be restarted until the fault was remedied.

There were also strict provisions for the protection of personnel such that access could not be obtained to any of the transmitter units until all dangerous supplies had been shut down and the apparatus earthed. No supply could then be reconnected to the transmitter until the staff member servicing the transmitter had closed and locked all the gates, thus restoring the interlock. Incidentally, even with these strict provisos in place there was at least one death recorded at the transmitter due to electrocution!

Further to the centre of the control desk was a cathode ray oscilloscope, which enabled the engineer to monitor the waveform of the picture and synchronising signals at the output of each stage of the modulator unit and the final waveform at the output of the modulated amplifier.

The Sound Transmitter

The Sound transmitter was built in three separate units, each unit being housed in a metal cubicle. The master oscillator, which was similar to that used in the vision transmitter, operated at half the carrier wave frequency and was followed by one frequency-doubling stage and five high frequency amplifying stages.

Modulation was effected at the anodes of the final high frequency amplifier by choke control, modulator, sub-modulator and sub-sub modulator stages. As in the vision transmitter the final high-frequency stage deployed two CAT9 water-cooled valves in push-pull. The main modulator stage deployed three CAM3 valves in parallel.

The transmitter was designed to give exceptionally high quality sound reproduction, and enabled full advantage to be taken of the wide frequency band that was available at VHF.

The frequency response of the transmitter was designed to be flat between 30Hz and 10Khz, the maximum departure being less than 2db over this range. The low-frequency harmonic content introduced by the transmitter was less than 2 per cent, at 90 per cent modulation!

All the valve filaments in the sound transmitter were heated by direct current from a motor-generator set, having an output of 300 amperes at 20 volts, the filaments of the early stages being fed through voltage-dropping resistances. The main high-tension supply at 6000 volts D.C. for the penultimate high-frequency amplifying stage, the power-output stage and the modulators was obtained by means of a hot-cathode type mercury-vapour rectifier fed by a step-up transformer and provided with the requisite amount of smoothing.

The stability of the high-tension voltage was carried out by means of a remotely controlled induction-regulator circuit.

All auxiliary high-tension and grid-bias supplies were obtained from metal rectifiers fed from transformers and provided with suitable smoothing circuits.

Station Power supply

The power supply requirements for the Alexandra Palace were obtained from the mains of the North Metropolitan Electric Power Company at 415 volts 50 cycles 3-phase, and were fed through an oil cooled circuit breaker and distribution switchgear.

A brief resumé of British (and several overseas) Finished goods & component manufacturers (as at January 2004) part 3 by Dave Hazell

CAV. Brand name used by Charles A Vandervell Ltd. A manufacturer of electrical components for the automotive industry and, in the early days of radio, wireless sets and accumulators. It was later taken over by Joseph Lucas.

CBS - Columbia Broadcasting System Inc. In 1955, a subsidiary, CBS-Hytron of Danvers, Massachusetts, made valves and CRTs. In 1968, CBS Laboratories (a division of Columbia Broadcasting System Inc), Stamford, Connecticut, USA - manufacturer of broadcast TV equipment (cameras, OB vehicles, etc).

CCL. Made electrolytic capacitors in the 1950s and 60s. A company called CCL Ltd was established in 1955 by Henry Goodrich and Ethel Cornell - is this the same firm? In 1964, CCL Ltd, Hanworth Lane, Chertsey, Surrey - maker of electrolytic capacitors. I think they probably became 'Pye Capacitors' around 1970, when the products were re-branded Pye (at which time the company name was Pye Electro Devices Ltd). What did CCL originally stand for? A new company, called Cambridge Capacitors Ltd (based in Romsey) was formed in 1989, by the merger of the Pye capacitor business and RIC Ltd.

CEI. Cambridge Electronic Industries plc was the name give to the holding company for a group of former Pye Group companies, when Philips (by then, the owner of Pye Group) decided to spin off some in the early 1980s. The name may have connections with the initial title of the newly merged Pye and Ekco group in 1960 - British Electronic Industries, which was later changed to Pye of Cambridge group. These companies included: Belling-Lee, Labgear, Pye Electro Devices and Hinchley. In 1992, after selling off most other businesses, CEI renamed itself Graseby plc (after Graseby Dynamics). In 1997 Graseby plc taken over by Smiths Industries. The HQ of CEI was at, Botanic House, 100, Hills Road, Cambridge, CB2 1LQ.

CES - Combined Electronic Services Ltd, 604 Purley Way, Waddon, Croydon, CR9 4DR (since 1968). The service company for Philips & Pye household products. In 1976, changed name to Philips Service.

CFT. Compagnie Francaise de Television. French company that developed the SECAM colour encoding system in the 1960's.

CGS. The CGS Resistance Company, Marsh Lane, Gosport Street, Lymington, Hants (in 1964 & 68). A maker of high power resistors. For many years a Thorn subsidiary. Made thick film hybrid circuits for Thorn, as used in the 3500 and 9000 series CTV chassis - as well as the infamously unreliable focus control module in Thorn's TX10 colour TV chassis! Now part of the Meggit Components Group. Not to be confused with Currys Group Service (now defunct!).

CML - Consumer Microcircuits Ltd, 142-146 Old Street, London, EC1 (in 1970). In 1972, Rickstones Road, Witham, Essex (the old Marconi-Elliott factory?). Maker of ICs. Still going. Don't confuse them with CML of Luton who make transmitters and receivers.

CRTS Ltd - Combined Radio & Television Services Ltd - see Regentone, KB & STC.

CSF. Compagnie Generale de Telegraphie Sans Fil. A French electronics company, with interests in broadcast television equipment. Merged with Compagnie Francaise Thomson-Houston-Hotchkiss-Brandt in 1968, to form Thomson-CSF.

CTS. CTS Corporation, Elkhart, Indiana (currently and in 1965). Maker of electronic components. In the UK, AB Metal Products made some resistive products under licence in the 60's and 70's - they were marked 'AB CTS'. In 1971, AB took over the European operations of CTS Corporation (USA), in exchange for 10% of their equity.

Cabinet Industries Ltd, cabinet manufacturers (in 1964).

Cable & Wireless - formed in 1929. Nationalised in 1947. Privatised in the 1980's.

Cadmium Nickel Batteries Ltd, Spedant Works, Park Royal Road, London, NW10 (in 1964 & 67). Maker of 'Cadnic' (?) and 'Voltabloc' brand batteries. At Castle Works, Station Road, Hampton, Middx (in 1971). Taken over by SAFT (of France) in 1967. Also in 1971, it changed its name to SAFT (UK) Ltd.

Callins. An infamous (Irish?) manufacturer of electrolytic capacitors in those black, cylindrical phenolic cases. They were widely used by Thorn (Ferguson) in the 1965-1975 era and had a reputation for being very unreliable! In the UK, they have not been heard of for many years. Radio Resistor Co. Ltd distributed them in the UK. In 1966, they seem to have taken over by SPS, and were located at Shannon Airport, Ireland (electrolytic capacitor manufacturer). See SPS entry.

Calscope - brand for scopes which looked identical to Scopex (in 1978).

Cambion. Cambion Electronic Products Ltd, Cambion Works, Castleton, Sheffield. The UK offshoot of the US company. Cambion was founded by Frank Lyman, in the 1930's, in Cambridge, Massachusetts and the name is derived from Cambridge Therminonic Corporation (in 1967, at 445 Concord Avenue, Cambridge, Massachusetts 02138, USA). Cambion produced a range of small electro-mechanical and electronic components for the military and professional electronics sectors. The Castleton plant was opened in 1961, to serve the European market. Cambion (plus Hollingsworth and SAE) were taken over by Midland-Ross in 1981. Subsequently, as a result of the parent company selling off this division to an Management Buy Out (MBO), a new company Interconnection Products Inc (IPI) was created. IPI got into financial difficulties and the UK operation and some other parts of IPI were bought by Wearnes Corporation (of the USA) in 1991. The Cambion name was restored. Still going in 2002.

Cambridge Audio Laboratories Ltd, The River Mill, St Ives, Huntingdon (in 1971). Maker of HiFi. In 1974, Cambridge Audio Ltd - same address.

Cambridge Instrument Co, 13 Grosvenor Place, London, SW1 (in 1963). In 1967, at 24 Carlyle Road, Cambridge. Maker of analytical instruments.

Camp Bird Ltd. A company established since at least 1903. Originally a mining company, it diversified into many fields, including acquiring: Hartley Baird Ltd, Electronic Reproducers Ltd (formerly EV Ltd and originally Sapphire Bearings Ltd) and A Prince Industrial Products - the UK distributors (in 1960) for Blue Spot/Blaupunkt/Dual, & Akkord until 1961. More info in WW Mar 61 p124.

Cannon Electric (Great Britain) Ltd. A US connector manufacturer. In 1965, their UK sales office relocated from 168 Old Street, London, EC1 to 25-27 Bickerton Road, Upper Holloway, London, N19. Later in 1965, they were at Lister Road, Winchester Road, Basingstoke, Hants (where they had already established a factory). Later taken over by ITT Corporation. In 2003, a division of ITT Industries Inc.

Cannon Industries Ltd, Electrical Appliances Division, Deepfields, Bilston, Staffs (in 1964). Domestic appliances. Later taken over by GEC.

Cape Electrophonics Ltd, 43-45 Shirley High Street, Southampton (in 1958). Makers of the Cape audio system (tape recording, tuner, amplifier).

Capital Radio, 12-14 Wakefield Road, Brighouse, Yorks. Founded by Noel Fitton (the R N Fitton, who founded Ambassador Radio & Television Ltd, in 1930) and Geoffrey Dobson, in October 1957. They introduced the name 'Stereosound' in 1958, for their audio equipment. In 1960 and 1980's, Stereosound Productions Ltd, Capital Works, 12-14 Wakefield Road, Brighouse, Yorks - successor company?

Cardross Engineering Co Ltd, Woodyard Road, Dumbarton, Scotland (in 1965). Manufacturer of the 'Vari-Stat' electric soldering iron.

'Carol' tape Recorders, Contronics Limited, Blackdown, Nr Aldershot, Hants

Carr. The Carr Fastener Co began in the USA in 1915. It was founded by Fred Carr of West Newbury, MA. It merged with in 1929 with US Fastener of South Boston, to form United-Carr Fastener Co. In 1938, Carr Fastener Co Ltd had a plant at Stapleford, Nottingham, where it made 'Dot' (terminals and sockets) and 'Cinch' (valveholders) components. In 1948, Carr had a UK manufacturing plant at Brantwood Works, Tariff Road, London, N17. United-Carr seems to have acquired Cinch electronic products at some point (in the 1960's?) - prior to the TRW take-over of United-Carr, in 1969. In 1965 & 69, Carr Fastener Company Ltd (a United-Carr Group company), Stapleford, Nottingham - UK stockists of Cinch, Dot and FT components but also maker of metal and plastic parts for others. Later in 1968/9, the UK manufacturing and sales operation was United-Carr Supplies Ltd, Clifton Works, Frederick Road, Stapleford, Notts (tel 060 239 2828, also 060 239 2661). By 1974, they had relocated to 112 Station Road, Ilkeston, Derbyshire. The three main brands were Cinch, Dot and FT. Cinch connectors was sold by TRW to Labinal of France in the 1990's

Carrington Manufacturing Co Ltd, Vulcan Way, New Addington, Croydon, Surrey (in 1964). Cabinet manufacturers.

Carron Co, Carron, Falkirk, Scotland (in 1948 & 64). Maker of gas and electric domestic appliances. Possibly cast Royal Mail post boxes in the early 20th century?

Castelco (GB) Ltd, Castle Works, High Street, Old Woking, Surrey (in 1964 & 73). Maker of miniature electrical switches.

Cathodeon. A Pye company, established in 1935 as their vacuum devices specialist. It went on to produce camera tubes, CRTs and Monoscopes. Cathodeon were based in Cambridge (as so many of the Pye companies were). Later on, they produced quartz crystals and associated products. In 1971, Cathodeon Ltd was at Trinity Hall Farm Estate, Nuffield Road, Cambridge. Became part of the Cambridge Electronic Industries group in the early 1980's. It was bought from CEI in 1991 by the management and now makes specialist light sources for use in scientific instruments, etc.

Cathodeon Crystals Ltd, Linton, Cambs (in 1957, 1976 & 1985). Quartz crystals. Pye from the outset? When CEI plc was formed, the company was transferred to it.

Cathodeon Electronics Ltd, Bircham Road, Southend-on-Sea, Essex (in 1964). CRT and Monoscope manufacturer. And a Pye subsidiary. In 1968, following the takeover of Pye by Philips, Mullard took over most of the Cathodeon assets, who then ceased to manufacture CRT's.

Cathora Ltd, 48 Earls Court Road, London, W8 and 44 Bavaria Road, London, N19 (in 1955). Makers of Band 3 converters.

Cawkell Research & Electronics Ltd, Southall, Middx (in 1960). Founded in 1948 by A E Cawkell. Taken over in 1960 by Simms Motor & Electronics Corp.

Celestion. Founded in 1924 by Cyril French, as a loudspeaker manufacturing operation within the Electrical Manufacturing & Plating Co (which he operated with some of his siblings), in Hampton Wick. In 1927, Celestion Radio Co. and Celestion Ltd were formed. Celestion made loudspeakers and in the early days, radiograms, valveholders and other radio components. In 1929, the loudspeaker operation was relocated to London Road, Kingston-upon-Thames, Surrey. Cyril French left the company in the 1930s. In 1947, the were bought by British Rola, the UK subsidiary of Rola Co, Cleveland, Ohio - an American speaker manufacturer. British Rola was located near to Celestion, at Thames Ditton. See Rola-Celestion.

Centralab. In the 1940's, Centralab Inc, 900 E. Keefe Street, Milwaukee, Wisconsin - maker of low power wafer switches for the electronics industry. Centralab (in 1955, a division of Globe-Union Inc), 910K E, Keefe Avenue, Milwaukee 1, Wisconsin. A maker of electronic components, including potentiometers. In 1965, they had offices at Centralab Ltd, Northway House, Great North Road, London, N20 (marketing 'Ultra Kaps' - barrier layer disc ceramic capacitors). By the 1970's, they also made semiconductors. The trade mark was 'CRL'. Globe-Union was a large maker of vehicle batteries. Globe Union was taken over by Johnson Controls Inc, in the late 1970's.

British Centralab Ltd, Canterbury Road, London, NW6 (in 1938 & 1947). Maker of volume controls, pickups, microphones, headphones, and loudspeakers.
The British subsidiary of the American component manufacturer. By 1970, there was a plant in Antrim, Northern Ireland, Centralab Ltd - jointly owned by Joseph Lucas (UK) and Globe Union Inc. of USA. Centralab Ltd bought Stability Radio Components ('SRC') and its subsidiary, Stability Capacitors (of Basildon), in 1970. Today, the only trace seems to be in the recently created BC Components (formerly most of the passive components division of Philips). The 'C' stands for Centralab, which makes ceramic capacitors in Hong Kong. Presumably, Philips acquired Centralab at some point prior to the creation of BC Components, (in 1999?).

Champion Electric Corporation (C.R.V.T.C Ltd), Champion Works, Seaford, Sussex (in 1947). Also at Drove Road, Newhaven, Sussex. In 1952, the MD was Mark Bolsom. The Bolsom family were directors of the company until it was acquired by Thorn. In 1952, works at The Drive, Newhaven, Sussex and London office at 16 Berkeley Street, London, W1. Maker of radios, amps and tuners, etc. Also electric cookers. Associated companies were: Newhaven Cabinet Works Ltd and Austin Clark (London) Ltd. The group also made/sold domestic appliances. Champion was taken over by Thorn Electrical Industries Ltd in 1957 and Champion products continued to be made for a time thereafter. Thorn had a factory at Denton Island, Newhaven in 1979 - this was probably a former Champion site.

Channel Electronic Industries Ltd, Dunstan Road, Burnham-on-Sea, Somerset (in 1956). Princess Street (same town), in 1954. Maker of Band 3 converter, sub-miniature IFTs and TV test equipment. In 1958, they introduced a transistor portable radio the 'Magpie'. In 1961, the company went into voluntary liquidation.

Channel Master Corp, Ellenville, N Y. In 1955, maker of antennas.

Chapman, C T (Reproducers) Ltd, Riley Street, London, SW10 (in 1957). In 1958, at Chapel Lane, High Wycombe, Bucks (factory?). HiFi equipment maker. Established in 1950 by C T Chapman and acquired by Derritron in 1960. C T Chapman was a director of Derritron Ltd, in 1967 - the parent company of the Derritron group.

Chicago Die Molding Co, Chicago, Illinois (circa 1940's). maker of 'Bakelite' control knobs.

Chicago Telephone Supply Co, Elkhart, Indiana (circa 1940's). Maker of variable resistors.

Chicago Transformer Corporation, Chicago, Illinois (circa 1940's). Maker of AF and power transformers.

Chilton. Brand name used for a tape recorder from Magnetic Tapes Ltd, Chilton Works, Garden Road, Richmond, Surrey (in 1970).

Chilton Electric Products Ltd, Hungerford (in 1955 & 64) - maker of electrical products, such as rechargeable torches, hair clippers, RCD circuit breakers.

Chilton-Solenoid (UK) Ltd, Hungerford, Berks (formed in 1962). Renamed UK Solenoid Ltd, in 1965.

Chinaglia (UK) Ltd, 19, Mulberry Walk, London, SW3 (in 1975). UK office of Italian test equipment maker.

Chloride - The Chloride Electrical Storage Co Ltd, Grosvenor Gardens House, Grosvenor Gardens, London, SW1 (in 1946 & 62). In 1963, they relocated their offices to 20-26 Wellesley Road, Croydon, Surrey. Battery makers since at least 1896. See also The Electrical Power Storage Co Ltd and The Tudor Accumulator Co Ltd. In 1955, Chloride Batteries Ltd. In 1964, Chloride Batteries Ltd, Exide Works, Clifton Junction, Swinton, Manchester.

Choiceview Ltd, Carlton House, Lower Regent Street, London, SW1 (in 1962). A company set up by The Rank Organisation and Rediffusion to promote 'Pay TV'. It also gave Rank the right to use Rediffusion cable technology.

Cinch. The Cinch Manufacturing Corporation, established in 1917. In the 1940's, they were located in Chicago, Illinois. They seem to have established a UK factory later on. They made valve holders and 'phono' plugs and sockets and connectors (including Jones plugs and D-types). Cinch (or just the connectors division) seems to have been acquired by the US firm United-Carr Fastener. The British operation was Carr Fastener Co Ltd, based in Stapleford Nottingham (in 1957). TRW took over United-Carr in 1969. In 1976, United-Carr Supplies Ltd, was at 112 Station Road, Ilkeston, Derbyshire - still selling Cinch electronic components. Cinch connectors were later branded as 'TRW Cinch'. However, TRW sold Cinch connectors in the 1980's and as part of a change in company direction, to Labinal of France.

Cintel. Cinema-Television Ltd (incorporating Baird Television Ltd), Worsley Bridge Road, Lower Sydenham, London, SE26 (in 1941 & 46). The earlier company, Baird Television Ltd, was set up by J L Baird, but went into liquidation, ca 1940. It re-emerged as Cinema-Television Ltd (which was controlled by Mark Ostrer - owner of the Odeon cinema chain). The Odeon chain was bough by J Arthur Rank, circa 1945 (?) and Cinema-Television Ltd, came to Rank, with the Odeon cinemas. Became simply Cintel Ltd by 1958 (still in Sydenham). Maker of photocells, GM tubes, quartz cells and NiHe discharge lamps. Later, test equipment, monoscope tubes and telecine machines. MD of Cintel and Bush Radio in 1952 was G Darnley Smith (photo in WW, Dec 52, p496). Became part of the Rank Organisation (at least by Nov 1950). By 1966, Cintel had moved to the former Murphy Radio site at Bessemer Road, Welwyn Garden City (as part of Rank Bush Murphy Ltd). Moved to Watton Road, Ware, Herts (co-sited with Rank Radio International Service Department). Sold off by Rank in the 1990's and went bust! At some point, they also had premises in Sidcup?

CIREC - Channel Islands Radio Engineering Co Ltd (in 1947). Contract maker of radios, etc.

Clang Ltd, Crown Yard, Cricklewood, London, NW2 (in 1964). Maker of electrical switches?

Clare (C P) & Co, 4719 Sunnyside Avenue, Chicago, Illinois (circa 1940's). Founded by Carl P. Clare in 1937. Maker of relays, including mercury wetted types. In 1959, the UK operation was C P Clare Ltd, 70 Dudden Hill Lane, London, NW10 - see also: Associated Automation Ltd. C P Clare was later taken over by General Instrument Corp. When General Instrument was broken up, C P Clare was spun off as a separate company. The electromechanical division was sold to Sumida of Japan. Clare (as it is now known) is now in the all-electronic relay and related electronic sectors. Taken over by Ixys Corporation in June 2002.

A. N. Clark (Engineers) Ltd, Binstead, Isle of Wight (in 1965). Maker of telescopic aerial masts. By 1967, a Coubro & Scrutton company.

Clarke and Smith Industries Ltd, Melbourne Works, Wallington, Surrey (in 1962 and 1978). In 1964, also Clarke & Smith Manufacturing Co Ltd - same address. An EMI company in 1962 (but in 1965, EMI divested its 49% interest in the group). In 1969, Clark & Smith Manufacturing Co Ltd, same address - a maker of language laboratories and electronic equipment (including heavy duty audio equipment for schools, etc.

Clarostat. Clarostat is a US company, making resistive components. Clarostat's beginnings were in the American Mechanical Laboratories Inc, of Brooklyn, New York - established in 1921. With the emergence of the radio industry, the company made headsets, crystal detectors and rheostats. The name 'Clarostat' is derived from a combination of clarifier and rehostat. In 1924, the company name was changed to Clarostat Manufacturing Company Inc. In 1948, Clarostat relocated to Dover, New Hampshire. They are still in business, although the Web site states 'The New Clarostat' - the company name is now Clarostat Sensors and Controls Inc (an Invensys PLC company by 2002). In the UK, some of their products were made under licence by AB Metal Products.

Claude Lyons Ltd, Valley Works, Hoddesdon, Herts and 76 Old Hall Street, Liverpool 3 (in 1965). Distributors for the 'Variac' variable voltage transformer (made by The Zenith Electric Co Ltd, London). Also made voltage stabilisers and distributed Intercontinental Instruments test equipment (in 1965).

Claudgen Ltd, Pitman House, Parker Street, Kingsway, London, WC2 (in 1964). Claudgen = Claude General neon signs. Maker of illuminated signs. Later taken over by GEC.

Climax Radio Electric Ltd. In 1934, the maker of a radio - model TC111.

Cliff. Manufacturer of knobs, 2 and 4mm plugs/sockets, etc. Based in Kent and still going (in 2002).

Clifton Aircraft Ltd, Lytham, Lancs (in 1948). Maker electric tabletop cooker and consumer units.

Clix. Clix was the brand name (in 1938), of Lectro Linx Ltd, 79a Rochester Row, London, SW1. Circa 1937, this firm (or its assets) were acquired by British Mechanical Productions Ltd - which traded from the same address. By April 1948, the new location was: 21 Bruton Street, Berkeley Square, London, W1. Also in

that year, they formed a distribution and sales subsidiary: General Accessories Co. Ltd., of the same address. In 1948, they had factories in Bristol and Wandsworth. They manufactured mains plugs (including the rather unsafe two-pin variety that seemed to use two large, brass split pins!), plugs and sockets (including 'Wander'/'Master' plugs), lampholders, and valveholders. They became a part of The Edison Swan Electric Co Ltd, (AEI) in 1952. The brand name Ediswan-Clix was also used. Later Siemens Edison Swan, then AEI.

Codar Radio Company, Bank House, Southwick Square, Southwick, Sussex. Maker of short-wave receivers, coils, preselectors and preamplifiers. At least, in the 60's and early 70's.

Coldrator. In 1956, a refrigerator brand name of The Hotpoint Electric Appliance Co Ltd, Peterborough (an AEI company).

Collaro. Collaro Ltd., Culmore Works, Culmore Road, Peckham, London, SE15 (in 1938). In 1948, at Ripple Works, Alfred's Way, By-pass Road, Barking, Essex. Founded in 1919 by Christopher Collaro, who resigned as Chairman and MD in 1958. Maker of electric heaters and turntables (in 1938), gramophones, pickup heads and record decks and later, tape decks. Taken over by Magnavox Corporation of the USA (around that time?). In 1962, Collaro was merged with its sister UK company Magnavox Electronics (the UK distributor of Magnavox finished products - radiograms, record players and tape recorders), to form the Magnavox Electronics Company Ltd - same address as Collaro. Still there in 1978 and selling Collaro turntables (WW Oct 78, p50). Magnavox was later taken over by Philips.

Collier. Collier Electric (Switches) Ltd, Central Avenue, West Molesey, Surrey (in 1948). Maker of tumbler switches. Later formed into Arcolectric?

Collins Radio Company, California - a long established US radio manufacturing company, which was taken over by Rockwell International (by 1979).

Colston Domestic Appliances Ltd, Colston House, London Road, High Wycombe, Bucks. White goods maker - esp. dishwashers. Taken over by Ariston (of Italy) in the 1970's.

Colton. In 1964 a producer of replacement stylii and the UK distributor for 'Jobo' (Dutch) turntables.

Columbia Gramophone Co Ltd, Newcastle-upon-Tyne. Merged with The Gramophone Co Ltd, in 1932, to form EMI.

Colvern. Colvern Ltd, of Mawneys Road, Romford, Essex (in 1948). Established in 1927, as a wirewound and precision potentiometer company - they also made radio coils in their earlier years. In 1964, at Spring Gardens, Romford, Essex. Taken over by TT Electronics group in the 1990's. Colvern Ltd, changed its name to AB Electronics Ltd in 1997.

Comark Electronics Ltd, Gloucester Road, Littlehampton, Sussex (in 1967). Manufacturer of test equipment (e.g. FET Tester).

Comet Radio Services, George Street, Hull (in 1955). TV & radio retailer. Established at least by 1941. Later became the Comet Radiovision discount warehouse chain. Taken over by Kingfisher plc in the 1980's.

Commodore Business Machines (UK) Ltd, 818 Leigh Road Trading Estate, Slough, Bucks (in 1980). Maker of the Commodore PET computer.

Concordia Electric Wire & Cable Co Ltd, Long Eaton, Nottingham (in 1958). Maker of microphone and other cables.

Connoisseur - see A R Sugden.

Connollys (Blackley) Ltd, Kirkby Industrial Estate, Liverpool (in 1965). Manufacturer of insulated winding wires and strips, also paper and plastic insulated cables. Later taken over by BICC and then sold (circa 2000) to Belden of the USA.

Contactum Ltd, Victoria Works, Edgware Road, Cricklewood, London, NW2 (in 1964 & 83). Electrical accessories manufacturer. Still going in 2004.

Contelec - a potentiometer brand (Swiss?), in 1967 & 71. In 1967, distributed in the UK by W Greenwood (London) Ltd, 21 German Street, Chesham, Bucks.

Continental Connectors Ltd, Industrial Estate, Long Drive, Greenford, Middlesex (in 1964). Connector manufacturer, incl. PCB edge types.

Co-operative Wholesale Society Ltd, Radio & Television Department, Alma Park, Worley Street, Upminster, Essex (in 1962). In 1952 CWS HQ was at 1 Balloon Street, Manchester 4 (and for many years thereafter). Procured 'Defiant' radio & TV sets (manufactured by Plessey up to 1966, then by Rank Bush Murphy) for local Co-operative societies.

Corby (John) Ltd, 28 Frances Road, Windsor, Berks (in 1964). Maker of the 'Corby' trouser press.

Cornell Dubilier - see Dubilier.

Cosalt Ltd. In 1971, their marine radio interests were sold to Redifon Ltd.

Cosmocord. Cosmocord Ltd., of 700 Great Cambridge Road, Enfield, Middx (in 1947, but the company existed prior to WW2). The crystal technology licensed from Brush Crystals Co Ltd, in 1947. In 1956, they relocated to larger premises at Acos Works, Eleanor Cross Road, Waltham Cross, Herts. Cosmocord were specialists in electro-acoustics, supersonics and synthetic plastics. They were the manufacturers of Acos cartridges - as used in many record players and radiograms of the 40's, 50's, 60's and 70's. They also made earpieces, microphones, knobs and plastic parts for other customers. In 1957, when A Schuman was its controlling shareholder and MD, Cosmocord Ltd was the subject of a takeover bid from The Pena Copper Mines Ltd. In 1969, they became agents for pickups made by Empire Scientific Corp, of New York, USA. In 1965, they formed an instruments division and marketed an 'Acos' branded bench ac millivoltmeter. In 1973, they marketed 'Martin' cabinet loudspeakers in the UK, and made multimeters and the Acos 'Lustre' pickup arm, plus their M6 range of magnetic cartridges. I think they were taken over by a plastics company in 1982 (Tatra Plastics group).

Cosmos. A brand name of Metropolitan-Vickers Ltd. Used for valves and lamps - until they became part of AEI and merged with Edison Swan.

Cossor. A C Cossor Ltd, the electrical and later, electronics company, was formed in the late 19th century. It was founded by Alfred Charles Cossor, eldest son of Alfred Charles Cossor (senior), who founded a glass blowing company in 1859. The glass company later produced a wide range of thermometers, manometers, hydrometers, syringes, etc. and A C Cossor (Surgical) Ltd, is still in business today.

A C Cossor (the electronics company) was headquartered for most of its existence in Highbury, London. It was a manufacturer of domestic radio and TV sets, valves, CRTs, X-ray tubes, radar systems and test equipment (including oscilloscopes). Cossor was one of the earliest UK valve makers. The consumer electronics division had been producing radios in the 1920's, including the first of many models to be known as 'Melody Maker', in 1928. Did Cossor sell its valve operations to EMI in 1949? Cossor Radio & Television Ltd was established as a separate limited company in the mid-1050's and was subsequently sold to Philips, ca. 1959. By 1959, the valve operation was also separated out as Cossor Valve Co Ltd. In 1960, they owned Sterling Cable Co, Lea Bridge Cabinet Works and Best Products. Shortly after this, the remaining Cossor radar, electronics and instrument divisions were bought by the American Raytheon company. In 1962, a new headquarters for the business now known as Cossor Radar & Electronics Ltd was opened at Elisabeth Way, The Pinnacles, Harlow, Essex. Cossor continued to make test equipment (e.g. oscilloscopes) until the 1980's. Recently, the 'Cossor Electronics' name has been dropped in favour of Raytheon.

Cossor Communications Co Ltd (in 1960& 66). Radiotelephones.

Cossor Instruments Ltd, Cossor House, Highbury Grove, London, N5 (in 1955). TV, radio and general test equipment. In 1968, Cossor Communications Co and Cossor Instruments were merged into a new company, Cossor Electronics Ltd.

Cossor Radio & Television Ltd. Formed in 1957 by A C Cossor Ltd, in 1957, at Cossor House, Highbury Grove, London, N5. In the 1950's, the firm had a policy of separating its divisions into operating companies. In 1962, at 233 Tottenham Court Road, London, W1. The division was sold to Philips, in 1959. They ceased to use the Cossor brand, circa 1966.

Cossor Radar & Electronics Ltd. Moved from Highbury, London, to The Pinnacles, Harlow, Essex, in 1959.

Cotron Electronics Ltd, 12 Harecroft Crescent, Sapcote, Leicester (in 1970). In 19701, Red Lane, Kenilworth, Warwickshire. A maker of CCTV monitors.

Cotto Products Ltd, Digby Street, Scunthorpe, Lincs (in 1958). Maker of washing machines and dryers.

Coutant Electronics Ltd, 5 Loverock Road, Reading (in 1970) but moved in same year to 3, Trafford Road, Richfield Industrial Estate, Reading (from where they had been operating since at least 1965). Power supply maker. In 1973, they also made thick film pots for colour TV application. By 1973, they were a Unitech company. They had a plant in Ilfracombe, Devon, in 1970. In business since at least 1964. In 1979, still at Trafford Road, Reading. Later merged with Lambda and based at Ilfracombe (Coutant-Lambda Ltd). It then became a Siebe company (Siebe merged with BTR in the late 1990's to form Invensys plc). Now known as Lambda Electronics Ltd, Ilfracombe.

Coventry Controls Ltd, Godiva House, Allesley Old Road, Coventry, Warwickshire (in 1966). Hermetically sealed time delay relays.

Crabtree (J A) & Co Ltd, Walsall (in 1946). An electrical accessories manufacturer. In 1964, at Lincoln Worls, Walsall, Staffs. Taken over by Ever Ready (GB) in the 1970's - hence Ever Ready 13A plugtops which looked exactly the same as Crabtree ones, apart from the brand name. When Hanson Trust plc took over Ever Ready GB (also in the 1970's), Crabtree went with them. In 1997, a management buyout from Hanson plc led to the formation of Electrium plc, which owns the Crabtree, Appleby, Marbo, Volex (accessories) and Wylex brands. The company HQ is at Brownhills, West Midlands, with other locations at Wythenshawe (old Wylex location) and Hindley Green (N.West England).

Creda. See Simplex Electric Co. Ltd, Creda Works, Blythe Bridge, Staffs (in 1960) - by then a TI company.

Creed Printing Telegraph Co, of London. Later ITT Creed.

Cressall. The Cressall Manufacturing Co Ltd. In 1964 & 67, at 59 Cheston Road, Aston, Birmingham 7. Maker of precision and high power resistors and printed circuits. In 1967, a member of the Expamet group. In 1968, S.C.E.E. Ltd, of Reddicap Trading Estate, Sutton Coldfield, Warks, changed its name to Cressall Printed Circuits Ltd. In 2002, now in Coventry and part of the Halma group.

Critchley Bros Ltd, Brimscombe, Stroud, Glos. Cable management systems manufacturer. Taken over by Thomas & Betts (USA), circa 2001.

Crofton Electronics Ltd, 35 Grosvenor Street, Twickenham, Middx (in 1977). For used CCTV equipment. In 1982, they made a deluxe adaptor for the Sinclair ZX81 computer.

Crompton Parkinson Ltd, Electra House, Victoria Embankment, London, SW1 (in 1946) - London offices (or HQ?). At Electra House, London, WC2 (in 1946). In 1964, HQ at Crompton House, Aldwych, London, WC2. Maker of Crompton electric lamps, kWh meters, panel meters, batteries, electric motors (made in Doncaster), etc. In 1973, Crompton Parkinson Ltd, 50-52 Marefair, Northampton - panel meters. The company was formed by the merger, in 1927, of The Crompton Electrical Co (founded in 1878 by Colonel R E Crompton) and F Parkinson & Co. Frank Parkinson (born in 1887, in Guiseley, Yorks) established his company in 1908. It was initially a supplier of electric motors, but later made its own. In 1932, C-P merged with The British Electric Transformer Co. Crompton was based in Chelmsford. It was acquired by Hawker Siddeley (in 1968). H-S was taken over by BTR plc, circa 1990. Subsequent to this, several C-P businesses were sold off. Crompton Lighting is now owned by Cooper Industries (USA).

Cropico. Brand name of Croydon Precision Instrument Company, Hampton Road, Croydon, Surrey (in 1966 & 69). Maker of laboratory equipment and UK agent for test equipment (e.g. Normatest multimeters).
Crossfield Electronics Ltd, 766 Holloway Road, London, N19 (in 1974). Specialist electronics for the printing industry. Later part of DeLaRue group.

Crown Radio Corporation of Japan. Manufacturer of consumer electronics. In 1967, they formed a UK subsidiary, Crown Radio Co Ltd, at 137-149 Goswell Road, London, EC1. The name seems to have faded out in the late 1970's but more recently, Crown branded products have reappeared (although not from the original Crown company, I think).

Crypton Equipment Ltd, North Acton Road, Park Royal, London, NW10 (in 1937). Maker of 'Crypton' battery chargers. Same firms as:
Crypton Equipment Ltd, Bristol Road, Bridgwater, Somerset (in 1964)? The latter is/was a maker of engine tuning/test equipment. The latter was subsequently taken over by Tube Investments.

Cryselco Ltd, Kempston Works, Bedford (in 1964). Lamp manufacturer.

Crystalate (Mouldings) Ltd, Crystalate House, Mill Lane, Tonbridge, Kent (in 1952 and 68). Maker of plastic moulded knobs, terminals, acoustic accessories and cabinets for the radio & TV industry. Acquired Mica Products Ltd in 1952. Established 1899.

Crystalate Gramophone Co Ltd. In business since at least 1929. In 1931, they had recording studios in Hampstead, NW London. Taken over by The Decca Record Company in 1937.

Crystalonics Inc. A US maker of varicap diodes, FET's and other semiconductor devices (in 1967 & 73).

CSA Industries Ltd, Warwick (in 1958). Maker of 'English Rose' cookers, refrigerators and kitchens.

Currys Ltd. Originally a family firm, which grew into a national chain, with Head Office at 77 Uxbridge Road, Ealing, W5. Sold bicycles, TV, radio, etc. I think it still had Curry family members on the board when , circa 1984, Currys was taken over by Dixons.

Cutler-Hammer Inc, Milwaukee, Wisconsin, USA. Maker of switches. Their UK licensee, Igranic Electric Co (later Brook Hurst Igranic Ltd, Bedford) was eventually taken over by them. C-H was taken over by Eaton Inc in the 1980's.

Cycloc - see Harmer & Simmons Ltd.

Cyldon - see under 'Bird'.

Letters

Dear Editor,

My hubby John (as I call him) was very fortunate in many ways... He was born to a father who was retired from a life in the Army with a keen interest in wireless.

John tells me that although his father was elderly and not able to play football etc. with him, he was at home during the day and during the school holidays too. During that time he had lots of patience and spent many hours educating his son and encouraging him to learn about the workings of radio and TV.

John says he spent most of his school holidays with a chum, ferreting through the bins behind the local Radio and TV shop, in Lancing, West Sussex, where he used to live. He would then rush home with the old valves, batteries and components he had retrieved from the bin and see what he could make.

Whilst most kids were reading their *Dandy* or *Beano* comics, John was spending his pocket money on *Practical Wireless*.

When he left school his mother wanted John to follow in his brothers footsteps and work in the British Rail Drawing Office. This he did but he hated the job and decided to diversify. His mother called his bluff and said that if he managed to secure a job in the radio and TV field, she would back him.

He went for an interview in a family-run radio and television business. The boss was old-fashioned and liked people with enthusiasm and gumption. He said that he would give John the opportunity to prove himself.

It wasn't long before John was confident enough to be out on the road repairing TV's in people's homes. He was also in his element if an old valve radio came into the workshop and he was given the chance to repair it.

That was where we met, almost 34 years ago now, I was just 15 and John was 18. The company had four shops and a large rental client base. I was employed as an accounts clerk and I also enjoyed helping in the shops if they were busy. John and I got married 3 years after we met and I can clearly remember his collection of old wireless sets, slowly but surely creeping into our home.

When the children were small and times were a lot tougher than they are now, we sold the collection. It was very sad, but a case of needs must. However, you got through that stage in your life. The family grew up and we moved to a bigger house, then the collecting started all over again.

John once again diversified to a much better paid job; he trained to be a central heating engineer using his knowledge of electronics and circuit diagrams as a basis for his new career.

When he qualified and was on the road again, part of his duties included checking the tanks in people's lofts. On many occasions people had old radios stored in the attic and typically John would mention (casually as one does) his hobby. More often than not people would say "Take that old radio with you, it's better off with a person who has an interest, rather than festering in the loft". Another source was car boot sales. Every Saturday and Sunday morning you can guess who was first in line through the gates? The collection is currently 300 and still growing.

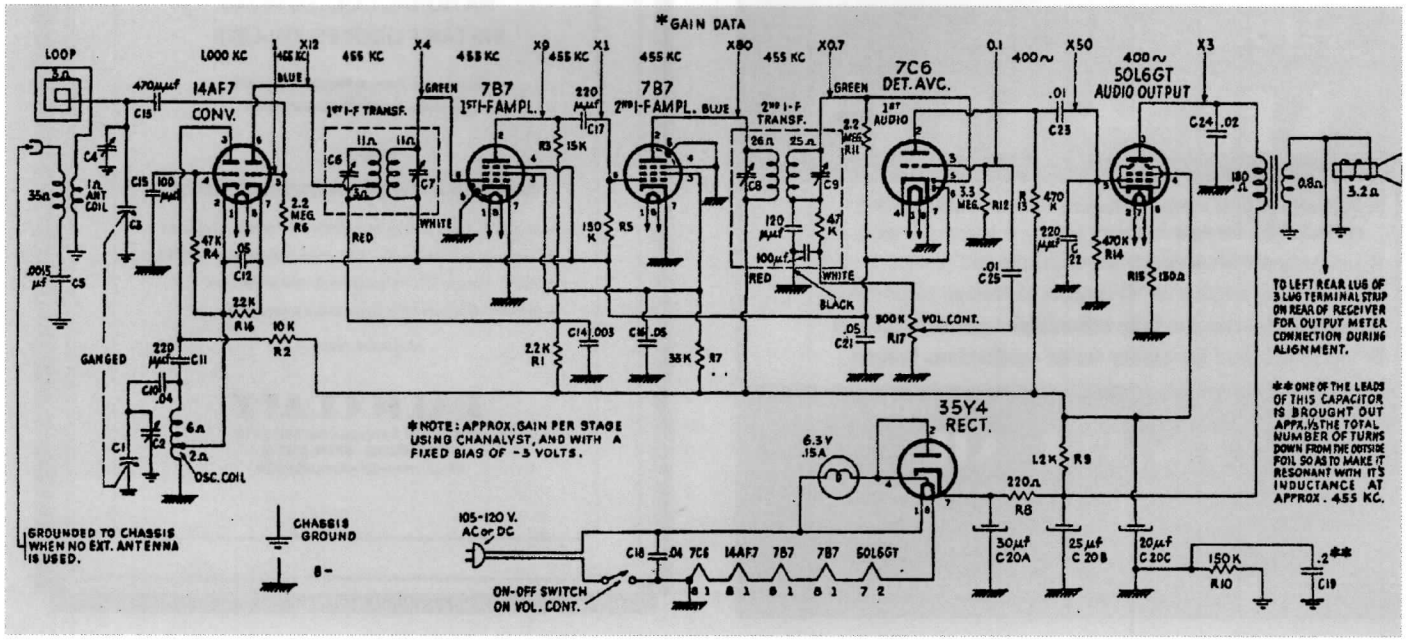
After 25 very happy years working for the Central Heating firm one of John's employers sadly died and the company was sold. After that, things were not quite the same, so after much lengthy discussion we decided to make big changes to our lifestyle and move on. To that end we have now bought a house in France and are devoloping our own Bed and Breakfast business.

But guess what? The radios came too! We've called our new home 'Radio Maison'. The doors to the B&B (Chambre d'hotes) opened in April of this year and many of our visitors (all nationalities) are very surprised to see the collection. As the business grows, we hope to be able to afford drapes for the ceiling and some decent flooring to enhance 'Le Petit Radio Musée'.

It goes without saying, John still continues to get up bright and early if he hears of a 'Vide Grenier (Attic Sale) in our area, so, as you can imagine, the search for more radios continues.

We hope that one day, John's collection will bring visitors with a similar interest to Plouha, which is a beautiful coastal area in Brittany.

Radio Maison – Bed and Breakfast
29 Rue Charles le Goffic, Plouha,



Bretagne 22580, France

Tel: 0033 296 202 875 Local Tel: 0296 202 875
email: anfo@radiomaisonbnb.com
www.radiomaisonbnb.com

Yours sincerely,
Ann Campbell

Dear Editor,

I would like to suggest a way to contact potential new members for the BVWS. Some of the more recent issues of 'The Bulletin' could be distributed to barber's shops and doctors/dentists waiting rooms etc. I presume there are people that have an interest in vintage radios and have not heard of the BVWS and given the chance to browse through the magazine it should persuade some to enrol or at least come to a swapmeet.

A limited number of magazines could be available for collection at swapmeets for distribution by members.

Yours sincerely,
John Clappison

Dear Editor,

I was interested to read about the Philco 48-460 described by J. Farrer in the Summer issue of the 'Bulletin'. I have one of these sets in cream - it's just cream paint over brown Bakelite though. The output stage on mine is also a 50L6GT, but according to Rider these sets were also made with a 50A5 glass 'Loctal'. This valve is electrically identical to the 50L6 and the output circuit is the same.

The performance of this set is quite astonishing on its small frame aerial, I guess the Americans knew how to wind coils! The two stage I.F. amplifier no doubt helps a bit too.

Rather than convert mine to U.K. mains voltage, I just plug it into a transformer, keeping the original U.S. plug of course. I'm always a bit dubious about using capacitors for droppers - should they go short circuit, the consequences are possibly better imagined than described!

Readers may be interested to see the cream version. The circuit from Rider shows a few differences from J. Farrer's.

Best wishes
Keith Waters

Dear Editor,

A mistake crept into the printing of my article 'The World's Most Powerful Radio Station'. In Vol 29 No 2 of The Bulletin the caption for picture No 10, line 7 should read: 'filaments 34 volts @3kA'. Additionally I would like to apologise to BVWS member Mr Cecil Rumsam (Rummy), an ex–BBC engineer, for omitting his name from the list of credits.

Yours sincerely,
John Clappison

Dear Editor,

Can you please tell me what this is? (see photograph above) It is a photograph of a relative of mine, long dead, with his prize possession.

Many thanks
Lytton Jarman

Dear Editor,

Reg Dykes' letter in our last issue leaves me unclear whether he is for or against the notion of an 'ether' but to my understanding the issue has been irrelevant for nearly a century. Since the formulation of Relativity and especially of quantum theory, all forms of electromagnetic radiation are seen as carried by photons, which behave as projected particles rather than oscillations in a hypothetical elastic medium or 'ether'. Electromagnetic oscillations being an intrinsic property of the photons themselves, the 'lumiferous ether' becomes obsolete and unnecessary.

It is strange that, at least in amateur wireless circles, the ether concept should have died such a lingering death. I suggest that the reactionary influence of Sir Oliver Lodge, whose writings enjoyed almost the status of Holy Writ in contemporary wireless literature, may be largely responsible. In spite of the nul results of his own attempts to

Letters continue on next page

detect the ether experimentally (plus those of Michelson and Morley) Lodge seems to have had an emotional need for an ether to underpin his belief in psychic phenomena, especially following the loss of a son in the first world war. Certainly, he promoted the ether concept relentlessly in the several wireless publications of the twenties and thirties for which he had some editorial involvement.

Ian Higginbottom

Dear Editor,

The Victorians understood that waves in water or that sound waves in air propagated because of the elasticity of the medium. That is if you push against air or water it resists your push and springs back when you stop pushing.

Faced with overwhelming evidence of the wave nature of light the problem was how could light travel through a vacuum. Common sense said that a vacuum (empty space) could not possess the necessary elasticity for a wave to propagate. Therefore an invisible all pervading medium, the ether, must exist for light (electromagnetic waves) to propagate in.

In fact empty space is not nothing, it is a space in which electric and magnetic fields can exist. To set up an electric or magnetic field in empty space we have to supply an electromagnetic force (emf) or a magnetomotive force (mmf). The field doesn't go in unless you push it and if you stop pushing the field collapses. The space resists the field and the strength of the field depends upon the force you apply. The constants for any medium which tell you how strong a field will result are called permittivity (electric) and permeability (magnetic). The permeability and permittivity of free space can easily be measured and are very far from zero. Consequently as seen by an electromagnetic field empty space has elasticity and the ether is not required for the propagation of light (electromagnetic waves).

After struggling for more than a decade with the four famous unsolveable equations, Maxwell came upon the idea of letting the electric and magnetic fields exist in unbounded free space. In this case the value of two of the equations becomes zero and the remaining pair can be solved. The solution defines a simultaneous pair of propagating waves and the application of the permeability and the permittivity of free space yields the propagation velocity (the speed of light). Using the appropriate constant yields the speed in any medium eg polythene has a permittivity 2.35 times that of free space giving a speed of 65% of that in a vacuum. This is the speed of a signal in a solid polyethelene coax cable.

It is important to realise that although we speak of electric and magnetic fields these are not two separate things but two manifestations of a common phenomena. Faraday guessed this and wrote "I think the connection is some kind of ray vibration". Maxwell produced rigorous proof which has withstood over 130 years of testing.

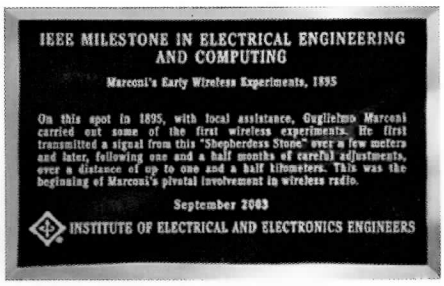
The ether is not necessary for the propagation of light and since there has been over a century of efforts to detect it, not the most minute trace has been found (it should be very easy to detect). I don't worry about its existence.

When presented with a complex explanation for everything I recommend the application of Occam's Razor.

LL (Bill) Williams

Dear Editor,

I wish to refer to two articles published in BVWS Bulletins Vol.21/2 and Vol.22/3 entitled 'A Marconi Mystery' and 'A postscript to Marconi Mystery' both written



La reconnaissance européenne

Président de la Fondation Salvan-Marconi, Yves Fournier reçoit le titre de chevalier de l'Ordre du mérite de la République italienne; une récompense pour son travail sur l'histoire du prix Nobel Guglielmo Marconi.

L'histoire entre dans l'histoire de sa commune.

Un honneur pour la commune

Une station climatérique

Clotilde Hénon

by my good friend Pat Leggatt who sadly died a few years ago.

A second postscript has been made by the IEEE on September 26, 2003 by the unveiling of a plaque elevating Salvan to the rank of "Milestone IEEE".This inauguration was honoured by the presence of the Princess Elettra Marconi-Giovanelli and the President of the Swiss Confederation.

You will find on the site www.fondation-marconi.ch (see photograph above) for information and photographs of the ceremony of handing-over of the title of knight of the order of merit of the Italian Republic (chevalier de l'ordre du mérite de la République italienne) to our president Yves Fournier.

Yours sincerely,
Dr.Max de Henseler

Dear Editor,

Magnetic Microphone Bar Amplifier
ref: 'Radio Radio' (Vol 1) page 53, fig 50.

The one I have cost 34 Shillings (label on the box front) and has a symbol which resembles the letter 'K' in a diamond shape. The amplifier is probably from 1924 and sold retail by the 'New Wilson Electrical Manufacturing Co'. It was sold also by I believe by Empire Electric Co of London W1 (and Economic Electrical Co?) with the logo EEC in 1925 at 38 shillings. Any comments welcome.

I should also be interested to know its probable value for insurance purposes only.

Yours sincerely,
Chris Price

Dear Editor,

The Earth as an auxiliary aerial

Here's a question for vintage radio users and restorers.

I've been restoring a locally made 1925 V3 by Hadfield & Henton of Malvern Link which is only 5 miles away from where I live. One of the many small firms across the land who never made it big during the wireless craze of the 1920's. The radio has been in my loft for about 20 years and was easy to get working again because it was clean and dry.

The set is quite primitive, with bright emitter valve windows in an ebonite front panel, square tinned copper wiring and a nice mahogany case with front and back doors. It's currently fitted with the unidentified 2V DE valves which it came with. Bands can only be changed by plug-in-coils. As a LW R4 listener, I tested it with an Amplion Concert Dragon AR 23 horn speaker on LW 198 using a 200 Igranic aerial coil and a 50 swinging reaction coil. The power supply is a modified Amplion Convette with 3 adjustable grid bias tappings.

I deployed a 12 foot insulated aerial wire strung to a hook in the ceiling, which gave reasonable pickup on 198, some 20 miles from Droitwich. During the testing of the aerial the wire fell on the floor doubling the signal, even though the wire coiled back on itself. This intrigued me so I held out the aerial wire in various directions and found that it always worked much better when lying untidily on the painted dry concrete floor.

I would love to know why this happens. Is it the same effect as putting a ferrite rod antenna AM radio next to a pipe or radiator to improve weak signals?

Yours sincerely,
Anthony Hopwood

Dear Editor,

Re: Reg Dykes and his ethereal memories.

It seems my old friend Reg Dykes has gently worked himself into a time warp digging up so much fringe science from L.G.Cramp. No matter what Cramp thought about the structure of the ether it is difficult to attach too much importance to the work of a man who describes himself as a 'New Age Scientist' and who takes so much interest in UFOs and antigravity!

Historically, the ether fiction provided a useful scaffolding to support philosophical and scientific theorists as they built up ideas about the universe from classical times through to the optics and gravity of Newton and on to the great equations of Maxwell. Thereafter it was slowly dismantled to reveal magnificent underlying ideas capable of standing on their own two feet without any support from any of the various versions of the fictional ether.

The nineteenth century 'luminiferous aether' began its progress into terminal decline even before the 1887 null results of the Michelson-Morley experiments. Resuscitation attempts had little effect when, in 1897, the great whirling machine of our very own Oliver Lodge failed to show 'ether drag' and life support was virtually withdrawn in 1903 when the *(http://en.wikipedia.org/wiki/Trouton-Noble_experiment" \o "Trouton-Noble experiment)* Trouton-Noble experiment proposed by George Francis FitzGerald failed to show a pair of electrically charged plates reorienting themselves perpendicular to the direction of motion through the ether. The ether was finally buried in 1905 when Einstein's special relativity initiated a whole new world into which Maxwell's constant velocity of light fell naturally into place. A further nail in the aetherial coffin was hammered home in the same year when Einstein proposed the photon as the quantum of electromagnetic energy. The old ether with its incompatible qualities of being utterly tenuous yet vastly more rigid than steel simply had to go. But it did not go!

When Hertz completed his famous experiments in1888 on the propagation of electromagnetic waves his success was heralded as a major scientific breakthrough by George Francis FitzGerald at the BA meeting in Bath in 1888. On this occasion, FitzGerald, the supreme Maxwellian of the period, emphasised the great importance of Hertzian waves in vindicating Maxwell but also, perhaps more importantly, in establishing the existence of an ether. In 1889 FitzGerald attempted to 'save' his all important ether with ingenious ideas that led to the well-known Lorentz-FitzGerald contraction of special relativity. He also proposed the charged plate experiment, carried out after his death by Trouton and Noble in 1903. Ether was still firmly on the scientific agenda. Nor would Einstein put a sudden end to this.

Lodge, like many physicists brought up on the old mechanistic ether of the nineteenth century, did not give up his cherished notions too lightly and adopted a modified form of the ether which he went on using for the rest of his long life. To him it was fundamental to the very process of life itself. In the Harmsworth article of 1923 quoted by Reg., Lodge confidently says, 'There is no excuse now for anyone to say the ether is endowed with incompatible qualities, or to doubt its existence'. He thus encouraged the new generation of wireless enthusiasts to continue using the old ethereal ideas somewhat past their sell-by date. There was nothing intrinsically wrong with Lodge using the word ether to describe the medium of space because he attached special meaning to it not at all similar to the older mechanistic ideas of lines, vortices, idle-wheels etc. But the popular notion of the ether remained in the form of an ill-defined 'tenuously mechanistic jelly'.

The old discarded ether retained this firm grip on the popular imagination and lent itself well to the prose and poetry of the times. The idea of aether waves somehow appealed to the poetic instincts of editors of wireless magazines aided and abetted by scientists who themselves found the old notion difficult to shake off. This allowed scientific dabblers to reinvent ethers all over again and Reg Dykes did a good job in unearthing one of the more colourful ideas initiated by Avenel and Cramp. Such ideas crept into the pages of popular science magazines and books but, fortunately, disappeared rapidly from the pages of respectable scientific literature. But not entirely.

The ether, even in our own times, has not been altogether abandoned. The year 2005 is being called 'Einstein Year' and it is curious to think that 100 years after Einstein laid the ether to rest it still re-emerges from time to time (e.g. 1,2,3).

Reg Dykes and others should not be too dismayed at losing their beloved ether - space is so much more interesting without it. No longer do we have to grapple with an all pervading ether full of contradictory qualities which utterly baffled our Victorian ancestors. We may now speculate on the role of virtual photons, vacuum fluctuations and field radiation pressure. The Casimir force which arises when parallel reflecting plates are freely suspended in a perfect vacuum is a real measurable effect and full of strange and exciting mysteries for Reg to ponder on.

1. P. Cornille, 'Correspondence: Making a Trouton-Noble experiment succeed,' Galilean Electrodynamics 1998: 9 (2), 33.
2. P. Cornille, 'A linear Trouton-Noble experiment which shows the violation of Newton's third law,' Hadronic J. Supplement 1998: 13 (2), 191-202.
3. Oleg D. Jefimenko, 'The Trouton-Noble paradox,' J. Phys. A. 1999: 32, 3755-3762.

Tony Constable

Dear Editor,

Crystal Clear (repairing a PU cartridge)

Everything worked on the 50's Ekco Radiogram except the Garrard GC8 crystal pick-up cartridge. It was dead, kaput, no output whatsoever.

I removed it from the pick-up drilled out the rivets and opened it up. The dreaded damp had struck. The crystal element was a disintegrating gooey mess. What to do?

There's probably someone somewhere with a stack of brand new crystal cartridges but I decided to take the awkward route! RS market a piezo-electric Bi-morph element (Cat No. 285-784) at approx £2.00 for a pack of 5. As they are narrower and a bit longer than the original element, it was necessary to use two crystals; one for LP and one for 78 and wire them in parallel. The original needle holders, needle operating pieces and rubber damping pieces were retained and re-used. The interior of the case was modified to accommodate the extra length (although in retrospect it would probably be easier to cut/break a piece of the length of the elements). Some of the rubber damping was cut in two so pieces could be used on each element, dabs of superglue being used to hold everything in place and the wires were soldered to the appropriate pins. Finally the two halves of the case were reassembled and the cartridge refitted to the pick-up. Although no actual measurements have been made, listening results have turned out to be surprisingly good. The same technique could probably be adapted to repair other cartridges.

Yours sincerely,
Ray Bayliss

Dear Editor,

An economical replacement for the B114 battery used on the Marconi P17B and similar miniature portables

Owning a Marconiphone P17B personal miniature portable I've sometimes had the desire to demonstrate it and with a model like this a mains PSU or large external batteries would spoil the effect.

The original B114 gave 69 Volts HT and 1.5 Volts LT. If one has an original battery, albeit U/S it should be possible to reuse the box and 4 pin socket. As it was I had to make my own box out of suitable cardboard and find a socket. It was found that eight PP3 batteries arranged in two rows of four and wired in series would fit in the required space giving a total of 72 Volts which is near enough to 69, and still leave enough room to fit a single D cell for the 1.5 Volt LT. Economics? If one were to use PP3s available normally it would be quite expensive, on the other hand it is possible to find 'Pound stores' where PP3s can be purchased at £1.00 or even three plus D cells at one pound or even 64p for two. Total expenditure in the best possible case £3.30, worst case £4,50. The result, a useable portable!

Postscript: having made a battery, I've found that one of the IF transformers in my P17B has developed an o/c coil. If anyone has a transformer or the remains of a P17B, P20B or Ever Ready model B to dispose of can they please contact me on 01392 350 417 (evenings).

Ray Bayliss

Minutes

Minutes of BVWS Committee meeting held on Friday 30th July 2004 at 5 Templewood, Ealing.

Present: Mike Barker (chair), Graham Terry, Ian Higginbottom, Terry Martini, Paul Stenning, Jeremy Day and Jonathon Evans via Conference phone.

1. Apologies for absence: Guy Peskett.

2. The minutes of the meeting held on Friday 28th May were accepted as a true record after a correction.

3. GT reported that the number of members (Ordinary, Complimentary, and Honorary) stood at 1695.

4. MB reported that the Society's balance stood at £33,029. This figure included monies from Auctions that were yet to be paid to the owners. A commission of £909 was raised at the last Wootton Bassett Auction.

5. PS proposed a backup Committee e-mail address should be put in to place as a contingency to any failures in the Swindon based e-mail system. This was agreed and PS will action and report back.

6. The Society will arrange and administer an Appeal on behalf of the British Vintage Wireless and Television Museum, Dulwich. London. To raise monies for urgent repairs to the roof of the Museum outbuildings. This will take the form of a postal Appeal letter and also by use of the Internet on the BVWS web site and the Vintage Wireless forum. Maintenance of the main house would also be considered. Since all funding from the Getty Organization had ceased last year with the death of John Paul Getty Jnr. The Museum can no longer afford to carry out repairs. Donations of money and also items that can be disposed of to raise funds would be considered.

7. PS reported that new material had been received for the events description page but more is needed. Photos and a description of a recent BVWS exhibition at The National Trust property 'Polesden Lacey' will also be added. Information on BVWS Auctions had been added with great effect and the results of all Auctions over the last 12 months are now available to view.

8. Phil Taylor has indicated that approx. 400 items have been selected for display. This excludes a good number more items that will be loaned from other Organisations and private collections.

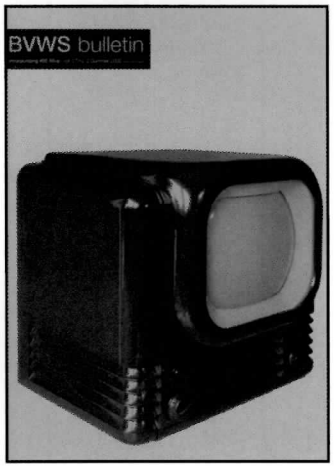
9. It was agreed that a Bring & Buy table would be operating at the next Harpenden and if supported by the visiting membership would become a permanent feature. Volunteers who have kindly offered their services for the day will run the table. Organization will be carried out by JE.

10. AOB
(i) Auction pictures on website should be expanded to show a greater range of the items to be auctioned not just the best of the bunch.
(ii) The entire stock of the book ëTickling the Crystal 1í(TC1) had been transferred from Bentomel Publications to the BVWS for distribution. This means that a discount will now be offered on TC1 to BVWS members as with ëTickling the Crystal 2í. Also an even better discount will be offered to members buying both books together. Advert in the next Bulletin.
(iii) JE will investigate and report back on the options of a Radio Exhibition at Bletchley Park.
(iv) MB reported that the Gerry Wells portrait is now well under way with Photography by CG now complete and given to Martin Constable.
(v) MB reported that the Society Mac Computer is being returned, and disposed of for Society funds.

The next meeting will be on 15th October in Swindon.

Back issues

Vol 10 Numbers 2, 3 & 4 Inc. The KB Masterpiece, Extinct Species "A Monster Defiant".
Vol 11 Numbers 1, 2, 3, 4 Inc. BTH VR3 (1924) receiver, Marconi's 1897 tests, Origin of the term 'Radio', Baird or Jenkins first with TV?
Vol 12 Numbers 1, 2, 3, 4 Inc. the Emor Globe, The Fultograph, Ekco Coloured Cabinets.
Vol 13 Numbers 1, 2, 3 Inc. Direct action tuning, The Philips 2514, Noctovision.
Vol 14 Numbers 1, 2, 3, 4 Inc. Cable broadcasting in the 1930's, The story of the Screen Grid.
Vol 15 Numbers 2, 3, 4 Inc. The wartime Civilian Receiver, Coherers in action, Vintage Vision.
Vol 16 Numbers 1, 2, 3, 4 Inc. The Stenode, The Philips 2511, Inside the Round Ekcos.
Vol 17 Numbers 1, 3, 4, 5, 6 Inc. Wattless Mains Droppers, The First Philips set, Receiver Techniques.
Vol 18 Numbers 3, 4, 5 Inc. The First Transistor radio, The AVO Valve tester, The way it was.
Vol 19 Numbers 1, 2, 3, 4, 5, 6 Inc. The Birth of the Transistor, Super Inductance and all that, reflex circuits, A Murphy Radio display, restoration.
Vol 20 Numbers 1, 2, 4, 5, 6 Inc. Radio Instruments Ltd., Japanese shirt pocket radios, Philco 'peoples set', notes on piano-keys, the story of Pilot Radio, the Ever Ready company from the inside, the Cambridge international, the AWA Radiolette, this Murphy tunes itself!
Vol 21 Numbers 1, 2, 3, 4 Inc. Marconi in postcards, the Defiant M900, GPO registration No.s, Personal portables, the transmission of time signals by wireless, the Ekco A23, historic equipment from the early marine era, the birth pains of radio, inside the BM20, plastics, Ferdinand Braun, pioneer of wireless telegraphy, that was the weekend that was, the first bakelite radios, BVWS - the first five years, the world of cathedrals, Pam 710.
Vol 22 Numbers 1, 2, 3, 4 Inc. Another AD65 story, the Marconiphone P20B & P17B, listening in, communication with wires, the story of Sudbury radio supply, French collection, Zenith Trans-oceanics, Farnham show, Alba's baby, the first Murphy television receiver, AJS receivers, Fellows magneto Company, Ekco RS3, Black Propaganda.
Vol 23 Numbers 1, 2, 3, 4 Inc. Sonora Sonorette, Bush SUG3, RNAS Transmitter type 52b, North American 'Woodies', Why collect catalin, Pilot Little Maestro, Theremin or Electronde, The Radio Communication Company, Early FM receivers, an odd Melody Maker, Black propaganda.
Vol 24 Numbers 1, 2, 3, 4 Inc. The Superhet for beginners, Triode valves in radio receivers, History of GEC and the Marconi - Osram valve, KB FB10, Great Scotts!, Riders manuals.
Vol 25 Numbers 1, 2, 3, 4 Inc. Repair of an Aerodyne 302, Henry Jackson, pioneer of Wireless communication at sea, Zenith 500 series, Confessions of a wireless fiend, RGD B2351, John Bailey 1938 Alexandra palace and the BBC, Ekco during the 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 020 8670 3667.

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

News and Meetings

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

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

2005 meetings
January 23rd Workshop at Vintage Wireless Museum.
Feb 13th Audiojumble 2005.
March 6th Harpenden, Auction and AGM.
April 3rd Leeds Vintage Audio Show.
April 17th West of England Vintage Wireless Fair.
April 24th Workshop at Vintage Wireless Museum.
May 1st NVCF.
June 4th Garden Party at the Vintage Wireless Museum.
June 5th Harpenden.
July 3rd Wootton Bassett.
July 10th Workshop at Vintage Wireless Museum.
September 18th Harpenden.
October 9th NVCF.
October 16th Southborough.
October 23rd Workshop at Vintage Wireless Museum.
November 13th Leeds Vintage Audio Show.
November 20th Harpenden.
December 4th Wootton Bassett.

2006
2nd April Leeds Vintage Audio Show.
2nd July Wootton Bassett.
12th November Leeds Vintage Audio Show.
3rd December Wootton Bassett.

For locations and times see below:

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

Audiojumble: See advert in Bulletin.
www.audiojumble.co.uk

Harpenden: Harpenden Public Halls, Southdown Rd. Harpenden.
Doors open at 10:00, tickets for sale from 09:30, Auction at 13:30.
Contact Jeremy Day, 01582 576124

Leeds Vintage Audio Show: Ramada Jarvis Hotel
Seacroft roundabout A64, Leeds. Doors open 10:00.
Contact Andy Wilcox, 0113 273 2323

West of England Vintage Wireless Fair:
Willand Village Hall (J27/M5). Doors open 10:30.
Contact Barrie Phillips, 01392 860529

NVCF: National Vintage Communications Fair.
See advert in Bulletin. Contact Terry Martini, 07947 460161
www.nvcf.co.uk

Wootton Bassett: The Memorial Hall, Station Rd. Wootton Bassett.
Nr. Swindon (J16/M4). Doors open 10:30.
Contact Mike Barker, 01793 536040

Southborough: The Victoria Hall, London Road.
Southborough, A21, Kent. Doors open 10:30.
Contact John Howes, 01892 540022 (between 8 and 9PM Only please)

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

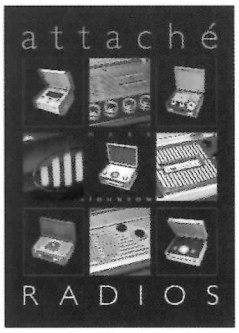
Out soon!

attaché
RADIOS

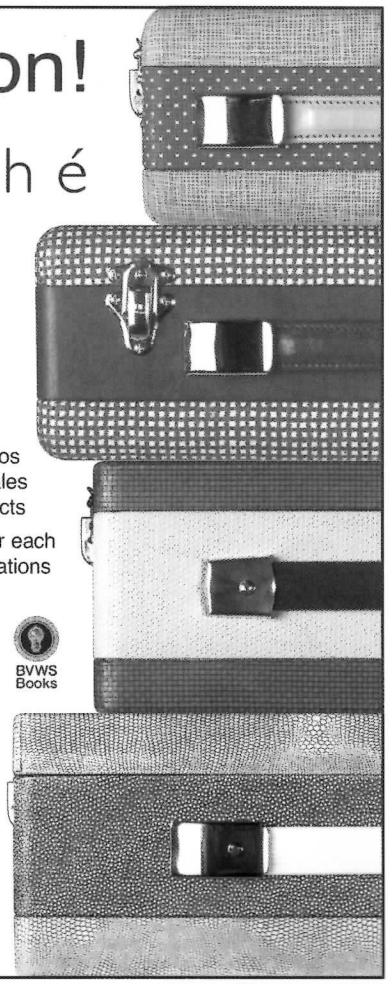
by Mark Johnson

An 80-page colour guide to the Attaché portable

- **140 radios in full colour**
- Over **200** additional photos of trade advertisements, sales literature and related products
- Detailed specifications for each model including colour variations

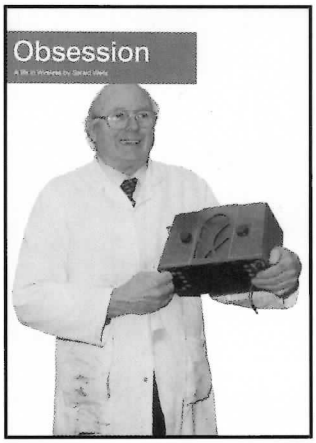


BVWS Books



Obsession

by Gerald Wells



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Free to BVWS members
£6 for additional copies

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National Vintage Communications Fair

May 1st 2005
NEC Birmingham UK

Now in our 13th year!

10.30 to 4.00 £5 admission
early entry 8.30 at £20

300 Stallholders

Stall bookings/Details
NVCF: 122B Cannon Street Road
London E1 2LH

a downloadable 'booking form' is available from the BVWS web site

Tel: 07947 460161 www.nvcf.co.uk