BRITISH VINTAGE WIRELESS SOCIETY

BULLETIN

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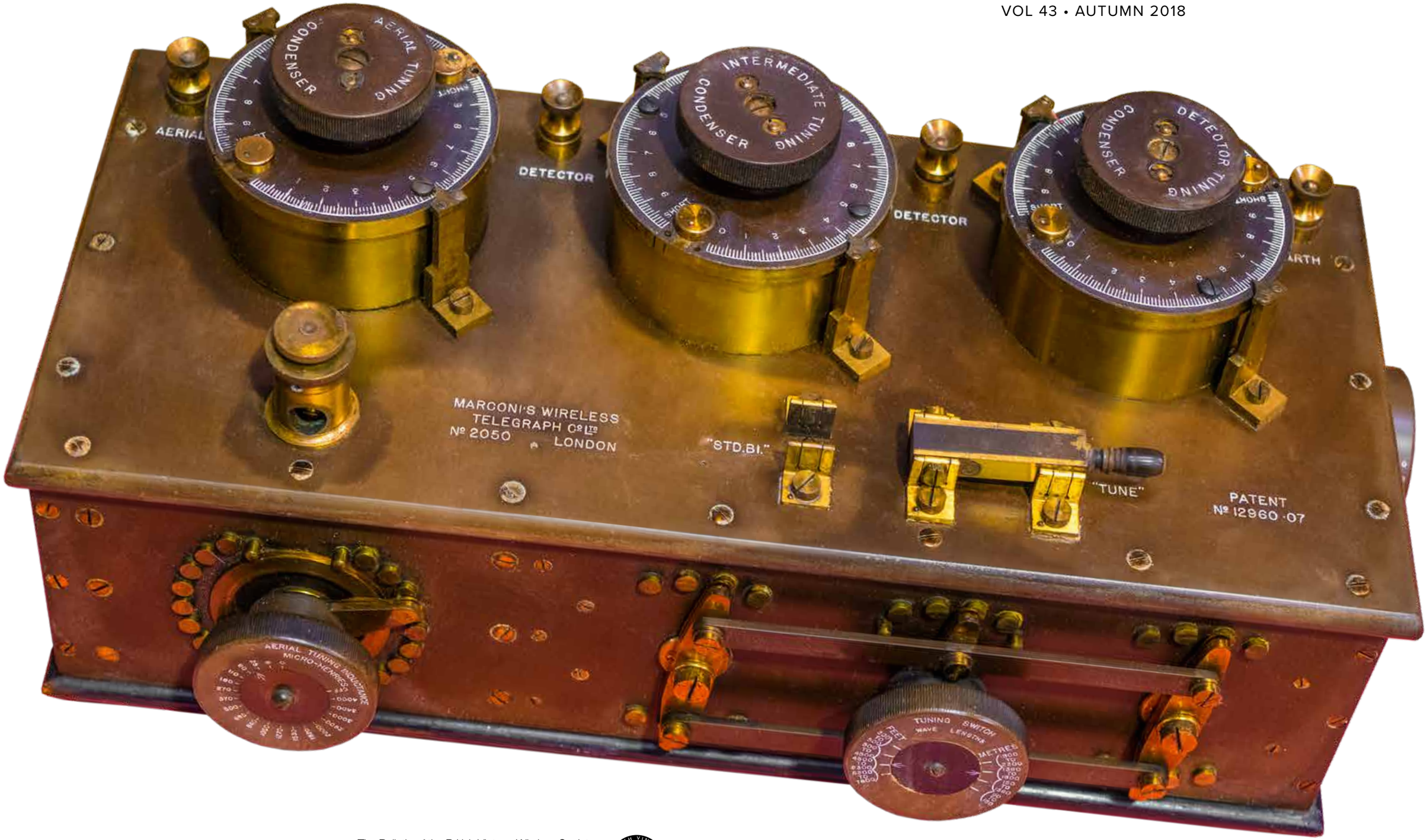

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BRITISH VINTAGE WIRELESS SOCIETY

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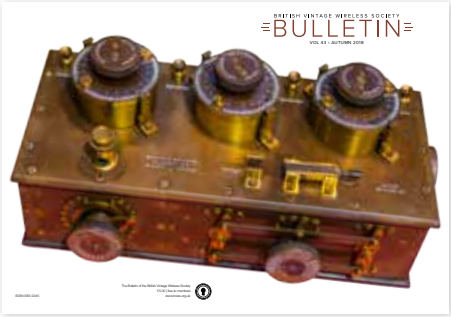
Cover Images
Marconi's Wireless Telegraph Co. Triple Tuner which sold for £13,500 at a recent BVWS auction

Photographed at the NVCF by Alex Hewitt

Edited by Alex Hewitt
Proof–read by Mike Barker and Steve Sidaway



From the Chair...

Many folks with whom I speak, whatever their age, working or retired, comment that there are never enough hours in the day. Time is a strange old thing, isn't it? If we want more food, we can increase what we sow and reap, if we want more water, we can dig a little deeper. But we can't find more time. We can't make time. And we can't, as advertisers would have us believe when marketing their latest labour-saving device, save time. The only thing we can do with time is to choose what we do as it ticks by.

Writing 'From the Chair' comes around all too quickly. A completed Bulletin issue goes off to the printers and then in no time at all, the editor is asking me again if I've 'done my bit yet'… But please don't misunderstand me if I'm making the task sound like a chore. Indeed, it's quite the opposite, a happy reflection on the activities and achievements of the Society and its members over the past quarter and an opportunity to promote the good things yet to come…

The Royal Wootton Bassett swap meet and auction in July saw many items of great and significant historical interest go under the hammer (not literally). 350 lots were auctioned in the usual slick and efficient manner, the auction started at 12.30pm and all was done and dusted, paid for and collected by 5.30pm, including a couple of short breaks! Many thanks to those who worked so hard on that very hot day and in particular our BVWS auctions agent, the most experienced vintage technology auctioneer in existence who also spends many days beforehand lotting, listing, lifting and loading! See the photos of the event in this issue.

The August swap meet at Punnetts Town organised by John Howes, grows in both attendance and stall numbers year on year. It's a warm and friendly get together in a most beautiful part of the country and is always worth the early start to travel down there. Unfortunately for me, last minute work commitments prevented me from going but reports confirmed that it was another great meet up with a few rarely seen items on sale.

Thank you to those who have previously forwarded details for alternative locations to Harpenden Public Halls, which we understand that we will no longer be able to use from 2020. We are starting to make enquiries but please let me know (by email is best) if you can think of any other locations, the more options we have the better.

Meanwhile, we will continue to hold our March and September meetings at Harpenden until you read otherwise here.

The BVWS Committee are still looking for someone to take on the role of Society Secretary.

This involves recording and compiling the minutes at committee meetings which are done by Skype and in person at our AGM in March. Please get in touch if you think you can help.

Continued thanks to Terry Martini-Yates who is acting in this role until we find someone who can take it on permanently.

We hope that you enjoy this issue of the Bulletin. This publication would not exist without the continued support and submissions of those sharing their time and experiences with us all. If you'd like to contribute to a future issue, be it anything from a letter to an article, please forward it to Alex the editor, he'll be glad to receive it.

I look forward to catching up with many of you at our coming events, see page 62 for more details.

Best regards

Greg

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The Kolster-Brandes GR10T, an export model

Scott Elliot

The KB GR10T came into my possession as part of a large ‘attic find’ by a friend of mine. When I eventually decided to start restoring it, I was puzzled why there was apparently no Trader Sheet available for it; but a little research revealed that the GR10T is an export model. The ‘T’ may mean ‘tropicalised’.

Description

The chassis is housed within a wooden veneered cabinet (walnut I think) measuring 19.5 inches wide by 7.5 inches deep by 12.5 inches high. Both sides of the cabinet and the front edge of its top are painted black, the rest of the veneer revealing its grain through cellulose. The loudspeaker grille and dial, in equal measure, occupy most of the frontal area. Their square features allude to the art deco era, but its true date of birth I suspect was in the 1950’s. Four cream coloured knobs spaced horizontally close to the lower edge completes the scene. The knobs have their functions written on their faces but the writing is just part of the moulding and is so tiny that it’s extremely difficult to read it! From left to right, the functions are, on/off/tone, volume, tuning and wave-change. The cellulose was dull and scratched and all the black paint badly cracked; but the veneer was in good condition without any bits missing, so it could in all probability be restored back to a very attractive cabinet with minimal effort.

Turning to the back of the set reveals an Aerial, Earth, External Loudspeaker and Gram sockets. The mains input selector plug has three positions, 100-120, 200-220 and 230-250 volts ac at 50-100 c/s. Other clues as to its intended non-British destinations were the mains lead wire colours; they were white, blue and red. It also has Medium and Short Wave Bands (including band-spread) but no Long Wave Band. The SW Band covers 36 – 100 Meters and the band-spread ranges cover the 11, 13, 16, 19, 25, and 31 Metre bands. There are some far flung Station Names on its dial; Baghdad, Sofia, Tripoli, Pretoria, Moalatya, Athens, Radio Ceylon, Tel Aviv, Salvador, San Paulo, Lucknow – to name but a few.

Removing the back cover revealed that all its vital organs seemed to be present, covered in a healthy layer of dust. I noticed straight away that there were three small valves and two larger ones and wondered if this mix of sizes was a bit unusual for a domestic receiver. Turning the tuning knob caused the ganged tuning capacitor vanes to rotate and the cursor to vertically traverse the dial. The latter has eight small square ‘windows’ to indicate which waveband is selected, but although the wave-change knob had positive ‘click stops’ when rotated, nothing seemed to be happening on the dial. The chassis is easily removed from the cabinet by simply pulling off the knobs and removing two screws accessible from within the cabinet. Only the round, eight inch PM loudspeaker then needs to be disconnected to separate the chassis from the cabinet. In spite of the latter not showing any signs of woodworm, its inside was treated with woodworm killer and put to one side.

Restored cabinet

The chassis

In order to glean at least a little information regarding the circuitry, the valves and their pin connections were checked out using a valve data book. Brimar valves are used throughout and are as follows: a 6BE6 heptode configured as frequency changer and local oscillator, a 6BA6 variable mu RF pentode provides IF amplification, a 6AT6 double diode triode for detection and audio amplification and a 6V6G beam tetrode for audio output. Finally, the mains rectifier circuit uses a 6X5GT double diode, and confirmed by its connections to the mains transformer, is configured for full-wave rectification.

With the chassis now exposed it was very obvious why the wave-change indicator wasn’t

Radio as received

Internal view of cabinate

working. A blue plastic 'flag' attached to a broken drive cord was lying limp across the dial diffuser! See figure 1. Without any information on how to re-string the cord, it was fortunate that it had remained in a position, that with a little imagination, the correct procedure could be deduced. The cord is only used to move the indicator flag across the dial windows, the actual wage-changes being implemented by a 4-gang rotary switch with the control knob fitted directly on its shaft. A sketch of how I thought the cord should be fitted was made and put with the flag and cord to one side for the time being. When visually inspecting the chassis from the underside, it was apparent that some electrolyte had oozed out of a large chassis mounted capacitor, devouring one of its terminals in the process! The writing on the capacitor's housing revealed it to be a 32uF/32uF unit, obviously the HT reservoir/smoother. Crudely strapped between the wires that had previously been connected to the now absent terminal, and chassis, was another 32uF electrolytic; no doubt this was a quick fix for a failed smoother in the past. See figure 2.

Moving on, the resistance of the mains transformer windings were checked, the results pointed towards it being in good order. The electrical isolation between the transformer windings and chassis was also found to be good. The transformer is coated in a black pitch like substance, which may be part of its 'tropicalisation'. Other initial checks revealed that the on/off switch (part of the tone control) was permanently open circuit.

After a general clean up, the steel chassis showed no signs of rust or corrosion. In fact, it is nice and bright and seems to have been originally treated with a silver paint type finish.

Since the reservoir/smoother capacitor would have to be replaced before switching the set on, there was little option but to tackle that job first. But by this time I was impatient to see if the chassis was in an otherwise working condition, so with the old capacitors disconnected, two replacement 33uF capacitors were temporarily fitted to the underside of the chassis. The faulty on/off switch was also temporarily bypassed. I know this is a bit naughty, but in cases like this I do have a strict rule; a large label is attached to the mains lead explaining what has been done. (I would never rely solely on the sets on/off switch to isolate the chassis anyway). Before powering up, I made sure that no short circuits existed between the HT line and chassis. The latter is internally connected to the mains earth and the Earth socket. A few feet of wire was connected to the Aerial socket, the loudspeaker connected, and the set powered up via an RCD and safety lamp.

With mains applied, one of the two dial lamps lit up immediately and the safety lamp glowed dimly. With medium wave selected I was soon receiving all the expected stations at good volume and quality. The volume and tone controls were a bit crackly when operated but apart from that all seemed to be well. With the safety lamp bypassed, the set was run for about half an hour. The mains transformer remained cold throughout and with nothing untoward happening, I switched the set off happy to continue with the restoration.

The reservoir/smoothing capacitor is mounted on the topside of the chassis, and after its

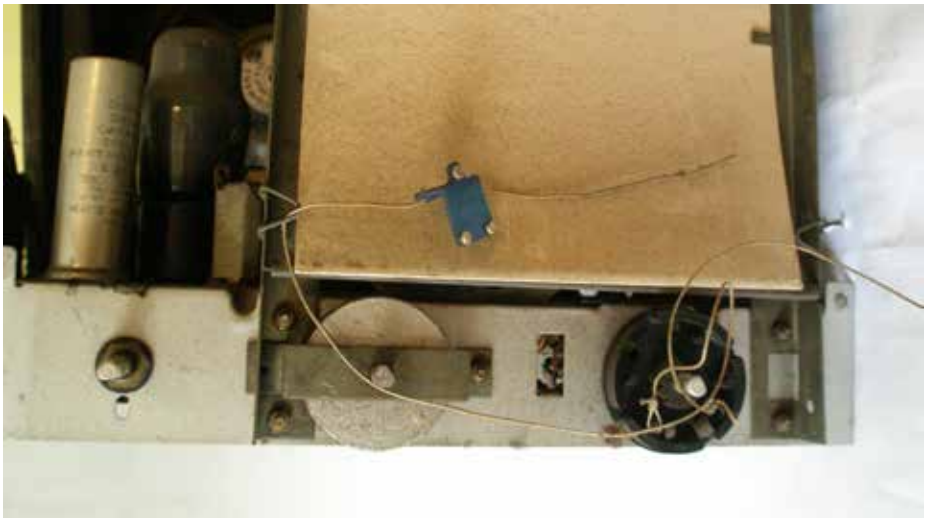


Figure 1

Figure 2

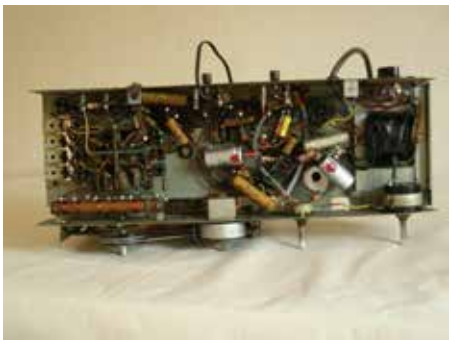


Figure 3

removal, work began extracting the remaining electrolyte. I lost track of the time it took to get the stuff out – it was rock solid! I tried drilling, cutting, digging, all of which put the thin aluminium housing at great risk of being damaged. Whatever I did, the electrolyte yielded only in small crumbs. Eventually the housing was empty but its base fixing tabs got broken in the process, meaning of course that it could no longer be acceptably secured to the chassis. I had hoped to fit the replacement capacitors into the old housing but in view of this damage it was no longer an option. However, epoxy putty was used to fix the housing to the chassis for appearances sake. See Figure 3. The replacement capacitors (the ones marked with large spots of red paint) can also be seen in Figure 3.

The faulty on/off switch (part of the tone control) was tackled next. After removal from the chassis, the potentiometer cover was easily removed by unbending its fixing tabs. To gain access to the switch compartment, two rivets had to be removed, this being achieved by filing their heads off. Once exposed, the switch contacts, embedded in a layer of solidified grease, were seen stuck firmly in the 'off' position. After a thorough cleaning (and oiling where appropriate), the switch was fully functional. During reassembly, the rivets were replaced with two 8BA screws secured with nuts, spring washers and a dab of nail varnish on the threads to make sure they don't work loose in the future. DeoxIt contact cleaner was used to clean the tone control track before re-fitting its cover.

Re-stringing the cord, which operates the wave-change indicator, was carried out using new cord; the sketch made earlier being put to good use. Care had to be taken when positioning the plastic 'flag' on the cord to ensure that it lined up correctly behind each of the eight 'windows' in turn at each click-stop. This involved placing the chassis inside the cabinet a few times on a 'trial and error' basis until correct. Once aligned correctly, the flag was secured to the cord with a spot of glue. The opportunity was now taken to clean the volume control track and the wave-change switch contacts with de-oxit. A flywheel tuning mechanism is used, which is a good thing because the mechanism is quite slow motion and would otherwise be quite a chore traversing the cursor from top to bottom on such a large dial. The mechanism (see figure 4) was cleaned and oiled where appropriate.

Past experience prompted me to check the capacitor, which couples the audio from the anode of the triode section of the double diode triode, to the control grid of the output valve. With the capacitor removed, it was connected in series with my 90-volt HT battery pack (10 x PP3's) and AVO 8. The latter confirmed that the capacitor was passing current, so was replaced with a modern equivalent. Well nearly – the original was marked 0.02uF and the nearest I had to hand of a suitable voltage was 0.047uF. Finally, the faulty scale lamp was replaced (6.3 volt/0.3 amp/MES) and the mains lead replaced with modern 'vintage look' gold coloured 3-core. The earth core was connected to chassis as original, and the on/off switch 'un-bypassed' at the same time.

With the essential repairs and general maintenance completed, it was time to give the set a proper soak test and see how it performed. On power up I was greeted with a nasty hum! Not mains hum though, more akin to the sound experienced when a finger is placed on the input to an audio amplifier. With this in mind, and the set positioned to give access to the underside of the chassis,

Figure 4

Restored chassis

Restored cabinet

the wiring around the tone and volume controls were carefully prodded with a plastic trimming tool. Eventually, it was found that by gently moving a screened lead connected to the centre tag of the volume control, the hum was completely eliminated. With the set switched off, a close inspection revealed that the lead's braiding was disintegrating and effectively open circuit. I guess it must have been disturbed whilst the tone control was removed and refitted. The screened lead connects the volume control to the grid of the audio amplifier via a capacitor and a 10M / 100K resistor network. So with such high impedances it's hardly surprising that the amplifier input screening is important. Another similar lead was found connecting the 'top' of the volume control to the Gram socket on the back of the chassis. Both leads were replaced – they are the grey ones in figure 3. The set now performed very well on medium wave with excellent audio quality and volume. Very few stations were found on the other bands but to be fair, only a short, low 'throw-out' aerial was used.

At this point, I took the opportunity to check some voltages. The potential at the reservoir capacitor read +300 volts and the smoother +275 volts. The anode of the audio output valve is fed directly from the +275 volts. The triode section of the DDT and the other valves measured around 65 volts at their anodes. These readings confirmed that all the valves were being supplied with voltages within their limits according to the valve data book. Whilst doing these voltage checks it was noticed that the audio output transformer has a second secondary winding, which is used to provide negative feedback to the volume control circuitry. A tapping on the transformer primary winding is used to reduce residual mains hum on the HT line. I left the set running for a further two hours, after which the mains transformer was just warm to the touch. The temperature inside the workshop at the time was 25 degrees Celsius, so I was convinced that the set wasn't consuming excessive current.

I was interested to discover what IF an export model might use; so the signal generator output was radiated into the set and adjusted around the 450 KHz mark. The output from the set peaked at 424 KHz indicated, which seems a bit of an odd figure but neither the signal generator or frequency counter are calibrated, so this figure may not be accurate. I later discovered that the KB GR40 (which is NOT an export set) uses an IF of 422 KHz, so perhaps the GR10T is the same. In any event, my set works so well that I would be very reluctant to adjust anything!

Over the next few days, the set was used whenever I was in the workshop and initially it was fine. But it did eventually develop a fault that stopped all audio output. This was caused by a lack of HT on the anode of the triode amplifier due to its 470K load resistor going open circuit. This was replaced and checked to make sure it wasn't overheating, and the set has operated trouble-free since.

The cabinet

As mentioned earlier, the cabinet was in good condition with no repairs necessary; only its finish would need to be re-done.

Station names

This would be only my second attempt at restoring a wooden cabinet, the first being the Sobell 511W described in a previous Bulletin. Polyurethane was used on the Sobell and although it did a great job at enhancing the wood grain, it left tiny bubbles on the surface – probably because it was applied by brush. More effort was then required to polish the bubbles out. I would experiment with something else on the GR10T; but first some sanding had to be done.

Fortunately, none of the scratches had penetrated the veneer, so with the glass dial removed it was just a case of carefully sanding the old cellulose off. Even less effort was required on the painted sides, just a light sanding was sufficient to smooth out the crazing. Two coats of black gloss Humbrol enamel paint was applied by brush to the cabinet sides and the front edge of the top. The remaining veneer was given four coats of clear, water based varnish – with a very fine rubdown between coats. The varnish was easily applied by brush and produced a pleasing finish with no further treatment required.

New felt feet were fitted to the underside of the cabinet, replacing the originals, which had virtually rotted away. The glass dial was cleaned before it and the chassis was returned to the cabinet.

Conclusion

It should have been blindingly obvious when I first received this set that it was an export model. The station names on its dial and with one of the mains voltage tapings being 100-120 volts, the clues were there! To my eternal shame, I hadn't noticed these immediately, and it was only after an unsuccessful search for a Trader Sheet plus a bit of research that I realised their significance. I latterly found out that the KB GR40 has a very similar circuit to the GR10T. The former uses the same valve line-up, apart from the addition of a front end RF amplifier. (Trader Sheet 1033 refers). The component layout and cabinet however, are completely different.

I would love to know the history of my set. Was it purchased abroad and brought back? Did it ever make it to foreign lands? If so, where? Could its very low serial number of 00009 imply that not many were made? I guess we'll never know.

Compared to the other sets in my small collection, I consider the GR10T to have superior audio quality. It has a very effective tone control, and if required, can be made to produce what is probably the 'mellow bellow' tonal quality, which other restorers frequently refer to.

I was sceptical regarding the use of a water-based varnish to finish the cabinet as I feared this might open the grain making the surface rough. In the event, this didn't happen and I was happy with the result – not too new and glossy looking, and in keeping with a sixty something year old radio that's seen a bit of life. The GR10T currently enjoys pride of place in my living room and is used on a regular basis.

The Champion Model 800 Radio

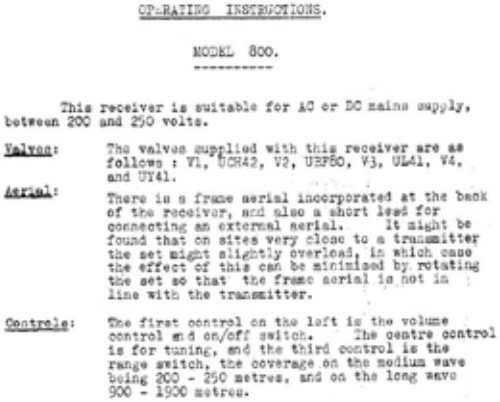
Stef Niewiadomski

Champion-branded radios, in their TRF and superhet variants, often come up for sale at swapmeets and auctions. Most of the ones you see have plastic cabinets, often cream in colour. Over the years, I've restored a few of these radios, which is not a difficult process and often involves fixing AC/DC power supply problems. They give good results especially when you take into account their relatively simple circuits, and their lower than average cost when new. At a Royal Wootton Bassett auction last year, I spied this model 800 from about 1953, which I hadn't seen before, and because it differs from the company's plastic models, I thought it merited a brief mention in the Bulletin.

Having no IF amplifier stage, the circuit is a short superhet using a UCH42, UBF80, UL41 and UY41 valve line-up with a 'universal' power supply. I haven't included the schematic here: it's easy enough to find on the internet. I've shown a section of the manufacturer's rather amateurish-looking operating instructions. It seems to indicate that the Champion company operated on a shoe-string budget and didn't waste money on multi-page professional type-setting when a single sheet would do, apparently typed-up by one of the secretaries.

A label attached to the radio indicated that it worked, and so after a quick safety check I fitted a mains plug, unravelled its throw-out aerial (the instructions mention a frame aerial, which didn't exist in my radio) and switched on. After a few seconds, the radio came to life and worked well on the medium and long wavebands. I left the radio to 'cook' for a few hours and apart from a wipe-down of the cabinet, that was the end of the restoration.

The radio's 1950s styling, making use of lightly varnished wood and a Perspex dial, is now back in fashion. Furniture with this so-called 'mid-century' look is popular among the trendy (not me, I hasten to mention) and so the radio wouldn't look out of place in their homes, or any other for that matter. It just goes to show that if you wait long enough, fashions come around again, so there's an excuse, if ever you need one, not to throw anything away!



OPERATING INSTRUCTIONS.

MODEL 800.

This receiver is suitable for AC or DC mains supply, between 200 and 250 volts.

Valves: The valves supplied with this receiver are as follows : V1, UCH42, V2, UBF80, V3, UL41, V4, and UY41.

Aerial: There is a frame aerial incorporated at the back of the receiver, and also a short lead for connecting an external aerial. It might be found that on sites very close to a transmitter the set might slightly overload, in which case the effect of this can be minimised by rotating the set so that the frame aerial is not in line with the transmitter.

Controls: The first control on the left is the volume control and on/off switch. The centre control is for tuning, and the third control is the range switch, the coverage on the medium wave being 200 - 250 metres, and on the long wave 900 - 1900 metres.

The Marconiphone 255 and 255 MC six valve battery portable superhet of 1932

Roger Grant

This set came from my local antique dealer, he hasn't had many radios for a while and what he has had have been large 1960's radiograms only fit for spares but not much else.

As Found

Today Lady Luck smiled at me and in his window was this attic fresh Marconi 255. It's in a bit of a bad way but restorable, most of the exterior finish is intact but slightly crazed with damp ingress and flaking on the corners. The front panel is becoming unglued from the top and there's a small strip of veneer missing from the top right corner, leather handle is disintegrating and all the exterior metal bits are rusty. That's the bad bit, on the bright side the speaker cloth is a little dirty but otherwise ok, all the valves are Marconi originals, all the trim and knobs are present and cleanable, the spring steel centre of the metal handle is intact and there's enough of the leather covering left to get a rough pattern for the manufacture of a new one. The handle anchor plates, the speaker adjustment plate and the catches that hold the back shut are all very rusty, but on removal I noticed that on the back of the catches there's the original brown paint, an important clue in the restoration.

I did a horse trade for this Marconi for a few antique odds and ends I picked up from a boot fair and he threw in a large old console radio in a poor state of health that I suspect was on it's way to the local tip and he got it disposed of for free, this was a Bush SUG26 with most of the front veneer peeling off, this was handy for the valves, including a push pull EL41 output pair, a 10" speaker and transformers etc.

Looking up the circuit diagram I found two versions of this set, the 255MC means moving coil, my set. The 255 had a balanced armature speaker. Looking further the later moving coil set seems to have returned to using a grid bias battery whereas my earlier set has auto bias. Strange that the later set seems to have gone backwards, also the volume control in the 255MC controls the voltage on the screen grids rather than the control grids and there's no local distant switch.

The set has suffered from the usual problem with battery sets, the battery wires shrinking due to the regular re-fitting of the battery wander plugs and spade terminals, usually the length of the battery leads indicates the amount of use the set has had. This set appears to have been well used as it has had its battery leads extended and joined with cloth and soft pitch insulating tape. There was enough of the original wires to see the type and colours. They are braid over rubber and very brittle, red, black, brown and brown with a blue fleck. I'll replaced these with my reproduction wires. These are made from braided cord from my DIY shop. They stock several sizes and I cut them into lengths of about 1 metre, pull the middle string out and replace it with PVC covered wire pulled through, this braiding is white so I paint it with Humbrol model paint. The modern colours are usually a bit too bright so I mix in a little black to tone it

As Found Back Open

The tired cabinet furniture

The original G Marconi logo

The stripped cabinet

The repaired missing veneer

The clear plastic valve holders

down to the drab colours of the 1930's and dilute it with a little white spirit to ensure it soaks in rather than sit on the top. Some very convincing new wires are easily achievable.

I convinced myself that due to the relatively heavy gauge of the half dozen or so strands in the original wire, that the original wire wasn't very flexible and my reproduction wire was a good match. The modern multi stranded wire has a more flexible conductor compensating for the slight stiffness of the painted braiding.

The cabinet

The repair of the missing veneer and the crazing of the original finish with some peeling off on the corners menat a cabinet job, unfortunately this meant losing the Marconi logo transfer on the top of the set. I took a few photos for future reference and will seek a new one or look into making a copy.

I removed the back door, chassis, speaker driver and frame aerials and stripped off all of the cabinet furniture.

I then stripped off the original finish with Rustins varnish stripper, re-glued the front panel parting from the top and replaced the small piece of missing veneer from the top right corner.

As I had recently acquired an air brush spray kit, I decided I would spray this one. This came about by a box of junk acquired with a radio some time ago, I found what looked like a small electric motor, about three inches in diameter and about four inches long. This had a small finned metal box on one end and turned out to be a small air compressor. More recently while purchasing some model paint from my local Hobby Craft I noticed an air brush paint spray kit in with the paint brushes. I recognised the connector adapter for the end of the air line as the same type as this compressor, the air brush usually being supplied from a compressed air aerosol. Now having the compressor I couldn't resist it, especially as this kit was now being marked down to half price in the sale.

The stripping off, repairing and sanding of the cabinet went well, the veneer appears to be quite thick, and as there were no deep digs or scratches to rub out, there was no problem anyway.

There was still some of the matt black paint lining the end grain of the plywood in the speaker fret, this usually goes missing when the end grain filler falls out, and this confirmed the original colour.

I found a tin of walnut coloured, oil based varnish from a previous project in stock. I don't like the new water based finishes so this was ideal. I thinned it with white spirit and it went through the spray gun very well, around three light coats did the job and when fully hardened I gave it a rub over with a drop of Brasso to get over the over glossiness of the new finish.

The speaker cloth was washed in warm soapy water then ironed flat fitting it straight away after ironing usually causes it to sag later when it absorbs a bit of moisture from the atmosphere, so I'll leave it in the shed for a couple of days. During this time I primed and repainted the end of the plywood in the speaker fret with Humbrol matt black model paint, de-rusted, primed and re-sprayed the rest of the cabinet furniture with Halford's Ford Rio brown spray paint and replaced the very rusty screws with repainted new brass ones. The next task after refitting the speaker cloth, was to clean and refit the speaker drive unit The coil continuity checked ok, 1600 Ohms on the AVO it was just a bit rusty and needed cleaning, it dismantled quite easily and after a good wire brushing and sealing with matt lacquer re-assembled, tested and set up on the bench before refitting. The medium wave frame aerial in the front of the cabinet removed for the cabinet re-spray just needed cleaning and returning. The connecting leads to the speaker and front frame aerial are braid over rubber type, the rubber was crumbling and falling out of the end of the braid in granules. Originally the ends of all of this type of wire were finished

The tuning gang

The wavechange switch

The MW frame Aerial

with a small piece of rubber sleeving, I assume to stop the braid from fraying. These were hard, split and falling off, these cleaned up ok and a piece of black heat shrink sleeving fitted to replace the original rubber sleeve. This stopped the crumbling rubber falling out of the ends and the wires now looked as original and not needing to be flexible put back in the cabinet.

The last of the cabinet furniture was the handle, the spring metal centre was de-rusted and the handle ends re-sprayed satin black as original, there was enough of the disintegrating leather original for me to get a template, two pieces sandwiching the spring steel centre and sewn together down each side. I had in the junk box a tired old leather tool wallet where the stitching and zipper had gone. The leather was a little bit thicker than I wanted so, the ends of the upper part of the leather on the original were extended and scraped thin and folded under the lower piece, I tried scraping my piece with a sharp modelling knife and it worked quite well. I even managed to skim a thin layer off of the back of the new pieces of leather to a much the thickness to the original. The leather cut from the old tool wallet had a string of stitching holes and I used these as a straight edge for my new handle cover, These were a bit wider spaced than the original but not noticeable without a comparison.

The speaker drive unit

The new wires

The stitching holes on the other side of the leather strips were punched with a modified small watchmakers screwdriver. This too worked well and when finished the leather was stained with brown leather dye and given a good polish with some brown boot polish. I was very pleased with the result, it even looked old.

The chassis

The chassis is the same as the internal metal cabinet furniture and plated so just needed cleaning. Removing the oxidised discolouration of the plating would only make it look worse so it was left alone. A lot of the tuning drive shafts and gears were rusty and needed dismantling de-rusting and treating with Kurust, then painted matt grey to match the plating of the chassis, I used Humbrol model paint and I mixed in a little matt black to match the colour of the plating.

The main tuning gang was completely covered with a screening box and when this box was removed the tuning gang in side was found to be as good as new just

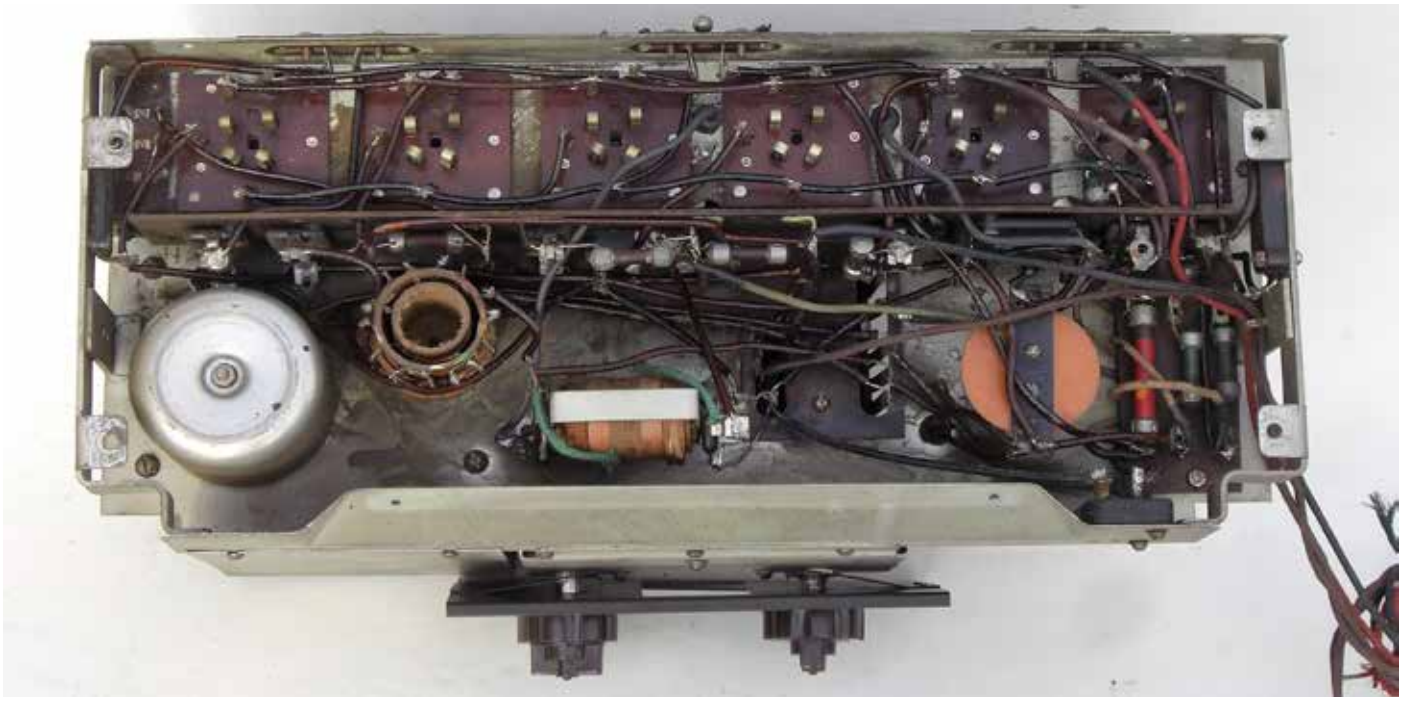
Inside the cabinet

a little dusty, easily vacuumed clean.

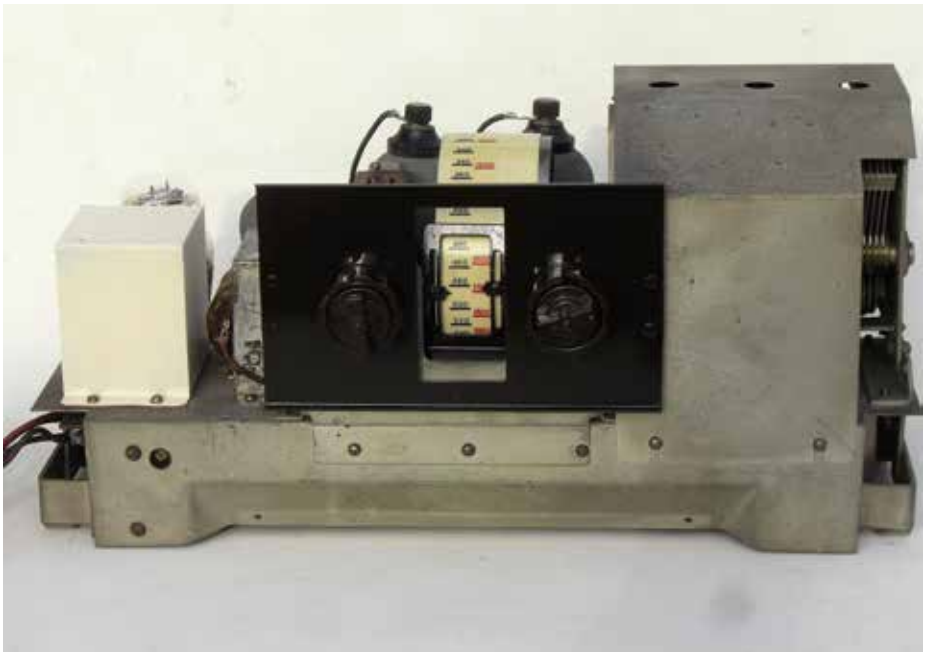
The valve holders were a little unusual, these were a sandwich type fitted under the chassis. The lower plate was Paxolin but the top part protruding through the holes in the chassis was clear plastic, a bit unusual for a set of this age.

The first part of the electrical checks was to run the valves on the valve tester, all the valves are Marconi types and look original, there are three S21 tetrodes, V1 the RF amp, V3 the mixer/1st IF amp, and V4 the 2nd IF amp, two HL2 triodes, V2 the local oscillator and V5 detector/Aaudio amp and finally V6 a KT2 audio output tetrode, unfortunately one of the S21's gave zero emission on the tester although the filament was intact, I don't have a Marconi S21 so it'll have a Cossor replacement.

There are no electrolytic capacitors in this set, but there are five paper de-couplers in a tin box mounted on top of the chassis. They all read around 50k of leakage, and required replacement. This was quite easy as the unseen bottom of the metal box was open and just filled with pitch. The pitch was melted with a heat gun and the pitch poured



Under the chassis

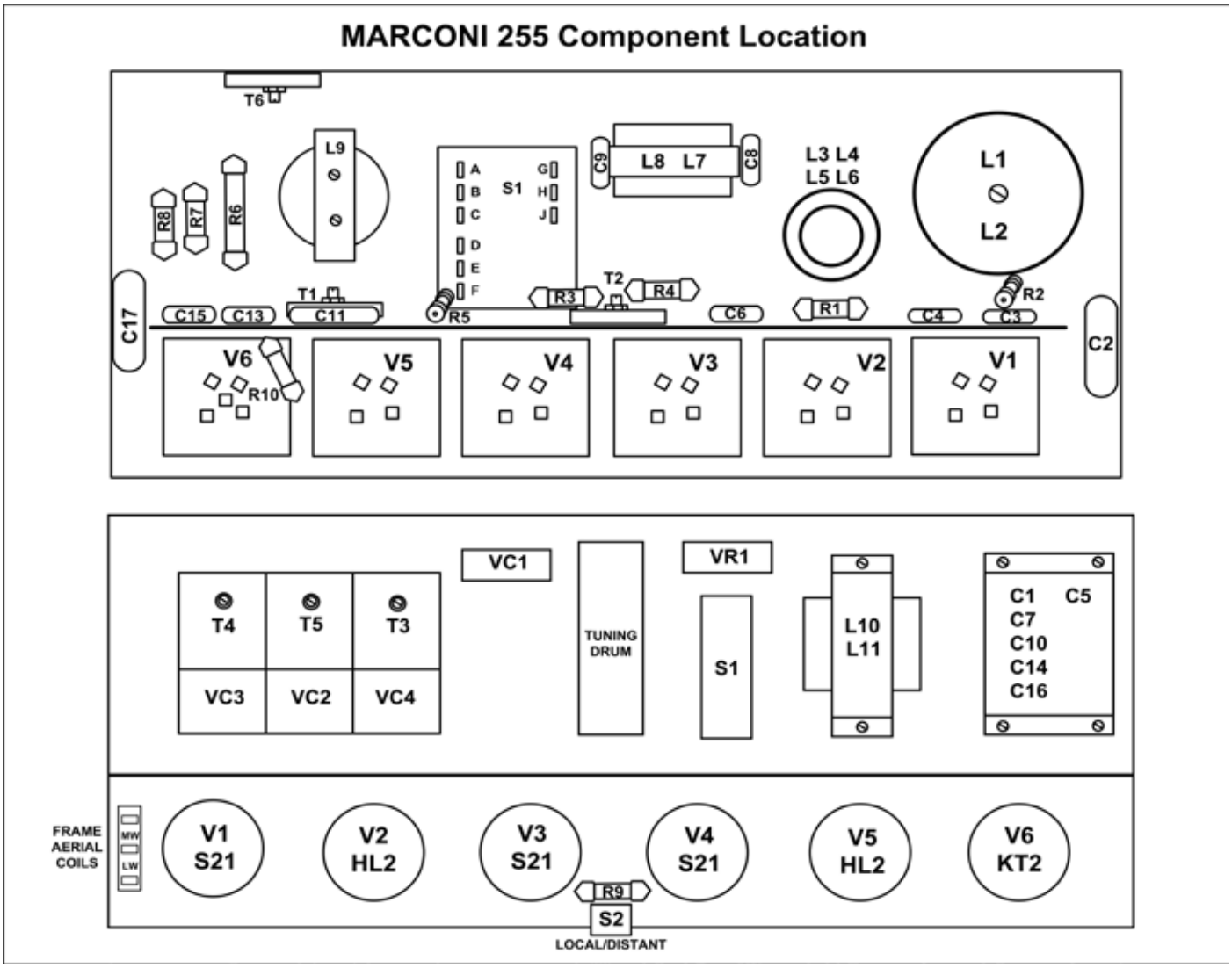


Chassis front view

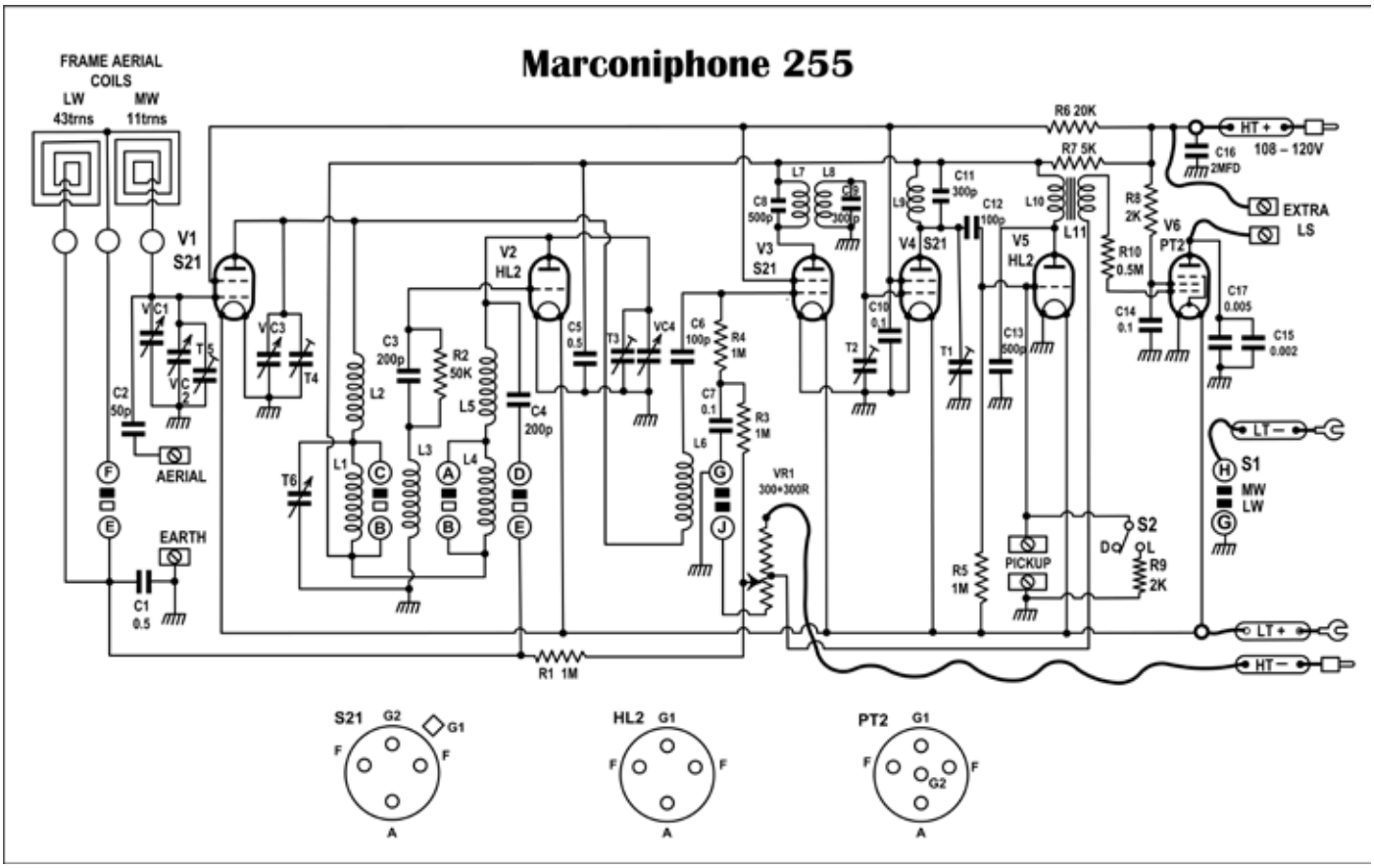
The accumulator box

Chassis top view

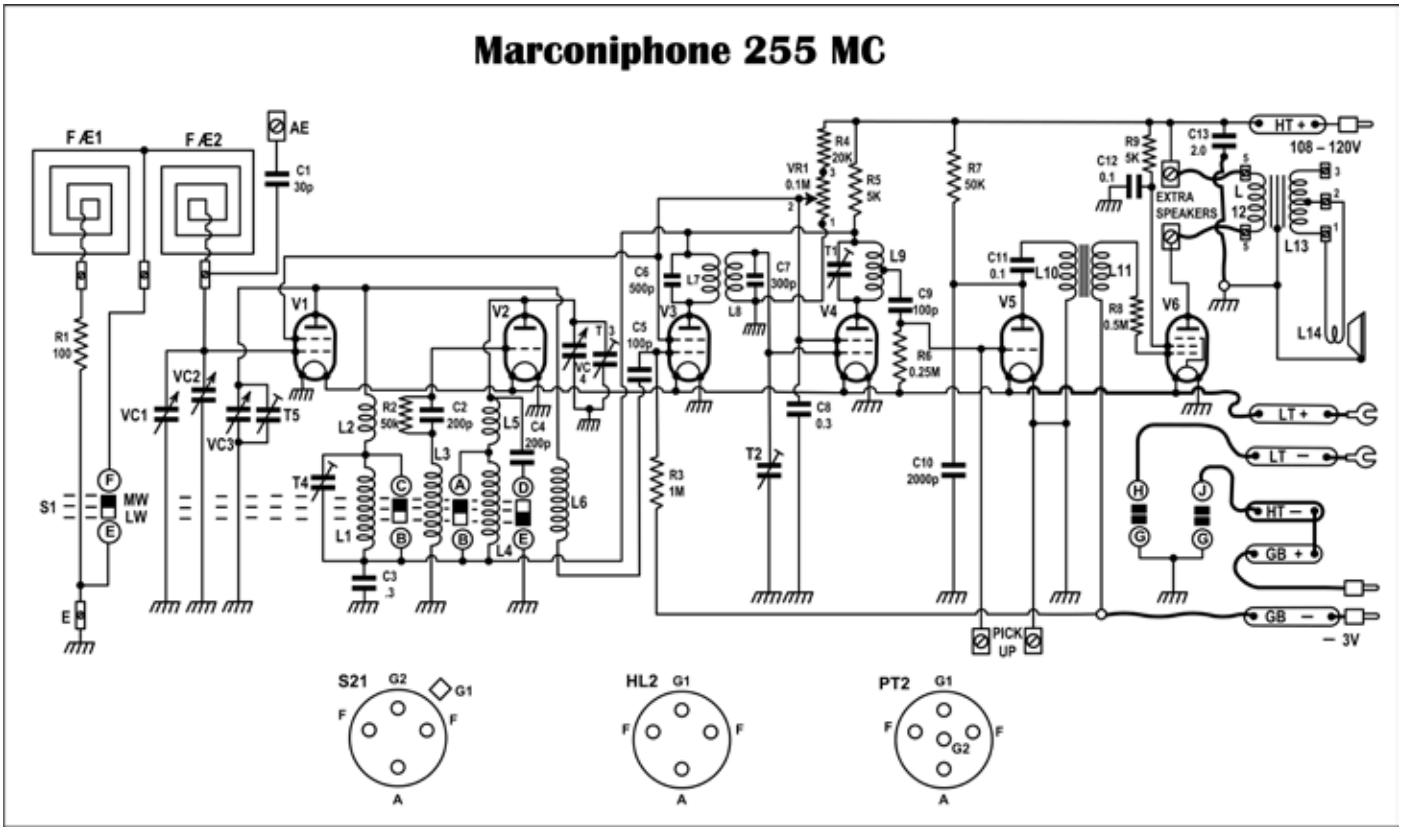
The finished accumulator



Component location drawings



The 255 schematic



The 255MC schematic

The new Logo experiment

Inside the back door

The works

into a metal cup for returning later. While the box was empty I stripped off its original flaking paint, primed and re-sprayed it with cream coloured Ford Ivory White (good old Halford's) a good match to the original. I then re-stuffed it with new capacitors and small blocks of wood to fill the spaces and re-filled it with the original pitch. I even refitted the original lead out wires after cleaning and fitting end sleeving.

All of the resistors checked and were in reasonable spec. The tuning coils, frame aerials and RF transformers were all ok but the inter-stage audio transformer had one of its windings open circuit. Fortunately this was the outer winding so I removed the outer frame and the laminations, a new design I hadn't come across before, instead of the usual "T's and C's" or the "E's and I's" this one has "F's and L's". This was reasonably easy as only the windings bobbin had been lacquered, inspecting the bobbin. The outer layers of insulation seemed tired, I very carefully removed the outer layers of empire cloth and found that the connection to the brass terminal strip had corroded and was open circuit. I cleaned and tested this end, open circuit, I started unwinding the layers and found several breaks. There was evidence of damp ingress on the first two layers but then the level of damp penetration seemed to improve and I found the last break near the end of the third layer. I now had a winding reading of 4.6k so I replaced the outer layer of empire cloth and re-glued the brass terminal strip in place then added another layer of empire cloth for insulation and gave it a couple of good coats of lacquer. Re-assembly went well, I had to open the outer frame edge fold-overs a little in order to re-fit the transformer body into it, after folding the outer frame back around the outside of the laminations I squashed the

side fold-overs in the bench vice, then re-squeezed again with two small ball bearings equally spaced about 2" apart to indent the fold-overs into the laminations for a better grip and close-up any mechanical movement.

I found unwinding the original layers of these windings quite beneficial, very often as in this case you can get lucky and find the break(s) early on. If nothing else it gives an idea of the winding technique, if I haven't found the break or an improvement in the winding condition by about half way through, I strip it all off and start a rewind.

Now ready for a run up. I put the chassis back in the cabinet with the under chassis screen removed for access and connected the front MW frame aerial. I connected up to my bench power supply, more for convenience than anything else and switched on. To my complete surprise the set burst into life, I swept through the MW band and the set was quite lively, if anything too loud. The volume control didn't make much difference, I measured the negative voltage across the volume control and with an HT of 118 volts and it read -5.5 volts just about what I was expecting. The volume control and its wiring checked all ok but checking for the minus bias on the grids proved V1 grid volts missing, tracing the voltage back to R1, I found the wire connected to point "E" on the wave change switch (see schematic) adrift, soldering this back on fixed the problem. This is an own goal as when I replaced the lead out wire from C1, part of the tag broke off and I failed to notice the wire feeding the RF end had sprung itself under a capacitor out of sight.

I read through the alignment procedure. The IF frequency is 125kc/s set by two trimmers T1 and T2, as the set worked so well and the stations appeared at about the right place on the tuning scale, I had decided that a full re-alignment was unnecessary. Just to prove that I could make no improvement, I gave two IF trimmers a tweak for maximum output and found them already peaked.

With the set performing well on medium wave, I then re-fitted the back with the long wave frame aerial and checked that all was well on Long wave.

Now back together I fitted a pair of batteries. For the HT I used one of my reproduction standard 120v Drydex batteries which fitted in the retaining wooden blocks quite snugly. Having six valves the LT required one of the larger accumulators, I only have one of these an Exide celluloid type, an original that I had replaced the innards with a 2v Dryfit gel accumulator. I hadn't used this for quite long time and as I removed it from the shelf the celluloid case disintegrated, it was in a poor state of health when I salvaged it many years ago. I retrieved the terminals, front and rear labels and the filler plug, the Dryfit accumulator not having been charged for as many years was now very dead. Unfortunately the labels were stuck fast to the cracked and broken pieces of celluloid so my only course of action was to scan them and reproduce new ones from over drawing them in MS Visio, I've used this method many times before and it's no longer the painstaking, slow process it used to be.

I considered making a new box from 6mm MDF and coating it in a thin layer of araldite and spraying satin black similar to other accumulators I have reproduced, while looking for an offcut of MDF I found an offcut of 5mm Perspex (plexiglass), a new challenge, could I make this look like celluloid ? I measured what was left of the original (and it would have fitted into the LT bay of the set perfectly) and cut the Perspex to size with a 45 degree bevelled edge join down the sides to hide the join.
I glued it together with "Gorilla" glue and made and fitted a top that fitted inside the outer box, The original celluloid box had top and bottom over-lapped glued joints so my box looks very similar. I rounded off the edges down the sides and round the top with a belt sander. This went very well and I sanded the edges down through the grades of cutting paper until I reached 800 grade which gave it the translucent appearance of celluloid, then continued with the 800 grade across all sides. My box now really looks the part, the only problem is it's the wrong colour, it's too white, it needs to be more yellow, but a dirty yellow, for this I gave it a thin sprayed on coat of dark oak matt varnish thinned with a little white spirit, one coat was enough and gave it the desired dirty old celluloid look. I was pleased with the result.

I then made an internal box to resemble the innards and hide the two "D" cells in their carrier, the LT power source. The sides were recessed to fit strips of Perspex to resemble the plates then sprayed Humbrol "Sea Grey Matt" a good match was lead plates, the gaps between the strips painted dark brown to resemble the spacers, I then fitted a battery carrier for two "D" cells with a TIP31 junction transistor, base and collector joined together in series with the two "D" cells. This loses about 0.6 of a volt across the junction bringing the final voltage to 2.4 volts so just right.

The new labels were stuck on the front and back and then sprayed with a thin coat of varnish to give the labels the same slightly yellowish appearance of the originals and waterproof the ink-jet ink they were printed with.

A Few Finishing Touches

The metallic coating on one of the HL2 triodes was beginning to fall off and with removing and testing it in the tester about 80% had now gone, while working on the set I noticed that the "sea grey matt" spray paint I had used on the mock battery innards was very similar to the matt metallic paint on the valves, so I removed the flaking screening paint and over-sprayed the HL2, this seemed a reasonably good match and the set ran ok without this

The finished set back open


New handle and Logo


The rear door

The finished set

bit of screening so it's just the cosmetics and if it isn't obvious it's V5 the one next to the output valve in the finished photos. The rest of the valves seem to have retained their metallic screen coating ok, and this stop gap remedy will do until I can source a better looking valve.

With the set almost finished, I need to replace the Marconi badge. I have the photos of the original and went about making a water slide transfer, I scanned in the photo and adjusted its size (the original badge was 26mm wide). I had purchased some waterslide transfer paper from my local stationers, there are two types, clear background and white background, the problem is that you can't print white, so with printing on clear transfer slide the background shows through the coloured parts of the transfer. Printing on the white transfer slide requires very accurate cutting out from the background including the windows in the lettering, but then the white edge of the transfer base can be seen around the edge of the transfer, the only compromise I could find was to make a clear transfer of only the outline of the logo, position this on the set then paint with a fine brush and very thin paint inside the outline of the logo then when dry, place the full copy of the logo transfer over the top of the painted background. I did one or two practice runs on an odd piece of wood, this worked reasonably well and I then applied this technique to the set. There's room for improvement but without a too close an inspection, the new logo looks good and well worth the effort.

The set now finished and works well. Due to the balanced armature speaker this is not a set one would listen to for any length of time but a reasonably good example of an early 1930's Marconiphone. The cabinet finish is still a little new looking but I find from previous restorations this tones down to a much more original look after a few years of aging.

An introduction to the miniature radio shop!

Miniature Radio Shop - Part 2

Bryan McAlley

How it was made...

The Practical Wireless magazines, Eveready batteries and gramophone needles are from the originals that have been reduced to 1/12 size.

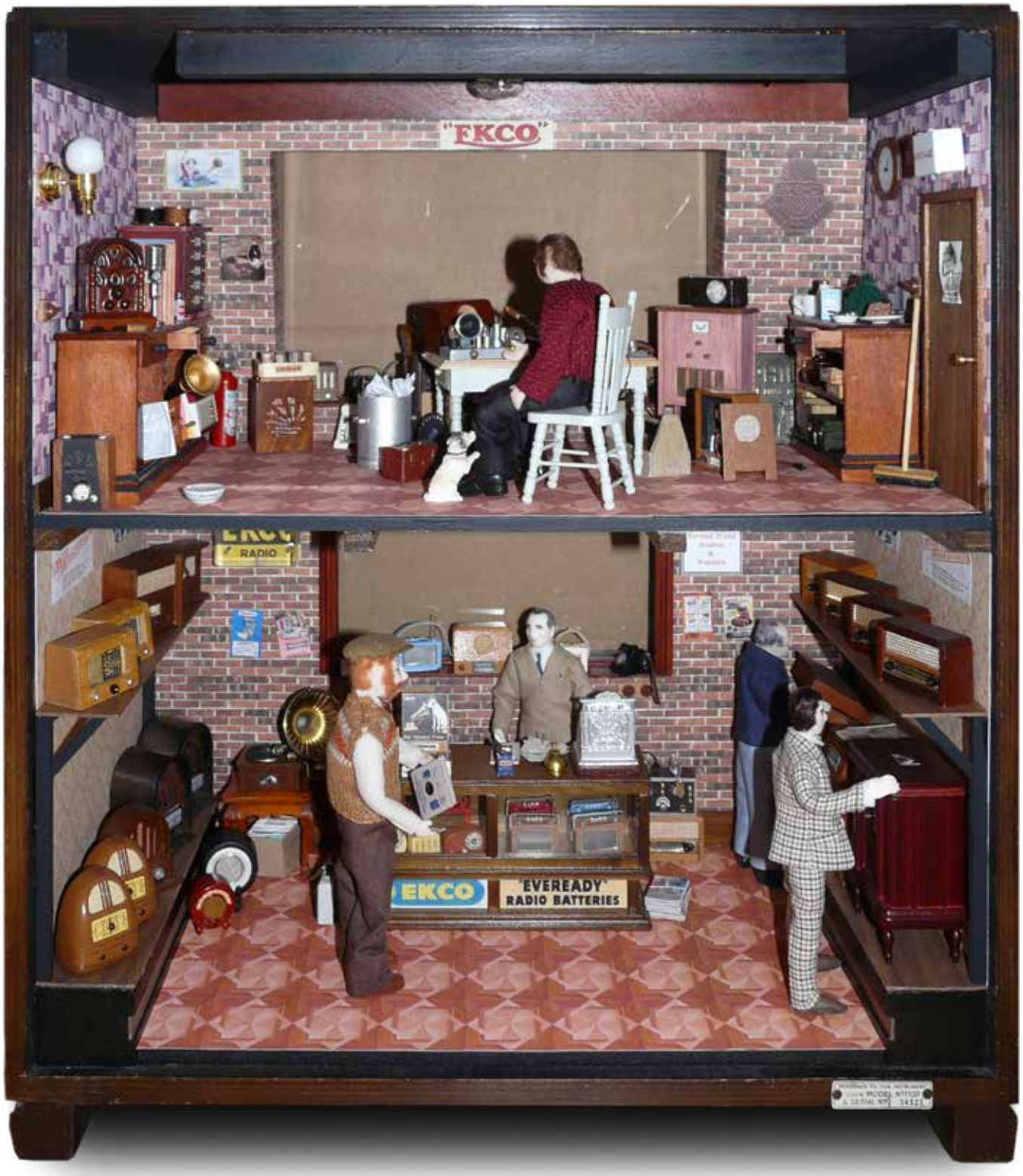
The silver microphone on the sideboard started off life as a necklace. With some glue and metal parts it looks quite authentic.

The gramophone on the table by the shop counter was made from a brass ornament. It's painted with enamel paints to replicate the wood. Tracey used some metal parts to make the needle arm which lifts on and off the record. She also made the arm rest and winder which turns.

The phoenix radio kit is a 1936 Ferguson radio. It's painted with enamel paints. Tracey left the back off so she could replicate the inside and she also made a new back to make it look more authentic.

The dancing ladies speaker on the windowsill is a copy of an art deco speaker from the 1920s. It's made from a bottle top and the ladies were intricately cut out with a craft knife.

The soldering iron on the work table was made from a tiny screwdriver and a pen spring. The solder was made using a small piece of dowel and wrapping wire around it.

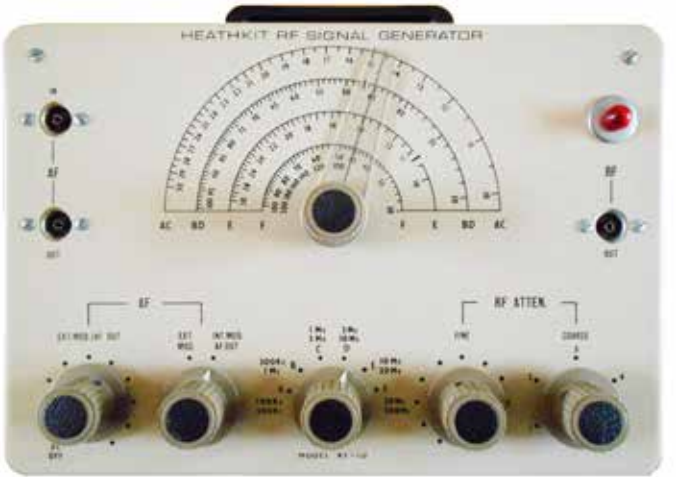

"EKCO"
RADIO
EKCO
"EVEREADY"
RADIO BATTERIES

Restoration of a Heathkit ‘RF-1U’ Signal Generator

David Taylor

I’ve had one of these little generators for some years now, which has served me well and works fine.

Pic 1: Older version



Pic 2: Later version

Last year I bought a non-worker from a rally, so as I set about restoring it, my existing working one came in handy for performance comparisons and to check for any wiring errors or other defects that I may have found when I opened up the non-worker, not knowing whether or not someone had got there before me. I think the non-worker may be from the mid to late 1960s and older than the working one as it is darker in colour and has a separate orange and silver dial, whereas the working one that I have is lighter in colour and the whole of the front of the case, including the dial, is screen-printed, as shown in pics 1 & 2. They’re nicely laid out and are a compact size, measuring 24cms x 160cms x 140 cms. (9.5” x 6.5” x 5”).

I fondly remember the Heathkit era of the 1960s – 1980s when I often longingly browsed through the catalogues, but the prices were far outside my range. I’ve discovered a 1966 catalogue extract which lists the RF-IU, the kit being priced at £13.18s 0d, the assembled price being £20.8s 0d. To put this into perspective, when adjusted for inflation, this equates to £250 and £363 respectively in 2018.

The ‘U’ suffix (as on all Heathkit equipment intended for the UK market) indicates that the version was modified for 230 - 250V AC mains, whereas the ‘RF1’ for the American market was for 117 Volts mains.

When browsing through the catalogues and seeing the wide range of kits, which encompassed audio, amateur radio, test and instrumentation equipment, computers and educational equipment, it’s a reminder of what a huge company Heathkit was in its heyday and how diverse was the range of products. I can’t begin to imagine how many designers, engineers and production staff it must have employed - not just in the USA, but at Gloucester too. Heathkit were rightly praised for their step-by-step well illustrated manuals which assumed no prior electronics knowledge and even gave instructions on how to make soldered joints. There was a back-up service if difficulties were encountered. The manuals - particularly the detailed diagrams - are all the more remarkable considering that they were produced by draughtsmen on drawing boards, without the facilities of computer-aided design.

Pic 3 Under chassis screening box

Specification of the RF-1U

The generator covers 100kHz to 100 MHz in six ranges, with calibrated harmonics from 100 MHz to 200 MHz as follows:

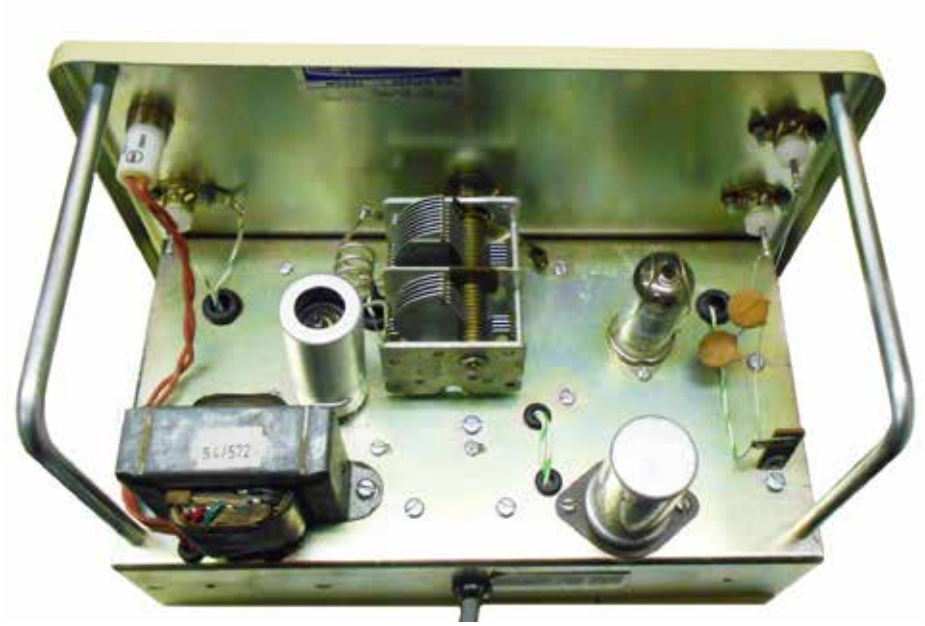
- Range A: 100 kHz – 300 kHz.
- Range B: 300 kHz - 1 MHz.
- Range C: 1 MHz – 3 MHz.
- Range D: 3 MHz – 10 MHz.
- Range E: 10 MHz – 30 MHz.
- Range F: 30 MHz – 100 MHz.
- Calibrated Harmonics – 100 MHz – 200 MHz.
- Accuracy, +/- 2% of dial calibration.

- Output impedance 75 Ohms.
- Voltage: Up to 100mV on all ranges.
- Internal modulation approx 400 Hz, 30% depth nominal.
- Audio output up to 9 Volts across 1 MegOhm.
- Valves:
- V1: 12AT7/ECC81 - RF Oscillator.
- V2 ECF80 – Modulator and RF output.

Rectification is via a Sentercell selenium rectifier.

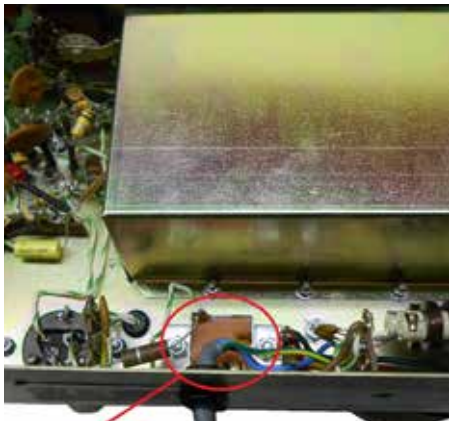
For those not confident or competent enough to construct the kits, for an additional charge Heathkit equipment could be bought ready-built, but most was home-constructed, so the quality of construction can be variable. To aid the home constructor, the coils and band-switch unit of the RF-1U was pre-wired and factory aligned. Just one coil - the range F coil consisting of four air-wound turns of 22 SWG tinned copper wire - had to be soldered to the tuning capacitor. The turns are later either opened up or squeezed together to align

Pic 4 Sentercel selenium rectifier



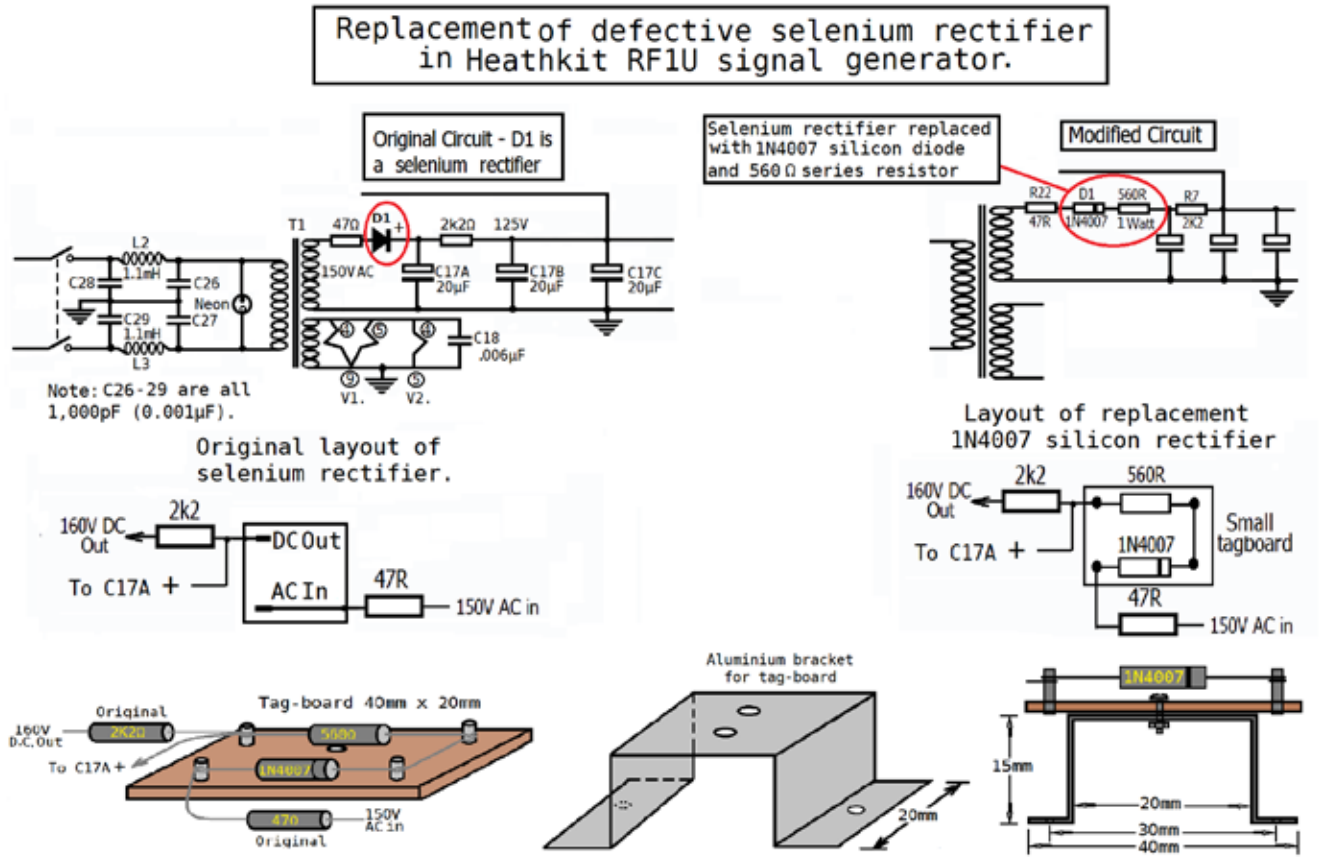
Pic 5 Above chassis layout

Pic 6 Old knotted twin mains flex, and new 3 core flex

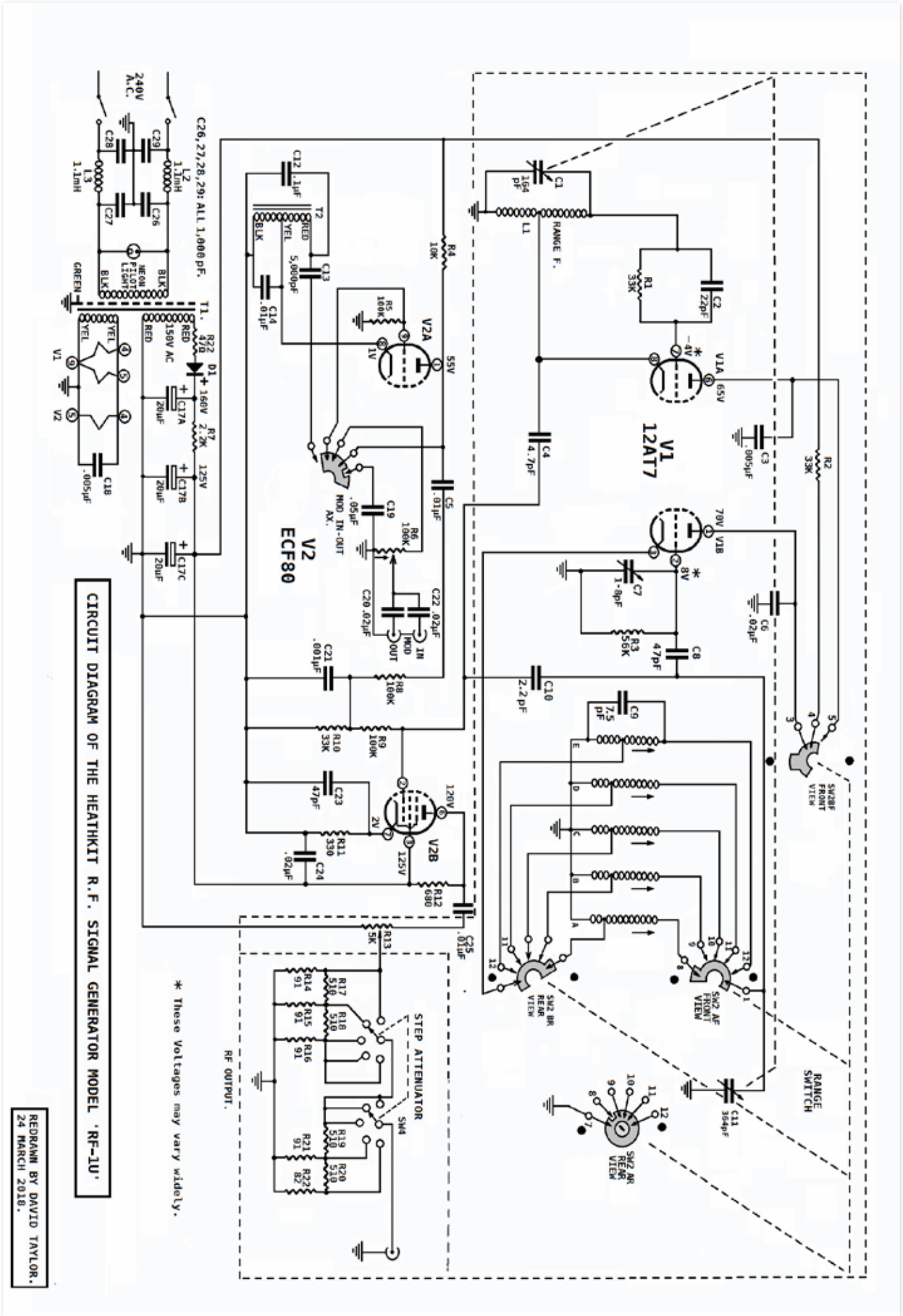


Pic 7 Faulty selenium rectifier

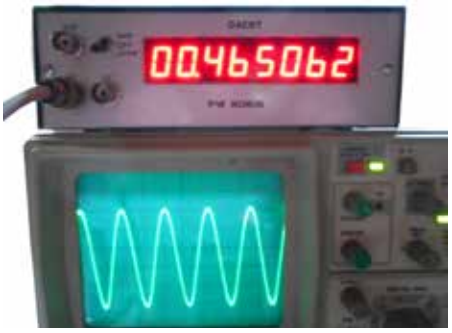
Pic 9 Tag-board & bracket with new silicon rectifer



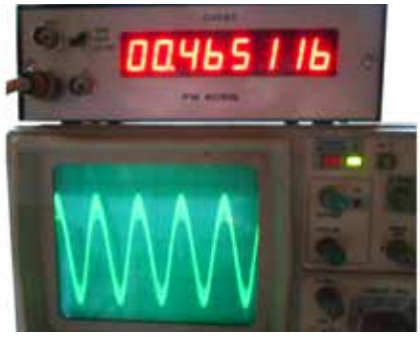
Pic 8 Rectifier replacement diagrams



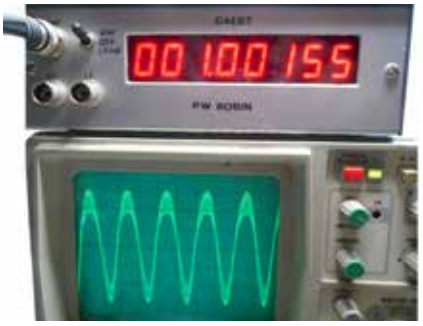
Pic 17 Heathkit RF1U Circuit



Pic 10 Unmodulated 456 kHz waveform



Pic 11 465 kHz modulated waveform



Pic 12 1 MHz modulated waveform

Pic 13 1 MHz unmodulated waveform

Pic 14 55.5 MHz displayed on 20 MHz Hameg 203 7 scope

Pic 15 Audi waveform

that range. The coils, band-switch associated circuitry, along with the circuitry around the V1 valve-holder are contained in a screening box bolted to the underside of the chassis.

Safety considerations

The first thing that's evident on removing the case is that the thin two-core mains flex isn't anchored inside the case – it's simply tied in a knot as with similar Heathkit mains powered equipment of that era. The cable passes through a grommet on the rear apron of the chassis and poses a safety hazard as it can be twisted around in any direction in use, risking fracture of the soldered connection over time, which could then touch the metal cabinet. As the mains cable isn't earthed, that poses an added hazard. As I'd done with my original one, I fitted a 3-core flex, earthed the case, and fitted a cable restraint in place of the grommet to firmly anchor the flex. (See pic 6). The mains cable doesn't go directly to the two pole mains switch on the audio control potentiometer – it goes to a tag-strip, and from there, via thin twisted flex to the pot switch and back again to the tag-strip.

- Pic 1: The front panel of the one under restoration.
- Pic 2: Front of my existing later model.
- Pic 3: The under-chassis screening box in place.
- Pic 4: The Sentercel selenium rectifier.
- Pic 5: Above chassis view.

On checking the output of the selenium rectifier, which - from a healthy rectifier would be 160V - it was down at 120V, albeit the AC input to the rectifier from the mains transformer was correct at 150V. Instead of the HT being 125 Volts after the 2k2 load resistor across the reservoir/smoothing capacitors, it was down at 95V, so it was evident that the rectifier was in need of replacement.

Pic 16 Dial accuracy at 100 MHz

Replacement of Sentercel selenium rectifier

I removed the rectifier and in its place I fitted a small 'turret board', similar in size to the selenium rectifier, with a 1N4007 silicon rectifier and a series resistor chosen to drop the higher voltage produced by the 1N4007 down to the desired 160V. By substitution, I found that a 560 Ohm resistor met this requirement. I made a small aluminium stand-off bracket to mount the turret board on the chassis, using the same mounting holes as the original rectifier.

The reservoir & smoothing capacitors consist of three 20uF electrolytic sections in one can. One is used as the reservoir, and the other two are wired in parallel giving 40uF for smoothing. The outer section of the capacitor is the reservoir and is marked red. The three sections reformed well, with little leakage, but had they needed replacement, the old can could have been re-stuffed with modern Rubycon miniature electrolytic capacitors from CPC/Farnell, which have a high ripple rating. One 22uF for the reservoir and one 47uF in place of the two 20uF sections used for smoothing would have sufficed.

Of the 21 carbon composition resistors, nine were more than 20% high - some by as much as 40%, so while I had the generator dismantled I decided to replace those.

Most of the capacitors were either disc ceramic or silver mica, and didn't pose a problem. There were just two tubular paper ones, which I replaced as a precaution.

Voltage checks:

The actual voltages attained will vary to some extent as compared to those shown on the circuitry depending on the mains voltage to the RF1U, which at the time of testing, was 245 Volts at my location. After replacement of the rectifier and the out-of-spec resistors, the voltages attained were close to those stipulated in the manual:

V1:

- Pin 1: Spec 70V. Actual: 74V.
- Pin 6: Spec 65V. Actual: 63V.
- Pin 7: Spec -4.0V Actual: - 3.5V.

V2:

- Pin 1: Spec 55V. Actual: 57V.
- Pin 2: Spec 125V. Actual 128V.
- Pin 6: Spec 120V. Actual 124V.
- Pin 7: Spec 2V. Actual 2V.
- Pin 8 Spec 1V. Actual 1V.

Accuracy

On completion of the remedial work I checked the accuracy of the frequencies at the extremities of each band using my home-built PW 'Robin' frequency counter. Back when the RF-1U was originally marketed, few amateur constructors would have had a

frequency counter at their disposal so the dial accuracy was important. Nowadays, we have the luxury of being able to set the frequency by reference to a frequency counter rather than rely only on the dial, so the dial accuracy is of much less significance. Nevertheless, the results showed that on all bands, the RF1U was well within the stated +/- 2% range:

- Range A: 100 kHz - 300 kHz: Exactly to spec.
- Range B: 300 kHz - 1 MHz: At 300kHz was 304 kHz (+1.3%). At 1 MHz was 980 kHz (- 2%).
- Range C: 1 MHz - 3 MHz: At 1 MHz was 990 KHz (-1%). At 3MHz was 2.98 MHz (- 0.7%)
- Range D: 3 MHz - 10 MHz: At 3 MHz was exactly to spec. At 10 MHz was 9.75MHz (-2.5%)
- Range E: 10 MHz - 30 MHz: At 10 MHz was 9.7 MHz (- 3%). At 30 MHz was 28.8MHz (- 4%)
- Range F: 30 MHz - 100 MHz: Exactly to spec across the band.

More a tribute to the Heathkit design engineers than my own handiwork!

- Pic 6: The old knotted 2-core mains flex replaced with 3-core flex and a cable restraint.
- Pic 7: The position of faulty Sentercel rectifier beneath the chassis.
- Pic 8: Diagrams of the old and new rectifier circuit, the new turret-board and bracket.
- Pic 9: The turret board with 1N4007 rectifier and series limiting resistor in place.

Waveform

RF waveforms on several ranges were checked as far as my 20 MHZ Hameg 203-7 analogue scope could cope with, which proved to be a good deal higher than I'd imagined. It coped well up to 30 MHz, showed a good trace at 55 MHz and even a reduced trace at 88 MHz. Not only a good test for the scope, but for the new pair of eBay-sourced 100 MHz scope probes at £7.60 the pair post free from a UK supplier. The AF waveform was also good and when used to modulate the RF waveform, that waveform looked fine too.

- Pic 10: 465kHz unmodulated waveform.
- Pic 11: 465kHz modulated waveform.
- Pic 12: 1 MHz modulated waveform.
- Pic 13: 30 MHz unmodulated waveform.
- Pic 14: Scope trace at 55.5 MHz.
- Pic 15: Audio waveform.
- Pic 16: Dial accuracy at 100 MHz.

As found, the generator had a mixture of odd knobs rather than its original Heathkit knobs, so I bought a set of matching knobs to make it look presentable.

Test sockets

The three sockets ('AF In, AF Out & RF Out') are TV type connectors, known in Europe and Australia, and maybe elsewhere, as 'Belling-Lee connectors' ('IEC 61169-2 radio-frequency coaxial connector of type 9,52'), whereas for many years, most test gear has featured 'BNC' connectors. Arguably the sockets could be replaced with BNCs, but they're perfectly functional, neat, and original. Given that Belling Lee sockets and plugs are widely used for terrestrial VHF/UHF roof antennas, antenna signal amplifiers, CATV distribution equipment, TV sets and FM / DAB-radio receivers, they're well up to the task, so I've left them in situ.

Conclusion:

All in all, the RF-1U is a very capable and compact wide range signal generator, well up to the task for hobbyists.

An informative Heathkit resource: http://www.heathkit.org.uk/

Acknowledgements:

My thanks to:

Chris Pettitt, G0EYO, for a full copy of the RF-1U construction manual.

Gary Tempest for his encouragement and support.

Making a cabinet using Perspex and Tensol 12 adhesive

Gary Tempest

The first picture (Picture 1) may have fooled you for a moment? Of course it's not a cabinet for a home built radio but it could have been, or a piece of test gear. Over the years there have been constructions in acrylic and Perspex sheet, seen on Forums and in the Bulletin, but these used mechanical ways of joining the panels together.

Picture 1. A new radio maybe

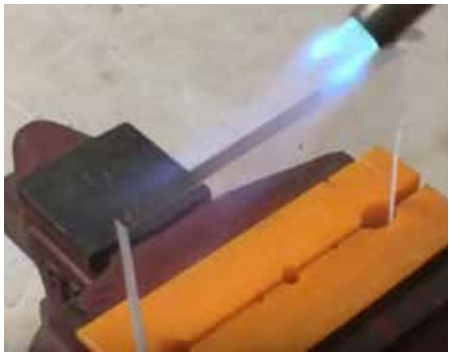
Actually, the Tensol 12 adhesive is said to be more akin to welding than gluing as the surfaces of the sheet are said to be bonded at the atomic level, once the solvent evaporates, rather than using a substance that simply links the atoms of one piece to the other. Such a substance could be Super Glue, which does make a very strong initial bond but may not be so good in the longer term. Also, there are reports of crazing of the panels occurring after some time.

Materials

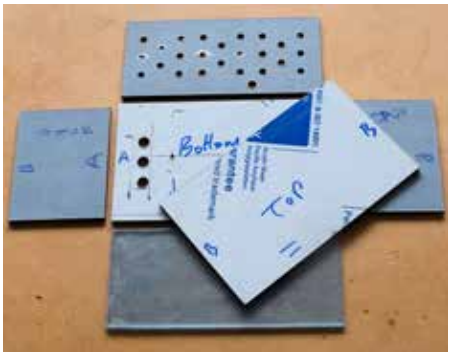
For the Perspex, the hard way would have been to buy 3mm sheet and cut all the individual panels myself and then used files and abrasives to polish the edges.

But now there is an easier way by buying the panels on-line from Plastic Sheets.com. A whole range of colours are available and the edges can be left sawn or polished. I didn't appreciate that polishing wouldn't be the laborious way that I might have used but by Flame Polishing. Picture 2 'grabbed' from a web-site, shows this being done using a butane torch: I wonder how many pieces get messed up until you get the technique right?

All of my panels were ordered with polished edges although some didn't need to be and

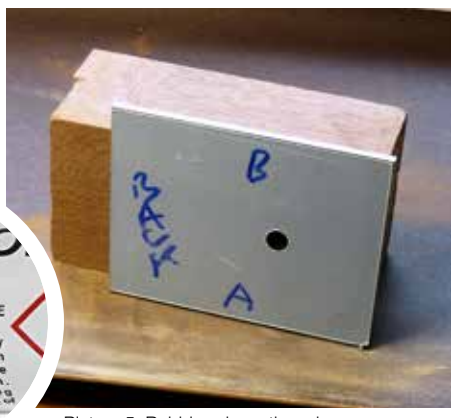


Picture 2. Flame polshing



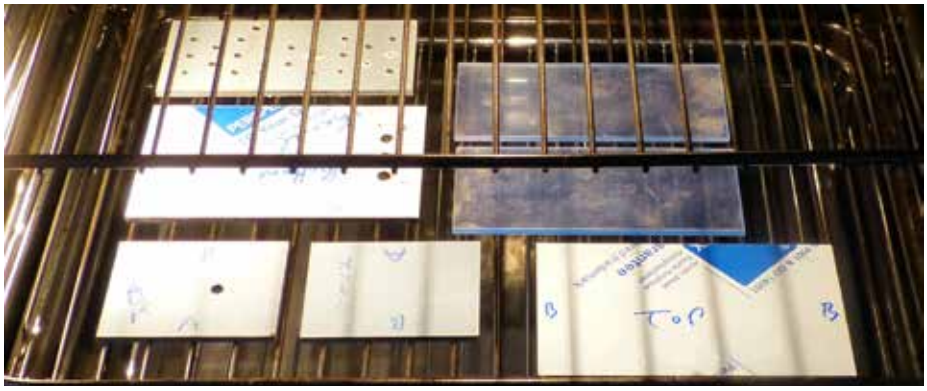
Picture 3. Pieces sorted

Picture 4. Tensol 12



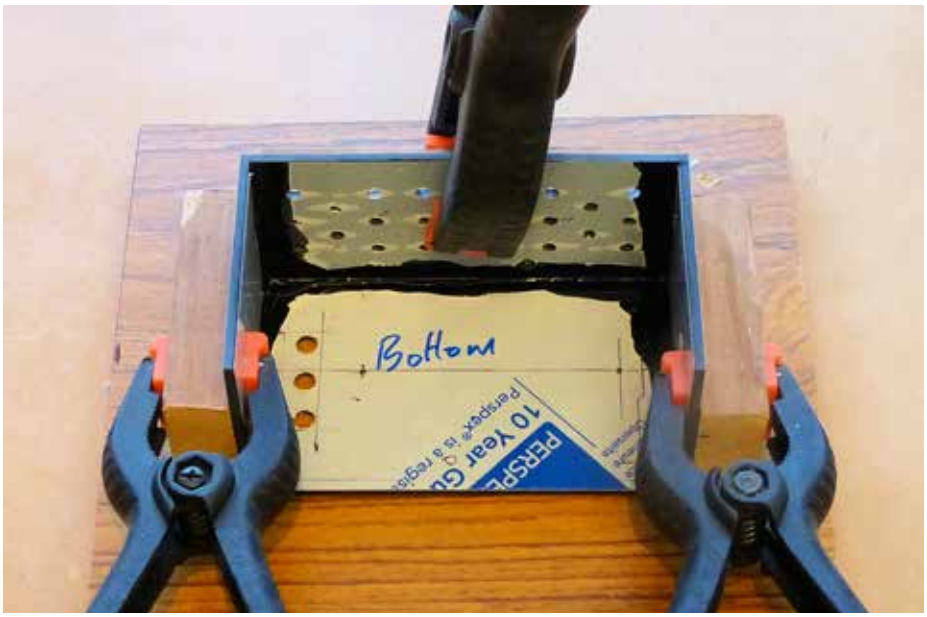
Picture 5. Rubbing down the edges

Picture 6. Jig for cabinet



Picture 7. Anealing for 2 hours

Picture 8. Pieces in the jig



Picture 9. After Tensol adhesive

in fact I had to rub down the edges to suit the Tensol, pictures 3 and 4. This is very thin and is applied from an applicator and has no gap filling properties. It was advised that the flamed edges wouldn't bond well as there are fine lines left by the saw. So these were flatted down on abrasive paper against a right angle block, picture 5.

The Tensol comes in a metal bottle, with an applicator and they must be left in the fridge for 12 hours before use to slow the evaporation of the solvent. It should be applied smoothly, in one continuous motion along the joint, allowing capillary action to draw it in. This is easier said than done and more so with coloured Perspex, unlike the clear as shown in a web-site demonstration. Here, the adhesive could be seen through the material entering the joint.

There is plenty of advice on using the adhesive: safety gloves, eye protection and having good ventilation. One negative feedback surprised me from someone who said the smell made him feel ill and stunk the house out. Used with a good spray mask, on a table in the garage doorway, I never actually smelt it until later when there was a faint odour indoors.

Joining the pieces

Initially, these were going to be the bottom, the two sides and the back and I knew I needed a jig to get this right. This was easily made from a piece of base board and pieces of hardwood with right angle edges. As seen in picture 6 one side was held with screws, for easier removal of the unit, and the other two by quick set Epoxy, pressing them firmly up against the bottom panel as a guide.

In the user instructions for the Tensol it advises annealing the pieces before joining if they have been machined, to prevent possible crazing. It's reasonable to think that includes cutting and flaming and I wasn't going to take chances for what is simple to do. Of course it first took an interrogation from my wife to use her oven and a promise that there was no pitch involved. Yes! I did get into trouble with that once, when she was out for the day!

picture 7 shows the annealing taking place at 80 deg. C for two hours with slow cooling afterwards.

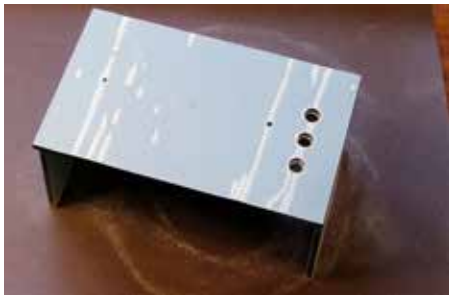
picture 8 is of a 'dry fit' of the pieces in the jig prior to welding and picture 9 after this has been done. It can't be seen but the top corners, sides to back, were taped tightly closed with masking tape.

Although Tensol makes an initial bond quite quickly developing full strength can take up to three weeks but there is a quicker way. After 24 hours the item can be placed in an oven, at 80 deg. C for 8 hours and I opted for this as shown in picture 10. One reason for doing this was that the front side corners had run a little out of square and I hoped this long annealing process, with the clamps as shown, would cure this. Thankfully it did.

As a test I glued two pieces of scrap Perspex; the edge of one to the flat surface of the other. They were simply left for a week; so before full bond strength had been achieved, and then I tried to snap the joint. It took considerable force.

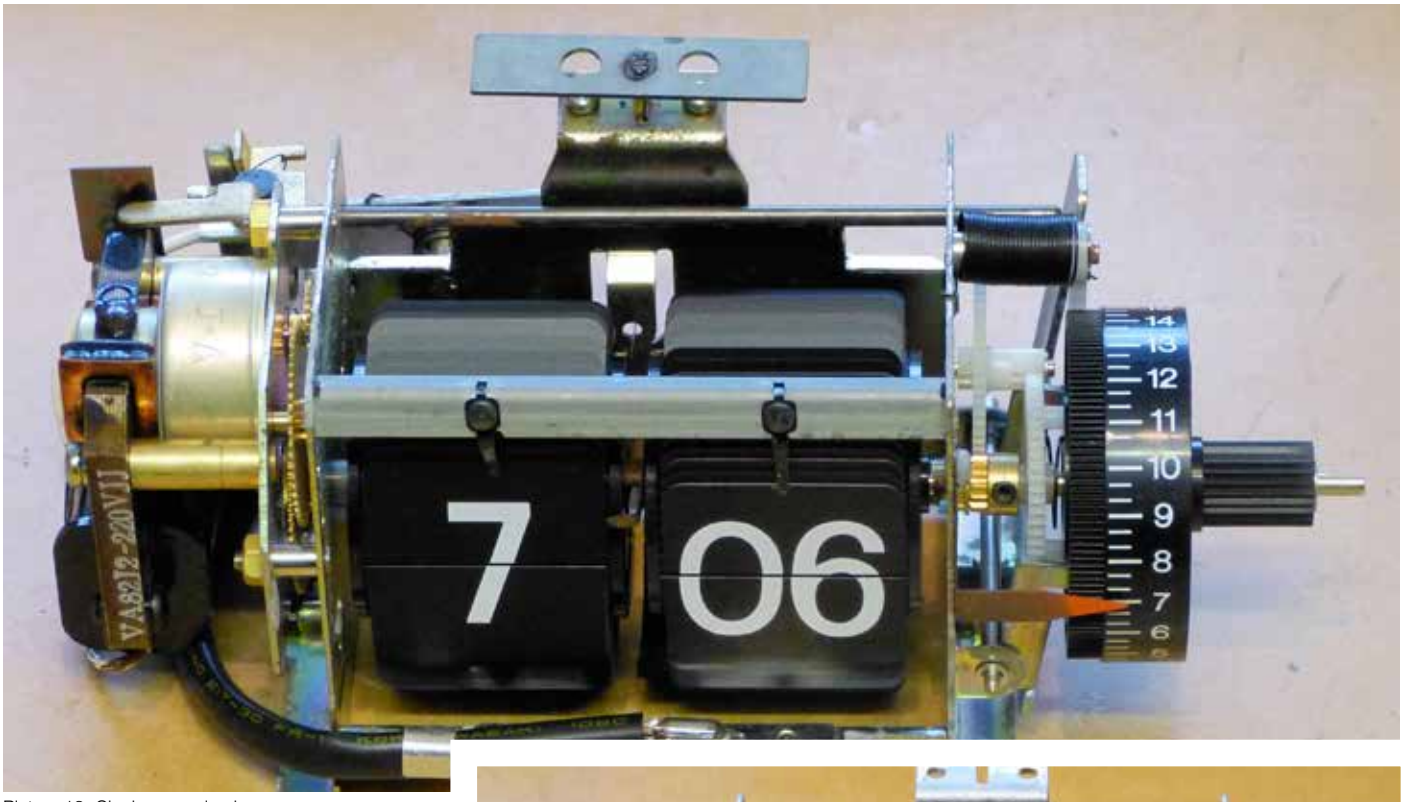
Inevitably the sides and back will be a few 'thou' out of flat, at the top, and this needed correcting before fitting the top. This was done in the usual manner by rubbing out on a sheet of abrasive paper on a flat surface, picture 11. The top could now be glued, picture 12, but I had to remove one clamp at a time as access was so limited. It was easy to keep pressure on the bottom, apply the adhesive and then replace it.

Picture 10. Eight hour cook at 80°C



Picture 11. Flatting out before fitting the top

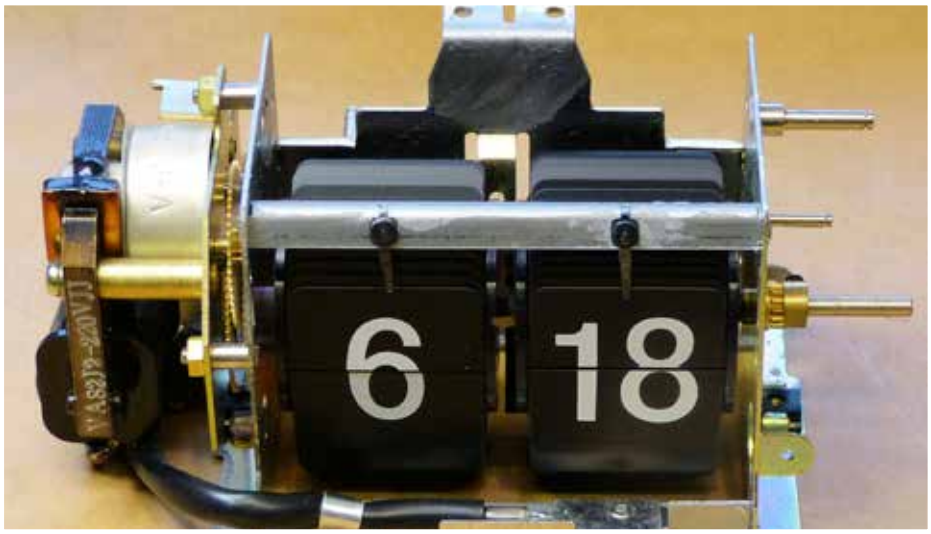
Picture 12. Fitting the top



Picture 13. Clock as received

The clock mechanisms and drilling holes in the Perspex

Two mechanisms were given to me about 5 years ago by a friend, how time flies, and probably date from the 70's before LED displays became common place. As can be seen in pictures 13 and 14 some parts are removed before use as a simple four digit clock. They use a tiny amount of current and ventilation holes are possibly unnecessary but I did drill some under the motor and in the back panel. Of course I also needed to drill holes for fixing, the mains supply cable and for the adaptor, to the spindle, for setting the time. No problems were experienced with this using sharp drill bits and with the Perspex clamped to a board.



Picture 14. Clock stripped for action

The front panel and the clock mechanism

The bottom and the top were made 5mm wider than the sides giving an overhang for the clear Perspex front panel. This was used to advantage by making it an interference fit between them, just by rubbing the edges down, again with the square block.

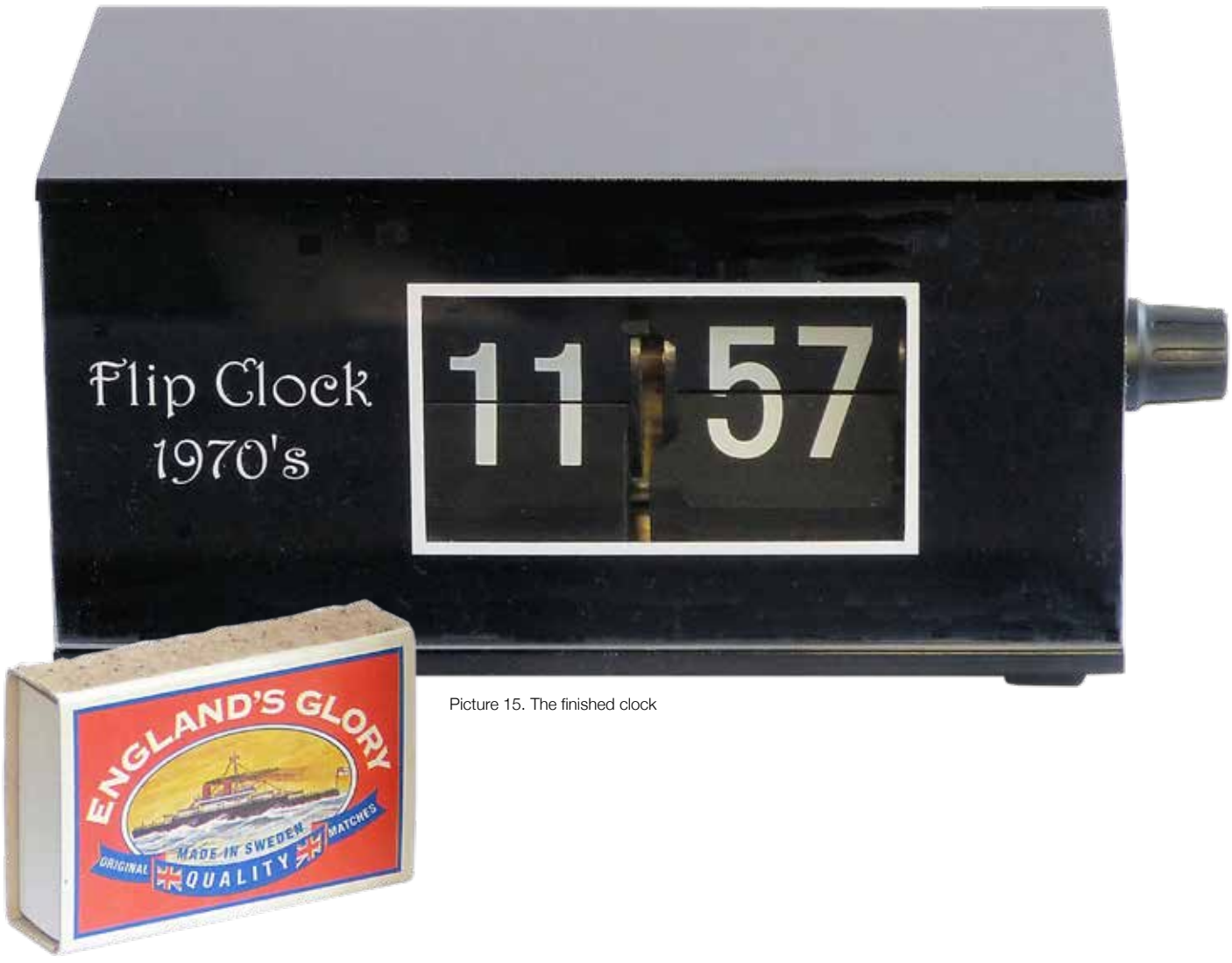
I wondered how to make a mask for the clock digits and did try decal (transfer) paper but it simply didn't print densely enough. Then starring at a CD cover, with its mini booklet inside, I wondered about using photo paper and so far it has worked well. The paper used was top quality and quite thick which I'm sure helps. Obviously, once the front is in place the ends of the paper are trapped by the sides and the rest is held by static cling, achieved by polishing the front with a dry microfiber duster. If in time the static breaks down and the middle of the print sags away then it can probably be held in place by some small pieces of non-hygroscopic Sellotape from the back to the edges. A surprise with the photo paper 'trick' is that the usual adverse optical effects that would be seen if using glass don't seem to occur with acrylic sheet. There may be possibilities here for dial making perhaps using another piece to form a sandwich.

Conclusions

This was an interesting project, with techniques that were new to me and the end result is most pleasing. As I have another mechanism I may case this up but this time in white Perspex.

References

Plastic Sheets.com



Picture 15. The finished clock

Royal Wootton Bassett, July 2018

Photos by Greg Hewitt

P300 -1 TX Valve

KB FB10

As featured on the cover, M.W.T Co. Triple Tuner 1907 - sold for £13,500

Three early french fotos triodes in wooden case

Marconi magnetic detector

Bush TV62

Columbia 112A

M.O.V Cat3 valve

Eddystone EC36B

Marconiphone 709 5" TV and combined radio

Philips 830A

Thermion ' Super Transportabe' AC

Cossor 54 6" TV, 1938


LUMINOSA
WAR II
Remember


BIKO

A selection of stalls seen this year at the NVCF, May 2018, Photographed by Alex Hewitt

Lars Magnus Ericsson Part 1 His life and company

Fons Vanden Berghen

This article fits into the series of articles I have written about 19th century pioneers in the then-upcoming world of telegraphy, the first telecommunication technology. Those were about Samuel MORSE, Louis BREGUET, Werner SIEMENS and prof. Charles WHEATSTONE: their life, activities in the field of telegraphy, their instruments, and their companies. And now it is time to dedicate an article to Lars Ericsson.

Fig 1

Fig 2

Let it be clear from the beginning: I did not do any in depth research regarding the historical facts; some talented people have already done this quite thoroughly. I found some useful general information in the three volumes “LM Ericsson 100 Years” (together 1.182 pages > see the Bibliography [1],[2],[3]) at the end of this article. Those books are fully devoted to telephony, with the exception of a few paragraphs on telegraphy (as I am a telegraph collector, this is somewhat unfortunate for me) . In those three volumes it is stated “Reproduction of the contents of this book is permitted provided that the source is mentioned”. So I was able to copy some paragraphs out of these books, mainly to compile Part 1 of this article (his life and company). Part 2 then is about Lars Ericsson’s telegraph apparatus in general and about the instruments in my collection. And in part 3 it is the same for Ericsson’s telephones. Finally, I have mentioned in an appendix some information about the Ericsson radios.

Note: In the text I will generally abbreviate the name of Lars Magnus Ericsson to ‘Lars’; and when I refer specifically to the company I will often use ‘Ericsson’ or ‘LME’.

How it started and evolved

Lars Magnus Ericsson was born on 5 May 1846. Having lost his father at the age of twelve, he began two years later as a smith's apprentice and smith at various foundries and forges. He also worked at times as a miner and as a labourer on the railways. In a letter written later in life, Lars observed that as a youngster he had longed for a sounder training, above all in the mechanical field. In 1866, at the age of twenty, he moved to Stockholm, taking his small savings with him. There, after a trial period of a week, Lars was taken on as instrument-maker's apprentice by Anton. H. Öller who had founded his telegraph workshop the year before with the aim “to produce, repair and improve telegraph machines”. Öller & C° was Sweden's first manufacturing company focusing on electrical equipment, and telegraph machines in particular. In 1856, Öller had submitted a joint patent application, with a watch maker, for a Morse apparatus that the new company began producing. They manufactured, on a manual basis, instruments for Telegrafverket, the Swedish PTT (See note [1]at the end of this article. Öller’s firm was partly financed by Government subsidies, since the telegraph authorities thought it important to have a Swedish workshop available for repairs, experiments and training. In 1869 Lars Magnus, still working for Öller, heard about an international exhibition planned for Moscow with the Swedish government offering assistance for eight workers from different industries to travel to the exhibition. “By this time, my self-confidence must have grown as I was bold enough to apply and also received a grant” he later wrote. Öller’s warmest recommendations must also have helped. What Lars Magnus saw in Moscow and St. Petersburg revealed to him the necessity of setting off for a few years “out into the great wide industrial world”. Moreover, like many other promising industrialists of his day, Lars, again on Öller’s recommendation, obtained a Government travel grant, which provided for training, studies and work in some of the more industrially developed countries of Europe He spent the years 1872-1875 in Germany and Switzerland, studying electro-technology. In order to acquire practical experience, he worked for about two years in one of the most prominent electro-mechanical engineering companies in Europe, Siemens & Halske of Berlin. Fig. 5 shows the first known working-drawing from Lars Ericsson’s hand! It is from his period of study in Germany. In 1876, at the age of 30, he left his employment at Öller’s, and in April he opened an engineering workshop ‘to repair instruments’, together with a fellow worker from Öller’s, Carl Johan Andersson. The business had begun under modest circumstances in a 13 square meter kitchen in a courtyard building in Stockholm. The firm was given the name “L M Ericsson &

Fig 3

Fig 4

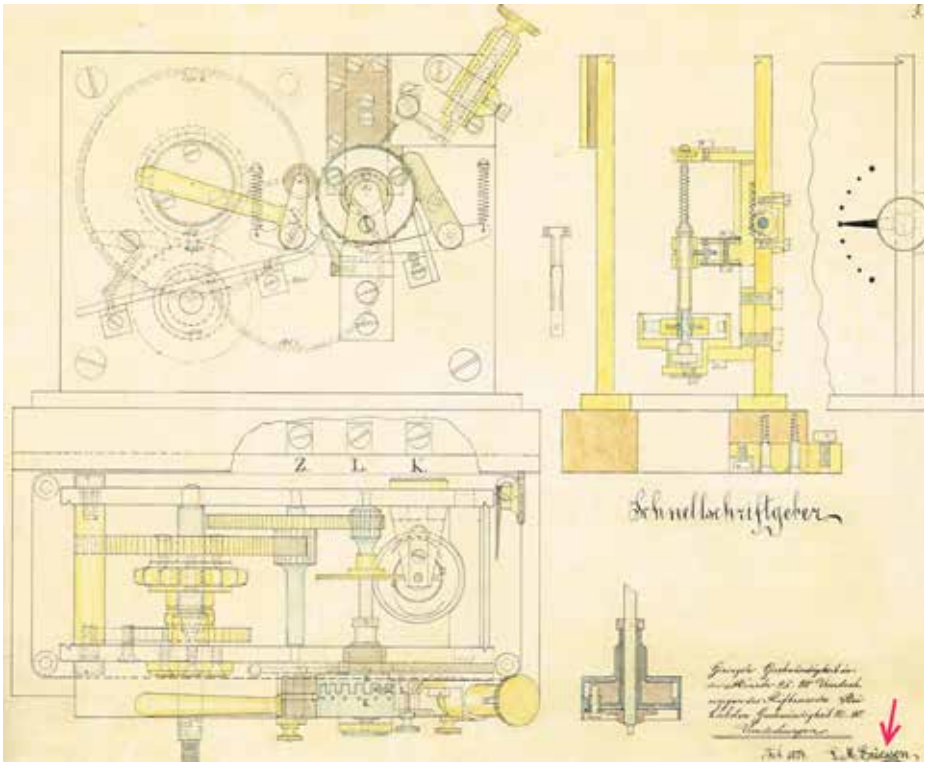
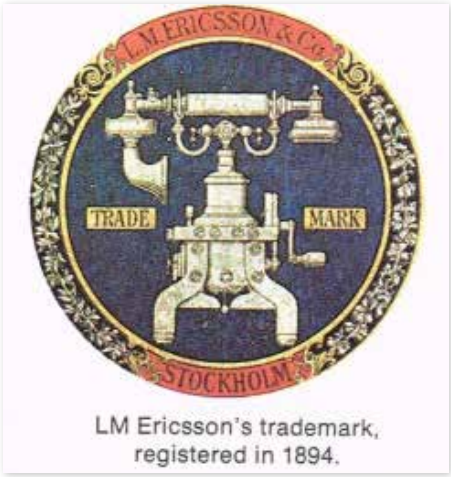


Fig 5


Fig 8



LM Ericsson's trademark, registered in 1894.
Fig 9

Fig 6


Fig 7

Fig 10

Fig 11

Co Mekanisk Werkstad Stockholm" (fig. 3 and 6). Carl Johan Andersson remained a part-owner until 1886. The job consisted mostly of the repair of instruments and various kinds of apparatus, and of simple manufacture. Soon the major tasks were the repair of "pointer" telegraphs (were these needle telegraphs or dial/ABC ones?) for the railways as well as Morse instruments for the public network. When 'L.M. Ericsson 'mechanical engineering workshop' opened its doors, the first customer was the Stockholm Fire Department, which, on April 6 paid the sum of a mere SEK 2 (Swedish crowns) for some repair work. But this laid the foundation for a global company, although Lars Magnus Ericsson himself had obviously no such ambitions when he started his company. The Swedish State Railways quickly became the largest customer. For the first fiscal year, the company's profits amounted to SEK 298. In 1876, an instrument maker earned about SEK 18 per week for 65 hours work.

In 1877, Ericsson obtained his first contract with Televerket [1], the Swedish "PTT", and began to compete with his former employer Öller, particularly in the new telephone technology. In 1878 Lars married Hilda Simonsson (fig. 7). Hilda was 17 and still a minor, so they had to apply to the king for permission to marry… They had three children within three years, the marriage was a long and happy one. It is known that she played an active role in both his practical and theoretical work. He talked to her about his creations in the making; from her came the encouragement to continue his exertions, he confessed his difficulties to her, he sought her criticism.

In 1877, Öller had quickly incorporated the telephone into his range, producing the first model in the same year. But after that, LME took the lead. In 1886, the competition from his former employees became too much for Öller, and he decided to phase out most of his production. Not only had Lars succeeded in making cheaper and better devices than Öller & Co, but he had also won over Öller's most highly-skilled employees by offering them higher salaries. Amongst them we can mention J.A. Lindholm and John Wikstrom (I return to them later in chapter 2.2.2.). Anton Öller died in 1889, whereupon Öller & Co was shut down after 33 years of operation.

So by 1877 the telephone had come to Sweden. The first demonstrations were held in Stockholm in August of that year. One of the first customers was Henrik Thore Cedergren, who installed telephones connecting his jewellery store and his residence on the same street. Cedergren was the man who a few years later would start Stockholms Allmänna Telefonaktiebolag (SAT). We will meet this company later in this story.

No one knows exactly when Lars Magnus Ericsson himself first came into contact with the new invention. It may have been at the end of 1877 or in early 1878. It is clear, however, that he soon received telephones for repair and that he not only immediately realized the telephones possibilities, but also discovered weaknesses in Bell's design that he subsequently began to correct. The first time a telephone is mentioned in Ericsson's business

Fig 12

Fig 13

Fig 14

records was on March 4, 1878, when he received SEK 4 for the repair of six telephone sets. The first telephones manufactured by Ericsson were presented later that year. The first two telephones with “ear trumpets” were delivered to a customer on November 14 at a price of SEK 55 per pair. As early as 1879, the telephones bore an elegant and image-enhancing label in the form of the name “L M Ericsson & Co Stockholm” embossed in gold against the background, in a style typical of the times. By 1880, Ericsson's workshop had ten employees. Production now consisted of telephones, telegraphs and various types of electrical instruments. By 1882, there were 50 employees who worked 65 hours a week. The company now supplied complete wall phones in a model that soon became known throughout the world as the “Swedish pattern” and that were using the ‘helical’ transmitter (the spiral microphone): fig. 8.

In 1884, a technician named Anton Avén at Stockholms Allmänna Telefonaktiebolag (SAT) combined the earpiece and the mouthpiece of a standard telephone into a handset. It was used by operators in the exchanges where operators needed to have one hand free when talking to customers. Lars picked up this invention and incorporated it into his regular telephones (fig. 13). At the time of incorporation in 1896, Lars Magnus Ericsson's company had grown into a major enterprise and manufacturing plants had to be erected. There were more than 500 employees, and the major share of production was exported. By June 1, 1896, his workshop had produced 100,000 telephones. The company was transformed into a limited liability company and Lars Magnus Ericsson was appointed as both president and chairman of the board. The new company was named “Aktiebolaget L M Ericsson & Co”[3]. The share capital amounted to SEK one million. Of the one thousand shares, Lars retained 900. The others were distributed among his oldest and most worthy employees. Lars Magnus Ericsson resigned from the presidency of LME in November 1900, and from the chairmanship of the board in February 1901. He saw fit to retire from LME- in spite of the fact that he was still, at the age of 55, in his prime. He preferred to spend the rest of his life on the Alby estate, which he had bought in 1895

That he should have left his company this early, just at a time when it was expanding, may seem remarkable in that he still, as far as can humanly be judged, had a great deal to offer it. But Lars Magnus Ericsson had a sense of proportion, and once the increasing scale of the business prevented him from following and controlling every detail as he had been used to do, he decided to hand over the responsibility to others. Also he may have been thinking of his father, who died at the age of 54. Part of the answer is certainly that he wanted to do something else with his life. He had been working hard from the age of 12, first to earn a living and then for his company. And there may have been another reason. Members of the family later said that he was sick and tired of trade union demands… Lars Magnus Ericsson died at the age of 80 on December 17, 1926, the year in which the company he created celebrated its 50th anniversary.

Ericsson further on without Lars Magnus.

During the first decades of the 1900s, there were several changes in Ericsson’s ownership structure. The first of these was a strategically important transaction at the turn of the century, when Ericsson acquired AB Telefonfabriken from Stockholms Allmänna[2] Telefonaktiebolag (SAT). Payment was effected with Ericsson shares, meaning that SAT with its major shareholding gained direct influence in Ericsson. At the same time, Lars Magnus Ericsson’s importance for the company declined, due to a reduction in his ownership share and his resignation from both management and the board of directors. This transaction created significant mutual interests between Ericsson and SAT, which was one of Ericsson’s largest customers, and led to a merger of the two companies in 1918. In 1920, the name of the Company became Allmänna Telefon AB LM Ericsson. The acquisition of other telecommunications companies put pressure on Ericsson's finances; and in 1925, Karl Fredric Wincrantz took control of the company by acquiring most of the shares. In 1926 the company was renamed Telefon AB LM Ericsson. Financial difficulties in the early 1930s (it was caught in the machinations of Ivar Kreuger, the notorious Swedish financier and confidence man.), contributed to the signing of an agreement with the International Telegraph & Telephone Corporation (ITT), in which the American company gained a majority ownership share of Ericsson. After the turbulent ownership changes during the 1920s, Ericsson’s ownership structure from 1932 onward was remarkably stable. Apart from ITT, which during the 1930s owned about a third of Ericsson’s shares (A series > voting right) , Handelsbanken had a shareholding of slightly more than 20 percent. while the Wallenberg family sphere held just under 7 percent. These last two groups remained the major shareholders until the mid-1990’s. In 1960, the Wallenberg family arranged with ITT to buy its shares in Ericsson, and has since controlled the company. In 1976 Ericsson introduced its AXE switching system. The AXE was the first fully digital switching system, converting speech into the binary language used by computers. This system was an immediate success, winning virtually every major international telecommunications project.

Ericsson got caught up in the ‘Dot-com bubble’ of the late 1990s. But then came the telecom crisis of 2000.

The company issued a profit warning in March 2001 and launched several rounds of restructuring, refinancing and job-cutting. During 2001, staff numbers fell from 107,000

Fig 15

Fig 17

Fig 16 & 18

to 85,000. A further 20,000 went the next year, and 11,000 more in 2003. Fortunately the company had survived as mobile Internet started growing. With past record profits, it was in better shape than many of its competitors. The major fund administrators pointed both to the seriousness of the crisis and the failure of Ericsson's cell phone operations, which by October 2001 had been merged with Sony. “Sony Ericsson” remained in operation until February 2012, when Sony bought out Ericsson's share. As from 2003 the emergence of full mobile Internet began a period of growth for the global telecom industry, including Ericsson. Ericsson started a series of acquisitions to strengthen its position in key technologies and market segments. [The first of these was Marconi (as we know well, a company dating back to the dawn of radio), whose assets included a strong portfolio in transmission, fiber optic and fixed network services. Further acquisitions included for instance Redback Networks, Entrisphere, Tandberg TV, … These are just a few examples. It is impressive what has happened from the early 2000’s up to now in several restructurings, acquisitions, mergers, joint ventures, co-operation agreements, partnerships, as well as sales of own divisions and daughter companies, divestments,... In May 2018, SoftBank partnered with Ericsson to trial new radio technology!

Today (2018) the company employs around 100,000 people and operates in around 180 countries. Ericsson holds over 42,000 granted patents as of December 2016, including many in wireless communications.

International expansion

The real growth of the company started in the 1880s in the form of an expanding export market. In 1881, the company’s international business was very small and limited to other Nordic countries. By the end of the decade, however, its telephones were appearing in western Europe, Great Britain, and Russia. If LM Ericsson’s export business expanded in the 1880s, it exploded in the 1890s. The company began selling telephones in Australia and New Zealand. Late in the decade it sold telephone exchanges that switch calls, as well as telephones in South Africa. During the Boer War, LM Ericsson supplied field telephones to the British armed forces. In 1899, LM Ericsson opened its first foreign factory, in St. Petersburg, Russia; by the turn of the century it had begun selling telephones in China and the South Pacific. In 1900, exports accounted for about 90 percent of LM Ericsson’s total sales. As we have seen, Lars stepped down as chairman in 1901. Even without the guiding hand of its founder, Ericsson continued to conquer international markets in the years leading up to World War I. It began selling equipment in Egypt and set up manufacturing subsidiaries in Great Britain, the United States, France, and Austria-Hungary. It also began installing telephone exchanges, joining with SAT to set up a network in Mexico in 1905. Ericsson suffered during World War I as hostilities cut off most of its foreign markets. Exports were limited to Russia and neutral countries. The outbreak of World War II did not make things any easier. The German invasion of Poland eliminated a foreign market that had been an important source of revenue. The company lost about a third of its export sales during the war as well as foreign assets that were destroyed or nationalized. On the other hand, Ericsson did benefit from Sweden’s military build-up and manufacturing of telephones, aircraft instruments, machine-guns, and ammunition for the military. Despite the nationalization of its Mexican subsidiary in 1958, sales in Latin America and Australia boomed in the 1950s. Profits grew, and the company expanded steadily throughout the post-war years.

Here follows a few more details for a limited number of countries where the Ericsson company was active in its earlier years.

*Scandinavian countries. It is obvious that the company soon became a major supplier of telephone equipment to the Scandinavian countries.

*UK. During the 1890s LME developed important markets in certain non-Nordic countries in Europe. These included primarily Great Britain and secondly Russia. LME had entered the British market in the late 1880s, and in the following decade this became LME's most important sales region, by a wide margin. Orders came mostly from the large British telephone operating company, the National Telephone Co., through its sales office in London that was opened in 1898. Since there was no major telephone manufacturer in Britain, telephone equipment was imported, to begin with from the USA, but from the end of the 1880s also from Sweden. The General Post Office bought LME's products. In October 1903 negotiations with the National Telephone Co. resulted in the formation of the British LM Ericsson manufacturing Co. Ltd. (‘British LME’), each party holding 50% of the shares. Production began in the factory in Beeston in 1904. After 1911, when National Telephone handed over the telephone network to the British Post Office, the latter became British LME’s biggest customer.

*Russia. At the end of the 19th century, there were many Swedish entrepreneurs active in Sweden’s eastern neighbour, which was also the largest country in Europe. Scandinavians were particularly well represented in the Russian capital, St. Petersburg, where they formed an expatriate community who also met privately and discussed business. Among Ericsson’s competitors, Siemens & Halske had already set up a telegraph factory in St. Petersburg. In the summer of 1896, Ericsson decided to buy a site in St. Petersburg for a factory and accommodation. Production started a year later in rented premises; this included assembling telephones from parts supplied by the parent factory. In 1900, these operations moved to the new factory. Lars Magnus took a deep interest in the Russian company and often visited St. Petersburg. The Russian operations, however, were abruptly terminated by the Revolution in 1917.

*France. The first order in France came in 1909 to replace the telephone exchange that was burned down in the autumn of 1908 in the rue Gutenberg in Paris (6.300 lines). In May 1911 a French limited company, the Société des Téléphones Ericsson (STE) was formed, in order to acquire further markets in France. And already in 1912 a factory was completed in Colombes, outside Paris. The production started in 1913 but it was only after the war

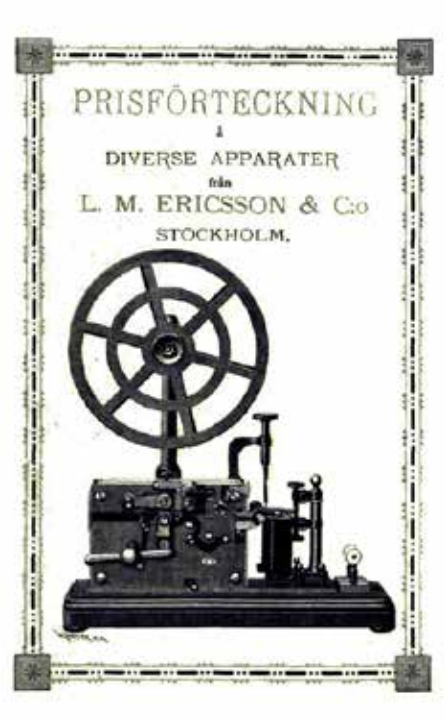


Fig 19

Fig 20

Fig 21

Fig 23

that this factory began to produce telephone equipment in earnest. In 1927 Ericsson sold the majority shareholding in STE to the Compagnie Générale d' Electricité (CGE).

*The Netherlands. The N. V. Nederlandsche Telefoonfabrieken was established in Rijen in 1920. An engineering works, in which LME had taken over two-thirds of the share capital, was reorganized to produce telephone equipment for the Dutch market, including the colonies. The factory developed slowly, and with great difficulty. For the whole of the period up to 1931, the Group lacked its own sales organization in Holland, its products being sold instead through the firm of Koopman and Co. in Amsterdam.

*Austria-Hungary. In 1910 the company Deckert & Homolka, well established in this dual monarchy with factories in Vienna and Budapest, began negotiations with LME Stockholm. This resulted in November 1911 in the formation of a Hungarian company and in 1912 of an Austrian one. LME subscribed to rather more than half of the share capital. Here World War I brought about an increase in orders and full employment for the two factories.

*Czechoslovakia In the early 1920s, LME was involved in Czechoslovakia through its branch factory in Prague. A partnership company was subsequently organized, in which the Austrian company had the majority shareholding. The factory was not profitable, and Ericsson was compelled to reorganize its operations in Prague. In January 1929, 'Ericsson Elektrizitäts Kommandit-Gesellschaft Scholta & Co'. became a partner in 'B., K. Prachalové a Spol' , a family company with a factory in Kolin.

There is a telegraph instrument of this company in my collection that can be seen in 2.2.1.

*Spain. Ericsson was established in Spain in 1922 and opened there its first factory in Getafe (Madrid) in 1924. In 1926, Ericsson made its first contribution to the Spanish telephone network with the installation of a central AGF exchange in San Sebastian. Until the late 1960s, Ericsson had a presence in areas such as telex and strategic networks for the military, and in 1969, Ericsson was chosen by Telefonica as a supplier of transmission equipment.

*USA. At around the turn of the century, LME's agent in New York had developed a certain market for LME's exchange equipment and telephone sets amongst telephone companies outside the Bell Group, the so-called "independent telephone companies". In order to create better prospects for an increased flow of orders the LM Ericsson Telephone Manufacturing Co. was formed in 1904. It proved not to be a success and the production of telephones was replaced by the production of electrical ignition devices for cars. Due to bad business the production was stopped in 1920 and all assets were sold early in 1923.

*MEXICO, AUSTRALIA, BRAZIL:
I mention these three big countries briefly just to say that these overseas markets came to be of a prime importance to LME during the post-World-War II period.

Catalogues

The Ericsson company had the good idea of putting a lot of catalogues (about 70, including a few leaflets) on one of its websites; see ref. [3]. That is certainly good news for collectors. As I mentioned regarding the books, here also the material is mainly about telephones. For me and my fellow telegraph collectors there is only one catalogue that completely deals with that subject, and in others there are a few pages dedicated to telegraphy. Here I list the most important catalogues, and add a few comments. Note that this LME list does not include all the catalogues that were published over the years; far from it, and there are many gaps. So, dating an item based on the date of the catalogue in which it first appears has its risks, as it might be some years older.

1886: In fig. 19 you can see the cover of a 24-page catalogue issued in June. As it is most probably the company's very first catalogue, showing the earliest products, I will enlarge upon it. The photo on the cover shows the typical Ericsson telegraph (cost: 220 SEK). I believe it is the first one that Lars had made. On page 15 we find the complete (but limited) family of telegraphy items that was in production at that time.
(fig. 20) The next images show the then-available telephones: the first two wall models(fig. 21) and the first desk set model (fig. 22). This desk set has a microphone that is fixed on a movable arm, with the microphone and earpiece separated. Further on this catalogue showed some small switchboards and a large one, galvanometers and a special fire-alarm telegraph. Somewhat remarkable: Lars did not make his own morse key at that time. My surmise is that he bought them from Öller. The language in this catalogue is Swedish.

1889: (48 pages) This one had the same telegraph and also a very nice portable one (it can be seen in the 'telegraph group photo' out of the catalogue of 1892 (fig. 25). I will present it later in detail in Part 2. This time there are three different wall telephones (labelled No 1, 2 and 3 in image 24) and the same desk telephone. Swedish language.

1892-1: (67 pages) Same situation on the telegraph front. Regarding the telephones, as well as the aforementioned desk set, this catalogue also showed the common "Skeleton": the one with a 'handmicrotelephone'. And there is also this Skeleton that has two handles (to ring the opposite person): see the red arrows in fig. 24. The idea was that in that way the apparatus was particularly suited for writing tables and desks at which two persons were sitting opposite each other (a telephone was expensive) see . Besides the five different wall telephones there was also a portable telephone model in a wooden box available. Compared with the 1889 catalogue there was one change regarding the telegraph items: the addition of a fire-alarm one. And this catalogue showed more switchboards. In Swedish.

1892-2: A supplement of 4 pages. Here appeared the nice table telephone with the bell. In Swedish fig. 23).

1892-3 (30 pages) A limited telephone catalogue with 3 pages on telegraphy.


L. M. Ericsson & C:o Mekaniska Verkstad, Stockholm.

Fig. 3

Telefonapparat för skrifbordet. . . . . . Pris 90 Kr.

Lika anordnad och i besittning af samma egenskaper som den föreg., dock med svagare ringverk (ringer på 5000 ohm). Tillverkas endast med den äldre mikrofonen.

Telefonapparat för mellanstation. . . . . Pris 95 Kr.

Till det yttre lika med ändstationsapparaten (fig. 1 & 2). Afsedd för mellanstationer å linier, som upptaga flera stationer efter hvarandra på samma tråd och konstruerad med hänsyn dertill att pågående samtal mellan tvenne stationer icke skall kunna uppsnappas af de öfriga.

4

Fig 22

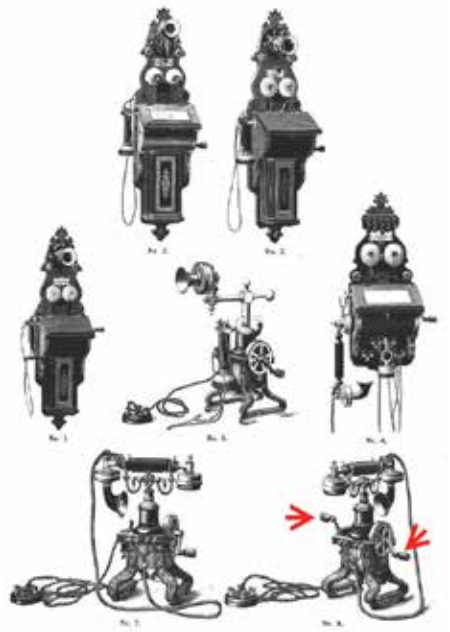


Fig 24

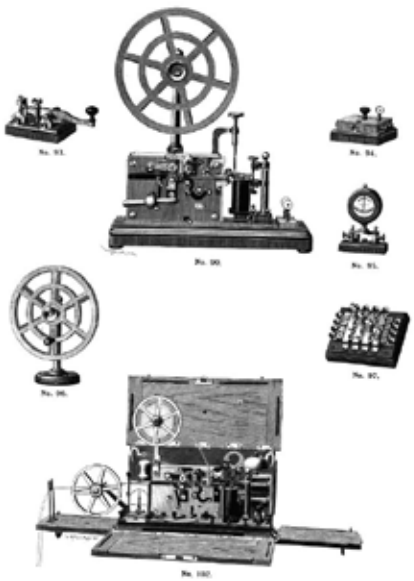


Fig 25

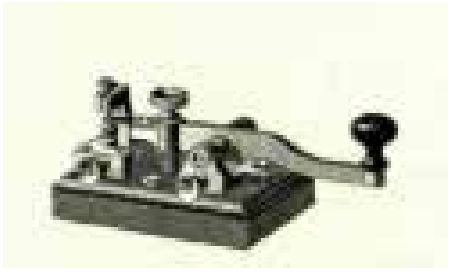


Fig 26

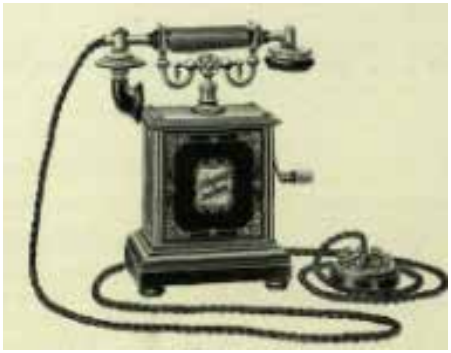


Fig 27

Fig 28

Fig 29

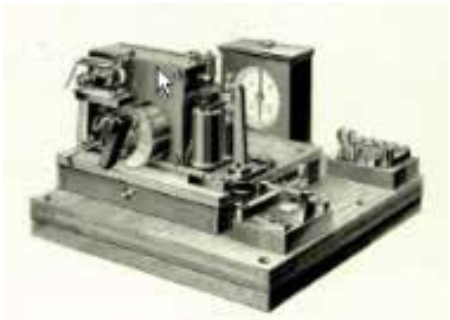


Fig 30

Fig 31wv

It has some group photos of which two are very useful, which is why I am putting them hereafter in full glory (fig. 24 and 25). In English, German, French.

1897: (131 pages) -4th. Edition - Telephony, fire alarms and 5 pages on telegraphy. It includes the 'standard' and the portable field telegraph station and now also a single morse key… (fig. 26) In English, French , German.

1901-1(Swedish), -2(English) & -3(German). Here appears the table telephone that encloses all the working parts in a black metal box (fig. 27).

1902: (253 pages!) - 5th Edition – It has a lot of good descriptions, including schematics. Still the two known "Skeletons" from 1866 and 1892. Here appears the elegant model nicknamed 'the Spider' (fig. 28). It even includes 8 (eight!) pages on telegraphy, showing the old model, the 'German' model (see Part 2) and also the portable telegraph. In English, French & German.

1910-1: (42 pages) – Section S – 3rd edition –Line protection (lightning protection &c… In German-

1910-2: (39 pages) – Section M – 6th edition – Portable telephones (fig. 29) and the one portable telegraph of above.

1910-3: (42 pages) – Section S – 6th edition - Line protection (as in 1910a) - English, French, German

1911-1: (171 pages) – Section A-C – 6th edition – Only telephone instruments – The 'barrel' telephone makes its appearance fig. 31). English, French, German

1913-1: (35 pages) – Telephone switchboards and accessories

1913-2: (180 pages) – Section O - 6th edition – Switchboards - English, French, German

1913-3: (157 pages) - Section O - 6th edition – Switchboards – Swedish

1914-1: (19 pages) – Telephone accessories - English

1914-2: (117 pages) - 6th edition – Telephones – Swedish

1914-3: (45 pages) – Section TA-TF – 6th edition – Telegraphy!! - Hurrah, fully devoted to telegraphs; at last! A real titbit (for me). Unfortunately, there is no other vintage of such a catalogue on the LME list. It covers: the 'classic' models TA100 and TA110, the 'German' ones (like fig. 30) TA200, 210 and 220, a sounder, several keys, galvanometers, paper tape wheel, relays, repeaters, spare parts,… Most of them will 'come to life' in Part 2 . The texts are in Swedish.

1922 -1,-2 and -3: Price tables, respectively #8; #9 and # 10 – Swedish

1923-1: (59 pages) –Section A-C - 7th edition –Telephones - Swedish

1923-2: (51 pages) - Section H - 7th edition –House exchange telephones

1928: (53 pages) – Section H – Telephones for multiple connections – Swedish

1930-1: (162 pages) – Section A-D, H - N°128 – 7th edition – Telephones: in French & Spanish

1930-2: (283 pages) – N°122 – Telephony – A lot of items, but the description is in Swedish. It has still four versions of the Skeleton: AC110, Ac120, AC 130, AC 200.

Five pages on telegraphy, including the TA100, the 'original' telegraph – In Swedish

1934-1: 63 pages) - Telephones > no longer the Skeleton, Fire alarm, …-In Swedish

1934-2: (139 pages) Telephones & signalling equipment, alarm systems - #188

1934-3: (139 pages) N°188 - Telephony and signalling equipment, fire alarm,… Here appear the classic telephones from the 1940s and 1950s, made of bakelite/plastic – In English

1935-1: (217 pages) – N°189 – Main catalogue – Telephony & alarm systems – In English

1935-2: (208 pages) – N°190 –- #ditto – In Spanish

1935-3: (181 pages) – N°195 - ditto – In Swedish

1935-4: (209 pages) – N°197 – about the same as 1935-3 – In Swedish

1935-5 up to 1935-12: - about alarm systems and promotion leaflets

1935-13: (209 pages) - N°200 – General catalogue – Same as 1935-1 – In French

1935-14: Identical to 1935-13

1935-15: (304 pages) – N°132 - Telephones and also five pages on telegraphy with the typical old-style telegraph, including spare parts

1937: (28 pages) – N°601 – Switchboards for LB systems – In Swedish

1938: (9 pages) – N°606 – Alarm systems – In Swedish

1939: (425 pages!) – N°610 – Main catalogue – again nothing about telegraphy… In Swedish

*Further catalogues (from 1942 till 1969) These are of no interest here as they deal with other areas or are leaflets, with the exception of

1945 1&2: resp. N°646 in English (375 pages) and N°648 in Spanish (376 pages) which deal with telephone spare parts

Look out for part 2 and 3 in the upcoming issues of the Bulletin.

A decade and a half of Excellence - Arthur Atwater Kent and his radios

Peter Lankshear

One of the most respected and successful American radio manufacturers was Arthur Atwater Kent whose receivers incorporated top grade fabrication and components, many of unique design and with plenty of eye appeal. Today these receivers are valued by collectors and many are still capable of excellent performance. Throughout this article there will be examples illustrating various annual developments, but it should be realised that a full list of models and variants produced over the production period amounts to about 300 different models! It takes a book to cover them all. appended is an article illustrating the progress of technology over a decade, by comparing a 1936 model with a best seller of 1926.

Figure 1 The 1924 factory at 4700 Wissahickon Avenue Philadelphia covered 15 acres. In 1928 a companion building was built in the neighbouring block at the top left of the picture

The reluctant student.

Arthur Atwater Kent was born in Burlington, Vermont in December 1873. His father had been a Civil War surgeon but was also a skilled and inventive machinist and it is clear that he passed on these attributes to Arthur, who from a young age, developed a keen interest in machinery and especially, electric motors. In common with others who became leading industrialists, he was impatient with formal education and whilst still at college developed and marketed small electric motors for fans and sewing machines. His family name was Kent but he preferred to add his mother's name of Atwater, and as he didn't like Arthur, he was generally known as Atwater Kent.

In 1902 Kent moved to Philadelphia where he successfully established a business making small electric instruments such as meters and intercommunicating telephones. In 1905 he purchased his first motor car

Figure 2 Arthur Atwater Kent observing the testing of a model 20C receiver

and the solving of ignition problems he encountered led to his making his first fortune.

Early automotive ignition systems were primitive, often using trembler spark coils, one for each cylinder and energised from a battery by a very basic low voltage distributor. (A well known car using this system was the ubiquitous Ford Model T.) As each cylinder fired, across its spark plug there was a stream of sparks, whose timing was not very accurate or optimum. Kent knew that it was the initial spark that ignited the fuel and that the rest of the sparks were wasted and with a power source comprised often of dry cell batteries this could be expensive. In 1905 he patented an adjustable, cam driven low tension contact breaker and began manufacturing his "Unisparker" system, combining contact points, condenser, centrifugal advance system, high tension distributor and ignition coil. This combination of course was what became the industry standard in use until the advent of electronic ignition. Unisparker kits were available for retrofitting to existing cars and increasingly, as original equipment to new vehicles. By 1915, 45 different models had Unisparker ignition. Kent set up a network of agents to provide sales and service and expanded his productions to include other electrical automotive accessories such as starter motors and lighting equipment.

Eye appeal

Arthur Kent had an eye for good looking well finished equipment and components. He was clearly a perfectionist, very fond of the combination of gold in association with dark reddish brown mahogany colour. At one stage, Atwater Kent badges were actually gold plated! The finish on Atwater Kent components, especially the Bakelite pressings, was superb. Even the automotive components were beautifully finished and stood out among the normal utilitarian car equipment.

Business boomed and when America entered World War 1, as well as for his normal automotive items, Atwater Kent contracted to the Government to provide optical artillery instruments to the U.S. Army. By War's end he had made his first fortune.

With the War ended, radio as a hobby was increasingly popular and Kent himself became interested. He saw that here was a possible market for making components for amateurs and enthusiasts. His Unisparker patents would soon expire, and with them his royalties. Sales were declining as increasingly, car manufacturers were installing as original equipment the accessories that previously he made. Already a multi millionaire, it is reported that he was seriously considering closing down his plant. Meanwhile in radio he had a hobby interest.

His factory was well suited to produce radio components. There is a close similarity between audio transformers and ignition coils, he already had coil and capacitor winding facilities, his machinery was ideal for making metal components and pressings, and his Bakelite moulding facilities second to none. Furthermore, Atwater Kent had an established country wide network of agents and distributors. He put his plant closing "on hold."

Breadboards 1922 - 1924

Initially he made popular items like variable capacitors, variometers, vario couplers, amplifier and detector units. It was convenient at that time for hobbyists to mount components on a wooden board and in the days before sliced bread, an essential item in every kitchen was a breadboard. With mortised end pieces to prevent warping these proved very suitable and readily available for home radio construction. The term "breadboard construction" is still used today for experimental "hookups".

To display his components Kent mounted

Figure 3 Model 20C 1925/26 - The model 20 was the repackaged popular 5 valve Model 10 Breadboard, dating from about 1923. In 1925 Kent reduced the size of the type 20 cabinet without compromising performance to create the best selling 20C. Over 250,00 were made. There were two separately tuned R.F. amplifiers, a tuned grid leak detector and two audio stages. With it in the photo is an AK type L horn speaker. There is a fuller description in the accompanying article.

Figure 4 Model 55 1929 - The year 1929 saw the introduction of the new '24 screen grid tetrodes. The 55 has two 224's as R.F. amplifiers, two type '27' as detector and audio stage, a pair of push pull 245 triodes output stage and a type '80 rectifier. The loudspeaker is a 10 inch moving coil unit. By 1930 the 55 had grown to become the 60 and 70 series with massive chassis and three R.F. stages.

them on his own 'boards, but naturally these were not the plain kitchen variety. By the end of 1922 he was selling assembled receivers on highly polished mahogany boards, and with the attractive Atwater Kent components, they looked a picture. Today survivors can command astronomic prices at auctions. In the next two years, he created nearly two dozen different varieties, with this construction, and in various configurations and valve counts, but unlike some other makers and designers, and with good reasons, he never incorporated performance enhancing regeneration. The owner could fit a variometer for regeneration himself if he wished to have this feature. One reason for the omission was that the RCA group held the Armstrong patents and demanded sizeable royalties for the few licences they issued. Another reason was that regeneration requires a degree of skill to operate properly and Atwater Kent was looking to the future when radio would become a household entertainment source and non-technically literate listeners would want easy to use uncomplicated receivers. We saw a similar situation when personal computers first became available. Many potential users who had been discouraged by the arcane and complex DOS were won over when the much more friendly Windows arrived.

Kent could see a future in broadcasting and in 1924, moved into a purpose built factory at 4700, Wissahickon Avenue. This was no ordinary factory. It covered 15 acres with many up to date features such as its saw tooth glass roof that let in plenty of light.

The first cabinet model 1924

Beauty is in the eye of the beholder and while the technically inclined enthusiasts loved the breadboards other family members might be less captivated by a complicated dust catcher cluttering up the living room. By 1924, other manufacturers were putting equipment in cabinets that fitted more into a domestic decor. Usually controls were on a vertical front panel with components mounted on some sort of horizontal shelf inside. In April of that year, Atwater Kent announced the cabinet Model 20 TRF. Based on one of the more popular of the breadboards, the model 10 of 1923, its circuit arrangement consisted of two tuned R.F. amplifiers, a grid leak detector and two transformer coupled audio stages. This arrangement provided sufficient gain and selectivity for most situations and industry wide was probably the most common

Figure 5 Model 84 type 1 1930/31 - Kent's first "midget" receiver and a first generation superhet. Three '24 valves as mixer, IF amplifier and detector. There was a '27 oscillator, '47 ouput valve and type '80 rectifier. The second type soon followed, using variable mu '35 valves as mixer and IF amplifier, solving the problem of effective gain control and difficulties coping with strong signals.

configuration. By 1925 the Model 20 was selling well, but before long, Atwater Kent, ever conscious of eye appeal reduced the size of the cabinet significantly but without compromising performance to create the very successful 20C, (Fig.3) whose sales eventually totalled nearly a quarter of a million.

With an increasing number and variety of radio stations and the availability now of loudspeakers, family members were becoming increasingly attracted to broadcasting, but the complication of having several tuning knobs was a deterrent to many non technical users. It was a common observation that it was a good idea to have three hands for tuning these sets. The next development was therefore to link the individual tuning capacitors together by phosphor-bronze belts.

Sales were boosted by extensive nationwide advertising and business boomed, reportedly at more than 6000 sets a day. To put this figure into perspective, assuming a ten hour working day, the factory was turning out a receiver every 6 seconds! In 1926 Atwater Kent announced its one millionth set, a model 35, essentially a neat steel cased single knob version of the model 20 with an additional untuned valve for aerial coupling.

Mains power 1927

In 1927 Kent's first mains powered receiver was introduced. Instead of the battery lit 201A triodes in use previously, it used the first AC heated valves in general use, the 1.5 volt and 1 ampere filament UX 226 and the 2.5 volt indirectly heated UY227 detector that had become available. These valves had similar characteristics to the 201A but eliminated the expensive and messy lead/acid filament battery. Mains powered supplies also eliminated the even more expensive high tension batteries. This convenience, together with metal cases and cabinets meant that sales soared.

By 1928 Atwater Kent had a second factory alongside, bringing the total area to 32 acres. It was claimed to be the biggest radio factory in the world and it was now possible by using massive automotive type presses for elaborate metal cabinets and fittings to be stamped out.

Early 1929 saw the introduction of the landmark screen grid tetrode valve, the type 224 which revolutionised the design of R.F. amplifiers, permitting stable high gain without neutralisation or stabilising resistors. Atwater Kent responded with his model 55.(Fig. 4) Housed in a handsome steel case it was a TRF with two R.F. stages, a biased triode detector and an audio stage driving a pair of the new type '45 power triodes. The 55 was capable of supplying several watts of good quality audio to its moving coil speaker mounted in a separate steel housing. Shortly after its introduction the 55 was given an internal frequency calibrated dial with a pilot light. The traditional 0 -100 dial was on its way out!

The failure of the stock market 1929

In October 1929, disaster hit America and with it the rest of the World, in the form of the infamous stock market crash. Atwater Kent had to retrench and was forced to lay off much of the work force. One wonders if he rued having recently added so much more factory space. Many radio manufacturers went "to the wall" but he was better able to survive. Unusually for such a major enterprise, his organisation was entirely independent. He was indebted to no one. There were no directors or shareholders to placate, and he had good financial reserves. With good management and his adequate resources, Atwater Kent survived. From 1926 he had been the largest radio manufacturer in the U.S. By 1930, the recession was hitting hard. Across town, Philco, who made radios more aimed at the popular market moved into the top selling slot and stayed there for several years.

Despite reduced demand, Atwater Kent continued producing TRF receivers through 1930 and into 1931, the range including several models for mounting in wooden cabinets. The final series of TRF chassis were quite magnificent with three screen grid R.F. amplifiers, in line 4 ganged tuning capacitors, good audio quality detectors and with audio systems using push pull power triodes but they were approaching the limit of TRF development.

The superheterodyne would be the way forward. Fortunately, RCA, who had jealously guarded the Armstrong patents relating to the superheterodyne and had refused to licence other manufacturers, was forced by the Department of Justice to give up their monopoly. Atwater Kent was able to respond quickly by adapting the big TRF model 70 chassis to a superhet configuration. There were to be no more new AK TRF designs.

The superhet and the first "miniature" 1930 - 1931

Purchasing power continued to be very limited. But the public still wanted radios to help brighten the gloom. As Philco had shown the answer to the situation was compact receivers in small inexpensive cabinets. Thus was born the "midget" mantel set with a simple but robust cabinet with often an arched top. These sets, made by many manufacturers, today are valued by collectors and are known variously as Gothic, Round Top, Cathedral, or simply Depression Radios. Atwater Kent produced its first arched top model, the 84, at the end of 1930 (Fig.5). Over the next four years Kent and many other makers produced a wide range of the "round tops".

Figure 6 Model 96 Early 1932 - A delux superhet with large (14" wide) chassis, R.F. stage and automatic gain control with pentode output stage. Like many of the larger Atwater Kent sets at this time the dial and controls were mounted on a wood grained painted metal panel so that the chassis could be slid into a variety of cabinets. The cabinet, minus the decorative grill, was first used for the big 1930 model 70 TRF.

Despite the difficult financial situation, there was a steady series of inventions, innovations and developments in radio production. The Depression years did not slow significant advances in receiver design and performance. In fact, the opposite occurred. During 1931 there were more improvements in valve technology. The tetrode '24 had revolutionised R.F. amplifier design but control of gain was difficult. Varying grid bias was not satisfactory and cross modulation from strong nearby signals was a problem. Controlling screen voltage was not the complete answer. The remedy was to create an extended grid bias cut off variation of the '24, the variable mu type '35/51. A bonus was that effective Automatic Volume Control (AVC) was now practical.

Another new valve was the '47 (Arcturus PZ), an output pentode with about twice the output and three times the gain of the popular '45 triode, simplifying audio amplifier design. Interestingly, Philips in Holland, were three years ahead having introduced the pentode B443 output valve in 1928.

Late in 1931, to satisfy the remaining "up market" trade, Atwater Kent produced several large prestige superhets, incorporating an R.F. amplifier before the mixer, and some had automatic gain control and neon tuning indicators. A prime example was the 8 valve model 96 (Fig.6).

Soon there followed the first of a new series of mains heated valves, providing at least 50% more gain than the earlier types and requiring 60% less heating current. For car radios and receivers without transformers there was an equivalent 6.3 volt series but the main series still had 2.5 volt heaters. This comprised the 56 general purpose triode, the 57 and 58 R.F. pentodes and significantly the new 55 double diode-triode, providing diode detection, AGC and audio amplification all in one envelope. A popular late 1932 model using this new series was the attractive arch top 627 (Fig 7.).

Short wave Comes of Age 1933

Short wave radio broadcasts had commenced in the late 1920's and by 1933

Figure 7 Model 627 Late 1932 - A classic 7 valve "cathedral" using the latest "50" series of valves, with RF stage preceding the mixer. New was the type 55 valve a combined diode detector / AGC/first audio stage. The cabinet is reproduced in the membership badge of the New Zealand Vintage Radio Society.

were increasingly popular. Atwater Kent in 1932 had developed a shortwave converter (model 93) to be used ahead of a standard M.F. receiver which acted as an I.F. and A.F. amplifier with detector. This combination created what was in effect, a superheterodyne receiver with a 1.0 mHz intermediate frequency.

By 1933 shortwave receiver design was making significant advances. Some of these developments were incorporated in a landmark communications receiver being developed by National. It was the famous HRO, best known in England as the mainstay of the WW2 Bletchley Park operation.

Atwater Kent for its part created the 708 mantel (Fig.8) and its mate, the 808 console, receivers with an eight valve chassis. I.F. amplifiers had previously operated in the range from 130 to 264 kHz but these frequencies provided insufficient image rejection especially for shortwave signals. The result was that signals appeared twice, separated by twice the IF frequency. The 708/808 chassis remedied this problem by using a four ganged tuning capacitor to provide a second tuned circuit before the R.F. amplifier valve and using an I.F. frequency of 472.5 kHz. To enhance the gain and selectivity there was a second I.F. valve. The valve line up of the 708 was:- R.F. amplifier, mixer, oscillator, and two I.F. amplifiers; all type 58 valves! There followed two new valves, the 2A6 diode, high mu triode and the power pentode 2A5. Coverage was continuous in four bands from 550 kHz to 20 mHz . The dial, although small, had a planetary drive reduction and was fully calibrated on all bands. For its time the 708 was an advanced receiver! It was also remarkably compact, extra chassis space being gained by the assembly of the R.F. and I.F. sections on a sub chassis.

Pentagrid converter valves 1934

It is apparent that by 1934, improvements in receiver design were becoming more of detail than major technical innovation. Apart from the heater voltage, 6.3V or 2.5V, the two major valve series were otherwise direct equivalents. Philco had long changed to the 6.3 volt series but Atwater Kent retained the 2.5 volt system into 1935 for the majority of his radios.

One significant 1934 introduction was the 2A7 and 6A7 pentagrid frequency converters. Previously, superhet frequency conversion had normally required a separate oscillator valve. Self oscillating pentode converters had a limited use in inexpensive sets, but were out of the question for shortwave receivers. The pentagrid combined the functions of both the oscillator and mixer, saving one valve. The 1934 development of the model 708, with a valve type 2A7 replacing two of the 58's was the model 447 (Fig.9). The tuning capacitor had split stators to band spread the upper frequency band. The elaborate dual speed dial drive, reported to be Kent's favourite, changed the scales with band switching. There was a vane type tuning indicator.

Many Atwater Kent multiband sets, including the type 447, had fan shaped dials with scales coupled to the wave change switch, so that only the scale associated with the band in use was visible and a selectable gear reduction, connected to the tuning knob, eased fine tuning of shortwave signals. A fine example these the sets using this

Figure 8 Model 708 1933 - A very compact squat cabinet with 8 valves and covering from 550khz to 20 mHz in 4 switched bands, a fully calibrated dial scale and planetary geared dial drive to a 4 ganged tuning capacitor. This was a very advanced and high performance receiver for the time, with two I.F. Stages tuned to 472.5 kHz to minimise images. It uses five type 58 pentodes, a 2A6 diode/triode and a 2A5 output pentode, all powered by the inevitable 80 rectifier.

Figure 9 Model 447 1934 - The next season's development of the 1933 model 708, with a new pentagrid converter valve type 2A7 replacing two of the 58's was the model 447. The tuning capacitor had split stators to spread the upper frequency band. The elaborate dual speed dial drive, reported to be Kent's favourite, changed the scales with band switching. This console cabinet was made in New Zealand, a common practice at the time, to economise on freight charges. Much of the chassis, the dial and the handsome mantel cabinet was the same as that used for the companion model 308 described by Gary Tempest in the Spring 2015 Bulletin.

type of dial is the meticulously restored 8 valve model 308, to as new condition, described by Gary Tempest in the Spring 2015 Bulletin. This article is recommended reading also as an example of the excellence of Atwater Kent design and construction.

Another popular and fashionable innovation was the "airplane" dial, fancifully so called for its use of a double ended pointer rotating in front of an illuminated circular scale.

By 1935 innovative design was slowing. It could be said that the domestic receiver had matured. With the possible exception of negative feedback, there were to be few fundamental developments to be made until the advent of semi conductors. There were of course improvements in valves and components but the basic modern receiver had arrived. Comparing the performances of equivalent receivers of 1935 and 1965 confirms that there is little difference.

By now the arched top mantel cabinet had given way to the flat topped "tombstone", good for the displaying of an ornament, but as many a serviceman would avow, not recommended for a vase or pot plant! "Top of the line" models had handsome console cabinets, fine furniture in their own right but it is likely that these receivers were more for prestige than for profit.

Octal based metal valves 1935

A much publicised feature of mid 1935 receivers was the introduction by RCA/GEC of their octal based metal valves. Heavily advertised as a major development they were really a sales stunt. In Britain, Marconi/Osram had in fact introduced their metal "Catkins" three years earlier. The RCA valves were, with a few exceptions, basically some of the existing 6.3 volt series in new garb and with identical characteristics! A good feature though was the octal bases. They did not become loose, and of course no shields were needed. Initially missing from the range was the combined diode/triode detector and audio valve. Instead there was the 6H6 diode and 6F5 triode pair. Conversion to the exciting new valves entailed little more than a change of sockets and an extra socket for the 6H6 and minor wiring relocations.

It must be emphasised that Atwater Kent had in production at any one time a range of receivers from inexpensive little AC/DC 5 valve medium wave sets through to large prestige multi band chassis in fine console cabinets. By now, a popular configuration, internationally and followed by Atwater Kent, was the superhet with an R.F. amplifier, a frequency converter, single I.F. amplifier, diode detector, and 2 stage audio amplifier. This type of receiver was (and still is) capable of meeting the requirements of the great majority of situations. A representative model early in 1935 was the 216, using the 6.3 volt filament standard glass valves. In mid 1935 the metal valves appeared and within a very short time Atwater Kent had changed the sockets of the 216 to octal and created the otherwise identical 637. The circuit values, cabinet and dial remained unchanged. The 1936, version of the 637 (Fig.10) remained in production, but with a black airplane dial. This last feature must surely have been influenced by the success of Zenith's "Big Black" dial.

By 1936 the radio receiver manufacturing scene had changed further. Design had

Figure 11 The 94 year old Atwater Kent 1924 factory today, courtesy of Google Earth. Like his products, Atwater Kent's factory was built to last. The building hasn't changed much in 94 years, but Philadelphia certainly has!

Figure 10 Model 637 type 2 1935-36 - This receiver was one of the current production models at the time of the factory's closing. The cabinet was available in a variety of shadings and used on several related models. A very popular and effective superhet configuration as used by many manufacturers, they had an R.F. and a single I.F. stages covering a couple of shortwave bands as well as the standard broadcast band. Atwater Kent's model 216 now used the increasingly popular 6.3volt series of valves of 6D6, 6A7, 6D6, 75 and 42 with an 80 rectifier. Featured was the new circular style buff coloured Airplane dial, still with the two speed drive. Mid Year, the valves were changed to the new all metal series, with little modification necessary to become the 317/337/617 and 637 type 1 models. For 1936, the 637 type 2 was essentially the 1935 model with a new screen printed black dial, and with illuminated arrows replacing the metal pointer. Zenith had set the fashion for black dials. There is a fuller description of the chassis in the accompanying article.

matured and stabilised. Specialist firms were now making many of the components that radio manufacturers once made "in house". It was now possible to make complete radios with minimum production facilities. As far as Kent was concerned the excitement and engineering challenges of the earlier years had gone. Budget priced radios now performed well and satisfied much of the market. Now in his 60's, he had made two fortunes, and although by all accounts Kent was a benign employer, trade unions were becoming restless. It was time to retire.

Epilogue 1936

Without warning in 1936, Kent announced his closing. Not answerable to directors and shareholders he could do as he liked. Senior staff begged him to sell his enterprise to them, but he didn't want his name to be used by others. He sold off his stock, plant and the two factories. The 1928 building was demolished in 1998 to make space for a car park but the original one he built over 90 Years ago, at 4700 Wissahickon Avenue, in Philadelphia is still in use, although not as a radio factory. (Fig.11).

Kent retired briefly to Florida to run a real estate business. He then moved to Bel Air, California, where he built a 32 room colonnaded mansion called Capo di Monte on top of the highest hill in Los Angeles. Until his death in 1949 he enjoyed his collection of cars, fine living, the arts and throwing lavish parties, attended by many of Hollywood's famous personalities.

Acknowledgements and further reading:-

There are some excellent photos of the factory in operation available on http://historyinphotos.blogspot.com/2013/05/atwater-kent-radio-factory.html

Riders Perpetual Trouble Shooters Manuals. Vols. 1-8.

Atwater Kent Service Manuals and Parts Lists.

"The Atwater Kent Radios " by Ralph. O. Williams. Antique Wireless Association's AWA Review, Volume 12.

“Radio Manufacturers of the 1920's” by Alan Douglas.

"Restoration of an Atwater Kent 308 from 1934" by Gary Tempest. BVWS Bulletin Vol. 40, no1.

The receivers in the photographs are from the writer's collection.

Factory today photo by courtesy of Google Earth.

Appendix

Ten short years

The "Golden Age" of radio was undoubtedly the decade following the mid 1920', and coincided with emergence and dominance of Arthur Atwater Kent’s remarkable enterprise and continued until his departure from radio manufacture. During this period, domestic receivers evolved from relatively primitive instruments understood only by technically inclined enthusiasts to a popular and vital item in many households. Their evolution mirrors the enormous technical advances made during this decade and every year brought new advances and innovations.

As an illustration, of these advances, in this section we analyse and compare two representative Atwater Kent receivers from this period, the 20C TRF from 1925/26, the other, the 637 three band superheterodyne from 1935/36.

1925/26 The popular 20c

The 1925 model 20c (Figure 3 of main article) started life about 1923 as one of the more successful "Breadboards", the model 10, assembled from Atwater Kent components, with two tuned amplifier stages, a grid leak detector and two transformer coupled audio stages. This configuration had proven to be very popular and was the most common type with many manufacturers. In a plain wooden box with a front panel backing the controls it became the AK model 20 Kent with his eye for attractive appearance of his products soon successfully increased the appeal by reducing both the height and depth, and in a solid mahogany case it become the compact 20C. Over 163,000 of the 1925 version (Type 7570) were sold

For 1926 the 20c returned but with three internal changes. The biasing of the audio stages was improved, the UV skirted short pin valve sockets were changed to the unskirted new UX long pin type and the detector audio transformer was enlarged. Sales totalled nearly 82,600 of the new type 7960 model 20c.

The aerial amplifier, RF and detector stages each have tuning knobs and positioned between the first two is an aerial tapping switch. At the right is an example of classic Atwater Kent design. The one neat unit contains the two filament control rheostats and on/off switch.

It is obvious from the internal views that there is no coil screening. Instead, coupling is sufficiently minimised by mounting the three tuning coils to be mutually at right angles.

No neutralisation

Due to their grid to plate capacitance, triode valves connected between tuned circuits will oscillate. Stable amplification can only be achieved by countering this capacitance, and the optimum and elegant method of stabilising triode tuned R.F. amplifiers is to apply neutralising.

Readers familiar with early technology will note that the 20C has no neutralising of the two RF amplifier stages. Neutralising, invented by Professor. Hazeltine, is achieved by feeding an out of phase signal from the anode to the grid of an amplifier stage. Hazeltine's development for this resulted from his work with the SE1420 receiver described in the Autunm 2010 Bulletin. Given Kent's desire for excellence, it may seem that he would have used neutralising without question, but that would have meant paying out massive royalties. Instead he achieved sufficient stability by inserting a small flat 500 ohm wirewound resistor in series with each RF amplifier grid lead. There has been some doubt about the real effectiveness of this method and it was claimed that in fact by clever layout Kent achieved a degree of neutralising by carefully using stray capacitances. Certainly, in operation the 20c is quite stable and docile. By 1929, the screen grid tetrode RF amplifier had arrived and neutralising was no longer an issue.

The middle valve of the 20c is the grid leak detector. In 1921, the newly formed RCA requested that GEC design a pair of new valves. The first was the universal general purpose triode UV201, soon with a thoriated tungsten filament to become the landmark 201A. Its companion was the UV200A, specifically intended for use as a detector. Instead of a hard vacuum, the '00A contained

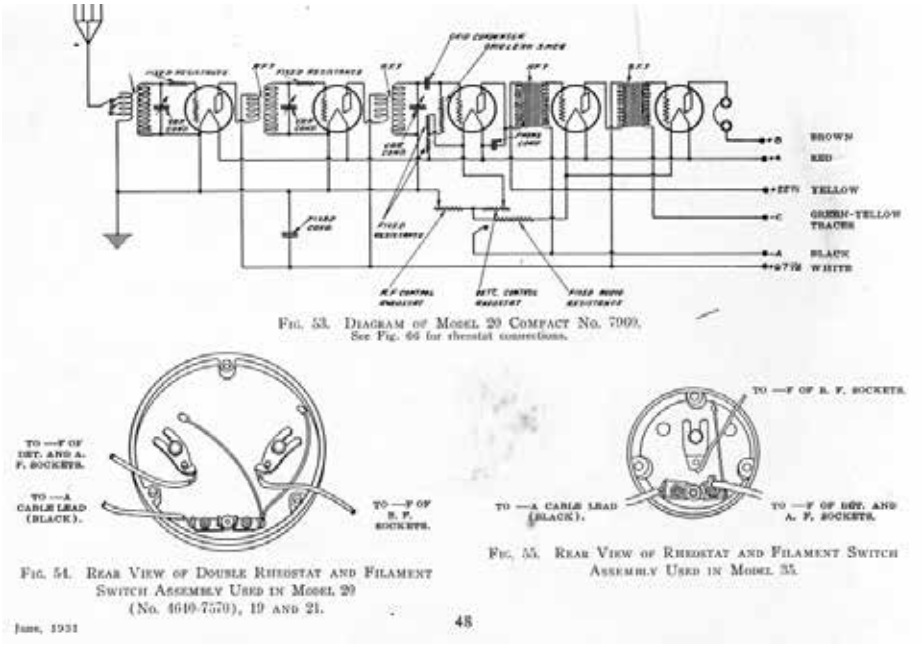


Fig. 53. Diagram of Model 20 Compact No. 7009. See Fig. 66 for rheostat connections.

Fig. 54. Rear View of Double Rheostat and Filament Switch Assembly Used in Model 20 (No. 4640-7570), 19 and 21.

Fig. 55. Rear View of Rheostat and Filament Switch Assembly Used in Model 35.

June, 1931 48

Figure 1 The circuit shows that the 20c was little different from any contemporary 5 valve TRF receivers.

Figure 2 There was ready access to the valves in the 20C.

Figure 3 The 20C certainly was compact

Figure 4 Underneath there were few components compared to Figure 6.

a small quantity of the gas Argon, making it useless as an amplifier but a sensitive detector. The 00A was more sensitive than the '01A but it could generate hiss.

Operating conditions for the two valves were different. The anode voltage for the 00A was lower than that of the 01A and its grid leak was connected to the negative filament terminal whereas the reverse applied when using the 01a as a detector. Typically Kent compromised by returning the grid leak to a tapped filament resistor. The 20c could therefore use either valve in the detector socket.

The two remaining valves are conventional transformer coupled audio amplifiers, using '01A valves. As valve design improved, Atwater Kent issued modification notes for the output stage to make use of the greater power delivered by the 112A and later the husky '71A.

As is described in the main article, each year saw significant progress and improvements. Some of the more significant were single knob tuning, mains power, screen grid valves, superheterodynes, band switching and short wave tuning and a steady series of valve improvements.

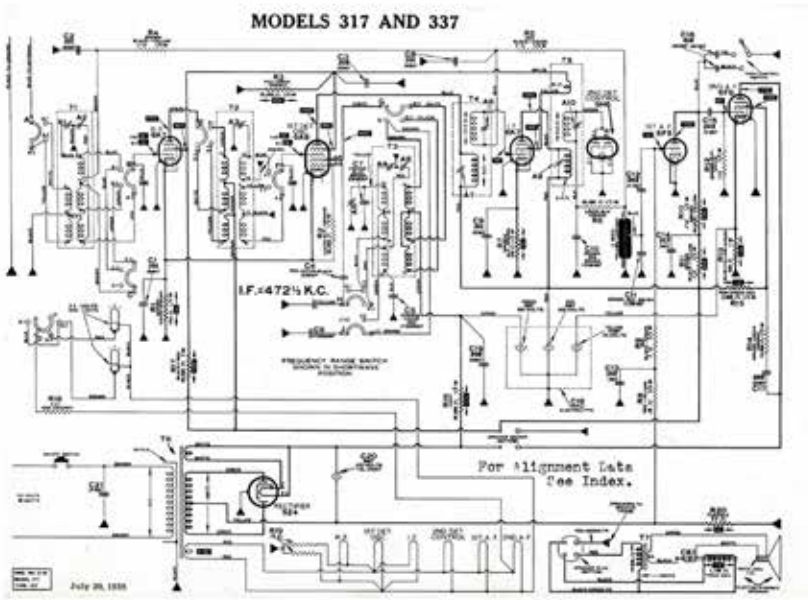


Figure 5 The 7 metal valved AK chassis was well designed but not significantly different from many "up market" contemporaries.

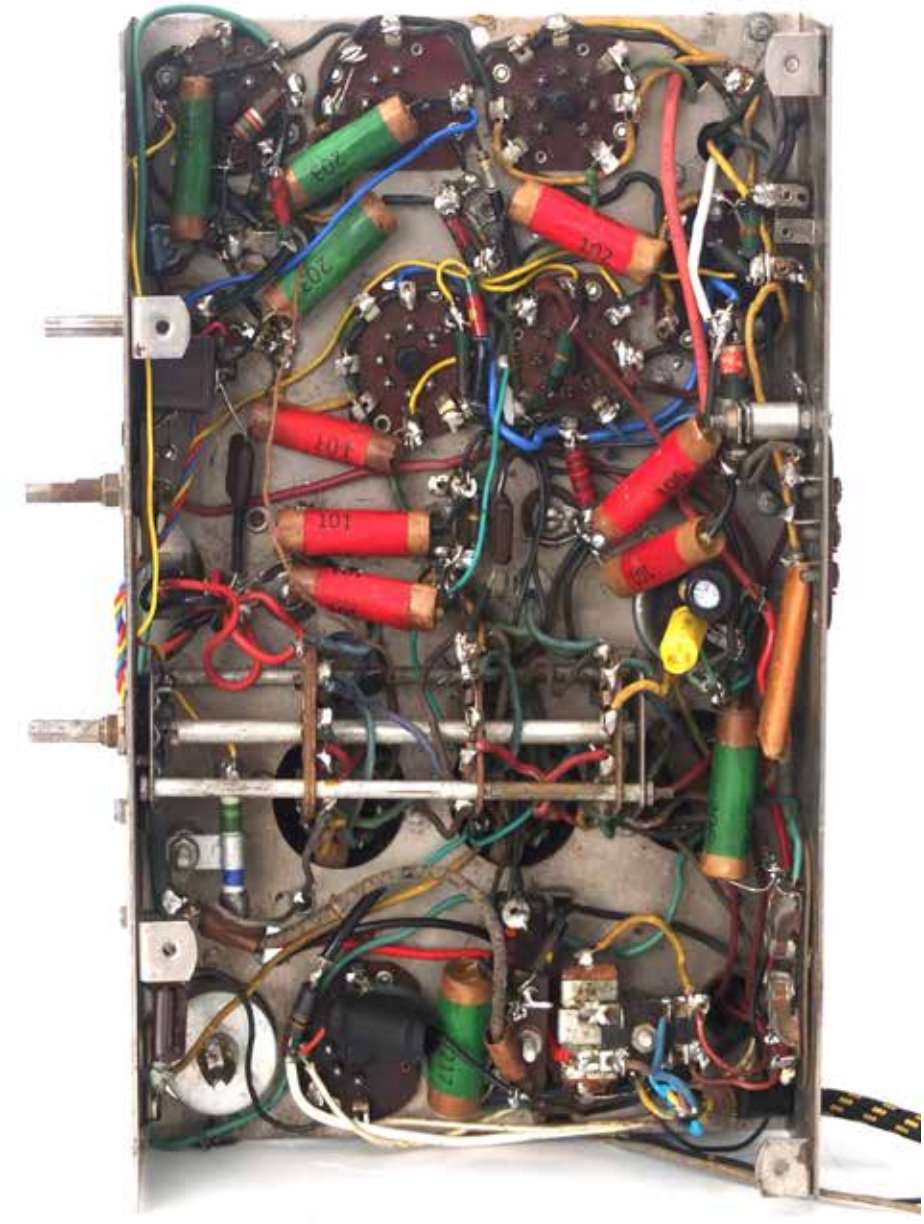


Figure 6 Comparison with figure 4 shows a dramatic increase in component count in 10 years. Some of the older styled ceramic bodied resistors have cast metal ends and the unique AK colour coding.

1935/36 The 637and siblings.

For our second description, we will look at an example of the final development of Atwater Kent receivers and which was in current production when the factory closed. The 637 (Figure10 of the main article) illustrates the progress of the technology of domestic receivers had made since the early 1920's,bringing us to the technology very familiar to many of our readers as the Bulletin frequently publishes articles about restoration of sets from this era.

As shown in the main article, by 1934/35, the 6 valve bandswitched superhet was becoming the "workhorse" of much of the World's radio industry, generally with an R.F. amplifier preceding the mixer/oscillator, a single stage IF amplifier feeding a combined diode/audio triode, a pentode output stage and a full wave rectifier. This configuration had proved to be sufficiently sensitive and yet tractable enough to cope with all but the most stringent of domestic locations.

By the beginning of 1935, Atwater Kent was beginning to use the increasingly popular 6.3 filament voltage valves for the mains powered radios and had introduced a 6 valve 3 band chassis for the 336 consol and 216 "tombstone" It had an 'Airplane" dial with two pilot lamps and surrounded by four control knobs - on/off/ volume, tone, band switching and two speed tuning control. Furthermore,with much fanfare the Octal based metal cased valves were released by RCA mid year

Metal valves

Fortunately, many of the new valves, apart from the sockets, were interchangeable with the existing series. Initially, as combination valves were not made, pairs of 6H6 and 6F5 valves were needed to replace the type 75 diode/triode, but with a few other very minor changes, all that was needed was 7 new sockets. The new chassis was used in several cabinet styles to create the models

There was however an unexpected problem that showed up later. The new octal/metal rectifier, the indirectly heated 5Z4, was not based on the dependable old directly heated pre 1930 type 80 and some proved to be unreliable for several set makers. The quick fix was to give the 80 an octal base and call it the 5Y3G. This spoilt the "all metal" line up but it cured the problem. A new 5Z4 was soon developed but the damage was done and the 5Y3G and later the 5Y3GT soldiered on for many more years. RCA also later produced a low filament consumption metal/octal version of the 80, the 5W4.

The circuit diagram of the new chassis shows that it was a conventional 3 band superhet. The band switching is standard although a single antenna winding serves the two short wave bands. The 1st valve is a standard 6K7 variable mu pentode, as is the 472.5 khz I.F valve. Between them is the 6A8 pentagrid oscillator/ mixer valve. To minimise frequency "pulling" on shortwaves there is no AVC to the converter.

Figure 7 Not a glass valve in sight! The large pulley wheel is part of the two speed dial drive.

There is a third winding on the second I.F. transformer connected to the screen grid of the I.F. valve. This provides a small degree of regeneration providing some increase in gain and sharpening of the tuning. To avoid instability this had to be applied with caution!

A single diode suffices for detection and AVC, but the 6H6 is a double diode so with the two in parallel there is a harmless degree of redundancy. The audio system is a very conventional high mu triode and pentode pair.

It can be said that the design of seven valve superhets of 1935/36 had matured. Apart possibly from the screen grid regeneration there was little to differentiate the 637 and its siblings from other well engineered receivers. The standard AM domestic receiver had arrived. There were to be few major new developments until the end of the valve era some 30 years later.

On the trail of the Perdio PR3

Tony Shaw

"Was a PR3 ever produced? – We would all like to know'' (Radio Radio Third Edition 1996) Although this article is intended to identify the Perdio PR3, I have widened the scope to include other factors, not least the background to my lifelong interests. As a consequence the PR3 element is embedded within the periods described. Additionally, the PR3 is set against contemporaneous early Perdio products (PR1-PR7).

Fig 1

Attention is specifically drawn to the Royal Signals period in which the earliest exposure to the PR3 was experienced. The use of the PR3 symbol is intended to indicate references to the receiver made available from surplus sources.

In the beginning

My interest in radio began accidentally when visiting my cousin at the age of 10. On going through his 'toy' trunk I came across a strangely shaped sloping front box with unfamiliar electrical connections. He willingly gave it to me explaining it was some kind of wireless, something to do with 'Cats' Whiskers'. (See Fig 1 reconstructed in 1970)

With the support of my school science teacher who explained to me that it was a crystal set which required an aerial, earth and high impedance earphones. I accordingly caught the No. 40 Crosley bus from Cheadle to Stockport to visit a government surplus shop which my teacher advised would have the high impedance earphones – indeed so at the princely sum of 5/- (1947). Where could I obtain such a sum? My father advised that the local newspaper shop, owned by a Miss Packer, needed a paper boy – the job was obtained (which lasted to the age of 20!) and about 4 weeks later I again visited the surplus shop only to be advised that the earphones price had risen to 5/6. Having only taken 5/- the owner –

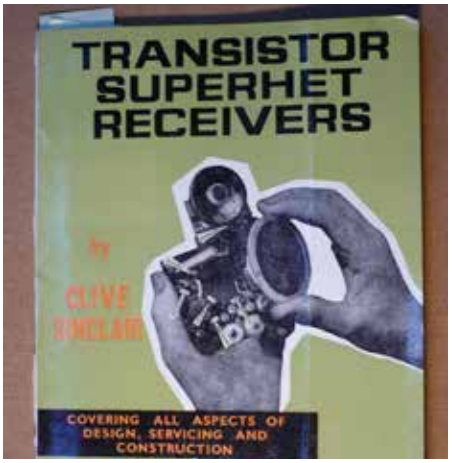


Fig 3

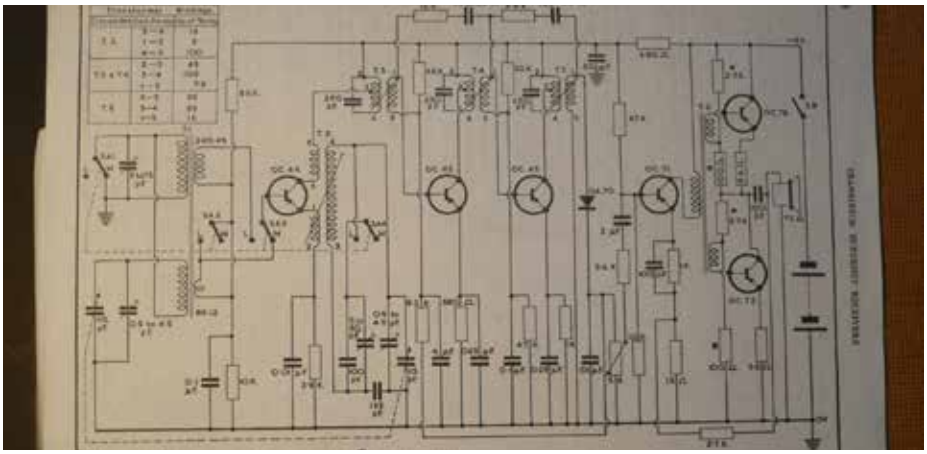


Fig 4

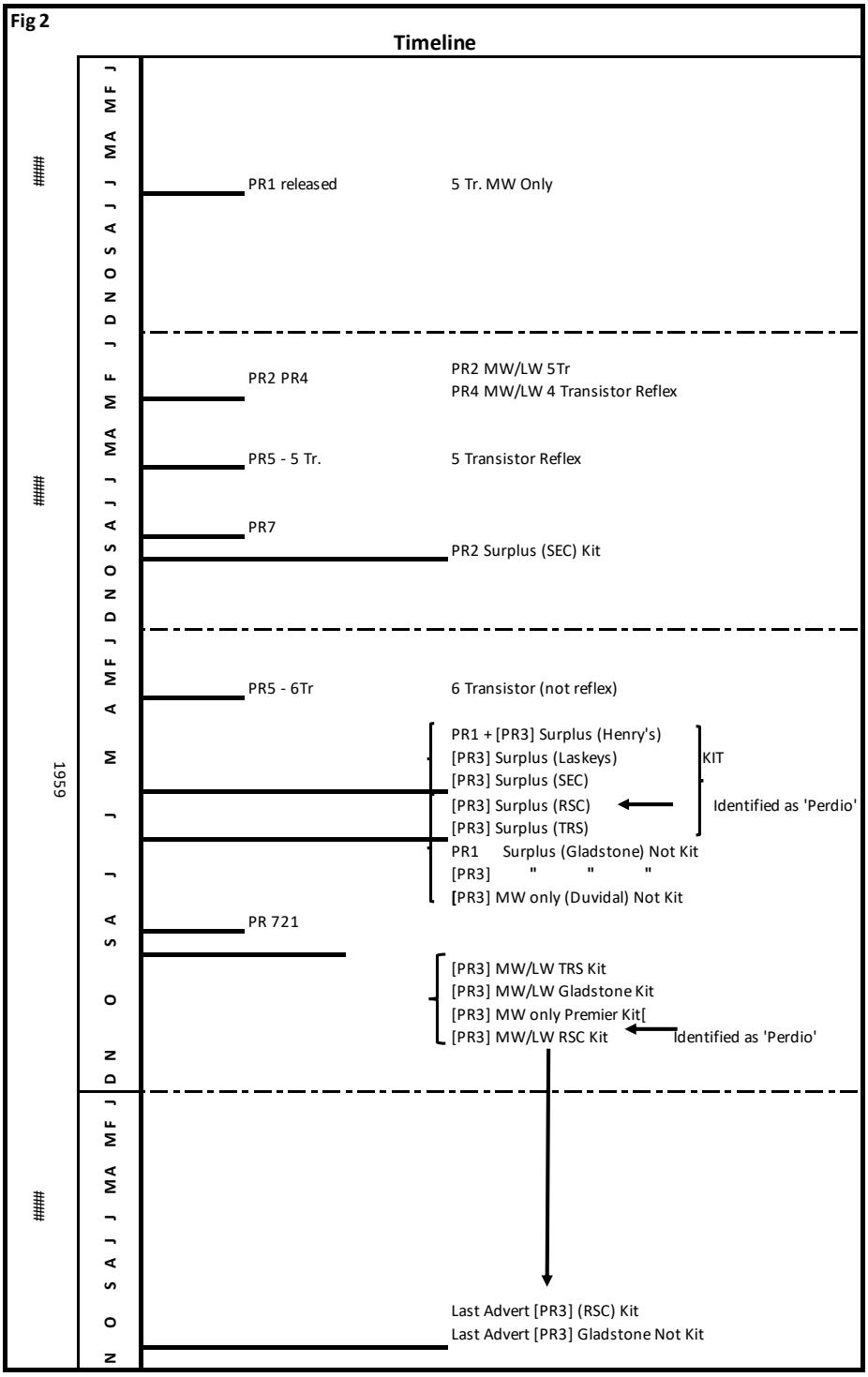


Fig 2 Timeline

a grumpy Mr Eckersly – grudgingly conceded that 5/- would be acceptable. With the addition of an aerial (iron bed frame) and earth (bathroom lead piping) the sloping front box provided me with 2 stations – both at the same time! (Home Service and Light Programme)

My Fascination with Wireless Commenced royal signals days

Fast forward to 1958 which after studies deferment saw me as a Radio Technician (Light) NCO Instructor in Radio Theory in the Royal Signals at Catterick camp in Yorkshire at the age of 21.

As a still enthusiastic radio person I joined other similar persons for technical discussions in the radio club located in Carey Road – favourite times included sports afternoons. The club was equipped with facilities for building various equipment and experimentation for many types of activity. This included building a double superhet arrangement for receiving the 'bleep signals' from the Russian 'Sputnik' satellite transmissions and later the Russian Telex (facsimile) transmissions from around the moon. Those frequenting the club had many interests which included regular pastimes such as tape recorders, FM tuners (Jason), Mullard 510 amplifiers, ITV Band III converters and transistor radios. These were just beginning to appear on the high street with the Pam 710 leading the revolution followed with (amongst others) the Perdio PR1 pocket radio at £23.2.0d

It is this line which will now be considered

The Surplus Market

From September 1958 a rash of Perdio related 'Kits' (and complete pocket radios) appeared and ran through to October1960, with 1959 being the most prolific year. Fig 2 Time Line shows these suppliers together with Perdio release dates.

In January 1960 Bernards (publishers) Ltd. published a book entitled 'Transistor Superhet Receivers' (Fig 3) within which is shown the Mullard Application Sheet Circuit (P36) (Fig 4) for a 6 transistor receiver. This shows an entirely novel way of increasing audio output and reducing battery consumption by the application of a 'single ended push pull' circuit nominally operating under Class B

Fig 5

Fig 6

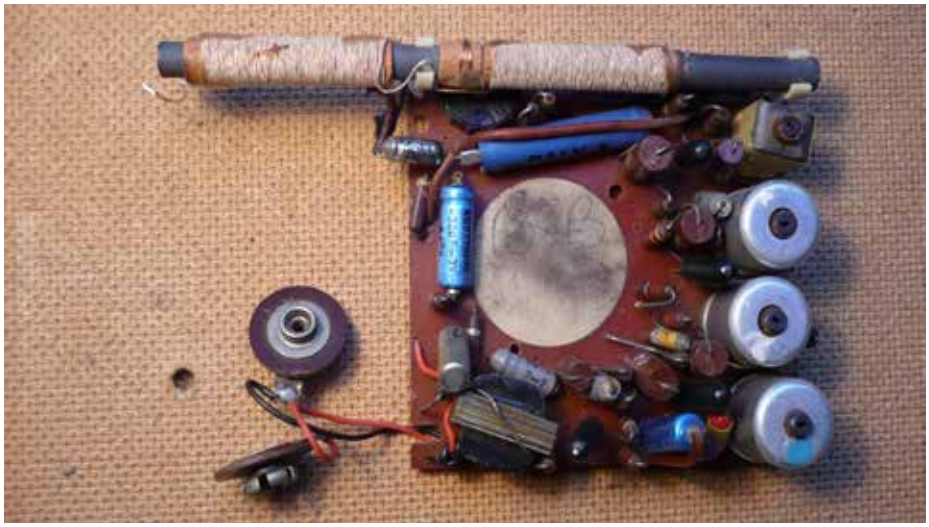


Fig 7

	Fig 1	Homemade copy of 1922 Receiver (1970)
	Fig 2	Timeline
	Fig 3	Transistor Superhet Receivers (1960)
	Fig 4	Mullard 6 Transistor Circuit [PR3 & PR5(ii)
PR1	**-**	Released June 1957 MW only, 5 transistors
	Fig 5	Case Front – Dial reconstructed – 8 slats
	Fig 6	Tuning Gang attached to case
	Fig 7	Component side
	Fig 8	Printed Circuit side 100 - 41
	Fig 9	No back screw – retained by clip
PR2	**-**	Released February 1958 MW/LW (See PR1)
PR3	**-**	Not commercialised
	Fig 10	[PR3] 6 transistor MW/LW SEPP Front 7 slats/Tuning Gang attached to PC
	Fig 11	Case interior – note wavechange switch guide
	Fig 12	PC side
	Fig 13	Component side. Note Mazda X A101 x 2 SEPP output
	Fig 14	Note **Perdio** I.D. to 1st I.F.
	Fig 15	Screw Back
PR4	**-**	Released February 1958 4 Transistor Reflex MW/ LW. Front 7 slats case front and back as [PR3]
	Fig 16	PC Side / PC – 4 - 110
	Fig 17	Component Side. Note – attached Tuning Gang
PR5	**Fig 18**	PR5 Released May 1958. 5 Transistor Reflex March 1959. Later 6 Tr SEPP (03-59)
PR7	**Fig 19**	Super 7 released August 1958
		PC Board PC 16 also used on: Piccadilly August 1959 Park Lane January 1961 Londoner March 1962
	Fig 20	Park Lane released January 1961
	Fig 21	Type 1 Printed Circuit I.D. PC16 Type 2 P.C. I.D.PC 7 PL (Made in Japan!)
	Fig 22	First Surplus Advert September 1958 Radio Constructor
	Fig 23	Surplus advert. Showing Perdio 6 Transistor RCS > June 1959 (PW)
	Fig 24	Release Dates & Pricing

Fig 8


Fig 9


Fig 10


Fig 11

Fig 14

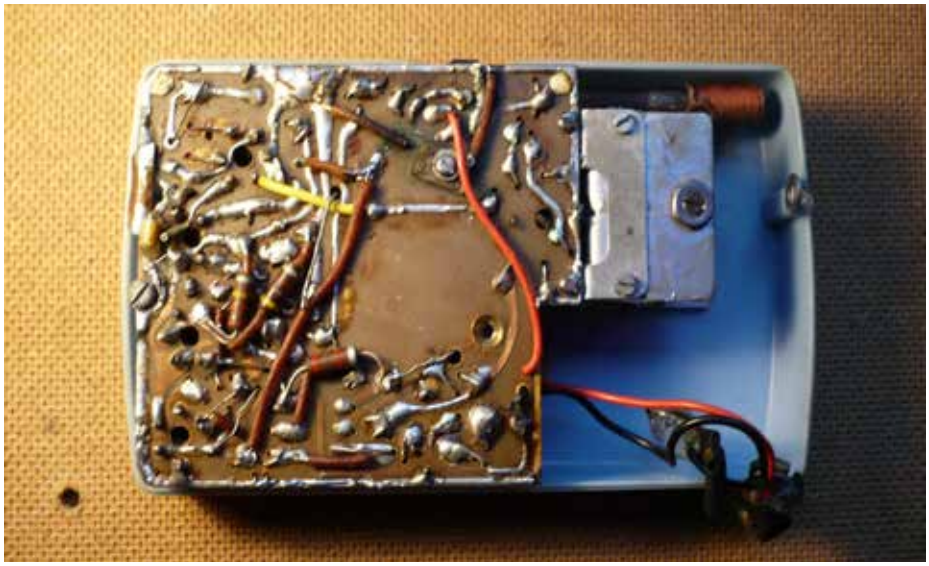


Fig 12

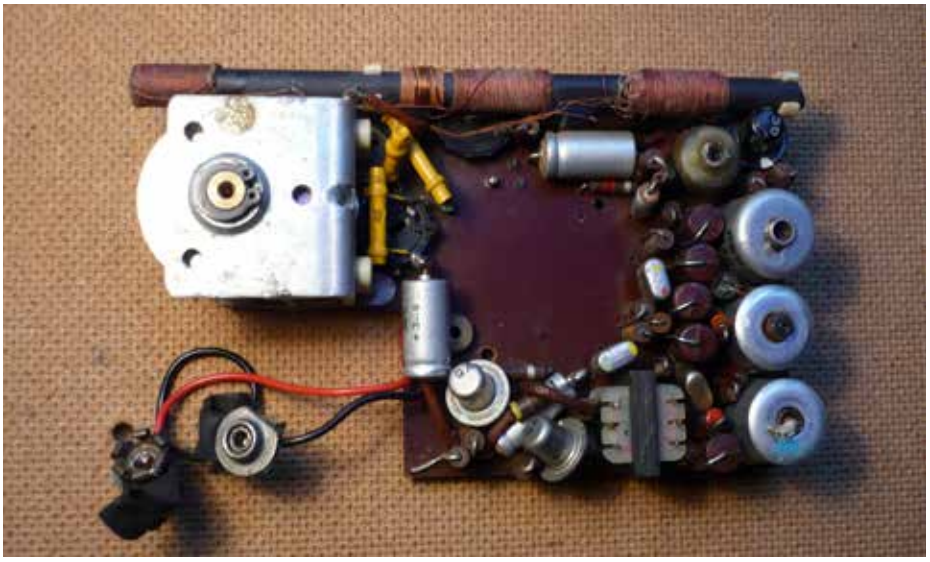


Fig 13

Fig 15

Fig 16

Fig 17

Fig 18

Fig 19

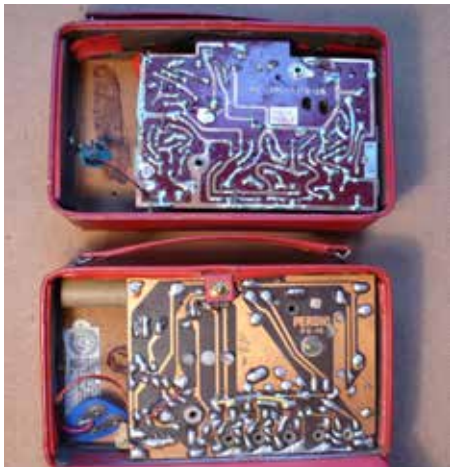


Fig 21

Fig 20

conditions (sometimes also known as parallel push pull). It is this circuit which was used by Perdio for the nascent PR3 and PR 5(s)

We all know that a PR3 was not commercialised but this does not mean it did not exist. It is a matter of conjecture, which, as two types of PR3 have been identified that the PR3 reached advanced development and pre-production prototypes in some quantities. It is probable that the Perdio Board of Directors pulled the plug on commercialising the PR3 in favour of promoting the PR5 and the, soon to be released, PR7 (with various derivatives) which proved to be one of the most successful receivers. Having pulled the plug on the PR3 what to do with the pre-production items and the remaining non completed PR1 and PR2? Answer – why not release onto the surplus market, the first of which was the kit of parts for the 5 transistor (MW-LW) PR2 in September 1958. (Partial listing of typical surplus providers is shown on Fig 2 Time Line)

These 'kits' and completed receivers continued to be available through to October 1960.

The Catterick Royal Signals days (ii)

It was in the aforementioned days, my Perdio experience began with the purchase of (eventually) more than a dozen of the kit and surplus PR's. These were built/faults found/ aligned. On demonstrating my first kit (built in the radio club), to my military colleagues I was asked to build these as requested. These were sold to finance the next and so on. It was through this activity that the six transistor kit PR3 began to appear (this was a new interesting technical development (SEPP).

The Post Military Years

During the Royal Signals Instructing years an opportunity arose on daily orders to attend a multi services diploma course on electronics at Nottingham University. On demob a job with Fielden Electronics for ten years, as design and applications engineer, was followed by a lifelong career in and around electronics.

Collecting begins

Around 1970 I began to take a new interest in the radios I had repaired in my youth and I began to acquire those receivers which remained favourites. During subsequent years I took every opportunity whilst on business throughout Europe (West and East) and elsewhere and also on holiday to acquire interesting radios.

In the 80's and 90's valve receivers began to dry up I turned my collecting attention to transistor receivers which were easily found at car boots and flea markets often for as little as 25p. In this field I specialised in collecting British transistor radios, at the time considering Japanese and Hong Kong radios not worth collecting.

This revived my interest in early Perdio.

The receivers

See figures 1 to 24

Miscellaneous

Not all the preceding PR3 were offered as kits: Some completely built: Some SEPP were offered with MW only!

Colours Red/Ivory/Blue (Very patriotic!)

Transistors were either all (list not definitive) or a mixture of:

Mullard OC44/OC45/OC45/OC71/OC72 x 2

Ediswan Mazda XA102/XA101/ XA101/XB103/XC101/XC101

Newmarket Red & Yellow/White/ White/Red/Gold/Green & Yellow

Coils made by Weyrad Radio manufacturing Weymouth

Volume control TR16B/VC1760 10KOHM – Ardente

Wavechange Switch TRC11/S1100 = Ardente

SEPP Driver Transformer TRC21A/D255 – Ardente

Ardente were a hearing aid manufacturer.

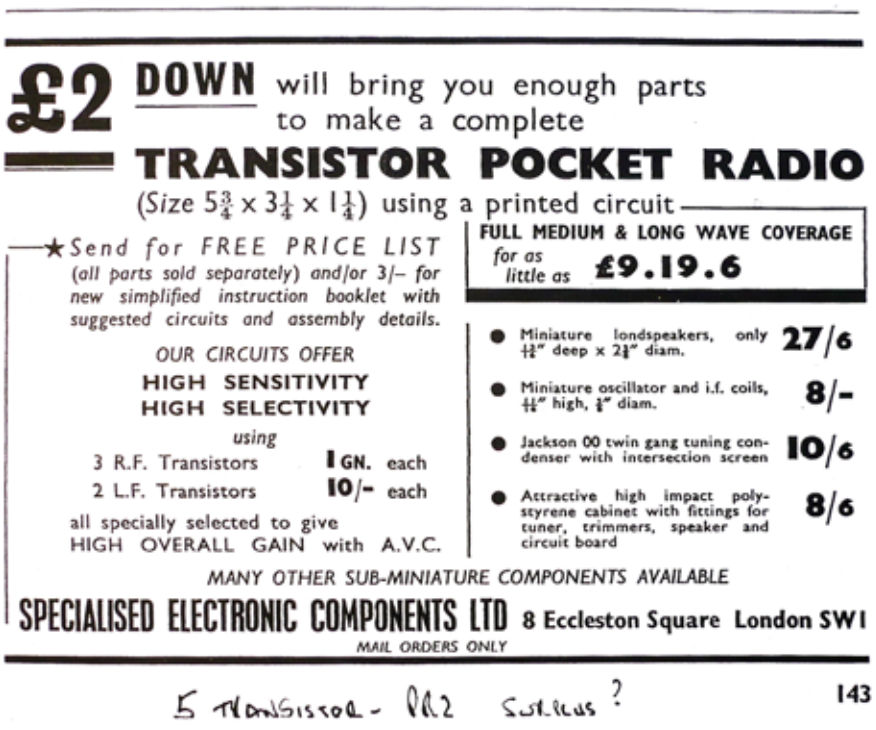


Fig 22

Fig 24

Model	Release Date	Price	MW/LW	Transistors	Source
PR1	June 1957	£22 Gns	M	5 Class A	RR
PR2	Feb 1958	£25.4.0	M/L	5 Class A	RR
[PR3]	Not released 03/59	£9.19.6 Kit	M/L (Henry's)	6 SEPP	PW March 1959
PR4	Feb 1958 Reflex	£13.13.0	M/L	4 Class A	RR
PR5 Deluxe Standard	May 1958 May 1958 28 March 1959	£22 Gns £19 Gns £16½ Gns	M/L M/L M/L	5 SEPP 5 SEPP 6 SEPP	RR RR WET 28.03.59
(PR6)/29/51?	29 Jan 1962 31 Aug 1962	£11.19.11 £11.11.0	M/L M/L		RB No.54 08/09/1998
PR7 Standard Deluxe	Aug 58 Rexine Aug 58 Leather	£22.11.7 £24.13.6	M/L M/L	7 SEPP 7 SEPP	WET 06.05.58 WET 06.05.58
PR721 Piccadilly (PR7)	Aug 1959	£15.4.6	M/L	7 SEPP	RR + Other
PR23 Park Lane (PR7)	Jan 1961	£17.6.6	M/L	7 SEPP	RR + Other
PR30 Londoner (PR7)	March 1962	£14.3.6	M/L	7 SEPP	RR + Other

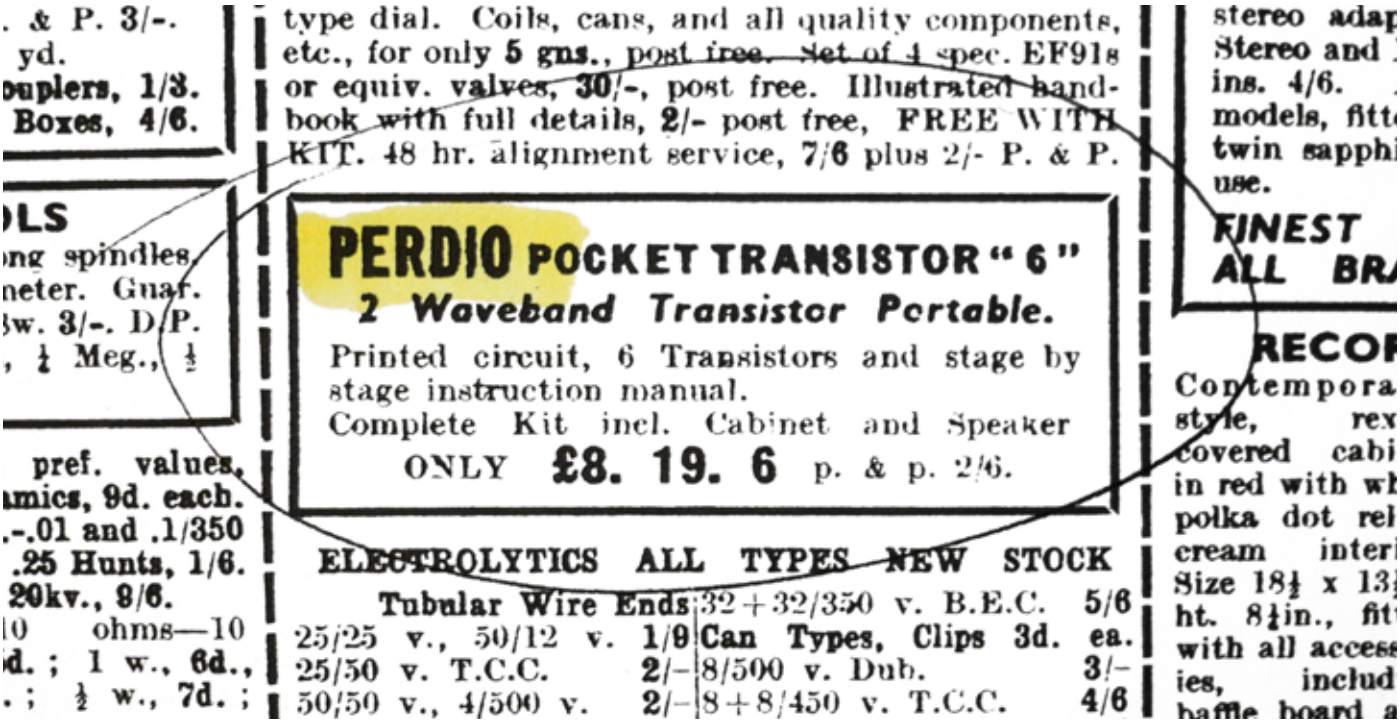


Fig 23

All 6 transistor versions were with Class B single ended push pull (SEPP) very closely based on the Mullard Application Sheet Circuit

Compare Figs 3 & 13 and note that the physical location of the first I.F. transformer is different therefore showing that at least two versions of the PR3 exist. Additionally careful assessment of the photograph of Fig 3 shows the two transistors of the SEPP quite clearly and the pair of XA 101 SEPP on Fig 13.

Having had the Perdio interest since 1958 Royal Signals days, I have tried in recent years to build a collection of PR1, PR2, PR3, PR4 and PR5 and it was at the 2016 NVCF Event with mounting excitement I spotted familiar blue shape - this turned out to be a long lost PR3. At last I had the PR3 proof in my hands, having handled these previously in 1958/9 – what a find! Although in poor condition it is complete and undamaged (See Figs 10-15)

To finalise my collection I am still urgently seeking a PR2

Conclusion

Now we have the answer to the question posed at the beginning of this piece with a real live PR3.

PR3 as PR3 really did exist!

Not only a photographic example Fig 3 but also a real life example Fig 12,13,14

These early Perdios have been a strong interest (obsession?) for an adult lifetime and a lot of detail has been absorbed during the years of collecting data which has been assembled here.

I trust members find the above of interest now.

Has anyone got a PR2?

Post Script

Perdio PR6 – unknown – was a PR6 ever produced? We would all like to know.

Fig 24 Perdio – Release Dates and Pricing shown on page 52

Sources/Publications

PW	Practical Wireless
RR	Radio Radio (Jonathan Hill) Third Edition 1996
WET	Wireless and Electrical Trader
RC	Radio Constructor
RB	Radio Bygones No. 54 Aug/Sep 1998 (PR6)

Sources (Providers)

Specialised Electronic Components Ltd RC 09/58 (P143)

Specialised Electronic Components Ltd PW 10/58 (P615)

Henry's (Radio) Ltd PW March 1959 (iv)

Lasky's (Harrow Road) Ltd PW March 1959 (91)

Specialised Electronic Components Ltd PW March 1959 (8)

Henry's (Radio) Ltd PW June 1959 (iv)

Lasky's (Harrow Road) PW June 1959 (P298)

Radio Supply Co. (Leeds) Ltd PW June 1959 (P280)

TRS Radio Component Specialists PW June 1959 (P323)

Gladstone Radio PW June 1959 (P331)

Duvidal Trading Company PW June 1959 (P350)

TRS Radio Component Specialists PW Sep/Oct 1959 (P495)

Gladstone Radio PW Sep/Oct 1959 (P491)

Premier Radio Co. PW Sep/Oct 1959 (P521)

Radio Supply Co (Leeds) Ltd. PW Sep/Oct 1960 (P448)

Gladstone Radio PW October 1960 (P524)

Acknowledgements

Terry Bateman (BVWS) PR1

Mike Kemp (BVWS) PR4

Gordon Bussey (BVWS) General Detail

Rose Savery Article Transcription

Matthew Stratford Compositing and Final Presentation

Radio Radio - Sunrise Press 3rd Edition 1996 - Jonathan Hill

Setmakers - BREMA 1991 - Geddes / Bussey

Additional Information

Dates of Perdio Addresses

1956-1963 - Perdio Ltd - Dunstan House, St Cross Street, London EC1

1963-1965 - Perdio Electronics Ltd - Bonhill Street, London EC2

1965-10/1965 - Perdio Products Ltd - Lowther Road, Stanmore, Middlx

Grand Café Buena Vista, Kinderdijk, Holland

Barrie Phillips

While on a visit to our granddaughter studying at Erasmus University in Rotterdam she took us up river to see the windmills at Kinderdijk.

When paying for our lunch I noticed, at the end of the bar, a Wurlitzer juke box surrounded by an eclectic collection of radios, including to my surprise several British models in my collection – Bush, Echo, Ever Ready, Murphy, Strad, etc.

The owners kindly allowed me to take some photographs and have also given their permission for use in the Bulletin.

They wondered if I was related to the Philips family of Eindhoven, sadly no.

p.s. It's a very pleasant spot for lunch, with added interest, if members are visiting the historic windmills, etc.

Letters

Email your letters to bulletin_editor@bvws.org.uk

Dear Editor,

Since the advent of Talking Pictures on Freeview Channel 81 I often sit back to enjoy an old film. The other day I spotted David Niven starring in the 1939 production of 'Raffles' so imagine my delight to discover some twenty minutes or so in, a scene set in the office of the Commissioner of Police at Scotland Yard in conversation with a colleague he then turns to switch on a console television set, showing a scene from a cricket match in which the hero Raffles is playing. Other bvws members may be able to identify the set if indeed it is genuine and not a triumph of the set designer's skill. It certainly appears to be a back projected image. The IMDb website makes the point that it may well be the first time an image of a working television appears in a feature film.

I've checked with the current published Talking Pictures schedule as the company does repeat showings but as yet only the Ronald Colman version is showing in early July. All an email to the company has generated has been delight my enjoyment of their service and a statement that at present they are not able to confirm another showing.

Keep up the fine work with the Bulletin and please do not change the name of the Society nor the Bulletin itself. To my mind such changes indicate a lack of confidence and detract from the business of running a much valued, successful, and long established organisation.

John Holloway

Dear Editor,

Some time ago our chairman invited member's contributions on how the Society moves forward in the 21st century. There have been several letters over the past few Bulletins touching on this subject, exploring the future of the Society, possible changes to our remit, to our constitution, and the scope of the equipment that we collect, restore, and preserve.

I joined the Society some seven months after it was formed – if I remember correctly, in March 1978. In those days one had to be proposed and seconded for membership – I was proposed by Gerry Wells and, if memory serves, Tony Constable kindly seconded me. So I've been part of the Society for a very long time now and seen many ups and downs, changes to the Bulletin, to our meetings, and to our Committee. For myself, there have been changes to the types of radios and other equipment that I favour, house moves, job moves, there has been relationship change, and all the combined angst and freedom that retirement brings.

All this is by way of emphasising that human beings and their circumstances do not stand still and so we must adapt all the time to change going on around us – either voluntary or forced. For forty years our Society has managed to remain fairly static in terms of what we're about, and this can be seen in our Society constitution. In essence we still collect, preserve, and restore vintage radios and TVs for ourselves and for future generations to enjoy. We study and promote interest in aspects of sound and vision broadcasting from its inception, together with the societal change and electronic developments that accompanied it.

Around us though, society is changing rapidly. How many people under, say, the age of 40 understand what is meant by the term 'wireless'? This was an archaic term for domestic radio even when I was in my infancy in the 1950s – in 2018 it usually means anything to do with internet and mobile phone networks. Google-search 'wireless' and you will pull up PAGES of information on networks, Bluetooth, phone-related subjects – and even a page on wire-less bras from Victoria's Secret..! So, in one sense, our very name is obsolete, and confusing to anyone who is looking for information on vintage radio topics. Our membership is ageing, and, to put it bluntly, is not being replaced. I was 23 years old when I joined the BVWS – how many 23 year-olds are joining us now?

The early electronic technology that we all love is now a very much a niche interest… When I first joined, there were many, many people around me, both in and out of the Society, who had either worked as a TV or radio repair man, or had trained as an electronics engineer or technician in the valve and early solid-state era. The passing of time has mean that people with those skills are now few and far between, valve technology has largely in the 'real' world been consigned to history books, transistors are even less visible, and the consumer and industrial electronics world has moved on so far from our interests as to be out of sight! With the skyrocketing growth of the internet and other alternatives, there are places in the world where even traditional broadcasting is teetering on the edge of extinction. Quite frankly I watch more TV from the internet nowadays than is received through my aerial….

If we are to have a healthy and growing society that will last into the later 21st century, and continue to ensure that collecting and preserving vintage radio/TV and its associated fields survives, I say we need to acknowledge what is going on around us. We MUST make changes both to the name of the Society (so that the modern world has at least a chance of finding us!), and to the scope of our interests, so that we at least retain and hopefully grow our membership, and stay relevant to today's changing world.

Steve Sidaway

Dear Editor,

I have to say I am ashamed of you. I am referring to your article at the top of page 5 in the summer 2018 BVWS publication.

"It was bought to our attention", then towards the end, "But if activity is bought to our attention". The only things "bought" were the items at your auction.

Please report for detention and write 100 times BROUGHT.

Regards

Graham Richardson

Hello Graham,

Thank you for pointing that out, I'm also ashamed of myself for letting this slip! I hate it when folk write 'there' when it should be 'their' or 'they're' and 'your' when it should be 'you're'.

The section in question was added after the proof readers had checked everything else, so I can't even blame them!

Greg Hewitt

2018 Accounts

BRITISH VINTAGE WIRELESS SOCIETY

CHARTERED ACCOUNTANTS' REPORT TO THE COMMITTEE

ON THE UNAUDITED ACCOUNTS OF BRITISH VINTAGE WIRELESS SOCIETY

We have prepared for your approval the accounts of British Vintage Wireless Society for the year, set out on pages 2 to 4 from the entity's accounting records and from information and explanations you have given to us.

As a practising member firm of the Institute of Chartered Accountants in England and Wales (ICAEW), we are subject to its ethical and other professional requirements which are detailed at icaew.com/ members handbook.

This report is made solely to the committee, in accordance with the terms and conditions. Our work has been undertaken solely to prepare for your approval the accounts of British Vintage Wireless Society and state those matters that we have agreed to state to you in this report in accordance with ICAEW Technical Release TECH08/16AAF. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than you, for our work or for this report.

You have approved the accounts for the year and have acknowledged your responsibility for them, for the appropriateness of the financial reporting framework adopted and for providing all information and explanations necessary for their compilation.

We have not verified the accuracy or completeness of the accounting records or information and explanations you have given to us and we do not, therefore, express any opinion on the accounts.

Moore Stephens (South) LLP

24/7/2018

Moore Stephens (South) LLP

Chartered Accountants

33 The Clarendon Centre
Salisbury Business Park
Dairy Meadow Lane
Salisbury
Wiltshire
SP1 2TJ

BRITISH VINTAGE WIRELESS SOCIETY

DETAILED TRADING RECEIPTS AND PAYMENTS ACCOUNT

FOR THE YEAR ENDED 31 DECEMBER 2017

	£	2017 £	£	2016 £
Turnover				
Subscriptions		24,141		30,375
BVWATM friends group subscriptions		1,573		1,400
Sale of publications		328		178
Advertising		95		400
Insurance		277		267
Capacitor sales		3,468		4,536
Deoxit sales		410		743
Meetings		1,041		1,653
Estate sales commissions		23,450		20,082
DVD sales		40		94
Donations		1,030		344
Miscellaneous		397		813
Postage		9		6
Bank interest		5		34
		57,064		60,925
Cost of sales				
Capacitor costs	1,250		90	
Deoxit purchases	-		549	
DVD sale proceeds transferred to BVWATM	50		210	
	1,300		849	
		(1,300)		(849)
Gross surplus		55,764		60,076
Administrative expenses				
General expenses	4,567		4,135	
Storage	2,310		2,730	
Insurance	550		550	
Meetings	7,446		10,435	
Printing, postage and stationery	1,031		1,625	
Bulletin costs	16,177		33,676	
Auction laptop	-		800	
Accountancy	740		740	
Credit card charges	1,573		-	
Extraordinary item - fraud	20,400		-	
Donations	424		713	
Friends group donation	-		1,400	
Sundry expenses - allowable	-		27	
		(55,218)		(56,831)
Operating surplus		546		3,245
National vintage communications fair receipts and payments				
NVCF income		14,425		14,707
NVCF management costs		(12,478)		(13,036)
NVCF other expenditure		(778)		(521)
NVCF Surplus for the year		1,169		1,150
Net surplus for the year		1,715		4,395

BRITISH VINTAGE WIRELESS SOCIETY

STATEMENT OF ASSETS AND LIABILITIES

AS AT 31 DECEMBER 2017

	Notes	2017 £	£	2016 £	£
Current assets					
HSBC Current acc		12,329		26,287	
HSBC Deposit acc		18,740		4,235	
NVCF acc		12,223		11,055	
		43,292		41,577	
Net current assets			43,292		41,577
Capital account					
At 1 January 2017			41,577		37,182
Profit for the year			1,715		4,395
			43,292		41,577

I approve the accounts set out on pages 2 to 4. I acknowledge my responsibility for the accounts, and for providing all information and explanations necessary for their compilation.

Mr J Day

Date : 23/7/18

BVWS Spares Dept

DeoxIT D5 contact cleaner / lubricant £18.50
aerosol can. Not cheap – just the BEST.
Available at all BVWS events or by post for an additional £4.00

New manufacture high quality metallised polyester film capacitors to replace all old paper types in
vintage equipment. Ideally sized for re-stuffing

All capacitors are 630 Volt working
All prices are for packs of 50 components and include postage and packing

Available in mix-and-match packs of 50 within price band by post.
Available in smaller quantities at all BVWS events.

0.001µF	**Price band A**	**0.022µF**	**Price band B**
0.002µF	**Price band A**	**0.22µF**	**Price band B**
0.003µF	**Price band A**	**0.047µF**	**Price band B**
0.0047µF	**Price band A**	**0.1µF**	**Price band B**
0.01µF	**Price band A**		

Price band A is £25.50 (inc postage)
Price band B is £29.00 (inc postage)

Electrolytic smoothing capacitors, standard 'old-fashioned' size, 500 Volt DC working
New manufacture by ARS

16/16µF £9.00 each
32/32µF £9.00 each
16/32µF £9.00 each
50/50µF £9.00 each
60/250µF for TV22 £9.00
8/8µF screw–type, 16/16µF screw–type,
32/32µF screw–type £9.00 each
16/16 µF tubular axial £6.50
10µF tubular axial £4.00
22µF tubular axial £4.00
33 µF tubular axial £4.00
47 µF tubular axial £4.50
70 µF tubular axial £4.50

NEW smaller 25mm can types for re-stuffing original single electrolytic capacitors

32µF, 47µF, 500Volt DC working £5.00 each

Postage and packing 1 – 4 caps £3.00 5 – 8 caps £4.50

All prices quoted are for BVWS members

For non UK addresses, please contact Mike Barker for prices, (see below). All orders should be sent (with payment made out to BVWS) to: Mike Barker, Pound Cottage, Coate, Devizes, Wiltshire, SN10 3LG. Cheques payable to British Vintage Wireless Society. Please allow 14 days for processing, but usually quicker! The above capacitors are supplied as a BVWS member benefit. Anyone found to be reselling these items for profit will be expelled from the Society

BVWS Books

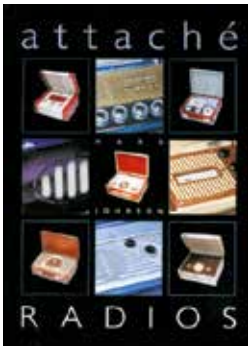
Tickling the Crystal

index and supplement
80 pages of GPO No. era British crystal sets. including comprehensive index listing sets in all five volumes of Tickling the Crystal
£11.95, £9.95 to BVWS members.
(+ £2.50 p&p UK) £3.50 EEC (rest of world £5.50)

Shareholders of the British Broadcasting Company

by Lorne Clark

68 pages. For the first time, a comprehensive listing of all of the companies, large and small, comprising the British Broadcasting Company - the forerunner to the British Broadcasting Corporation. Illustrated.
£10.95 (+ £2.50 p&p UK)
£3.50 EU (rest of world £5.50)



Attaché Radios

by Mark Johnson

An 80 page colour paperback guide to the Attaché portable
• Detailed specifications
• 140 radios in full colour
• Over 200 additional photos of sales literature, trade ads etc.
£12.00 (+ £2.50 p&p UK)
£3.50 EU (rest of world £5.50)

Obsession

by Gerry Wells

Growing up in the 1930s, young Gerry Wells preferred wireless to toys. He had a postwar career as a radio and TV engineer designing and managing amplifiers, PA's and TVs. He founded the British Vintage Wireless and Television Museum from the home where he was born. This is the story of one man's dedication to wireless
£6.00 196 pages paperback (+ £2.50 p&p UK)
£3.50 EU (rest of world £5.50)

Tickling the Crystal
256 pages. Over 200 full-page photographs.
£14.95 for BVWS members plus £7 p&p for UK, £13 EU (rest of world £19)

Tickling the Crystal 2
Limited, Only 750 copies printed. 208 pages. Over 125 full-page photographs. £29.95 (£24.95 for BVWS members) plus £7 p&p for UK, £13 EU (rest of world £19)

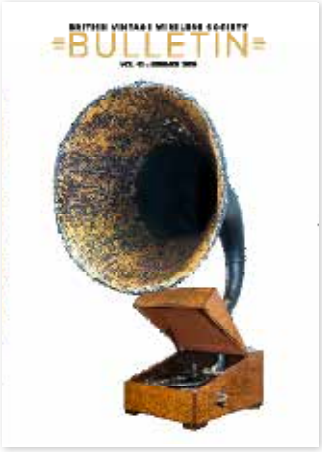
Tickling the Crystal 3
Limited, 500 copies printed. 240 pages of GPO No. era British crystal sets. Over 75 full-page photographs. £29.95 (£24.95 for BVWS members) plus £7 p&p for UK, £13 EU (rest of world £19)

Tickling the Crystal 4
More Domestic British Crystal Sets of the 1920s. 280 pages of GPO No. era British crystal sets. Over 115 full-page photographs. £29.95 (£24.95 for BVWS members) plus £7 p&p for UK, £13 EU (rest of world £19)

Tickling the Crystal 5
More Domestic British Crystal Sets of the 1920s
The final edition in Ian Sanders' thorough five volume set exploring GPO No. era British crystal sets. 252 pages/ of GPO No. era British
£29.95 (£24.95 for BVWS members) plus £7 p&p for UK, £13 EU (rest of world £19)

BVWS Books

Slipcase to house the first three volumes of Tickling the Crystal £9.95 Buy all three and get slipcase free! (postage £12 UK, £35 EEC, £55 US) BVWS members buy two and save £12 (postage £9 UK, £24 EEC £28 US)
Cheques payable to British Vintage Wireless Society
Mike Barker, Pound Cottage, Coate, Devizes, Wiltshire, SN10 3LG



The Bulletin back issues

All Bulletins and supplements are priced at £4.00 each + postage.

Postage: for individual Bulletins add £1.50, for all extra bulletins add £1 each. Cheques to be made payable to 'British Vintage Wireless Society'.

Mike Barker, Pound Cottage,
Coate, Devizes,
Wiltshire, SN10 3LG

Stuck for a Stylus?

Thousands of new old stock vintage styluses & cartridges to fit a huge range of record players & radiograms from 1930 to 1970.

Please e-mail Bryan McAlley on brymac@btinternet.com with make and model required, including a photo of the existing stylus/cartridge if possible.

Styluses from £4.99 each post free to UK.
Cartridges price on application.

Valveman

The story of one man's lifetime of obsession.

Gerald Wells was Valveman. His life's work was an attempt to amass one of the world's largest collection of valves, vintage radios and other early apparatus from the pioneering days of wireless communication.
This documentary film innovatively blends, using a variety of motion design and filmed reenactments, the last hundred years since radio began through to the early days of television.

£12.00 (including p&p) £14.00 in EEC. Rest of world £15.00

Mike Barker, Pound Cottage, Coate, Devizes, Wiltshire, SN10 3LG

£9.99 from The British Vintage Wireless and Television Museum, 23 Rosendale Road, West Dulwich, London SE21 8DS and all BVWS meetings

www.valveman.co.uk
www.bvws.org.uk
www.bvwm.org.uk

11th November 2018
Golborne Swapmeet

Golborne Parkside Sports & Community Club, Rivington Avenue, Golborne, Warrington. WA3 3HG
Contact Mark Ryding 07861 234364

23rd September 2018
Harpenden Auction & Swapmeet

Harpenden Public Halls,
Southdown Rd, Harpenden AL5 1PD
Contact Vic Williamson 07805 213369

Sunday 7th October

AUDIOJUMBLE 2018

Sale of Vintage and Modern Hi-Fi Equipment at The Angel Leisure Centre, Tonbridge, Kent

10.30am Entry £6 • 9:30am Entry £12
8:30am Entry £20 • Stalls £30
Bookings/Enquiries 07873 862031
info@audiojumble.co.uk

1/8 page advertisements cost £22.50 - 1/4 page advertisements cost £45 - 1/2 page advertisements cost £90 - full page advertisements cost £180.
Contact editor_bulletin@bvws.org.uk for more infomration.

Events Diary

2018 Meetings

9th September Murphy Day at Mill Green Museum
15th September BVWATM Television Day & Table Top Sale
23rd September Harpenden
7th October Audiojumble
11th November Golborne
1st December BVWATM Afternoon of Music and Museum Sale
9th December Royal Wootton Bassett

2019 Meetings

3rd March Harpenden Auction and AGM
12th May National Vintage Communications Fair
7th April Golborne
7th July Royal Wootton Bassett
4th August Punnetts Town
22nd September Harpenden
3rd November Golborne
8th December Royal Wootton Bassett

9th September 2018
Murphy Day

Mill Green Museum, Mill Green Ln, Hatfield AL9 5PD
Free Entry 2pm to 5pm

9th December 2018
Royal Wootton Bassett Auction & Swapmeet

Royal Wootton Bassett: The Memorial Hall, Station Rd,
Wootton Bassett, Swindon (J16/M4) SN4 8EN.
Doors open 10:00 - Contact Mike Barker, 01380 860787

GPO Numbers
Martyn Bennett is the custodian of the BVWS GPO Registration Numbers list. As many members know, the project of assembling this list was started in the early days of the BVWS and was carried on by the late 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 GU51 4LY
telephone: 01252-613660 e-mail: martyb@globalnet.co.uk

The British Vintage Wireless and Television Museum:
23 Rosendale Road, West Dulwich, London SE21 8DS
020 8670 3667
Harpenden: Harpenden Public Halls, Southdown Rd. Harpenden.
Doors open at 9:30, tickets for sale from 09:00, Auction at 13:00.
Contact Vic Williamson, 01582 593102
Audiojumble: The Angel Leisure Centre, Tonbridge, Kent.
Enquiries, 07873 862031 info@audiojumble.co.uk
NVCF: National Vintage Communications Fair
For more information visit: www.nvcf.co.uk
Royal Wootton Bassett: The Memorial Hall, Station Rd.
Wootton Bassett. Nr. Swindon (J16/M4). Doors open 10:00.
Contact Mike Barker, 01380 860787
Golborne: Golborne Parkside Sports & Community Club.
Rivington Avenue, Golborne, Warrington. WA3 3HG
contact Mark Ryding 07861 234364
Punnetts Town: Punnetts Town Village Hall, Heathfield,
East Sussex TN21 9DS (opposite school)
Contact John Howes 01435 830736
Mill Green Museum: Bush Hall Lane, Mill Green, Hatfield, AL9 5PD

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

CONTRIBUTE TO THE BULLETIN

WE NEED YOUR ARTICLES!

Do you have a restoration you'd like to share?
Do you want to share any stories from working in the trade, i.e. manufacture, broadcast, retail or service?
Are there memories you'd like to share?
Do you want to talk about your current projects or collections?
Or anything Radio, Television or Audio related!

Even if it's just a letter send it our way!

Articles can be as long or as short as you like, about anything you want as long as it is relevant to the magazine. If you have an idea that you're not sure about, email **bulletin_editor@bvws.org.uk** and we'll be happy to listen.