BRITISH VINTAGE WIRELESS SOCIETY

BULLETIN

VOL 43 • WINTER 2018

The Bulletin of the British Vintage Wireless Society
£5.00 | free to members
www.bvws.org.uk

ISSN 0955-9345

Bulletin of the British Vintage Wireless Society
Volume 43 No. 4
Winter 2018

www.bvws.org.uk

Printed by Pureprint

Cover Images
Sterling Telephone and Electric company: Anodion Three, Type R.1591 and Sterling Baby speaker horn, 1924. Courtesy of Dave Church

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From the Chair...

As the year draws towards a close, I'm mindful of all the things that I'd intended to do during 2018 but never quite achieved, particularly in the workshop. At the start of a new year, we often make resolutions, or a 'to do' list for that year. There are many inspiration quotes published on social media and one caught my attention: It suggested that it was equally important to have a 'not to do' list - habits and routines that we do because we've always done them or maybe they are expected of us. So maybe we should stop doing these and do what we really want to do instead. I intend to practice this in 2019, I'll report back…!

Earlier in the year Guy Peskett resigned from the BVWS committee as secretary and also from the post of NVCF organiser. Guy has been continually involved with the committee since 1996, when he advised on an update to the constitution which was necessary after some turbulent times. He then took up the post of committee secretary – a post he held for over 20 years. He became the NVCF organiser from the time the event moved to the WEC, with much help from his wife Yasuko, putting in very many hours of hard work between them. He was also involved, with the late Gordon Bussey, in getting the historically important Marconi Collection in to the security of the Oxford University Bodleian Library at a time when the collection would otherwise have been broken down and sold off.

It was agreed unanimously at the last committee meeting that Guy should be given an Honorary Membership of the BVWS. We wish Guy and Yasuko a happy retirement from these duties and look forward to seeing them at our future events.

At the last committee meeting, the treasurer explained the need for an increase in the BVWS membership fees for 2019. This will be the first rise for some years. The Bulletin production is the biggest expense for the society, with printing and postage costs in particular ever escalating. Subsequently membership will increase by an additional £3 for UK members (about the price of a pint) and a little more for international members, dependant on region.

Your membership renewal form is enclosed. You can renew by post or easily on line where debit/credit cards and PayPal are accepted, just follow the guidelines on the pink sheet. Please get your renewals to the membership secretary by the end of January in good time to receive the Spring Bulletin that will contain your 2019 membership card. It causes the membership secretary, who gives his time freely, a huge amount of unnecessary effort when the renewals miss the deadline for the next Bulletin, as he has to mail the packages out individually, increasing postage and packing costs too!

Whatever method you choose to renew, please remember to place your vote for the Pat Leggatt Award – The Best Bulletin Article of 2018, there have been so many of them to choose between this year. The winner will be announced at the AGM next March at Harpenden.

2019 events kick off with an Extra Auction at Royal Wootton Bassett on 3rd February. This is necessary due to the amount of collections that are coming in. It is an auction only event with no stalls or bring and buy as we will have 400 lots to get through. The hall will be open for viewing at 9am, auction starting at 10.30am. Hot and cold refreshments will be available throughout the day.

Please find enclosed your 2019 BVWS calendar. Thank you to Eileen at the BVW&TV Museum for letting the Bulletin editor come down and take the many photographs required.

I'd like to thank all of the helpers who assist at our events, from the regional swap meets right up to the NVCF. I'm not mentioning you by name, as the danger is that I'd forget someone but your help really is appreciated, we couldn't run events without you!

I wish you all a Merry Christmas and a very Vintage New Year!

Greg

Contents

Cossor 464AC Radio - Page 10

Audiojumble, October 2018 - Page 30

Gecophone BC1001 - Page 34

Pye VT2 - Page 36

Lars Magnus Ericsson Part 2
About the Ericsson telegraphs

Fons Vanden Berghen

As we have seen in the overview of catalogues, the range of LME telegraphs and accessories is rather limited. This is in strict contrast with the plentiful information that is available about their telephones, and is the reason that from time to time I have to put a question mark in my text.

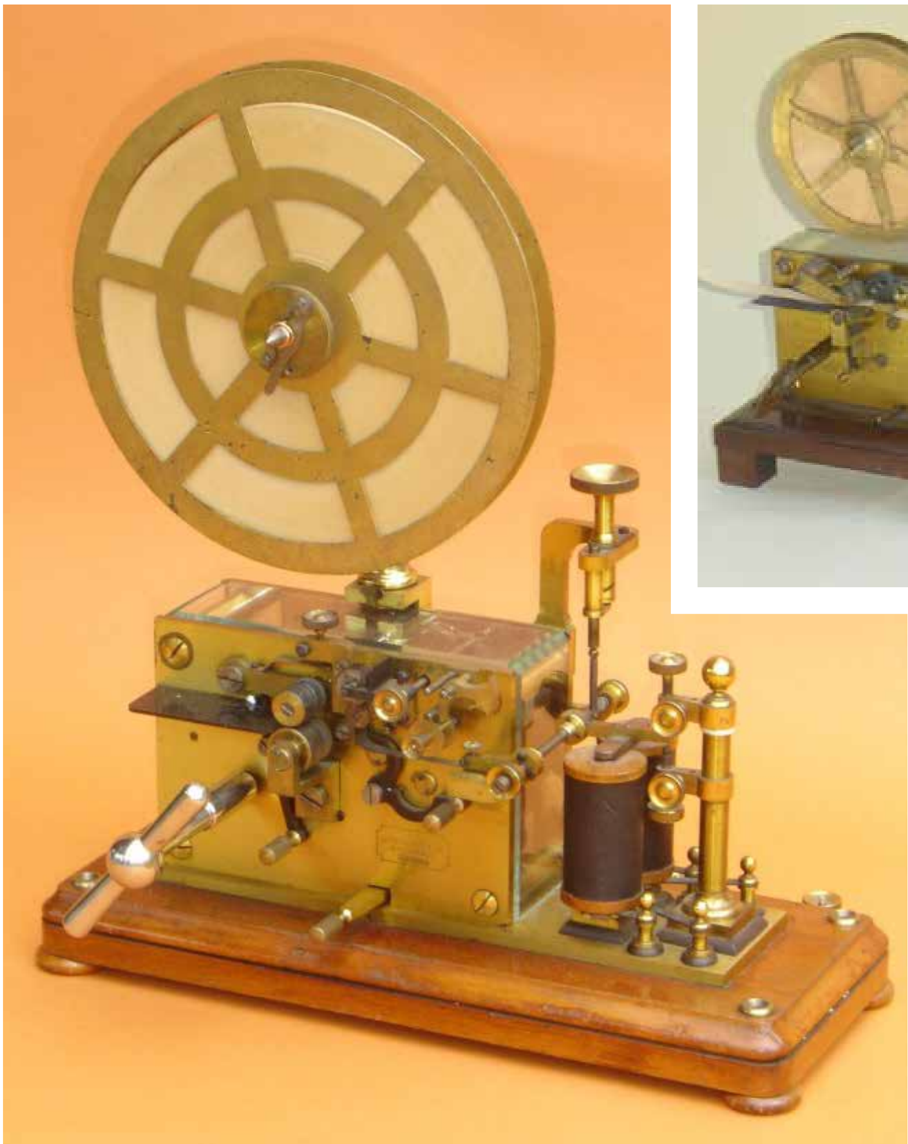


Fig 32

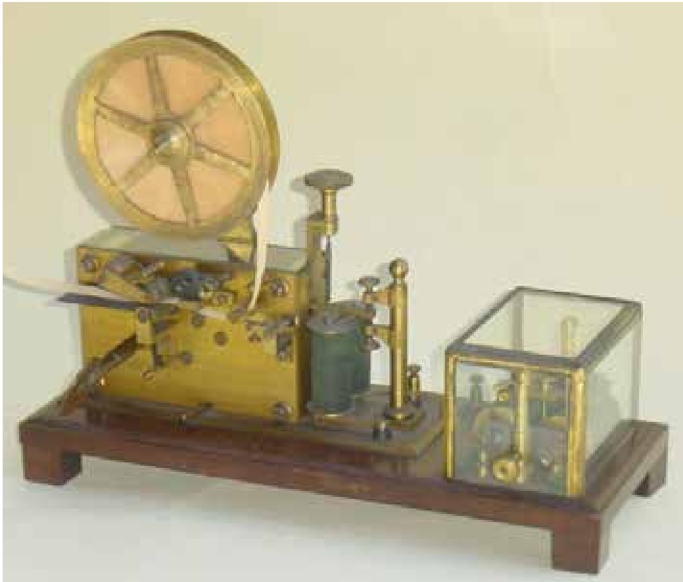


Fig 33

At first sight it may seem remarkable that the basic design (fig. 32 and 34) has lasted from the very beginning (1878?) for about seven decades (end of the 1940s, I suppose). But we have seen this before. First I have to note that the design of Lars's first model (catalogue from 1886, but probably older) corresponds almost perfectly with the one of the much earlier telegraphs designed and made by Digney in Paris (fig. 33) in the 1860s. I am pretty sure that Lars acquired a license or just copied the design. But he is not alone; the same also happened, for example, here in Belgium. Our most typical telegraphs here -signed Richez, Van Hulle, Devos,….- are also a 1-to-1 copy from the Digney ones. In those I have found parts inside them signed Digney... Telegraphs of the second half of the 1900s were very solidly made. And all what they had to do, they did rather well: print dots and dashes on a paper tape. So there was no need for changing the basic functions and design. That also happened with Digney telegraphs in other countries, and with Lars's third model fig. 38). This is the typical governmental German model made by Siemens & Halske in the late 1860s. It is the one that I noticed in the LME's catalogue from 1902. So this brings me to the point where I have to state that the third morse telegraph from Lars was a copy of this German model. Like the German ones it had the spring mounted on the outside, and later on the spring was inside the housing (fig. 39). The second telegraph (catalogue from 1892) that Lars brought out the portable one (fig. 35 - 37),, was also a Digney look-alike, but all the other elements that made it a complete transportable station were certainly designed and made by Lars. Further on I will refer to them as model 1, 2 and 3. I am not aware of any other morse telegraph by Lars, nor of telegraphs with a different technology

Some Ericsson telegraph items in my collection

The four telegraphs (that I know of)

*Telegraph 'model 1'(fig. 32)

Compare with this much older Digney one. (fig. 33) It appeared in the catalogue of 1886 (the first catalogue listed in 1.4.

*Telegraph 'model 2' (fig. 36 - 37)

This is really a fine telegraph. I noticed it the first time in the catalogue of 1892. You can see the morse key, the galvanometer, the lightning protector, the ink bottle, the paper wheels, the rotating switch, the winding key, the nice case…,all so beautifully made with great craftsmanship. It is my favourite morse telegraph and therefore I am devoting the rest of the page to its photos

*Telegraph 'model 3' and 'model 4' (fig. 38)

These are look-alikes of the 'standard' German models: the oldest model can be seen in (fig. 39) the same as the one in the catalogue from 1902.

*The 'model 4' (fig. 38) was made in the factory in Kolin in Czechoslovakia by the ERICSSON & SPOL company (see 1.3.).

Have there been other models? I don't know (apart from a few not-so-interesting alarm telegraphs).

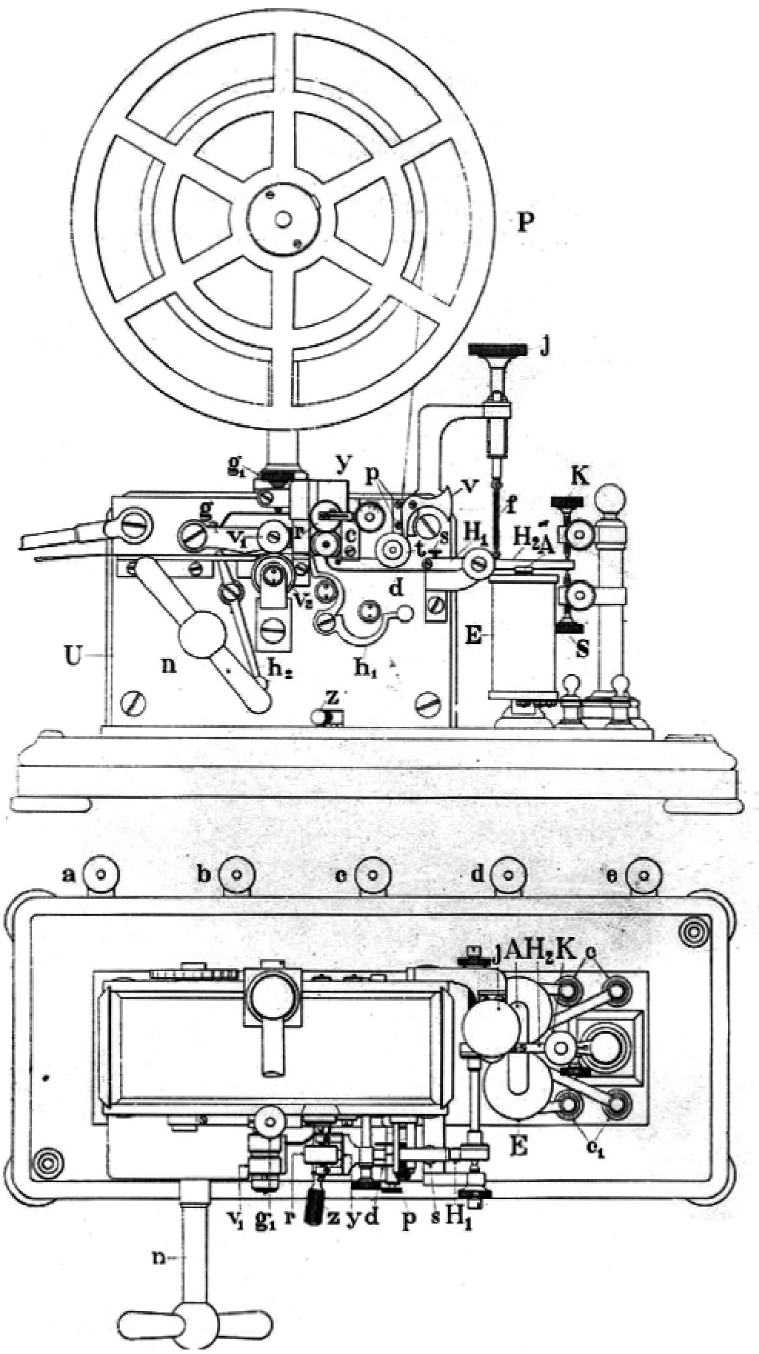


Fig 34

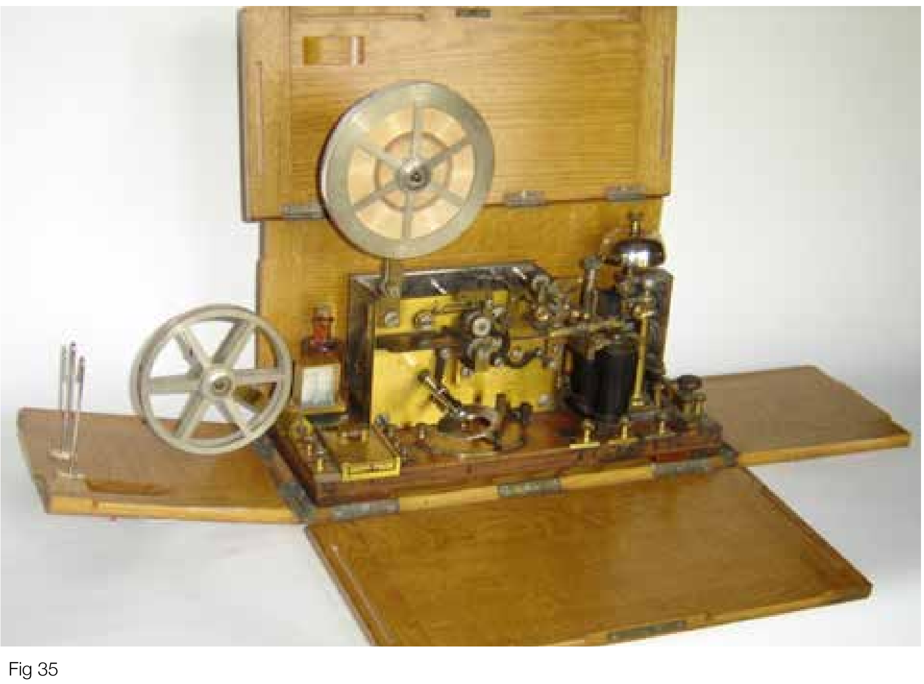


Fig 35

Fig 36

Fig 38

Fig 39

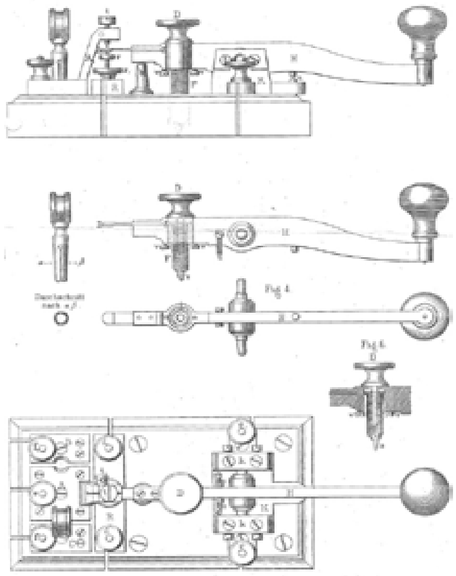


Fig 40

Morse keys

*The 'mother key' (as I call it) from Öller (fig. 40). As we have seen in Part 1, Lars was very late in making keys. He most probably bought them from his first employer, Anton Öller, who built the first key in Sweden (in 1857?). The design is rather unusual; just one example: the contacts are at the rear of the key. Not only had Lars left Öller's workshop, but also two of the most highly-skilled employees: J.A. Lindholm and John

Fig 41

Fig 42

Fig 43

Fig 44

Fig 45

Fig 46

Wikstrom. As Lars had done in 1876, they set up their own shop in 1878. Amongst others, they made this particularly well designed key, so the chance is high that LME bought keys from them. Later on LME manufactured this key and other models using the basic design of the first one. My key on the left is an Öller's one from 1865 or earlier. LME was not the only one; several other companies worldwide copied this famous key. Even the Marconi company had a similarly designed key for wireless use, the model PS-213, and this after 1950! While my old camelback key is on the cover of my first book (1998), this fine key is on the cover of my second book (2002).

In the LME catalogue from 1879 appears for the first time a key (only one) clearly derived from the one above. It is a less complicated version, labelled No. 810 in this catalogue and Type TA 610 in the catalogue from 1914. Here appears also the key Type TA 620. The fig. 41 shows my TA610 at the left-hand side and the TA 620 at the right. The 'mother key' –bottom, middle- had in this catalogue the number TA 660. See also (fig.40)

Auxiliary equipment

The next images show two galvanometers (fig. 42 and 43), a paper tape rewinding wheel (fig.44), a "repeater" (fig. 45) and a 'Key On Board' (fig. 46). The repeater allows regeneration of the battery signals in both directions, using a local battery. And a 'K.O.B.' is a simplified telegraph that consist of a key and a 'sounder'. The sounder makes two different sounds depending whether a morse dot or a dash is received (positive or negative current); so it allows receiving 'by ear'.

Look out for part three in the next issue.

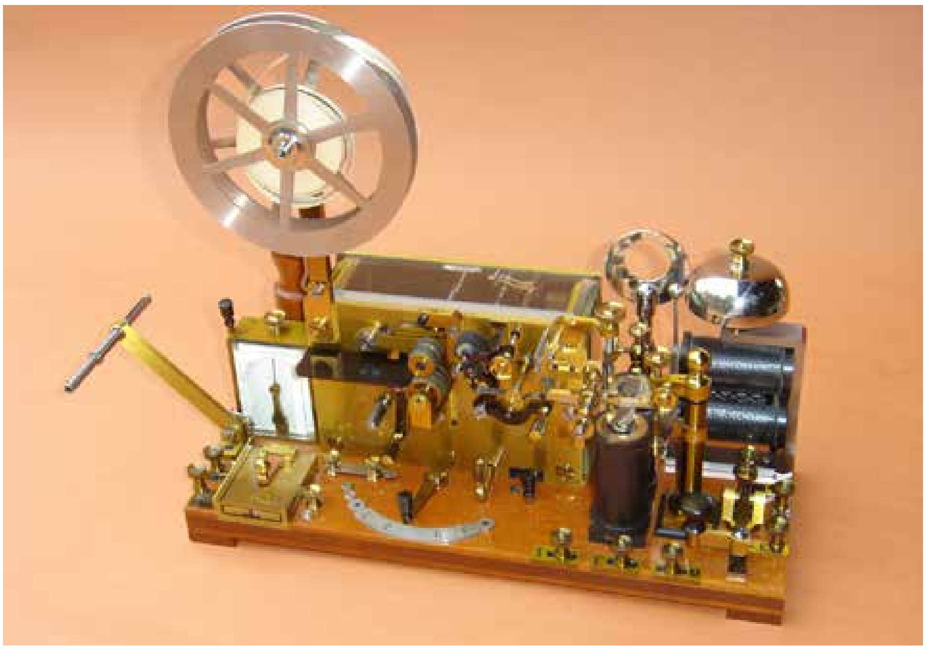


Fig 37

Experimenting, hoping and trying

Kim Foden

Wireless in the lives of two Orkney brothers. Jack and Jimmy Twatt born in 1910 and 1915 were curious Orkney boys who dabbled in all things radio.

In Jimmy's own words we can gain an insight into this enthusiasm. *"Some time in 1923 was the first time I ever saw or heard a radio receiver."* He was 8 years old at that time. *"My brother Jack had been invited by one of his school friends to come and listen to his father's new wireless set. Of course, we had to listen using headphones. At that time loudspeakers were rare and needed powerful sets to drive them. Putting on the headphones I felt transported. Signals were loud and clear, the voices and music apparently coming to life in the middle of my head, and not coming out of a box a few feet away. I felt I was in the distant studio and experienced a feeling of privilege; a feeling which I have not experienced since on any loudspeaker system however good. The set was quite small with only one valve which stood out on top where it lit up the room. The set had a crystal with cat's whisker detector.*

"The Twatt family's first set was a four valve receiver known as the Family Four and was built by Bill Mackinson around 1925. (The Mackinsons moved to Canada in 1927 but their name lives on at Mackinson's Corner, the Uppie goal for Kirkwall's Ba' game.) The set had a loudspeaker and, given a big aerial, it was even a good performer in the winter sport of staying up until around 2am, when if conditions were favourable, listening to American medium-wave broadcasters.

"I'm afraid the day came when Jack and I took the Family Four completely to pieces and, over the next weeks, months and years used parts plus new components to progress to designing and building various receivers. One of our hi-fi aims was to hear organ pedal notes and bass instruments, which were almost inaudible." They did eventually manage this.

Where did the power come from in Kirkwall to do all this?

Jimmy explained, *"In the early 20s, the war being over, the time came for the Royal Naval Air Station at Houton, Orphir to be closed. It had depended on a large electric power station consisting of three diesel generating sets, stand-by battery, magnificent central switchboard, all contained in a corrugated iron building. Kirkwall Town Council bravely bought the lot and set it up on Junction Road. Streets became electrically lit and customers were connected to one or other side of the 3-wire system.*

The Twatt family: l-r Jimmy, Mary (nee Leonard), James and Jack.

Jack Twatt

Jimmy Twatt

"Radio enthusiasts made haste to throw out their HT dry batteries to install instead small lead-acid rechargeable HT batteries of up to 120 volts.

"The DC mains system was a great boon to the town, but to gain power outside the burgh would require a change to AC. The county had to go through another war before that could be achieved."

What was to be heard in Orkney in the 1920s?

Again in Jimmy's own words, *"By day there was the BBC from Aberdeen and Essex. By night there were any number of foreign stations. Almost at any time there was, forcing its way through, the Morse signalling of Wick Radio with its ancient spark transmitter. A more interesting set of transmissions came, twice a day, from three more isolated lighthouses in Orkney, namely Auskerry, Copinsay and Suleskerry in voice communication with the Northern Lighthouse Board Centre in Stromness, which acted as net controller... On at least one occasion, a visiting three-piece band, in Orkney for the agricultural show season, was invited into the Stromness 'studio' to give a concert to the three lighthouse crews, and others in the know.*

"Not much news emanated from these lighthouses until a large cargo ship, the Hastings County, ran ashore on Auskerry in June 1926. She seemed to be laden with luxury items, from miniature radios (the first we saw) to two large high class yachts as deck cargo."

In 1956, while Orkney was theoretically outside the range of the nearest television transmitter operating at Meldrum near Aberdeen Jack believed that, with some effort, pictures could be received in Kirkwall. An amplifier was built, a huge wooden mast was procured and an aerial constructed to top that. When conditions were right, a snowy picture could be seen. Television arrived officially in Orkney with the opening of the transmitting station at Netherbutton in Holm in time for Christmas 1958.

The following quote from The Orkney Herald dated 15th May 1956 reads,

"With an estimated population of 20,400 persons and a total of 5,394 wireless receivers, Orkney has rather more than one wireless for every four inhabitants. This figure was given by the Post Office the other day... The most astonishing figure, however, is that given for the holders of television licences. These now number 74."

Remember, Orkney's television transmitter opened at the end of 1958. Like Jack, Orcadians were experimenting, hoping and trying.

However, 25 years earlier, in 1931 Jack and young brother Jimmy had built, from bits and pieces, a 30 line spinning disc televisor in the hope of being able to resolve experimental radio signals originating from the Baird Television Company's laboratory in London and later BBC transmissions from Broadcasting House, London. The transmissions took place on week days between 11pm and 11.45pm. The family home would fill up with hopeful locals who, when conditions were right, did indeed see pictures by wireless. Eventually, however, the Baird spinning disc system was dropped in favour of the preferred cathode ray tube to display the picture.

During his time as a radio instructor in Royal Artillery signals during WWII, Jack was a pioneer of VHF communications. However, he had to be content to have radio as his hobby for most of his life. He was owner/ editor of local paper The Orkney Herald and later a DECCA navigation engineer.

He was always proud of his younger brother Jimmy who, after studying in Edinburgh and Imperial College, London, secured work with Marconi as a development engineer on broadcasting transmitters, becoming the company's resident engineer at the BBC's Droitwitch transmitter.

During WWII Jimmy assumed responsibility in the company's Echo Sounding Laboratories where he was involved in the design of the underwater supersonic buoy. These were used as navigational aids to guide naval surface ships and submarines into landing places on the enemy coast. The design work and trials on the development models were carried out within about nine months. The early buoys were laid by surface ships or submarines at periscope depth. Later models could be fired from a submarine's torpedo tubes thus avoiding possible observation by the enemy, but this had required some involved design work to adjust the buoyancy.

Having completed the design, Jimmy was then involved with sea trials on both ships and submarines, an experience he was not likely to forget. The supersonic signals were transmitted at pre-determined intervals and could be heard by a ship's ASDIC for a distance of five miles. After a set time, or if they were swept up by minesweepers, they were designed to self-destruct!

The buoys were successfully employed in the Mediterranean and on D-Day.

Jimmy Watt, as he was known within the company, had a distinguished career at Marconi having been in charge of Maritime Development including communications and radar. Eventually he was appointed Technical Manager of the Maritime Division. As a Manager he was highly respected technically and well liked by his staff.

Originally published in The Society of the Friends of Orkney Wireless Museum's Bulletin, Volume 27 No1, June 2018

Restoring a Cossor 464AC radio

Stef Niewiadomski

The A C Cossor Ltd Melody Maker has the distinction of probably being the longest running brand identity for a domestic radio, and some enthusiasts may wish to rise to the challenge of collecting an example of all the incarnations. The name was used from the mid-1920s - initially on a kit TRF radio - and then a series of Cossor-manufactured TRFs and superhets (built in a massive factory in Highbury, London) finally ending in 1955 with the model 524. At the end of the 1950s, the company was in dire trouble and was absorbed in Philips, although the Cossor name continued to be used for some time, often on radios with Plessey-assembled chassis.

The 464AC was not one of the Melody Maker series, but was one of a small group of AC mains-operated 'table' models produced by the company. Literature shows them as the 462, 463 and 464, possibly having different cabinet styles, but details on what the exact differences were is scarce. They used the same three waveband chassis, and were introduced by Cossor during the difficult period just after the war, in 1945 and 1946, as it switched from vital war work back to peace-time production. Cossor's service manual for the 464AC shows a release date of April 1946, in time to be a star performer at the 1946 RadiOlympia show. The Trader service sheet shows a sale price of £14 16s 3d, plus purchase tax.

Overall the radio feels heavy for its relatively compact size (13½-inches wide by 9–inches high by 6¾–inches deep), caused by the weight of the mains transformer, the steel chassis and the hefty magnet of the speaker. The cabinet of my radio was made from Bakelite and was in good condition, with no breaks or cracks. The weight of the internals would guarantee a very broken cabinet, should the radio be dropped. The Swiss Radiomuseum indicates that there were three colour variants to the cabinet, namely black, green and ivory, though I would say that mine is definitely brown, and not black, but I suppose it may have changed colour over the years.

The mains lead had been cut off, and because of the radio's age, I wasn't inclined to simply re-instate it and switch on without first taking a good look over the chassis.

Figure 10: The radio in its restored state, back in its cabinet. You may be able to see that the clear, and yellowed, clear plastic dial barely covers the opening in the cabinet.

The chassis

There was a back panel fitted, and on it a useful label (see Figure 1) showed the type and position of the five valves, and other useful information. Removal of the chassis from the cabinet was a simple job: the knobs came off easily as did the two screws securing the chassis into the cabinet, and a spring-loaded screw which helps support the speaker. The chassis slid out backwards complete with the dial and the speaker. Once it was removed, the dusty state of the chassis could be seen. Still attached to the chassis was the card supporting the frame aerial: with most radios equipped with frame aerials, they are attached to the inside of the back panel, and have to be unsoldered to allow full access to the chassis. Having a chassis with separate support for the frame aerial was a pleasant surprise.

The 4½-inch diameter speaker was stamped 'Plessey electrodynamic speaker 15 May 1946'. Plessey normally operated fairly anonymously (certainly to the end user of radios): you don't often see the Plessey name on components (except those yellow, red and black electrolytics) and so it was good to see the origin of the speaker, making a change from the Elac and Goodmans examples I often find inside radios.

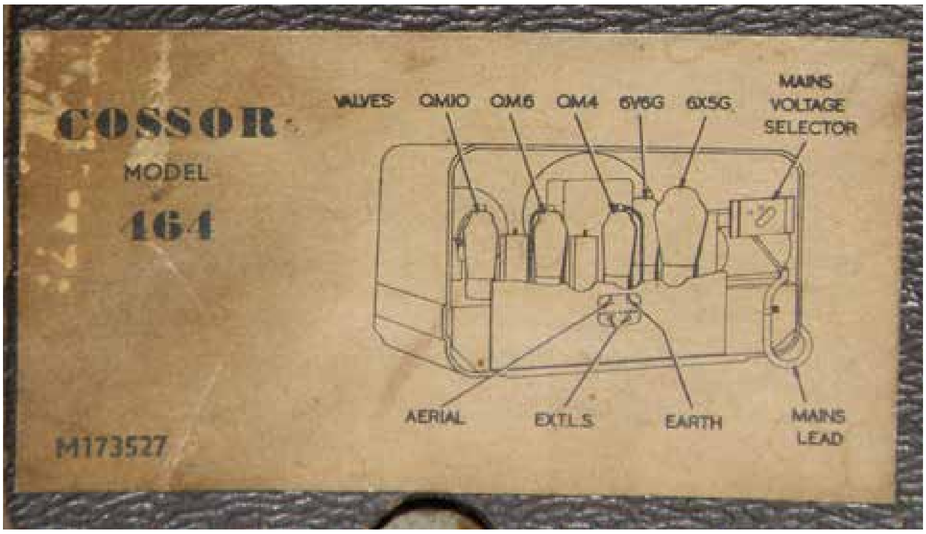


Figure 1: The label stuck onto the back panel showing the type and position of the five valves, and other useful information.

Broken glass

The 464AC is notorious for having a broken dial glass. A thin layer of glass covers the calibrated dial, which is itself printed on thin glass and the combination sandwich is viewed through a moulded plastic window, which was rather yellowed on my radio. In my humble opinion, both layers of glass have a tendency to break for three reasons: firstly, they are only about half the thickness of what you normally encounter on radios; secondly, they are secured by metal clips on either side which no doubt put them under stress; and thirdly, their top and bottom edges are cut at angles, the cutting of which in the factory probably introduces stresses which eventually help to crack and break them. I dread to think how many of these dial glasses broke during the manufacturing process, or were broken by the time they reached the dealer.

On my radio, both layers of glass were broken at the bottom right hand corner. Unfortunately the broken front piece was nowhere to be found, and the rear piece was just about held in place by the side bracket. Figure 2 shows how the rear piece of glass is held in place at an angle. I decided to leave the glass pieces in place while I restored the chassis, as I felt that removing them, and then having to re-attach them, would result in more damage.

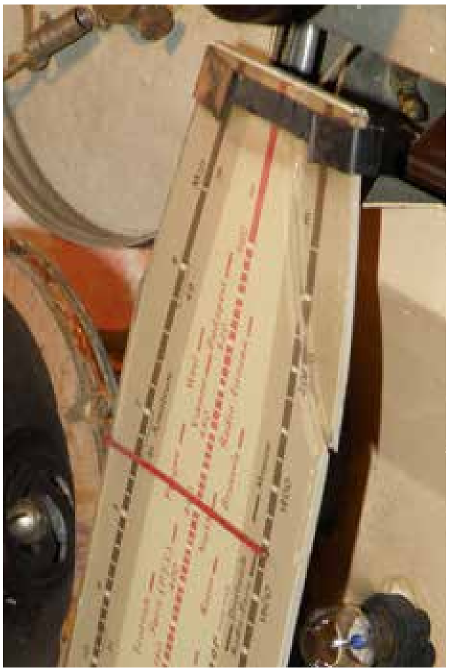


Figure 2: The broken piece of dial glass - sadly the fate of many 464AC dials - is held in place at an angle by the fixing bracket. A portion of the top layer of glass has been lost.

Behind the glass was the dial bulb: I unscrewed it and tested that its continuity was good, so I screwed it back in place .

Valve line-Up

The schematic for the radio, as taken from the Cossor service sheet, is shown in Figure 3. It's a fairly standard medium, long and short (16m-52m) wave superhet with an IF of 465kHz. My radio was equipped with what looked like the original set of valves, namely: a Cossor OM10 frequency changer (close to the ECH35); a Cossor OM6 IF amplifier (equivalent to the EF39); a Cossor OM4 double-diode triode signal and AGC detector / audio amplifier (equivalent to the EBC33); a Ken-Rad (marked 'Made in the USA') VT-107B (equivalent to the 6V6G) audio output stage; and finally a Mullard 6X5G full wave rectifier (marked 'AMERTY', indicating that it had been made in the US and shipped to the UK to be sold by Mullard, see Figure 4). Assuming that all the valves were original, the types and brands used show how they had to be gathered from various sources in the immediate post-war period.

The chassis of the radio is relatively safe, being isolated from the mains by the mains transformer, the primary of which is adjustable between 200V and 250V. Although the 6X5G rectifier is indirectly heated, it has its own heater winding on the mains transformer.

I removed the valves to give me access to the top of the chassis for cleaning, and all went well except for the top cap of the OM10 which refused to free itself from its clip and came adrift. Luckily the remaining wire sticking out of the envelope was a good length (see Figure 5) and I was able to carefully clean it, hook it around a length of thin bare tinned copper wire and solder the two wires together. I then threaded the new wire through a small hole I had drilled into the top cap, and after applying some quick setting Araldite to the top of the glass envelope, soldered it onto the top cap. I would find out later whether the vacuum in the valve was still intact.

I wanted to test the heaters on all the valves and learn a little about how heaters change (or not) over the years. So rather than simply test them all for continuity on a DMM (which is what I usually do), I decided to check what current they took at their nominal heater voltage of 6.3V. I connected a DC power supply across pins 2 and 7 of an octal socket (all these valves conveniently use the same pins for their heaters), and measured the current they took when the supply was as close to 6.3V as I could set. The OM10, OM6 and OM4 were within 4mA of their nominal 200mA; the VT-107B took its exact design current – 450mA – at 6.3V; and the 6X5G took about 580mA at 6.3V, pretty close its nominal value of 600mA. Since all these heaters were still very close to their design voltage and currents, I guess this shows how stable the manufacturing process was when they were assembled all those years ago. My conclusion was that all the original valves had good heaters.

Restoring the chassis

I disconnected the leads going to the speaker and removed it from the chassis because it was in the way for accessing some components on top of the chassis. The speaker's coil measured about 2.6Ω, so I knew that the winding was intact. This gave me access to the output transformer's secondary: it measured at about 0.9Ω, and so this was also good. I also removed the frame aerial, after carefully labelling and unsoldering its

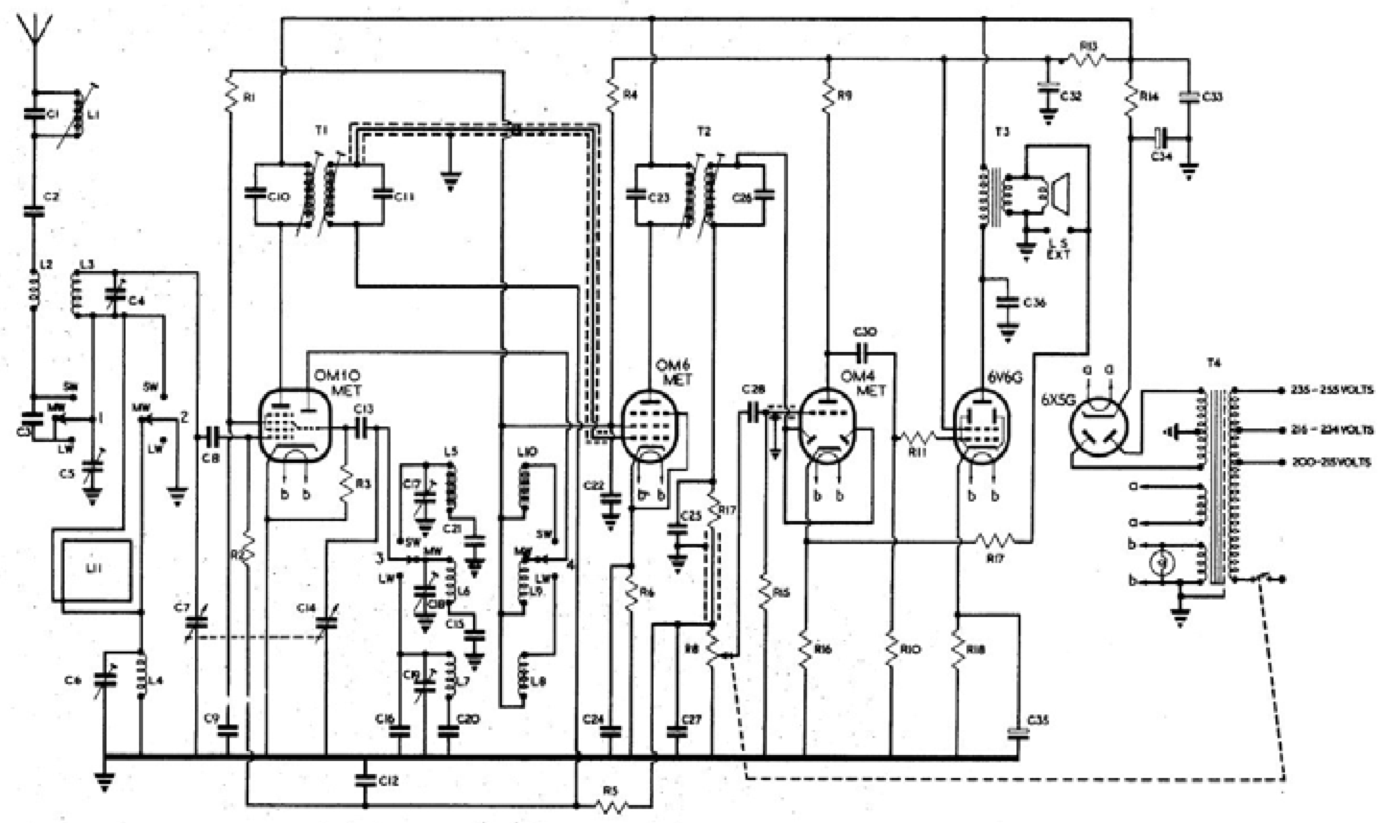


Figure 3: Schematic for the 464AC, as taken from the Cossor service sheet.

Figure 4: The Mullard 6X5G marked 'AMERTY', indicating that it had been made in the US and shipped to the UK to be sold by Mullard.

connections, again to give me better access to the top of the chassis. Figure 6 shows the chassis with the frame aerial removed. I could now see the serial number of the chassis, which was 025165, stamped into the rear of the chassis. The dial cord was intact and the tuning mechanism turned freely and operated the tuning capacitor and pointer. Cossor's top and bottom chassis views (see Figure 7) are very well drawn and were very useful in identifying components on the chassis.

Above the chassis I could see a green-bodied TCC 16μF electrolytic and a resistor mounted inside a sleeve, which I took to be R13. The resistor measured at 4.89kΩ, against its nominal value of 3.9kΩ, and so it was a good candidate for replacement. The Cossor service sheet indicated that C32 and C33 should both be located in this area (in a single can), but the capacitor I found was definitely just a single. As I prodded the wiring around the resistor and capacitor, it disintegrated and the soldered joints fell apart – fairly typical of power supply wiring that has been heat cycled many times over the years. Two wires remained sticking through a grommeted hole to the underside of the chassis.

The socket for the 6X5G looked different to the others, and was covered in a light coating of rust. Whether this was fitted in the factory, or at some later date, I'll never know.

Taking a look at the power supply end of the underneath of the chassis, I could see a chassis-mounted can electrolytic whose end was bulging. This appeared to be C34, and I had to drill out a couple of rivets securing its clip to remove it. It was an 8μF 450V Hunts electrolytic. I had a RadioSpares 32μF + 32μF 450V electrolytic in a can, dated 1969, which fitted the original hole perfectly, and so after testing it for leakage and capacitance, I fitted it in place. I decided to fit a 10μF 450V capacitor in place of the original C34, and use the two 32μF electrolytics as replacements for C32 and C33. The 6X5G is spec'd to have a maximum capacitance of 4μF connected to its cathode (quite a low value compared to many other rectifiers), and so I included a 100Ω resistor between the cathode (pin 8) and the 10μF capacitor to limit the surge current out of the cathode. I replaced R13 and R14 with new resistors, and so I was confident that the power supply would now be reliable. All the HT current flows through R14, and its ohmic value and the HT current it carries mean that it dissipates about 4.5W. I had a

Figure 5: Top of the OM10's envelope showing the broken grid connection wire. Happily the wire was long enough to allow an extension wire to be attached, and the top cap to be re-attached, and the vacuum was still intact as indicated by a working valve when the radio was switched on.

7W component handy and so I used this.

Most of the wax-coated paper capacitors looked tired and runny, so I decided to change them all, along with the 6V6G's cathode resistor's bypass electrolytic. A total of eight capacitors were changed at this stage - not to everyone's taste I know, but this should result in a reliable radio from now onwards. All the resistors measured fairly close to their nominal values, and apart from R13 and R14, were left in place. Figure 8 shows the underneath of the chassis after the repairs had been made.

I renewed the mains cable: the original was two-core, as was normal for the time, and I fitted a replacement two-core cable and a plug with a 1A fuse. After giving the radio a good soak test, I would check the insulation resistance between the mains and the chassis and decide whether a three-core cable could be fitted.

Switch on

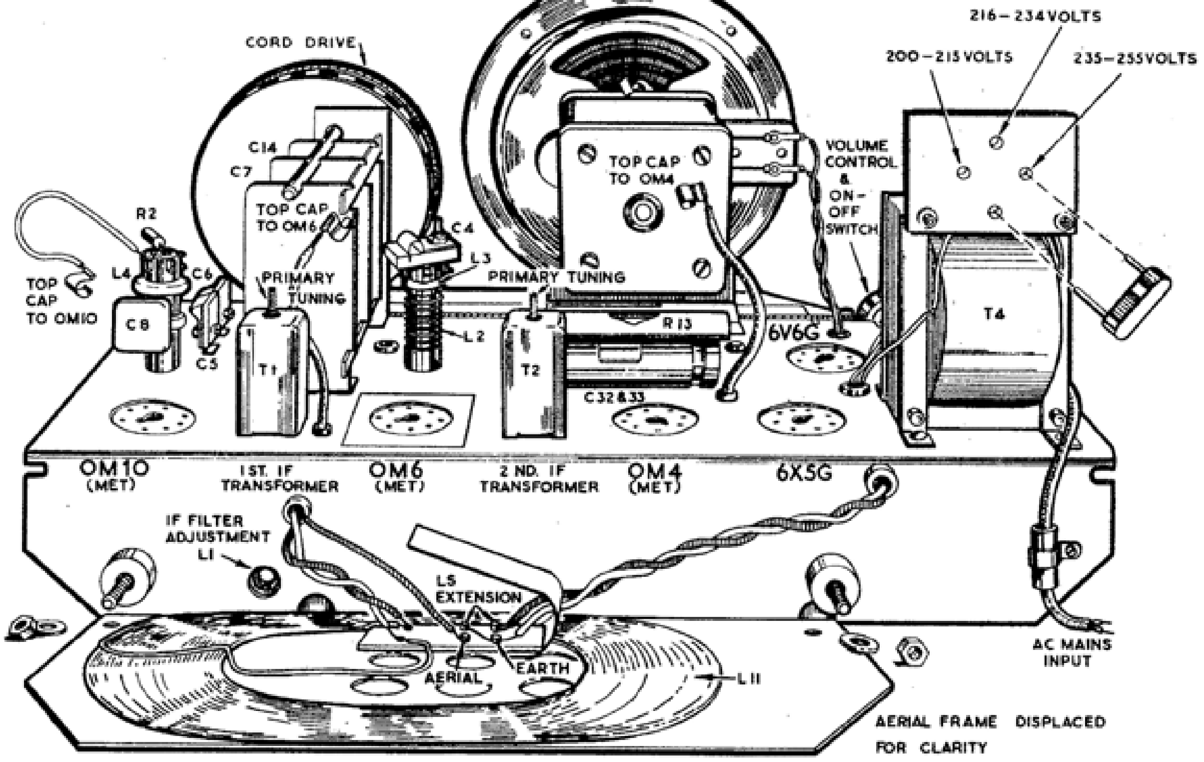
I attached an external aerial, plugged the radio in and switched it on at the mains. After 15 seconds or so, it came to life with some output from Radio 4 on the longwave, so it seemed that my repair to the OM10's top cap connection had worked. I noticed that the dial bulb was not lit, but this just needed to be tightened in its socket and then it lit up. The nominally 500kΩ volume control was noisy (and measured end-to-end at only 410kΩ) and no amount of turning it from side to side made it better, so I resolved to replace it. Initially I couldn't hear anything with the wavechange switch in the medium and short wave positions, but after a spray with switch cleaner, stations started to appear. Tapping the volume control made the audio level go up and down, and I suspected that this was a symptom of its noisy, intermittent condition.

I only had a 250kΩ potentiometer, without a mains switch, to hand, and I fitted this in place for the noisy original, wiring the mains directly across the mains transformer's primary. The audio level was well up now, and tapping the volume control, or the chassis, made no difference. I must admit I wasn't too impressed with the audio quality: at only 4½-inch in diameter, I thought that the speaker was rather small, and Cossor could maybe have squeezed in a larger, maybe elliptical one. At this stage the chassis was still out of its cabinet – I'd see later if the sound quality was any better when the radio was re-assembled.

The adjusters on the IF transformers were still secured by their original factory wax, and so had never been fiddled with. I wasn't going to be the first to do this, and so I left them alone. I left the radio switched on for a couple of hours to soak test, and its sensitivity definitely got better, presumably as the coils and other components dried out and returned to their original values. Even after all those years calibration on the medium and long wave was where it should have

Figure 6: Rear view of the 464AC's chassis, after the frame aerial has been removed. A small screen, mounted between the two IF transformers, can be seen shielding the OM6 IF amplifier valve from the frame aerial. The two 'G' octal valves can be seen adjacent to the mains transformer.

TOP OF CHASSIS.



BOTTOM OF CHASSIS.

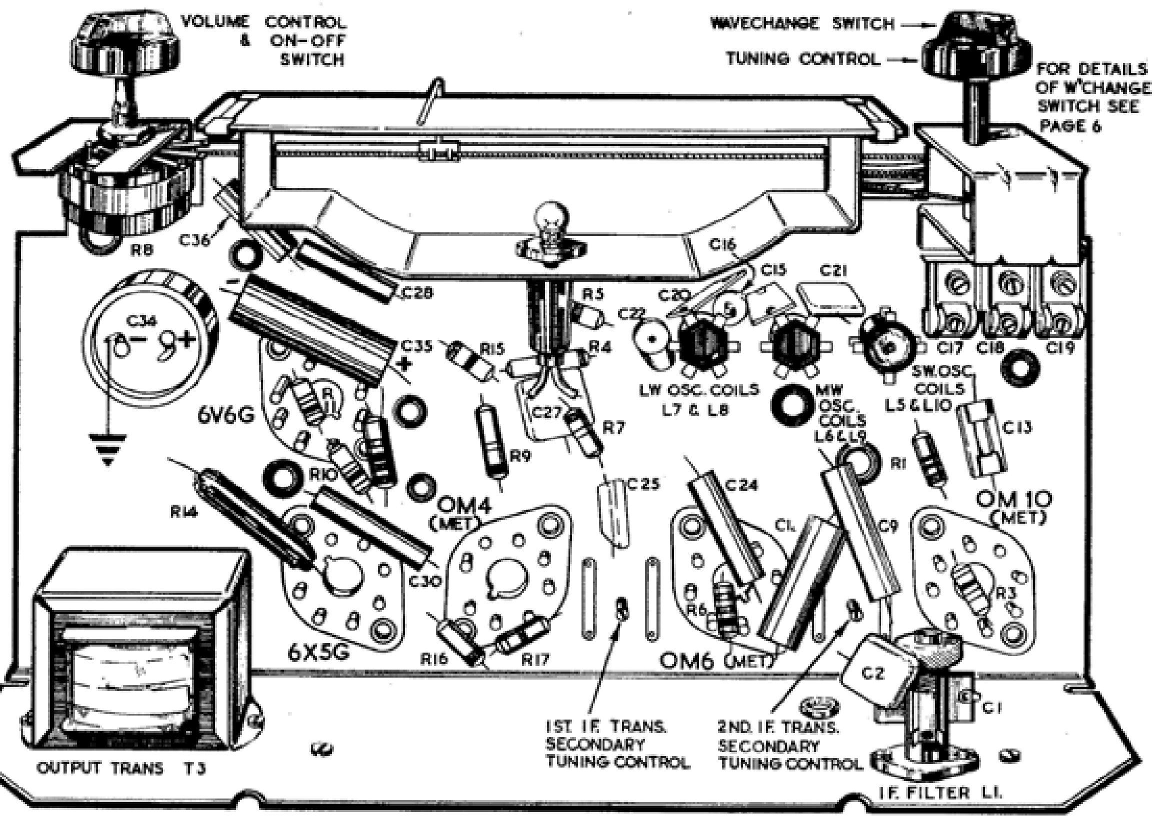


Figure 7: The well-drawn top and bottom chassis views, taken from Cossor's own service manual.

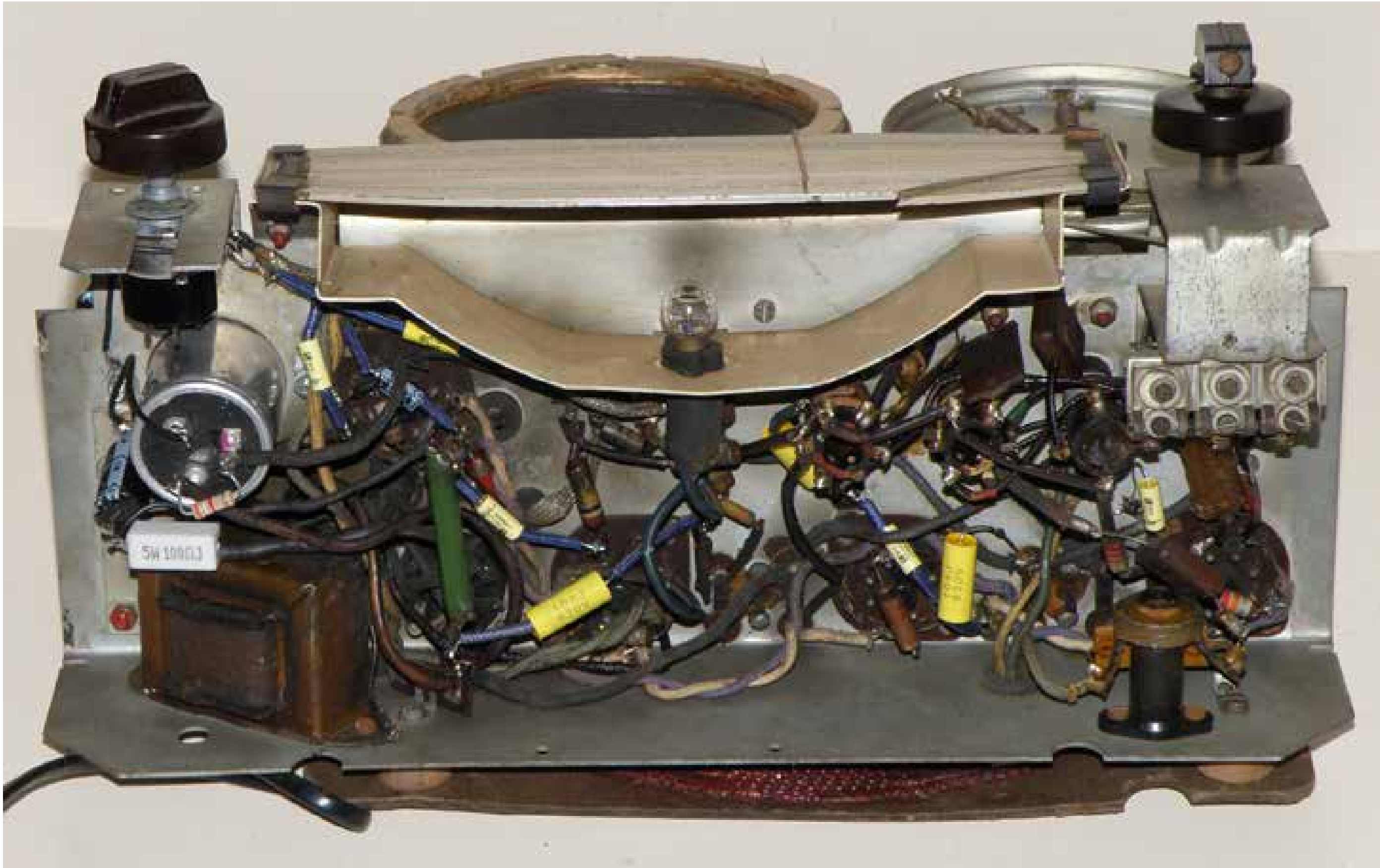


Figure 8: Restored condition of underneath of the chassis. The dial bulb is held neatly in place at the centre of the dial and provides very even backlighting. The replacement power supply components can be seen at the left hand side of the chassis, next to the audio output transformer.

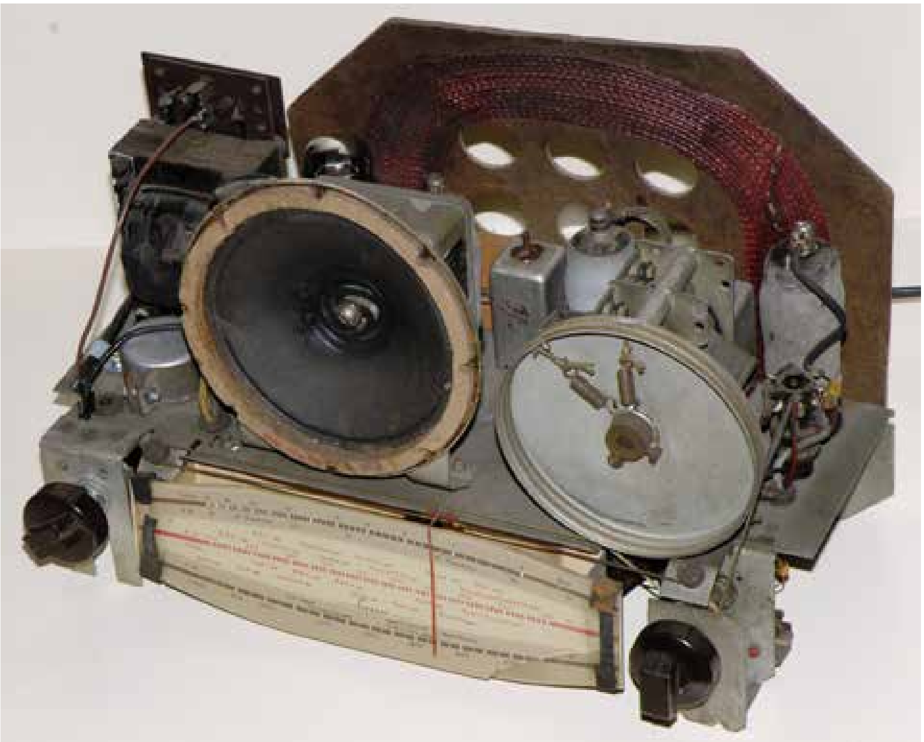


Figure 9: Front view of the restored chassis. The rather small speaker, which is not much bigger than the dial drum, gave what I thought was mediocre audio quality.

been, and I could hear various shortwave transmissions inside the indicated bands.

I now checked the insulation resistance of the mains transformer's primary winding with respect to the chassis, and it was greater than 100MΩ. This gave me the green light to fit a three-core mains cable, with the radio's chassis connected to mains earth. The restored condition of the chassis can be seen in Figure 9.

Cabinet

The Bakelite cabinet was in good condition and so I just gave it a wipe over, and didn't try to over-polish it. This might help when I came to photograph it: curved polished Bakelite cabinets are notoriously difficult to photograph, especially when using flash.

As mentioned earlier, the plastic dial cover was yellowed, and cleaning it didn't help, so I left it as is and re-fitted it into the opening in the cabinet, securing it from the back with sticky tape. It seemed to be too small for the opening and barely covered the hole: it would seem that it has shrunk since it was originally fitted.

After putting the radio back together, I switched on again and allowed it to warm up for a while. The quality of the audio was somewhat improved, but not as good as would have been provided by even a slightly bigger, for example a 5-inch diameter, speaker.

Figure 10 shows the radio in its restored state.

Summary and conclusions

My Cossor 464AC is a good-looking radio released just after the war, at a difficult period for the manufacturer in terms of sourcing components. What looked like the original set of valves was still in working condition, even after I had broken and repaired the top connection on the OM10 frequency changer valve.

The underneath of the chassis looked original, but evidence above the chassis indicated that someone had modified the HT smoothing components at some stage, and the soldering had not been very reliable. After replacing most of the power supply components, and allowing a few hours of soak testing, the radio worked well on its medium, long and short wave bands.

The Perdio PR7 "Park Lane" transistor radio

Roger Grant

Having a sort out of half a dozen or so half finished projects in order to clear some space before I started anything else, I discovered this early transistor set that immediately sent me back to my school days when transistor sets first appeared. With fond memories of listening to radio Luxembourg while doing my homework and later radio Caroline and Atlanta.

Needless to say that the sort-out stopped for the duration while I indulged myself in this nostalgic trip back to my youth. Yet another project jumped the queue and cluttered up the bench even more.

I can't remember where it came from but it had hung around among my transistor sets for a couple of decades. Now rediscovered it seemed to have gained an instant eye appeal, a typical late 1950's cheaply made transistor set in the British style, unlike the Japanese sets with moulded plastic cabinets in a leather carrying case with an earphone accessory. These were mainly aimed at the American market and calibrated in Kc/s. At this point I couldn't resist getting this set working.

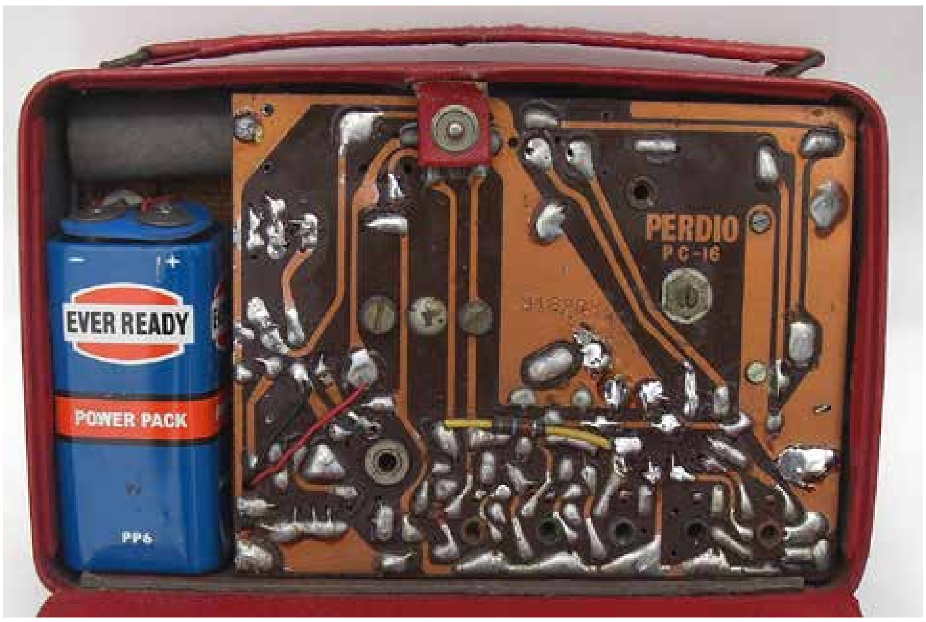
The sound quality of the early transistor sets was very poor, at fractions of a watt output, no comparison to the large wooden main set or radiogram at home at the time and a step back to the tinny sound of the moving reed or iron speakers of the late twenties and early thirties, most of them sounding like a 'wasp in a bottle' to quote Gerry Wells.

This set built by Perdio a London based company was formed in 1955 by Derek and Joyce Wilmott along with J.D. Heslop, Derek was an ex-RAF pilot and a RADAR researcher for Decca, he was already an inventor with designs for miniature consumer electronics including tape recorders and record players. The PR7 was among the first successful early British transistor sets produced in 1958, following the PR1, a 5 transistor set produced earlier in 1957. This PR7 "Park Lane" a 7 transistor superhet is a cheaper version of the "Super 7" housed in a nice leather case and around thirty bob (£1.50) cheaper at £16/7/6 (£16.37) .

Perdio (shortened from personal radio) later moved to Sunderland and went on in 1963 to produce the worlds first British transistor portable TV, the Perdio "Panorama", but failing to compete with the far eastern imports Perdio went into liquidation in 1965 leaving a legacy of early transistor technology.

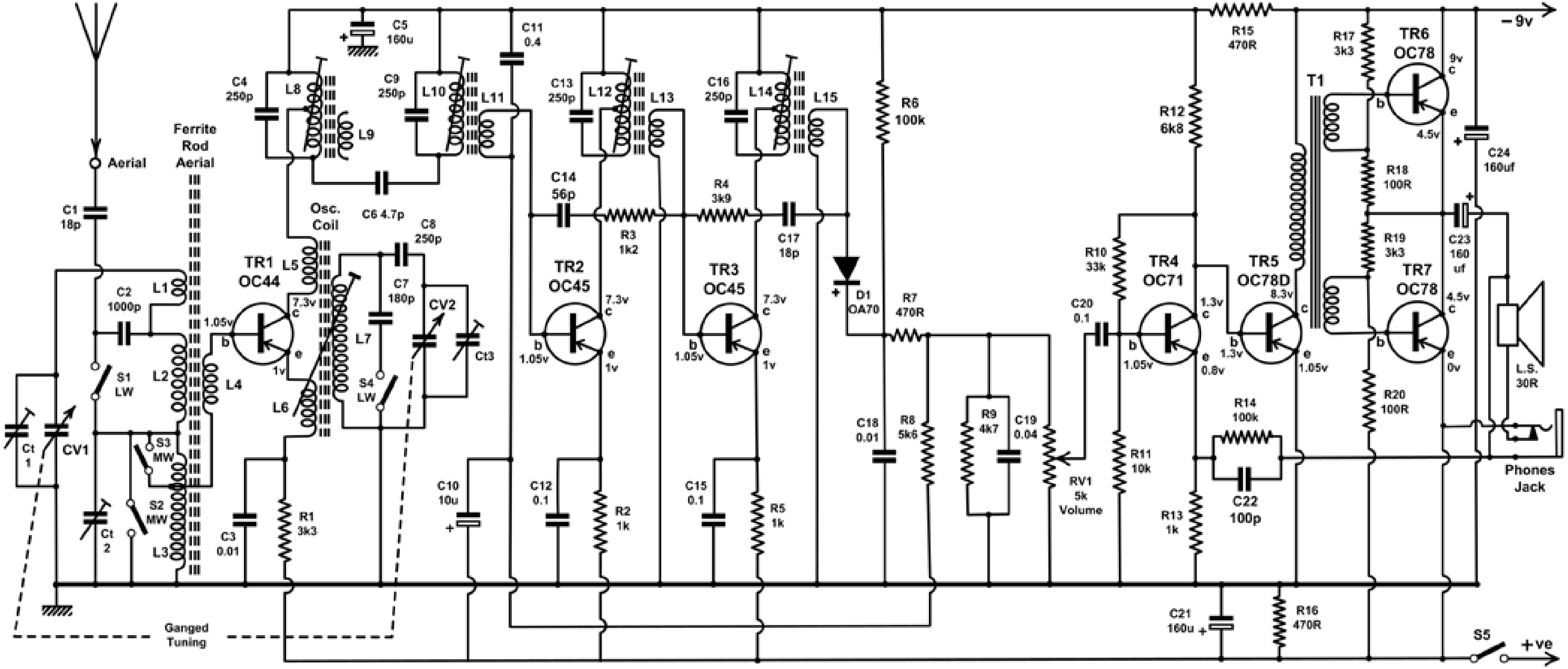
The circuit, a dual waveband seven transistor superhet employing a printed circuit board Superhet employing a printed circuit board and using the Mullard OC range of transistors, one of the big three main British transistor manufacturers of the day, the other two being the NKT series from Pye Newmarket and the GET range from GEC. The first stage, a self oscillating mixer using an OC44 followed by two IF stages using OC45's with an OA70 diode detector. The first audio stage uses an OC71, being the extra transistor deviating from the normal six transistor set circuit of the day, then an OC78D output driver and a pair of OC78's as a class B push pull output producing around a quarter of a watt of output. The set also provides an earpiece socket for personal listening and a wander socket for an external aerial, although this set was quite lively so the the aerial socket was unnecessary, perhaps intended for a car aerial.

There are a few other minor deviations from the norm, capacitive coupling (C6) and double tuning between the mixer/first IF, TR2



PERDIO PR7

Models:- Londoner, Park Lane, Super 7 and Piccadilly



and TR3 the IF transistors are neutralised (of the transistor internal leakage) by R3, C14 and R4, C17, a bias rail for the non AGC RF/IF. stages, this derived from the emitter current of TR5 across R16 applying around -1v of bias with respect to the +ve rail.

In the early set the earphone socket is connected to the driver stage cutting off the power to the output stage and the later set, from the output stage cutting off the speaker.

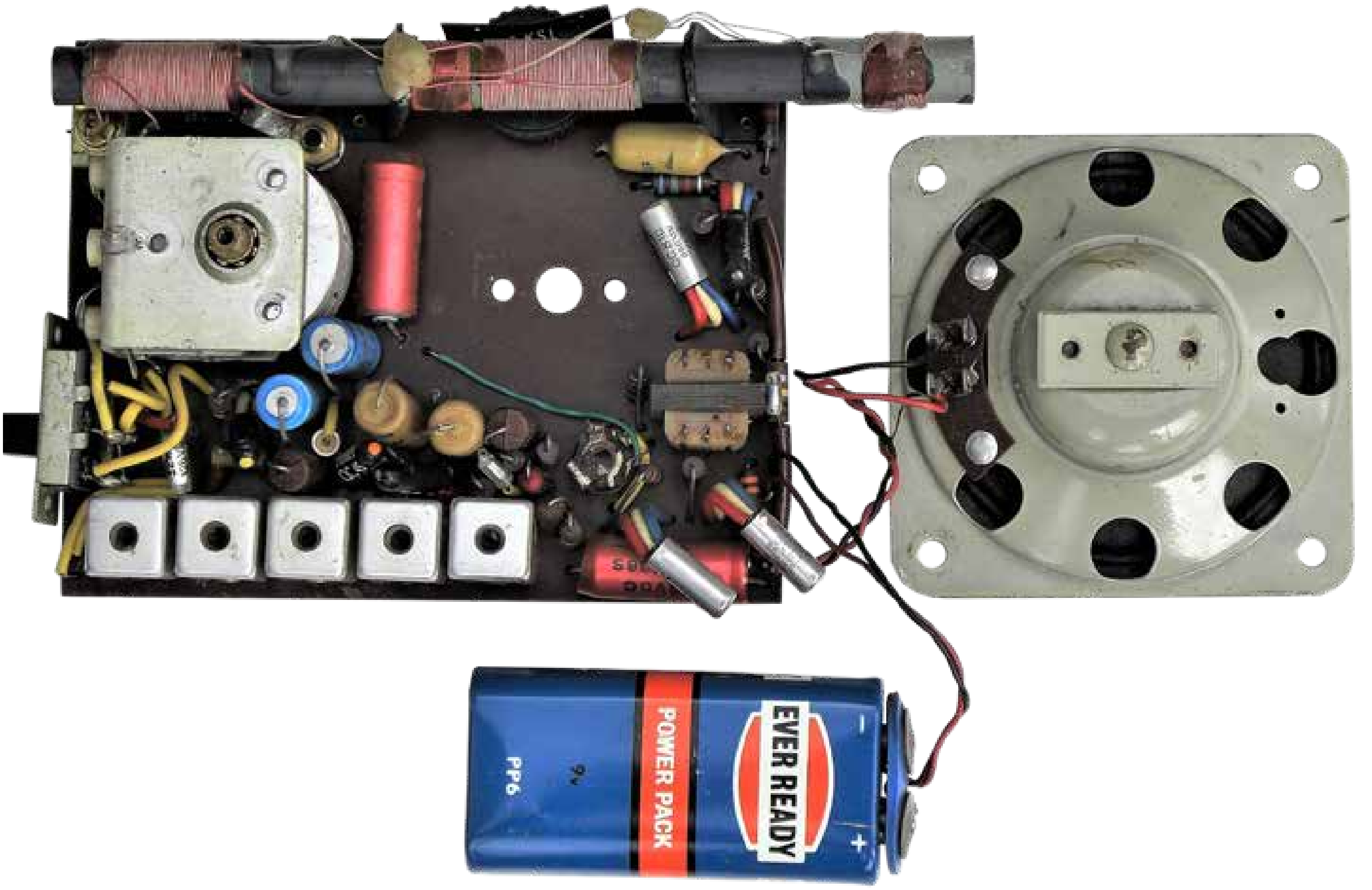
The set sounds a little better than most of the pocket sets mainly due to the extra audio stage and reasonably beefy three inch speaker.

The cabinet, measuring 6” x 4” x 2” deep, a little larger than the average shirt pocket set, has a Rexine covered cardboard outer case. This is a hardboard front panel covered with an expanded aluminium speaker fret with brass trim, a bit basic to say the least but seems to have survived quite well, even the handle has remained in tact, the tuning knob is quite robust and has managed to stay bright and resisted the usual scratches and cracks, only the centre retaining disc required polishing with Brasso and a coat of clear lacquer.

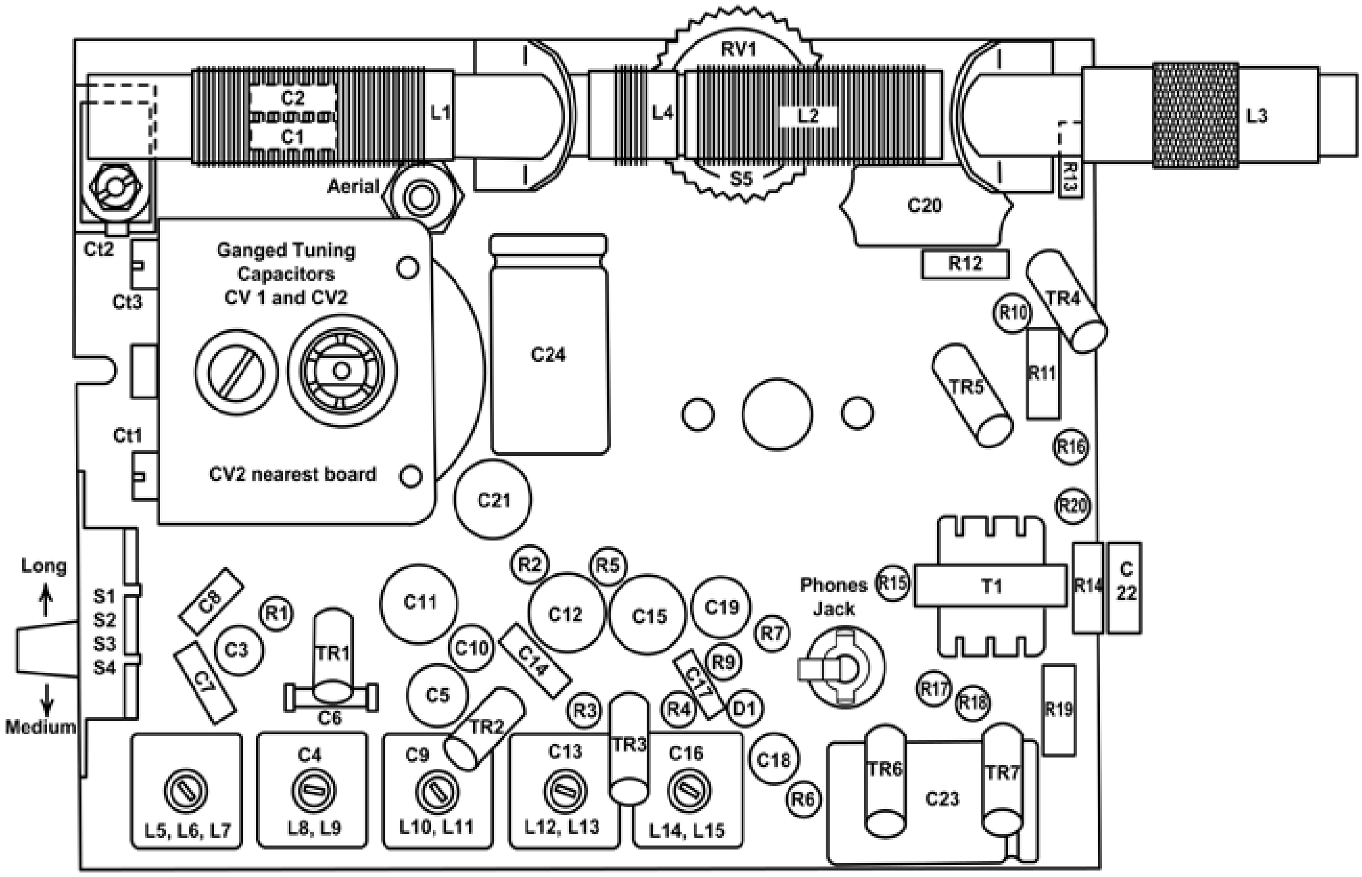
On fitting a battery so the set didn’t work, I started with a check around the printed circuit with the AVO, the output transistors first as these tend to be the least reliable. These proved ok with the mid point voltage between the output transistors at half battery voltage as expected but there was no crackle from probing around with the AVO. It was very dead so the next candidate was the earphone Jack socket switch, this checked ok but the speaker was open circuit,

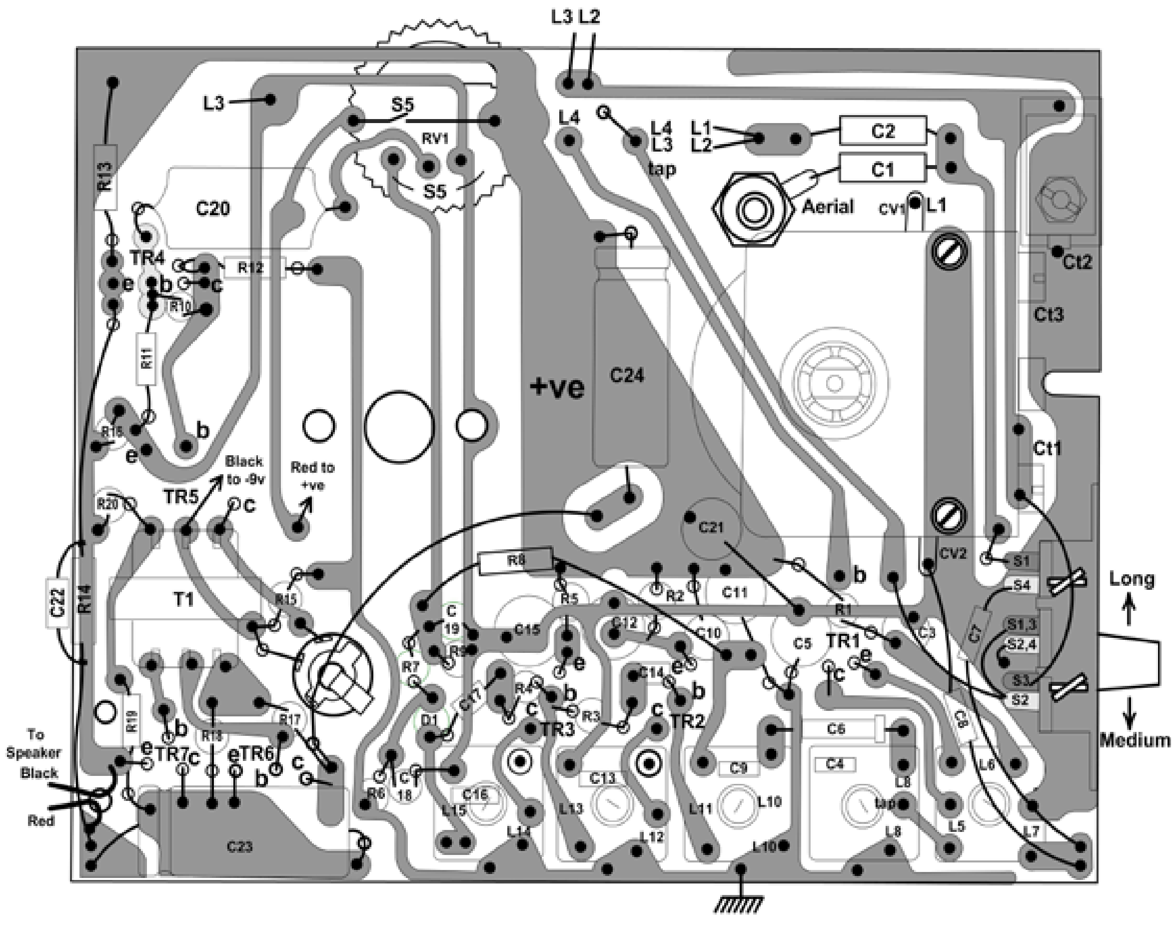
I was dismayed by this as I would have a problem finding a replacement. The speaker was a purpose built well made square framed 3” 1960’s 30 Ohm type, with an integral

mounting plate for the PCB and reasonably rare, not giving up without a fight I checked the resistance of the speech coil on the buttons in the cone, to my complete surprise I found 30 Ohms and looking further I found that one of the jumper wires from the button to the tag-strip, a piece of string covered in a fine copper braid was open circuit just as it entered the tag strip. This was easily fixed by increasing the size of the blob of solder retaining it. The audio stages now came to life but that was all, no RF, as I worked back through the stages I would get the healthy bop when touching the AVO test lead on the base of the transistors as its impedance momentarily disrupted the standing bias. When I reached TR1 I found that the collector read almost battery volts, meaning its not doing anything and on removal I found the collector was open circuit. Problem solved! Now working the set proved to be intermittent and varying in gain and this was traced to the wave change switch, a simple double pole slide switch which was easily dismantled for cleaning, the set now performed very well and was very lively. I cleaned the cabinet, handle and tuning dial and replaced it back in its

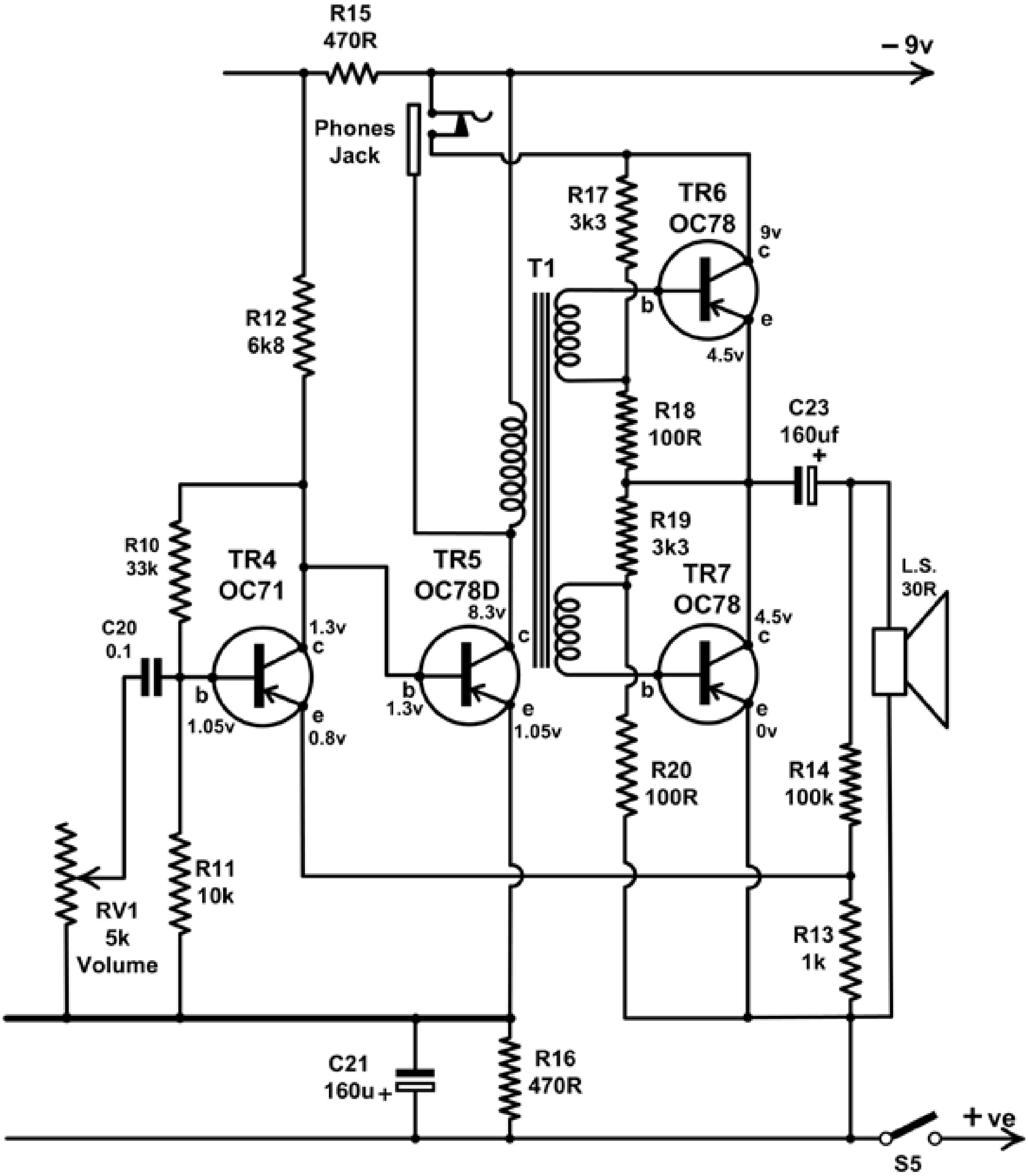


Perdio PR7
Component Locator





PERDIO PR7
Earlier Phones Jack Circuit



cabinet, leaving it running while I polished and lacquered the brass tuning dial retaining disc. The gain gradually reduced and the set became very insensitive so back on the benc. All the voltage readings appeared to be about correct and whilst working the sets gain was constantly varying up and down. As all the stages were working I turned my attention to the AGC line. There's a 10mfd electrolytic capacitor C10 decoupling the AGC and this seemed a prime candidate. Its replacement made no difference, monitoring the AGC on the oscilloscope proved the AGC DC level to be wandering around with a steady level of signal. R8 the AGC feed from the detector checked ok leaving C11, a 0.04 paper capacitor the AGC RF de-coupler. On removal this proved to be very leaky with its resistance varying up and down from around 1 meg to around 1k and on replacement the set returned to normal operation.

All it needs now is an authentic battery. I had in stock an old Ever Ready PP6, a PP3 will easily fit inside, I series drilled out and removed the plastic bottom followed by its innards. The top plate with the battery connectors now pulled out through the bottom and I was able to solder a PP3 battery clip to the original internal jumper wires. Replacing the top plate and pushing it up flush to the top I then secured it with a few spots of rapid Araldite. Job done, probably the easiest battery re-stuff that I have ever done. This deviation from my tidy-up didn't take too long and was quite an enjoyable little job.

Hedghog - How I developed a 625 to 405 line converter

Frank Cuffe with additional material by Jeffrey Borinsky

Back in November 2016 I finally decided to have a go at building a standards converter; it had been niggling in the back of my mind for a while. It was something I wanted to try but had been putting off because I knew that I would have a lot to learn and therefore this project would require a large commitment. With the limited amount of time that I have for such projects I felt it could possibly take in the region of 12 months to complete. In the end it took much longer as it was the spring of 2018 before Hedghog was complete.

First thoughts

There are quite a range of converters ranging from the relatively simple line dropper without any interpolation to the much more complex that does two or more line interpolation, but which type to try and build? I decided to go with a line dropper with simple 50:50 interpolation, as I felt that it was just within my capability.

The next thing I had to decide was, would it be a linestore or a framestore? A linestore is economical on memory but the 405 output must be synchronised at frame rate with the 625 input. Framestores require more memory but the output and input can operate independently. For me it was a no-brainer, a frame store it was as I thought that implementing a framestore would be easier because the 625 and 405 sides could be built and tested separately. As well as that, I could modify the software I wrote for my PICGEN test card generator and use a PIC microcontroller with some additional logic to generate all the waveforms needed to control the 405 side of the framestores as well as generate the 405 sync pulses. With the addition of a classic R-2R ladder (fig. 1) digital to analogue converter, the 405 side was sorted!

The 625 side needs a means of getting the analogue PAL video into a digital format. I could go with an older setup of analogue to digital converter plus sync separator or use a modern single chip solution, but which to choose? Both have their merits. The older analogue-to-digital converter plus sync separator are potentially available as through-hole components so are easier to prototype. A modern single-chip video decoder does the analogue to digital conversion, sync separation and also processes the video signal which gives superior performance. They require programming but that isn't a problem as the microcontroller can do that. However they are available in surface mount only, which makes them more difficult to prototype. In my mind it had to be the video decoder for its superior performance.

Which decoder chip? The Texas Instruments range is what I gravitated towards as they are popular and I like the way their documentation is written. Their TVP5150 decoder is in a 32-pin surface mount quad flatpack. It converts PAL video signals to 8-bit ITU-R BT.656 format, often incorrectly called "601". It is an inexpensive video decoder with good performance that does most everything. Unfortunately it didn't suit my application because in the BT.656 format, luminance, chrominance and syncs are all contained within the same data stream. My converter would therefore need a means of separating the luminance and syncs. I felt this might be too big of an ask for the components that I intended using. So to keep component count as low as possible I chose its bigger brother, the TVP5146 which is in an 80 pin quad flatpack. This can be programmed to have the luminance and chrominance available on separate ports. The TVP5146 also has active video, horizontal sync, vertical blanking and field identification signals, each of which is very programmable and all are available on separate pins. They are important, as those signals together with a little logic are all that is required to control the 625 side of the framestores. For the memory I decided to use two AL422 dual port framestores.

Having picked the major components, the next thing was to decide on some logic to tie it all together. The traditional way would be some TTL chips but I decided on a programmable logic device even though I hadn't used one before and it would mean I needed to learn

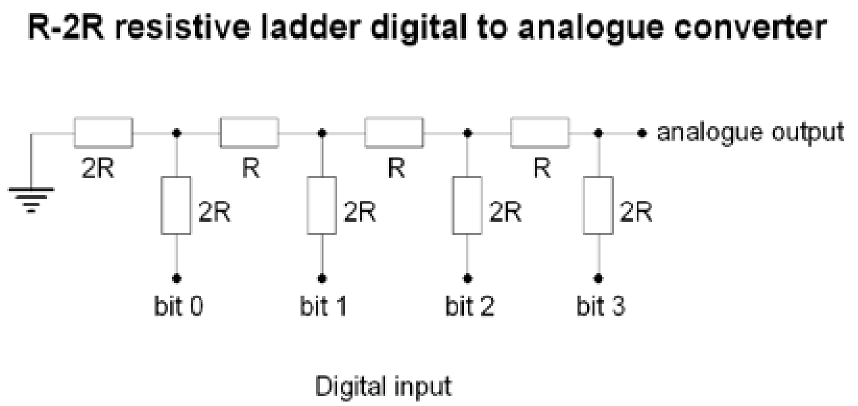


Fig 1. 4 bit R-2R ladder

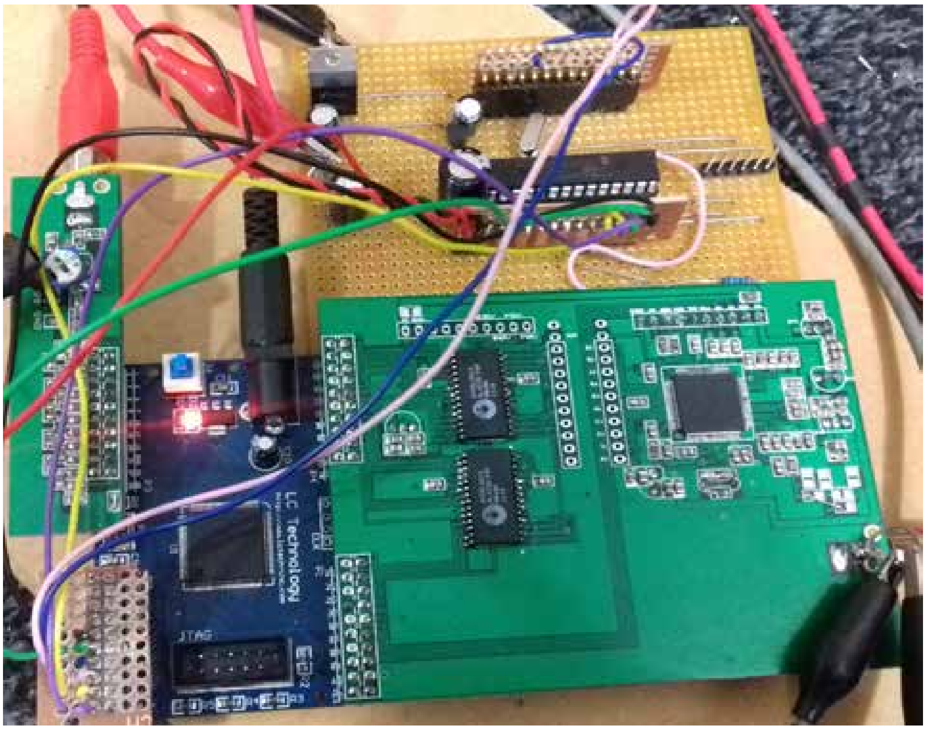


Fig 2. My first prototype

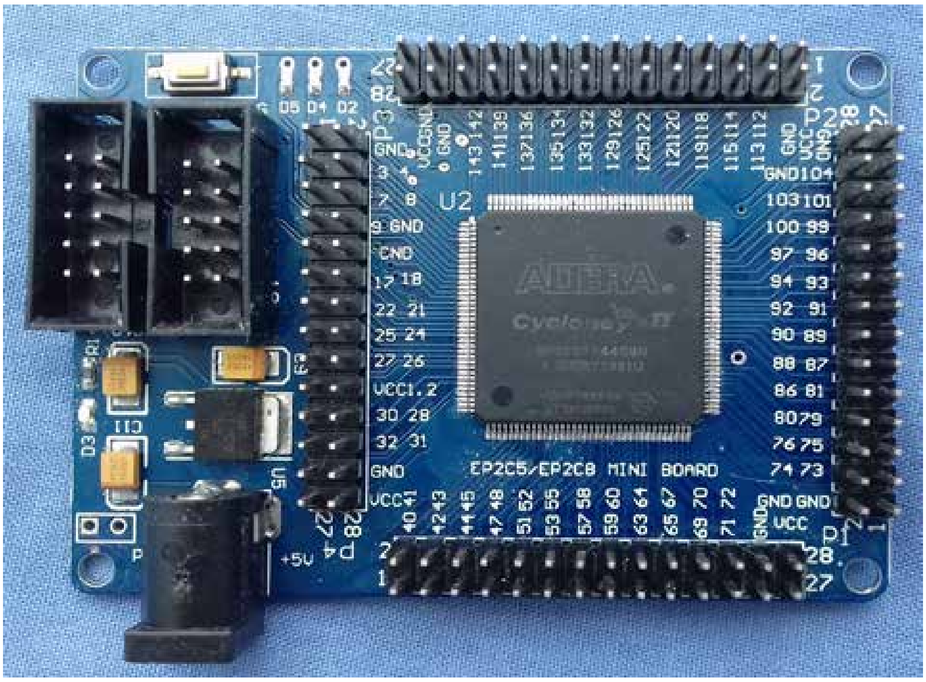


Fig 3. EP2C5T144 FPGA board

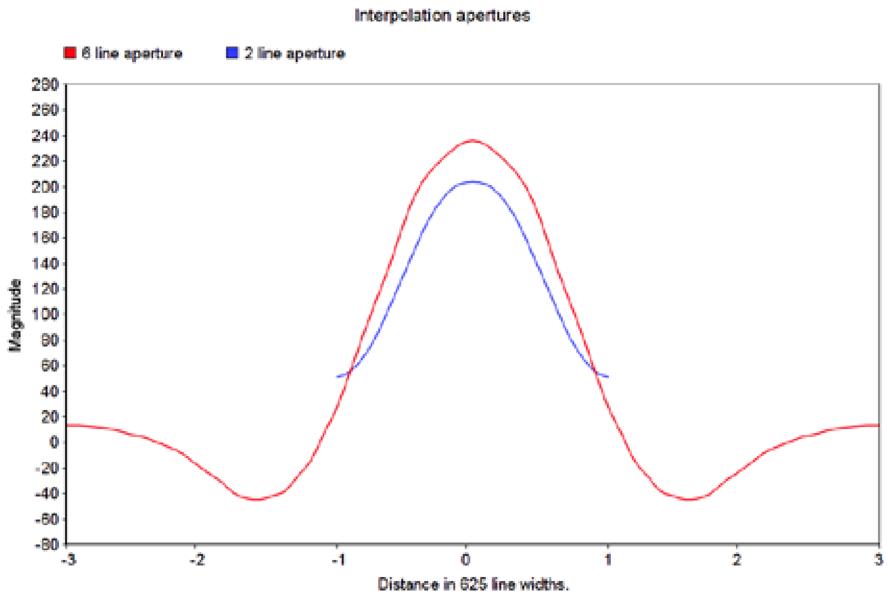


Fig 5. 2 and 6 line apertures

a new programming language. Why a CPLD (Complex Programmable Logic Device)? The great thing about a CPLD is you can redesign the logic circuit within it over and over again without soldering a single wire. So what is a CPLD? I like to think of a CPLD as a blank canvas of unconnected logic gates and flipflops. The act of programming connects the gates in whatever configuration is required to perform the required logic function. As logic gates and flipflops are the basic building blocks of all logic, almost any type of logic circuit can be built within the CPLD, the limiting factor being the amount of gates the CPLD has. I knew little about CPLDs and looking around the internet where were a whole host to choose from. But which one? I picked the Altera Max II EPM240T100C5 as it had enough IO pins, was inexpensive, appeared to be popular and the Quartus programming tools are free to download from Altera.

Starting construction

With all the components decided on it was time to start constructing. The PIC microcontroller was easy as I mounted it and its associated components in my usual way on a scrap of stripboard with headers to connect to the rest of the circuit. I tackled the video decoder next and it was a little trickier as it is in an 80 pin surface mount package with a pitch of 0.5mm. There are adaptor boards that connect a chip like this to 2.54mm headers but with the dire warnings in its data sheet about keeping decoupling capacitors etc as close as possible to the chip pins, I felt that this approach would most likely not work. The only way that I could see being feasible was to design a PCB. But it would need trace widths and spacings of just 0.25 mm and I knew that I wouldn't be able to home-brew traces that are that fine. So how to proceed? I came up with a scheme, where every second pin of the decoder chip was bent upwards. This left the remaining non-bent pins on a 1mm pitch which I could easily make traces for. I made a small PCB to fit on top of the IC to connect to the bent pins. By carefully selecting the sequence of bent pins on each row, so they mostly consisted of power and ground pins, and leaving the data pins to

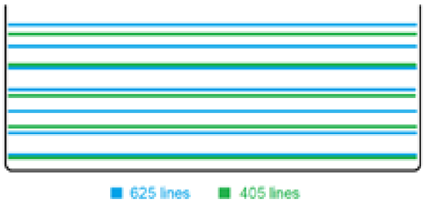


Fig 4. 625 and 405 lines

connect on the main PCB the number of traces on the small PCB could be minimised. The PCB was designed, etched and tinned. Then it came to mounting the components. The first step was to mount the TVP5146 to the PCB. With the pins of the TVP5146 being on a 0.5mm pitch, the magnification that the bench magnifier gave wasn't enough and I hadn't a microscope. I managed by taping a hand magnifier to my bench magnifier to get enough magnification. First the appropriate pins were bent to a 45 degree angle. Next the straight pins were soldered to the main PCB. Then the small PCB carefully aligned and glued to the top of the TVP5146. So far so good! But this is where things started to go south. The pins are surprisingly brittle and inevitably once bent beyond 45 degrees one would break rendering the TVP5146 useless. I tried a number of times, each time destroying a TVP5146. After putting a considerable amount of time and effort into working out the order of bending the pins, designing the PCBs and etching them, it was all in vain. I just had to move on, but what was left?

Getting a PCB manufactured professionally

The only way I could see to go forward was to get the PCB manufactured professionally. PCB manufacturers require a Gerber or similar manufacturing file to make the PCB. I use the free Design Spark PCB software to design PCBs and it can generate such manufacturing files. I designed the PCB for the TVP5146 and also included on it the AL422 framestores plus headers to connect to the CPLD and microcontroller boards. A strip along one edge would be cut away from the rest to make a second PCB which has headers to connect to the opposite side of the CPLD and pads for the R-2R ladder and emitter follower. I emailed the Gerber file to the manufacturer and in ten days the PCB arrived. The quality was excellent and the cost was far less that I had spent on ruined TVP5146 and PCB material. It didn't take too long to cut the PCB in two and populate both boards, The PCB came with a solder mask which made soldering the surface mounted components easier.

Programming the CPLD

As well as downloading the Altera Quartus Prime programming tools I needed some kind of programming adaptor. The Quartus USB Blaster connects the computer to the CPLD. Initially I had used schematic entry to program the CPLD. This is literally drawing out a schematic of the circuit that is needed and the Quartus tools then implement that circuit in the CPLD. Schematic entry is OK for simple designs but as things get more complex it is unwieldy to use and difficult to follow. Even so, it was tempting to keep using schematic entry but eventually I decided to bite the bullet and try to learn a programming language.

There are two main hardware description

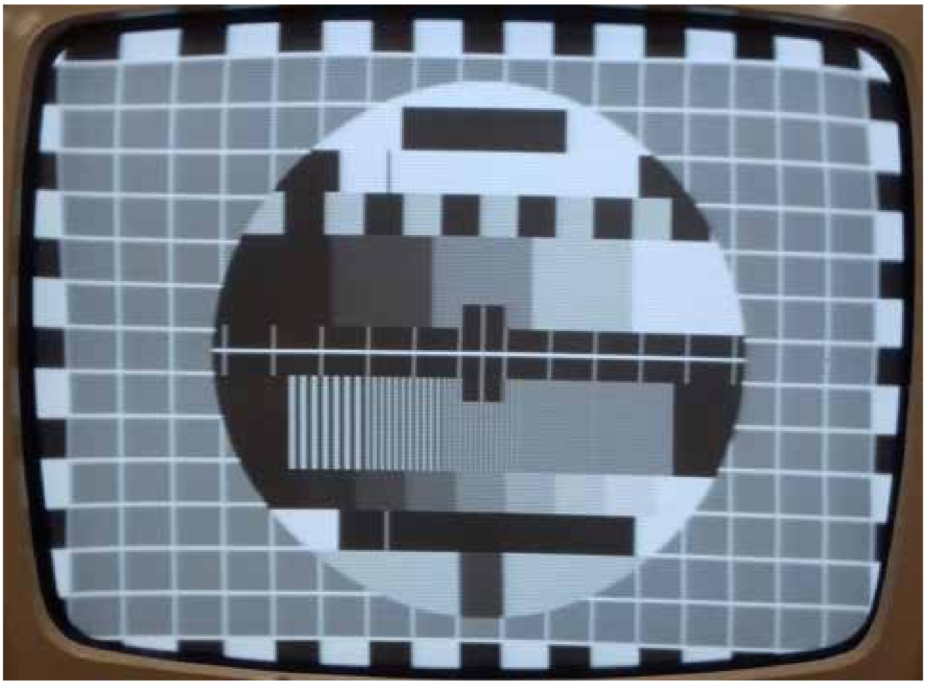


Fig 6. Test card

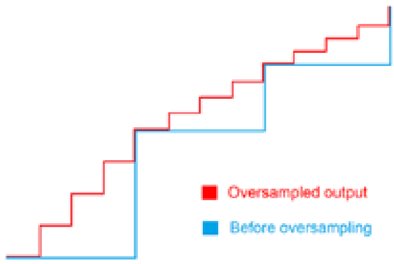
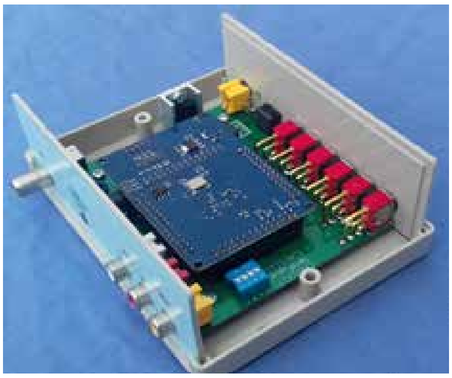


Fig 7. oversampling

fig (8) close up of mis-spelled silkscreen

Hedghog front view


Hedghog in its case

languages Verilog and VHDL (Very high speed integrated circuit Hardware Description Language). I knew nothing about either one but had come across VHDL more often and for that reason VHDL was my language of choice. Learning a programming language was a very good decision as once I started to get the hang of it, it was so much quicker and easier, and offered far more control.

The game changer

In the spring of 2017 I had my first prototype (fig. 2) working. The converter was a relatively simple one and worked by dropping every third line, with the information from the discarded line being split 50:50 between the two kept adjacent lines. The results were OK but there was lots of room for improvement.

I posted a thread about the converter on the Golborne Vintage Radio Forum and that was where Jeffrey Borinsky suggested that using an FPGA (Field Programmable Gate Array) would be a better way to go. I immediately dismissed the idea as I knew nothing about FPGAs and the little that I picked up about them over the years gave me the impression they were very difficult to program and use. I am embarrassed to admit that at the time I didn't even know that they were closely related to CPLDs. I learned that a FPGA was basically a big CPLD that contained a very large amount of programmable logic along with some extra hardware. This usually includes fast multipliers, PLLs (Phase Locked Loops) and memory. The same tools that I was using for programming a CPLD could also be used to program an FPGA. I decided to give it a go, but which FPGA? There are several low-cost development boards and I thought that the Altera Cyclone II EP2C5T144 (fig. 3) was a good compromise between cost and capability. This is actually a very small FPGA but even so it has more than 4000 logic cells, up to 26 multipliers and the potential for several lines of video storage. The evaluation board cost less than £20.

I knuckled down and started to learn about them and as I did I found out that sure they may be a little harder than a microcontroller to program but for that little extra effort the payback is huge! Their speed, versatility and what can be built inside them is truly incredible. There were many WOW! moments along the way. Like a CPLD, the logic circuit within it can be redesigned over and over again. It can't be overstated how well suited they are for building a converter. If anyone is thinking of designing and building a converter my advice would be that their time would be best spent going down the FPGA route as opposed to any other way.

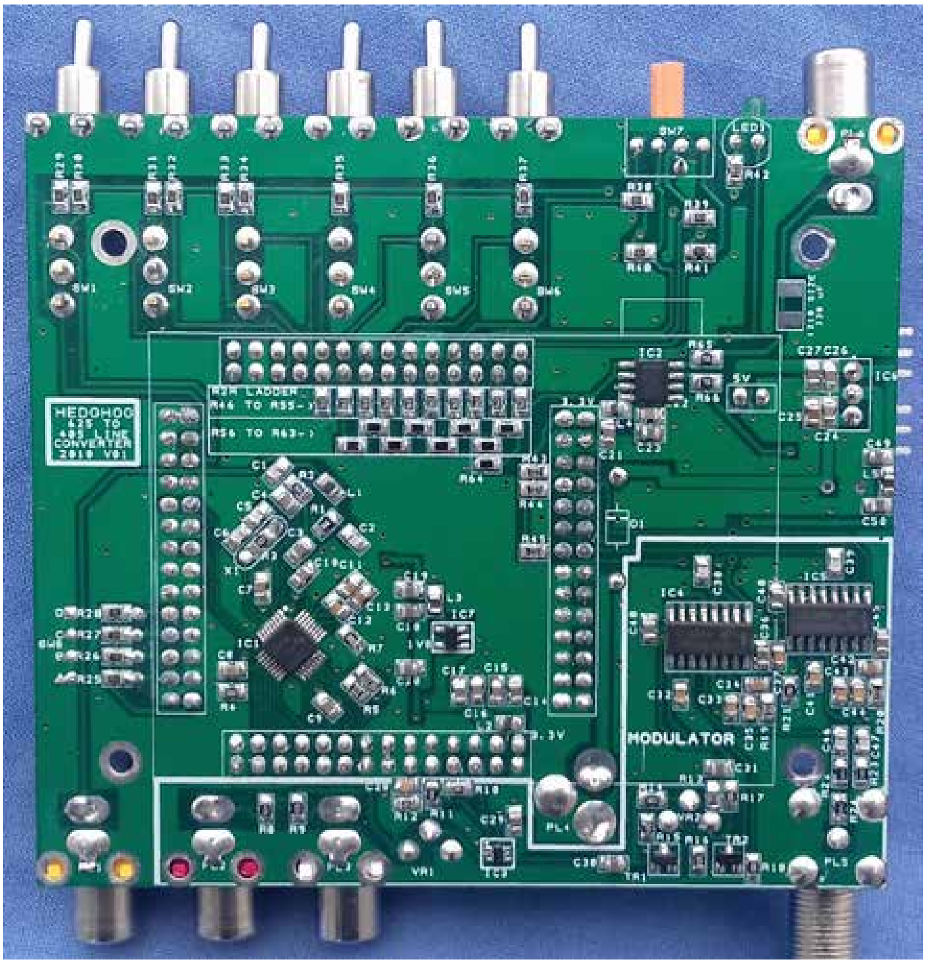
In using an FPGA my aim was to improve the interpolator, to reduce the chip count by carrying out their functions within the FPGA and to add some extra features. I felt that the best way to proceed was to use the first prototype as a starting point and bit by bit move as much of it as I could inside the FPGA. I started off by replacing the CPLD and its functions with the FPGA. The microcontroller was being used to program the video decoder and also did all the 405 line timing. These functions were the next to be done within the FPGA so that I could dispense with the microcontroller. The two framestores were the next to get the chop. Doing this required a total redesign of the interpolator to a line store as the FPGA has not enough internal memory for a frame store. The FPGA also enabled me to downsize the video decoder from the TVP5146M2 to a TVP5150 as the FPGA could easily extract the syncs and luminance from the ITU-R BT.656 formatted video.

The interpolator

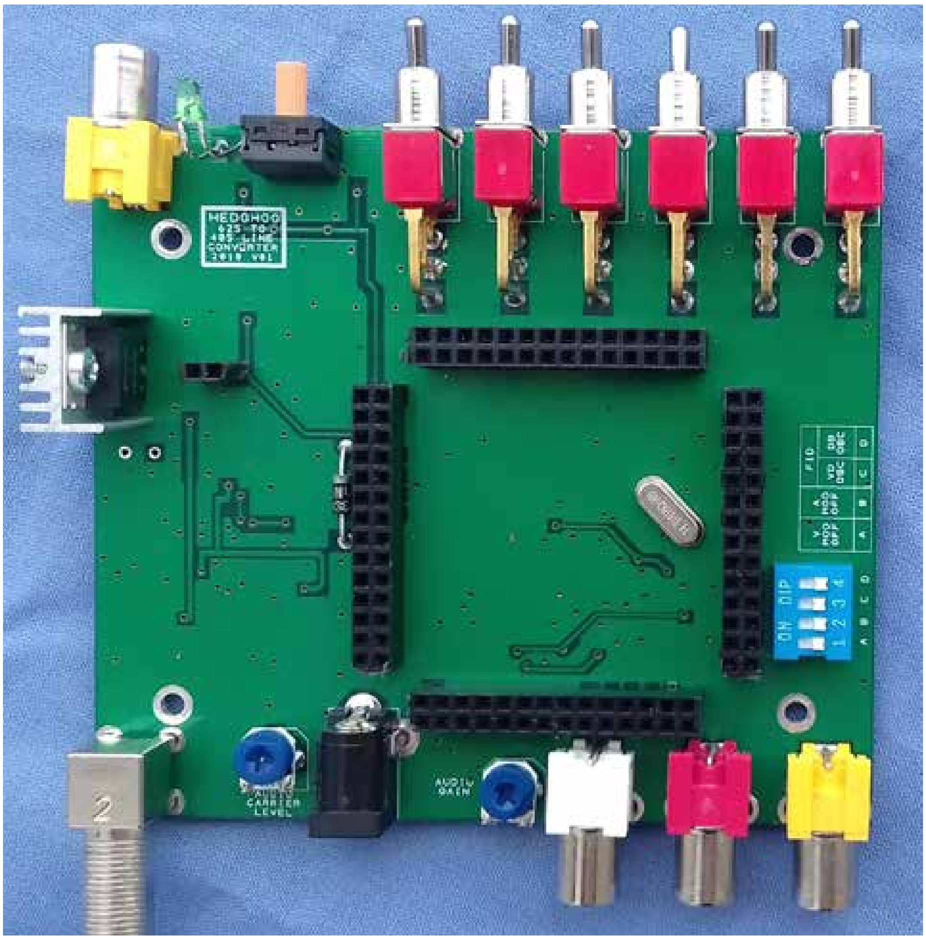
Converting from 625 lines to 405 lines requires reducing the line count by approximately one third. The simplest way to do this is to discard every third line. This does work but the results are unsatisfactory, with any sloping picture content having very jagged edges. This is simply the result of one third of the picture information being lost. Interpolation is a means of converting to a different number of lines while retaining all of the picture information. How accurately the interpolation is done determines the converted picture quality.

In my first prototype the interpolation was done crudely, by splitting the information in the dropped line 50:50 between the adjacent two kept lines. This gave a big improvement over no interpolation but was nowhere as good as a proper interpolator.

The problem with the 50:50 interpolator is



Hedghog PCB bottom view



Hedghog PCB top view

that the 405 lines don't fall evenly between the 625 lines. This is depicted in fig. 4. As every 405 line is in a different position in relation to the 625 lines, the proportion needed of each 625 line to generate a given 405 line needs to be calculated based on the distance the 405 line is from the 625 line. The proportions are stored in memory as coefficients. Before I started this project I would have thought that the coefficients would be linear in nature but for optimum performance this is not the case. For 2 line interpolation a cosine plus lift aperture is required, while 3 or more lines takes the form of a modified sin(x)/x. The apertures for my 2 and 6 line interpolators are plotted in fig. 5.

The first linestore interpolator that I built with the FPGA was a 2 line, this was a big improvement over the 50:50 one that I previously had been using. I tried different interpolators that used up to 8 lines and particularly liked the results that a 6 line one gave as it produced noticeably better results over the 2 line interpolator that I had. A 6 line interpolator by its nature generates some unwanted artefacts which are visible on some picture content. I wanted to use the 6 line interpolator but I was unsure if those artefacts would be intrusive enough to cause a problem. This left me with a bit of a dilemma, which one to use? I decided to use both. I added an aperture switch which selects soft, medium and sharp apertures. 'Sharp' being the 6 line interpolator, 'Medium' is the 2 line interpolator and 'Soft' is a 3 line interpolator on which I have adjusted the coefficients to give a softer picture.

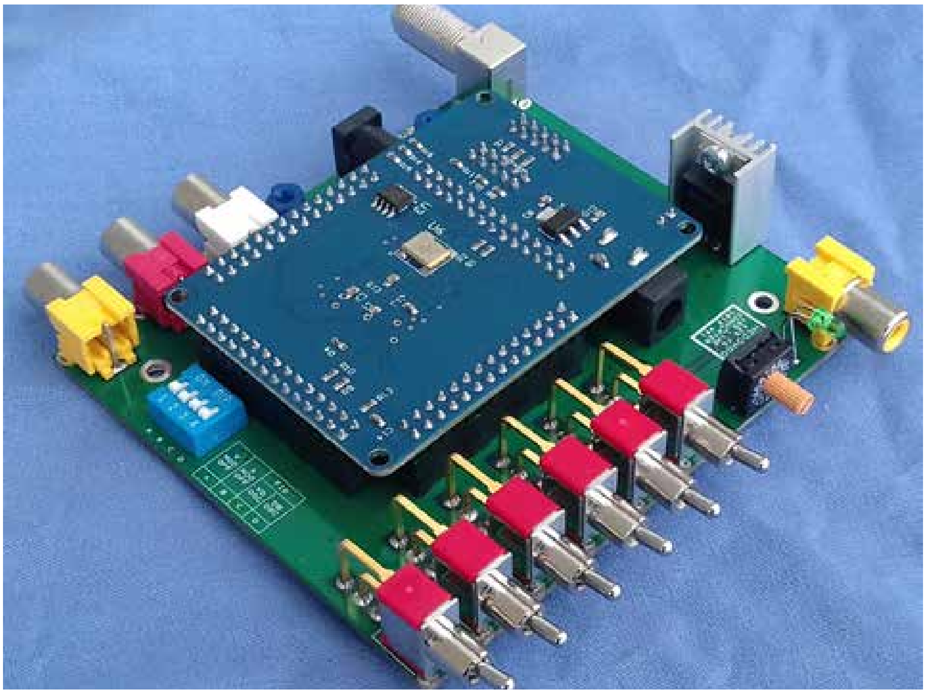
Adding some extra features

From the start of this project one objective that I had was to provide a converted output with a 5:4 aspect ratio. Why would one need a 5:4 aspect ratio? TVs that were manufactured up until about 1950 have a screen aspect ratio of 5:4 meaning that when viewing video that has a 4:3 aspect ratio they need to be horizontally over-scanned to get the displayed aspect ratio correct. As some of my sets can barely fill the screen never mind overscan it, a 5:4 output would be useful. I achieved a 5:4 aspect ratio in the converter by cropping the beginning and end of each 4:3 line. As there are fewer pixels in the cropped line, the remaining pixels need to be stretched to occupy the correct length in time. This is done by reducing the 405 pixel clock frequency. In the earlier stages of this project my plan was to use an AD9850 DDS Synthesizer to provide a programmable pixel clock that would allow the clock to be changed to suit whichever aspect ratio was required. I never got to try this as the FPGA can generate different clock speeds with ease. When in 5:4 mode the active line length is increased from the 4:3 length of 80.2µS to 82.9µS as I believe this is in keeping with the older 5:4 standard.

Pedestal is another feature that I've included. When selected this raises the black level 50mV above blanking level, whereas normally black level is equal to blanking level. What use is it? Pedestal is used to help reduce the visibility of flyback lines on TVs without flyback blanking. While it doesn't eliminate the flyback lines it does help to reduce their intensity. I believe 405 line broadcasts used pedestal for a very short period of time.

Even though equalizing pulses were never used on System A, the converter can produce them if required. When equalizing pulses are selected, the number of broad pulses is reduced to 6 where normally there are 8.

The converter also generates a test card(fig.



Hedghog PCB with FPGA board fitted

6) and grey scale. The test card is in the style of the Philips PM5544 electronic test card. This is generated by an algorithm rather than being stored as an image. Admittedly it is a bit modern-looking for vintage sets but on the plus side it is functional and, as it is done within the FPGA, no extra resources are required.

The FPGA also generates test tones of 400Hz and 1kHz. An analogue switch allows selection of the test tones or external audio.

Video output and modulators

The converted video is oversampled at four times pixel rate. It is done by calculating 3 intermediate values and inserting them between the original samples. This is depicted in fig. 7. This has the effect of producing an output that is a closer representation of an analogue one, resulting in less filtering being required after the digital to analogue converter.

Digital to analogue conversion is done by a R-2R resistive ladder which is buffered by a THS7314 video amplifier which also contains a 8.5 MHz low-pass filter. This video amplifier supplies 1V peak-to-peak video to a phono socket on the front panel and also supplies the video modulator.

Two MC44BS373CAs, one each for sound and vision, are employed as a system A modulator. This covers channels 1 to 13, selectable by a Hex switch. The circuit that I used is one by David Robinson which I saw back in 2005 on the UK Vintage Radio Repair and Restoration Forum. The MC44BS373CA has been obsolete for many years now but at the time of writing this article it is still available on AliExpress. The converter can be built without the modulator and used with an external modulator.

PCB and case

After having spent so much time on the converter I felt it was only right to finish it off by fitting it into a case and designing a final PCB. Which case to use? When searching for a case there were a number of things that I needed to keep in mind. The maximum size of PCB I limited to 100mm by 100mm as the cost of manufacturing PCBs larger than this gets expensive. I wanted all components including switches and connectors to be mounted on the PCB. I could not fit all the switches and connectors along one side of the PCB, so this would mean that the case would have to have removable front and back panels and also that the front and back panels could be no more that 100 mm apart. Also the PCB mountings in the case needed to be far enough apart to allow the headers for the FPGA board to fit between them. After a rather long search the only one that met my needs was the Multicomp MCRM2015M instrument case. Under £8 from Farnell!

I then designed a double-sided PCB to fit inside the case. It measured 100mm by 89.5mm. All the option switches and a phono connector for converted video fitted along the front. Power, audio in, video in, and RF out connectors went along the back. To make construction easier, I kept the components well spaced on the PCB so that there is plenty of room to manoeuvre a soldering iron between components. With the exception of the semiconductors, all other surface mounted components are 0805 size which I find are relatively easy to solder, with just the aid of a bench magnifier.

I printed front and rear legends for the case onto coloured paper which I then laminated. I used a scalpel to cut out the holes for the connectors and switches. The laminated paper fits into the same slots as the front and rear panels. The slots in the top half of the case were wide enough but the slots on the lower half required widening to accept both panel and legend.

And why Hedghog? When I designed the PCB I mis-spelled the word on its silkscreen (fig. 8). Rather than remake the PCB I decided to keep the name.

If anyone fancies having a go at building one, all files necessary to make the PCB, program the FPGA and build the converter are available to download from www.electronics.frankcuffe.ovh/hedghog

Summary and acknowledgement

At the start of this project I had modest expectations and would have counted my first prototype as a success and completed the project at that. But as I started working with FPGAs a whole new world of possibilities opened up and I got a little more ambitious. In the end I ended up with a converter that performs way above what I could ever have imagined building. This I owe in no small way to Jeffrey Borinsky who introduced me to FPGAs and then tutored me along the way. Without his very generous help this would have been a very different project.

REFERENCES

My website, which also has details of my PICGEN test pattern generator: www.electronics.frankcuffe.ovh

Jeffrey Borinsky's website: www.borinsky.co.uk

Golborne forum: http://golbornevintageradio.co.uk/forum/

Thread on Golborne where Hedghog is discussed: http://golbornevintageradio.co.uk/forum/showthread.php?tid=6193

Altera, who made the FPGA I used: www.altera.com

Useful FPGA stuff: http://www.leonheller.com/FPGA/FPGA.html

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PCB design software: www.rs-online.com/designspark/pcb-software

R-2R DAC tutorial: https://www.tek.com/blog/tutorial-digital-analog-conversion-r-2r-dac

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A Review of Television Standards Conversion: https://www.bbc.co.uk/rd/publications/bbc_monograph_55

Punnetts Town, August 2018

Photos by Mike Barker

A display of 819 Line TVs by David Norton

Making replica wooden knobs on the lathe

David Taylor

In the Spring 2017 edition of the Bulletin, I noted from the article by Stef Niewiadomski on the restoration of a 'Bestone' radio that one of the three wooden knobs was missing and another one was damaged. If not rare, the radio is certainly uncommon, so the chances of original knobs turning up were slim to non existent. Hence, Stef had fitted a set of three alternative wooden knobs.


Pic 8: The set of replica knobs mounted on the Bestone radio.

Stef has been a prolific writer in the Bulletin and other magazines such as Radio Bygones for many years. I've enjoyed reading his articles and built a capacitor reformer that featured in the Bulletin some time back, and other projects that he's designed. As a small gesture of appreciation for his efforts I got in touch with Stef to say that as a hobbyist woodturner, if he sent me the damaged knob, I'd have a go at making him a set of three replicas. Quite a lot of vintage radio restorers seem to have woodturning and metalworking lathes, yet might not have considered using them to turn replica knobs, so I thought it might be helpful for me to explain how I went about it.

Accurate measurements are called for, involving lots of stopping and starting the lathe as the work progresses, the aim being to make a set of knobs that aren't just 'similar' to each other, but are identical. As the knobs are sited close together on a radio, any slight differences will be immediately apparent. To ensure that the knobs are perfectly concentric when mounted on the control shafts of the radio, I mounted each wooden blank on a mandrel in the lathe headstock while the blank was turned to shape. The mandrel needed to be the same diameter as the control shaft - usually ¼", though sometimes 6mm. If knobs are in natural wood rather than painted, due to variations in timber grain and colouring, there's little prospect of just making one replica to exactly match an original knob, so really, a full set needs to be made. The processes involved are:

1. Turn a wooden square to a round spindle, 5mm larger in diameter than the knob.
2. Part off a wooden blank from the spindle for each knob.
3. Make a brass insert on a metalworking lathe for each knob, drilled out to the diameter of the radio control shafts and roughen up the outside of the insert. In my case, the insert needed to be 12mm outside diameter, drilled ¼" bore.
4. Mount a wooden blank in the woodturning lathe chuck and use either a 12mm Forstner bit or an end mill in the tailstock, rotating the chuck by hand while advancing the bit into the blank, not going any deeper into the blank than necessary. Do not use an engineering drill bit as it may penetrate too far into the blank, being pointed at the tip.
5. Coat the brass insert with two-part epoxy cement and with the wooden blank still in the chuck, use the tailstock to force the brass insert into the wooden blank.
6. Make a metal mandrel on which to mount the blank when turning the blank to shape on the lathe.
7. Drill and tap the blank and the mandrel 4BA and use a 4BA brass grub screw to mount the blank on the mandrel and place the mandrel in the chuck ready for turning.
8. Turn, sand and finish the replica knob using shellac friction polish.

All that remains is to remove the knob from the mandrel and fit the knob on the radio control shaft using the 4BA grub-screw.

I had the damaged original knob from Stef to hand so was able to compare various hardwoods to try to get a reasonable match. Iroko and mahogany were not a good match, but English walnut seemed quite close, so I went with that. I drew a sketch of the knob with the critical dimensions so that I could check with digital callipers as the work progressed. Given that the largest diameter of the knob was 30mm and the height was 25mm, I turned a spindle 35mm diameter from which I parted off three blanks, each 30mm long, then with the blank mounted on the mandrel, I could true it up to make sure it would be exactly concentric when mounted on the radio control shaft.

The knobs each required a brass insert 16mm long x 12mm diameter drilled 1/4" for the control shafts of the radio, and tapped 4BA for mounting the knobs on the shafts. I turned a 1/4" diameter mandrel for each knob on my metalworking lathe on which to mount the wooden blank in the lathe chuck for turning. I then turned the brass inserts, roughing the outsides with a junior hacksaw while the inserts were on the lathe, so as to provide a good key for the two-part epoxy adhesive when the brass inserts were glued into the wooden blanks.

The only complication in completing the knobs was that eight notches had to be milled out around the perimeter and I don't have a milling machine. I tried a number of techniques using a router jig and a Dremel in a jig, but not to my satisfaction, so in the end I had to get a chum to mill the notches for me on his milling machine.

The aim in woodturning is to 'sand the shape of the wood' – not to 'sand the wood to shape' or sharpness of detail can be lost, so it's important to keep the turning gouges sharp and to get a good finish 'off the tool' to minimise sanding. I gave the knobs a coat of shellac sanding sealer to seal the grain, then a light sanding, firstly with 220 grit, then 320, 400 and 600. (There's no possibility of skipping any grades - say going from 220 to 600). I finished them on the lathe using shellac 'friction polish'.

The pictures will make the processes clearer.

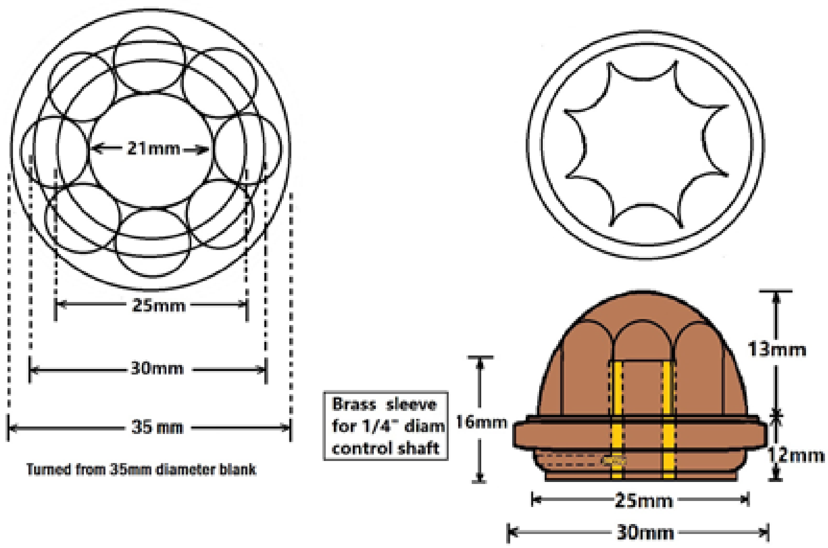
When 3-D printers appeared on the scene some years ago, they seemed to hold much promise for replicating Bakelite and plastic knobs and other items such as plastic trims that couldn't be created on a lathe. That said, now that the price of such printers has dropped to affordable levels, (though still not cheap), the take-up seems to have been slow and the printers seem to me to have

Pic 1: The damaged original knob used as a pattern.

Pic 3: Two brass inserts turned and roughened up.

Pic 5: One knob turned and sanded, ready for the perimeter finger grooves to be milled.

Pic 6: Three knobs awaiting milling. (I made a fourth in case of mishaps!).



Pic 2: My sketch showing the critical dimensions.

Pic 4: Three walnut blanks with inserts fitted, and three mandrels turned from scrap alloy bar on which to mount the blanks for turning.

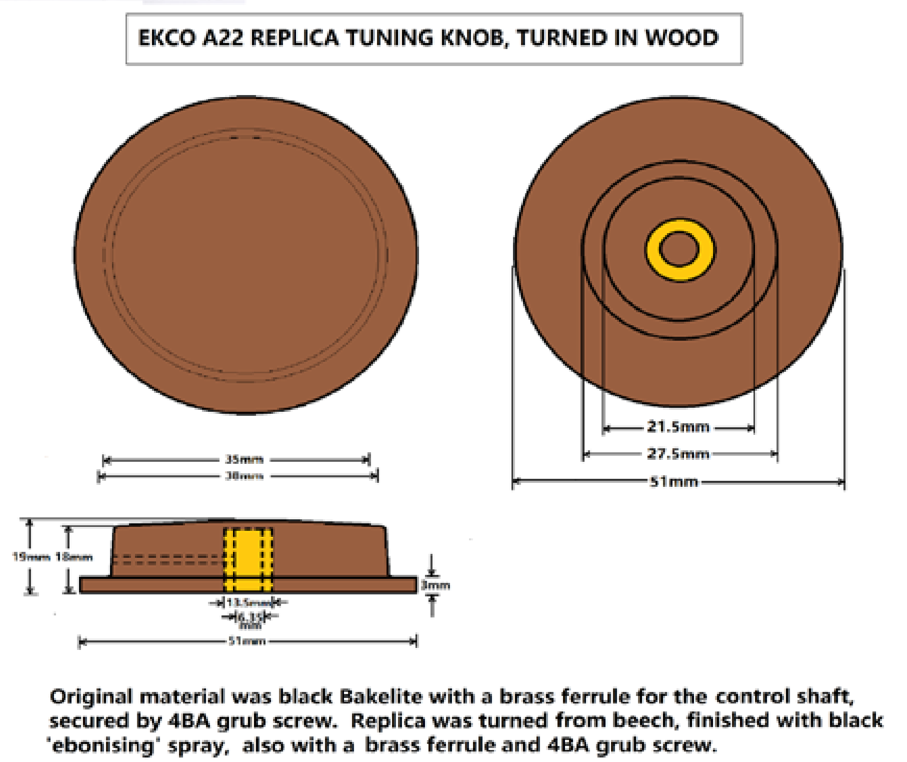
Pic 7: Four completed replica knobs plus the damaged original which Stef sent me.

two distinct drawbacks. Firstly, even items created on expensive machines that I've seen in operation at the Science Museum using a fine nozzle seem unable to create a smooth glossy finish, and have visible 'striations' where the material has been applied. (Whether or not that drawback can be overcome, I've no idea). Secondly, the plastic material seems only available in primary colours which may not be a good match for that desired. Then of course, there's the need to acquire the necessary software skills to either scan 3-D objects, or to design the object to enable the printer to be programmed.

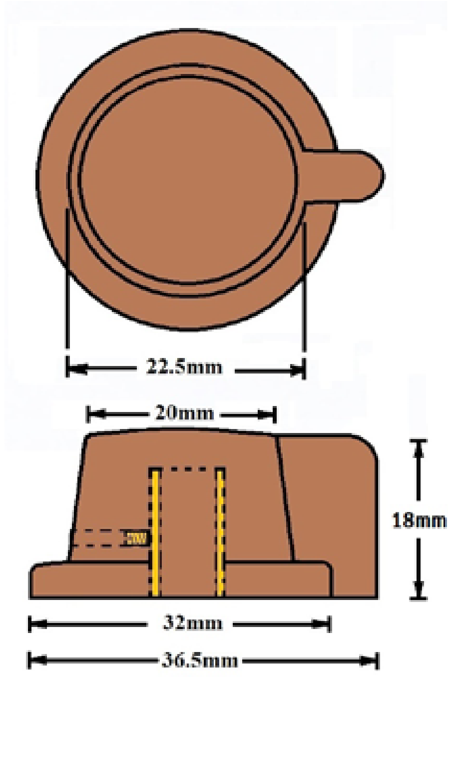
Having turned the replica wooden knobs for Stef's Bestone radio, it occurred to me that replica knobs to mimic Bakelite could perhaps be turned in wood on a lathe for certain radios. Whilst by no means all Bakelite knobs will lend themselves to wooden replicas, (especially if engraved with lettering or having intricate designs and fancy milled edges), quite a lot will. As an exercise, I made two replica black knobs for an Ekco 'A22' - the larger one being the tuning knob, the other - with a 'tab' on it - being the smaller volume control on/off knob, (identical to the wave-change switch knob), which at first sight doesn't look like a suitable candidate for turning on a lathe due to it having a finger 'tab'.

As these knobs were to be sprayed with black 'ebonising' spray – a speciality paint for woodturning - I made the blanks from beech, which is close-grained hardwood, so sands very smoothly. My aim was to make them look almost indiscernible from black Bakelite. I used my own brown A22 knobs as a pattern. The techniques used were similar to turning the Bestone knobs, without the complication of having to get a good match to the original wood grain and colour, nor did it involve any milling of finger grooves. I cut the blank for the larger knob cross-grained on my band-saw, and turned a spindle for the blank for the smaller knob. The smaller knob needed a 'tab' to be made and to be neatly glued into a slot cut into the skirt of the knob.

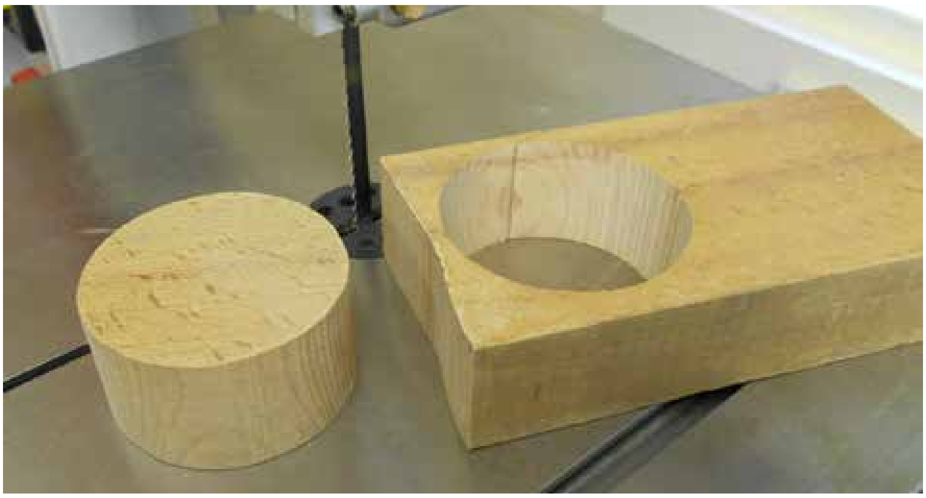
On completing the woodturning, as before, I gave the knobs a coat of shellac sanding sealer to seal the grain, then a light sanding to 600 grit, then I gave them a coat of hi-build auto primer and a final sanding before two coats of black ebonising spray. I was pleased with the end result and think they're a good match for the originals.



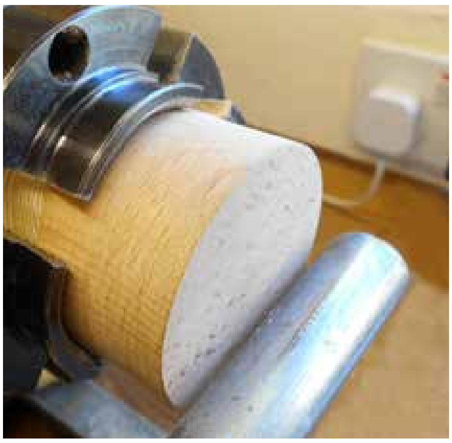
Pic 9: Sketch of the large Ekco A22 knob.



Pic 10: Sketch of the small Ekco A22 knob.



Pic 11: A beech blank cut on the band-saw for the large knob.



Pic 12: The beech blank in the chuck with a packing piece behind, trued up ready for drilling for the brass insert.

Pic 13: The chuck being rotated by hand, with a 12mm end mill in the tailstock to mill the blank to the correct depth for the brass insert.

Pic 14: Gluing in the brass insert.

Pic 15: The large A22 knob blank mounted on a mandrel in the chuck, taking shape.

Pic 16: Large knob almost finished.

Pic 19: The small knob taking shape on the lathe.

Pic 17: Finished large knob alongside my original brown A22 Bakelite knob, and the mandrel on which the replica knob was turned.

Pic 18: A blank for a small A22 knob being parted on the lathe from a beech spindle.

Pic 22: The three woodturning tools used to create the replica knobs.

Pic 21: Two original brown Bakelite knobs alongside the two black replicas on the right.

Sourcing timber

A search on eBay for 'English beech wood-turning spindle blanks' will find plenty of suppliers, then the square blanks can be turned to round on the lathe to the desired diameter in a matter of minutes. Kitchen utensil shops usually have beech rolling pins quite cheaply up to 50mm diameter, which are excellent for turning knobs. Cross-grained beech up to say 40mm thick for larger diameter knobs such as the large A22 tuning knob that I turned can be had from hobbyist timber suppliers and sawmills.

Admittedly it takes an hour or two to create each knob, involving the use of a metalworking lathe as well as woodturning, but that said, if a replacement knob can't be sourced, for those with the equipment, skill, time and inclination, it provides a solution at minimal cost if the materials are to hand. True, it's time consuming, but we're hobbyists doing what we do for fun and a sense of achievement, using our leisure time for enjoyment - dancing to our own tune!

Pic 20 Small A22 knob notched ready for tab to be glued into place

As to the woodturning tools that I used to make the knobs, there were only three – a roughing gouge to turn the wood to the required diameter, a 'parting tool' with which I did most of the turning, and a round nosed 'scraper' to create the dome shapes.

I'm sure that there must be many examples of hard to find wooden and Bakelite knobs that would lend themselves to being replicated along similar lines. I regret that due to time constraints I'm unable to make replica knobs as a service to others, but if the need arises, I hope that this article and the pictures might assist (or even inspire!) those equipped with lathes, but who perhaps hadn't considered using them for this sort of application.

Audiojumble, October 2018

Photos by Carl Glover

Lowther transmission line speakers

Volksempfänger VE301

Ferrograph Series 3

Wharfdale W.50 and Tannoy Mercury V4

Watt's with all these power amps? some quality naims amongst them!


A selection of 'vintage' iPods!


Goldring Lenco

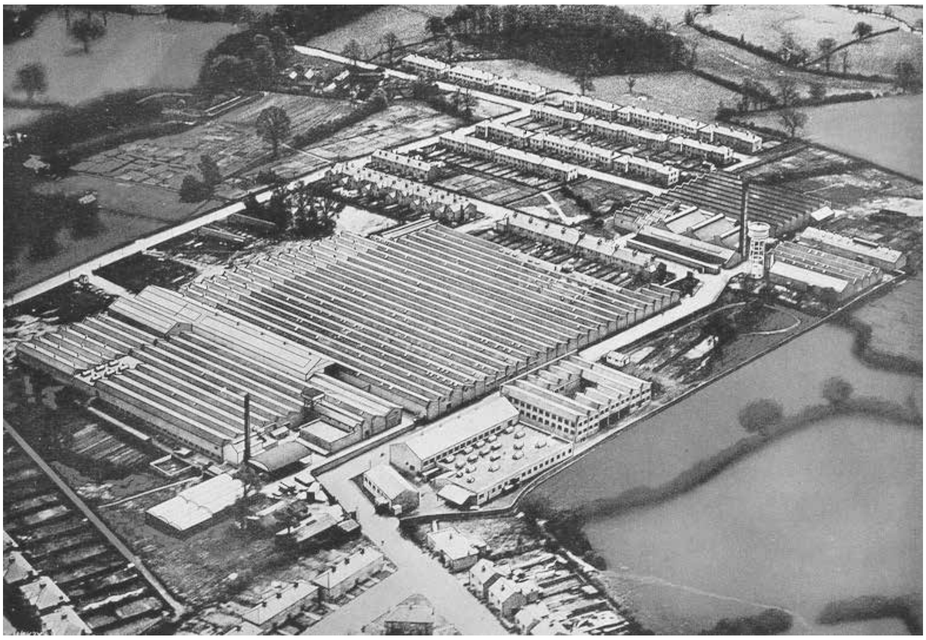
An elevated view of the Audiojumble
October 2018,
Photographed by Carl Glover

Gecophone 1922 to 1925 Part 1

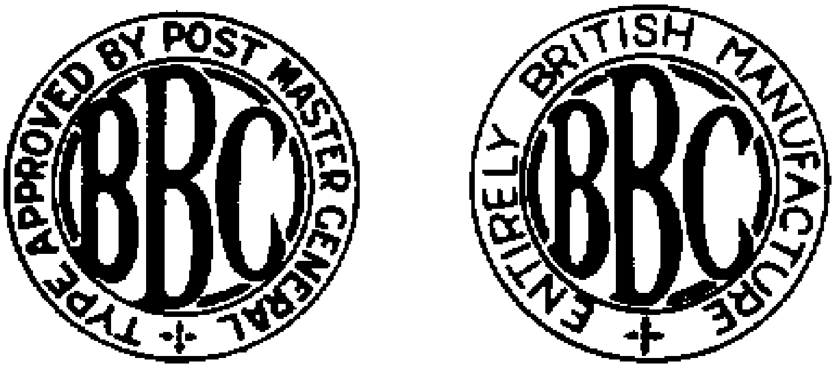
Evan Murfett

I have been planning a comprehensive series of articles on all the Gecophone models up to 1925 for some time for the purpose of sharing knowledge with other collectors, showcasing my growing Gecophone collection and, more importantly, to invite feedback, corrections and new information from readers in order to expand the body of knowledge.

GECoPHONE



GEC Copeswood Estate at Stoke, Coventry c.1926



Left: BBC/PMG stamp, November 1st 1922 to September 1924.
Right: BBC/EBM stamp, September 1924 to 1927.

Gecophone radios were (and still are) seen as some of the highest quality British wireless receiving sets from this era. From the meticulously finished 'handsome' mahogany cases to the complete range of accessories available, GEC had an eye for quality and marketing and had few rivals for the title 'Best of British'.

For me, the period 1922 to 1925 represents the golden age of British wireless manufacture. So 1925 is a logical cut-off date for my collection as, after then, Gecophone sets dramatically changed in style and construction, away from their distinctive beginnings when function dominated form. All of the photographs in the articles are of the author's collection unless otherwise noted.

In the Beginning

Hugo Hirst joined fellow Bavarian immigrants Gustav and Max Binswanger in 1886 to form The General Electric Apparatus Company. In 1889, the business was incorporated as a private company known as General Electric Company Ltd and in 1900 GEC was incorporated as a public limited company. GEC commenced the manufacture of crystal and valve receivers and accessories at the Peel Conner Telephone Works at the Copsewood Estate in Coventry in 1922.

GEC exhibited the BC1001 Crystal Set No. 1, BC1501 Crystal Set No. 2 and the two valve BC2001 HF & DET smoker's cabinet receiver at the British Wireless Exhibition 30th September to 7th October 1922.

On 18th October 1922 the British Broadcasting Company (BBC) was formed, comprising some 300 British manufacturers headed by the 'Big Six': BTH, GEC, Marconi, Metropolitan Vickers, The Radio Communications Co and Western Electric.

On 1st November 1922 the scheme was introduced whereby all commercially manufactured crystal sets, valve receivers and valve amplifiers had to bear the BBC/PMG stamp together with a GPO registration number.

The small number of receivers sold between September and 1st November 1922 did not bear the BBC/PMG stamp or the GPO registration number.

Crystal Receivers

BC1001

Crystal Set No. 1, open detector BC1001 (1922-23), BBC/PMG stamp, Reg. No. 102.

Originally introduced in about September 1922, the earliest of this model has 'PARIS' inscribed on the ebonite control panel as opposed to 'LOADING COIL' on later versions. The horseshoe shorting link, which was to become the GEC trademark, could be removed and replaced with a Long Wave loading coil used to tune to the wireless telegraphy time transmissions from the Eiffel Tower on 2,600 metres. Early versions also have an ebonite coupling tuning dial engraved 0 - 180° as opposed to the later Bakelite dial with the same inscription. Early versions of the mahogany case have clearly visible screw heads holding the lid to the sides.

Specification – A single circuit crystal receiving set complete with one pair of 2,000 ohm, double-headgear telephones, and with plugs fitted to take an additional pair of telephones if required. Tuning is effected by means of a variometer, which allows for fine adjustment. The set is constructed for wavelengths of 300-500 metres, and is fitted with sockets for the addition of a loading coil to give longer wavelengths if desired, and for the reception of the Paris time signal. The detector is a 'Gecosite' crystal, which is specially sensitive and does not require a potentiometer or battery. Enclosed in a well-made polished mahogany case, and supplied complete with two 10-ft lengths of flexible wire for connecting up to the leading-in terminal and earth, one coil of 100-ft. 7/22 enamelled copper aerial wire, two insulators, one pulley block, one aerial fixing eye, one leading-in terminal and one earthing clip. Full printed instructions for use are contained inside the case.

Approximate range (with standard PO aerial) 25 miles. Price complete, £5 10 0.

Crystal Set No. 1, enclosed detector BC1002 (1923-24), BBC/PMG stamp, Reg. No. 102,

BC1002 – Lorne Clark's collection

Introduced in 1923, the enclosed detector version is the same as the open detector version (BC1001) with the exception of the crystal detector now being of the enclosed type and the removal of the mount for spare crystal cups on the lid.

Specification – Deck of high-grade matt ebonite, fitted with plug and socket terminals for aerial and earth connections, and sockets for two sets of telephones. Tuning is by variometer, covering 300-500 metres, and sockets for the addition of loading coils for higher wavelengths, such as that of the Chelmsford station, are provided. Detector is a 'Gecosite' specially sensitive crystal enclosed in a dust-proof glass cover. The whole instrument is fitted in a highly finished mahogany cabinet with cover, and all metal parts are heavily nickel-plated. Supplied complete with one pair of double headphones, 4,000 ohms with connecting plug, two 10-ft lengths of flexible wire for connecting up to the leading-in terminal and earth, one coil of 100-ft. 7/22 enamelled copper aerial wire, two insulators, one pulley block, one aerial fixing eye, one leading-in terminal and one earthing clip

Approximate range (with standard PO aerial) 25 miles. Price, £4 10 0.

Crystal Set No. 2 BC1501 (1922-23), BBC/PMG stamp, Reg. No. 103.

BC1501

As with the No. 1 Crystal Receiver, early versions of the No. 2 Crystal receiver have 'PARIS' inscribed on the control panel as opposed to 'LOADING COIL' and have ebonite coupling and condenser tuning dials. Also like the No. 1 crystal receiver, early versions of the case have clearly visible screw heads on the lid.

Specification – For more selective tuning than Crystal Set No. 1. This set has a coupled circuit with adjustable coupling. Aerial tuning is effected by a tapping switch and the closed circuit is tuned by means of a moving plate condenser. The detector is a 'Gecosite' crystal, which is specially sensitive and does not require a potentiometer or battery. Fitted with a testing buzzer and key so that the crystal may be adjusted to its most sensitive position. Constructed for wavelengths of 300-500 metres, and fitted with sockets for the addition of a loading coil to give longer wavelengths if desired, and for the reception of the Paris time signal. Supplied complete with one pair of 2,000 ohm, double-headgear telephones, and fitted with sockets to take one extra pair of telephones if required.

The whole enclosed in a well-made polished mahogany case, and supplied complete with two 10-ft lengths of flexible wire for connecting up to the leading-in terminal and earth, one coil of 100-ft. 7/22 enamelled copper aerial wire, two insulators, one pulley block, one aerial fixing eye, one leading-in terminal and one earthing clip. Full printed instructions for use are contained inside the case.

Approximate range (with standard PO aerial) 30 miles. Price, £9 15 0.

Junior Crystal Set BC1700 (1925), BBC/EBM stamp, No Reg. No.

BC1700

Specification – The whole instrument, including the deck, is of highly finished mahogany; all fittings are bright nickel plated finish, maintaining the standard of the more expensive Gecophone models. Tuning is carried out by means of a variable condenser and fixed inductance coil. The inductance is situated under the panel, and covers the 275-600 metre wave band. By removing the shorting link and plugging in a suitable loading coil the wave length may be increased as desired. Two aerial terminals are provided, so that the set may be used on short or long aerials. Two pairs of telephones may be connected direct to the instrument by means of the three terminals shown.

Price, £0 16 0.

As I mentioned in the introduction, I welcome feedback, corrections and additions to this article. Please contact me at evan-alex@aanet.com.au .

Acknowledgements:

Thank you to Lorne Clarke and Martyn Bennet for their generous contributions to this article.

Back from the dead - adventures with a Pye VT2

Matt Spanner

A dark, damp, leaking, and unwelcoming lockup garage was being cleared out in Hemel Hempstead over the bitter winter of 2012. The majority of the contents were worthless rubbish, which had been hoarded for over five decades by the late owner. Hidden amongst the junk however, a few treasures were still waiting to be discovered. A huge amount of crates containing now highly collectable LP records were being pulled out, along with a fair quantity of old motorcycle parts, rotten old bits of furniture, and a pair of extremely rusty petrol lawnmowers. Buried away at the back was the thing that interested me the most. It was a bakelite Pye VT2, one of the elusive old Fifties televisions that had been on my wish list for many years.

The middle-aged Grandson of the late garage owner, who I was told 'liked to fiddle with old tellies' remembered it being stored away just before Christmas 1963, shortly after the family purchased a new Pam dual-standard set.

For the next 49 years the VT2 remained forgotten, untouched and completely undisturbed.

£100 later, it came home with me…

Quite predictably it was in a shabby old state, a filthy rusty mess to put it bluntly. Had it been a wooden cased telly I imagine it would have found a new home in the nearby skip. Being a bakelite set had certainly helped ensure its survival.

Half a century of moisture and damp had wreaked total havoc with the internals. Apart from the thick coating of rust which covered the chassis I was also treated to a selection of broken and detached valve holders, unravelled mains droppers and wirewound resistors, rotten and deteriorated wiring, and lots of lovely cracked and dried up Hunts capacitors.

The side mounted channel changer and fine tuner knobs were both missing. The tuner unit itself had become detached from its mounting on the cabinet side, and all of its connecting wires had been torn off a nearby tag strip. It was partially jammed in the lower chassis and had snapped off one of the rf cores. On removing the line output cover I discovered a DY86 EHT rectifier, which had been crudely fitted in place of what should have been an EY51. The LOPT looked equally sick. Nearby a trio of smoothing cans all bulged visibly. An array of cobwebs and long dead insects completed the scene. I was a bit disheartened but I've restored sets in a similar state. I thought about the good points.

The cabinet although filthy, was undamaged. There were no cracks anywhere and it hadn't ever been bashed or knocked about. Apart from the pair of knobs the Pye was complete, and I'd always wanted one.

I decided then that I wouldn't let it beat me. The Pye VT2 was after all, historically important and one of the design classics. It had an interesting story to tell…

It all started back in 1953, when the idea of a second television channel was first proposed. It had been decided that ITV, or Commercial Television as it was soon to become known, would be broadcast on Band III, to run alongside the BBC on Band I.

One day in mid-1953, C O Stanley, the director of Pye , was in attendance at one of the regular meetings of the British Radio & Electronic Equipment Manufacturer's Association (BREMA) of which Pye was a member. The subject of ITV was raised for discussion and the Chairman, clearly uninterested, dismissed it out of hand and then went on to pour scorn on the idea.

This came as a surprise to Charles Stanley. He totally disagreed. He was after all a strong willed Irishman, and up to now had

an excellent track record with the post-war miracles he had worked with Pye. Stanley was one of our pioneers, therefore all in favour of progress and of the idea of this new and exciting television channel.

The negativity of the chairman had truly irked him, and the story goes that he just got up quietly from his chair and left the room. Not long afterwards he tendered Pye's resignation from Brema.

At the time there was still much doubt as to when or whether ITV would actually go ahead. It was the biggest thing to happen since television broadcasting began in 1936, and at the time was unchartered waters. As such the set up period was fraught with all the expected technical and legal difficulties. The entire concept was enormous.

Once the wheels were put into motion it was found, quite unsurprisingly that more time and collaboration would be needed, both for the network to install and set up transmitters, and for television manufacturers to create and produce suitable tuners to enable Band III reception on all new receivers. Work would also begin to develop and produce domestic converters which could be retrofitted to Band I sets, so viewers could receive ITV on their existing recievers.

To make their lives a bit easier, the members of BREMA agreed not to make any reference to ITV or its tuneability in their advertising until May 1954. It put Pye in a unique position.

This is when C.O Stanley must have had the 'light bulb' moment. Pye was no longer a member of BREMA, so was not bound by this agreement. There was nothing to stop Pye from marketing an all new modern television which would receive ITV straight away, at the click of a switch, without the fuss of any front end modifications. The set would have a single coaxial aerial socket, with no need to be fitted with or connected up to an external converter. This is exactly what Pye did with the VT2.

Every other major radio & television manufacturer had their hands tied, but Pye could now do as they pleased. Way ahead of the game, Pye pulled off their biggest coup, tipped off their

rivals, and beat them hands down.

The VT2 was released in January 1954, and it was a bakelite beauty. Being a compact 12" table set, it was elegant, modern, and even affordable, priced at a shade over £40. The cabinet design was unique and very striking in appearance, so much so that it would eventually be dubbed the 'Dan Dare' Pye, due to its space age styling.

Appearance wise, it looked the same as the Band I V2, which had been launched 4 months previously but with one obvious difference. On the left hand side of the cabinet was an unfamiliar looking rotary control. Behind this lurked an all new (Type 7) 13 channel band I/III tuner, making it the first ever UK factory built television capable of Band III reception. It would set the standard for every other setmaker to follow.

Put simply, the Pye VT2 was a landmark. The definitive 'ITV ready' receiver.

Although the launch of ITV was still a long way off, all of this must have come as a blow to the competition. It soon emerged that broadcasts would not begin for another 20 months. Enough time for most other major manufacturers to catch up.

Back at home I stared at this little piece of history that I was now the proud owner of.

I'd certainly have to put the hours in if I was going to restore it properly. It deserved (and needed) the full treatment. This wasn't going to be a case off 'blow all the dust out, snip the mains filter cap and plug it in', it was rotten and horrible inside.

I began by first removing the chassis and the tuner unit, and then carefully brushed off the debris from above and below the chassis using an airline and an old paintbrush, trying hard not to break bits off and cause even more carnage. It was in such a bad shape that I had to spray it liberally with WD40, and then scrub it all down with a toothbrush and some steel wool.

Rust still covered most of the chassis, but everything was now in a cleaner state and I could see properly what I'd be up against.

After digging out the Newnes book for 1953/54 along with a Trader sheet, I started to write a nice long list of all the bits I was likely to need, along with their values. Capacitors and dropper resistors featured heavily. I'd need a replacement frame hold control, and also a slider type line hold control. Both had rotted and were open circuit. The width slider also had a jammed and broken ferrite core.

I had most of the bits and pieces in stock, and a scrap Ultra chassis provided me with a nice clean pair of matching slider controls. I made no attempt to salvage any of the original Hunts capacitors, they were all very nasty looking and fit for nothing except the dustbin.

I worked my way around the VT2 installing all the new components, cleaning bits up and re-soldering dozens of dry and dirty looking connections. I restuffed all the original smoothing cans with modern electrolytics, and used an automotive rust removal product on the chassis, gently applied to a small area at a time. This did a very acceptable job and got rid of a lot of the pitting.

Most of the original early PVC-covered wiring had survived and cleaned up nicely, although I did replace a fair amount around the mains input area which had become blackened and brittle.

I removed the bodged in DY86 EHT rectifier from the top of the LOPT. Someone had soldered this directly to the valve heater pins. I then fitted a correct EY51.

A few more valve bases were to break off when re-inserting the valves, as the steel rivets securing them to the chassis had rusted away. I reattached them all quite easily with a pop rivet gun. The broken RF core was also saved, as luckily the winding was still intact. Its paxolin former had snapped off close to the chassis but responded well with a drop of superglue.

The first power up was approaching, but first I cleaned up the neck of the crt and the scan coil connections. I'd already checked the tube for the usual heater continuity and emission, which to my surprise had passed with flying colours. The CRT is held in place by an elaborate aluminium cradle so I left it all intact for now, mainly as I'd have no means of supporting it in a dismantled state. The chassis would just about stand on its side at the rear of the cabinet after extending one of its plug-in leads. It would be impossible to work on the VT2 or take any meter readings in an assembled state, as the chassis is screwed to a solid (but slightly vented) plywood base with no access to the underside. This must have been a nightmare set back in the day, which is probably why few of these have survived.

Applying any kind of signal was a long way off yet. At the moment my only goal was to make the Pye produce some first light. This would turn out to be a long way off as well.

A mains lead with the correct two pin plug was dug out and power was applied. Sight, sound, and smell were pressed into service but it was all quite civilised. There were no fireworks or explosions and all the valves and the tube heater lit up nicely. The HT seemed quite healthy at 168v and after a minute or two a very faint line whistle began.

I glanced at the screen but there was no illumination. The line timebase appeared to be doing something however, and the whistle changed in note when the replacement line hold slider was operated. The heater in the new EY51 EHT rectifier valve was dim and only very slightly lit.

I took the easy option and fitted a new PL81 and PY81. Both looked old and tired so it wouldn't hurt. The line whistle was then definitely more audible, but still nothing on the screen. I had a fiddle with the ion trap magnet in case someone had moved it out of position but this didn't make any difference.

I worked my way around the line output circuit, quite straightforward on the VT2. The width coil was ok, the line oscillator transformer read fine, as did all the resistors and capacitors in the stage. I could draw a small spark from the anode of the EY51 but there was just nowhere near enough EHT present. Nothing else appeared to be amiss so sadly I had to suspect the LOPT.

I'd been reading all about LOPT saturation, where the pitch used to insulate the overwind absorbs moisture over years of damp storage.

This changes the 'Q' of the winding and has the effect of damping the EHT just enough to deprive the set of a raster. Judging by the history and the overall condition of the Pye, I highly suspected this to be the cause. I removed the LOPT for careful examination.

It didn't look that bad and I've certainly encountered worse, considering that the LOPT in my (fully working) Bush TV22 looks like it has been in a bonfire. The original service manual quotes the DC resistances of each winding so I compared each of these to the transformer. All were intact and all measured reasonably close to this. It did look and even felt slightly damp when handled so I left it sat on a hot water pipe in an airing cupboard. Every other day I heated it up with a hot air gun in an attempt to boil off any moisture within the overwind. After a week or two of this performance I reinstated the LOPT and tried again. Rather disappointingly, there were no improvements.

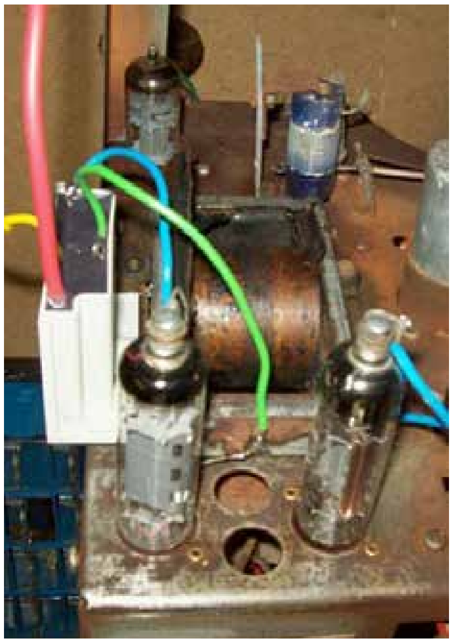
Keen to make some sort of progress I had a look through my drawer of old line output transformers in search of something with similar characteristics. A few were wired in temporarily, just to see if I could get any light on the screen.

The third one I experimented with came from a scrap Ferguson 991T, which I'd broken up about 15 years previously. With this temporarily hung in place I had a bit of a breakthrough and a dim and defocused bit of light appeared on the right of the screen. This responded with the brightness control but wouldn't fill the mask even with the width and height fully advanced.

I considered trying a voltage doubler or a tripler, taken from the anode of the line output valve to derive the EHT. For this to work I'd first have to perform the delicate operation of removing the overwind from the original transformer, a totally non-reversible act!

I had a NOS Thorn tripler in the drawer, so with nothing to lose I got a scalpel and cut off the top part of the LOPT which forms the mounting panel for the EY51. This revealed the overwind in all its glory.

I used the scalpel to scrape the pitch off the sides, and then just cut away the turns a bit at a time, keeping pressure to a minimum. No going back now. I began to wince as I got near the underwind, as a disaster here would probably spell the end. Luckily the LOPT had quite a thick paper layer present between the pair of windings which had survived in good order.



I cleaned up what was left and the input to the tripler was connected to the anode (top cap) of the PL81, and the ground to chassis. I cut the connector off the end of the old EHT lead and soldered it to the tripler's much more heavily insulated one. Then came Take 2.

After about a minute's warm up there was an absolutely piercing line whistle, I quickly peered round the front and to my amazement a brilliant bright raster had appeared.

The scans still wouldn't quite fill the mask and the raster was incredibly bright, so I deduced that the EHT was now too high. A bit of third harmonic tuning was needed so I added a HV EHT capacitor rated at 12kv from the PL top cap to chassis. A value of 200-300pf was suggested for this so I fitted a 270pf mainly as it was to hand. This appeared to damp the new found EHT enough to restore normal operation.

I didn't have access to an EHT meter at the time so I couldn't determine exactly how much was present, but it didn't strike me as being far off the 7.5kv which was required. After roughly setting up the scans, picture shift, and adjusting the ion trap for maximum brightness I now had a bright and correctly sized raster with beautifully focused scanning lines. I felt very pleased with the progress I'd made.

Although the tripler is a non-original mod it was kind of a necessary last resort. Generally I'm a sucker for originality and I've spent many hours restuffing wax capacitors, recreating chassis labelling and reproducing tuning scales. At least what I'd done on the Pye was

easily concealable, as the LOPT cover when refitted would hide any clues to the presence of my little solid state friend. I made up a simple right angled bracket to mount the tripler on its side immediately above the underwind. The line output stage should now prove to be super reliable, with far less strain present.

The Pye now seemed quite happy and stable and I fancied a change, so I decided to leave the internals alone for a while and turn my attention to the Bakelite cabinet. This would require a full strip down as it was completely filthy, and I wanted to make the VT2 look as pristine as I possibly could.

First came the unenviable task of removing the tube. This is done by undoing two nuts, one each side of the CRT cradle which clamps it to 4 opposed aluminium brackets, which in turn secure the entire assembly to the cabinet sides. The construction of this was a work of art.

Once I'd got it undone, the bomb disposal impressions began and with the cabinet on its face the tube was carefully lifted clear complete with its cradle, rubber mask and implosion screen.

The aluminium cradle houses the scan coils and focus magnet assembly, and is also clamped around the rubber mask to form a rim band. With this slackened off I gently separated it from the circular inner part of the mask and gently slid the whole lot off the neck of the tube. I then had to remove the mask from the tube face which was an equally delicate operation as I didn't want to risk damage to either.

As I expected the rubber mask was slightly fused to the tube face and didn't want to let go at first, but I persisted and managed to ease it off with a bit more pressure. I was terrified the mask might break up as it looked like it had sank a bit at the front immediately below the red 'Pye' badge.

Luckily it had only dropped out of its locator on the cabinet front and when I finally got the bit of plate glass off it turned out to be in quite good condition and still fairly firm. The Mullard MW31-74 tube was then carefully washed, wrapped up in an old blanket and put in a box well out of harm's way. I wouldn't be needing it for a while.

I removed the speaker and tuner mounting panel next, lots of rusty slotted screws to deal with. I had to use mole grips to remove most of these.

The Bakelite cabinet is constructed from four separate pieces, the top, front, and sides.

I slackened off most of the larger screws which hold it all together but some refused to budge. These were given a good soaking with WD40 and left alone for a couple of days. I had no intention of risking brute force here and cracking an irreplaceable piece of Bakelite.

The WD40 worked its magic on all but one screw, which sheared off on one of the cabinet sides. I managed to drill out what was left and then re-tapped the brass insert without any drama.

So it was time for the big clean-up. I soaked each cabinet piece in soapy water to begin

with, and scrubbed all the muck out of the louvered sides with a nailbrush. Once this was done I got the T-Cut and beeswax polish out. Two hours later I'd repolished all the parts to perfection. It was one hell of a transformation.

I wasn't overly happy with the rubber mask. This was heavily stained and didn't really respond to any cleaning. I didn't like the appearance of it. It was too dark and discoloured, and was made darker still when covered by the implosion screen, which has a slight tint to it. I carefully removed the red enamel 'Cambridge Pye' badge and noticed that the area underneath it hadn't discoloured. It was originally a slight off white colour. The closest colour match I could find match was Ford 'White Diamond' acrylic car paint purchased from Halfords.

Firstly I sprayed the mask with a high build plastic primer, and then applied about 5 coats of white diamond. I left it in a warm airing cupboard to dry out properly before I thought about refitting it.

A week or so later I reassembled the CRT, cradle, mask, and implosion screen. The tinted screen gave a greyer appearance to the mask. Getting the tube into the mask and clamped up without the usual stray hairs, fingerprints, and dust particles getting between it and the implosion screen was very difficult and I had to have a few attempts. However it was well worth the effort. When it was all back in the cabinet I was very satisfied with the appearance of the VT2.

The final stage in the restoration was persuading it to produce a picture. This, I was soon to find out was about to plunge me into a world of issues.

Before I refurbished the cabinet I did attempt to squirt a signal into the set, but curiously the front end was totally dead. Not the slightest bit of noise or activity could be seen on the screen.

I worked my way around the tuner and the RF stage looking for the obvious at first. A few substitute valves were tried in the first instance but with no improvements. While taking voltage readings I discovered that the sensitivity control was open circuit. This was a 3k wirewound pot which I'd previously missed, and fell apart as I poked at it with the meter probes. I replaced this with a similar one and tried again. This time there was a very weak signal and a small amount of screen activity and disturbance, but very little gain or volume, awful sound on vision, and nothing yet that resembled a picture.

Further checks revealed a few high resistors, but nothing silly. Soon enough I had a breakthrough and found that the CG12E vision detector diode was o/c in both directions.

After this little discovery I immediately pounced on the sound detector and series limiter diodes. A CG6E and a WX6. The CG6E was also completely o/c, and the WX6 was reading about 3meg each way.

I replaced the CG6E with an OA81, and a pair of 1N4148's to replace the original germanium CG12E and WX6. To my delight the VT2 then burst into life with loads of volume, and the deafness was cured.

The turret tuner was now wide awake, with nice loud cracks when changing channels. With this set to channel 1 and a signal applied, a picture of sorts was obtained.

It was quite a jumbled up mess. The frame timebase was running at completely the wrong frequency and the picture information was wrong. The line and frame holds were both weak and wouldn't lock properly.

At the time I was using a VHF modulator and some 405-line video tapes, fed through a tired old Ferguson Videostar player. This was temperamental at the best of times. I plugged in a good working Bush TV24 to run alongside the Pye, just to rule out any problems with this arrangement.

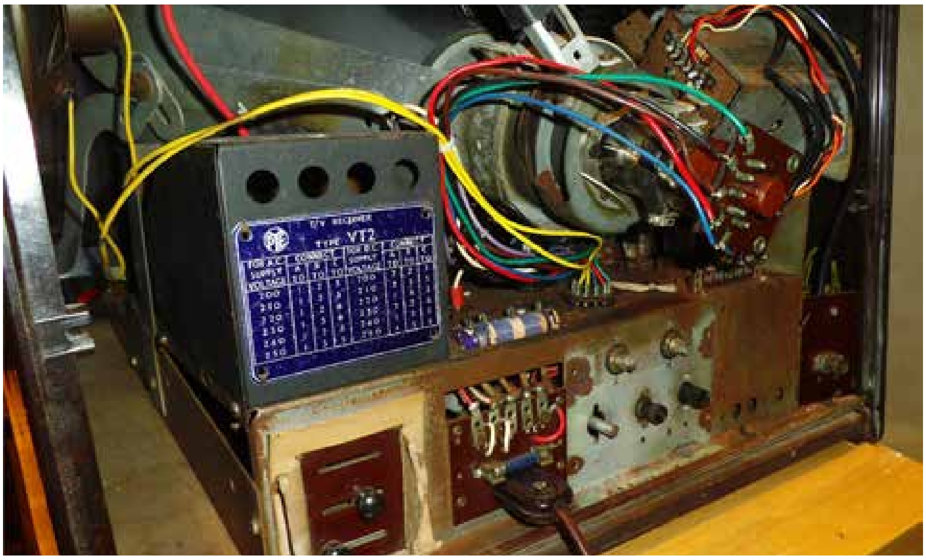
Then, disaster! The frame collapsed and I was left with a brilliant white horizontal line. The secondary of the frame blocking oscillator transformer had gone open circuit, and I didn't have anything suitable to replace it with.

It was now March 2012. At the time a house move was looming, and I knew that all of my spare time would soon be gobbled up with organising and renovating, and that for a while old radios and tellies would have to go on a backburner.

Regrettably, the VT2 was wrapped and tightly taped up in thick polythene, and stored away once again.

A busy five years passed by, in this time I'd finished renovating, rebuilt a classic car, created a nice big repair and display area for all my old sets, gradually moved them all in, and also treated myself to an Aurora converter.

The Pye VT2 was still at my parent's house, partially forgotten about and wrapped up exactly as I'd left it. By now more stuff



had been dumped on it and every time I went round to visit it stared at me forlornly. Eventually I couldn't handle the sight of this anymore so one day last summer I brought it home determined to get it finished. I retraced my steps and remembered most of what I'd done and what still needed doing.

To make the VT2 a bit easier to work on I removed the timber base and strapped the chassis to the cabinet support bars using cable ties. It worked a treat but just meant I had to work on it upside down.

I removed the frame oscillator transformer and sent it away to be rewound. It came back looking like new and was reinstated in the set. Soon enough I was back where I was 5 years ago with the peculiar frame fault and loss of sync.

The frame speed was too fast and it was giving me a 'twice normal speed' image. I'd previously swapped the ECL80 frame output valve for a new one but there was no improvement. I went through all the local resistors and found the 120kΩ ECL80 anode load resistor had shot up to over 1mΩ. Replacing this corrected the picture information but caused it to roll uncontrollably. I could slow it down but the frame hold pot reached the end of its track and it still wouldn't lock.

I played around with some component values in the frame stage. The timebase frequency is determined by a 390kΩ resistor and a 0.5uf cap. Raising the value of the 390kΩ reduced the speed and I was then able to lock the frame but doing this caused awful flicker.

To cut a long story short, and after a lot of frustration and much head scratching the NOS ECL80 that I'd fitted turned out to be duff. Its valveholder also turned out to be very dirty and fussy, and the frame would collapse intermittently when it was touched with the meter probes. I removed and replaced this as well which completely cured the problem.

The VT2 now appeared to be working and the journey was coming to an end. I sat and watched it in awe. After about 10 minutes there was a bit of line slip. This slowly got worse and then to my horror all line and frame sync were lost and the picture disappeared. Here we go again.

After another merry dance it was found that the ECC81 sync separator valve had also given up on life. A new one restored the picture and this time it stayed there. There wasn't a great deal left to do now. The EHT was measured and was reading just under 6kv. This was a bit too low so the tripler arrangement was revisited. The 270pf HV tuning cap was changed for a 180pf, which brought the EHT up to just under 9kv and quietened down the line whistle. I was very happy with the performance. The VT2 was now very stable with good definition.

I refitted the cabinet base and inserted the chassis and tuner. New 2 & 3BA screws were used as most of the originals were rusty and butchered. A correct pair of tuner knobs were kindly supplied by John Wakely. John also provided me with lots of advice and expert help to get this one finished off and working properly.

The back cover had suffered from damp and had gone a strange shape, but responded well to a good clean. I managed to flatten this out by clamping it up between some pieces of timber for several days.

So finally the VT2 was minted, mended and lives again.

It is now 64 years old, and spent 49 of those years hidden away in appalling conditions before being rescued. Now a rare survivor, this is one of my favourite tellies and I'm very proud to be its custodian.

I'm often asked for a demonstration and if it is for sale. You can watch it all day long, but no I won't be parting with it anytime soon!

How many more of us have got a VT2 in captivity…?

Toggle switches used on US and other radios

Gary Tempest

This type of switch is often used on American radios and also on EMI sets as they had links to RCA. But Bulgin made one that is similar. One was used as a radio / phono switch on the Zenith 7A28A, written about in a previous Bulletin. It is from this switch that the pictures are taken.

The phono switch used on the Zenith

A possible cure for intermittent switches is by squirting switch cleaner down the operating arm. But if the switch is really filthy, and this one was, it probably won't be satisfactory. It could actually make things worse by flooding dirt in the 'barrel' into the inside. This one, as many were, was a double pole change-over type.

Having previously dismantled this type when used for EMI bandwidth switches, I knew how to do it and it's not that difficult.

Picture 1. A Bulgin toggle switch

The first thing is to drill off the rivet heads, finishing with a small drill the same size as the rivet shank. It's essential not to leave any burr on them, which will split the Paxolin laminations that form the body of the switch, when they are tapped out.

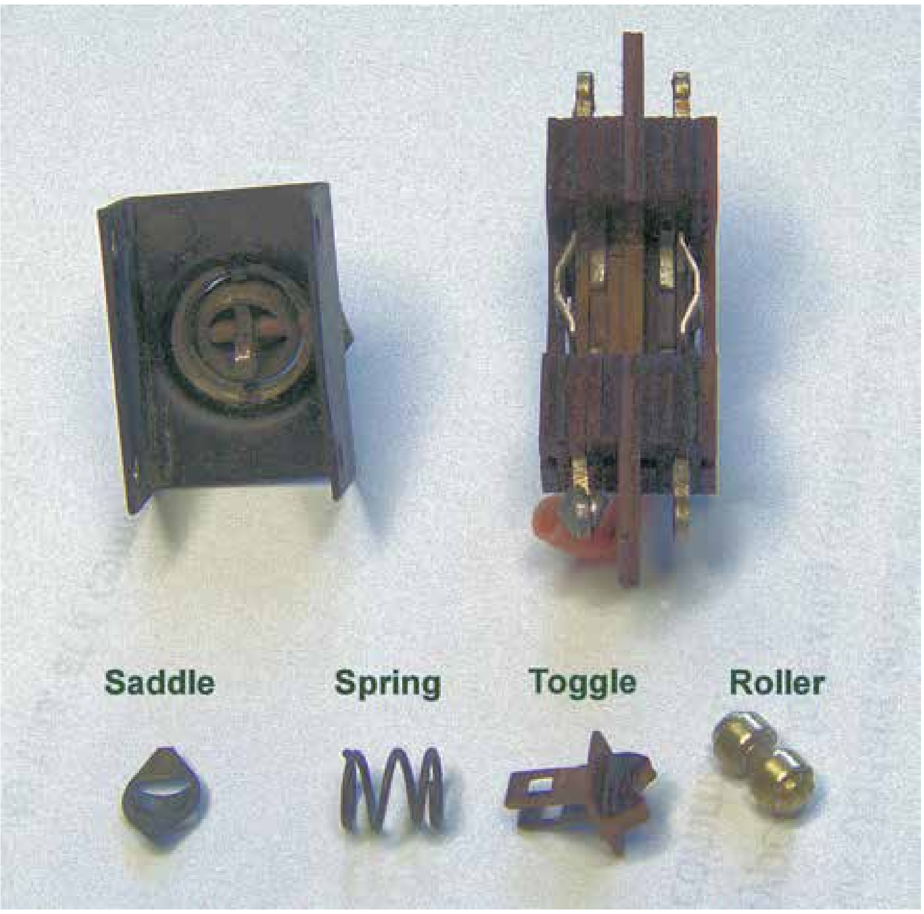
A suitable tool is the shank of a 'pop rivet' that is also useful to hold the switch temporarily together for trial after reassembly. Fortunately, once the body is removed from the housing the Paxolin parts do not fall apart as they are held together by hidden pins.

But of course the switch parts will come out, allowing a thorough cleaning which this one really needed being particularly dirty and gummed up, possibly with old grease.

The picture shows the metal frame of the item with a ball ended operating arm. On this sits a saddle that recesses into one end of a spring. Inside the other end of this slips a Paxolin toggle that rides on a roller that actually forms the switch wipers. The roller, with metal ends that are plated on the periphery and the outside, are on an insulated shaft, which runs on a track in the switch body. In this can be seen vertical contacts that mate with the roller outsides. The peripheries of the rollers make, by the spring pressure, with contact sets in the bottom of the body thus making the actual connections. When the switch is operated a nice snap action occurs as the roller moves from one end of the track to the other.

With all parts cleaned the switch can be reassembled which at first isn't easy. A trick I use is to hold the saddle on the operating arm with a tiny drop of Superglue applied with a needle. It seems a good idea to use small dab of lithium grease to the track. Then the spring, toggle and roller are placed in position in the body, as it is carefully slid into the frame held on its side. It may take a couple of attempts but once assembled the 'pop rivets' can be slid through to hold things together so that operation can be tried. At first it may seem a little stiff but after a few movements the saddle will come free and the switch should feel normal only needing checks now that there are very low contact resistances.

The final step is to replace the 'pop rivets' with 2mm nuts, bolts and lock washers with a dab of nail varnish, to make sure, applied to the thread ends. To do this the holes, one at a time, may need opening out very slightly with a rat tail file or with great care a sharp drill in a drill press with the switch well supported.



Picture 2. The RCA switch inside

Picture 3. The switch held together with rivets

Picture 4. The switch finished

Golborne, November 2018

Photos by Greg Hewitt

Dynatron Mazurka with stereo valve amp

GEC BT7094

Bush TV62

Dynatron

Co-op Defiant, get your divvy's!

Pye 1960's TV

Hacker Herald RP37A

The ideal car to take your vintage purchases home in!

What's it worth?

Peter Brown

Around fifty years ago, when I started to take an interest in second-hand valve radios, there didn't seem to be much general interest. At that time old radio sets were usually classed by the public as just old fashioned second-hand goods that needed to be replaced with something modern.

McMichael 362, £16/5/6 new in 1936 - What price now?

Philco 444, £6/6/- new in 1936 - What price now?

I suspect this attitude was a continuation of the early 1950s, after six years of war and a post-war dismal period of rationing and shortages. At that time, apart from genuine antiques, goods were either new if you could afford them or second-hand if you couldn't. The age of modern collectables had not yet arrived. When conditions improved, contemporary furnishing became all the rage, homes refurbished with modern fireplaces, doors, light fittings, curtains, carpets, wallpaper and so on. A fresh start! Out with the old, in with the new, including domestic appliances. Old radios, mostly in big dull cabinets were out of place in a modernised brightly decorated and furnished home. They had to give way to contemporary radiograms. I recall in the mid 50s, seeing marble fireplace surrounds and wooden radios in rubbish skips.

Domestic radios

Radio sets were caught up in this rush to modernise and one must suspect many old sets were thrown away as one didn't want family, friends and neighbours to see that you had such old-fashioned ancient things. Most people wanted to 'keep up with the Jones's' by modernising.

The trade publication, 1952 edition, advised dealers when taking in second hand radios in part exchange, that "The allowances indicated can only be made against receivers in first-class working order". The earliest listed radios were those originally made in 1940-41 and the trade guide advised that "earlier models than those listed have no commercial value". How that has changed!

It took a while for that to change, until old radio sets became collectable and attracted high prices, often just for their image rather than for their performance. One example of this is the comparison between sets made by Ekco in 1945-46. One, an A21, a fairly good receiver in a large upright brown Bakelite cabinet, magic eye, push-button station presets, retailed when new at £20/8/3 with a 1952 maximum trade-in of £6/-/-. For those who couldn't afford that, there was the A22 in a round black with chrome-trim cabinet, with fewer features, at £2/11/- cheaper than the A21 with a retail price when new of £17/17/3 and a 1952 maximum trade-in of £5/4/-. But now, an A22 might cost £hundreds (One apparently sold at Bonhams auction for over £600), but an A21 can be purchased for a fraction of that price. The contemporary AD75 cost even less at a new price of £14/0/8. There is a similar story about the Philco A444, so called Peoples' Set from 1936, or the deluxe version, the A527. Designed down to a price and retailed at a comparatively affordable 6 guineas when new for the A444, but in 1952 of no commercial value. For comparison, a new McMichael 362 in a wood veneered cabinet would have cost £16/5/6 in 1936, nearly £10 more than the A444. Quite a different story now! Prices now seem to be governed by the looks of the set and have little to do with performance.

Price rises in recent years can perhaps be illustrated by the rise of the DAC90 variants. These used to be very common but not particularly well regarded. DAC90A, mostly brown, some white and some DAC90 as well were readily available in charity shops, junk shops, garage sales, and jumble sales. Over time I bought many of these sets, never paying more than £10, many bought for £4 or £5 each as they were just old radios, mostly not working and with dull cabinets. After a few years, I repaired them all. Obvious repairs included the electrolytics and most of the condensers on the tag strip. After checking each for safety, performance and then cleaning and polishing the cabinet, refitting the chassis, I had yet another restored set ready for a new owner, selling for between £40 and £75 as that was how far the going-rate had increased in a few years for these sets in good condition.

I was also given some old sets by people who heard I was interested and had long-unused radios they just wanted to get rid of. As to the so called 'classic sets', little did I know when I repaired many round Ekcos, Peoples' Sets, Pye sunbursts and others that in time these would become so expensive. They were at the time, just ordinary, mostly three valve + sets of no particular merit as radio receivers. I was personally more interested in the pre-1935 sets of which examples were still available as 'of little value' but gave more satisfaction after I managed to coax them back to life. I recall one 'skip rescue' when a young lad brought me a set to repair that his father had found in a skip in poor condition. It had no makers name, but was probably a 1933/34 Lampex upright radiogram that took some considerable effort and parts to repair, but it was worth it to see the delight of the young lad when I demonstrated it working before he took it home.

Communications radios

The 1950s situation was similar to domestic sets. There were lots of ex-military sets available with very little interest in them - readers may remember places such as

Ekco A21

Ekco A22

Ekco AD75

Ekco B25

Henry's, Proops, Smiths and others in Lisle Street in London. The market was flooded with receivers such as AR88, HRO, WS19, WS22, BC611, R1155, mostly complete, working and some even unused in their crates. Most sets were big, heavy and/or needed special power supplies, which is a probable reason for their unpopularity at the time. I did buy, repair and eventually sell a number of these until sources became scarce and prices rose to the level I thought unreasonable and few were available. As a personal example, for my use as an amateur radio operator, I purchased a former SOE Type 3, Mark 2, commonly called a B2 spy set. It was dated April 1945, complete and original with all accessories, some still unused, even including its original handbook. I bought it at a very reasonable price for use as my transceiver, not as a collectable. It was an affordable alternative to a then-modern amateur radio transmitter with separate receiver and accessories. I sold that set a long while ago and I doubt I could afford to buy it back now.

Make and Model	Original Price £	s.	d.	Allowance £	s.
EKCO					
1945-46					
A21, 4v AC, 3 wb	20	8	3	6	0
A22, 4v AC, 3 wb	17	17	3	5	4
AD75, 4v AC/DC, 2 wb	14	0	8	4	2
B25, 4v B, 3 wb	17	17	3	4	13

Components

A similar situation prevailed with components. At amateur auctions, serviceable and unused radio valves could be purchased by the large box load, not individually and prices for each valve were in pence rather than pounds. The same was the case for other components including all types of transformers. A couple of pounds could buy a large box of mixed items that would usually contain some usable components for use in restoration. The older the items, the lower the price! It all was geared to the amateur who just liked to amass components to use in projects rather than being resold for profit. Later on, of course I needed to buy some modern components such as condensers from RS as much for reliability as well as for availability.

Test equipment

If second hand radios were of little value, then even more so was valve-based test equipment, a lot of which was scrapped in the late 1960s to mid 1970s.

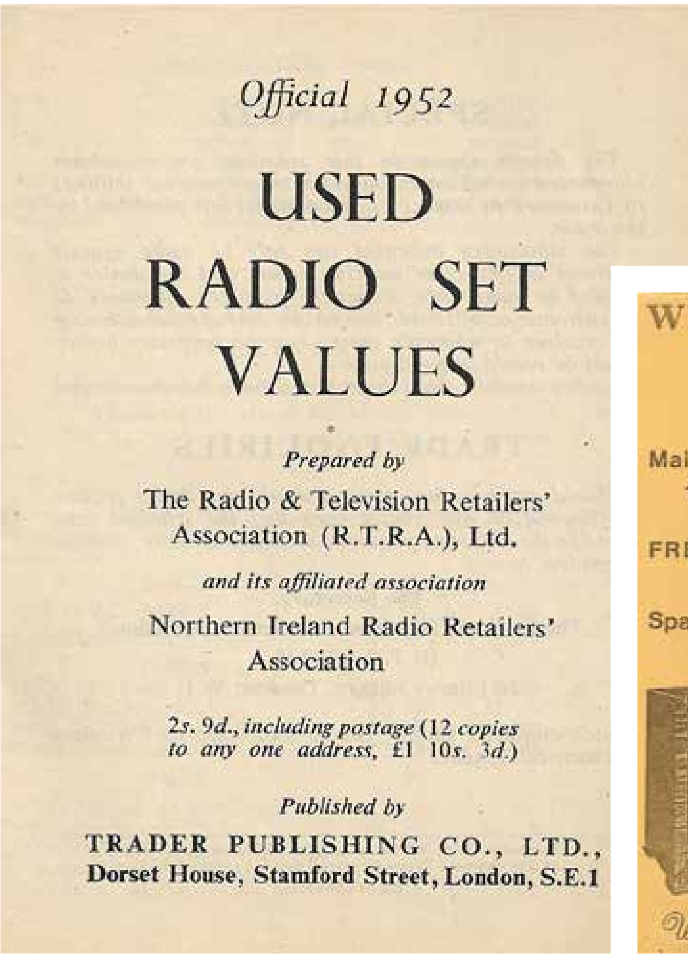
After I set up my first repair area, I scouted around for predominantly commercial organisations who were upgrading from valve-based technology to that based on semi-conductors. It didn't take long to find one that was about to scrap all their old equipment. Luckily I got there before the whole lot was thrown into the skip. I bought, among other items, an AVO VCM mark II complete and working for £5, and a bench stabilised power supply as a free gift. Other acquisitions included a number of AVO 8s, some in leather cases, some in wooden boxes with accessories - none costing more than £5; a very useful Taylor 20B circuit analyser and signal tracer for 50p that can simply and quickly find at which stage the signal fades or disappears, making repair easy; signal generators, both RF and AF plus frequency counters were mostly free or costing less than £10. I expect most 'vintage' test equipment that has survived is now in extended demand with consequent high prices.

Affordability?

Many years ago, amateurs like me could indulge their interest for very little outlay at a time when availability was high, general interest and prices were low. As with other 'collectables', for example the astronomic price of some old cars, some newcomers to the field of vintage radios may well be priced out.

The future?

It seems that some vintage radios and associated items will be changing from items of genuine interest for what they are, into commodities to be bought and sold for profit. Personally, after many years of active participation, when pleasure and satisfaction rather than profit was my objective, I am now winding down and after 40 years, I no longer undertake repairs for others.



Official 1952

USED RADIO SET VALUES

Prepared by

The Radio & Television Retailers' Association (R.T.R.A.), Ltd.

and its affiliated association

Northern Ireland Radio Retailers' Association

2s. 9d., including postage (12 copies to any one address, £1 10s. 3d.)

Published by

TRADER PUBLISHING CO., LTD., Dorset House, Stamford Street, London, S.E.1

First direct wireless message, UK to Australia

Ray Robinson

22 September 1918, The high powered Marconi Transmitting station (200kW) at Waunfawr sent the first wireless message to Wahroonga using Long Wave wireless telegraphy. Waunfawr is a large village near Caernarfon in Wales, in the United Kingdom. Wahroonga is a suburb of Sydney, in New South Wales, Australia.

The Prime Minister of Australia, Mr. W.M. "Billy" Hughes was in Britain, inspecting the troops in the Great War. He was accompanied by the Minister for the Navy, Mr. Joseph Cook. Each sent a message to Australia. Mr. E.T. Fisk was the managing director of A.W.A. (Amalgamated Wireless Australasia) and set up the experimental receiving station at his home "Lucania" in Wahroonga. A commemorative certificate was issued. In 1935, a monument was erected at the site, consisting of a marble column bearing a statue of Mercury on the top. It was unveiled by Billy Hughes, and by wireless telephone, the Marchese Marconi addressed the assembly, from Paris, France.

Hughes was using his wireless message to strengthen support for the war effort in Europe at a time when support in Australia was waning. The message is engraved on a plaque on the statue.

"I have just returned from a visit to the battlefields where the glorious valour and dash of the Australian troops saved Amiens and forced back the legions of the enemy. Filled with greater admiration than ever for these glorious men, and more convinced than ever that it is the duty of their fellow citizens to keep these magnificent battalions up to their full strength."

A Centenary celebration at the commemorative statue, was held on Saturday 22 September 2018. Attending were Fisk descendents, Dick Smith, politicians, counselors, residents, and the public. The Wahroonga Town Crier was the Master of Ceremonies. He introduced the choir which sang the Welsh National Anthem (in Welsh) and then the British National Anthem "God Save the Queen" (in English). The Morse message was broadcast over the PA, and a politician read the text translation. Then the 1935 message from Marchese Marconi was broadcast over the PA, from an actual recording. The crowd then moved to the adjacent church hall to view the displays.

Town Crier and Choir

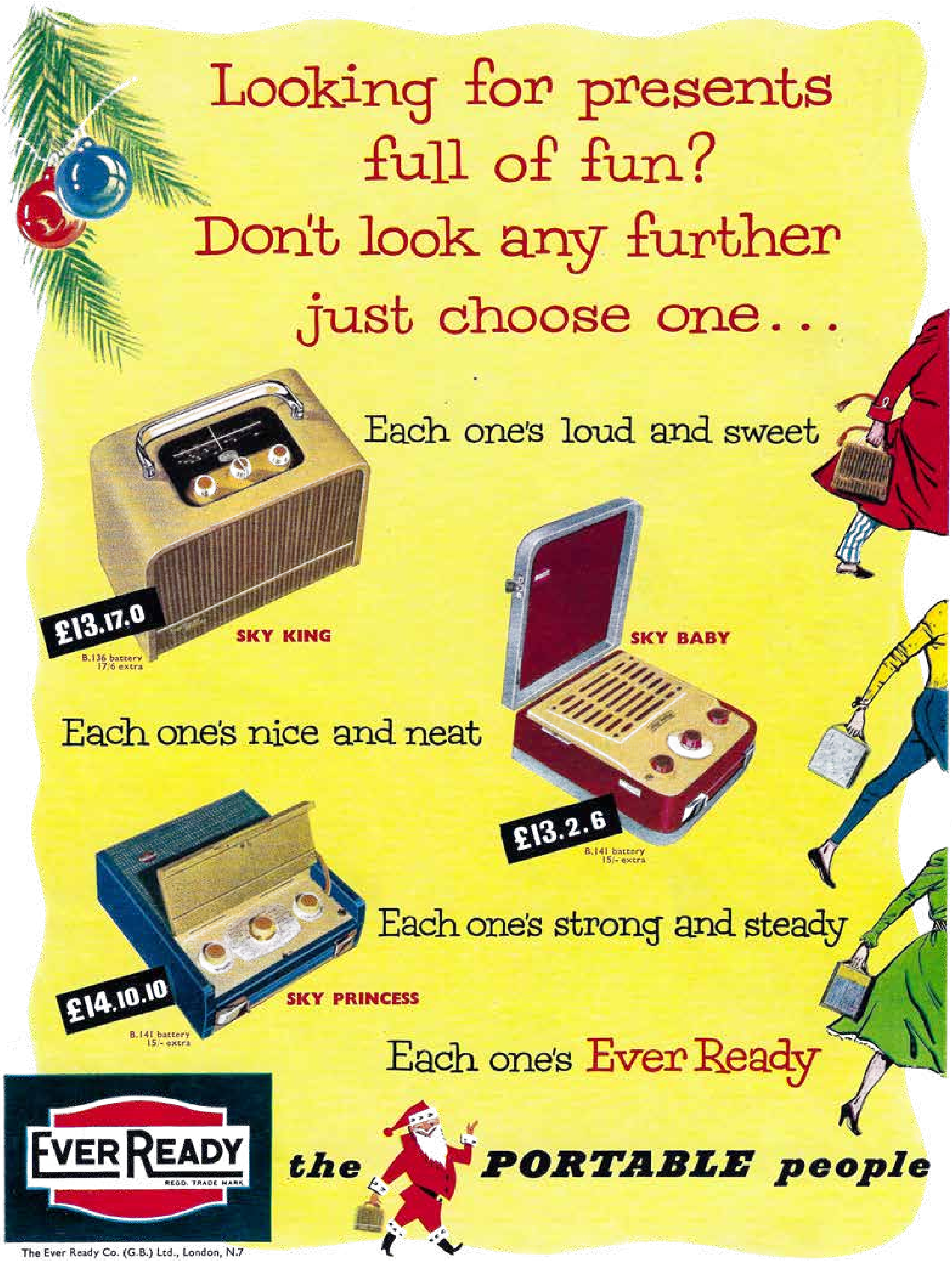
The local radio club HADARC (Hornsby and Districts Amateur Radio Club) had a special event call-sign, (VK100MARCONI) and used it to make many Amateur Radio contacts on the day. They had set up an operational amateur radio station, and attempted to exchange wireless messages with the Dragon Amateur Radio Club in Wales, using their special event amateur call sign GB2VK. The WIA (Wireless Institute of Australia) will be holding a special event in September and October, using the special event call sign VI#MARCONI for participating States and Territories. The # will be replaced by the State call sign number when used in each state. VK2 is New South Wales, VK3 is Victoria, VK4 is Queensland.

The HRSA (Historical Radio Society of Australia) had a display of Marconi equipment and memorabilia. There was a Ships Transmitter Pancake Coil and Induction Coil, an AWA Expanse Panel Receiver, a Stirling Aircraft Spark transmitter, a Crystal Set (AWA Radiola), and a replica microphone as used by Dame Nellie Melba in her broadcast from Marconi's Chelmsford works, on 15 June 1920.

Peter Jensen had a table containing a Marconi Tuner, Maggie, Wilson Transmitter, Short Wave Tuner, and two working Spark Transmitters.

HRSA Display (John McIllwaine)

Marconi Display (Peter Jensen)



Looking for presents full of fun?
Don't look any further just choose one...
Each one's loud and sweet
£13.17.0
SKY KING
B.136 battery 17/6 extra
SKY BABY
Each one's nice and neat
£13.2.6
B.141 battery 15/- extra
Each one's strong and steady
£14.10.10
SKY PRINCESS
B.141 battery 15/- extra
Each one's Ever Ready
EVER READY
REGD. TRADE MARK
the PORTABLE people
The Ever Ready Co. (G.B.) Ltd., London, N.7

Early American Colour TV Receivers.

Graham Dawson

In Britain regular Colour television transmissions started in June 1967 on BBC2 on 625 lines. The fact that Britain had adopted 405 lines before WW2 and continued on that standard in 1946, delayed developments of a colour service until the 625 standard was adopted for BBC2 in 1964 and all subsequent new stations would use this standard.

BBC1 and ITV changed to 625 lines from January 1970. However experiments with adding colour to 405 line signals were carried out by the BBC in the mid 1950s and proved it was possible using the existing network.

In the USA 525 lines was adopted as their system after the war, and this remains the case today, excepting high definition broadcasts. So they were in a position to develop colour TV once a viable method had been established by the National Television System Committee in 1953.

The first commercial colour receiver was the Westinghouse H840CK15 in early 1954.

(fig 1) Approximately 500 sets were made at a retail price of $1295 and very few sold.

Some 20 sets remain today, mostly in museums.

Shortly after, in March 1954, RCA introduced the CT100 receiver (named "The Merrill") and using a CTC2 chassis at a price of $1000.

Approximately 4500 of these sets were made, but due to the high cost and lack of colour programmes, very few were sold. The set had 36 valves and a 15" shadow mask tube type 15GP22. This tube (or Kinescope) was 24" long, of all glass construction and made by RCA. About 150 of these sets survive today and are an expensive enthusiasts item, especially if the tube is good, since glass to metal sealing problems of the shadow mask caused vacuum leakages on many of them. The phosphors used were much closer to the NTSC ideal colours, with the result that they gave a truer colour rendition than subsequent tubes.

Figure 2

Figure 1

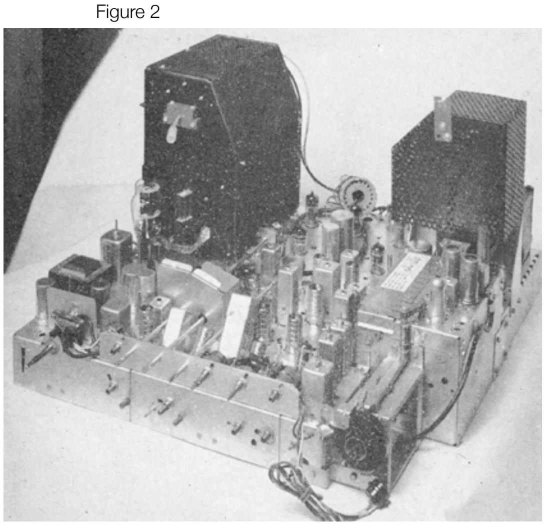


Figure 3

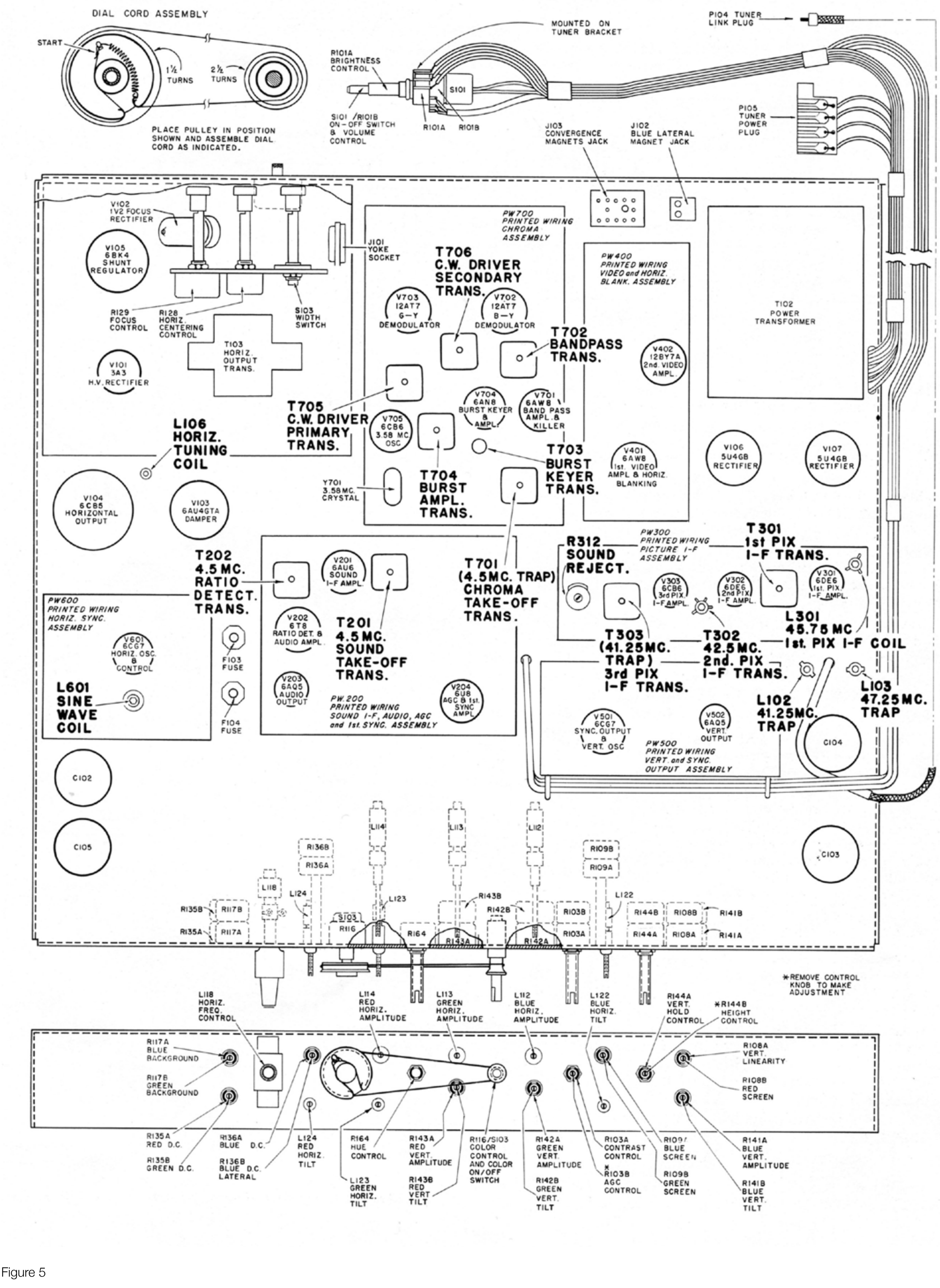

DIAL CORD ASSEMBLY
START
1½ TURNS
2½ TURNS
PLACE PULLEY IN POSITION SHOWN AND ASSEMBLE DIAL CORD AS INDICATED.
MOUNTED ON TUNER BRACKET
P104 TUNER LINK PLUG
R101A BRIGHTNESS CONTROL
S101
S101 /R101B ON-OFF SWITCH & VOLUME CONTROL
R101A
R101B
J103 CONVERGENCE MAGNETS JACK
J102 BLUE LATERAL MAGNET JACK
P105 TUNER POWER PLUG
V102 1V2 FOCUS RECTIFIER
V105 6BK4 SHUNT REGULATOR
J101 YOKE SOCKET
R129 FOCUS CONTROL
R128 HORIZ. CENTERING CONTROL
S103 WIDTH SWITCH
T103 HORIZ. OUTPUT TRANS.
V101 3A3 H.V. RECTIFIER
PW700 PRINTED WIRING CHROMA ASSEMBLY
T706 C.W. DRIVER SECONDARY TRANS.
V703 12AT7 G-Y DEMODULATOR
V702 12AT7 B-Y DEMODULATOR
T702 BANDPASS TRANS.
T705 C.W. DRIVER PRIMARY TRANS.
V705 6CB6 3.58 MC OSC
V704 6AN8 BURST KEYER & AMPL.
V701 6AW8 BAND PASS AMPL. & KILLER
T703 BURST KEYER TRANS.
T704 BURST AMPL. TRANS.
Y701 3.58MC. CRYSTAL
PW400 PRINTED WIRING VIDEO and HORIZ. BLANK. ASSEMBLY
V402 12BY7A 2nd. VIDEO AMPL.
V401 6AW8 1st. VIDEO AMPL & HORIZ. BLANKING
T102 POWER TRANSFORMER
V106 5U4GB RECTIFIER
V107 5U4GB RECTIFIER
L106 HORIZ. TUNING COIL
V104 6CB5 HORIZONTAL OUTPUT
V103 6AU4GTA DAMPER
T202 4.5 MC. RATIO DETECT. TRANS.
V201 6AU6 SOUND I-F AMPL.
V202 6T8 RATIO DET. & AUDIO AMPL.
T201 4.5 MC. SOUND TAKE-OFF TRANS.
V203 6AQ5 AUDIO OUTPUT
V204 6U8 AGC & 1st. SYNC AMPL.
PW.200 PRINTED WIRING SOUND I-F, AUDIO, AGC and 1st. SYNC. ASSEMBLY
T701 (4.5MC. TRAP) CHROMA TAKE-OFF TRANS.
PW600 PRINTED WIRING HORIZ. SYNC. ASSEMBLY
V601 6CG7 HORIZ. OSC. & CONTROL
L601 SINE WAVE COIL
F103 FUSE
F104 FUSE
R312 SOUND REJECT.
PW300 PRINTED WIRING PICTURE I-F ASSEMBLY
T301 1st PIX I-F TRANS.
V303 6CB6 3rd PIX. I-F AMPL.
V302 6DE6 2nd PIX. I-F AMPL.
V301 6DE6 1st. PIX. I-F AMPL.
L301 45.75 MC 1st. PIX I-F COIL
T303 (41.25MC. TRAP) 3rd PIX I-F TRANS.
T302 42.5MC. 2nd. PIX I-F TRANS.
L102 41.25MC. TRAP
L103 47.25MC. TRAP
V501 6CG7 SYNC. OUTPUT & VERT. OSC
V502 6AQ5 VERT. OUTPUT
PW500 PRINTED WIRING VERT. and SYNC. OUTPUT ASSEMBLY
C104
C102
C105
C103
L114
L113
L112
R136B
R136A
R109B
R109A
L118
L124
L123
R143B
R142B
L122
R135B
R117B
R135A
R117A
S103
R116
R164
R143A
R142A
R103B
R103A
R144B
R108B
R141B
R144A
R108A
R141A
*REMOVE CONTROL KNOB TO MAKE ADJUSTMENT
L118 HORIZ. FREQ. CONTROL
L114 RED HORIZ. AMPLITUDE
L113 GREEN HORIZ. AMPLITUDE
L112 BLUE HORIZ. AMPLITUDE
L122 BLUE HORIZ. TILT
R144A VERT. HOLD CONTROL
*R144B HEIGHT CONTROL
R117A BLUE BACKGROUND
R117B GREEN BACKGROUND
R108A VERT. LINEARITY
R108B RED SCREEN
R135A RED D.C.
R135B GREEN D.C.
R136A BLUE D.C.
R136B BLUE D.C. LATERAL
L124 RED HORIZ. TILT
R164 HUE CONTROL
R143A RED VERT. AMPLITUDE
R116/S103 COLOR CONTROL AND COLOR ON/OFF SWITCH
R142A GREEN VERT. AMPLITUDE
R103A CONTRAST CONTROL
R109A BLUE SCREEN
R141A BLUE VERT. AMPLITUDE
L123 GREEN HORIZ. TILT
R143B RED VERT TILT
R142B GREEN VERT. TILT
*R103B AGC CONTROL
R109B GREEN SCREEN
R141B BLUE VERT. TILT

Figure 5

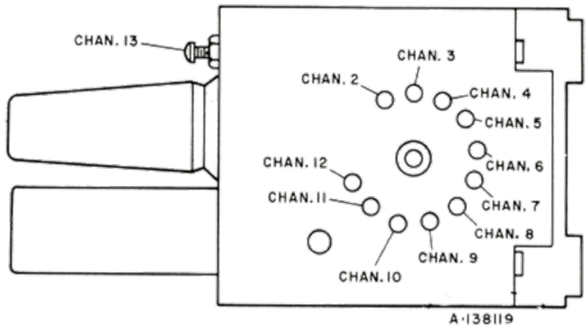


Figure 4—KRK40B or KRK40C VHF Oscillator Adjustments

FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture.

CAUTION.—In some receivers, the FM trap will tune down into channel 6 or ever into channel 5. Needless to say, such an adjustment will cause greatly reduced sensitivity on these channels. If channels 5 or 6 are to be received, check to make sure that it does not affect sensitivity on these two channels.

Replace the cabinet rear panel. Make sure that the screws holding it are up tight, otherwise it may vibrate when the receiver is operated at high volume.

KINESCOPE REPLACEMENT

KINESCOPE HANDLING PRECAUTION.—Do not open the kinescope carton, install, remove, or handle the kinescope in any manner, unless shatterproof goggles are worn. People not so equipped should be kept away while handling the kinescope.

REMOVAL OF KINESCOPE.—Take off the front control knobs by pulling the knobs outward. Remove the side control knobs by pulling the knobs outward. Take off the rear of the receiver. Disconnect the H.V. Ultor anode connector inside the H.V. compartment. Remove the yoke plug and unplug the speaker. Remove the plug from the convergence yoke assembly and disconnect the kinescope socket.

The tuner assembly must be removed for removal of the Kinescope. Unplug the link cable and power cable from the tuner. Loosen the self-tapping screws holding the volume control bracket and slide the bracket up to the enlarged openings and remove from the tuner assembly. Remove the screws holding the tuner bracket and remove the bracket from the receiver.

The main chassis must be out of the cabinet for removal or installation of the kinescope. Take out the bolts holding the chassis and slide the chassis out from the rear. The kinescope should be installed with the cabinet resting on its face. Lay the cabinet on its face with a heavy pad used to protect the cabinet front.

Remove the blue beam positioning magnet, the purifying magnet assembly and the convergence yoke by sliding them off the kinescope neck. Leave the yoke fastened to the kinescope H.V. insulator.

Remove the four nuts holding the kinescope mounting brackets to the front mask assembly. Refer to figure 5. Slide each bracket upward, then out under the equalizing magnet projections at the open end. Remove the springs and rubber cushions under the brackets.

Lift the high voltage insulator, with the yoke attached, up and off the kinescope neck. Grasp the flange of the kinescope at the insulator and lift out of the mask.

Remove the insulator from around the flange and unclip the anode connector.

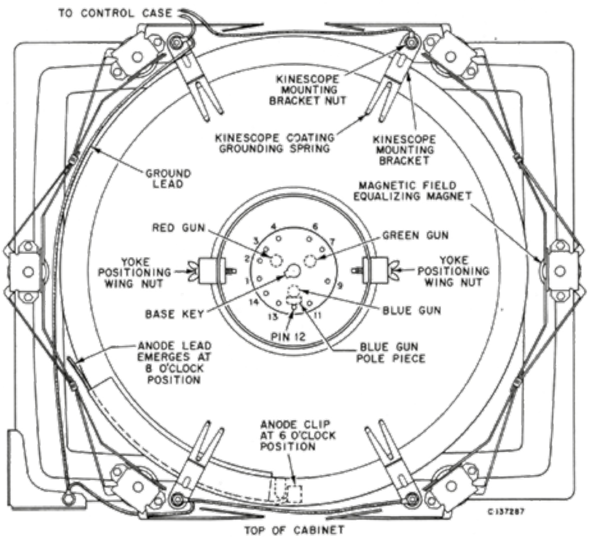


Figure 5—Kinescope Assembly

INSTALLATION OF KINESCOPE.—Take the kinescope from its carton, observing the precautions in handling as noted previously. Connect the anode lead at the position shown in figure 5. Place the insulator around the flange with the lead emerging at approximately the 8 o'clock position. Grasp the kinescope by the flange and place it into the front mask with the blue gun facing you. The position of the blue gun may be determined from the numbers moulded into the kinescope base. The blue gun is located next to pin 12. The blue beam positioning pole piece attached to the blue gun is another means of identification. (Refer to figure 5.)

Replace the HV insulator and yoke assembly over the neck of the kinescope. Replace the four kinescope mounting clamps, springs and rubber cushions and tighten the clamps in place. The receiver may now be returned to an upright position.

CAUTION: The rubber cushions must be replaced first, then the grounding springs and finally the mounting clamps. Do not install the cushions between the grounding springs and the clamps, to do so will prevent the kinescope coating

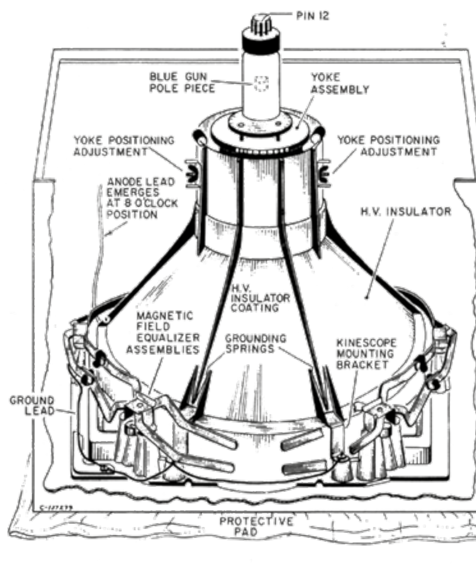


Figure 6—Kinescope Installation

Figure 6

RCA Brought out a 21" set later in 1954 and the price of the CT100 dropped to $495 to try and sell off the unsold sets. A picture of the set and chassis are shown in figs 2 and 3.

New colour receivers were introduced by RCA every year, and I have the 34 page service manual for the CTC 5 series of 1956 shown in fig 4, with the chassis layout in fig 5 and a page explaining how to change the 21AXP22 kinescope fig 6. This CRT had a metal cone between the faceplate and gun assembly and being fed with 25KV made it a rather lethal unit. Improvements in tube manufacture made the metal cone redundant and later 21" tubes were of all glass construction. They also changed the phosphors to give a brighter display, but compromised the colourimetry from the NTSC ideal.

Round tubes continued to be made until the mid 1960s, when improved glass technology allowed a rectangular shape and sizes up to 25" diameter to be made. In Britain the first colour sets all used either 19" or 25" tubes and no round tube sets were ever marketed here. While working for RCA I acquired a 21" 21FBP22 tube and scanning components, and built a set in 1966. This was the subject of an article in issue 27/1 of the BVWS Bulletin in 2001. (fig 7)

Because of 10 years manufacturing experience, by 1966 American colour sets were both cheap and reliable, something which took the UK a number of years to achieve. Both NTSC and PAL are very similar in their colour encoding method, and it was possible to convert an NTSC receiver to PAL by modifying the subcarrier frequency circuits and adding a subcarrier switch and delay line to the decoder. The line and field frequencies were close enough to be within the capture range of the synchronising circuit adjustments.

It was of course necessary to modify the vision IF bandwidth and change the inter carrier sound from 4.5 to 6.0 Mhz or fit 625 line IF strips. The set I built was basically an RCA CTC15 chassis of 1963 with the above alterations incorporated. This made for a stable and reliable receiver which ran for 10 years before being retired. It still works and is run every few months to keep the components happy; a testament to the design and manufacture of a complex piece of electrical equipment.

RCA VICTOR

COLOR TELEVISION RECEIVERS

MODELS

21-CT-7835(U), 21-CT-7837(U), 21-CT-7855(U), 21-CT-7857(U), 21-CT-7865(U), 21-CT-7866(U), 21-CT-7867(U)

Chassis No. CTC5B, CTC5C, CTC5D or CTC5E

— Mfr. No. 274 —

SERVICE DATA

— 1956 No. T5 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE CO., INC.
CAMDEN 8, N. J.
FOR
RADIO CORPORATION OF AMERICA
RCA VICTOR TELEVISION DIVISION

"The STANWICK"
Models 21-CT-7835(U)—Mah. Grain
Models 21-CT-7837(U)—Oak Grain

"The WESTCOTT"
Models
21-CT-7855(U)—Mah. Grain
21-CT-7857(U)—Oak Grain

"The DARTMOUTH"
Models
21-CT-7865(U)—Mah. Grain
21-CT-7866(U)—Wal. Grain
21-CT-7867(U)—Oak Grain

GENERAL DESCRIPTION

All models are color television receivers, capable of reception of either black and white or color programs. The receivers employ a shadow mask, three gun, directly viewed metal kinescope.

Models without a "U" designation in the model number are receivers with VHF only and feature full 12 channel VHF coverage. Models with the "U" designation in the model number are UHF/VHF receivers and feature full 12 channel VHF coverage plus any UHF channels desired.

The receivers feature: intercarrier FM sound system; stabilized horizontal AFC; magnetic convergence and electrostatic focus; crystal controlled AFC color synchronisation; low level color demodulation and a color "killer" circuit to disable the color channel during black and white reception.

Figure 4

Figure 7

Marconiphone model 253AC

Richard Allan

The advertisement reproduced on page 30 of the Autumn 2017 Bulletin has prompted me to describe one that I acquired four years ago. The model 253AC is a TRF four valve, long and medium wave band, AC mains operated table top radio housed in veneered wood case dating from around 1933.

Marconiphone produced two radiograms (254AC/RG and 271RG) using the same circuitry. The same chassis was also used in the HMV436 and the Columbia 355 and 620RG.

I purchased it from someone who rescued it from the loft of his mother's house when she moved some years earlier. As can be seen from the pictures, it was in a poor condition but seemingly complete and unmodified. A pencilled note on the chassis indicates that it was repaired in May 1945 but I could see no obvious changes. Several problems that would need fixing were immediately obvious when the chassis was removed from the case.

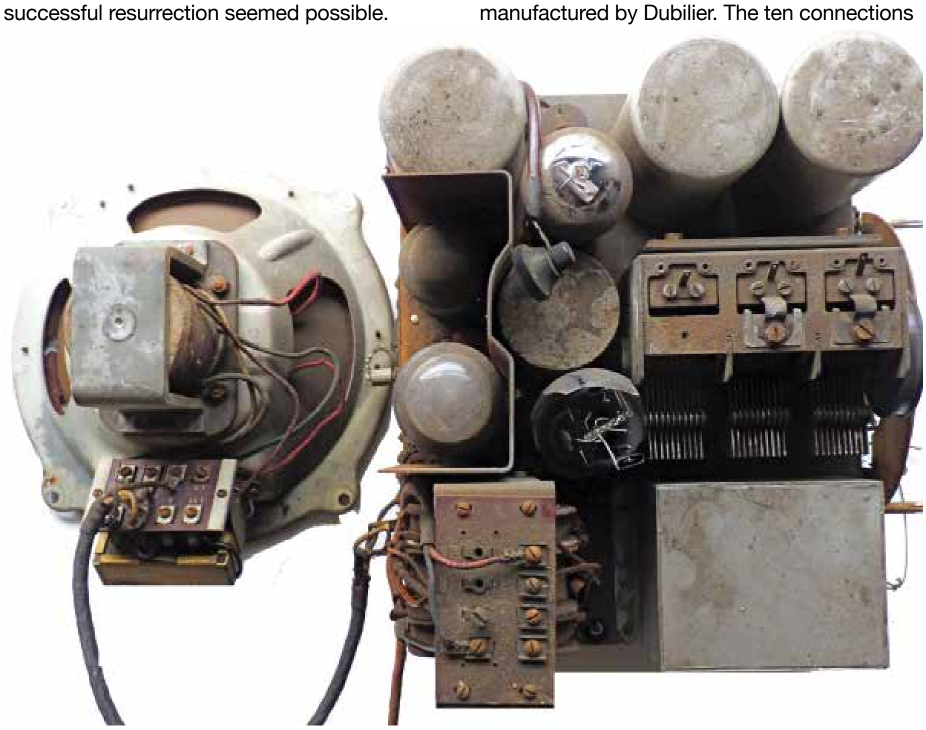
Advertisement from 1933

Wire mesh replacement for perished cloth

Dublilier Capacitor block

The smashed rectifier valve would require a replacement, the HF amplifier valve would need repair, the loudspeaker cone would need support, the dial assembly would need re-stringing, the inter valve transformer and the metal can housing capacitors had overheated and leaked black pitch over the chassis so that would need attention as well. This was the first preliminary inspection!

With all the valves removed I energised the set and checked the mains transformer, all seemed OK and the pilot lights worked. The loudspeaker produced a click from a 9 volt battery and the field winding and output transformer checked OK for continuity. So successful resurrection seemed possible.



Chassis as received

Replacement capacitors

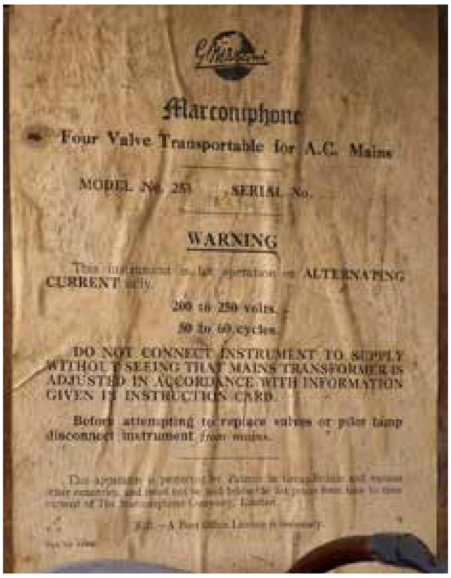
The other obvious discrepancy was that the valves were all of Mullard manufacture rather than the Marconi ones specified (see specification and circuit description).

When I removed the loudspeaker I found that the cone moved very freely as the flexible peripheral support had been almost completely eaten away. What remained was carefully scraped away and replaced with a piece of cotton fabric (from an old shirt) glued in place with PVA adhesive. The tuning mechanism was cleaned, lubricated and restrung and the valve holders and wave change switch contacts were given a dose of switch cleaner.

The majority of the paper capacitors are housed in a wax and pitch filled tin plate box manufactured by Dubilier. The ten connections can be seen on the picture showing the underside of the chassis. The inter valve transformer together with two associated capacitors are housed in a heavy pitch filled cylindrical screening can. With some difficulty, each was gently heated with a hot air gun and the contents extricated. The transformer was OK but all the capacitors were discarded and replaced. As can be imagined getting the capacitor assembly out and back in place was not the easiest of tasks but went well without mishap. The transformer had me beaten for quite a while - I had muddled up the connections and one wire was making contact with the the screening can.

Chassis after repair

Interior labels



Interior labels

Fortunately the wire on the top of the HF valve was long enough to solder an extension and re-attach the terminal which I super-glued in place. When everything was back together with a replacement full wave rectifier in place and when attached to a fairly substantial aerial the set then worked well, though some care was needed to tune weaker stations juggling between the volume/reaction and the tuning controls as necessary.

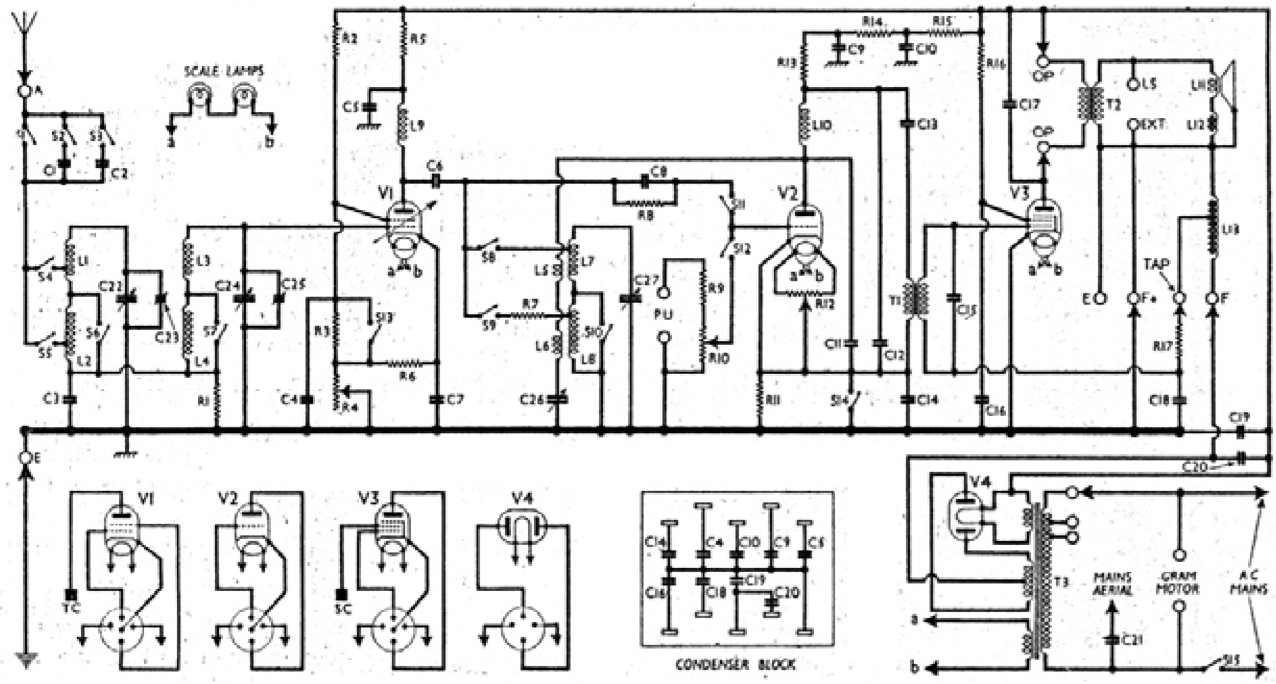
The varnish on the veneered wooden case was in poor condition so I decided to strip it completely and apply a coat of stain (American Walnut) and finish with a couple of coats of Danish Oil. Before embarking on this process I photographed the Marconi trade mark on the top which had seen better days and spent quite a while repairing and sizing the image before printing several copies onto light weight paper which was then coated with a single coat of clear cellulose nail varnish. When dry they were trimmed with a craft knife and the best looking one was glued in place once the stain had dried and before the Danish Oil treatment. The discoloured celluloid dial

Finished appearance front and back

Loudspeaker as received

Marconi label

Radio as received



Circuit diagram of the Marconiphone 253AC receiver. Inset beneath the circuit is a diagram of the condenser block, viewed in the position shown in the under-chassis view.

Schematic from Trader sheet 573

Stripped ready for staining and finishing

New support for loudspeaker cone

window was discarded and replaced with a piece of glass and a piece of speaker grille cloth was glued in place. The rear panel originally framed a torn and fragile cloth which was discarded and replaced with a piece of wire mesh stapled in place. Finally four new felt feet were fixed to the base.

Original Specification

VOLTAGE RANGE 200 to 250 volts AC 50 to 60 Hz. This instrument is designed to work only on the voltages for which it is adjusted. Should any variation be experienced the supply company should be notified immediately.

IMPORTANT-This instrument must not be connected to a supply point which is "fused" for more than 5 amperes (working current).

CURRENT CONSUMPTION 65 watts (approximately).

SPEECH OUTPUT 1.25 watts (approximately). 8 watts anode dissipation.

WAVELENGTH RANGE 200 to 550 metres (approximately) and 1000 to 2150 metres (approximately).

Circuit description

The Aerial is connected via S1 directly, or via C1 or C2, and tappings on coils to a band-pass filter. The primary coils L1 and L2 are tuned by C22 and the secondaries L3 and L4 by C24 and coupled via C3.

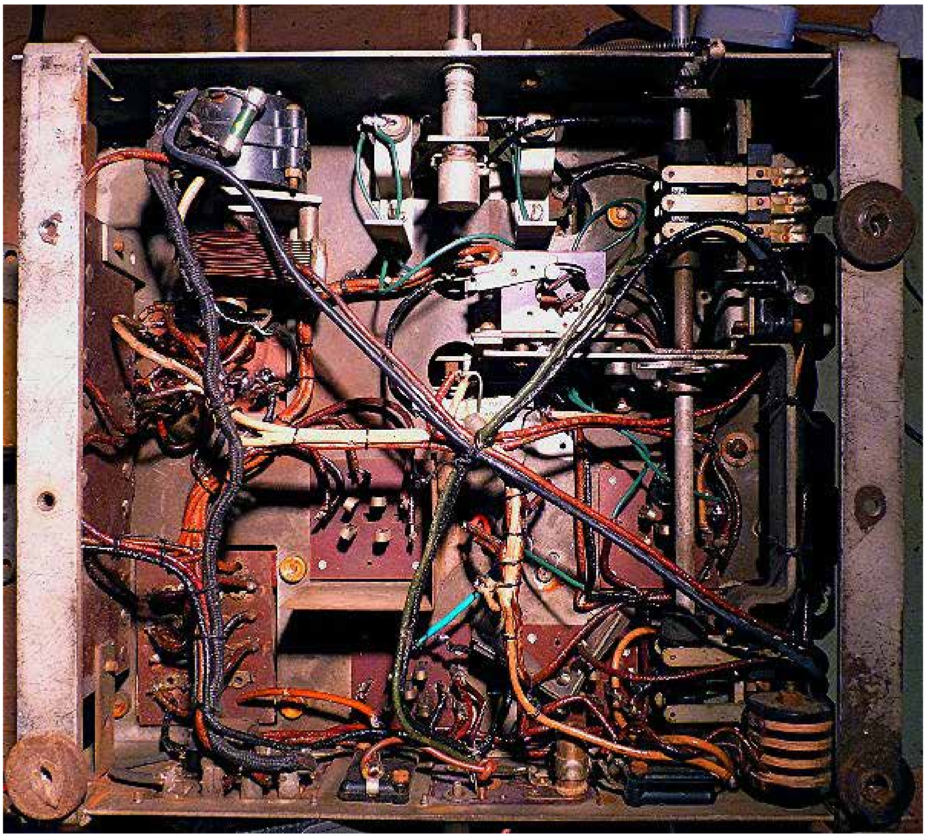
The gain of the High Frequency Amplifier tetrode V1 is controlled by the variable resistance R4 and grid bias by R6.

Intervalve transformer and capacitors

The coupling between V1 and Detector triode V2 is via L9 and C6 with C8 and R8 providing bias. The control grid circuit is tuned by L7, L8 and C27.

Reaction is applied from anode via coils L5 and L6 and controlled by variable capacitor C26, which is ganged with R4.

Connections for a gramophone pick-up are included in the grid circuit via switch S12. The input is developed across R9 and the volume control R10, which is also ganged with R4 and C26. The total output is limited by the drop across R9. When the control is turned to "Gram," S13 closes and S11 opens, to disconnect the early radio stages, while S14 opens to permit the application of bias to V2. Coupling between V2 and the Output pentode V3 is via R13, C13 and T1. Tone correction is provided by C15 across T1 secondary and C17 across the primary of T2. Terminals for a low impedance external speaker are provided on the secondary of T2.



Underside of cf chassis (the capacitor block connections are at the bottom left)

HT current is supplied by full-wave Rectifier V4. Smoothing of the HT is by the speaker field L13, in the negative HT lead together with C19 and C20. Bias for V3 is obtained from a tapping on L13. Mains aerial coupling via C21 is by a plug on a flying lead. There are terminals for a gramophone motor on the mains transformer T3 when this chassis was used in the radiogram models.

Letters

Email your letters to bulletin_editor@bvws.org.uk

Dear Editor

I am writing as I could not disagree more, nor more strongly than I do, with Steve (letters Autumn Bulletin). I must say that I have the utmost respect for such a long serving member of the society and nothing I write nor the way I do must be interpreted as a lack of the same.

To preface my dissection of Steve's letter, I am a relative newcomer to the Society. My body is a few weeks shy of its 60th birthday, but I am still 21 on the inside.

First, times change etc., agreed! However, the bits of kit we try to preserve do not!

Second, I feel **very** strongly that the word "Wireless" should be kept. Nobody will ever use nor should need to use that word in a search to find us. When people search, they use general terms like "I want to fix old radios" or "I want to refurbish old radios". The more general the term the better. However, I am VERY concerned that using those terms and even adding "wireless" to them does not find the society's web site. The same sites appear in each search that I tried. All that means is that our site needs something called Search Engine Optimisation (SEO). SEO is a way of placing information in a site so that a site can not only be found easily, but that it appears high up the results. Most people do not go past the first page of results.

The issue with people not joining is, I feel, down to "progress". Having mass-produced and dirt cheap integrated circuits and transistors, for example, simply takes the magic and curiosity out of the subject. There is nothing much to see when power is applied. It also sets the bar higher to entry. I recently read about a teenager in the US who was making solid-state devices in his garage. The photos showed how much equipment he needed. A lot less equipment is needed to get started with old radios and televisions. having said that, I do not believe that it is impossible to get fresh blood, it is just that a name change is pointless and even detrimental.

Cheers,

Guy Simmons

Dear Editor,

Through the pages of the Bulletin, I'd like to express my thanks to all those volunteers who made my visit to the Burntisland Museum of Communication (Fife, Scotland) such a great experience. The museum is definitely worth seeing if you're in the area. It is just north of Edinburgh across the spectacular three Forth Bridges .

This museum is packed full of military, domestic and amateur equipment. I'd especially like to thank Marion for co-ordinating my visit and Jim and Ken for the time they spent with me.

Museum website: http://mocft.co.uk/

Regards,

Ian Liston-Smith

BVWS Spares Dept

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32μF, 47μF, 100μF, 500Volt DC working £5.00 each

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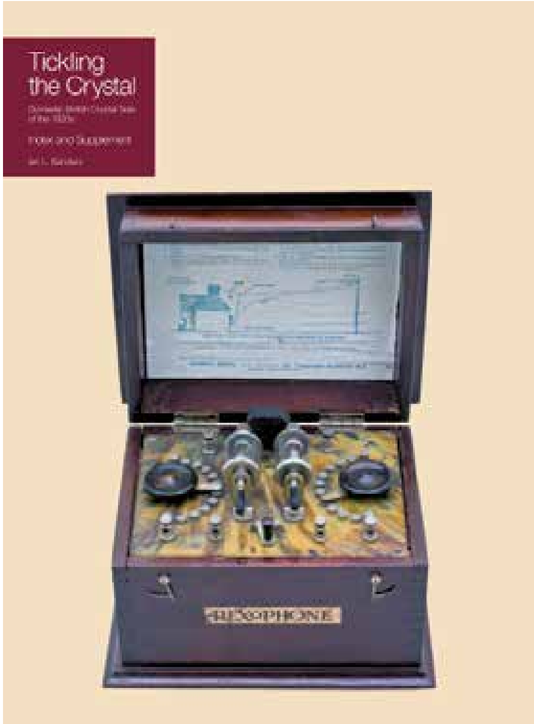
All prices quoted are for BVWS members

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



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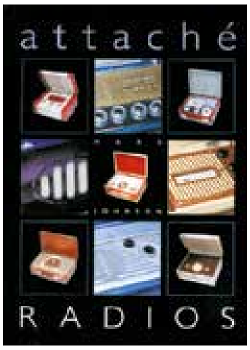

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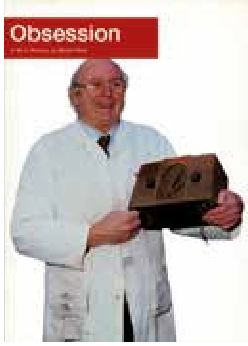

Obsession
by Gerry Wells
Growing up in the 1930s, young Gerry Wells preferred wireless to toys. He had a postwar career as a radio and TV engineer designing and managing amplifiers, PA's and TVs. He founded the British Vintage Wireless and Television Museum from the home where he was born. This is the story of one man's dedication to wireless
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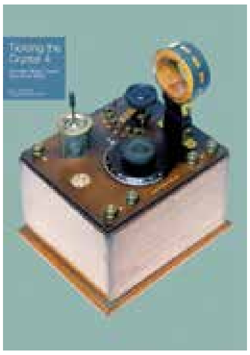

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The Bulletin back issues

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

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

1st December BVWATM Afternoon of Music and Museum Sale
9th December Royal Wootton Bassett

2019 Meetings

3rd February Special Auction at Royal Wootton Bassett
17th February Audiojumble
2nd March BVWATM Music Afternoon
3rd March Harpenden Auction and AGM
7th April Golborne
28th April BVWATM Table Top Sale
12th May National Vintage Communications Fair
2nd June BVWATM Table Top Sale, Vinyl & Shellac Music Extravaganza
7th July Royal Wootton Bassett
4th August Punnetts Town
24th August BVWATM Music Afternoon
7th September BVWATM TV Open Day Event
15th September Murphy Day
22nd September Harpenden
6th October Audiojumble
3rd November Golborne
7th December BVWATM Music Afternoon
8th December Royal Wootton Bassett

3rd February 2019
Special Auction Only Royal Wootton Bassett

Royal Wootton Bassett: The Memorial Hall, Station Rd,
Wootton Bassett, Swindon (J16/M4) SN4 8EN.
Doors open 09:00 - 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 07454 710777
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

3rd March 2019
Harpenden Auction, Swapmeet & AGM

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

NVCF

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