The Bulletin

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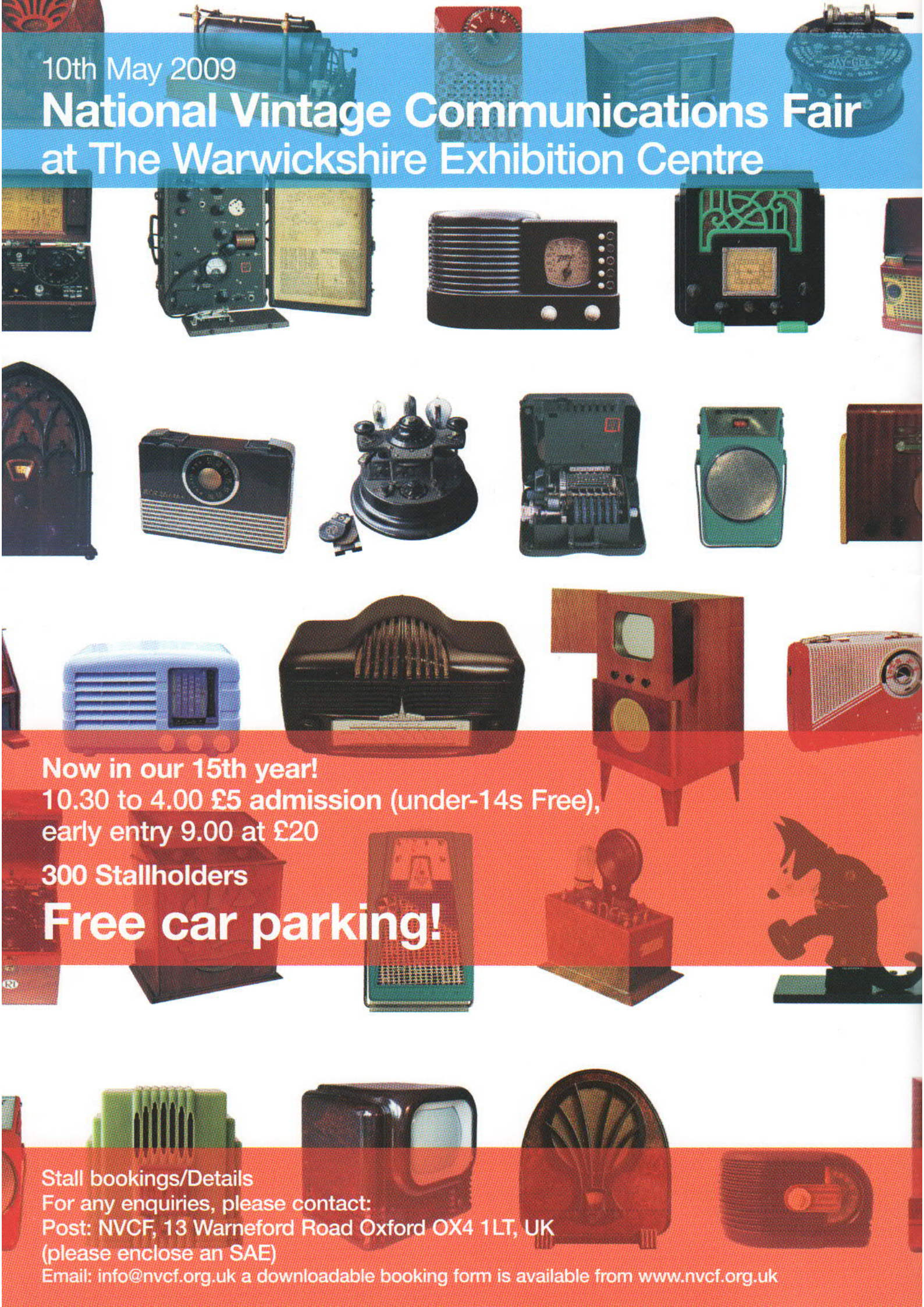
National Vintage Communications Fair at The Warwickshire Exhibition Centre



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Incorporating 405 Alive
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From the Chair

I have noticed recently quite a lot of debate both here in the Bulletin letters pages and also the UK Vintage Radio forum on the subject of whether one should preserve or restore vintage equipment and the general merits of both. I see this as a matter of personal taste. Although a great deal of my own collection is still completely untouched and as found, this is not due to the desire to leave it that way, but simply down to the fact I have not had the time to do otherwise. For me, the enjoyment in collecting is both being able to admire the items for their design and quality of manufacture, and also for their performance and to satisfy this requirement they must be fully working. How else would we be able to have displays of working 405 Line TV's and radios at meetings to enjoy? So how far do you go with a restoration? This surely depends on personal taste and the state of the item when found.

Over the last few years there have been articles on some very extensive restorations where items in near 'Basket case' condition have been lovingly brought back to life for future years of enjoyment. I applaud those who dedicate so much time and effort ensuring a once unattractive silent item can be enjoyed both by themselves and future generations. The Society aims include Preservation and Restoration and unless we encourage members to do such work and to write about it, often spending great amounts of time doing so, and giving away very useful hints and tips and displaying their work the general interest will dwindle.

It is fair to say that with all types of collecting we are only custodians of the items to ensure they survive in to the future, and without restored and working examples to help create new interest in those people who have never seen or heard vintage equipment, more and more of it will find its way to the tip rather than being saved.

I urge you all to take up your soldering iron, get out your Avo, and bring a piece of radio, TV or audio equipment back to life, display it prominently in your home and use it!

Mike

Right and below: some of the lots and the scene in Bonhams auction rooms, Knightsbridge at the Jeff Salmon radio collection sale.

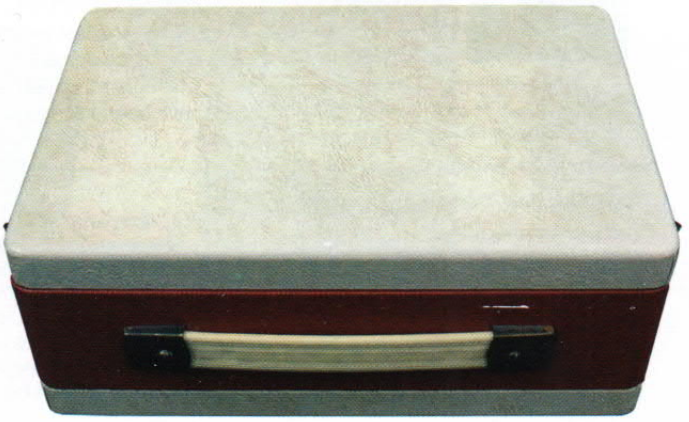
A Philco type 444 'The People's Set' sold for £144 and an Ekco type AD76 (Belgian version), sold for £1,260 inclusive of Buyer's Premium, a Fada type 1000 'Bullet' of 1945 sold for £2,640, all prices inclusive of Buyer's Premium. Prices overall were very reasonable for a collection of this type.

Another look at a Vidor 'My Lady Anne' CN430 portable from 1955 (and a little on the GEC BC4941, 1948)

by Gary Tempest

This radio has been with me for some while and I wrote a short piece on it back in Bulletin Summer 1999. This detailed a repair made to the combined On/Off and wave-change knob.

At the time the usual suspect capacitors were replaced but not much more than that was done. It came into the workshop again recently as the performance seemed below par and I wanted to make a 'battery box' for it, the box to hold 10 PP3's, for 90V HT and 5 AA's for the 7.5V needed for the valve filaments. With mains pollution becoming ever greater it's useful to have sets that can also play on batteries. Besides, it's sometimes nice to be free of the mains cable and for garden events it's another way to bring old valve radios to the fore.



Other radios in the "Lady" series

There are three others that are battery only radios: Lady Margaret 1954, Lady Catherine 1956 and the Lady Elizabeth 1958, this having a ferrite rod aerial and using printed circuit board construction.

A look back at 'All Dry' battery / mains valve receivers

The early battery portable radio sets of the mid-20's on used a 'wet battery' (an accumulator) for LT and a dry battery for HT. But in 1939 portable set design moved on with the introduction of a new series of valves. These were octal, and, briefly side contact based types, having directly heated filaments, rated at 1.4V and 50 mA, excepting the output valve which had a centre-tapped heater rated at 1.4V for each half. It could be used with the two halves in series or parallel for parallel operation with the other 1.4V types. Used in series it made possible the first 'universal' receivers that would work on either dry batteries or AC/DC mains.

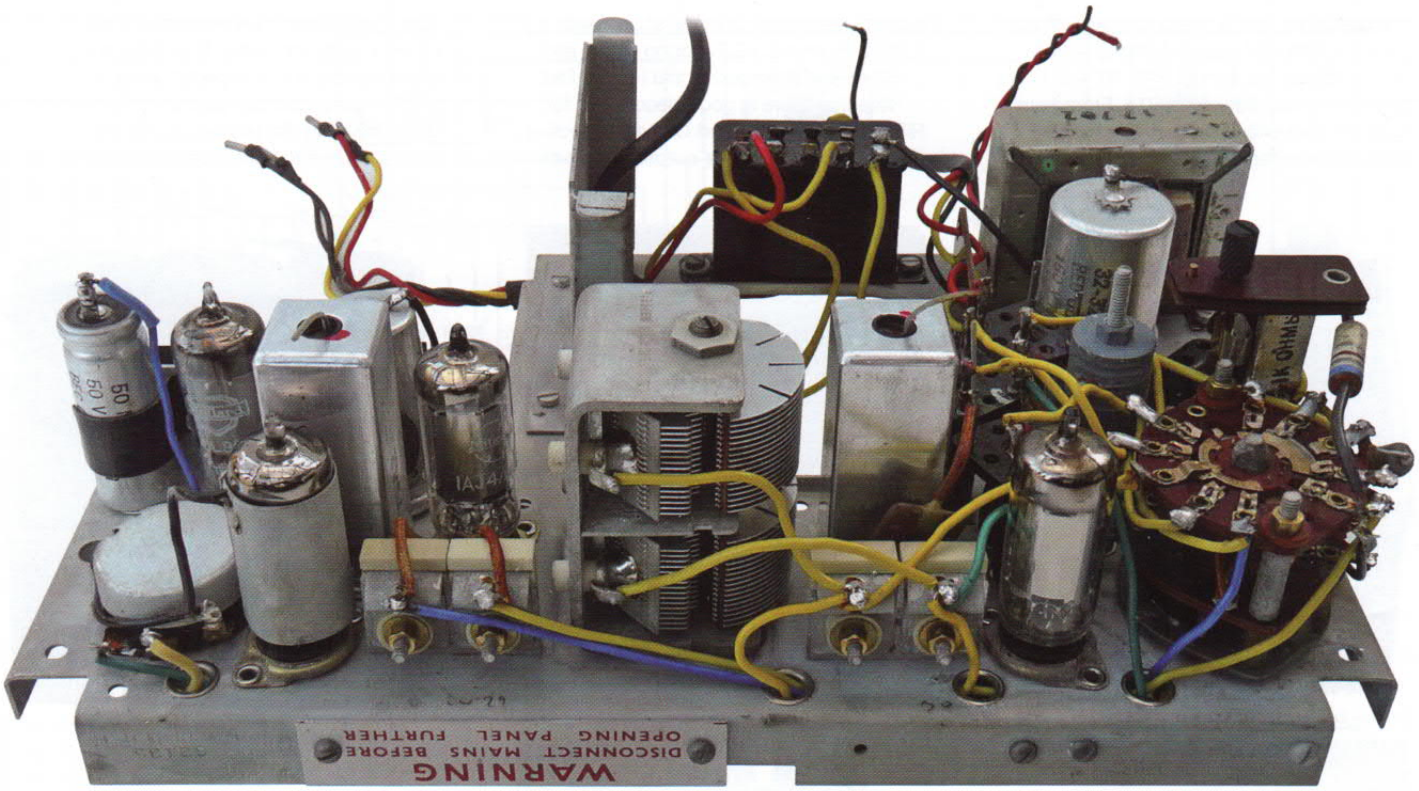
Looking through the Trader Sheets shows an example of this in the Double Decca from 1940 (TS 473). For battery operation the heaters are switched in parallel but for AC/DC mains operation the heaters are switched in series and fed via a dropper from the HT supply. The HT is derived from a UY31 rectifier, having a 50V at 100 mA heater, supplied from the mains via its own power hungry dropping resistor.

Post War in 1946, Decca really did the double and resurrected the set (TS 788). It still used octal valves but had the heaters permanently wired in series. They were switched either to a dry battery or again fed with a resistor from the HT supply for mains use. The HT supply now used a metal rectifier (from the TS picture this is certainly a copper oxide type, each disc having a reverse breakdown voltage of only a few volts). It made for a much simpler design doing away with complicated switching, the valve rectifier and its dropper resistor.

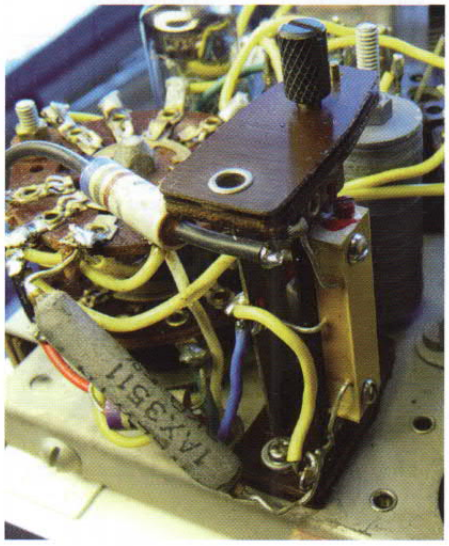
By the late 1940's, valves developed in the USA became available with the same heater requirements as their pre-war counterparts but in B7G form. Of the Trader Sheets looked at, all the radio manufacturers that used them had gone over to metal rectifiers at the same time. Trader Sheets call all types of these devices "metal" but again from the pictures, they all look like selenium rectifiers (these can be smaller with fewer sections because each has a reverse breakdown voltage of around 20V).

Of these, they were either Battery / AC/ DC mains or Battery / AC mains only, the latter having a transformer with the advantage of a fully isolated chassis.

Included in the Battery / AC/ DC mains were: Philco B2602 (1950), Philips 401UB (1950), Ultra Twin (1950), Pilot Dandy (1951), GEC BC4444 (1952), Philips 523UB (1953), Vidor Gala (1952), Ultra R786 (1953), Vidor CN431 (1955).



Vidor chassis



Vidor heater 'pot' replacement

In the Battery / AC mains only were: Vidor 396 (1949), Ekco Stroller (1949), Ekco MBP149 (1951), Ferranti 915 (1951), Vidor Henley (1953). Note: the Vidor 396 uses a valve rectifier.

All of these radios used the valves with the heaters in series, fed via a dropper resistor from the HT line for mains use.

One radio found was the Roberts RMB (1951) that wired the heaters in parallel. For mains operation it used a separate transformer winding and a metal full wave bridge rectifier.

And so to 1954, when the valve makers introduced new types of B7G valves with filaments that only needed 25 mA of current. The output valve still needed a more powerful heater though and continued with two 1.4V sections that could be connected in series or parallel. This brings things neatly to the My Lady Anne.

Sources: *Valve Radio & Audio Repair Handbook* by Chas E. Miller. Internet Wikipedia.

The My Lady Anne circuit diagram (Trader Sheet 1215)

The circuit by 1955 had settled down into a conventional four-valve plus 'metal' rectifier line up.

Small frame aerials for LW and MW, with a loading coil for this, feed to a heptode frequency changer.

The output couples to an IF stage having, according to the Trader Sheet, a neutralising capacitor C12 (3.3 pF) for V2 anode to grid inter-electrode capacitance. Not seeing how this worked, in the accepted sense of feeding back an anti-phase signal, with the bottom end going to ground via C23 (0.01), I asked member Peter Lankshear. This is what he said: *Confusing isn't it? A very small amount of neutralisation is required. C12 is very small, but its output is nevertheless divided by the bypass cap C23. There is then a minute but sufficient amount of the anode signal fed into the bottom of L9 which is resonant at the I.F. frequency. Because L9 is resonant, the neutralising component undergoes a 180 degree phase change at the grid end which is correct for neutralising.*

The amount of feedback must be very tiny but then again so is the anode to grid capacitance whose effect it's cancelling. According to my Wireless World data book this is 0.3 pF.

The signals move on to a conventional diode detector and audio pre-amplifier with a strangely small coupling capacitor C17 at 100 pF. More on this later.

Not a lot to say about the audio amplifier except C19 which is connected by a switch when the lid is closed. If the set is still switched on then positive feedback, from V4 anode to V3 screen grid, makes the radio produce a 'rude' noise in the loudspeaker.

Valve heaters

The heaters are connected in series with a feed from the HT supply (R20, R21, and R22) for mains use. But HT current needs to be taken into account and so bypass resistors are used to balance up the individual valve heater voltages. Although the anode and screen currents are low (the output DL96 being the greatest at 5 mA) they would still cumulatively add current to the lower valves in the chain; possibly shortening their life. The resistor R18 across half of V4 filament interested me, balancing up the effect of the valve's own HT current. It would have been nice to disconnect R18 but this was physically not easy to do. What was easy was to disconnect the HT battery, which would indicate what R18 was correcting when HT was present. With HT current, the voltages across the filament halves were within 2% but without it they were unbalanced by 15%.

Valve bias and AGC

The output valve V4 will have about 5.6V of bias (average to the centre tap) because of its position in the heater chain. However, for mains use this is increased by about 1.9V due to the drop across R17. For use with batteries this would be unacceptable, requiring more voltage from the LT battery, and so R17 is shorted out. To compensate for this V4 grid is made more negative due to HT current through R19.

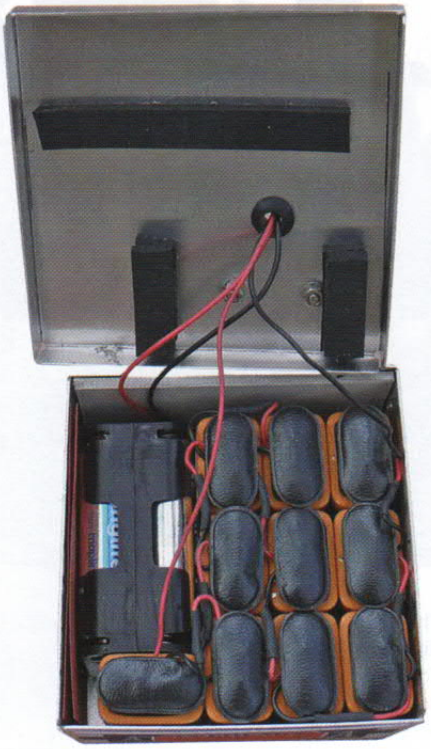
What of the bias arrangements of the other valves? V1 oscillator grid leak is returned to one side of the filament so will have minimal bias. Its signal grid along with V2 grid (both requiring little grid bias according to the data sheet) are returned to the AGC line. With no signal this actually needs to be positive to compensate for the valves' positions in the heater chain. Without R15, for no signal, the AGC line would be about 0V but with it becomes + 2.5V. The

calculation for this is pretty simple: just add up V3, V1 and V2 heater voltages (4.2V) and divide by the sum of R15, R7 and R8 to give the current flowing in R15. From here subtract the voltage across it, from the 4.2V, to give the voltage on the AGC line. For the record I measured, using a 'scope' with a 10M Ohm probe, +2.5V for no signal and –0.5V for the strongest signal I could find.

Note that there is good decoupling for RF signals with C24 and C25 and effective audio decoupling of the output valve with C26. This wouldn't be necessary if the heaters were connected in parallel and supplied from a low impedance source.

V3 is conventionally placed in the filament chain, being at the bottom, as it's the most sensitive to hum pickup. Again it's

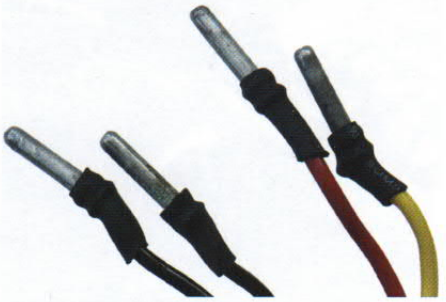
Battery box outside

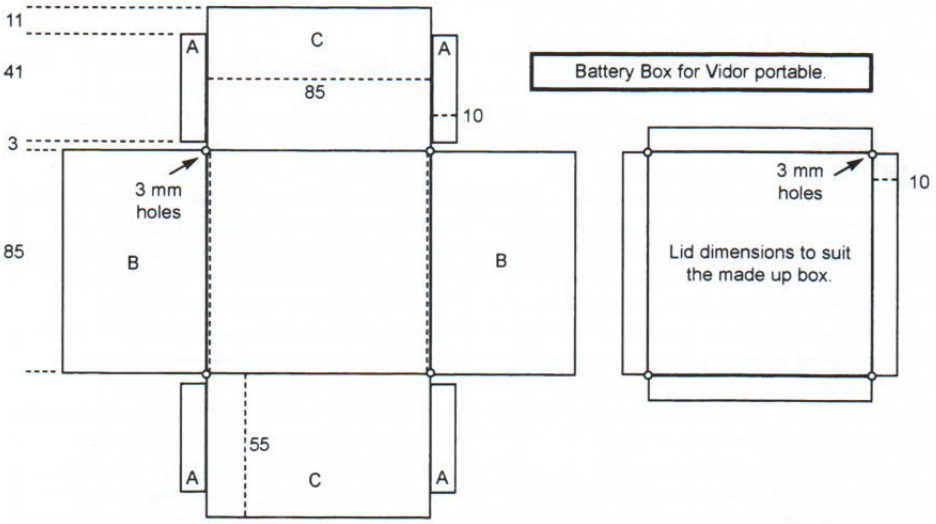

Batteries in the box

Combined HT and LT batteries

Battery box in the radio

LT battery with 'dummy

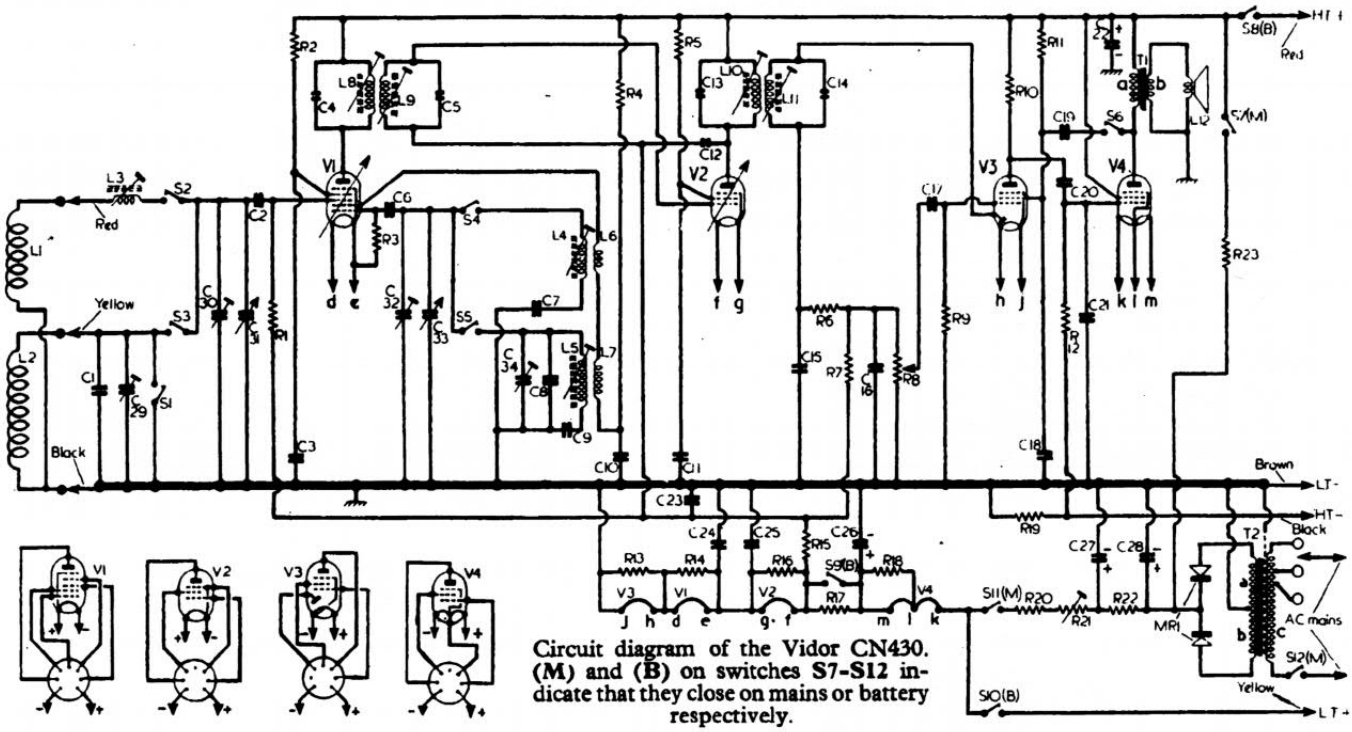

Vidor power connections



Notes for Box: (all dimensions in mm)
Mark out and drill 3mm holes. Cut out and bend up tabs A.
Bend up sides B 1/2 mm inside the line (Allows the tabs A to overlap sides B). Bend up sides C.
Drill through tabs A and sides B and fit eyelets

Fixing bracket top

Fixing bracket underside



Circuit diagram of the Vidor CN430. (M) and (B) on switches S7-S12 indicate that they close on mains or battery respectively.

RESISTORS		Values	Locations
R1	V1 C.G.	470kΩ	E3
R2	V1 S.G. feed ...	120kΩ	F3
R3	V1 osc. C.G. ...	27kΩ	F3
R4	Osc. anode feed ...	33kΩ	F3
R5	V2 S.G. feed ...	39kΩ	E3
R6	I.F. stopper ...	47kΩ	D3
R7	A.G.C. decoupling	2·2MΩ	D3
R8	Volume control ...	500kΩ	C1
R9	V3 C.G.	10MΩ	D3
R10	V3 anode load ...	1MΩ	D3
R11	V3 S.G. feed ...	2·7MΩ	D3
R12	V4 C.G.	1·8MΩ	D3
R13	Filament H.T. by-passes	150Ω	F3
R14		180Ω	F3
R15	A.G.C. delay ...	1·8MΩ	E3
R16	Filament H.T. by-pass	270Ω	D3
R17	V4 extra G.B. ...	75Ω	A1
R18	Filament H.T. by-pass	620Ω	D3
R19	V4 G.B.	120Ω	E3
R20	Filament ballast ...	680Ω	A1
R21	Filament adj. ...	1kΩ	A1
R22	Filament smoothing	3kΩ	A1
R23	H.T. smoothing ...	2·2kΩ	A1

CAPACITORS		Values	Locations
C1	L.W. aerial trim ...	100pF	B1
C2	V1 C.G.	100pF	E3
C3	V1 S.G. decoupling	0·01μF	F3
C4	1st I.F.T. tuning ...	65pF	B1
C5		65pF	B1
C6	V1 osc. C.G. ...	100pF	E3
C7	M.W. osc. tracker...	567pF	B1
C8	L.W. osc. trim. ...	160pF	C1
C9	L.W. osc. tracker...	280pF	B1
C10	Osc. anode decoup.	0·01μF	F3
C11	V2 S.G. decoupling	0·01μF	E3
C12	V2 neutralizing ...	3·3pF	D3
C13	2nd I.F.T. tuning	65pF	C1
C14		65pF	C1
C15	I.F. by-pass ...	100pF	D3
C16		100pF	D3
C17	A.F. coupling ...	100pF	D3
C18	V3 S.G. decoupling	0·01μF	D3
C19	Alarm osc. coupling	0·005μF	D3
C20	A.F. coupling ...	470pF	D3
C21	I.F. by-pass ...	100pF	D3
C22*	H.T. reservoir ...	32μF	A2
C23	A.G.C. decoupling	0·01μF	E3
C24	Filament by-passes	0·1μF	F3
C25		0·1μF	C1
C26*	Filament smoothing	100μF	C1
C27*		50μF	C1
C28*	H.T. smoothing ...	32μF	A2
C29‡	L.W. aerial trim. ...	40pF	B1
C30‡	M.W. aerial trim.	40pF	B1
C31†	Aerial tuning ...	523pF	B1
C32‡	M.W. osc. trim. ...	40pF	B1
C33†	Oscillator tuning...	523pF	B1
C34‡	L.W. osc. trim. ...	40pF	C1

*Electrolytic. †Variable. ‡Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	M.W. frame aerial	1·7	—
L2	L.W. frame aerial...	14·0	—
L3	M.W. loading coil	1·8	A1
L4	Oscillator tuning coils	2·3	A1
L5		5·1	A1
L6	Oscillator reaction coils	1·5	A1
L7		2·3	A1
L8	1st I.F.T. Pri. ...	13·5	B1
L9	Sec. ...	13·5	B1
L10	2nd I.F.T. Pri.	13·5	C1
L11	Sec. ...	13·5	C1
L12	Speech coil ...	2·5	—
T1	O.P. trans. a ...	570·0*	B2
	c ...	0·33	
T2	Mains trans. a ...	235·0	A2
	b ...	250·0	
	c, total	434·0	
MR1	Metal rectifier ...	—	A1
S1-S5	Waveband switches	—	A1
S6	Alarm switch ...	—	—
S7-S12	Mains/battery sw.	—	A1

Valve	Anode		Screen	
	V	mA	V	mA
V1 DK96	90	0·7	71	0·2
	Oscillator			
	35	1·6		
V2 DF96	90	1·7	68	0·6
V3 DAF96	*	0·06	*	0·02
V4 DL96	88·5	4·0	90	0·8

Extracted from Trader Sheet 1215 Vidor CN430

another valve that needs only a volt or so of negative grid bias. Some will come from the heater with the valve's grid resistor returned to ground. However, Peter tells me there maybe a small additional bias from having such a high value resistor (10M Ohm). To quote him again:

The DAF96 bias method is a standard one for hi mu triodes. It relies on contact potential to generate about 0.75 volt across a 5-10meg resistor. Fritz Langford-Smith produced a paper on the subject many years ago and showed that for low to moderate signal levels it actually produces less distortion than fixed or cathode bias.

I think that the term "contact potential" is a bit confusing. The bias method was used for indirectly heated valves as well as directly heated. As I understand it, the bias builds up as a result of some passing electrons settling on the grid and not all being unable to leak off because of the very high grid leak resistance. It is always greater than 5.0meg - generally 10meg. (This is of course what happens when an open circuited grid 'blocks').

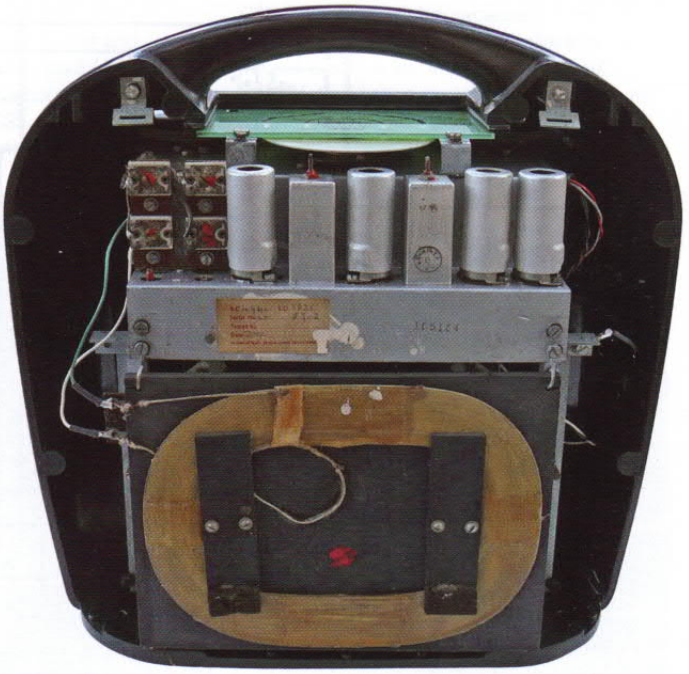
The effect is greatest with high mu valves. I did some tests and with a 10meg leak, a 12AX7 developed about 0.75 volts, a 12AT7 about 0.5 volts and a low mu 12AU7 very little bias at all.

Back to me again: I could only measure (10M Ohm 'scope') about –10 to 15 mV for the DAF96 so this type of bias doesn't add much here. This valve runs at starvation voltages and currents and the Trader Sheet doesn't give anode and screen voltages. However, using the 'scope' again the anode and screen voltages were 13V and 25V (HT 90V). Ohm's law gives an anode current of 77 micro Amps and a screen current of 24 micro Amps, agreeing reasonably with the given current figures.

Work done

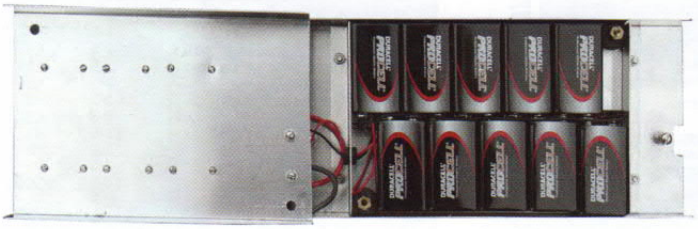
These are not the easiest of radios to work on. Firstly the frame aerial panel needs removing from the lid, to unsolder its connections. This is secured with a couple of spacers screwed into the lid sides. But the panel has to be prised from grooves in the top and bottom of the lid

GEC BC4941

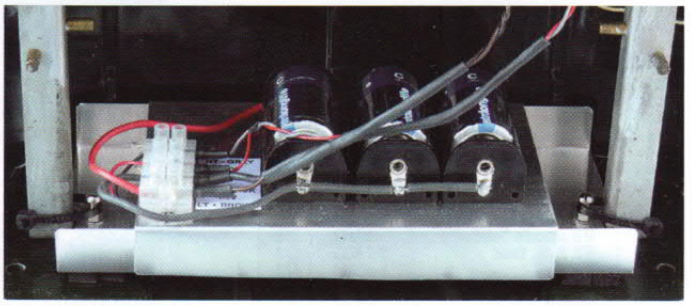


GEC inside

Battery pack



HT battery inside



Battery pack fitted

without damaging it. Now the metal front panel, that mounts the shallow chassis and loudspeaker, can be taken out. After removing the fragile knobs and unsoldering the speaker connections the chassis can be parted from the front plate. My aim was not to go through this more than once.

First thing was to replace the rest of the old wax paper capacitors and do a check on all resistor values. Some of the high values had gone too high and surprisingly some low ones as well. The low ones were the heater bypass resistors that Vidor had seen fit to make 2% tolerance. They ranged from +12% to +16%. (Note: the Trader sheet gives different values to the ones fitted: I stuck with these reckoning them to be a change during production).

Once replaced, a check confirmed the heater voltages with the current set, by potentiometer R21, to the recommended 23.7mA. They were 1.37, 1.38, 1.38 and 2.86 for both halves of V4.

On the previous occasion, when the radio had just been made to play, the open circuit, wire wound potentiometer, R21 was replaced. All the wire was removed and a small multi-turn Cermet 'pot' screwed to the now bare Paxolin panel (see picture).

Once an alignment had been carried out the radio worked well excepting two problems.

1. LW Radio 4 interference

This was a strange one, as it only affected Radio 4 and did not affect other sets on an external 'long wire' aerial (or this one if the long wire temporarily replaced the frame aerial). Stations either side did not have the strong cross-modulation tone sufficient to make the desired programme unintelligible. After quite a search, it turned out to be caused by the Virgin Media Broadband modem hidden away, and forgotten about, behind the computer.

2. Residual volume

With the volume control at minimum, the sound from the speaker was still too loud. I soon established that this could be cured by increasing the value of C17 from its low value of 100 pF. What was needed was to provide a larger audio shunt to V3 grid. It would seem that the valve was creating its own input.

I asked Peter about it: *The grid, which is coupled to the diode by the internal valve capacitance, acts as a diode, much as in the manner of a grid leak detector. The larger coupling capacitor (C17) would bypass more RF to the bottom end of the volume control. This could be proved by disconnecting the capacitor.*

Why didn't I think of that? Sure enough strong stations produced considerable volume.

I had a look at the circuits of the other Lady radios and this capacitor had a value of 1000 pF, so it seems an error was made with this one in the series.

The Battery Box

Batteries HT

Low cost PP3's are available from several sources and connectors to link them together from Maplin Electronics. A dab of Superglue sticks the batteries together making connecting easier. It has a downside if one battery fails prematurely, which happened to me with some batteries from another source

It may be possible to find zinc carbon batteries (which also includes zinc chloride in Farnell listings) that are cheaper than alkaline types. But these have less capacity and lower shelf life compared to alkaline types. There is data to be found on Internet web sites but it can be confusing. Manufacturers enthuse about the merits of all constructions but performance depends on many factors including current drain, usage and rest times (duty cycle) and temperature. My conclusion was that for radio use, alkaline batteries could have about a third more capacity and twice the shelf life of zinc chloride and four time the shelf life of zinc

carbon. Shelf life is important if you are only going to play the radios infrequently.

Choosing "Standard" or "Economy" alkaline then the lowest cost, at the time of writing, came from Farnell. These were the Duracell Procell, 20 batteries for £17.15 + VAT. These did have a data sheet and are ideal as they supply low currents for a long time. Typically they reach 5V in 90 hours for a 1K Ohm load (at 70 degrees C.), which matches nicely with a typical radio current drain. The batteries I bought are marked "Mar 2012" but experience shows that the shelf life is far longer than this. I have some (not the same make) that are marked "2002" and, for radio current drain, are still working.

Because of cost (greater than 3 times) "Premium" alkaline (Duracell Plus and Ultra) are not worth considering. Anyway, their service life for radio use is similar. Where they are best is for high current applications (E.g: cameras, toys with motors etc).

Batteries LT

Alkaline types are cheap and Maplin do a series connected holder for 6 AA size batteries. It does mean making a 'dummy' to short out the unused position. A piece of dowel was used for this with a wire, let into the side, joining a drawing pin at one end and a brass tack at the other.

From the available data (Duracell – Procell), typically a battery will be down to 1V in 90 hours for a 43 Ohm load (34 mA). This service life, used in the radio, should exceed that of the PP3's used for the HT battery.

I also had a look at powering radios where the heaters are in parallel. For five (the output valve counts as two) 25 mA types then two parallel C cells maybe a good solution. For five 50 mA types then three parallel C cells would be better. Maplin do a holder for a single cell, with tag output, for easy parallel connection.

From given data (Duracell – Procell) a C cell will typically be down to 1V, for a 125 mA load, in about 60 hours. For a 250 mA load it's likely to be half this. (D cells approximately double these figures).

Apart from service life, the physical properties of the batteries need to be taken into account. Vertical radios may require more heavy batteries, C or D cells, to get the centre of gravity approximately correct. Also, how they fit with the PP3's, used for the HT supply, for the particular radio, makes creating a suitable battery box that much easier.

How long will the batteries last

Looking through the excellent book,'Attaché Case Portables' by Mark Johnson, I was amazed to see 250 hours quoted, by the makers 'Rees-Mace', for the Gnome, on its recommended battery package. (This radio is circa 1947 and must be amongst the very earliest to use B7G 50 mA valves).

How low in voltage could the supplies get before a radio was no longer considered useable? Simple tests showed that about 2/3rds for LT and 50V for HT is about the limit (these voltage were used in assessing the batteries above). So with the suggested batteries then around 90 hours usage should be obtained before needing to consider replacements.

The batteries (zinc-carbon) for the Gnome were an AD4 for HT and two B104 for LT. The book conveniently gives the dimensions for these. They took up about three times the volume, of PP3's and three C cells, for about the same increase in quoted usage time. However, unless you were an avid user then the batteries were likely to expire due to time rather than current drain. It must have made for a very heavy radio too.

Making the Battery Box

This was made from 0.5 mm sheet aluminium which is a delightful material to work with in this thickness. I have included a layout diagram just in case anyone fancies making a box for a similar radio. The dimensions maybe slightly oversize for the particular batteries: they do vary slightly. However, if loose, some thin cardboard can be cut to fill the spaces. Self-adhesive, neoprene sealing tape was used on the lid and around the box in the radio. The connections as shown in the picture were made to a piece of connection block. Purists won't like this but I reasoned the original battery connector would never be used again. Accordingly I cut the pins free from the Paxolin panel with side cutters. A little heat shrink tubing over the ends and they fit nicely into the connection block. The box labels, made on the PC, are of course unnecessary and just me enjoying myself.

The clamp for the box needed to be of thicker material and 1.5 mm sheet was used.

Most tools for simple sheet metal work will be found in the average workshop. A vice is useful (I wouldn't be without one) and a couple of 'bending bars'. These, in my case, are just two 18 inch lengths of 1 inch section angle iron.

A few tips, for those that need them:

Marking out is made a lot clearer if you use a fine tip CD marker pen. I use tin snips for 'coarse' cutting out and less distortion happens if the lower blade is kept in contact with the metal. Some bending does occur and it's best to start with a cut 1/2" away from the line. After this, make a couple more cuts with the last one homing in to the mark. Doing it this way ensures that most of the distortion is to the waste material. Whenever possible, say for corners, then a Junior Hacksaw makes the cleanest cuts. Drilling a small hole at the crossroads of corners ensures interference free bending. For finishing off and getting really straight edges then clamp the sheet to an old steel rule and 'draw file' to that. Draw filing is where the file is drawn along the edge and not across it.

When bending sheet metal it's necessary to keep in mind where the metal for the bend is coming from, in this thin sheet it matters less. If the metal is clamped on the line then the piece bent over supplies that needed for the bend. Never ever hit the metal directly, always use the hammer against a wooden block. Most bends can be made in the vice or the bending bars but not all. These will be the last ones where the box, for example, is being completed. Here the trick is to cut a piece of right-angled wood (for thin sheet, softwood is adequate) that fits inside. Then clamp it to a flat surface, using a G clamp, and bend up the external pieces using a wooden block.

A Battery Box for a GEC BC4941

This is a slightly strange radio design but I like it a lot. For a portable it's big and heavy being about 13" tall and weighing 12 lbs. on my modern battery pack. It works well though and sounds good from a largish speaker in a very solid cabinet.

I have included some pictures of it as some readers may not have come across the 'trick' of plugging PP3 batteries directly together. If there is room in the radio it saves using the connecting clips. Only one is needed, of the rigid type, which can be cut in half with the ends filled with a little epoxy. The box in this case is two simple trays with bolted on ends for the lower one.

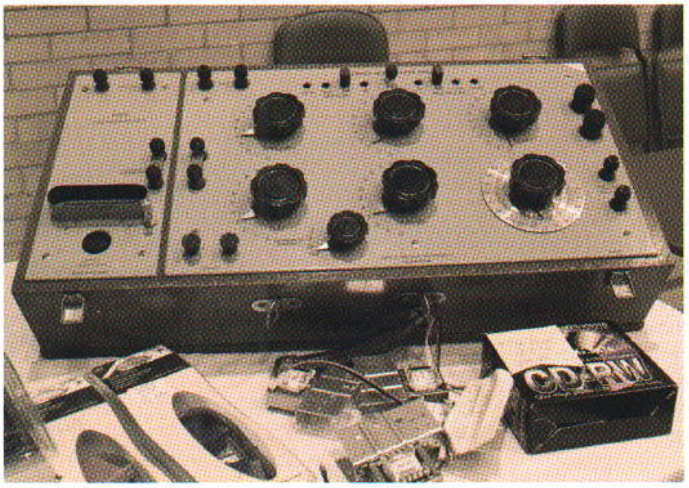
Conclusions

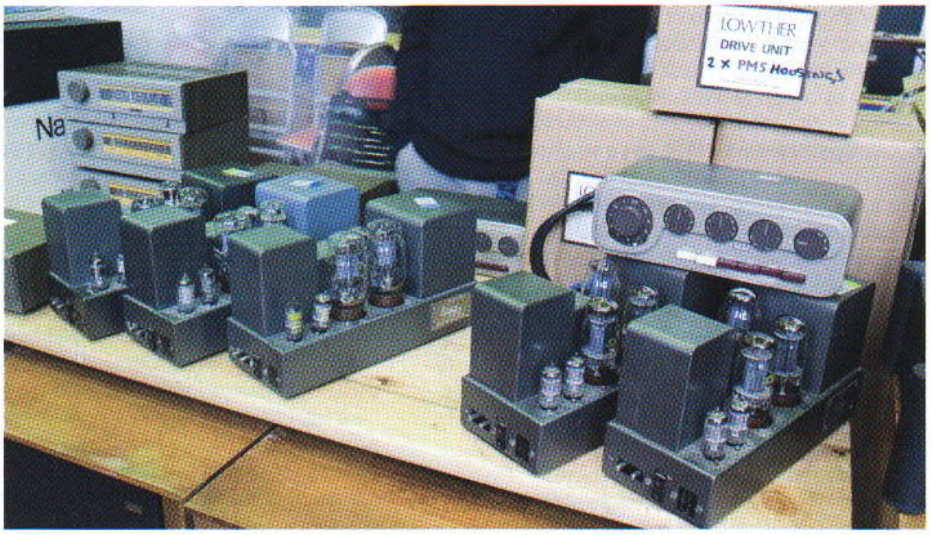
This particular My Lady Anne is a very clean example and to me well worth the time I spent on it.

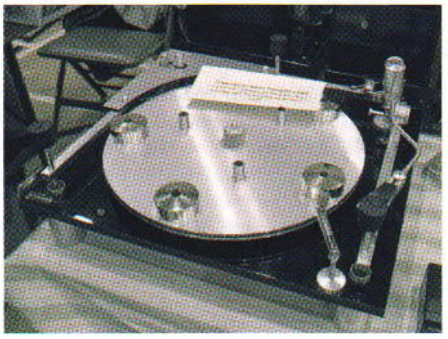
The project was more interesting than I could have imagined, but radios often have things to discover if you look for them. As I have said to friends "... much of the interest you make yourself".

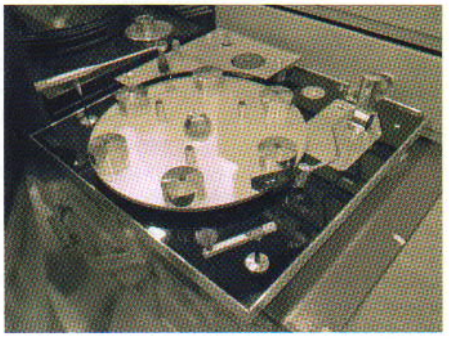
Audiojumble!

Photographs by Carl Glover









Volume
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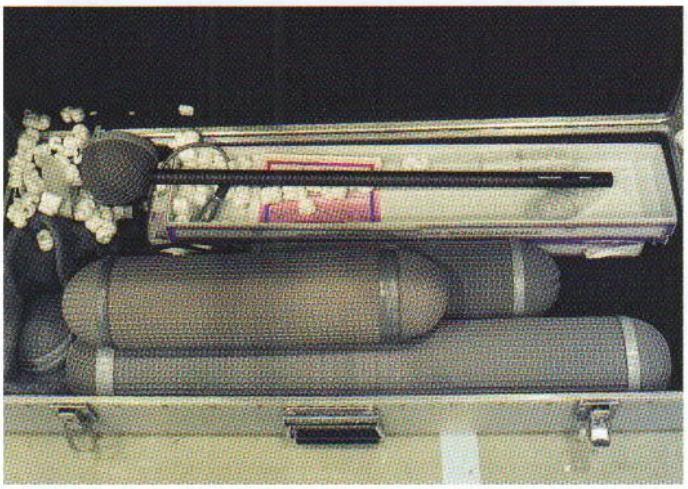
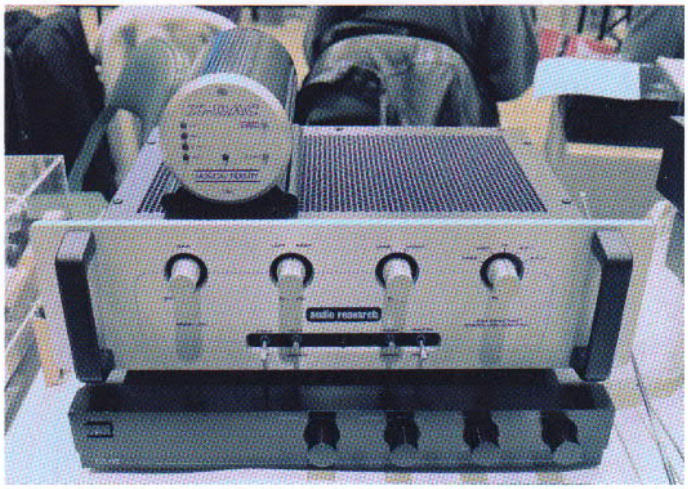
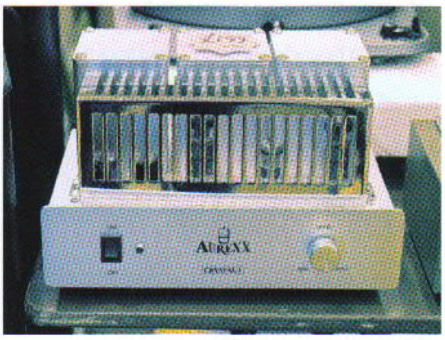



audio research


AUREXX

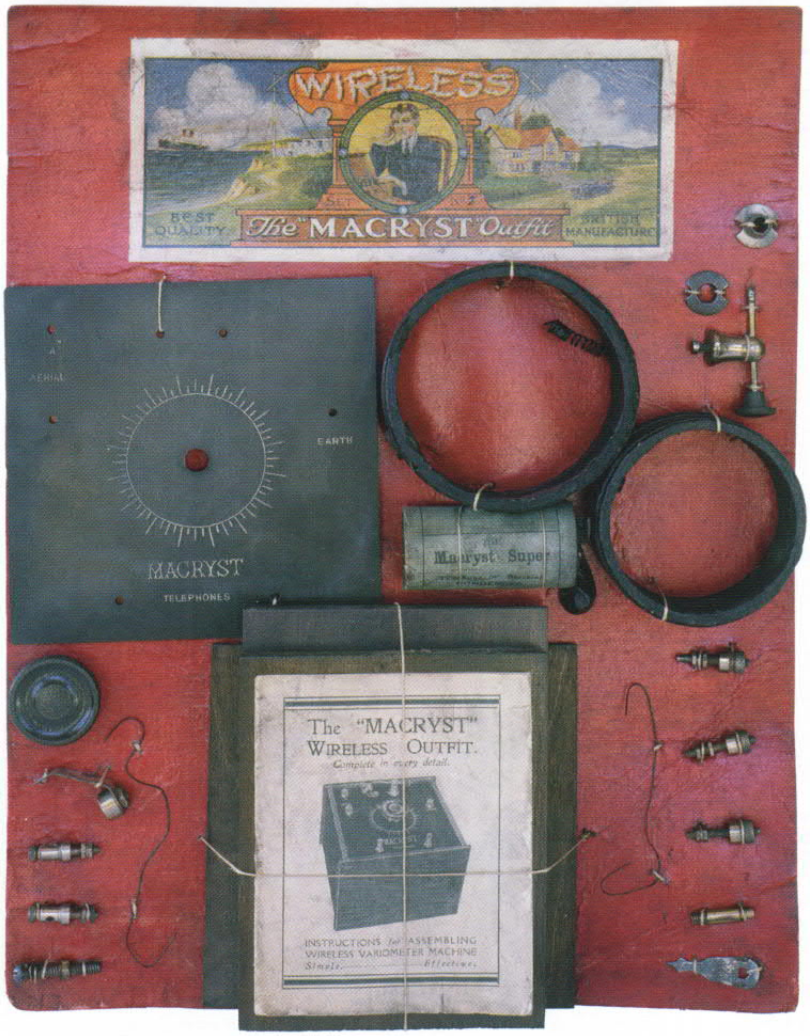
"Macrysts" and "Mostyls" by Ian L. Sanders

The *Macryst* range of crystal receivers distributed by the firm of S.M. McEwan & Son, 280/2, Old Street, London and the *Mostyl* family of crystal sets produced by the gramophone manufacturer, Gramostyles Limited of Birmingham share remarkably similar designs. So much so, that some very close (but so-far unknown) connection must have existed between these two companies – one possibility being that Gramostyles manufactured receivers for distribution by McEwan & Son under the *Macryst* trademark.

The *Mostyl* receiver by Gramostyles Ltd. of Birmingham. The mahogany-cased model at left carries the Post Office registration number 4140, while the number on the right hand set, with a rexine-covered cabinet, rather mysteriously seems to have been deliberately erased. Both of these models had provision for a long-wave loading coil and both carry the BBC approval stamp.
Below: The *Mostyl* trademark, derived from the company name – *Gra**mostyl**es*.

Particularly noteworthy is the unique detector arrangement (patented by Gramostyles) and used exclusively in both marques. Although the retail pricing is not known, the high-end models of both the *Mostyl* and *Macryst* – which most likely date to late 1923 or 1924 – were of above average quality in terms of their highly polished cabinet finish and overall workmanship. Fine nickel-plated fittings were used on all models.

Gramostyles, with premises at 9, Bennett's Hill and 249, 250 Icknield Street, Birmingham was a manufacturer of gramophones during the 1920s. The *Mostyl* appears to be their only foray into the business of wireless receivers – the company's Managing



Above: The *Macryst Wireless Outfit* included all components, engraved panel and simple, open cabinet. The large, tubular aerial condenser is mounted in the centre of the presentation board.
Above, right: The *Macryst* receiver by S.M. McEwan & Son. Well-finished in a polished mahogany cabinet, the factory assembled model was of significantly higher quality than the company's kit version of the same receiver.

Director, W.G.H. Jenkinson seems to have had a personal interest in matters wireless through his family relationship with one Harold Jenkinson co-named as inventor, together with Gramostyles Limited, on the crystal detector patent issued to the company. The *Mostyl crystal* set carried the relatively late Post Office registration number, 4140 probably dating the set to the first half of 1924, while that of the *Macryst* is unknown, although it also carried the BBC approval stamp.

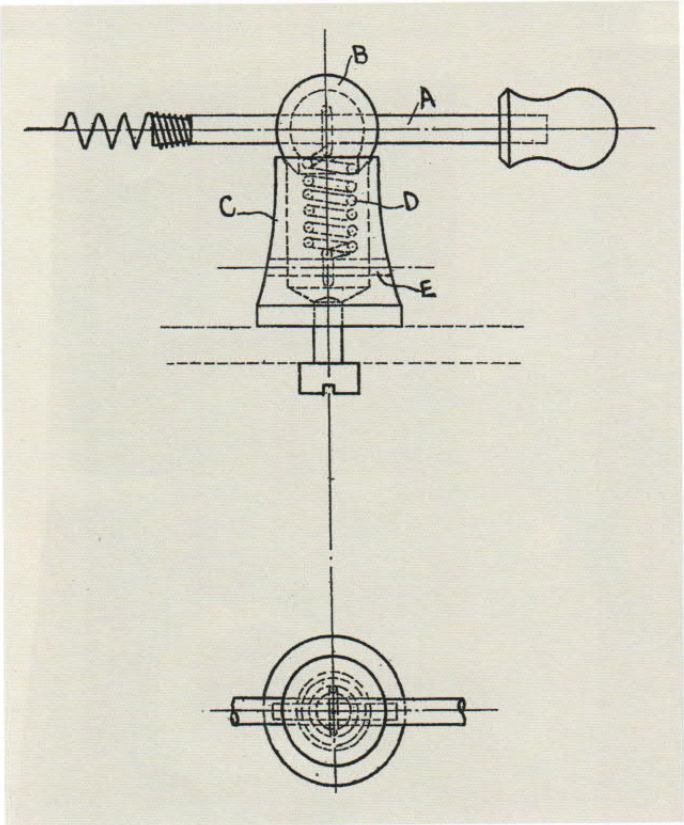
The *Macryst* was available as either a kit of parts (*Macryst Super No.1*) or as an factory-assembled receiver. The kit's components were supplied on an attractively packaged, brightly coloured, red presentation board, but the ebonite control panel and the cabinet were of much lower quality than those used in the factory model. The *Macryst* seems to have been a medium wave, broadcast band only receiver, whereas some *Mostyl* sets featured a shorting link that could be removed for the connection of a long-wave loading coil – otherwise the panel layout and circuits were the same. The *Mostyl* was supplied in a range of models – a

"high-end" receiver in a polished mahogany cabinet, a lower cost version in a rexine-covered wood cabinet (although a blue silk insert in the lid gave the set a 'quality' appearance) and what looks to have been a kit version.

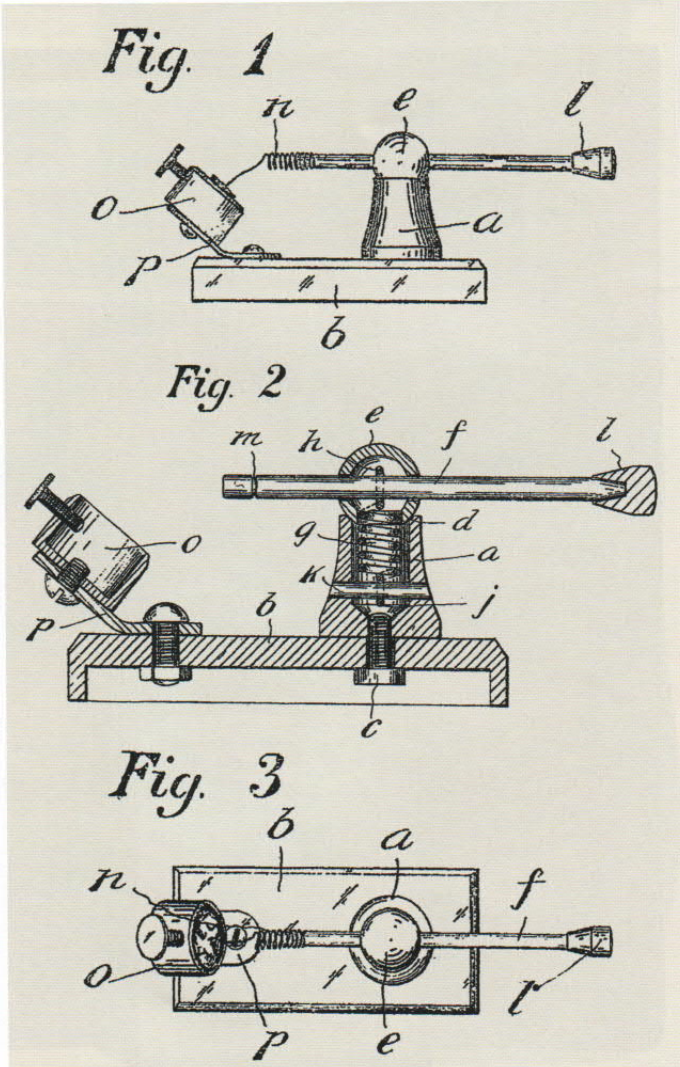
All models employed a conventional, variometer-tuned circuit with a broadcast band wavelength coverage of between 350 – 450 metres. A series aerial condenser allowed for different length aerials to be used; a minor distinction being the use of a "*TeloRadio*" brand condenser in the *Mostyl* sets, while the *Macryst* receivers employed the company's own branded condensers.

Very little is known of S.M. McEwan & Son, other than that the company distributed their own line of wireless components during the early 1920s. Neither they nor Gramostyles appear to have advanced beyond crystal sets to manufacture or supply valve receivers, nor did they advertise their products in any of the popular wireless journals of the day. Similarly they do not appear in the well-known catalogues of the major wireless apparatus distributors of the time. The *Mostyl* receivers,

The patented detector arrangement used in the *Mostyl* and *Macryst* receivers. A tension spring inside the column held the ball in place in its socket and allowed unrestricted motion of the detector arm.



Above and below: Provisional Specification submitted by Gramostyles for an improved crystal detector with an application date of April 26th, 1923. This detector was used exclusively on both the *Macryst* and *Mostyl* sets.



Abstract:

219,113. Gramostyles, Ltd., and Jenkinson, H. April 26, 1923. Crystal detectors. – The arm f carrying the wire contact member of a crystal detector is slidable through a ball e mounted at the upper end of a hollow column a, A tension spring g within the column has an eye at its upper end surrounding the rod f, thus holding the ball e on its socket and also retaining the rod f frictionally on the ball. An eye on the lower end of the spring is looped over a pin k secured to the lower part of the column. The wire contact member may be attached to the rod f over a reduced end portion of the rod, or by means of a groove m. The crystal cup o may be secured in an inclined or other position to the base b, on which the column a is held by a screw c.

Figures submitted with the complete patent specification described in British Patent 219,113 issued to Harold Jenkinson and Gramostyles Ltd. on July 24th, 1924.

PATENT SPECIFICATION

Application Date: April 26, 1923. No. 11,292/23. **219,113**

Complete Left: Jan. 18, 1924.

Complete Accepted: July 24, 1924.

PROVISIONAL SPECIFICATION.

Improvements in and relating to Detectors for Wireless Instruments and the like.

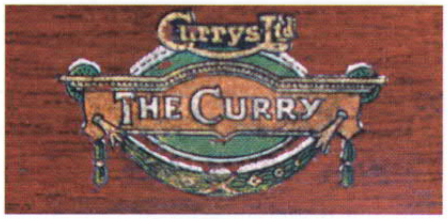
We, GRAMOSTYLES LIMITED, a British company, 249/250, Icknield Street, Birmingham, England, and HAROLD JENKINSON (British), 33, Freer Road, Birchfields, Birmingham, England, do hereby declare the nature of this invention to be as follows:—

The invention relates particularly to the type of detectors known as crystal detectors and is an improved method of pivoting the stem which supports the adjustable member. As shown in the accompanying drawing a stem —A— is a sliding fit through a hollow ball —B— which is mounted in a base —C—. A tension spring —D— is looped over —A— inside —B— passing through a hole in —B— and is looped over a peg —E— which is secured in —C— thereby obtaining the necessary tension.

Dated the 23rd day of April, 1923.

For and on behalf of
GRAMOSTYLES LTD.,
W. G. H. JENKINSON,
Managing Director.
CHAS. E. WARD,
Secretary.
HAROLD JENKINSON.

Left: The *Mcree* crystal receiver carrying the Post Office registration number 4304, also employs the detector described in the Gramostyles patent. Although the origin of the Mcree marque is presently unknown, could there be a connection between the manufacturer of the *Mcree* and the *Macryst*? Certainly the name has an uncanny similarity and while the former is more compact, the two designs share a similar sloping panel design.



Top right and right: This *Mostyl* crystal set was sold by the high street retailer Currys Ltd. under its own brand "*The Curry*".

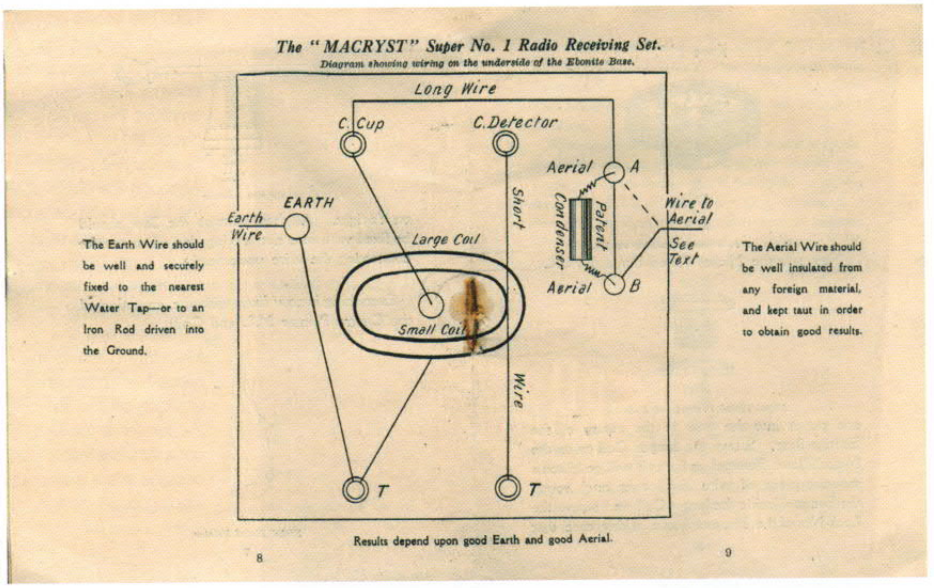
Right: A broadcast-band only version of the *Mostyl* crystal set. The cabinet suggests either a kit set or a later non-original modification.

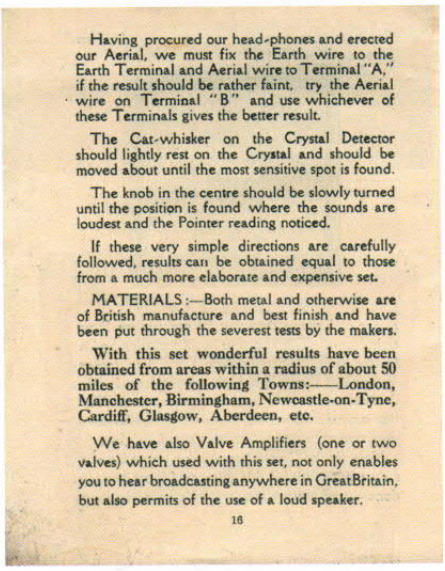
Photograph courtesy of Steve Harris, On the Air, Vintage Technology Centre, Howarden. *Airwaves*, July/August 2000.

however, were sold by Currys, but probably in limited numbers, based on the scarcity of surviving examples and the fact that the sets were not featured in the retailer's literature.

The author would be interested to receive any information on the manufacturers of these receivers, any advertising literature or to learn of other existing examples of similar sets: author@crystal-sets.com

Right: Another version of the *Mcree* transfer.





Having procured our head-phones and erected our Aerial, we must fix the Earth wire to the Earth Terminal and Aerial wire to Terminal "A," if the result should be rather faint, try the Aerial wire on Terminal "B" and use whichever of these Terminals gives the better result.

The Cat-whisker on the Crystal Detector should lightly rest on the Crystal and should be moved about until the most sensitive spot is found.

The knob in the centre should be slowly turned until the position is found where the sounds are loudest and the Pointer reading noticed.

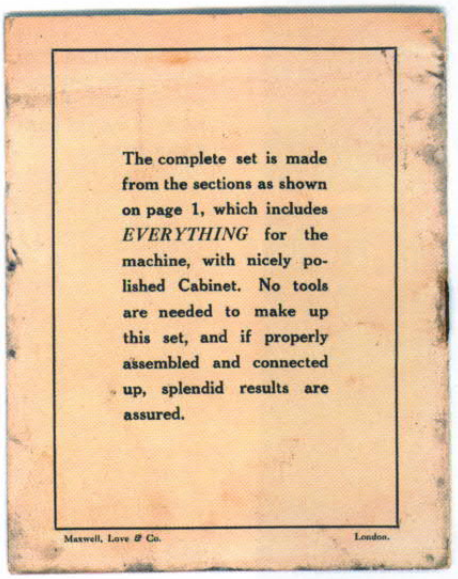
If these very simple directions are carefully followed, results can be obtained equal to those from a much more elaborate and expensive set.

MATERIALS:—Both metal and otherwise are of British manufacture and best finish and have been put through the severest tests by the makers.

With this set wonderful results have been obtained from areas within a radius of about 50 miles of the following Towns:——London, Manchester, Birmingham, Newcastle-on-Tyne, Cardiff, Glasgow, Aberdeen, etc.

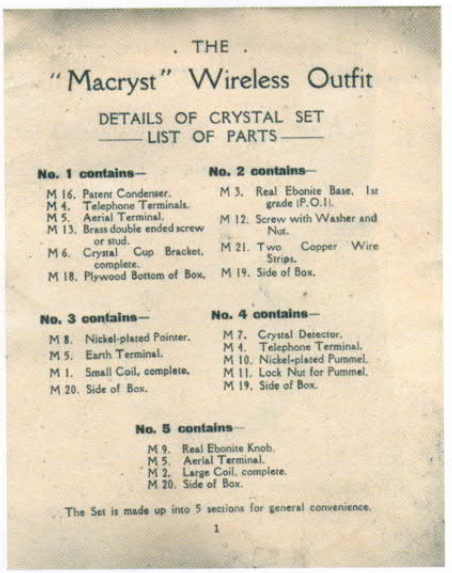
We have also Valve Amplifiers (one or two valves) which used with this set, not only enables you to hear broadcasting anywhere in GreatBritain, but also permits of the use of a loud speaker.

16



The complete set is made from the sections as shown on page 1, which includes *EVERYTHING* for the machine, with nicely polished Cabinet. No tools are needed to make up this set, and if properly assembled and connected up, splendid results are assured.

Maxwell, Love & Co. London.



. THE .

"Macryst" Wireless Outfit

DETAILS OF CRYSTAL SET
——LIST OF PARTS——

No. 1 contains—
M 16. Patent Condenser.
M 4. Telephone Terminals.
M 5. Aerial Terminal.
M 13. Brass double ended screw or stud.
M 6. Crystal Cup Bracket, complete.
M 18. Plywood Bottom of Box.

No. 2 contains—
M 3. Real Ebonite Base. 1st grade (P.O.I).
M 12. Screw with Washer and Nut.
M 21. Two Copper Wire Strips.
M 19. Side of Box.

No. 3 contains—
M 8. Nickel-plated Pointer.
M 5. Earth Terminal.
M 1. Small Coil, complete.
M 20. Side of Box.

No. 4 contains—
M 7. Crystal Detector.
M 4. Telephone Terminal.
M 10. Nickel-plated Pummel.
M 11. Lock Nut for Pummel.
M 19. Side of Box.

No. 5 contains—
M 9. Real Ebonite Knob.
M 5. Aerial Terminal.
M 2. Large Coil, complete.
M 20. Side of Box.

The Set is made up into 5 sections for general convenience.

1

Top left and above: Instructions booklet for the *Macryst "Wireless Variometer Machine"*, aka a crystal set.

Top right: The *Macryst* was a conventional, broadcast-band only, variometer-tuned set. A series aerial condenser allowed for different length aerials (terminals A or B) to be connected to the set.

Left: This advertisement for the *Multiplex* terminal adapter rather suprisingly features a *Macryst* (or is it a *Mostyl*) crystal set! *The Radio Times*, March 28th, 1924.

The Pixytone novelty receiver revisited

by Ken Brooks G3XSJ

Last year's article on the Pixytone four valve receiver mentioned a crystal set using the same plastic cabinet mouldings. At that time none had been seen but publication prompted others to offer sight of the crystal set, and brought news of a related electrical product leading to an unexpected purchasing opportunity.

The *Pixytone* receiver

The crystal set variant of the *Pixytone* in their multicoloured glory

A NOVEL LINE

British Astral

Attractive Table Lighter with novel tilt switch giving approx. 10,000 lights for a penny from A.C. mains any voltage. NO SMOKE OR FUMES.
Retail: Black 36/-.
Assorted Colours 39/6.
Plus Purchase Tax.

GLOBE ELECTRIC Cigarette Lighter

BROOKS & BOHM LTD.,
90, VICTORIA ST., LONDON, S.W.1
Telephone: VICtoria 9550/1441.

Wireless and Electrical Trader, May 29 1948

The *Globe* electric cigarette lighter, utilising the same moulding as the crystal set and the *Pixytone*

Beginnings of the concept

Despite the Pixytone receiver being a very tight fit in its cabinet, it was suggested in the article that the makers had used their contacts at Ekco to source the unusual hemispherical mouldings. On reflection it seemed unlikely that the designers would have made life so needlessly difficult for themselves by choosing such a small enclosure, and that the cabinet may have been adapted from another product.

Evidence to support the conjecture was soon provided by BVWS member Andrew Denton who generously offered an advertisement from the Wireless and Electrical Trader from 29 May 1948. This shows a cabinet similar to the Pixytone receiver as "A Novel Line" - the British Astral Globe electric cigarette lighter. A black lighter cost 36/- whilst in various colours the cost was 39/6d, all plus Purchase Tax.

The chance of acquiring one of these lighters would seem pretty remote. Just as this article was being finalised for publication our Editor Carl Glover called to say that a well known plastics collector was offering one for sale. This news prompted the purchase of what must be the prettiest cigarette lighter ever made, that glowing description coming from a non-smoker!

More on the the Pixytone

Returning to the Pixytone receiver which

was advertised in 1951, a further advert was spotted in Practical Wireless from March 1959 offering the receiver less valves and loudspeaker for 15/-. That these were offered such a long time after the Pixytone first became available suggests the incomplete receivers represented remnants of earlier production, probably resurrected from a long storage.

Readers of the earlier article will remember that the Pixytone featured was acquired from the estate of a local radio enthusiast. Some of his remaining papers recently passed via the author for distribution to others, and amongst an assortment of faded magazine cuttings and outdated catalogues was an original Pixytone circuit diagram showing the two band receiver, and two versions of the power supply for 115 and 250 volt supplies. On the reverse is coil data and switch connections – an interesting find indeed.

A novelty crystal set

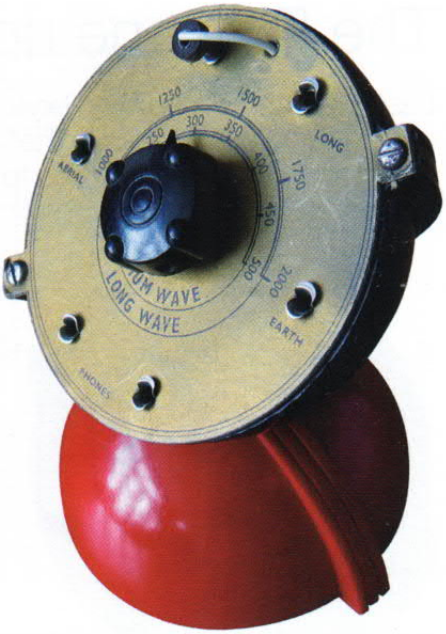
The same cabinet mouldings were also adapted as the basis for a novelty crystal set. No advertisements have been seen for these, so it is not possible to associate them with a date or manufacturer. Prompted by the article, BVWS member Peter Brunning offered his crystal set for examination. The Pixytone valve receiver cabinet comprises three similar hemispherical mouldings but the crystal set uses just two, coloured red and black in his example. The absence of an upper hemisphere provides space for a flat, circular front panel made from the same type of gold embossed card used on the valve receiver. The whimsical tuning knob remains, but the waveband selection plug is utilitarian, whilst crude sockets are provided for the aerial, earth and headphones. Unlike the Pixytone, there is no manufacturer's name and the delicate loudspeaker grille with three supporting feet fitted under the base has been omitted.

Jonathan Warburton-Brown provided images of his delightful multi coloured crystal set collection. Colour coordination does not seem to have been a priority during assembly and in this selection we are presented with sets having decidedly lurid and perhaps randomly selected colour combinations like red and blue.

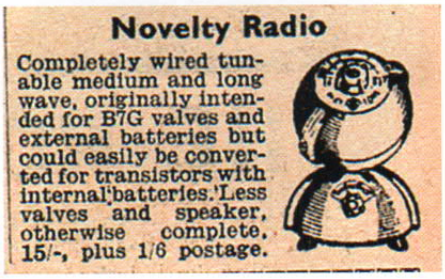
Further speculation

There is something about the hemispherical cabinet mouldings that still makes one wonder if they were originally used for an as yet undiscovered product. Perhaps lighters and radios were just imaginative applications of surplus stocks. Those elegant crafted ribs and the range of colours suggests some kind of cosmetic product or bathroom accessory that pre–dates the cigarette lighter. The ribs on some examples of the crystal sets and the lighter have been filled with a gold colour, perhaps in an attempt to brighten the design, whilst on the more decorative Pixytone receiver they remain plain. However, notice that the lighter does not have the base plate with feet that is fitted to the receiver. Would these have been specially moulded for the receiver, along with those intricate control knobs at a later date just to match some existing stocks of mouldings? It seems unlikely when evidence like capacitor marking, advertising, and company information points to the Pixytone being a product of the 1950's. Was there, perhaps, an earlier version of the Pixytone, with the lighter and crystal set being an attempt to make use of surplus mouldings?

Whatever, it appears that the striking Pixytone receiver was a little too radical for its time, and even as a novelty product was difficult to sell. As for the lighter, it seems an act of pure desperation that the advert resorted to the unlikely appeal of a cigarette lighter featuring no smoke or fumes!



A fetching version of the crystal set in red

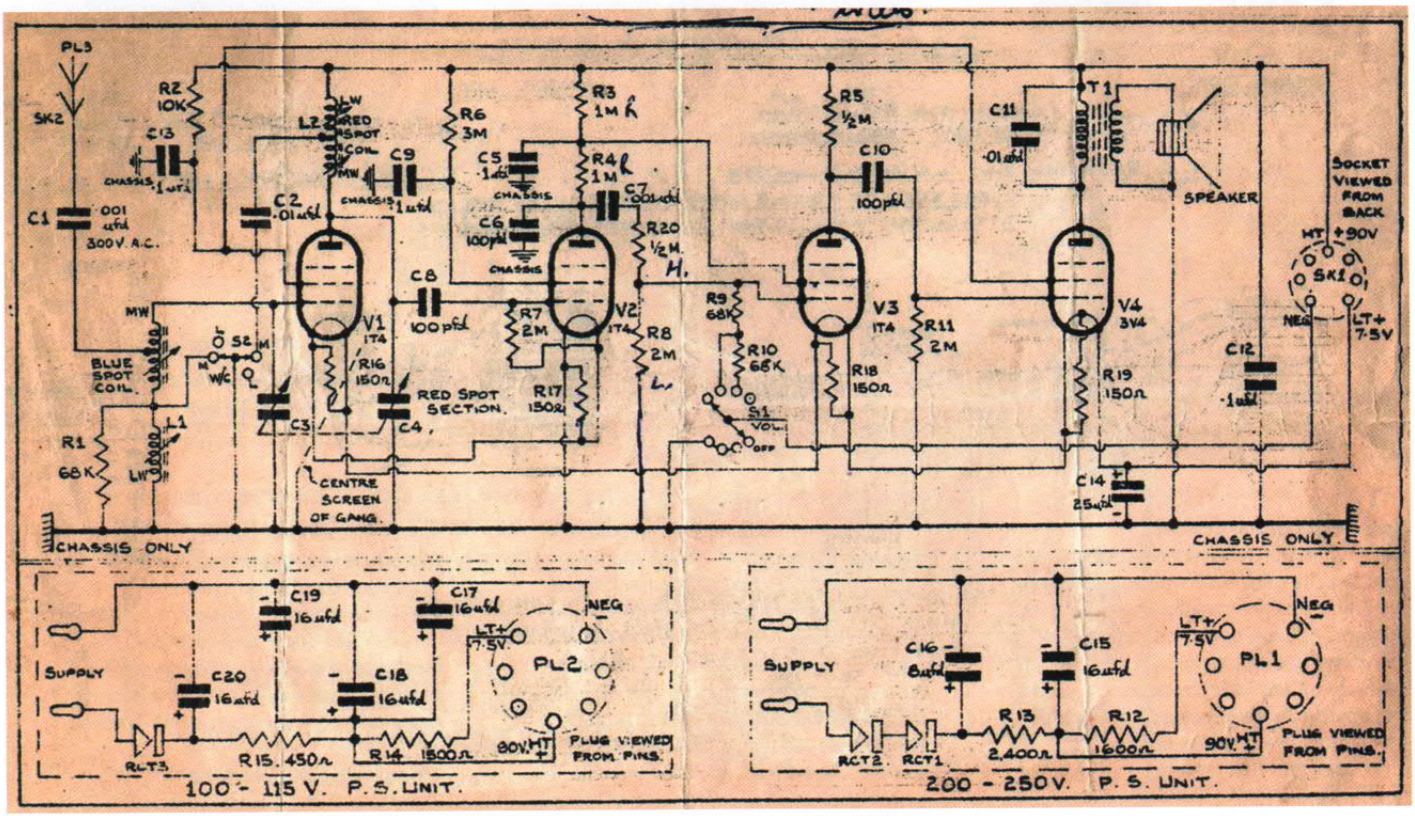


Novelty Radio

Completely wired tunable medium and long wave, originally intended for B7G valves and external batteries but could easily be converted for transistors with internal batteries. Less valves and speaker, otherwise complete, 15/-, plus 1/6 postage.

Pixytone advert, *Practical Wireless*, March 1959

Pixytone circuit



HMV 904 five inch Television & All World Radio – A Truly Remarkable Find In Deepest Cornwall

By Peter Carlton.

It's amazing how sometimes something will come totally out of the blue when you least expect it. A short while back I was contacted via letter by someone with an HMV 904 five inch TV set and combined radio which has a really fascinating history, and I am now the proud owner of it! This set won't have been listed in the surviving pre-war TV sets' database, as the previous owner doesn't even have a computer or mobile phone. I have now registered it. It's nice to know that another pre-war TV set has survived for more than seventy years. According to Michael Bennet-Levy's book "*TV Is King*", this five inch set is much rarer than the seven inch version.

Maintaining the Lead in

TELEVISION

Model 904
Price 29 GNS.

"HIS MASTER'S VOICE" engineers have played an invaluable part in securing for Britain pre-eminence in the science and art of Television. No other country has enjoyed a regular daily service for two years — in no other country has it been possible for two years to view national events such as the Coronation procession and the Armistice service or Sports meetings such as Wimbledon — the Test Matches — Big Fights, etc., through the medium of Television in the home.

The pioneers of the high definition system employed by the B.B.C. for the Television service are the Engineers in "His Master's Voice" laboratories, a team of experts who were responsible for the designing and development of the amazing Emitron Camera, the vans used for outside transmissions and much of the studio technique employed.

The secret of "His Master's Voice" supremacy in Television lies in the revelation that the Television receiving instruments offered to the public are designed by the Engineers responsible for the system.

With the introduction of low-priced Television, "His Master's Voice" increase their lead, making it possible for those within the London Service Area to have sight and sound in the home, combined with all-world radio, for 6/4d. a week.

"HIS MASTER'S VOICE"

Pioneers of the High Definition System

I know the history of the set right back to when it was new. The original owner bought the set, obviously new, and used it until the television service was closed down in 1939 for the duration of the war. The original owner's wife sadly died and he was reluctant to part with anything that he had bought whilst his wife was alive and so, after the war he had still got the set. He was friends with a family and their son, then at college, went around to the owner's house and they watched the re-opening of the television service in 1946 on this very set. The original owner kept the set until 1953, at which point he then bought a new ten inch HMV television set and this set was passed on to the person who owned it before me, who has thus had the set ever since 1953. When the set was last used it was in perfect working order, both radio and television worked perfectly and the CRT gave a very good well-defined picture. It appears that the only time anything was ever done to the set was directly after the war when EMI serviced all of their pre-war sets for the 1946 re-opening; nothing else was ever done to it, the chassis has only ever been out of the set once since it was manufactured.

Certainly the owner never did anything to the set. He said used the radio a few times when he first had it but as the family moved away from the London area the TV was no longer useable due to it not being able to receive Alexandra Palace and so it became a display item. He collected other items, including a few later TV sets, but this was the only pre-war set. His next oldest TV set was from 1951, he seems to prefer to just collect and display items and not actually use them, which means they remain in their original state. Thus, for this set's whole life, it has been kept indoors in a warm dry non-smoking atmosphere and so is in superb condition. All knobs, back and front, are present and undamaged, as is the back panel. Inside, nothing has been touched, there is no grime or muck, only the natural layer of dust you would expect. It even has the original mains lead and 2-pin plug. The CRT looks fine, with no visible damage. As it had a relatively small amount of use the CRT should be good. On top, the HMV trade mark is intact. The cabinet appears to be walnut, the finish is original and looks stunning.

Because the set is so completely original I have decided for the time being at least to leave it exactly as it is, a superb example of an untouched pre-war TV set. It is possible that I might have it restored in the future, but if so this would need to be by a fully qualified professional restorer who could restore the set to its exact pre-war condition, both above and beneath the chassis but that is not something I am at present considering. It would be interesting to know the opinion of others in this regard. It must now be almost impossible to see a pre-war television set exactly as it looked when it left the factory. Obviously there's the "I'd love to see a five inch picture on that set" element to it but, for the present it is for display only.

I'm sure that there still are sets out there waiting to be discovered. I had a chat with Gerry Wells about the television, He was amazed that one had turned up; he mentioned that when he worked for EMI in 1947 he was actually repairing these sets. He told me that they only ever made about 250 of this model; they were less popular than the seven inch set at the time and are consequently much rarer. He also said

that repairers/dealers were breaking them up as people wanted the larger nine inch screens after the war which, presumably, is why so few have survived. Gerry thought it should be easy to get it running; the CRT should be fine, just a bit of ion burn perhaps, but maybe not too much due to it not being used from 1953. He described the set as "very good and efficient".

I exchanged E-mails with a professional restorer (who is also a BVWS member) and he gave me the contact details of a gentleman in Devon who actually worked on these sets when they were brand new. I telephoned him and he is a nice elderly gentleman; he was originally from the London area and worked with television all of his working life. His first encounter with television was in the 30–line era; he told me how, after about 11pm, when the stations had closed down, the 30–line transmissions would go on the air. Vision was from the London Regional Transmitter and sound was from the Midland Regional Transmitter. This, of course, led to him working with High Definition Television and he worked on many sets, in particular the HMV, 904 from new. It was a real privilege to be able to talk to someone who had actually worked on these sets since their manufacture!

He told me quite a bit about the set; he said that as it had been kept dry and warm all these years, the mains EHT transformer should be alright. He advised, if it is ever restored, to gradually bring it up on a Variac once all the condensers had been checked and replaced if necessary. In particular it might be necessary to change the two 0.1uf mains EHT condensers and the smoothing electrolytics. While this in no way changes my feeling at present about not restoring the set, it was extremely interesting to talk to someone who knows them very well. It's amazing just how much information there is when you start making enquiries.

The service data includes the alignment procedures and, interestingly mentions a difference for very early receivers below a certain serial number; this set has a really low serial number, so it must be one of the very earliest examples of this model. The EHT condensers are the original 1930's 'two in one can' unit; thankfully it was never changed. All the valve cans are present, complete with metal top covers, and even the tiny Bakelite knobs for the rear controls are all present and correct.

As for value, whilst that's not the reason I collect, things can happen in any of our lives where we are forced to sell things, in which case it's much better to keep the set in its most valuable condition.

Meanwhile, rest assured that when you read this article the set will still be totally untouched. I am going to wait to get some feedback about this before I ever consider professional restoration.

I really love the fact that the set even has its original 2-pin plug, that's a bit like the icing on the cake. It's as if the set is preserved in the nicest possible way. If the set had been repaired in later years then I wouldn't hesitate to have it professionally restored, it's the fact of this unique original untouched condition that makes me feel that it should remain so.

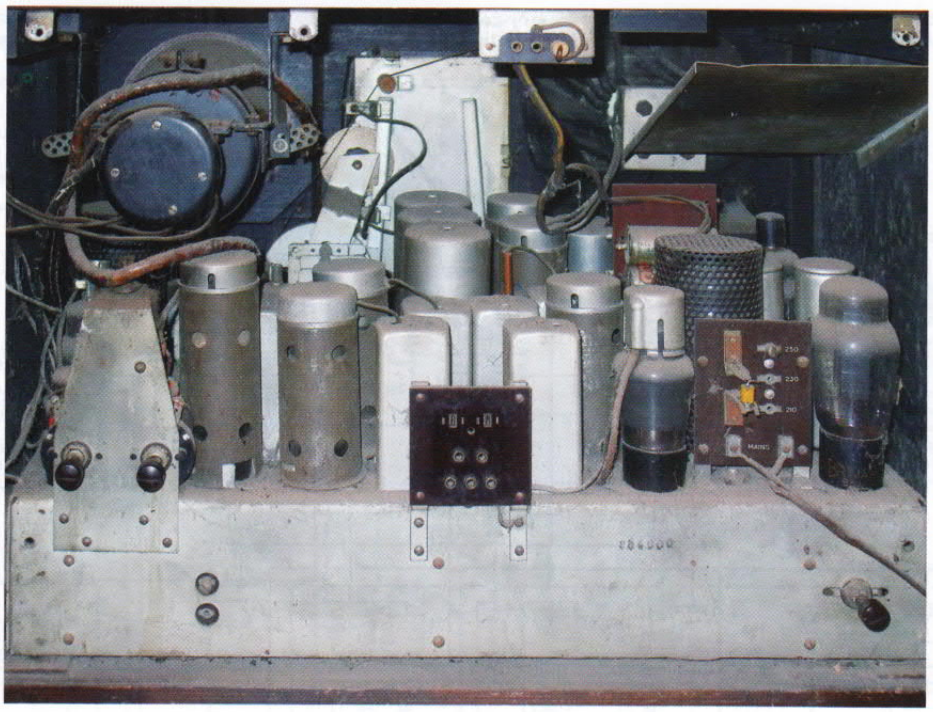
The service data looks as though the EHT transformer is underneath the chassis. The set is certainly very heavy. When I went to collect it I was expecting a five inch set that could be lifted with ease – was I wrong! It actually needs two people to lift it.

This is actually the very first time that I have added anything to my collection and not restored it. I've always insisted that everything *has* to be in full working order, be they radios, radiograms, gramophones or clocks. Of my TV sets, the other oldest is the Marconi 703 Mastergram, which is fully functional and, thanks to help from other collectors, I was even able to track down the few parts needed to get everything working perfectly. However it is the condition and absolute originality of this set which persuades me to break my rule. Even my wife said to me that I should leave it exactly as it is, but she didn't expect me to agree because everything else is working. She naturally assumed that I'd want the HMV 904 to work – a unique case Indeed.

It is also worth considering the amount of use the set would have if it were restored. The Marconi 703 Mastergram is only used as a treat or if we have visitors, I think you really expect that with pre–war TV sets. I haven't made any final decisions yet, but all I can say is that, if I do eventually have it professionally restored then I'd rather put the money in to this set than spend it on a contemporary flat panel TV! At least I'd have something worth showing for the money. Meanwhile, rest assured that when you read this article the set will still be totally untouched.

Whilst it is highly unlikely that it would be needed it's good to know that the CRT could be re-built (by RACS in France) if that were ever necessary.

Unbelievably, I have some spare parts for the 904. In the mid–1950s the previous owner was walking past a junk shop and outside he saw the Marconi version of the HMV 904; the cabinet was tatty, but apparently it had had little use. It cost 10/-. He bought the set, took it home, completely dismantled it (!!!) threw the cabinet away, but kept everything else as spares. This meant that there was a spare CRT, scanning coils, knobs and so on for thie HMV. He was able to find all this for me and consequently got a wide range of spares. He said that he may even still have the set of valves. He doesn't think he



MODEL 706 — TELEVISION AND ALL-WAVE RADIO RECEIVER

(Size of Picture, 4½ ins. by 4 ins.)

THIS Model introduces Television for the first time at a price within the reach of everyhome. It combines a really efficient Television receiver, giving a picture of quite enjoyable size, with a three-waveband, all-wave radio, better than most world radio receivers. Although the picture is of relatively small size it will be found quite adequate and suitable for rooms of average dimensions . . . . (For A.C. mains) (Table can be supplied at an extra cost of 8 Gns.) 29 Gns.

The above price does not include the cost of the necessary aerial and installation. For details of these incidentals always consult your local Marconiphone Dealer.

★ SEE PURCHASE TERMS AND TECHNICAL DETAILS ARE GIVEN ON PAGE 12 ★

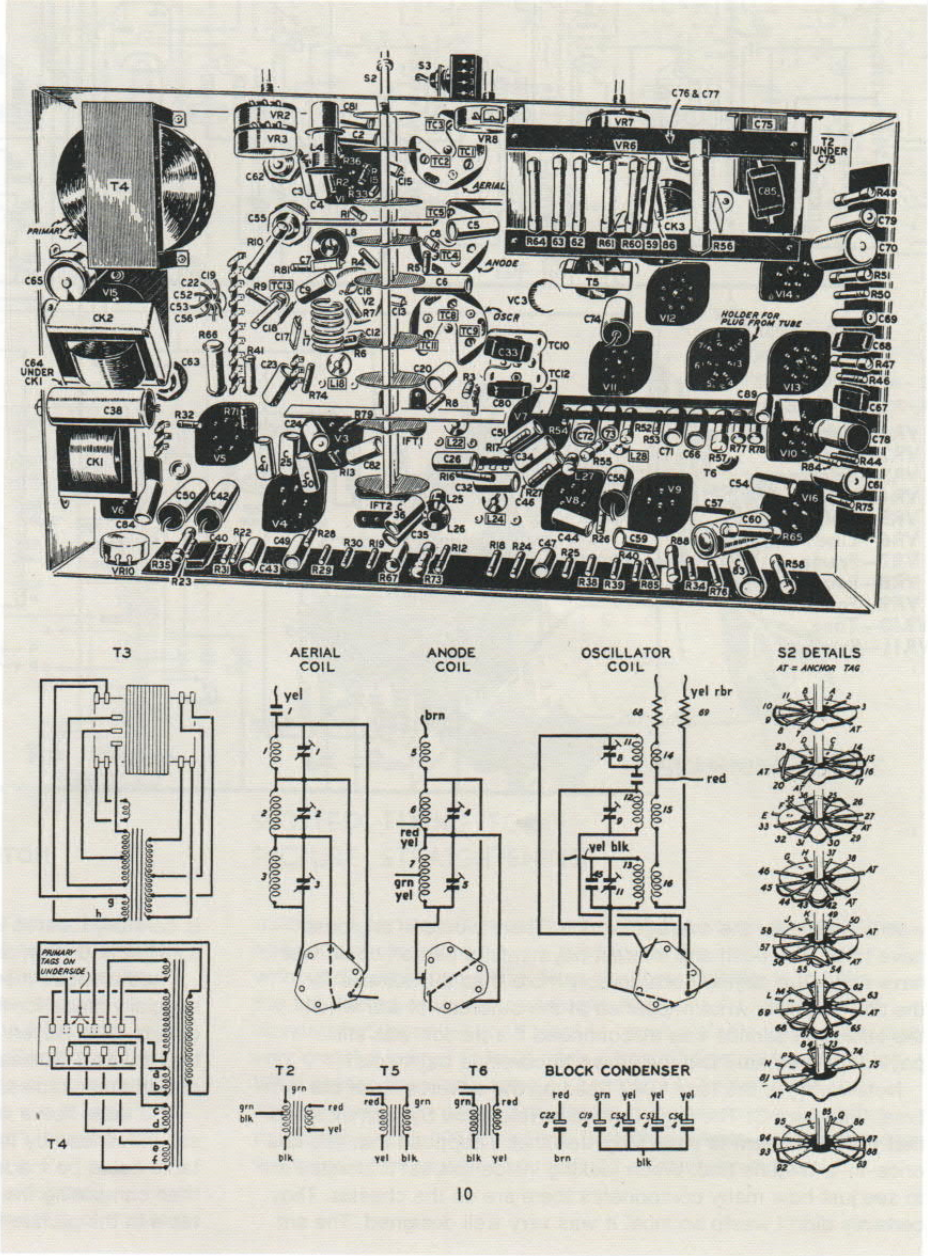
retained the spare chassis, but isn't totally sure; he will let me know if he finds it. It's hard to imagine a time when you could buy a pre-war TV for 10/- In, say 1955, the set would have been eighteen years old, and how do we view TV sets that old today? It was different then though I imagine as they were really works of art, but I suppose with television taking off so much in the fifties and people wanting larger screens perhaps the pre–war sets sadly stood little chance. Thank goodness some have survived.

I've always wanted one of these little sets but never imagined I would get one. I'm so glad I got the five inch model. Amusingly the CRT aperture looks smaller

Thank goodness some have survived. I've always wanted one of these little sets but never imagined I would get one. I'm so glad I got the five inch model.

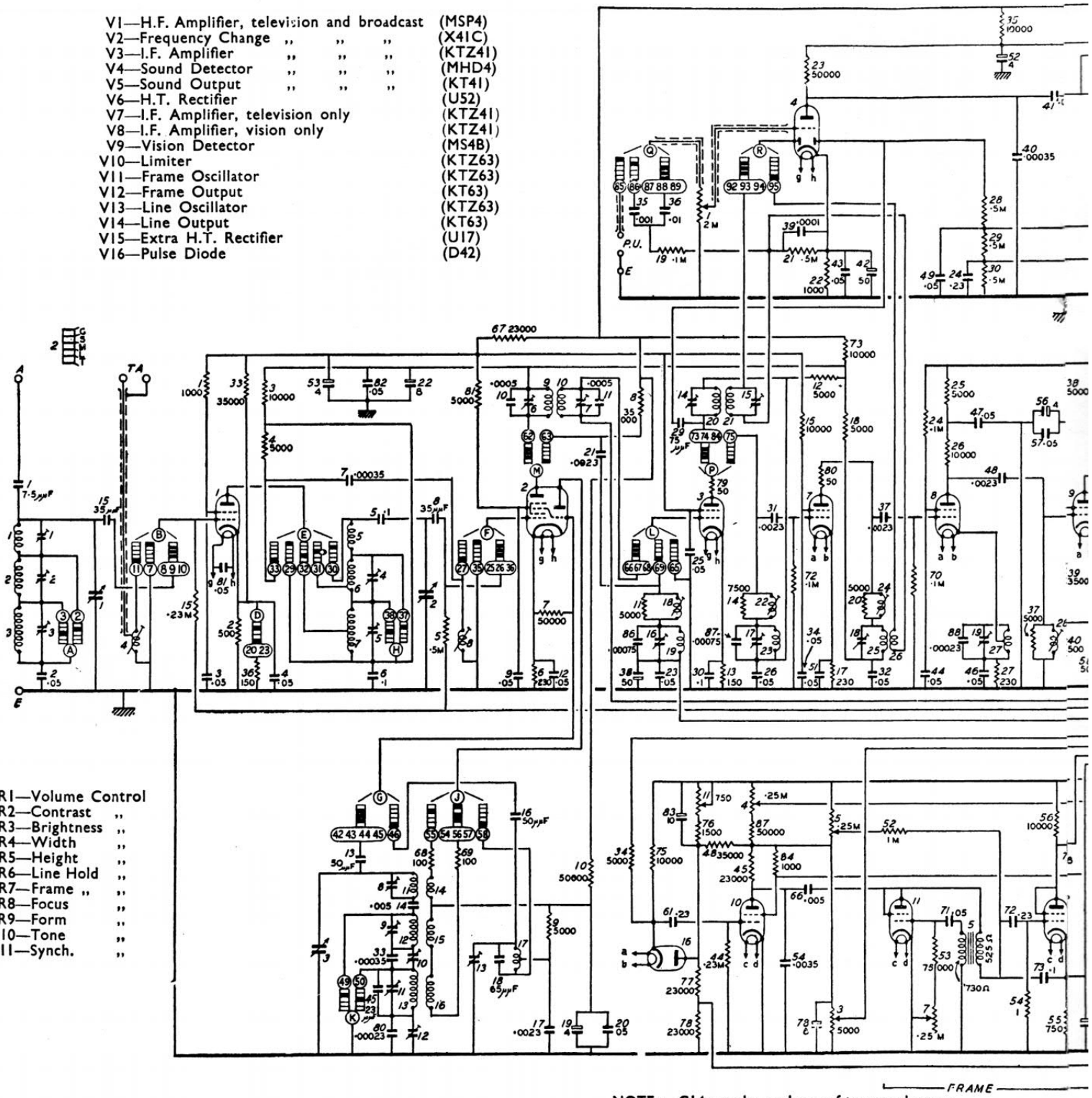
than the loudspeaker aperture. The fact that it was the smallest CRT television EMI ever made makes it even more interesting. Surely five inches must be the smallest size for CRT sets made for domestic use?

The cost of the set, 29 Guineas, back in 1937 must have been a small fortune. That also explains why so few of these sets exist, it would be interesting to know if any sales records have survived at EMI of how many of each model were sold. It seems that EMI did a hire purchase system where you could pay 6/4d. a week. This would have been well beyond the reach of most working class people at that time. When my grandmother worked in the 1930'3 she was paid 10/– a week and got £1 at Christmas, so that was double wages once a year. The repayments on the set would have been a very large proportion of a whole



NOTE : To accommodate variations in the magnetic flux of the focus coil it may be necessary to vary the value of R57. Values of 2,500, 3,500, or 5,000 ohms (2
focus adjustment have been tried. It is important that correct focus can be obtained in the first third of the rotation of the " Focus " control (from min

V1—H.F. Amplifier, television and broadcast (MSP4)
V2—Frequency Change ,, ,, ,, (X41C)
V3—I.F. Amplifier ,, ,, ,, (KTZ41)
V4—Sound Detector ,, ,, ,, (MHD4)
V5—Sound Output ,, ,, ,, (KT41)
V6—H.T. Rectifier (U52)
V7—I.F. Amplifier, television only (KTZ41)
V8—I.F. Amplifier, vision only (KTZ41)
V9—Vision Detector (MS4B)
V10—Limiter (KTZ63)
V11—Frame Oscillator (KTZ63)
V12—Frame Output (KT63)
V13—Line Oscillator (KTZ63)
V14—Line Output (KT63)
V15—Extra H.T. Rectifier (U17)
V16—Pulse Diode (D42)



NOTE : C14 may be made up of two condensers.

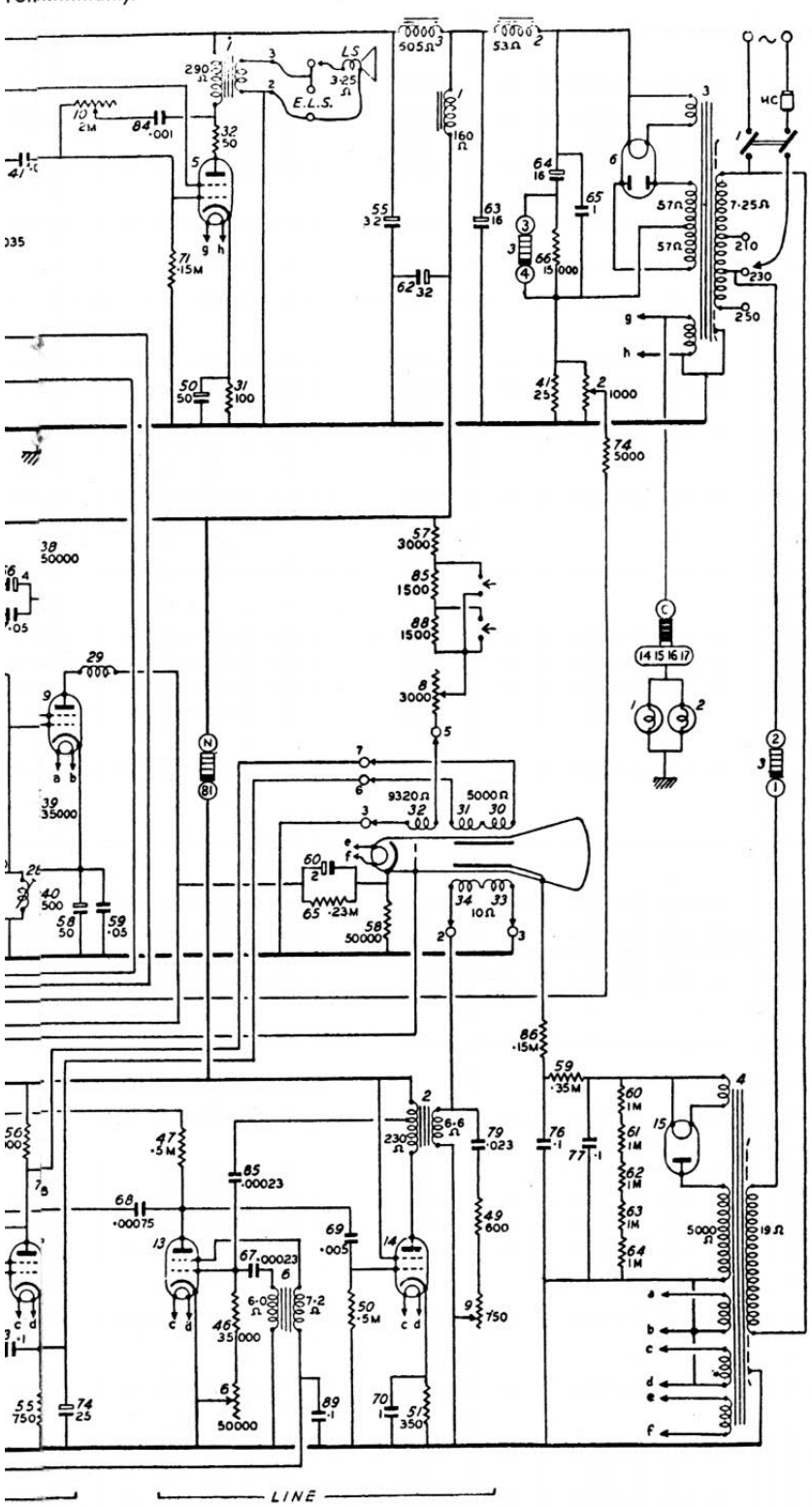
weeks wages for the average worker. There would in any case have to be a deposit and interest payments, a person could well have ended up paying considerably more than 29 Guineas for the set. I wonder what happened at the outbreak of war when the television service was discontinued if a person was still paying for their set? Did they have to continue payments?

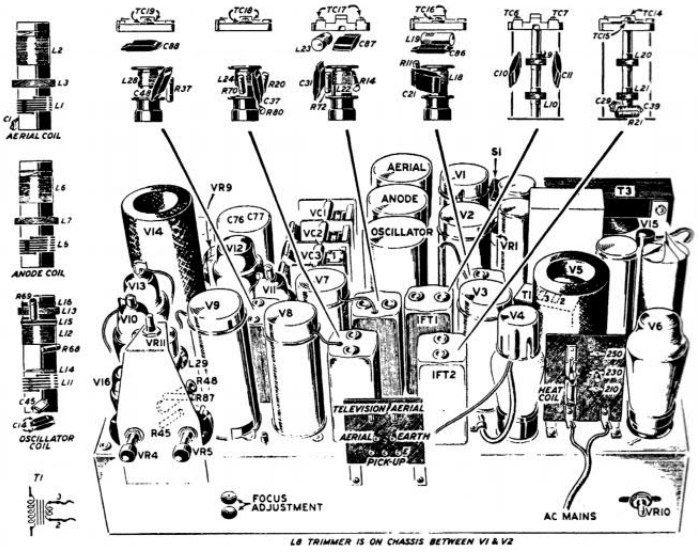
Noteworthy is the term HMV used on the advertising of the time, 'Pioneers Of The High Definition Television System'. It's sad that the BBC seem to have forgotten that. I suppose that this is a once-in-a-lifetime find. When looking inside this set it amazed me to see just how many components there are on the chassis. They certainly didn't waste an inch! It was very well designed. The set is carefully located in our front room, away from the window and sunlight and in an area where it is unlikely to come to any harm.

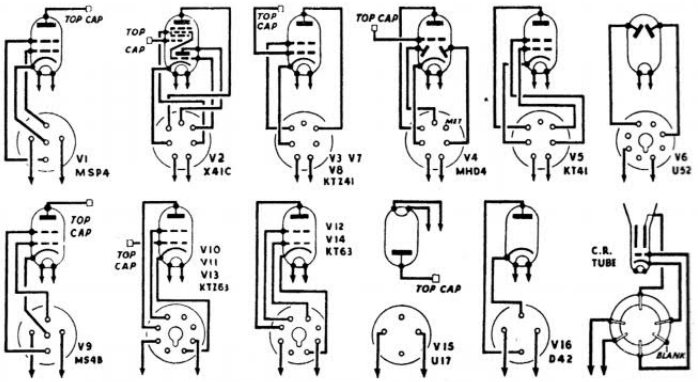
I had a vague memory of seeing a picture of a table specially made for these sets. Someone kindly sent me details of an advert showing the set and table and it seems that it was 3 Guineas extra at the time. I've never seen one of these tables, but hopefully one may turn up.

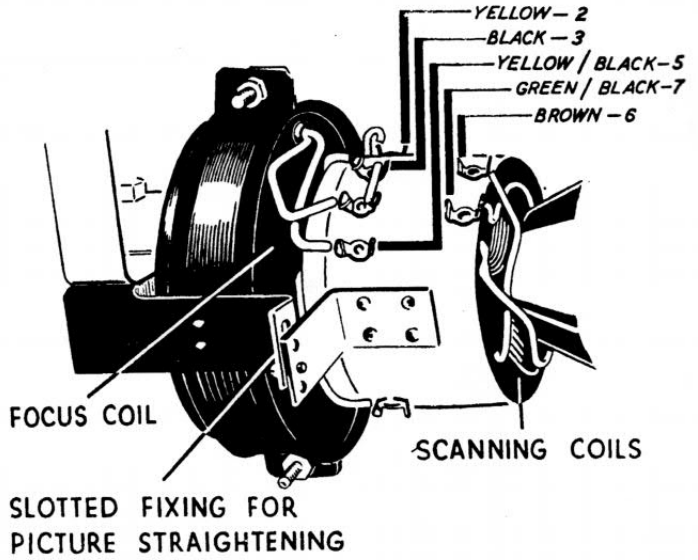
The table had a very 'Modern' look for its time, perhaps still influenced by the Art Deco period. Possibly a copy of the table could be made by measuring the actual TV set itself and then comparing the measurements of the set which is on the table in the picture in the advert and working out its' scale.

) ohs (2 watt) may be used. Do not alter resistance until both positions of the
ronminimum).







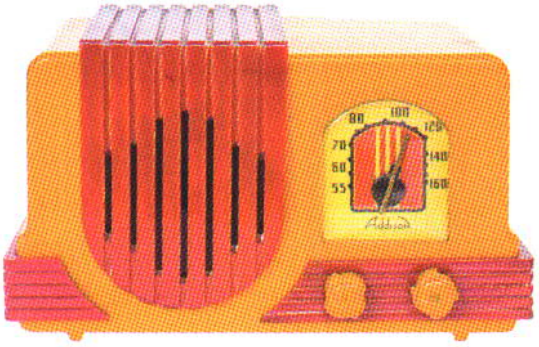


This wonderful find has led to questions of all kinds; a small number of these sets survive, but none it would seem in original condition like mine. It makes you wonder when these sets would have been taken out of service, or designated as 'second' sets, perhaps around 1955 when ITV came along (although standards converters were available of course). Certainly a five inch picture would require you to be pretty close to the screen. It would not have been practical to lift the set to use it, as it is *very* heavy. and, due to its fragile nature, I can't imagine people doing that each time they wanted to use it. Perhaps it stayed either on its purpose–built table or on a sideboard.

So what now? It has been suggested that this set is of museum quality – it certainly is exceptional, even the knobs gleam! I have, however, photographed every available angle inside and out, without disturbing anything. Now, my responsibility is to keep the set dusted, warm, dry and safe. Naturally, I'd love to see it working but for now I don't want to touch a single thing. I just feel very grateful indeed to have such a beautiful set in my collection. What makes the whole thing so complete is knowing the set's history from when it was new, that is priceless to me. Long live the Marconi–EMI 405–Line High Definition Television Set, showing the world's first regular High Definition Television system!

Jeff Salmon Radio Collection, Bonhams 28th April, Knightsbridge

A small selection of lots photographed by Carl Glover



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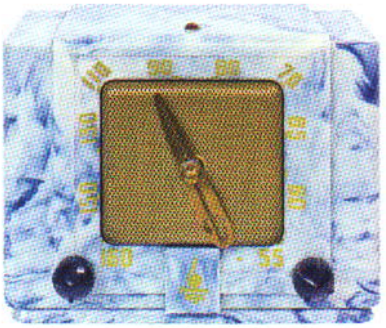

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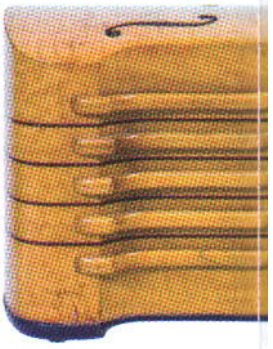

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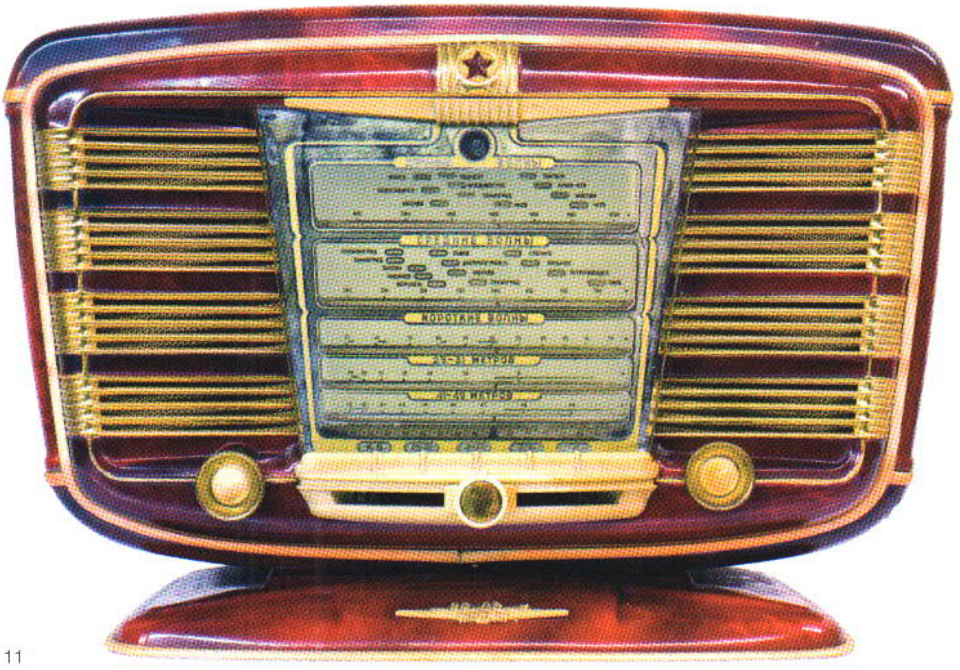

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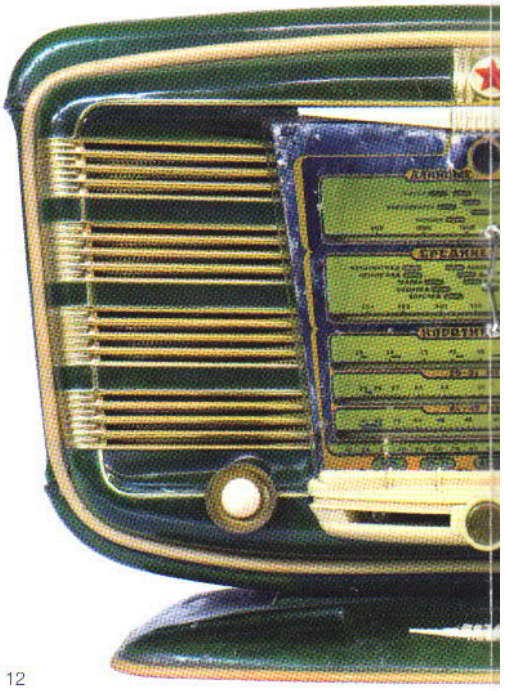

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1: Addison type II, 'Waterfall', 1940
2: Emerson type 472, series A, 'The Clock', circa 1948
3: Artes type AR3 'coffee machine', 1955
4: Emerson type 564, circa 1947
5: Emerson AU190 Cathedral
6: Emerson type 400, 'The Patriot', 1940-41
7: Unknown Czech two-band in speckled blue case
8: Emerson type 256, 'The Strad' 1939
9: Emerson type EP 375 'five-plus-one', 1941
10: Crosley type G 1465, 1938
11 & 12: Russian Red Star, in red; Red Star in green - both with interesting 'joystick' wavelength and tuning control, on tin plinth bases.
13: SNR 'wave' in black, in similar format to Russian Red Star set.

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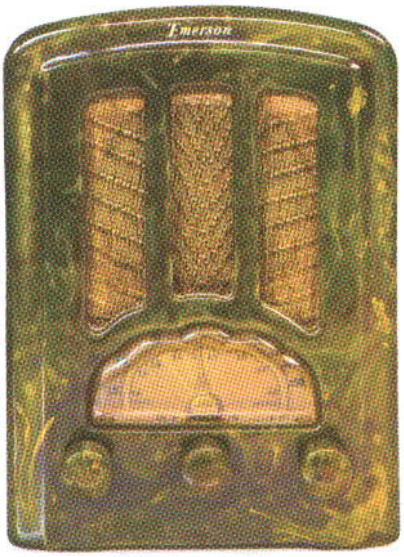

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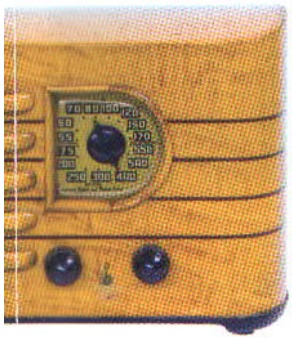

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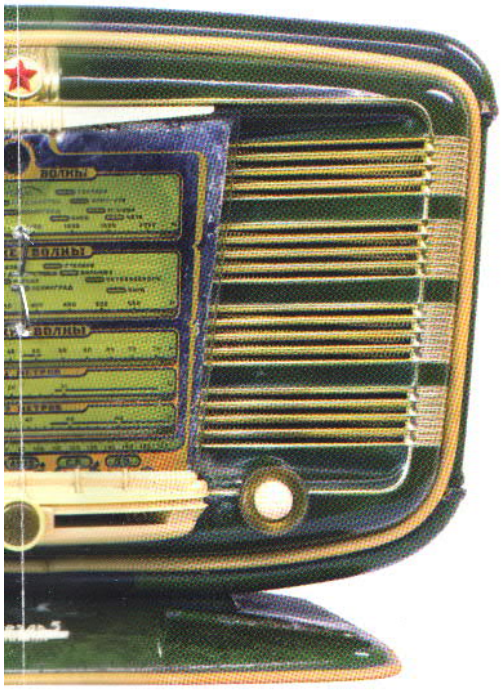

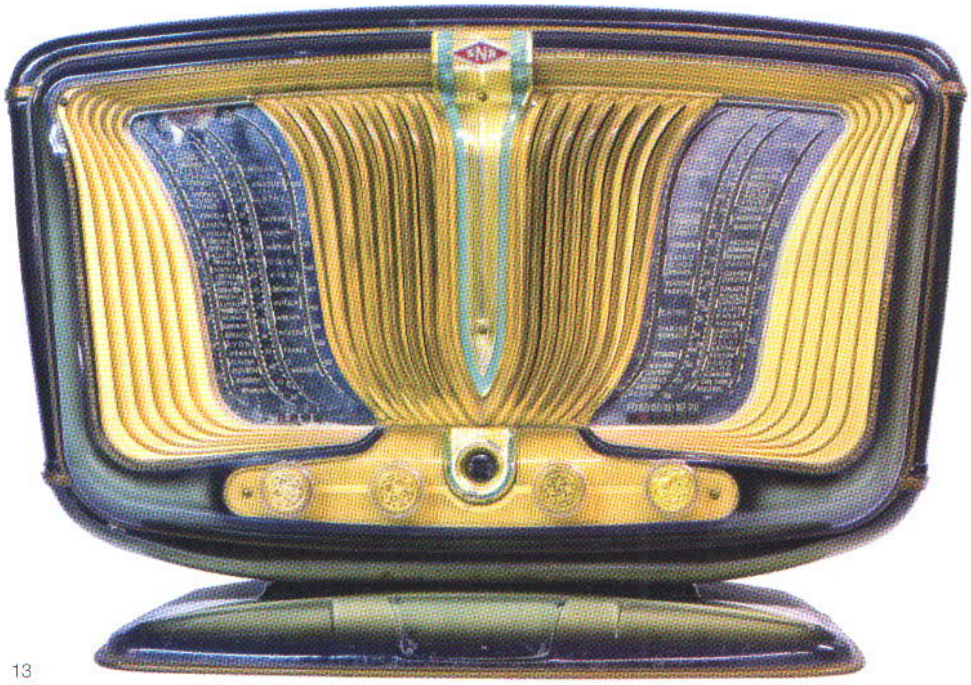

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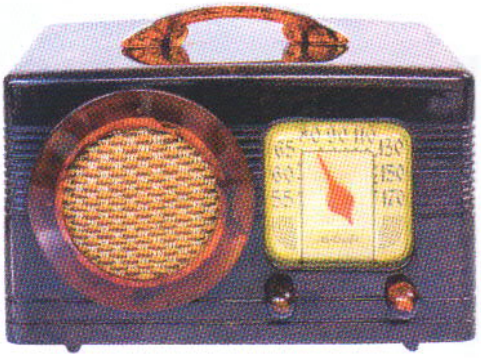

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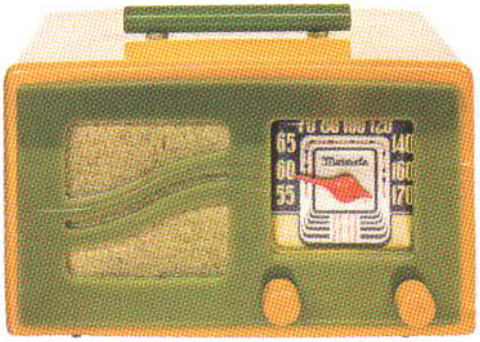

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13: Fada type 652, 'The Temple', 1945
14: Fada type 1000, 'The Bullet', 1945
15: Majestic Type 1, 'Charlie McCarthy', 1938
16: Garod type 6AU1, 1945
17 & 18: Phonola type 547, 1939
19: Kadette type L, circa 1947
20: Radialva 'Super-Boum', circa 1960
21: Motorola type 50XC, 1940
22: AWA Fisk Radiolette, Australian
23: Sentinel type 284 NI, 1945
24: Air King type 52, 1933
25 & 26: Sonora Sonorette, 1950
27: Motorola type 51X16, 'S grille', 1941-42
28: Motorola type 50XC, 1940
29: Radialva 'Super-Boum', circa 1960
30: Healing Moderne in lime green, 1951, Australian
31: Motorola type 51X16, 'S grille', 1941
32: Philco 'Boomerang' 1940's
33: Telefunken 55, Spain 1950's

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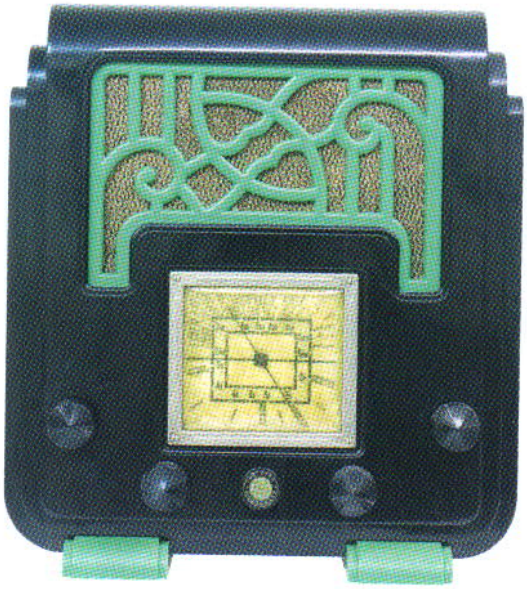
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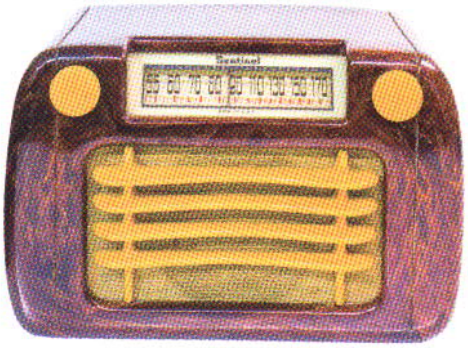
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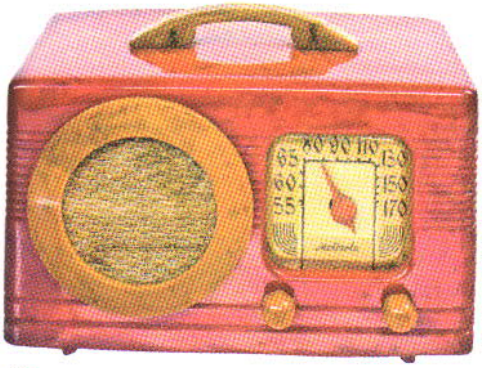
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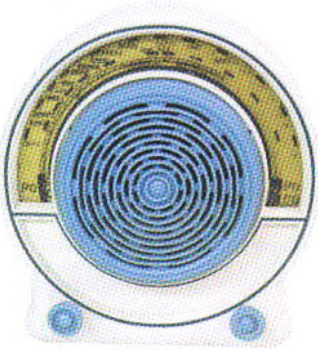
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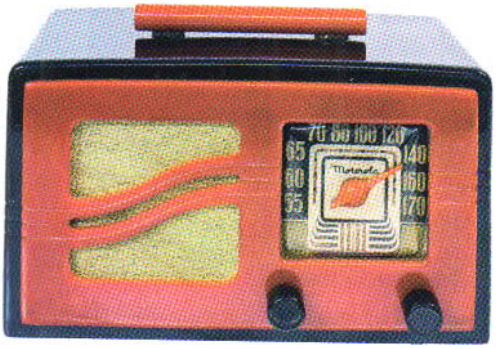
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Guaranteed... For Life?

by Peter Merriman

There is nothing like doing something simple and undemanding to allow the mind to wander off and ponder on the great Mysteries of Life such as what, say, carpet manufacturers mean when they advertise 'Guaranteed for Life'. Whose life? Mine? Yours? Theirs?

So it was, when I was unwrapping to check a large number of New Old Stock (NOS) valves recently, that I found myself wondering about another great M of L, namely, why it is that having unwrapped a new valve, one can never re-wrap it so tidily and, sometimes, not even get it back into the carton it came from.

However, on this occasion, I was dragged back from my reverie by discovering, in the tissue round an unfamiliar commercial valve manufactured by Mullard, a miniature booklet printed on paper even flimsier than that of a Christmas cracker motto.

It was, in fact, a statement of guarantees relating to types of valves etc. used in an electronic world mostly far removed from that familiar to lovers of EF50s etc. Despite its flimsy presentation, this booklet gave an insight into the care and attention which Mullard must have given to the application and use of their products.

What follows describes the content of the booklet; some parts are worth reproducing in full to illustrate their approach. The book starts with general statements, but goes on to detail how these apply to various differing products.

"General Conditions of Guarantee:-

NOTE

-The word "valve" as used hereinafter shall also be taken to mean electronic device.)

The conditions set out below apply to all industrial and transmitting valves and electronic devices guaranteed by Mullard Limited: -

(1) That the valve has not been operated outside any of the maximum ratings published by Mullard Limited.

(2) That right of access to equipment installation for the purposes of inspection of operating conditions and valve life records shall be accorded to a representative of Mullard Limited or any agent appointed by them, if so desired.

(3) That if the valve should fail after a filament life shorter than the guaranteed period, it shall be immediately returned to the Service Department of Mullard Limited, complete with full information as called for in the Questionnaire Form supplied with the valve.

(4) That examination of the valve may necessitate dismantling, after which it cannot be returned.

(5) That the life of the valve shall be deemed to be the total number of hours during which its filament is energised

(6) That the decision of Service Department of Mullard Limited, on the cause of failure, and on any applicable allowance, be accepted.

7) That the valve was purchased from Mullard Limited or their authorised distributor, and that the full list price has been paid.

8) That it is returned at the sender's risk and expense, and is received by Mullard Limited in its condition as at the time of failure.

9) That the guarantee does not cover misuse or consequential or accidental damage."

Interpretation of conditions

These general conditions are met in ways dependent on the type of valve and an Index (see below) sets out which conditions apply to particular groups of valves.

1) Filament Life

For many groups the general principle relates to guaranteed filament life. The groupings are for 1000 hours (2/1000), 1500 hours (2/1500) and 2000 hours (2/2000). Thus, for group 2/1000: -

"This valve is guaranteed against defects in manufacture for a period of 1,000 hours of filament life. Should the valve fail under normal treatment with a life of less than 100 hours it will be replaced free of charge. Should the valve fail with a life of between 100 and 1000 hours it will be repaired or replaced at a charge proportionate to the expired portion of the guaranteed life calculated to the nearest 100 hours of life. This guarantee expires two years from the date of sale to the original user."

Note. For the other groups, the wording is the same except for the insertion of the appropriate hours after the oblique. Note the restriction to the original user,

However, within these categories there is a special group 2/2000R, for which the conditions are: -

"2/2000R

This valve is guaranteed against defects in manufacture for a period of 2,000 hours of filament life. Should the valve fail under normal treatment with a life of less than 100 hours it will be replaced free of charge. Should the valve fail with a life of between 100 and 2,000 hours it will be repaired or replaced at a charge proportionate to the expired portion of the guaranteed life calculated to the nearest 100 hours of life. This type of valve will be repaired (not more than three times) provided it is in repairable condition, and any allowance will, therefore, be calculated in relation to the cost of repair in accordance with the following formula: -

P = 100 (G-H) divided by G

Therefore C= R-RP
Where P = Percentage credit
G = Guaranteed minimum life.
H = Actual life attained.
C = Charge to customer.
R = Cost of repair.

This guarantee expires two years from the date of sale to the original user."

2) Period of usage

There are further categories of 3 months (3M) and 6 months (6M), with simple replacement free of charge for failure within these periods. However, category 12 months (12M) is more detailed: "12M The valve is guaranteed against defects in manufacture for a period of 12 months from the date of its being first put into service. Should the valve fail within one month it will be repaired or replaced free of charge. Should the valve fail after one month but before 12 months have elapsed it will be repaired or replaced at a charge proportionate to the expired portion of the guarantee period calculated to the nearest month. This guarantee expires two years from the date of sale to the original user."

3) special

Finally, there is a SPECIAL category for which a guarantee period is agreed between Mullard and the manufacturers of the equipment in which the valves are to be used; details will depend on exact conditions of use etc.

The index to guarantee periods

A list totalling 87 individual valves and 6 groups of special valves is included; the following excerpt shows the general pattern.

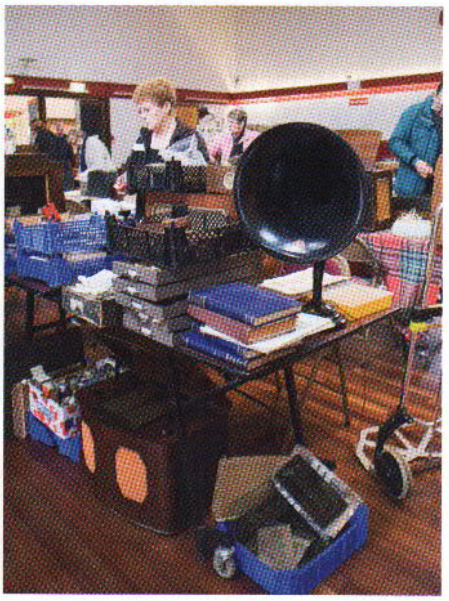
MZ1-100, QQV5-P10, QV1 –150A.....2/1000
QY5-3000A, TY12- 25W.....2/1500
RG1 -240A, XR1- 3200.....2/2000
TX10 – 4000.....2/2000R
QQVO3 –10.....3M
XG2 –12.....12M
JP9 Series.....SPECIAL

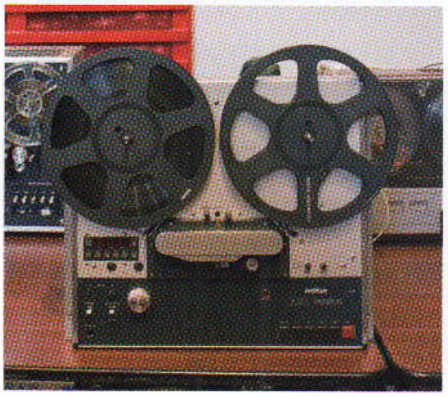
Cold cathode tubes, Electrometer tubes, Instrument/Monitor CRTs, PE Cells, Stabilisers and Radar tubes are all category 3M.

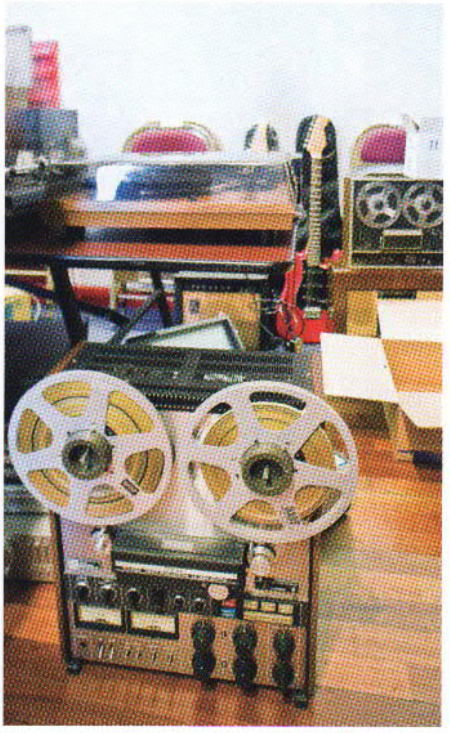
Probably very few of these will be familiar to most electronics enthusiasts, but this does serve to show not only that there was a vast range of valves used in industrial and commercial equipment but also the lengths to which Mullard were prepared to go in order to give good service. It is somewhat of a contrast to the usual slip of paper sometimes found in the flimsy wrappings of the 'domestic' run of products. However, in the unlikely event of anyone today using one of these valves and experiencing failure, I think that the expiry date of two years will probably preclude any success in approaching Mullard for replacement!

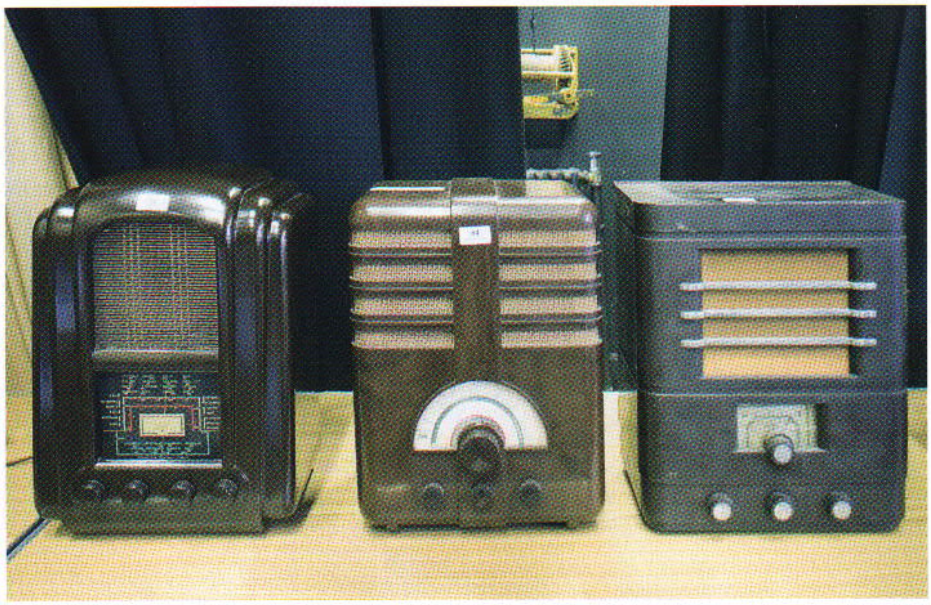
So now I can go back to sorting the rest of the valves found in Grandpa's attic.

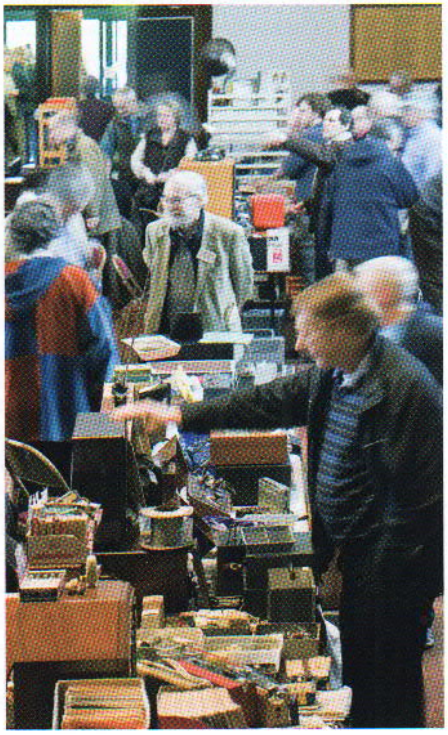
Pictures from Harpenden photography: Carl Glover

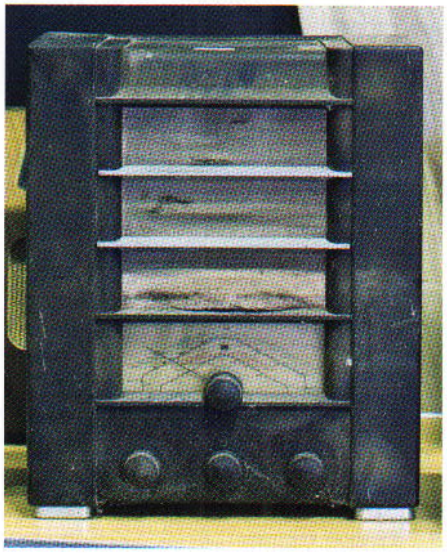










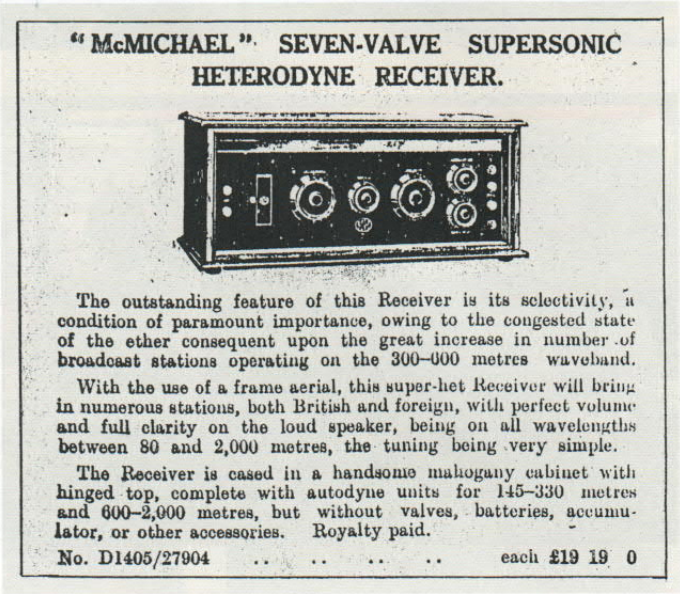


Mullard

The McMichael seven valve supersonic heterodyne receiver

by LL Williams

Seven valves covering 80 to 2000m in four wave bands, variable selectivity down to as narrow as 4kHz, a low noise frequency changer, it will handle signals over a 70 dB input level range. A late 1930's high performance communications receiver? No. This is a 1925 broadcast receiver and it was British.



"McMICHAEL" SEVEN-VALVE SUPERSONIC HETERODYNE RECEIVER.

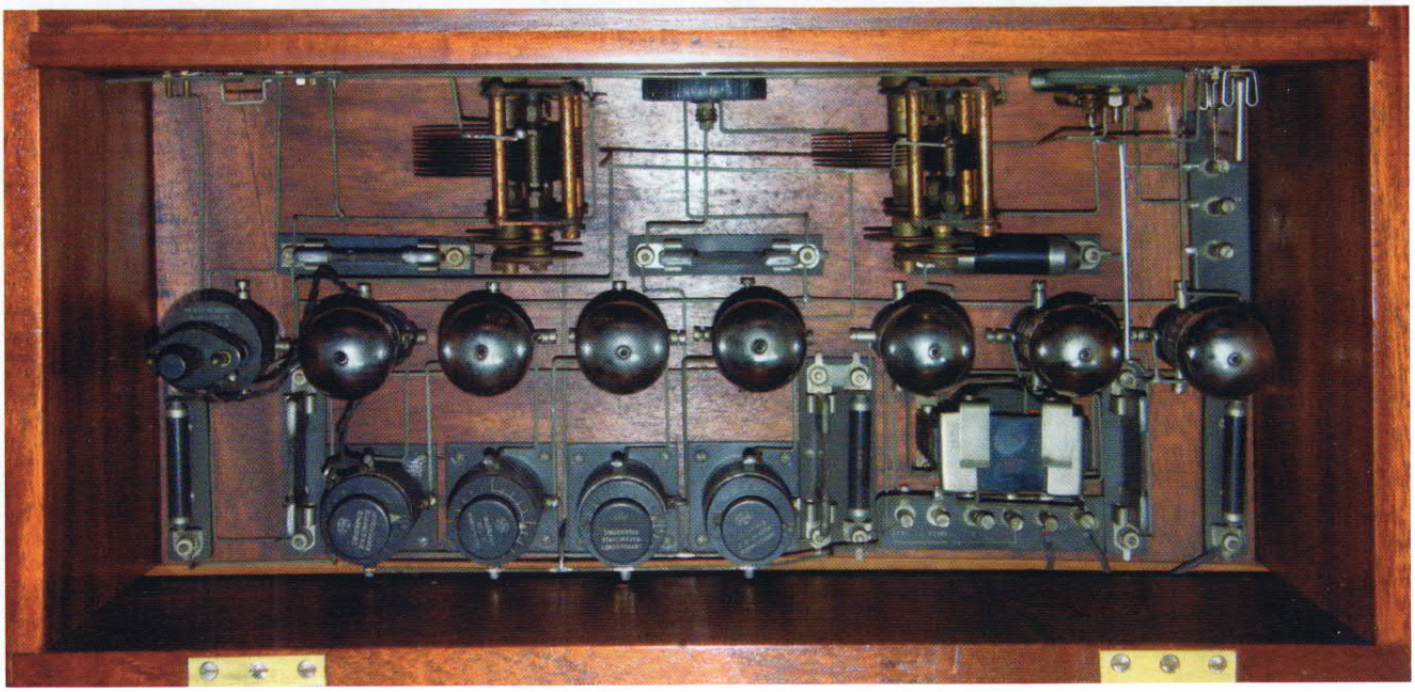
The outstanding feature of this Receiver is its selectivity, a condition of paramount importance, owing to the congested state of the ether consequent upon the great increase in number of broadcast stations operating on the 300–600 metres waveband.

With the use of a frame aerial, this super-het Receiver will bring in numerous stations, both British and foreign, with perfect volume and full clarity on the loud speaker, being on all wavelengths between 80 and 2,000 metres, the tuning being very simple.

The Receiver is cased in a handsome mahogany cabinet with hinged top, complete with autodyne units for 145–330 metres and 600–2,000 metres, but without valves, batteries, accumulator, or other accessories. Royalty paid.

No. D1405/27904 .. .. each £19 19 0

Although the company was always known as McMichael, it was a partnership between Leslie McMichael and Benjamin Hesketh who was the circuit designer, hence the MH monogram which was engraved on the panels and most of the component parts which they made for themselves for the early sets. The rest of the title of this article, 'Supersonic Heterodyne Receiver', I think also merits a short note. The name of the circuit was of course later contracted to the familiar superhet but its origin testifies to an era when the only man–made objects to travel faster than the speed of sound were rifle bullets. Supersonic therefore meant frequencies



beyond the upper limits of human hearing and not faster than sound. Just after the end of World War Two aircraft attained the speed of sound and were termed supersonic and to avoid confusion, frequencies above audibility were designated ultrasonic but we never changed the name of the set to ultrahet.

Early British superhet broadcast receivers are very rare and for good reasons. They were very complex and expensive compared to simple TRF circuits which were quite adequate for pre–1930 broadcast band reception. This one retailed at £19.19s without batteries, accumulators or valves, which meant that to have a working set you would have to lay out close to £40 which was close to a year's pay for a working man in 1925. The superhet was principally an American development and the few British companies making a superhet receiver in the mid 1920's tended to copy American designs. This set is all British. Both McMichael and Hesketh were radio amateurs and much advanced receiver design has been done by amateurs because they require to communicate over long distances without benefit of the high transmitter power and large aerial arrays available to commercial operators. Consequently they need the highest possible receiver performance. This set represents what the most technically advanced British radio amateurs built in the early 1920's. It was sold as a broadcast receiver but short wave bands and variable selectivity was certainly not a requirement for broadcast receivers.

Right from the earliest days the McMichael objective was the highest achievable quality in performance and construction and that is what they did. When you look at this set, every detail is the finest available in its day. The wooden base–board on which the circuit is built is the finest mahogany, but it is not just a piece of wood, it is made in three sections with two end pieces with the grain at right angles to the centre piece, joined with a thick tongue and groove in the way in which wooden drawing boards were made so that they would never warp. The coils and IF transformers are on formers machined from solid ebonite bars as were the valve holders. The capacitors and resistors were specially made for the job and each part was engraved with the MH monogram and filled with red wax. They were proud of what they made. The wiring is in bare, square section tinned copper jig, bent before assembly to produce consistent circuit strays and when two conductors cross they cross at 90 degrees to minimise stray coupling. The layout is a classical in–line construction running from frequency changer to audio output in a straight line to achieve a lot of gain without screening, by keeping the high signal level stages physically separated from the input end. In every respect this set gets my vote as the best of British in 1925. It was a no–expense spared piece of high technology designed for those who wanted the very finest and could pay for it.

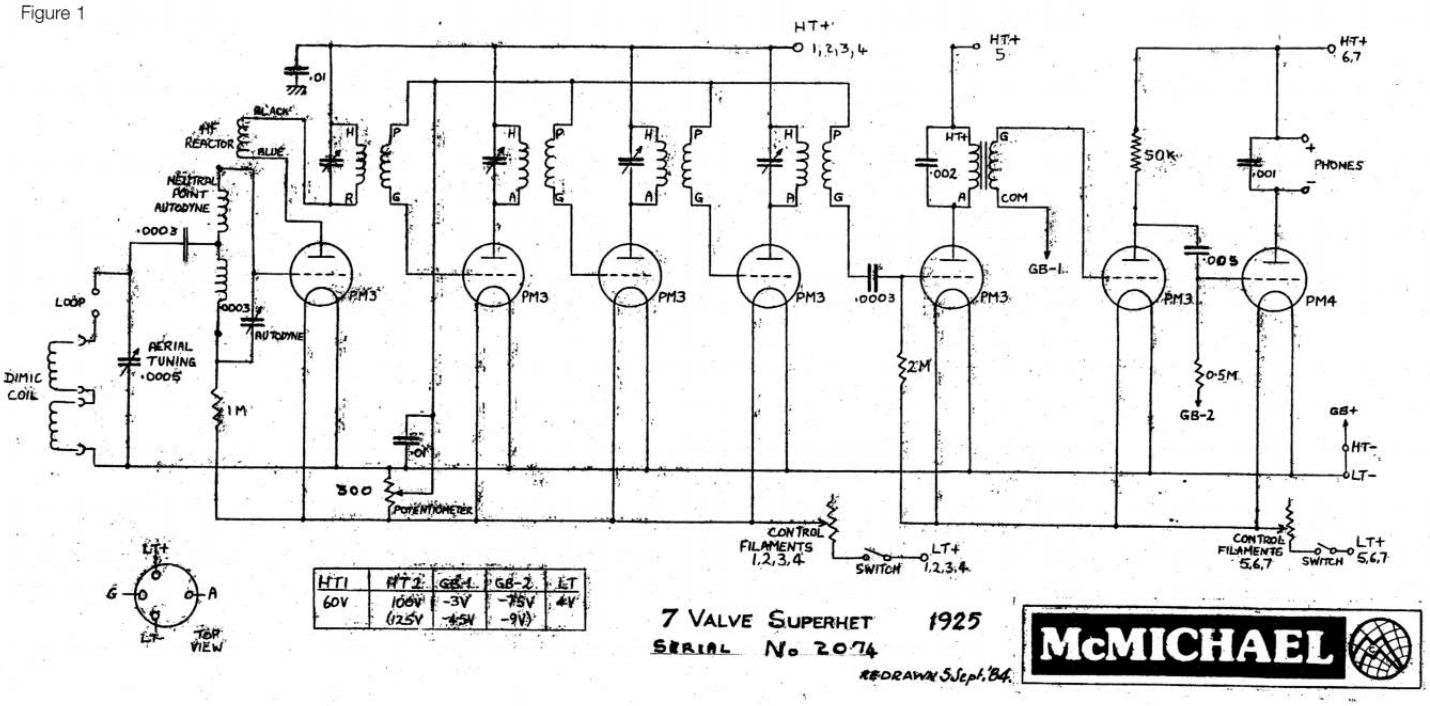
My acquisition of this set was quite a saga. I came across it in the early 1980's and it was in the hands of one of those collectors most of us come across from time to time, who will never sell anything even if they don't want it, but will swap it for exactly what they want and nothing else. This one didn't think much of the McMichael. "It was an old–fashioned thing on a wooden board – not a proper radio with a chassis and in a bakelite cabinet that ran off the mains". It had been stripped of "everything of value". The cabinet, which was a nice piece of wood, the valves and the two filament rheostats which were good for battery chargers, otherwise it was complete and as soon as I saw it I had to have it; but he wouldn't take money for it. The price was a late 1930's Philips bakelite radio of one specific type and nothing else!

I eventually located the required Philips in the hands of another "won't sell, will only swap" collector. Are they unique to the Midlands or do you have them in your area? This time the price was three new boxed BSA valves. These really are rare but I knew where there were some. A local dealer had recently cleared an old radio repair shop which went back to the 1920's and spent two days destroying the accumulation of fifty years of uncollected repairs. "Terrible old rubbish – the attic was absolutely filled with it. Some of the sets were ever so old, they filled two skips but I sorted out the good stuff." The "good stuff" was anything of recent manufacture and the accumulated stock of boxed valves. Most of the valves were modern miniature all–glass types, but the dealer had separated some big ones, "no good for TVs" and had a large cardboard box of them including three new boxed BSA valves and some very useful vintage types. He wouldn't sell me the BSA valves; his sticking point was £40 for the whole box full. I didn't really want them all but even in the early 1980's when £5 would buy a very collectable radio, there was a lot more than £40 worth of rare valves in that box, so I gave him £40 and so acquired the McMichael and a very good supply of rare old valves. The valves in that box I sold over several years at Harpenden and the proceeds paid for a V2 and a set of valves for the McMichael. It was the best £40 I had ever spent.

Having got the set, I began restoring it to full operable condition. My collection isn't for looking at, it is for operating. In this endeavour I had the good fortune to contact via the BVWS a fellow member who was then curator of the McMichael Museum. He had restored a similar set which I now believe is in the British Vintage Wireless and Television Museum. To carry out the restoration, several incomplete sets were used and consequently a lot of parts were left over. I was given two rheostats and a print of the McMichael circuit diagram which proved to have detailed differences to the detector stage in my set. My set was undoubtedly in untouched original condition but it is an earlier construction than the museum one. I assume there was a bit of circuit development here and from the changes I can guess why.

Having obtained the filament rheostats I put some valves in the sockets and checked

Figure 1



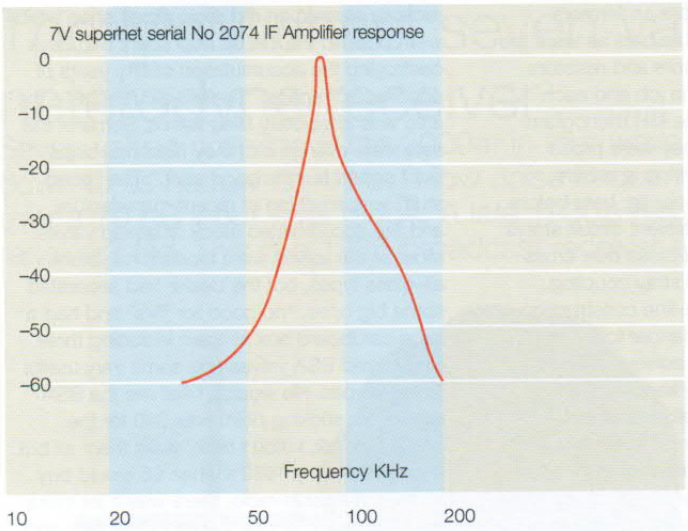


Figure 2

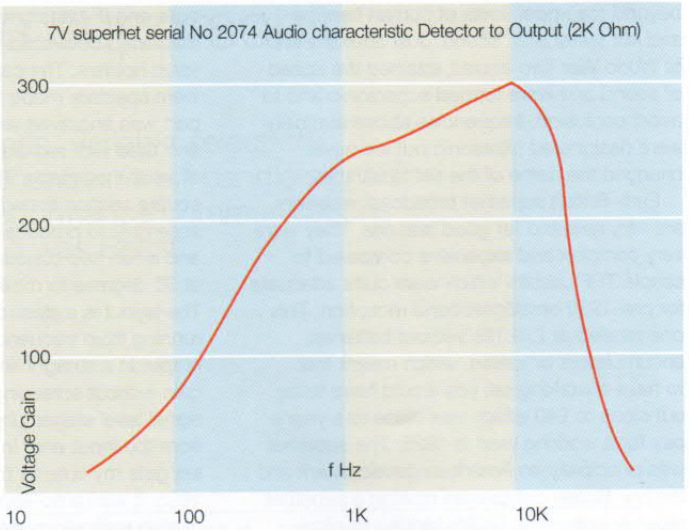


Figure 3

out all the circuits with LT and HT applied. No valves were supplied with the set as supplied by McMichael and any GP battery triodes should do but the circuit design requires 4v filaments for reasons I will go into later. The circuit diagram I was given says PM3's but I'm sure I saw the museum set at Harpenden in the early 1980's with R–types lighting up the inside of the cabinet with their very bright filaments. R–types are very likely, being quite cheap at eight shillings in 1926 compared to one pound, two shillings and sixpence for PM3's, but they consume seven times the filament current. Eight unused PM3's (seven plus one spare) proved unobtainable, so in the end I settled for unused "Radivac" (Dutch) 4v triodes with thoriated tungsten filaments, gettered and with top pips they look at home in there. With valves installed everything was working fine, but the IF tuning was all over the place.

Each IF transformer has a small compression type mica trimmer built into the centre of the coil former. The trimmers have a knob with a pointer and a scale calibrated with a zero at the mid point and plus and minus calibrations on either side. A pin in the scale prevents the pointers from going more than half a turn either side of zero. Obviously this is the variable selectivity arrangement. With all four pointers at zero all IF's are at the centre frequency and selectivity is maximum (about 4 kHz at –6 dB in my set). By turning the four IF knobs alternately plus and minus, the IF's are staggered and bandwidth is increased. Memorise the IF dial settings for the bandwidth you require and it takes only seconds to lift the lid and set the dials. Unfortunately someone had discovered that undoing the locknut on the pointers leaves them free and defeats the stop pins in the dials and you can then rotate the knobs until the trimmers go solid or the screws fall out. Easy enough to correct – just disable the conversion oscillator and inject a signal into the mixer grid and align the IF's, set the pointers to zero and lock them with the knob and shaft.

One question – what was the designed centre frequency? About 70 kHz was common in early superhets of this type. Some of the trimmers were at maximum compression before the resonant frequency got as low as 70 kHz. In the end I settled for 85 KHz where all the trimmers were near mid–range. Coincidence? 85 kHz was a standard IF with transformers manufactured until the mid 60's for the third IF in triple conversion communications receivers.

I now had a complete fully operable set except for one thing. Superhets of this type always operated with a frame aerial for sound technical reasons. The front panel has two terminals engraved 'loop' which is where it is connected. If this set operated down to 80 metres the frame aerial certainly wasn't like any of the frame aerials I have ever seen at a BVWS swapmeet.

I came across a sepia photograph of a 1924 amateur station with a receiver looking very much like mine and beside it was a very small diamond frame aerial on a stand. It had to be small if it went down to 80 metres. I scaled its dimensions by reference to things of known size in the picture and counted the turns in the spaced winding and did a rough calculation. It would resonate at about 75 to 200 meters with the set's aerial tuner. Round the outside of this I put another winding with all the turns in a single slot to cover 300 to 800 metres. With a 2 mic (2 mH) McMichael Dimic coil in the loading coil socket on the front panel the coverage extends to 2000 metres. I don't know if this is really how it was done but it certainly covers 80 to 2000 metres in four bands with the two plug–in oscillator coils provided.

I now had a fully working set which would receive medium and long wave broadcasts from all over Europe on a small frame aerial and in addition would receive AM signals on the 80 and 160 metre amateur bands. No doubt Ben Hesketh always knew it would.

One thing was lacking. I purchased some genuine mahogany at great expense and my old friend Ron Jones, with whom I travelled all over the country to BVWS meetings when we were both younger, made me a reproduction cabinet. Ron, as those of you who know him will testify, is a master craftsman in wood or metal – but please don't ask him to make anything for you as he cannot do it any more.

That's the anecdotal bit – now to the how and why of what to me at least, is a very interesting bit of mid–1920's hi–tech, starting with the frequency converter. Early superhets almost always use an autodyne converter which was patented in 1913 as a heterodyne detector for Morse reception but it was implicit in the circuits operation that it could heterodyne a signal to any desired frequency. It didn't have to be audible, it could be supersonic. The autodyne as used in the early superhets had some serious shortcomings but in some respects it far outperforms the multi–grid converters which came later and for this reason was used as a converter for VHF, FM sets and VHF television sets after World War II. The vices of the autodyne were overcome by a separate oscillator in a few very early sets and the superiority of triode mixers over multi–grid types caused them to be preferred because of their superior noise and inter–modulation performance for the very highest performance communications receivers, until the end of the valve era in the late 1960's.

The oscillator tuner in my set is engraved "Autodyne Capacitor" Don't believe everything that you read. The converter in my set is not an autodyne, it is a circuit called a tropodyne. The McMichael circuit calls it a neutral point autodyne so this may be the first appearance of the tropodyne before it got its name. You may think it very pedantic of me and the McMichael name is quite accurate, but I feel that when a well known circuit has been modified to eliminate two major defects it deserves to be distinguished by a new name. The autodyne is a tuned plate grid (TPTG) oscillator with the aerial coupled to the grid. TPTG oscillators can only oscillate at a frequency which is not the resonant frequency of either the anode or grid circuits which must be tuned to slightly different frequencies to obtain oscillation. The feedback path in a TPTG oscillator is anode to grid capacity which would these circuits be purely resistive, be negative. With both the resonant circuits at a slightly different frequency, oscillation will automatically take place at a frequency where one circuit is above and one below resonance causing sufficient phase shift in both anode and grid circuits, one lagging and the other leading, to change the feedback to positive.

The problem is that any attempt to tune the grid circuit to the signal frequency will change the frequency of oscillation, changing the IF frequency which must be returned to the correct value by retuning the anode

circuit to get the oscillation frequency right. The other problem with an autodyne is that the oscillatory frequency is coupled to the aerial and radiated, causing interference. The tropodyne addressed both of these problems. The feedback for oscillation was obtained by a winding in the anode circuit coupled to a tuned circuit at the grid. The frequency of oscillation was therefore solely determined by the grid tuned circuit. The grid coil is centre–tapped and the circuit is so arranged that at the centre tap the oscillator voltage with respect to earth is zero (the neutral point). The aerial tuned circuit which can now be tuned to the wanted signal, is coupled to the neutral point so that the oscillator voltage is not applied to the aerial circuit but signal and oscillation are superimposed at the grid where rectification by the grid and filament diode generates the desired difference frequency (the IF), and also an image response from any incoming signal differing from the wanted signal by twice the IF. I trust that any reader who worked their way through that bit, will at least understand why I insist that a tropodyne is different to an autodyne even if they still think I'm pedantic.

The image frequency response is the weakness of all single conversion superhets with low IF's. The image frequency is strongly attenuated by the aerial circuit which weakens it, but if there is a strong station at the image frequency, because the IF is low and it is only slightly off tune, it may appear with the wanted signal. Higher IFs were only really practical with the advent of screened grids and pentodes for IF amplification.

There is one final aspect of the design of this converter which must be mentioned. Only two plug–in oscillator coils are supplied for four wave bands. Examining the oscillator wave–form shows it to be very asymmetrical, ie. it has a very strong second harmonic component. One band is tuned using the oscillator fundamental; the next higher frequency band is tuned by changing the aerial circuit and using the oscillator second harmonic. Two coils, four bands.

Now we come to the IF amplifier. This provides the set's sensitivity and selectivity using three identical transformer–coupled amplifier stages. Each of the four interstage transformers has a tuned primary and an un–tuned secondary with twice as many turns. This provides what is by the standard of mid 20's sets, very high selectivity. The curve of Figure 2 was taken with all IF adjusters zeroed. The high gain available needs to be adjusted to suit the signal strength and the usual method of reducing filament temperature is quite inadequate. The grid to filament voltage varies from one end of the filament to the other by four volts thus returning the grid circuit to the positive leg of the filament causes the valve to draw more anode current and have a higher mutual conductance than would be the case were it returned to the negative leg. The potential gradient along the filament gives the valve a pseudo variable–mu characteristic. The circuit designer has put a potentiometer across the filaments of the first four valves and returned the IF amplifier grids to the slider thus providing an IF gain control. Controlling all three IF valves cubes the gain variation obtainable with a single stage, giving a very useful gain control. At the maximum gain available, my IF amplifier goes unstable, oscillating at about 120 kHz. There is a hump on the selectivity curve at about 120 kHz indicating that there is some positive feedback at that frequency. I think one of the amplifiers becomes a TPTG oscillator with the grid winding self–resonant; not surprising with an un–neutralised triode. The gain is however more than adequate long before the point of oscillation is reached. The valves I am using certainly have more gain than R–types. A maximum stable gain of just over 80dB was measured with the filament rheostat at 85% and the potentiometer at near minimum.

An idiosyncrasy of my set is that the potentiometer is wired so that it is rotated anti–clockwise to increase gain. Turning the gain down very low to handle very strong signals requires turning the filament current down, which has some unpleasant effects, no doubt because it also affects the oscillator, so I turn the frame aerial off the signal. I expect that is what the old time operators did.

The detector is a standard grid leak circuit without reaction. I have seen superhets with grid leak detectors and reaction but this set has no need of reaction to enhance sensitivity and selectivity, and not using it eliminates a critical adjustment. The detector plus inter–stage transformer produce considerable audio gain and the following RC coupled stage produces a further voltage gain of about twenty times before the output stage. The output terminals are engraved 'Telephones' but this stage is quite capable of driving a high resistance horn speaker to a considerable volume.

The frequency response of the audio stages (fig.3) requires some comment. The low frequencies rise about 6dB per octave up to 1 KHz which leaves the output lacking in bass, not that horn speakers of this period have much bass response. Using the IF's at narrow bandwidth cuts the side bands, leaving the output lacking treble and this characteristic, deliberately created by using a very small coupling capacitor, is probably an attempt to compensate for loss of treble. The inter–stage transformer has its primary shunted with a capacitor to produce a peak at about 10 kHz which is not a good idea. AM transmissions usually only went up to a little above 4 kHz to limit bandwidth and all there is at higher frequencies is unwanted noise. I don't know when 9 kHz channel spacing for AM became standard, but it would be necessary with the increasing number of broadcast stations and the 9kHz superhet whistle, caused by the adjacent channel carriers, required the higher audio frequencies to be removed. The museum set has a filter in the detector output.

When I was young I thought that the development of radio receivers was a progression from crystal sets to valves then TRF sets, then superhets because that was the progression in most radio books, and if we built radios it was also our progression. Later I found out that superhets went back to the early 20th century long before the advent of broadcasting made crystal sets popular. Now superhets are almost the only surviving form and are still the subject of some development after almost 100 years, the last 50 of which have seen circuitry change almost beyond recognition. This set was one of the first steps on a long road.

Off the box

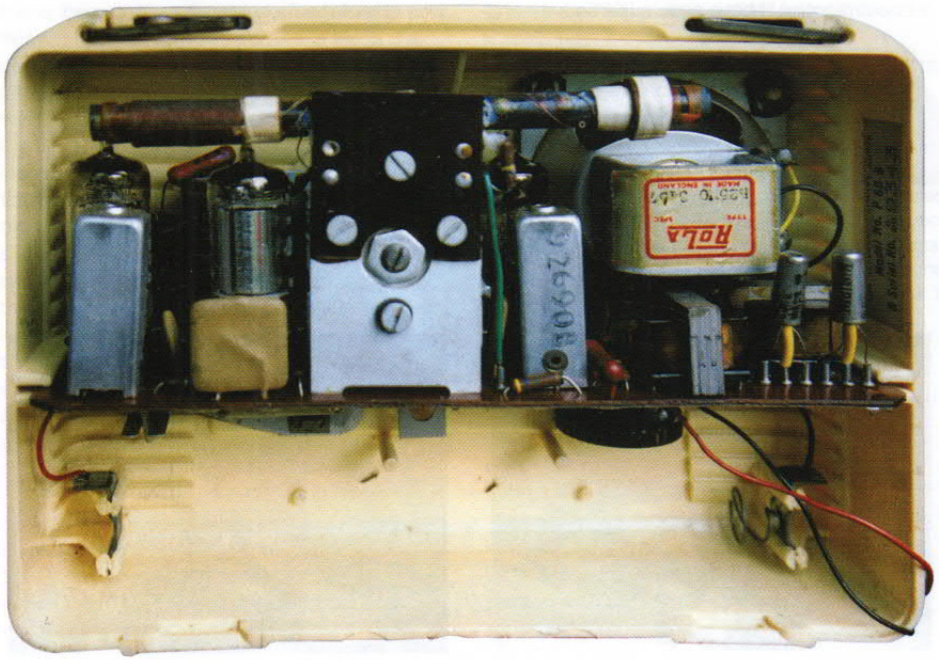
Dicky Howett writes, "The late John Cura wasn't the only person 'telly snapping' away. I plonked my box brownie in front of the tv screen many times. However, can 1950s BBC OBs have been quite so out of focus? I suppose we just all got used to it: The indifferent resolution of domestic receivers. Nowadays, the reverse seems to apply. HD pictures are just too 'sharp' for me."

Marconi's hybrid – the P60B by Peter Nash

The arrival of the transistor did not immediately spell the end of thermionic devices in receiver production. The early transistors were initially confined to low power, low frequency applications. Gradually, the availability of devices and circuit techniques improved until it was possible to economically transistorise all stages of a superhet receiver. Transistors gained a more gradual acceptance for television applications which led to the profusion of so–called 'hybrid' chassis where valves and transistors were used together.

By contrast, there were comparatively few hybrid radios produced: the transition to semiconductors was much more sharply defined than with television. The subject of this article, the Marconi P60B, is one such hybrid radio dating from the late 1950's. It is a two band battery operated portable employing three valves and two transistors.

Upon first seeing the Marconi, its compactness will surprise especially when compared with similarly styled portables. It is much smaller than and does not possess the chunkiness of the KB Rhapsody series. Place it next to a Bush TR82 or MB60 and it will be positively dwarfed. Whilst the KB and Bush have a certain weight and solidity to them, the Marconi is of much lighter construction. Pulling up the carrying handle offers another surprise: the plastic is very thin in the middle section, but the outside edge being chamfered and slightly rounded gives the illusion of substance. It feels too weak for the job. Fortunately, it can be just as easy to carry the set without the handle. The plastic housing consists in the most part of dominant horizontal ribbing back and front, which endows it with a very tactile quality. Wherever you grab hold of this set you will have a good grip. Underneath the radio lurks another surprise: a small slot intended for inserting a coin and twisting as a means of removing the back cover. Normally, one would expect this only on smaller pocket sized receivers.



Once the back cover is carefully removed, the light construction is immediately obvious: it is an early example of manufacturing to come. A PCB is slotted into a fairly thin plastic case. There is absolutely no wasted space. Indeed, if the receiver were to be fully valved, it is difficult to see where the extra valve would have been placed. Inside the back cover is a label giving very explicit instructions for battery replacement. By implication, it also provides a lesson on how batteries used to be, ie cans with a cardboard sleeve. The instructions were to place three cells in a row (observing polarity of course) after having removed the sleeve from the central cell completely, slide the sleeves from the outside cells so that they partially enclose the centre cell. This way, the three cells are formed into a tube which does not keep springing up in the middle. The HT battery was a block which was fastened to the studs on the back cover by a rubber band.

Let us now take a look at the circuit.

The circuit

The power requirements are 4.5 volts (LT and transistor supply) and 67.5 volts HT. The early stages of the receiver follow along completely conventional lines for a late generation valved portable. Signal pick up from the ferrite rod aerial is passed to the frequency changer stage, headed by the first valve, DK96. Signals are converted to the IF of 470 KHz and passed to the next stage of amplification by pentode DF96. Signals are then coupled to the detector diode within the third valve, DAF96. After being filtered and passed to the volume control, the required level of audio is amplified by the pentode section of the DAF96. This is where the receiver departs from convention. Normally, the amplified signal appearing at the anode of the DAF96 would be capacity coupled to a DL96 output valve. Instead, the anode, via a coupling transformer, drives a transistorised push–pull output stage featuring a pair of Mullard OC72's. The maximum output power

My own example of the Marconi was original apart from the HT decoupler which had been replaced by one of the grey RS types.

available is probably in the region of 200mW.

There is a preset resistor used to set the working point for the output transistors, but it is also in series with the valve filament supply. On the face of it, this seems a strange thing to do: why should the valve filament current be linked to the output stage bias? Closer study reveals the answer is as smart as it is simple. As the LT supply is nominally 4.5 volts and the total valve filament requirement is actually 3 (valves) x 1.4 volts = 4.2 volts it is desirable to drop a fraction of a volt so as to not overrun the valves, especially with a new battery. The fractional voltage dropped across the preset resistor is not wasted but forms the bias voltage for the output stage. The voltage is developed across the lower arm of a potential divider. The upper arm is formed by the filaments of the three valves in series. There is also another aspect to this arrangement. It provides a degree of bias stabilisation. This works because the valve filaments exhibit a positive temperature coefficient. The filament's resistance rises slightly with temperature. In the interests of research, I decided to check this.

I wired the filament pins of one of each valve DK96, DF96, DAF96 (same valves used in the Marconi) in series and measured the current drawn for a range of expected applied LT voltages. The equivalent resistance could then be calculated.Over an applied voltage rising from 3.7 to 4.3 volts, the resistance increased by approximately 12 ohms, representing a change of roughly 7%. Thus, with a falling battery voltage, the upper arm of the potential divider is able to compensate some way by increasing the forward bias to the output stage. How much difference this makes aurally is open to conjecture. I suppose the accountants at Marconi Sales would have been very happy that all of this was achieved at the cost of only one preset resistor!

Repairs

My own example of the Marconi was original apart from the HT decoupler which had been replaced by one of the grey RS types. I cautiously applied power and was rewarded with reception of some stations on the medium wave band, but as the LT current consumption was about twice as much as I would expect, switched off again. Long wave was dead.

Investigations revealed the preset resistor which sets the output stage bias had succumbed to 50 years of oxidation leading to a higher and uncertain contact resistance. This in turn caused the output stage to draw excessive current. I did not have a spare preset resistor available to the same pattern, therefore elected to replace it using fixed resistors to make up the required value. By taking a physical measurement of the resistive track and where the slider had been set, it was a simple matter to deduce the resistance. By backing this up with some tests, it was confirmed that the value chosen was indeed a sensible compromise between battery economy and audio performance. A second component up for replacement was the LT supply decoupling electrolytic which had developed an intermittent short circuit.

Total loss of long wave reception was cured by resoldering one of the fine wires which had come adrift from the long wave aerial coil. We now had a fully functioning receiver offering complete long and medium wave coverage.

Now that the Marconi was operating reliably, the next job was to see if it could be fitted with modern day batteries and returned to portable use. Fortunately, the modern day C sized cell is a direct equivalent of the specified U11 cell. Just three of these in series takes care of the LT requirements. The HT side required more thought: the B139 originally used has now been extinct for probably over 30 years. I thought it should be feasible to make up the required supply using a battery of PP3 cells in series and fastened to the studs on the back cover by a rubber band in the spirit of the original idea. The only trouble was that there was just enough room to accommodate eight PP3 cells (giving 72 volts) but not with the connectors which snap on the top. The only solution that I could think of here was to re–use old connectors

The big advantage of owning the Marconi in 1958 would have been that of battery economy.

taken from dead batteries with wires soldered to the sides to save vertical space. A piece of cardboard would be needed as an insulator to prevent the live connectors contacting the print side of the PCB.

Work to the receiver was not quite finished yet, for although I had been most careful to monitor the current consumption when the set was switched on, I had neglected to check this when the set was switched off! After the batteries had been fitted and the radio was in regular use, it became apparent that the former were running down even if the set had not been switched on for a few days. This was caused by a continual leakage current of 3 mA through the LT section of the switch when it was open! There was no obvious conductive path for the leakage current and visually the switch appeared clean. Replacement of the control was out of the question, it being of a non–standard pattern. Repair was also deemed unviable because the assembly looked far too fragile and fiddly to work on. Instead, I tried a kill or cure approach and flashed the switch with about 60 volts. After this, the leakage current was considerably reduced, in fact under 10 micro amps. Not perfect, but much more tolerable. Sometimes we have to nurse these radios with unorthodox means!

In use

Using miniature output components and loudspeaker, the reproduction predictably lacks bass. Fortunately, it also lacks a corresponding amount of treble, so that the overall effect is balanced and not as tinny as it could be. Set to a moderate volume, it is quite easy on the ear, the limited top response being very useful for filtering out adjacent channel splatter which is so prevalent in the evenings. There is less AF gain to hand than if the receiver had been fully valved: that DAF96 is working into a much lower load than is usual. Nevertheless, with the volume set to around 70% there is adequate sound for the average sized room, although it will never rattle any windows!

RF performance is reasonable for the class of set. Long wave pick–up, which is quite good, is fully tuneable despite '1500' being the only annotation on the dial.

The cream housing and maroon controls so typify the period it is from. The neat styling fully exploits the available material and savings in space offered by the miniature components. Out of interest, I compared the dimensions of the Marconi against one of the more compact valve attaché case portables, which would have been contemporaneous. I chose the Pye P114BQ. This is also battery operated and works very well. The Marconi has only 40% of the volume of the Pye. Much handier for slipping into a bag and taking down to the beach or a picnic. There again, the Pye is much more robust, with the sturdy wooden cabinet walls being a good 10mm thick on my example. By comparison, the Marconi is housed in a fairly thin, fragile case only 2.5mm thick. It seems that few Marconi P60B's (or the HMV variant, 1410) survived, it may be that many of these succumbed to the rigours of rough handling.

The big advantage of owning the Marconi in 1958 would have been that of battery economy. With an HT consumption of just 4 mA and LT drain a mere 30mA (unless it was set too loud) it would play your favourite programmes for hours on end just about anywhere.

An interesting receiver, embracing both kinds of technology and turning in a creditable performance for its day.

Letters

Credit where Credit is Due
In my article 'A Short History of the Re-Echo Company', published in the Spring 2009 issue of *The Bulletin*, I had omitted from my final draft the intended list of credits. I would like to thank the following:

The National Archives, Kew, for allowing publication of the Re-Echo Electrical Manufacturing Co. Ltd. letter.

Ian Sanders for proof reading an early draft, for allowing me to publish his images of advertisements and for his support and encouragement in writing the article.

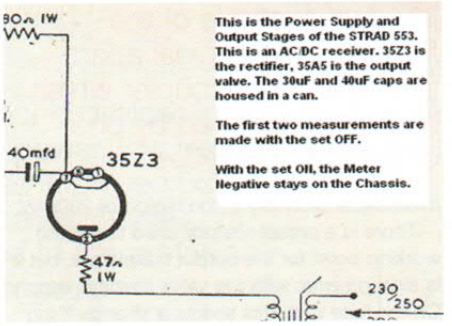
Lorne Clark, with my apologies.

Dear Editor
I went to the last BVWS workshop day at Gerry's in West Dulwich and since he has a well-known interest in all things to do with vintage television I showed him an interesting illustration from the Radio Times of November 11, 1932 (ten years of broadcasting issue). I thought it deserved a wider audience (see image below). it was done by accomplished artist Stephen Spurrier because the conditions in a 'live' Baird TV studio precluded photography. Note the pageboy appearing in the bottom right to show the heavy makeup needed for the 30 line system. I copied it actual size so the subscript remained legible.

Anthony Hopwood

Dear Editor
The 'Beginners Guide' in the last issue of the Bulletin, shows in Fig 1, the basic diagram of an AC power supply.
The text in the 'window' of that diagram states that the receiver is AC/DC. when it is clearly an AC only model. Although the valve heater arrangement is unusual, the valve heaters being wired in series from the secondary of the mains transformer, it is by no means unique.

As this article is aimed at 'beginners' in a very respected publication, I feel that this should have been noticed prior to publication.



In any event,that the overall article is meant in 'good spirit' I don't doubt but I have to say the information is very generalized and proper warnings regarding a safe approach to the repair and service of mains powered receivers is not dealt with, in a proper manner, at all.

I feel that any 'beginner' should be directed towards publications like "Valve Radio and Audio Repair Handbook" by Chas. E Miller who tackles the subject in a responsible and practical way.

Perhaps as Editor, you could bear these points in mind for future items of this nature.

I do normally enjoy The Bulletin, it is very well produced and presented in all other aspects, so keep up the good work.

Regards,
Stephen Nelson. Retired Radio and Television Service Engineer.

Dear Editor
The 'Beginners Guide' is useful but there's a safety issue on page 36. Dealing with the hazard of asbestos dust, the author recommends being downwind of it when I think he means upwind!

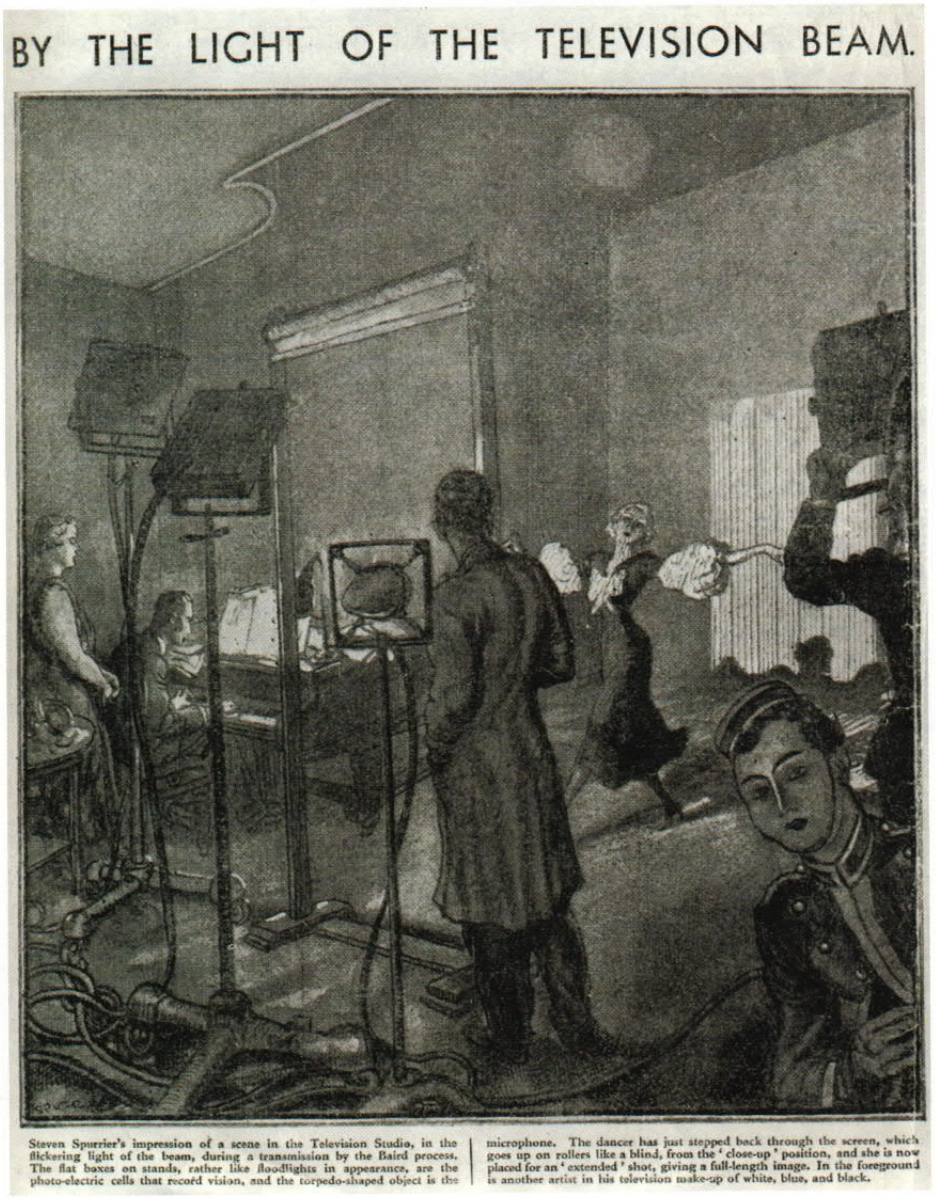
Yours,
Douglas Morgan

Dear Editor,
Since the appearance of the sheets with the newsletter offering capcitors suitable for valve radios I have been questioning the need to buy 50 capacitors of the same value. I'm sure there are others like me who probably will only restore or repair 2 or 3 radios in the next 10 years who would be interested in buying a dozen of each value to have on hand. If others feel as I do perhaps the committee would consider offering the capacitors this way.

Regards,
Allan Way

Dear Editor
I am a relatively new BVWS member and have enjoyed my membership to date and reading The Bulletin. However, I am somewhat concerned about the bad feeling that seems to have arisen regarding the degree of restoration necessary for a vintage wireless.

I am happy to own and display a receiver that looks its age provided the cosmetic faults are not too off-putting. For me it is mostly a case of whether the receiver has the potential to work. There are also



Steven Spurrier's impression of a scene in the Television Studio, in the flickering light of the beam, during a transmission by the Baird process. The flat boxes on stands, rather like floodlights in appearance, are the photo-electric cells that record vision, and the torpedo-shaped object is the microphone. The dancer has just stepped back through the screen, which goes up on rollers like a blind, from the 'close-up' position, and she is now placed for an 'extended' shot, giving a full-length image. In the foreground is another artist in his television make-up of white, blue, and black.

collectors who prefer their receivers to look as close to mint condition as possible. I would not like to predict whether future generations of collectors will be falling into the first or second category, but I feel that there is room for both and that differing views should be equally represented in The Bulletin without receiving criticism from either party. Surely each restorer who works on their set does it with the best intentions?

There are differing views on many subjects within the community of vintage radio enthusiasts. For example there are those who are happy to attach some sort of digital conversion unit in order to receive vintage programmes (on BBC Radio 7?) and create a realistic atmosphere of the past, while others are happy to listen to modern analogue broadcast programmes. Personally, I find it quite interesting to listen to modern popular music in glorious mono.

Maybe there is a balance between preservation and restoration aspects of Wireless collecting. The former suggests keeping sets in as original a condition as possible, whilst the latter suggests replacing worn parts in order that performance is restored to as near new as possible.

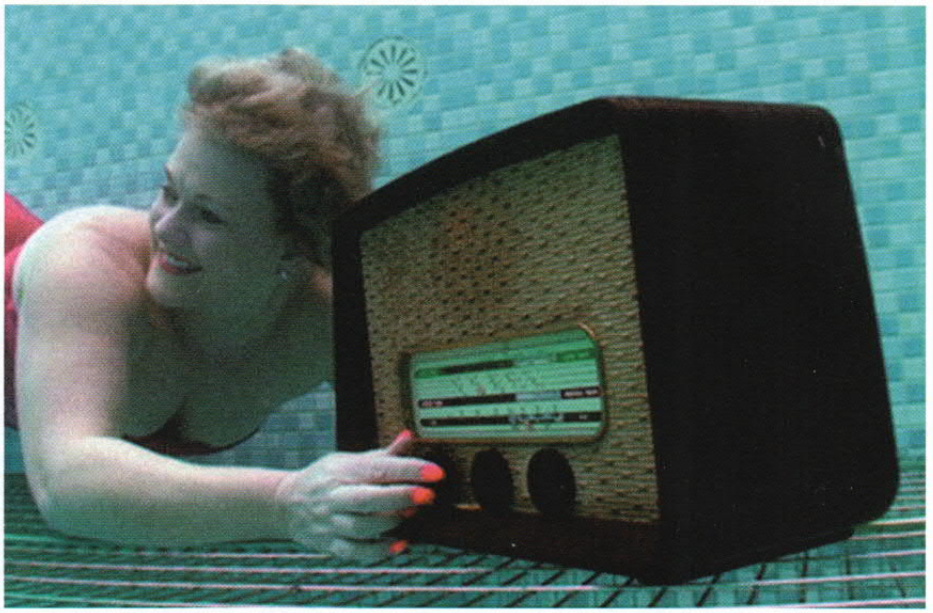
I was personally dismayed when on a visit to Amberley Chalk Pits Museum 20 years ago, I was told by the proprietor that under no circumstances would any of the sets in the vintage radio display be made to work because this would lead to many of the original components (many of which were rare) to fail and have to be replaced by newer parts. This unfortunately led to visitors to the display being unable to hear what a vintage radio should sound like – many would have been too young to have been around in the days of valve radio.

The contributions made by Roger Chacksfield, Graham Dawson, Gary Tempest and Tony Dalton all contain relevant and worthwhile points regarding restoration. I hope that we realise that there are differing views on the subject (and others) and that we can respect each views with good grace even if we disagree with them.

Regards,
Del Burgess

Dear Editor,
The BVWS Bulletin is very interesting as always, especially Stef Niewiadomski's Marconiphone product range article in the Spring 2009 edition. Am I the only one to notice his miscalculations in the 'value of money' section? He converted the prices of 1950's goods to today's values but forgot to do the same with the wages of the time. A typical TV set would cost two months salary, not three years.

Yours sincerely
Mark Braileford



Listen to the Archers like you never have before – giving a new meaning to 'soak test'.

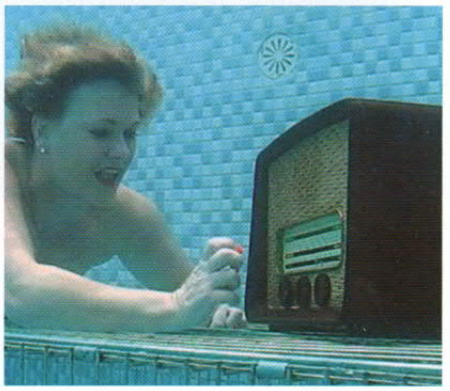
Dear Editor and radio enthusiasts everywhere,
Around 82 years ago in 1926 a radio factory was founded in The Hague in The Netherlands. It made the later famous Dutch radio brand ERRES and the company itself was named after the founders "van der Heem".

About this company a website is made: www.vanderheem.com (or www.erres.eu) to prolong the memory of this famous Dutch company.

On the website you will find all product information and pictures of the produced models (PRODUCTEN). There is also a section with more than 450 detailed product information and building plans for repair purposes (SCHEMA).

Hopefully it will be of interest to your fellow BVWS members
Regards,

L.J. Gussenhoven,
van der Heem & Bloemsma
documentatiecentrum

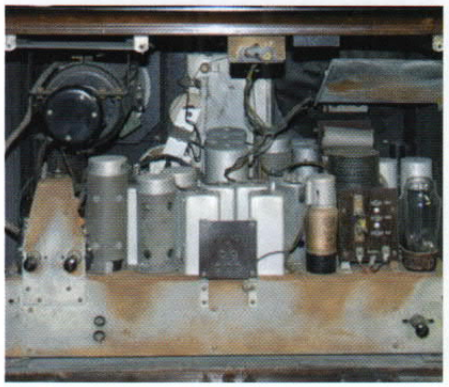


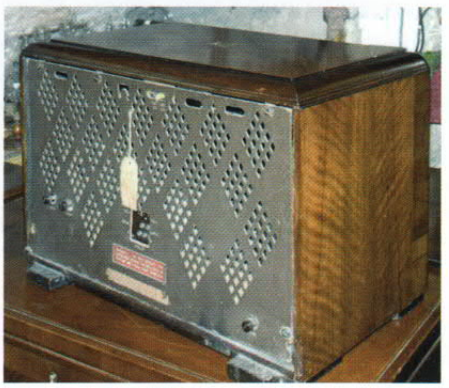
Dear Editor.
I wonder whether you feel the attached photo might merit publication in our normally more serious and professional journal?

If you think it worthwhile,a suitable caption might be: "Pausing for a brief rest during a strenuous underwater filming session,actress/model Wendy Dean listens to her favourite programme on her HMV radio. Note – no radio was harmed during the filming of this item!"

Cheers,
Mike Plant

Below: Listed on ebay in early April, this HMV 904 pre-war television/radio with 5 Inch Screen from 1938 sold for £6000





Left and above: two photographs of long-term BVWS member Louis Coakley whilst working at 'Barrys', Yarm Lane Corner, Stockton–on–Tees, County Durham. 'Barrys' sold radios, televisions, bicycles and cameras. The photographs were taken in 1955, which was the same year that Louis got married and later moved to another company. Louis is standing on the left.

Out of sight beyond the hill

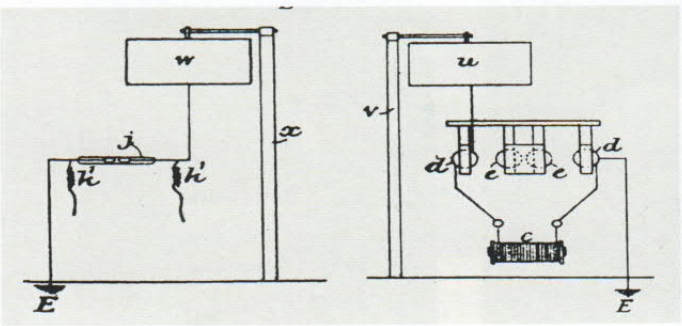
by Ralph Barrett

In the course of 1981 I had the occasion to visit the birthplace of radio, Villa Griffone, with the archivist of the Marconi Company, Betty Hance. We were able to trace the remarkable event of the first radio transmission to a receiver, out of sight over a hill

Below: Marconi installed the transmitter in the upper floor room, by the window at the back of Villa Griffone, it has a plaque below.
Bottom, right: A picture of the Villa Griffone of the period.

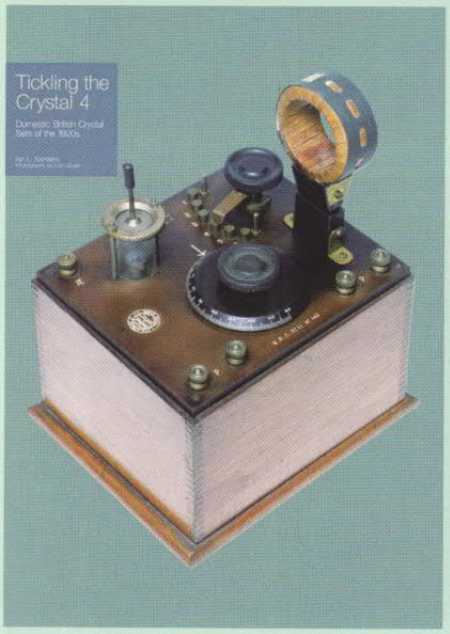
Below: The plate antenna patent diagram of 2 July 1896

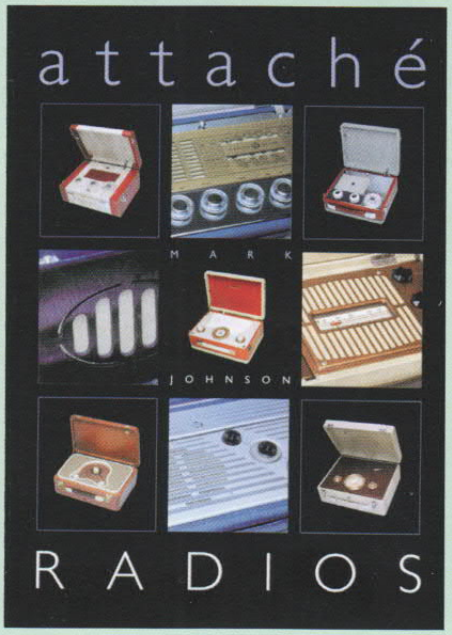
Above: The view from the window of Villa Griffone, the precise location of the receiver has an iron marker (right).

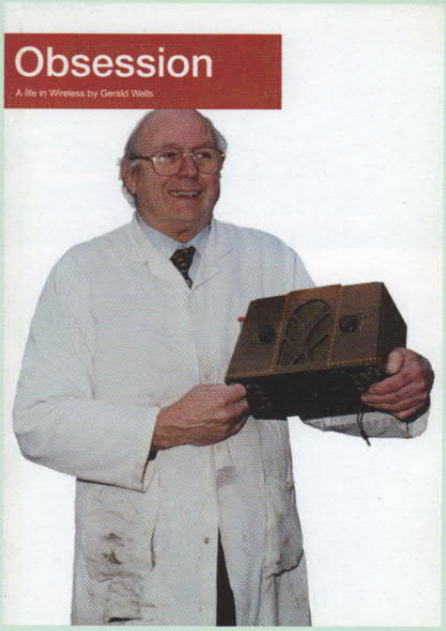


BVWS Books

Out Now!







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Obsession

by Gerald Wells

Gerry Wells had led an extraordinary life. Growing up in the London suburb of Dulwich in the inter–war years, he shunned a conventional 1930's childhood, preferring wireless and other household items. After the war he managed a career as a radio and TV service engineer and even designed and managed amplifiers, PA equipment and TVs. Today he runs the Vintage Wireless and Television Museum from the same family home from where he was born in 1929.

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BVWS Books

GB2AF On The Air

To celebrate 100 years of radio association at the British Vintage Wireless and Television Museum, members of the Cray Valley Radio Society set up and operated station GB2AF using a mixture of vintage and modern equipment in late September 2008. This association started in 1908 when Alfred Rickard Taylor, 2AF (later G2AF) an early radio pioneer lived at that address.

The property was later sold to Gerry Wells' family and the rest is documented in Gerry's book "Obsession". One special visitor was former RadCom columnist Pat Hawker MBE (G3VA), who took a short turn on the key. Over the weekend, the station made well over 700 QSOs around the world.

Pictures by kind permission of BVWATM.

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10.30 to 4.00 **£5 admission** (under-14s Free), early entry 9.00 at £20

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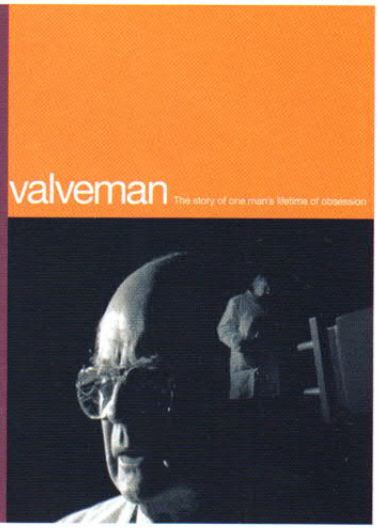

The British Vintage Wireless and Television Museum

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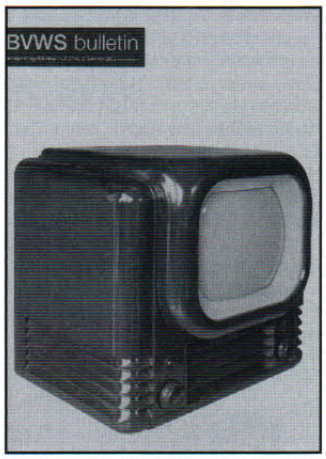

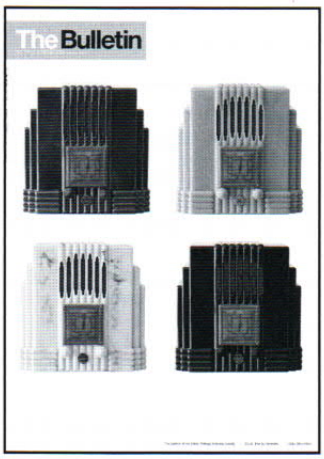

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News and Meetings

GPO registration 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 GU13 8LB
telephone: 01252-613660 e-mail: martyB@globalnet.co.uk

2009 meetings

10th May NVCF, Leamington Spa
6th June Garden party at Vintage Wireless and Television Museum
7th June Harpenden swapmeet
5th July Wootton Bassett
12th July Table top sale at the Vintage Wireless and Television Museum
19th July Workshop at Vintage Wireless and Television Museum
14th August Friday Night is Music Night at Vintage Wireless and Television Museum
13th September Table top sale at Vintage Wireless and Television Museum
18th October Harpenden swapmeet
1st November Workshop at Vintage Wireless and Television Museum
22nd November BVWS North West meeting, Lowton
27th November 'A Festive Music Night' at the Vintage wireless and Television Museum
6th December Wootton Bassett

Workshops, Vintage Wireless and Television Museum:
For location and phone see advert in Bulletin. 11:00 start.
Harpenden: Harpenden Public Halls, Southdown Rd. Harpenden. Doors open at 10:00, tickets for sale from 09:30, Auction at 13:30. Contact Vic Williamson, 01582 593102
Audiojumble: The Angel Leisure Centre, Tonbridge, Kent. Enquiries, 01892 540022
NVCF: National Vintage Communications Fair
See advert in Bulletin. www.nvcf.co.uk
Wootton Bassett: The Memorial Hall, Station Rd. Wootton Bassett. Nr. Swindon (J16/M4). Doors open 10:30. Contact Mike Barker, 01380 860787
Lowton: Lowton Civic Hall, Hesketh Meadow Lane, Lowton, WA3 2AH
For more details with maps to locations see the BVWS Website:
www.bvws.org.uk/events/locations.htm

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