The Bulletin

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The Bulletin of the British Vintage Wireless Society £5.00 | free to members ISSN 0955-93

15th May 2011
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at The Warwickshire Exhibition Centre

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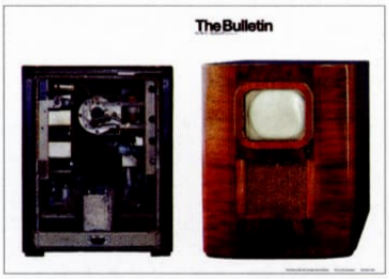
Bulletin of the British Vintage Wireless Society
Incorporating 405 Alive
Volume 36 No.1 Spring 2011

www.bvws.org.uk

Separations and Printing by Hastings Print



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Photographed by Mike Barker
Graphic design by Carl Glover and Christine Bone
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Proof-reading by Mike Barker,
Ian Higginbottom and Peter Merriman

Contents

From the Chair

We are all constantly bombarded with the grim news about the state of our economy and how everything is costing so much more for less, so we thought it would make a change to turn the tables and give you an even larger Bulletin with an increase of four pages at no extra cost. What a good way to start off the New Year.
I have been very pleased to hear from members who have sent letters to their MP's in regard to the Analogue radio switch off and would like to thank everyone who has written to me with their responses. We are now at the stage where the 2015 date has been postponed, but we must still keep up the pressure and keep the letters flowing to air our objections, so please if you have been meaning to write to your MP but have not yet done so, now is the ideal time.

You will remember that in my last "from the Chair" I mentioned there would be no main Auction and AGM event as in previous years due to rising costs of the Harpenden Hall. You can still enter any items into all other auctions by way of sending me a list, either by letter or e-mail telling me which event it is for and details of the items and then just bring them along. The commission raised from BVWS auctions is used for things like the Christmas DVD, the Calendar and other supplements so please use the service to the fullest so that we may continue to provide these. You may not get as much for your item as perhaps you could on Ebay, but you won't have to deal with listings, pictures and then getting your money. It is all done for you there and then and you walk away with the proceeds knowing that you have supported your Society.

As I have already mentioned in these pages, later this year we will be holding a large exhibition to celebrate the 75th Anniversary of the world's first regular high definition television service. We have a number of planned activities that we are currently working on. As part of the display, I would like to ask those members who have restored and fully working vintage Television receivers to contact me with details so that we may hopefully include those sets in the display. We are open to all suggestions and comments on the display and hope to cover television from its earliest experimental form right up to the present day. More news on this with specific dates and locations will appear in the next Bulletin.

New Honorary Member.

The Committee has the greatest of pleasure in rewarding Mr Ian Higginbottom with Honorary lifetime membership of the Society. Ian has served the Society from its very inception, even before April 1976 and was one of the few special people at that historic inaugural meeting of the Society. Ian first served as Treasurer and then later, until only a few years ago, Newsletter editor. Making sense of the multitude of scribbled advertisements and producing the Newsletter. We have all shared in Ian's wit and wisdom over the years both at events and in Committee and we look forward to much more in the future.
Mike...

Gordon Bussey

It is with geat sadness to anounce that Honorary BVWS member Gordon Bussey passed away on the 20th January 2011.

He was the author of 'Marconi's Atlantic Leap', 'Vintage crystal sets 1922-1927', and 'The Story of Pye Wireless'. He co-wrote 'The Setmakers', 'Television The First Fifty Years' with Keith Geddes, and 'Hacker Radio' with Geoffrey Dixon-Nuttall

Gordon was instrumental in preserving the Marconi collection which now resides safely in Oxford.

The BVWS Committee's sympathy goes out to all Gordon's friends and relatives at this sad news.

Right: Gordon Bussey (left) and Douglas Byrne (right) in happier times, Bologna, Italy 1995

The 'Radio Service', 'Northern Radio Service' and 'Service Radio' Companies of Wolfie and Leah Grossman

by Lorne Clark and Ian L. Sanders

Service Radio Company Limited was the last of three 1920s wireless companies, all bearing similar names and all associated with the intriguing immigrant couple, Wolfie Grossman and Leah Myerovitz of London. The approximate dates of operation of the three companies were as follows:

Radio Service Company Limited:	August 1922 to February 1923 (finally wound up May 1924).
Northern Radio Service Company:	February 1923 to February 1924.
Service Radio Company Limited:	February 1924 to April 1927 (finally wound up September 1927).

Above: Radio Service Company's model 'R.S.No1 CRYSTAL' in its production form.
Above, Right: Same model but this example in a mahogany cabinet and panel engraved with the 62, Oxford Street address.

Wolfie Grossman and Leah Myerovitz's companies produced a range of rather imposing, high quality crystal receivers along with amplifiers, crystal detectors and various other wireless components.

Radio Service Company Ltd.

Wolfie Grossman was of Polish Jewish origins, son of Isaac Grossman, a 'general dealer'[1]. In 1922 Wolfie Grossman and his partner Leah (Lena) Myerovitz, otherwise known as Hilda Myerovitch (sic), were living at 6 Park Crescent, Clissold Park, London, N.16. with their daughter, Shirley, born May 1922.

The couple set up in business together, registering *Radio Service Company Limited* on August 14th 1922, with a nominal capital of 1000 x £1 ordinary shares[2]. The company's Memorandum of Association, dated August 12th 1922, was signed by both Wolfie and Leah using the above address – Wolfie was described as 'Manager' while Leah referred to herself as simply a 'Married Woman'. Each was shown as owning a single share. The registered office of the company was declared as Evelyn House, 62 Oxford Street, London W1. The company also had a branch at 143 Church Street, Stoke Newington, London.

A Return of Allotments dated October 14th 1922 reveals that Leah Myerovitz had by this time increased her number of shares to 400, while Wolfie Grossman was issued 100 shares in his own name. The documentation also shows Leah was continuing to refer to herself as a 'Married Woman', but Wolfie's status was, for some reason, changed to 'Traveller' rather than 'Manager' – it is likely, given the unequal distribution of shares, that Leah was now taking a more active role in the company's affairs.

The company advertised a crystal receiver, the *R.S. No.1*, in September 1922 and participated in the All-British Wireless Exhibition held at the Horticultural Hall, London between September 30th and October 7th of that year. The *R.S. No.1* was a large, sloping panel receiver of registered design featuring a sophisticated dual tapped inductance and variable

Above: 'SERVICE SUPER CRYSTAL' receiver by Service Radio Company Limited featuring the Service Multi-Crystal Detector and Multiphone headphone adaptor
Above, Right: 'SERVICE SUPER CRYSTAL' receiver by Northern Radio Service Company Limited also featuring the Service Multi-Crystal Detector

The Service detector was particularly robust in design and was used by several commercial manufacturers on their crystal sets.

Willesden ..	239	Service Motor & Supply Depôt, Motor Engineers, Wireless	26 Station par Wil gn N.W.2
lissold	3317	Service Printing Co., Printers, Wholesale Stationers	54A Kng Hrny's w
lissold	4934	ServiceRadio Co. Ltd., Wireless Instrument Manufacturers	67 Church st N.16
ntral	5326	Service Reeve & Co. (London) Ltd. ..	14 St Mary Axe E.(
op	3840 }	Service Supply Ltd., The, Hardware,	94 Southwark st S.
op	3841 }	Hollow-ware Merchants	
olborn	6457	Service Trading Co. Ltd., Wire, Sports Wholesalers	Tichborne ct Hig Holborn W.C.2
ttersea ...	1858	Services Rendered Club, British Legion .	11 East hill S.W.1

Extract from October 1924 London Telephone Directory

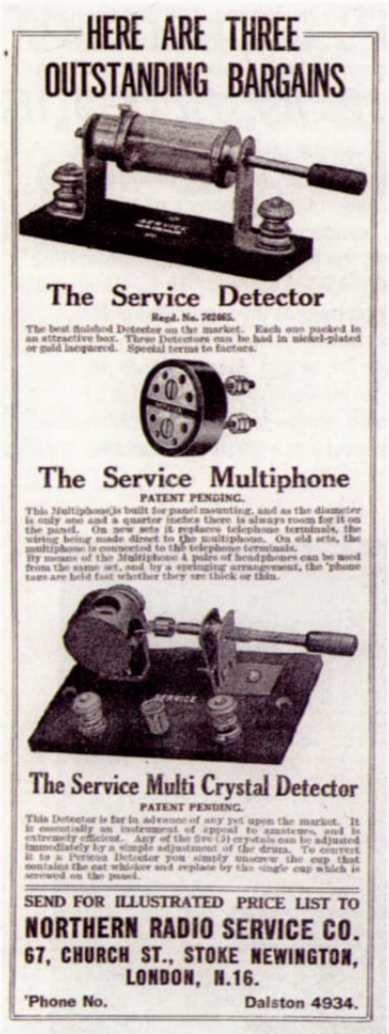
19 23. Marriage solemnized at Philpot Street Synagogue in the District of Mile End Old Town in the County of London

No.	When Married.	Name and Surname.	Age.	Condition.	Rank or Profession.	Residence at the time of Marriage.	Father's Name and Surname.	Rank or Profession of Father.
16	Twenty Sixth December 19 23	Wolfie Grossman	23	Bachelor	Wireless Instrument Maker	43 Highbury New Park Islington	Isaac Grossman	General Dealer
		Lena Myerovitz otherwise Hilda Myerovitch	20	Spinster		69 Church Street Stoke Newington	Samuel Myerovitch	Reader

Married in the Philpot Street Synagogue according to the Usages of the Jews by Certificate

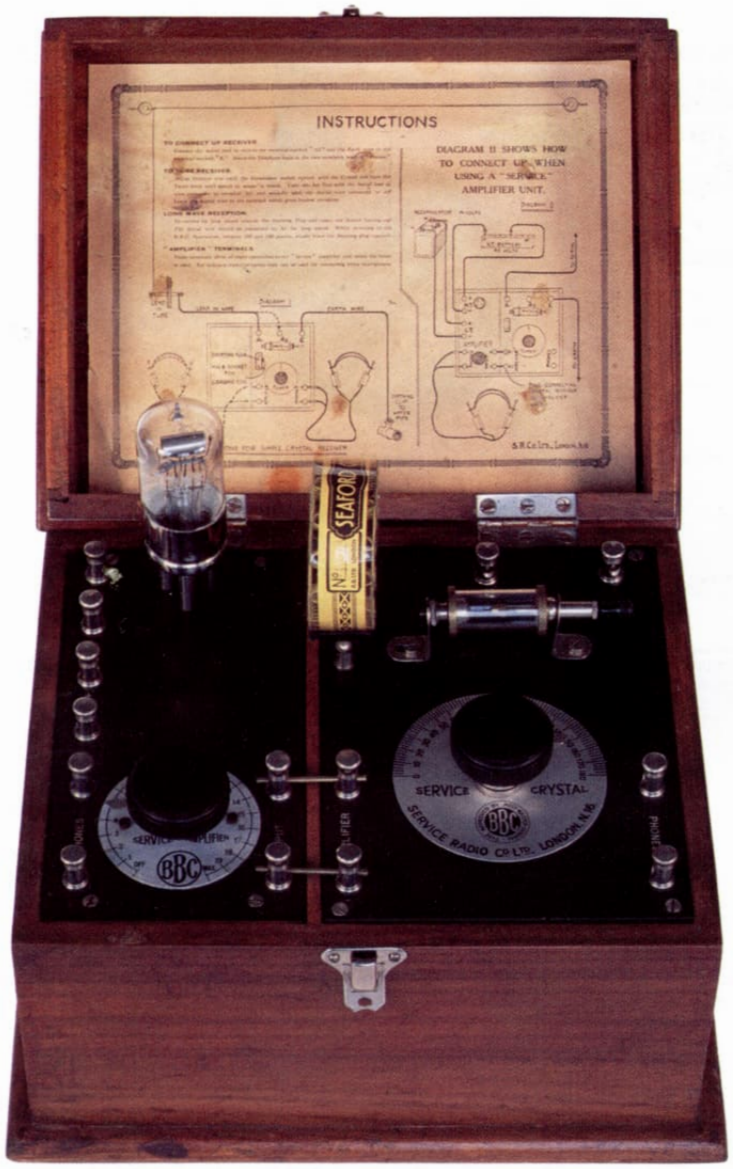
This Marriage was solemnized between us, W. Grossman, Hilda Myerovitch. In the Presence of us, S. Goldzweig, L. Adelman. J. Adelman Minister, Adams, Secretary for Marriages

Marriage certificate for Wolfie Grossman and Lena (Leha) Myerovitz (otherwise known as Hilda Myerovitch [sic])[1]



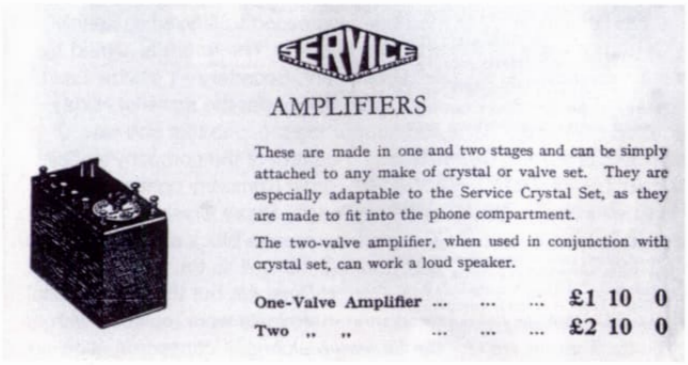
The Service Detector, Multiphone and Multi Crystal Detector. The Wireless Trader, February 1924

Advertisement by Radio Service Company showing an early version of their R.S. No. 1 crystal set. Amateur Wireless and Electrics, September 30th 1922.



Left: Service Radio Company's *Service Crystal* model with one-valve amplifier fitted into the headphone compartment.

Above: One valve *Service Amplifier* produced in 1924 by the Service Radio Company and designed to fit into the headphone compartment of their *Service Crystal* receiver as shown at left. Measuring 6¾ x 3½ x 4½ inches, with the valve mounted on top of the panel, the amplifier was priced at £1 10s. 0d.


SERVICE

AMPLIFIERS

These are made in one and two stages and can be simply attached to any make of crystal or valve set. They are especially adaptable to the Service Crystal Set, as they are made to fit into the phone compartment.

The two-valve amplifier, when used in conjunction with crystal set, can work a loud speaker.

One-Valve Amplifier	£1 10 0
Two ,, ,, ...	£2 10 0

Service one and two–valve amplifiers – Catalogue of Radio Sets, Components and Accessories, ca.1924 (Unnamed).

(probably condenser) tuning arrangement. An enclosed headphone compartment was incorporated beneath the panel. Priced at six guineas including headphones, it was certainly a 'high-end' receiver for the period. According to their advertisements, *Radio Service Company* would also accept contracts to construct wireless receivers for others to individual specifications. A second version of the *R.S. No.1* crystal receiver was produced sometime later which now carried the BBC/Post Office approval transfer. This version featured a simpler dual tapped inductance–only tuning, but was housed in a larger cabinet with a lid. Compared to typical crystal receivers of the time, the set was of an impressive size, measuring some twelve inches in height with the lid closed.

Radio Service Company Limited was never listed as a member shareholder of the British Broadcasting Company[3], although, as discussed above, at least some of its sets did bear the standard BBC/Post Office approval roundel. Whilst the approval and Post Office registration scheme had been introduced in November 1922, the system of enlisting for shares in the BBC was actually not set up until February 1923, just weeks before *Radio Service Company* went into voluntary liquidation. To become a member of the BBC, a £50 deposit was required, together with the purchase of at least one £1 share. This, together with the fact that the BBC intended to back-date to November 1922 any royalties owing, may well have impacted the decision to liquidate the company. So, how were they able to apply the BBC mark to the company's products at all? The BBC restricted the availability of their trade-mark transfers to just four suppliers, and a letter of authority from the BBC was required in order for a radio manufacturer to purchase a transfer[4]. Between November 1922 and February 1923, it must be assumed that the BBC would issue such a letter of authority to any manufacturer who could simply show that his set(s) had been approved by the Postmaster General. However, from February 1923 onwards it seems more likely that the British Broadcasting Company would only have issued such a letter of authority to those manufacturers who had Post Office approval for their sets and were also member shareholders of the BBC.

At an Extraordinary General Meeting on February 19th 1923 it was agreed that *Radio Service Company Limited* be voluntarily wound up owing to its inability to pay its outstanding debts and on March 20th 1923 a liquidator was duly appointed. The final winding up meeting took place on May 27th 1924.

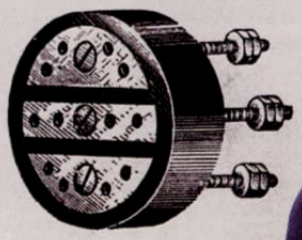
A letter from the liquidator dated February 13th 1924, a full year

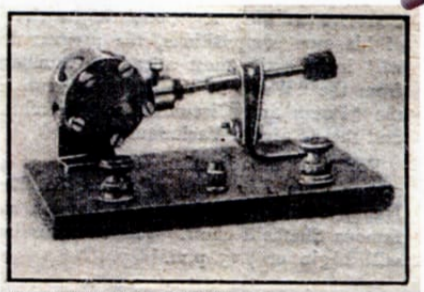
SERVICE

MULTIPHONE CONNECTOR

A neat and unique device for connecting a number of pairs of 'phones in series or parallel. Especially useful in making up new sets where it is fitted in place of the usual telephone terminals, or can be fitted in various rooms, thus doing away with the necessity of moving the set. The 'phones are connected by plugging the 'phone tags into the holes, and tags of all thicknesses are held fast by means of a spring device.

2312. **1/6**





AROUND THE SHOWROOMS

SEVERAL combinations are possible in perikon detectors, and, of course, any one catswhisker can be used with a multitude of crystals. A neat detector with which you can try any number of perikon combinations is shown by the photograph.

Five crystals are accommodated in a holder that can be rotated; this is on the left. A catwhisker can be easily substituted for the crystal mounted on the adjusting arm. These detectors are made by the Northern Radio Service Co., of Church Street, N.16.

Above: Service Multiphone' headphone connector by Service Radio Company Limited.

Far left: Detail of the aluminium dial with BBC/type approval marking.

Left: Amateur Wireless and Electrics, April 25th, 1924.

after the decision to wind up of Radio Service Company Limited, gave the go-ahead for the registration of a new company in the name of *Service Radio Company Ltd.* The similarity of the name was no doubt intended to reinforce an impression of continuity, but what did Wolfie Grossman and Leah Myerovitz do in the intervening twelve months?

Northern Radio Service Company

In spite of the liquidation of *Radio Service Company Limited*, Wolfie Grossman and Leah Myerovitz continued trading during the next twelve months, from February 1923 to February 1924, but now as *Northern Radio Service Company* (notably not a limited company). This new company was a shareholder member of the BBC with premises at 143 Church Street, Stoke Newington, London N16 – a branch address of the former *Radio Service Co. Ltd.* It is not clear why Wolfie and Leah used 'Northern' in the new company name. Wolfie and Leah (Hilda) were in fact married on December 26th 1923 at the Philpot Road Synagogue, Mile End Old Town. The marriage certificate[1] shows Wolfie to have been living at 43, Highbury New Park, Islington and Hilda living at 67, Church Street, Stoke Newington. Interestingly, it is the Church Street address that was used by the company in their advertisements during 1924.

Only one model is known to have been produced by *Northern Radio Service Company* – a crystal receiver, the *'SERVICE SUPER CRYSTAL'*, almost identical to Radio Service Company's later *R.S. No.1.* This set featured the *Service Multi-Crystal Detector*, a novel device with a rotatable drum that could hold up to five crystals. The detector employed an adjustable arm holding either a cat's-whisker cup or a zincite crystal. The latter, together with a piece of chalcopyrite mounted on the drum, would then form a Perikon detector. The spare cat's-whisker cup or zincite cup could be conveniently attached, when not in use, to a stud mounted on the front panel. The set was available with an orange/black marbled ebonite panel and carried the BBC/Post Office approval transfer in the lid and the registration number 593.

Interestingly, another company, *Wireless Enterprises Limited* described as 'Wireless Dealers', shared the same Oxford Street address in London as that registered in August 1922 to the *Radio Service Company*. Wireless Enterprises was formed on March 10th 1923 with Thomas Scott Lucas as its Director and appears to have been short-lived. The company is listed in the London telephone directory for October 1923, but only in that one edition. Lucas apparently failed to file the necessary paperwork and the company was eventually struck off the companies register. There is no evidence of any formal business relationship between Wolfie and Leah Grossman and Thomas Lucas, but there must surely have been some connection given that the two companies used the same address. Possibly Wolfie and Leah were simply letting or sub–letting office space to another company to help in what surely must have been difficult financial times for them, or perhaps they were enlisting *Wireless Enterprises* to act as a distributor of their products?

Service Radio Company Ltd.

Wolfie and Leah Grossman set up their new company, *Service Radio Company Limited*, on February 18th 1924 after receiving approval from the liquidator of *Radio Service Company*, as discussed above. *Service Radio* became a member shareholder of the British Broadcasting Company in July 1924[3], taking just one share. In the Articles of Association[5], Wolfie Grossman (now describing his occupation as 'Wireless Engineer') and Leah Grossman were each shown to have been allotted one share in the new enterprise. The registered office was declared as 67 Church St., Stoke Newington, London. A Return of Allotments for March 1924 dated May 9th 1924 shows that Wolfie's allotment of shares had been increased to fifty, while Leah's was one hundred. The return is signed by 'H. Grossman', Secretary – possibly Leah signing herself under the name of Hilda and supporting the idea that she was exercising control of the company's affairs?

Service Radio Company continued to offer the *Service Super Crystal* receiver. The marbled orange/black ebonite panel was retained, as well as the *Service Multi-Crystal Detector,* but the conventional headphone terminals were replaced with the *Service Multiphone connector*, allowing several pairs of headphones to be attached to the set. The model carried the same Post Office registration number, 593 as the earlier set produced by *Northern Radio Service Company*. Another, smaller receiver, the *Service Crystal* was produced with variometer tuning and housed in a more typical cabinet with side headphone compartment. One and two–valve Service Amplifiers were offered, designed to fit neatly into the headphone compartment of the *Service Crystal set*. Like its predecessor, the smaller receiver was of excellent quality, but was more competitively priced; the total cost of the *Service Crystal* receiver, fitted with a two-valve Service Amplifier was just

£4 0s 0d, and by comparison considerably cheaper than the similar *Western Electric model 44001* with its two-valve *Weconomy* amplifier priced at £12 0s 0d.

Service Radio Company continued to offer a comprehensive range of components and accessories bearing the company's name, such as detectors and their unique *Multiphone* connector. By this time the design of the *Multiphone* had been improved to allow series or parallel connection of additional headphones. The original design, found on the example of the '*Service Super Crystal*' receiver, allowed only a parallel connection.

Although surviving longer than its predecessors, *Service Radio Company* could not endure the intense competition of the UK's early wireless trade for more than a few years and by April 1927 a liquidator was once again appointed to wind up the Grossmans' wireless affairs. Their last foray into the business ended in September 1927 with a final dissolution meeting of the company. What became of Wolfie and Leah remains unknown, but their tenacious record of nearly five years in the wireless industry suggests that they would likely have set their sights on another enterprise before too long a period had elapsed.

In June 1924 Leah applied for a patent '*Improvements to Crystal Detectors for Wireless Receivers*'. The patent[6], which was finally approved in September 1925, was concerned with furnishing the cat's-whisker detector arm with an anti-backlash screw type in/out adjustment rather than the normal sliding joint arrangement.

Footnote

Interestingly there was another *Radio Service Company*[3] in existence in 1925, run by George Daniel Le Lievre and operating from 105a Torriano Avenue, Kentish Town, London N.W.5. No known connection between Le Lievre and the Grossmans exists and this was almost certainly a completely separate firm. It was not a 'limited' company.

Acknowledgements:

Our thanks to David Rudram of the Amberley Museum & Heritage Centre for arranging access to the museum's excellent collection so that we could photograph their '*Service Multiphone*' headphone connector.

References:

1. Marriage certificate, Wolfie Grossman, 1923, UK General Register Office reference: vol. 1c page 664
2. National Archives, Kew: file ref. BT 31/27396/183774, Radio Service Company Ltd.
3. Lorne Clark: Shareholders of the British Broadcasting Company. BVWS Books, 2010. ISBN 0-9547043-6-3
4. BBC Written Archives, Caversham Park: file ref. CO51.
5. National Archives, Kew: file ref. BT 31-28356-195775, Service Radio Company Ltd.
6. Leah Grossman. Improvements in Crystal Detectors for Wireless Receiving Sets. British patent No. 238,995, issued 3rd September 1925.

Leah Grossman was granted a patent for an improved crystal detector assembly in September 1925. It is interesting that Wolfie Grossman was not shown as a co-inventor. It seems that Leah was indeed the driving force behind the Grossmans' wireless business.

PATENT SPECIFICATION

Application Date: June 24, 1924. No. 15,224/24. **238,995**

Complete Left: Feb. 7, 1925

Complete Accepted: Sept. 3, 1925

PROVISIONAL SPECIFICATION.

Improvements in Crystal Detectors for Wireless Receiving Sets.

I, LEAH GROSSMAN, of 67, Church Street, Stoke Newington, N. 16, British subject, do hereby declare the nature of this invention to be as follows:—

My invention relates to crystal detectors of the type having a sliding contact arm which is mounted so that it can be given an angular movement in any direction relative to a central axis.

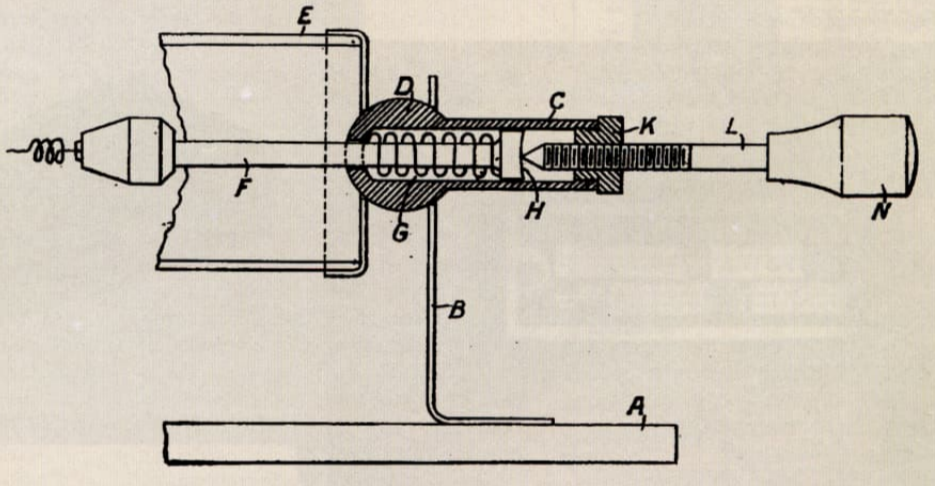
In order to control the contact pressure to a very fine degree I provide the arm with a piston like face adapted to slide within a tube which is mounted on a universal joint. The outer end of this tube is closed by a cap through which a controlling set screw or friction device operates. The set screw is provided with a milled head or the like to facilitate operation by hand and the point is adapted to co-operate with the piston face.

The face of the piston may be flat, concave, or convex and is pressed outwardly against the set screw or other controlling device by means of a coiled spring or piece of elastic material.

The contact arm may be enclosed by a glass or like tube.

Dated the 24th day of June, 1924.

L. GROSSMAN,
67, Church Street, Stoke Newington,
N. 16.



Philips 930A by John Pether

The set before restoration

I found this receiver at an amateur radio car boot sale, and from its appearance it seemed to have spent many years in a damp shed. The cabinet had no veneer on the top and very little on the sides. I decided to purchase it and one day attempt to re-veneer the cabinet. I have spent my working life repairing radios and televisions but have nothing to do with the outside. I started reading as many articles as I could find; luckily a friend who restores antique furniture was able to inform me what type of veneer and dye I would require. He also loaned me a glue pot and a special tool for squeezing out any lumps of glue before clamping the veneer in place. There was a good source of veneer in Aylesbury; £18 gave me a roll large enough to cover the radio twice which allowed a broad margin for error.

My first problem was how to clamp the veneer to the top of the set? This was solved by sawing two pieces of old fencepost and glueing them together with packing to achieve the correct width. I cut a shape to match the top with a band saw and lined it with felt to apply equal pressure on the top.

Having prepared everything, I cut and glued the veneer for the top and sides of the cabinet, clamping one side at a time and leaving it to dry for a week between stages.

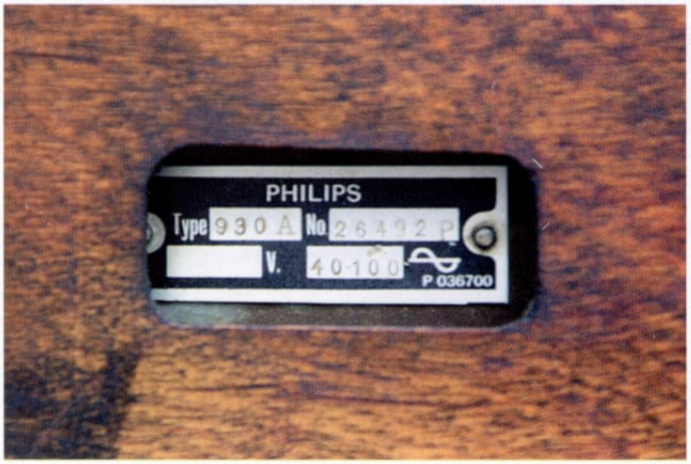
The front of the cabinet was in fairly good condition but had pieces missing from the top and the bottom of the columns. These were easily made from hardwood and glued into place. The old varnish was removed from the front and was cleaned and sanded. The rest of the cabinet was sanded and the corners and edges were sprayed with dark oak varnish. After the varnish had cured for a few days the entire cabinet was sprayed with light oak. As I have another of these sets I had the advantage of a good match regarding colour.

The next step was to make a new Back–board for the set. this was made by using the remains of the old board as a template, using a scroll saw to cut out the design. The paper badges on the rear of the set were recreated on a computer using Paint Shop and printed and stuck to the rear of the cabinet. The rear was then sprayed with dark oak varnish to match the original colour. I then cleaned the chassis and decided at this stage not to restore it.

I decided to wash the original speaker cloth and after drying, it was re–fitted to the cabinet using Copydex glue.

The radio was reassembled and for a first attempt at cabinet restoration I managed to achieve a good result, and although it took many weeks it was well worth the effort! Compared with the instruction card which came with my original receiver, the columns on the left and right of the cabinet have been simplified on my receiver which has a later serial number.

Below: Philips information panel

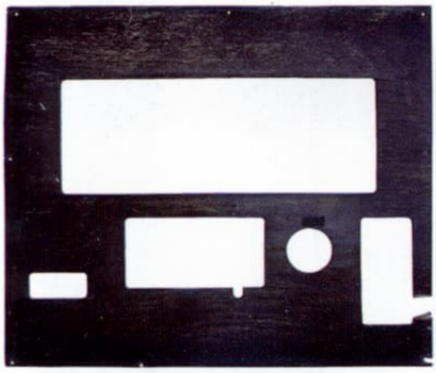


Below: Former to help veneer keep shape on curved top of Philips set

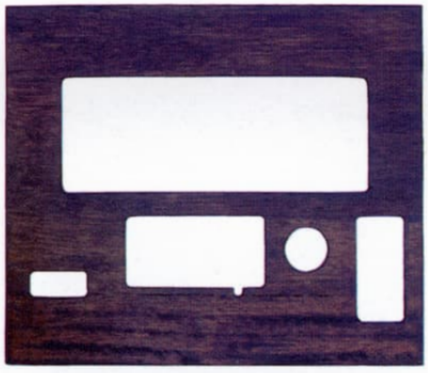
Set before varnishing

Above: Reproduction Philips label for back of set

Left: Set after varnishing using an airbrush and compressor



Original radio back



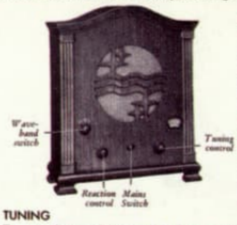
Reproduction radio back

The finished set

INSTRUCTIONS FOR OPERATING PHILIPS RADIO RECEIVER MODEL 930 A

PERFORMANCE

This receiver is designed primarily for the reception of local and regional transmitters. Under normal conditions a choice of programmes is available in all but the most outlying districts. Provided the set is not installed very close to a transmitter, a number of Continental programmes can also be heard after dark if the set is coupled to a good aerial.



ADJUSTMENT

The positions of the controls can be seen in the figure.
In order to switch on the set, depress the mains switch.
Adjust the waveband switch to one of the following positions*:

"S" (short) 200- 450 metres,
"M" (middle) 400- 950 metres,
"L" (long) 900-2,100 metres.

*) These values are approximate and depend upon the length of aerial used and the number of the aerial socket. Changing from a socket of higher number to one of a lower number will lower the wavelength range in each position of the waveband switch.

TUNING

First turn the reaction control as far as possible to the left. Then turn the tuning control so that the desired station is heard at its maximum. If necessary, turn the reaction control slightly to the right in order to increase the sensitivity of the set. This control should, however, never be turned so far to the right as to cause oscillation (whistling).
If it is not possible to obtain the required volume without causing oscillation, insert the aerial plug in a socket with a different number (see under „Connection" on the other side of this card) and re-adjust the tuning control until the station is again received at its maximum strenght.

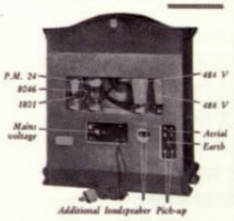
GRAMOPHONE REPRODUCTION

To adapt the set for gramophone reproduction, withdraw the aerial plug and connect the pick-up leads to the sockets marked "⏀" at the back of the set.
When reverting to radio reception, withdraw the pick-up leads from the receiver.

ADDITIONAL LOUDSPEAKER

An additional loudspeaker can at any time be connected to the set. Sockets marked "LS" at the back of the set are provided for this purpose.

INSTRUCTIONS FOR INSTALLING PHILIPS RADIO RECEIVER MODEL 930 A



INSERTING THE VALVES

Insert the following valves in the correspondingly marked sockets:
Philips rectifying valve 1821;
Mullard P.M. 24 with five-pin base;
Mullard 484 V with five-pin base;
Mullard 484 V with five-pin base.
Inside the set Philips pilot lamp type 8046 illuminates the tuning dial. In order to change this lamp, simply withdraw its holder, which is situated behind the 1821 valve socket, and remove the lamp.
The rubber ring supplied with the receiver should be fixed round the bulb of the detector valve, i.e. the Mullard 484 V valve, in the extreme right-hand valve socket of the receiver, as viewed from the back. Whenever the valve is replaced, the ring should be taken off the old valve and placed on the new one.

CONNECTION

The positions of the various sockets can be seen in the figure. Install a good outdoor aerial with a total length of between 40 and 80 feet in as high and open a position as possible. It is important to place the set as near as possible to the aerial lead-in. If reception of the local transmitter only is desired, the use of a modest outdoor aerial or even an indoor aerial will as a rule be found sufficient. Connect the aerial to one of the sockets marked "Y" at the back of the set, as follows:
to "1" for reception of a powerful local transmitter;
to "2" for maximum selectivity;
to "3" under normal conditions;
to "4" for greatest sensitivity.
The best earth is obtained by making connection to an earthing tube or plate. Generally speaking, however, connection to a clean main water-pipe or to the earthing lead of a lightning arrester will be found sufficient. Connect the earth lead to the socket marked "$\frac{E}{Gnd}$" at the back of the set.
Finally, insert the two-pin mains plug in a wall-socket.
The receiving set must only be connected to an A.C. mains supply of the voltage for which it is adjusted (this can be seen at the back of the set) and a periodicity of 40—100 cycles.
Adaptation of the set to another voltage may be effected only by a radio dealer.

SOME REMARKS

When these instructions have been carried out, the receiver will give entire satisfaction, the set having been thoroughly tested before being packed. If, after being installed, it does not work quite satisfactorily the following possibilities should be considered.
1. The valves may make poor contact; clean their pins and push them well home in their sockets.
2. The aerial, earth or mains connections may make poor contact.
3. The aerial-earthing switch, if any, may be in the wrong position.
4. The mains socket may not be alive. This can be tested with a table lamp.

If a valve does not get warm after the set has been switched on for some time, it may have become defective. Make sure by substituting another valve of the same type.
Should the receiver develop a fault consult your dealer, who will if necessary communicate with us.

R 1489 E. (P.M.) - 13751

The Philips 372B *Super Inductance* By R.J.Grant

A battery set as suggested by the 'B' in the model number, from the Philips "Super inductance" range. I purchased this set from a boot fair, when the back was removed it was found to still have both of its batteries, a Drydex combination HT with grid Bias battery, and a glass accumulator. Unfortunately on discovering the batteries inside I failed to hide my enthusiasm, this didn't leave much manoeuvring room when it came to reducing the price. The battery is a real bonus as the batteries in these sets are often missing and an original to restore or as a pattern to reproduce for another set which really makes it a double–find.

The cabinet had all of its lacquer removed and had been rubbed down ready to be refinished, it looked like this had been done some time ago as it was now a bit grimy with a few digs and bits of veneer missing. All of the knobs were intact and in good condition, the back had a few minor signs of past dampness in the form of white chalky marks but was otherwise ok.

First released in 1934, this set seems to be only part Art Deco in style as it has a nice inlaid veneer of different woods around the speaker fret and across the front and around the sides of the cabinet, but an earlier conventional keyhole style tuning scale. Although this is nicely calibrated in metres, there's no room for station names, generally the set's still in keeping with a nice piece of furniture.

Electrically, this is one of the Philips 'Super inductance' range employing six valves with a push-pull class B output stage (PM2B Output valve) with the good quality cabinet, making it one of the top class sets of its day.

A 'Super inductance' set is instantly recognisable by the three shiny copper coloured coil screening cans. These are multiple Tuned Radio Frequency stages (TRF) which Philips seemed to hang on to longer than the other manufacturers but soon out–performed by Superhetrodynes already around at this time.

The knobs were removed easily as I had pre-treated the grub screws with a drop of WD40 several days earlier, careful not to get any on the bare veneer. The chassis sits on a middle shelf inside the cabinet with the accumulator next to it and the HT and Grid bias battery in the compartment below.

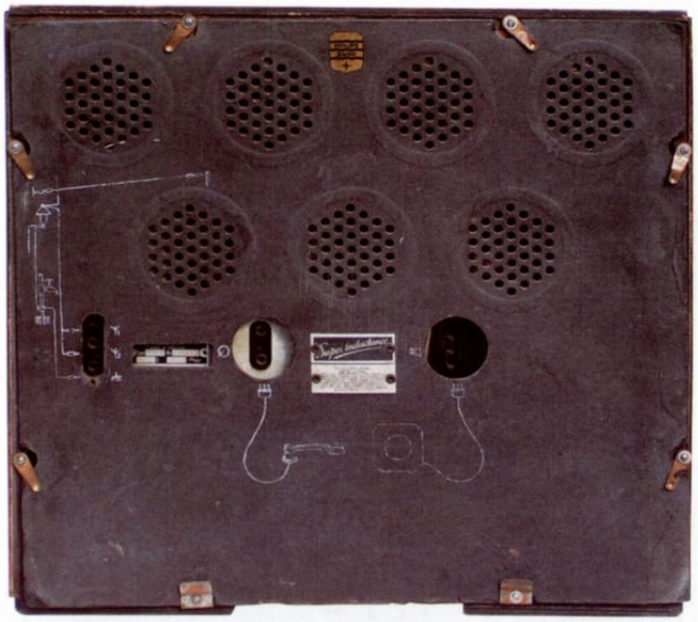
The four chassis retaining screws were removed. These are accessed through holes in the bottom of the cabinet and the speaker disconnected via two ceramic terminal blocks, definitely not original but about the right age.

The chassis now removed was a bit grimy and showing its age but has very little evidence of corrosion and will only need electrically repairing and cleaning. The four speaker clamp brackets were removed, the nuts were locked with extra lock nuts and then sealed with the famous red paint typical of Philips who continued this practice well into the 1960's. The speaker was removed complete with its cotton dust protection bag and output transformer.

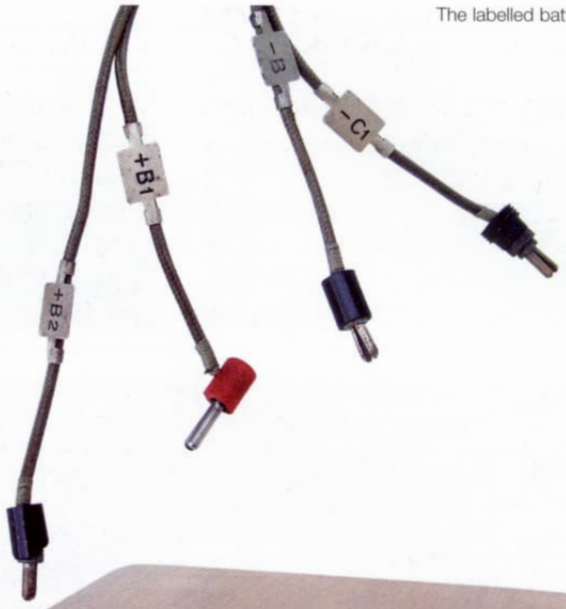
The speaker cloth was next to be removed and peeled off quite easily, the glue had turned into dust and really lost its grip. The cloth was in excellent condition and would only require vacuum cleaning; this set had obviously come from a non smoking household.

The tuning scale escutcheon was removed next and in order to clean and polish it properly I removed the celluloid window. This was held in place by four brass rivets. These Bakelite rivets have a coarse helical thread, carefully cutting slots in them with a hacksaw blade enables them to be unscrewed and re-used with minimal chance of damaging the Bakelite, these rivet slots are hidden from view when the chassis is re-installed.

The brass and enamel Philips badge is frequently missing on these sets, so when the set has one I usually remove it and re-glue it with modern glue so as not to lose it in the future. If it doesn't come out easily then I drill a small hole in the Bakelite behind it and push it out with a piece of stiff wire, well worth doing as you can polish it with Brasso and spray it with clear lacquer before refitting. The brass on these badges is usually oxidised



The back showing aerial details



The labelled battery leads

The speaker re-installed

Back off, batteries installed

and appears to be unprotected, either from new or the lacquer lost with age. On this set the badge was stuck fast (the first time I have come across this!) so after polishing it with the escutcheon, I carefully lacquered it with a brush in situ.

The knobs were cleaned and polished at the same time and the indent in the wave change switch re-filled with a touch of gold coloured paint. This indent points to one of four brass markers on the front of the set, Off, MW, LW, Gram, these will have to be removed before the re-finish of the cabinet, they stand quite proud of the woodwork and a tug with a pair of pliers pulled them free quite easily. These were also polished with Brasso, then pushed into a piece of card to keep them vertical while being spayed with Lacquer ready to refit.

The cabinet was cleaned with foam cleaner and then wiped over with white spirit, I noticed that in one place the previous restorer had sanded through the veneer, there were several digs and small pieces of veneer missing, all of this can be disguised with filler and stain, but there's a large chunk right in the middle at the top which had to be dealt with as it's a real eyesore and difficult to hide. I cut a piece of veneer of as close a colour and grain match as I could find, (salvaged from a wrecked set) slightly larger than the chunk missing, I then placed this over the gap and accurately cut the original veneer round it with a scalpel. I then trimmed the hole out to the cuts so the new piece would fit exactly, this was glued in place with PVA glue and held with masking tape while the glue dried. The new veneer was slightly thicker than the original so it can be cut back flush with 900 grade cutting paper (Halfords).

The rest of the digs and missing veneer were small and filled with wood filler of similar colour and then cut back with fine cutting paper ready for the new finish, the new piece of veneer and small areas where the previous sanding had gone through the veneer were colour matched with wood stain.

At this stage the flaking dark brown paint used on the non veneered ends of the plywood between the front and top of the set, were sanded smooth ready for a new coat of paint. The visible end of the plywood in the speaker fret was also painted brown, this required a little more attention as the layers of the ply were uneven, probably due to exposure to dampness sometime during its long life. The really proud bits were cut back level with course sand paper, then all exposed end grain plywood sanded smooth and primed with diluted Unibond (PVA Glue 50/50 with water) ready for re-painting after refinishing the rest of the cabinet.

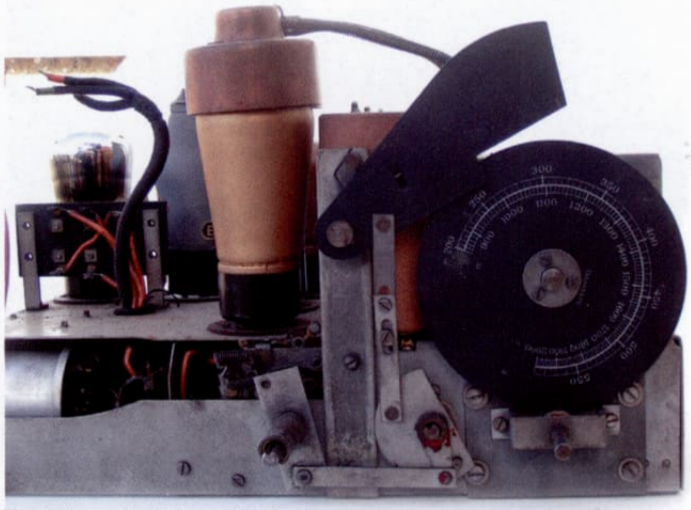
The next step finishing the cabinet was a bit slow and required two important ingredients, Patience and a nice dry day, as any hint of dampness in the atmosphere will spoil the job. The colour of the wood is about right so I didn't want to make it any darker so clear varnish is the one I used, previous experience on cleaning original finishes showed them to be less than shiny so I used the satin sheen variety rather than ending up with a toffee apple and finished it with Brasso and furniture polish to give it a final lustre rather than a shine. The first coat was thinned with white spirit, applied and left a full twenty four hours to fully dry and harden, many thin coats are best, if the varnish is too thick you leave brush lines and you won't be able to rub it flat. Don't be tempted to apply the second coat after four hours as it says on the tin as the next stage was to rub off the nibs

The missing piece of veneer

Veneer repaired

The veneer rubbing through

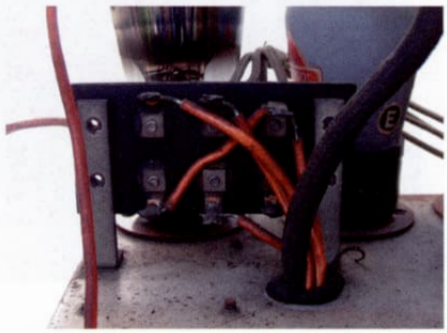
The inlayed veneer and tuning escutcheon



The tuning scale shutter mechanism

The fret end of the ply ready to paint

The speaker cloth glued and pinned



The rear of the battery wire terminal panel

and after four hours the varnish is nowhere near hard enough to do this. (In this case I used a spirit based varnish I had in stock, modern acrylic based varnish can be thinned with water, In my experience I found drying and hardening times a lot longer). Stage two, The nibs rubbed off so the surface feels smooth to the touch, don't rub through the vanish just a light dusting with 1000 or 1200 grade cutting paper is all that's required, then the second coat was applied and again left a full twenty four hours, then the second rub down.

Stage three. The colour matching was adjusted, I used coloured varnish to slightly adjust the colour of the new veneer as the colour of the wood changes slightly when varnished, I only had the gloss variety to hand and had to apply two coats to get the colour right, with drying time in between, this done in this small area of new veneer only and rubbed flat with wet and dry cutting paper to remove the glossiness. The final level of gloss will hopefully be the same as the final coat.

Stage four, the third coat applied, when dry the cabinet looks good, about right and feels smooth to the touch so this is the last coat, left two days to really harden then rubbed down with Brasso to give it a slightly higher level of gloss (but not shiny) and finished with silicone furniture polish to add a bit of lustre. It's never going to be perfect but I was very pleased with the result. The exposed plywood ends, now primed with Unibond, were painted with a similar brown paint to the original.

In the speaker fret two coats of matt undercoat were required to fully hide the plywood end grain and obtain uniform smoothness. On the ridge between the front and top the set the paint was over-lapped very slightly as the phantom sander had rolled off the edge of the veneer revealing a fine line of lighter plywood. The top coat of paint was a mix of colours, gloss and undercoat to get the colour and level of gloss right; modern paint usually needs toning down a bit as its always too glossy and colour rich. (Sometimes just a spot of matt black is all that's needed)

While the cabinet was being re-finished the speaker cloth was cleaned, ironed flat and humidity conditioned before it was put back into the cabinet. (I usually leave it in the garden shed until ready to refit, a damp place to undo the shrinkage when ironed and avoid sagging if ever stored in humid conditions). The speaker has a lip pushing the speaker cloth forward into a recess in the front panel but to avoid the cloth sagging I prefer a ring of glue around the outer edge to hold it in tension, drawing pins hold it in place while the glue dries. While the glue is drying I'll refit the wave change markers by tapping them back into their original holes with a small toffee hammer with some masking tape on its face to avoid damage to the new lacquer, with just a small touch of super glue to ensure they don't fall out in the future. The tuning escutcheon refitted and the cabinet is now complete.

After a bit of a clean I had a look round the chassis, all was intact, the Trader sheet (No 617) circuit shows there are no electrolytic capacitors and only a few paper types, so a run round with the AVO is next. Most of the paper types are sealed in a can which might prove difficult to replace but they are all ok (Leakage greater than 5 Megs), I then measured the battery rails

A spray of lacquer for the wavechange markers

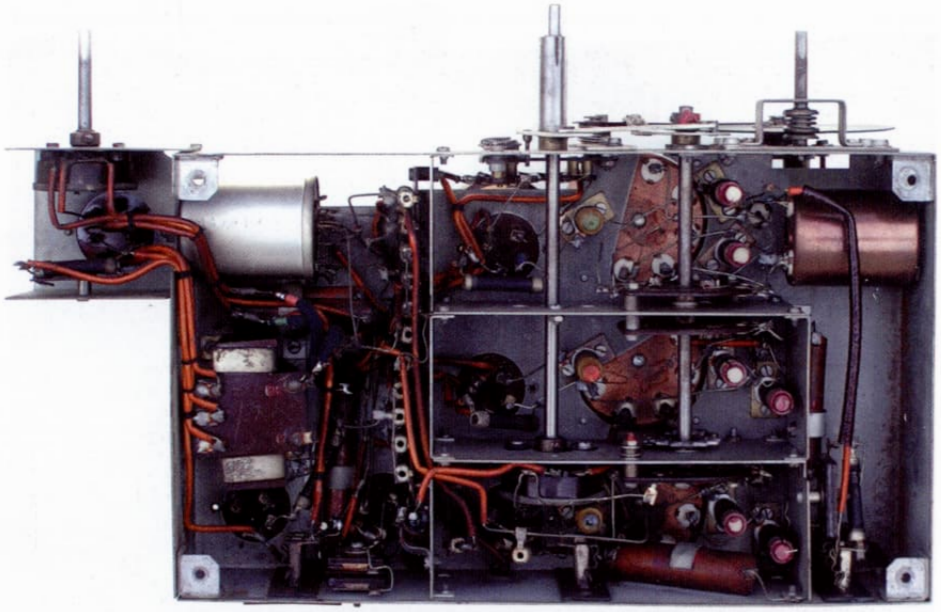
Wavechange marker holes

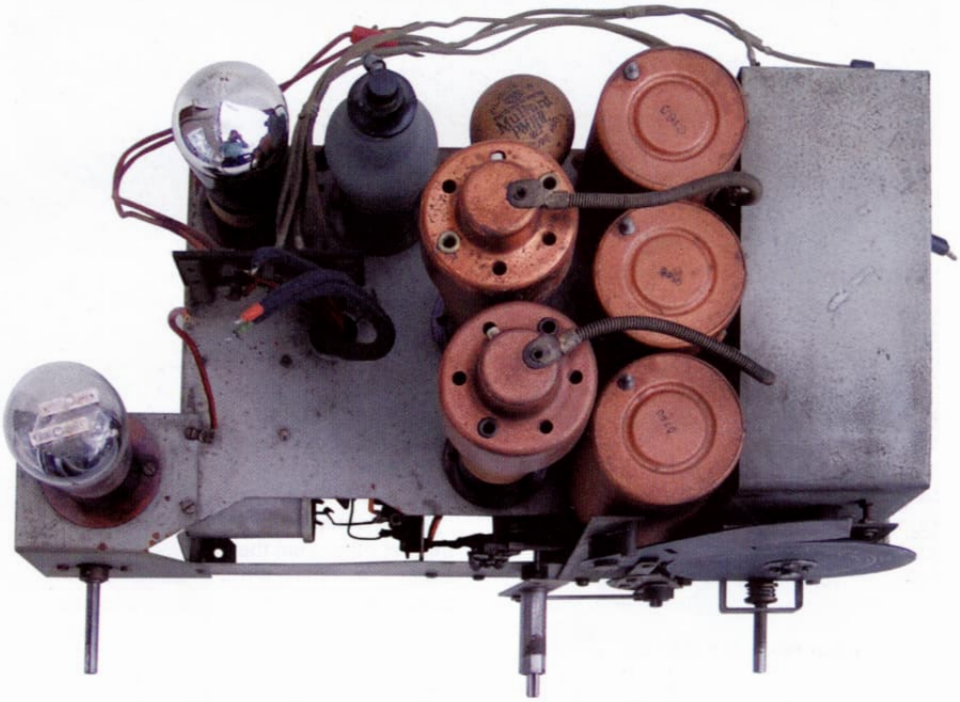
The wavechange markers in situ

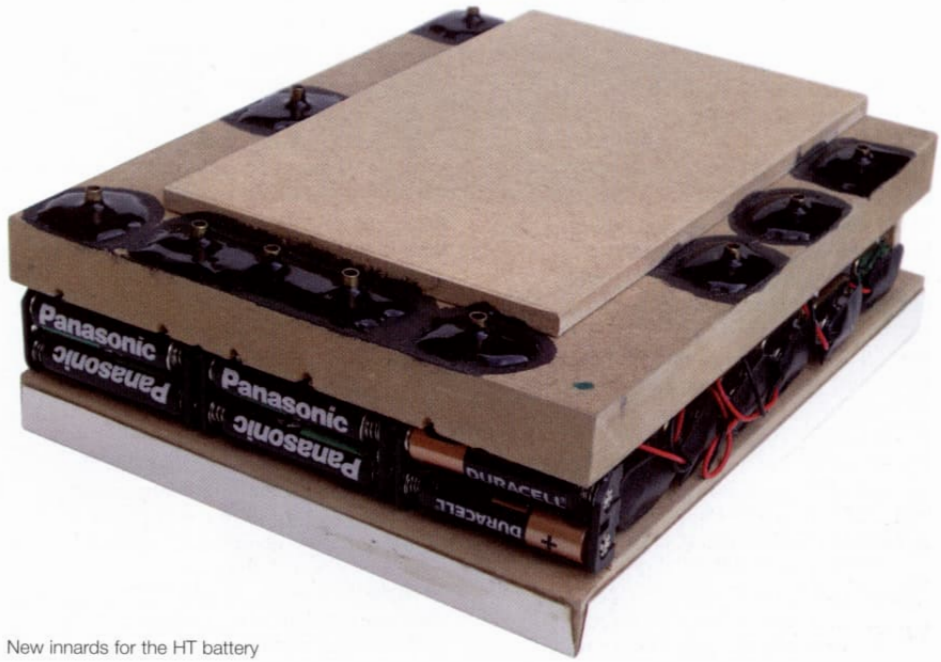
to ground and there were no shorts so the next step is to check and connect the speaker and apply some volts. The speaker output transformer is attached to the speaker. This has a centre tapped primary as it's a push pull output and both halves checked ok with a good crackle from the speaker on both halves when the AVO was applied (You don't get the crackle with a high impedance DVM, it's not the same!). The speaker itself is in a protective cotton bag and as all is ok I decided not to disturb it and refit the whole assembly back in the cabinet, the safest place while working on the chassis.

I connected the speaker to the chassis via a piece of three core mains lead as a temporary extension and powered up the set from my battery replacement power supply on the bench.

On switch on I got a healthy microphonic ringing from the audio valves and a good buzz from the top of the volume control but not much else, running round the valve pins with the AVO proved all of the voltages to be within that quoted in the Trader sheet. The buzz stopped at the







New innards for the HT battery

The finished set

grid of V3 but looking at the circuit, this is strapped as a diode and doesn't amplify, it's just used as the detector diode.

Injecting the aerial straight into the control grid of V1 produced nothing but on V2 produced some faint results, swapping the two PM12's now produced nothing from V2 proving the PM12 now in V2 to be faulty; replacing the faulty PM12 solved the problem and the set came to life.

The moving coil speaker in the cabinet produced some quite mellow tones and the set performed very well, as all the valve voltages are about correct I assumed all of the resistors were still about their correct spec and none of the de-couplers were pulling any of the rails down. The HT current was about 10 m/A about what I would expect from a push–pull output stage at a reasonable volume.

Running the set on its internal plate aerial in the top of the cabinet made the set very deaf but there is a diagram of the aerial requirements and how to use the water main as an earth on the back of the set, so I expect the plate aerial is for local stations only.

The grid bias is set by fixed resistors in a divider chain R19 thro R21, driving V2, V4 and V5 grids, I assumed the battery "C" plug would go in the full –9 volts tapping as the voltages were set by this divider chain. The AVC circuit biases the grid of V1 from the detector V3 anode. I later discovered from the Trader Sheet that the Battery "C" should be set to the –3 volt, tapping, this further improved the set's performance (although increasing the HT battery drain by a couple of milliamps).

The chassis is as original and only required a new valve to make it work, not bad for a 76 year old. I could probably improve its short aerial performance by replacing all of its capacitors but prefer to keep the set original and as manufactured, there is no evidence of any repair work and I would like to keep it that way.

There are a few nice features about this set other than the fine woodwork cabinet, there is a terminal panel for the battery leads making it very easy for the repair man to replace them when they get short, and they always do on battery sets as the wander plugs keep falling off and need refitting. All of the coils are sealed inside their screening cans as are the paper capacitors, protecting them from the elements, perhaps that's why it only needed a valve to repair it.

The tuning scale has a shutter blanking it out when the set is switched off so you will not run the expensive batteries flat, this employs some quite heavy mechanics for this relatively simple task with little chance to go wrong. The set also has a tone control, R18, or top–cut as I think they preferred to call it in those days.

The Accumulator, empty and dried out, has only two pole plates, these are in very good condition, almost new. (Most radio accumulators only have two plates as they're only required for low constant current drain for long periods, unlike a car accumulator, there's no requirement for short heavy current drain as in starting an engine).

There was a little evidence of debris and sediment in the bottom of the jar, this was dislodged with a small piece of cotton cloth on the end of a wooden chop stick, easy when there's only two plates and plenty of space in between them, then flushed out with clean water before re-filling with dilute sulphuric acid and distilled water.

The dilution ratio is about 30% acid to water from neat sulphuric acid with a specific gravity of 18.50 down to 12.50, remembering to add the acid to the water in small amounts to avoid a violent reaction and having some bicarbonate of soda to hand just in case you need to neutralise any spillage. Luckily I was given about a pint of sulphuric acid by a fellow wireless collector several years ago, just waiting for an opportunity to use it on an accumulator rebuild, this was found to be already diluted when checked with a hydrometer.

The HT battery, a Drydex combination HT and grid bias, was also in reasonably good condition. 120 volts HT tapped at 108, 96, 84, 72, 60 and 48 volts for variable screen grid voltages, the lowest tappings for grid bias at 9, 7½, 6, 4½, 3 and 1½ volts. If maximum grid bias voltage of -9 volts is used this reduces the maximum HT+ to 111 volts (GB+ and HT- being the same point).

The set being a table model doesn't need the weight to be right as there's no issue with centre of gravity and balance as with portables, so it just has to look right.

The new battery was made from two pieces of 15mm MDF, cut to size and glued to a third smaller middle piece of wood, so the thirteen PP3 and six AAA batteries can be installed in the gap around the edge. The middle spacer piece was cut to size so that the whole height of the battery is 5mm less than the inside of the cover, as the protruding terminals are inside of the cover. The terminal sockets were made from 0.5mm brass shim stock, about 20mm wide strip and wrapped round a 4mm drill to form a tube.
The top of the battery was marked out and drilled with 4mm holes for the terminal sockets, the brass tubes pressed onto these holes with about 4mm protruding through the top, leaving 1mm underneath to solder on the connecting wires, then fixed in place with touch of super glue. To finish off a small puddle of "Araldite" 2–3mm deep placed round the terminals and when set painted black to resemble the pitch used in the original battery. Finally a 5mm piece of MDF or corrugated card was cut to fit inside the terminal area stopping the cover from sagging onto the top of the battery. The battery was wired using PP3 connectors and AAA battery holders from Maplins. The battery now complete just needs the outer cover from the original to finish it off. I intend to make a reproduction battery cover for everyday use preserving the original but for now the original will do.

I purchased this set to fill a gap in my series of Super inductance sets, when I've finished playing with it I'll re-fit the original HT battery innards to the cover (they appear well dried out and mummified) and fit an empty accumulator while the set is out of use, and keep the restored one for current projects.

November 21st 2010 Golborne swapmeet photographed by Mike Barker

Practical Wireless in Wartime by John Holloway

For someone born in 1937, when one comes across a piece of contemporary history in the form of a magazine dedicated to a subject which was to become of interest, the temptation to want to share it with others is too great to be ignored.

I was visiting a friend and fellow BVWS member, Bill Milne, a few months ago and during the course of the conversation he mentioned that he had picked up a copy of Practical Wireless for December 1941. He produced a fairly pristine copy which I leapt upon and quickly thumbed through. Over tea we discussed some of the articles it contained one or two of which surprised us in that with the country at war, PW was explaining some of the principles of aircraft direction finding. Bill offered to lend me the magazine and on my return home I read though it in more detail and thought it might be of interest to others.

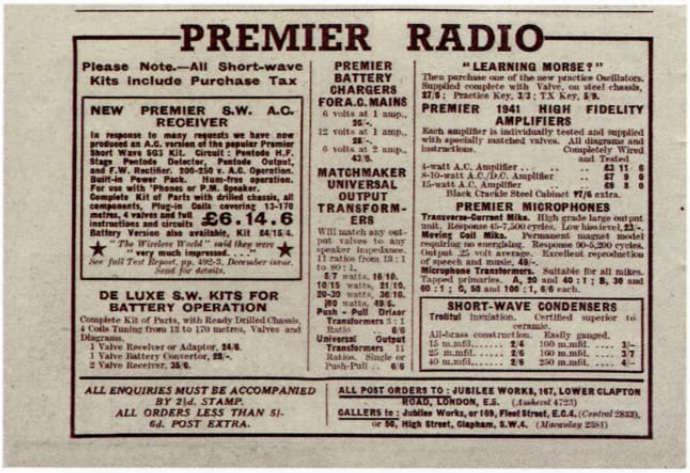
Wartime restrictions were in force and the effect on size, paper quality and the amount of advertising carried were certainly not making things easy for the editor, F.J. Camm, the two members of staff noted on the first page, Frank Preston and the appropriately named L.O Sparks and his publisher, George Newnes. As can be seen from the front cover it was not the most visually arresting layout though I expect the Advertisement Manager at The Chloride Electrical Storage Company would have been happy with his display for Exide Batteries. With a retail price of nine old pence for forty-eight pages of content I suspect that was pretty good value for the times.

In terms of the war December 1941 was quite a month. The 6th saw the beginning of the Soviet counter attack at Moscow and on the 7th, the attack by the Japanese on Pearl Harbour and the garrison at Tobruk was relieved. But of course none of these momentous events had taken place when this edition was put to bed sometime in November.

So what about the content? The Editor was much concerned with the status of radio engineers and the apparent proliferation of bogus societies promoting spurious qualification for a fee. It appears that some of these organisations traded using quite grand and imposing titles. One such was, the 'Royal' Institution of Radio Engineers which incorporated the Institution of Radio Engineers. The British Institution of Radio Engineers (BIRE) and the Institute of Wireless Technology saw to it that the proprietor of this organisation was brought up before a judge who sentenced him to 12 months in prison having been charged with conducting a bogus concern. It was stated in court that he could not even repair his own wireless set. The diplomas issued were signed by a 17 year old typist. There is one wonderful line in the editorial praising the work of the BIRE in this case. 'It is to the credit of the British Institution of Radio Engineers with which is fused the Institute of Wireless Technology'.... Something for the News Quiz I feel.

Before we move into the magazine proper there is a short paragraph which in typical upbeat wartime spirit asks what readers think of the new format and pointing out that due to lower levels of advertising there is more space for articles.

Moving on, there are two references to Lord Hankey's Appeal to the wireless trade. These take the form of a half page advert inside the front cover opposite the editorial and as a feature in 'On Your Wavelength' by the mysterious Thermion. Hankey was a respected senior Civil Servant who became a minister in the early part of the war, first as Chancellor of the Duchy of Lancaster and then as Paymaster General. It was in this latter capacity, a post always close to the requirements of the military and security forces, that he asked the Wireless Trade to offer working multi range AC and DC meters such as the Model 7 AVO, the Model 40 and the Universal AvoMinor, along with other manufacturers' products of a similar type and quality. There was an option to



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★ "The Wireless World" said they were very much impressed. ★

See full Test Report pp. 492-3, December issue. Send for details.

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Microphone Transformers. Suitable for all mikes. Tapped primaries. A, 20 and 40:1; B, 30 and 60:1; C, 50 and 100:1, 6/6 each.

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Trolitul insulation, unaffected superior to ceramic.

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25 m.mfd.	2/6	160 m.mfd.	3/7
40 m.mfd.	2/6	250 m.mfd.	4/-

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2 PRACTICAL WIRELESS December, 1941

ROUND THE WORLD OF WIRELESS

Broadcast for Maltese

A SPECIAL weekly programme for Malta is to be broadcast by the B.B.C. and will be in addition to the one for the British Forces serving there.

Valves in a Bible

A WORKMAN who always carried a Bible under his arm when he went to work was questioned recently by his employers during an inquiry into the pilfering of wireless valves. It was discovered that the Bible was merely a case for the man to carry away a valve every time he left the works.

Overseas Radio Change

THE B.B.C. overseas services have been reorganised and divided into two sections—the first for enemy and enemy-occupied countries, and the second for other countries.

Radio-controlled Aerial Torpedo

A RADIO-CONTROLLED aerial torpedo is being developed by a U.S. Navy yard engineer, and Service officials have seen a 6ft. model at work.

Operated on the gyroscope principle, the winged torpedo is designed to fly at 30,000ft. Carrying a load of bombs, it would be set at the starting-point to power-dive at terrific speed into a designated enemy target, spraying bombs.

Super-sensitive Television Set

A TELEVISION set—seven times more sensitive than normal ones—is reported to have been completed by two Japanese professors in Tokio after nine years' work.

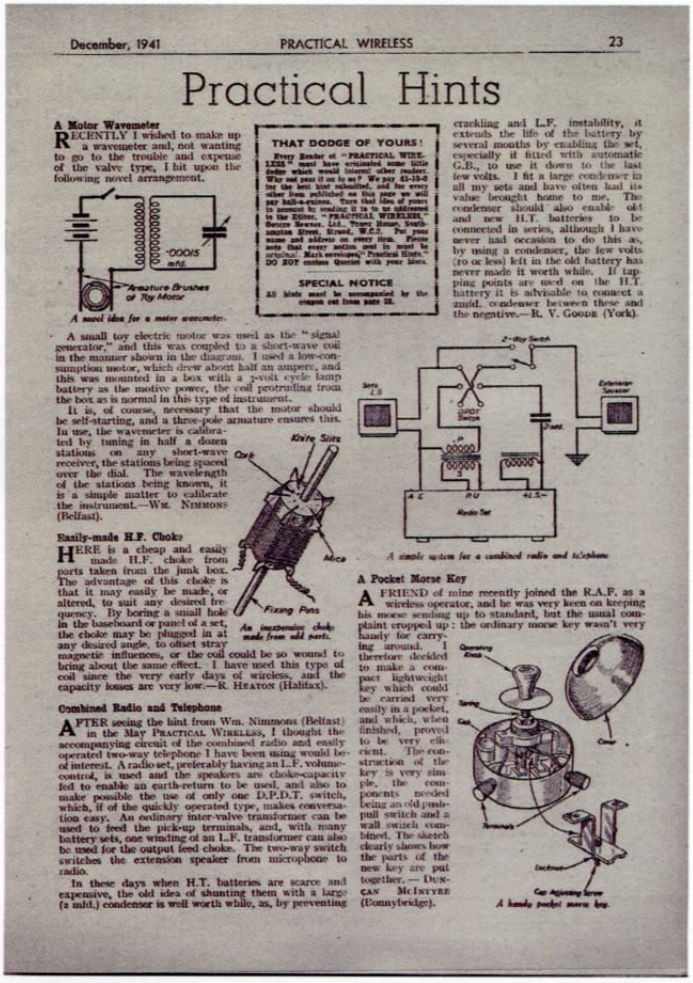
Empire Radio Chain

NEW short-wave radios being built in Australia with a power of 100 kilowatts will complete a chain of British Empire stations for the dissemination of authentic news.

Sweden Listens to the B.B.C.

A RECENT broadcast in the B.B.C.'s Swedish transmission described a visit to Swedish sailors now marooned in Britain owing to the torpedoing of their ships by the enemy, and mentioned that the International

Women and girls are now being trained as radio operators by the B.B.C. Our illustration shows students being taught the principles of transmitter operation with a small table set and wavemeter.



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Practical Hints

A Motor Wavemeter

RECENTLY I wished to make up a wavemeter and, not wanting to go to the trouble and expense of the valve type, I hit upon the following novel arrangement.

A novel idea for a motor wavemeter.

A small toy electric motor was used as the "signal generator," and this was coupled to a short-wave coil in the manner shown in the diagram. I used a low-consumption motor, which drew about half an ampere, and this was mounted in a box with a 9-volt cycle lamp battery as the motive power, the coil protruding from the box as is normal in this type of instrument.

It is, of course, necessary that the motor should be self-starting, and a three-pole armature ensures this. In use, the wavemeter is calibrated by tuning in half a dozen stations on any short-wave receiver, the stations being spaced over the dial. The wavelength of the stations being known, it is a simple matter to calibrate the instrument.—WM. NIMMONS (Belfast).

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best hint submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to be addressed to the Editor, "PRACTICAL WIRELESS," Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every section used in must be original. Mark envelopes, "Practical Hints." DO NOT confuse Queries with your hints.

SPECIAL NOTICE

All hints must be accompanied by the coupon cut from page 28.

Easily-made H.F. Choke

HERE is a cheap and easily made H.F. choke from parts taken from the junk box. The advantage of this choke is that it may easily be made, or altered, to suit any desired frequency. By boring a small hole in the baseboard or panel of a set, the choke may be plugged in at any desired angle, to offset stray magnetic influences, or the coil could be so wound to bring about the same effect. I have used this type of coil since the very early days of wireless, and the capacity losses are very low.—R. HEATON (Halifax).

An inexpensive choke made from odd parts.

Combined Radio and Telephone

AFTER seeing the hint from Wm. Nimmons (Belfast) in the May PRACTICAL WIRELESS, I thought the accompanying circuit of the combined radio and easily operated two-way telephone I have been using would be of interest. A radio set, preferably having an L.F. volume-control, is used and the speakers are choke-capacity fed to enable an earth-return to be used, and also to make possible the use of only one D.P.D.T. switch, which, if of the quickly operated type, makes conversation easy. An ordinary inter-valve transformer can be used to feed the pick-up terminals, and, with many battery sets, one winding of an L.F. transformer can also be used for the output feed choke. The two-way switch switches the extension speaker from microphone to radio.

In these days when H.T. batteries are scarce and expensive, the old idea of shunting them with a large (2 mfd.) condenser is well worth while, as, by preventing crackling and L.F. instability, it extends the life of the battery by several months by enabling the set, especially if fitted with automatic G.B., to use it down to the last few volts. I fit a large condenser in all my sets and have often had its value brought home to me. The condenser should also enable old and new H.T. batteries to be connected in series, although I have never had occasion to do this as, by using a condenser, the few volts (10 or less) left in the old battery has never made it worth while. If tapping points are used on the H.T. battery it is advisable to connect a 2mfd. condenser between these and the negative.—R. V. GOODE (York).

A simple system for a combined radio and telephone.

A Pocket Morse Key

A FRIEND of mine recently joined the R.A.F. as a wireless operator, and he was very keen on keeping his morse sending up to standard, but the usual complaint cropped up: the ordinary morse key wasn't very handy for carrying around. I therefore decided to make a compact lightweight key which could be carried very easily in a pocket, and which, when finished, proved to be very efficient. The construction of the key is very simple, the components needed being an old push-pull switch and a wall switch combined. The sketch clearly shows how the parts of the new key are put together.—DUNCAN MCINTYRE (Bonnybridge).

A handy pocket morse key.

either donate or sell though from the tone of the advert it was hoped that patriotism would overcome mere commercialism and donation would be the choice.

The other inside front half page advert was from our old friends Premier Radio offering the New Premier SW AC receiver as a kit for £6.14s.6d and the range of Premier 1941 High Fidelity Amplifiers in 4, 8 and 15 watts versions fully wired and tested from £3.11s.6d to £9.8s.0d with a black crackle Steel Cabinet 17/6d extra.

Another page featured short news items in 'Round the World of Wireless' some of which are worth mentioning. The BBC was busy organising its overseas service to provide news and a feeling of hope across Europe and the Mediterranean. A special weekly programme aimed at the population of Malta was announced in addition to the British forces own service, and broadcasts to the enemy and enemy occupied countries would be distinct from those to all other countries. In addition, a number of new 100watt radio stations in Australia completed a chain of British Empire stations 'for the dissemination of authentic news.' The BBC was also reported as training women radio operators for wartime service.

As possibly a hint of what was to come some 20 years later, it was announced that two Tokyo based professors had developed a super sensitive television receiver after some nine years' work. How this piece of industrial espionage got through is not revealed.

On the home front, a large northern engineering firm was reported as experimenting with short wave as a possible cure for the common cold. The success rate is claimed to be nearly 70%. However, the report states that the researches involves short radio waves, prophylactics and quote 'one other treatment about which details are not available.' Conspiracy theorists today would have a field day with that line!

Two personal stories complete this round up of news. One highlights the stick-to-your-post spirit of the time telling the story of a wireless operator who saved a Norwegian ship and most of its crew by continuing to send out an SOS but who then sadly died at his post. Another told by the crew of a Wellington bomber flying low over a French town giving the 'V' signal with its navigation lights. In response there was a succession of twinkling 'V's.' from skylights, windows and motor cars in the streets.

Page three sees the start of the technical articles dealing with coil winding, receiver maintenance and testing, LF choke construction, the design of a small standby receiver and a piece detailing how to use the mains as an aerial. This latter one may well have been prompted by the fact that eyebrows might be raised and a visit from the local constable might occur if one started to erect a large external aerial at this time in the nation's history.

There follows No.7 in a series on Public Address equipment, in this case portable kit for use for mobile or in temporary situations. The various requirements and options are covered as well as some advice on good practice both in terms of safety and maximising positioning of the speakers.

The enigmatic 'Thermion' comes up with what sounds like a pet theory he is trying to promote to the government, namely that when Allied bombers flying over Germany having reached Berlin and other main centres and the local radio stations were closed down for the duration of the raid the BBC should immediately transmit propaganda broadcasts to the local population on the station's usual frequency. Whether this was ever taken up I have no way of knowing but it sounds like a security and logistical nightmare.

As mentioned earlier, there is an article on

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Bonding and Screening in Aircraft

A Paper Read Before the Institute of Practical Radio Engineers

By J. F TOMLIN

THE meticulous care taken when bonding and screening metallic elements in aircraft may, from a layman's viewpoint, seem somewhat stressed or perhaps overstressed in its application. This is not so, and it is the purpose of these notes to briefly, yet concisely, outline the reasons why the operation has to be regarded as one of the most important of all relative to the assembly as a whole.

These reasons may be divided into three groups, as follows:

(1) To alleviate or possibly eliminate any interference with the reception of wireless signals from other aircraft or from numerous ground transmission systems.

(2) To provide a capacity counterpoise that will effectively act as an "earth" for radio apparatus installed in the aircraft when in flight.

(3) To minimise the risks of fire which may be caused by atmospheric or other electrical phenomenon.

Fire Precautions

Dealing with (3), it should be understood that relatively large surfaces of metal, such as the wings, etc., of an aeroplane, collect charges of atmospheric or static electricity quite high in voltage values; so that were these metal surfaces not all bound or bonded together their tendency to develop large differences of potential would finalise in the creation of spark discharges of a magnitude sufficient to set fire to the aircraft when in flight. This alone illustrates how important it is to provide for a complete, low-resistance "earth-bond" of all the metal surfaces and bodies incorporated in the aircraft structure.

Surface Contacts

These must be bare and clean; that is, where panels are riveted to a framework care should be taken to make sure that a good metal-to-metal contact is obtained; at frequent intervals or spacings, protective coverings or anodisings must be removed, either by emery paper or a suitable chemical, before the bond is attempted; then the surfaces re-treated or anodised again.

Should this, however, not be possible, such surfaces must be bonded together by aid of external connectors, these usually consisting of multi-stranded or plaited phosphor bronze (or copper) wires, quite flexible, terminating at either end in round-holed tags or connectors which are clamped and soldered to the wires or cable and thus used in conjunction with 4 or 6 B.A. bolts, screws and spring washers to effect the bond from metal-to-metal. In some instances fibre-covered aircraft nuts, specially manufactured for the purpose, are used.

Bonding Movable Elements

This type of flexible connector is also used to bridge turnbuckle joints in control wires, movable flaps and elevators, the latter, say, every 18ins. or so. Additionally, where control wires must pass through a metal member, the hole is insulated with a fibre bushing to serve the dual purpose of minimum friction to lessen wear and tear and to alleviate disturbance from an otherwise metal-to-metal threading.

Tail Wheel Discharges Static on Ground Contact

Every metal section, component or wire is bonded as a complete one-piece body to act as an "earth" for the wireless installation, transmitter and receiver or receivers, the whole network or bridge-work then being connected to the tail wheel of the aircraft, which discharges resident static through a metal-dust tyre thread on ground contact—when landing, or a spring-like wire brush trails the ground for this same purpose.

View of the interior of the pilot's compartment of a Curtiss-Wright aircraft (Model 20), showing arrangement of instruments, new type control wheel and the "tell-tale" instrument panel.

Bonding Composite Constructed Aircraft

Civil, and some "trainer" aircraft are composite in construction, that is, wood and fabric comprise the greater part of their surface areas generally, with a corresponding lessening of metal surface to act as an "earth." In these instances an artificial counterpoise is incorporated as a substitute, this usually being effected by attaching a strip of copper foil or other metal, of, say, 26 s.w.g. x ½in. or ¾in. along the full length of longeron and wing spars, bonded together so as to supply one "earth-frame." Then, all other metal parts of the aircraft, such as metal engine seats, instrument panels, etc., are incorporated into the bonding network and the whole, as one unit, bonded to the tail wheel.

Aircraft Direction Finding which one might feel could make the powers that be a little worried though the article does acknowledge that only the very basic theory is dealt with in this case. It's interesting to note that the author looks forward to being able to reveal some startling numbers of outstanding developments in radio which had and will have taken place by the end of the war.

Along side this was an article based on a paper delivered to the Institute of Practical Radio Engineers by J.F. Tomlin. It dealt with the problems of screening in aircraft which apart from the electronic effects, also included the prevention of fire caused by equipment failure or damage due to enemy action.

In the meantime people wishing to follow careers in radio and electronics in the Signals branch of one of the Services or join a course at a recognised wireless college were offered help by Practical Wireless. There is the first of series of articles familiarising students with the type of questions they might encounter and the answers to help them achieve their goal. Some specimen questions included:

1. Describe a satisfactory form of HF control.
2. Explain the principles of reaction.
3. Give a simple explanation of crystal frequency control.
4. What is the essential purpose of an HF choke?

There then followed detailed answers to these questions which I am sure would have been eagerly seized upon both for content and style.

More short articles follow ranging from Practical Hints to a detailed look at the design of a cathode-ray Oscillograph designed for the investigation of very high frequency phenomena and being able to deal with transients whose rate of rise may be several thousand kilovolts per second. My description must end there for the simple reason that the rest is completely over my head!

We are now at page 32 and a page devoted to the latest record releases from

Parlophone, Columbia, HMV, Decca and Brunswick. Classical and popular music are covered in equal measure and artistes such as Richard Tauber, Malcolm Sargent and Arthur Fielder rub shoulders with Victor Silvester, Felix Mendleson and his Hawaiian Serenaders, Joe Loss and Duke Ellington not forgetting the monologues of Stanley Holloway, no relation.

By now advertisements are beginning to appear. In all I counted seven offering correspondence courses and a fair number of familiar names such as Bulgin, Stentorian, London Central Radio Stores in Lisle Street not forgetting the Fluxite Quins with those awful poems.

Finally we come to the classified ads charged at two shillings per line or part thereof. Minimum charge four shillings. Not cheap by any means. Here's one that must mirror many businesses at this time:

'We regret that owing to all our employees having joined H.M Forces we are unable to accept orders for cabinets except to callers. Limited stocks only. We have a large stock of radio components – H.L. Smith 286 Edgware Road London W.2'

Most of the companies offering components were based mainly in central London, Lisle Street, Little Newport Street, in Soho. A little further out Kennington and Elephant and Castle seems to be a popular area. Of course any reader of a certain age will remember with some fondness these areas as sources of treasure trove for long after the war.

As I was closing the magazine my eye was caught by a single entry under Short Wave Equipment. It promoted H.A.C. short wave receivers. One of their single valve models was the first radio receiver I built. In 1941 it was being advertised for 16 shillings plus 6d postage. I bought mine about 12 years later for about three times that figure and spent many hours with headphones clamped to my head listening to the wonderful world of radio, thumbing through the World Radio Handbook and praying that the batteries would hold out until my pocket money became due.

Wootton Bassett photographed by Carl Glover


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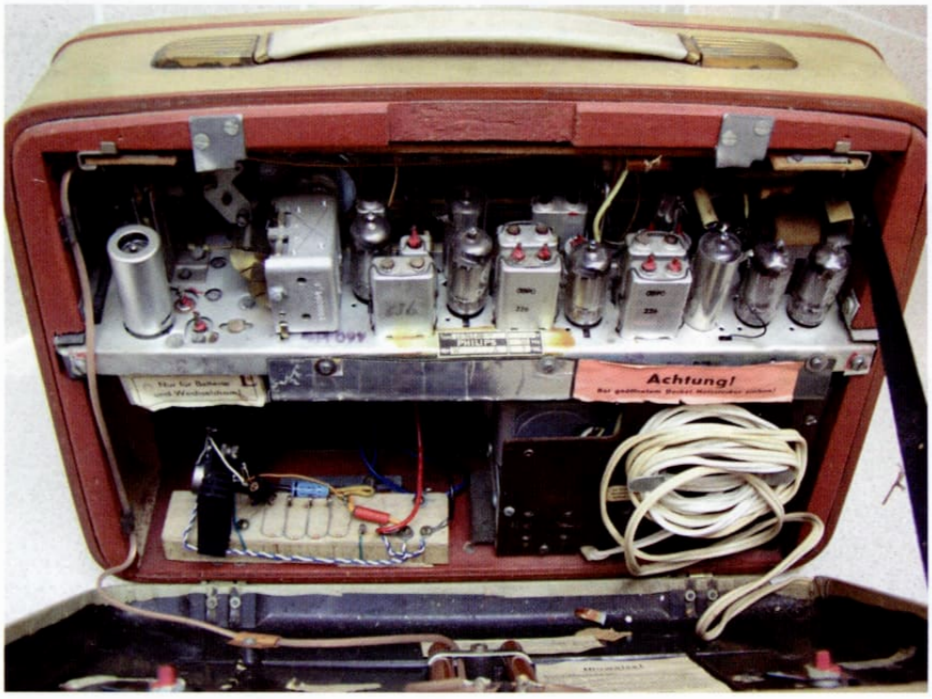
Colette's Makeover: The Philips LD562AB

by Robert Darwent

The Philips 'Colette' is a luxurious mains/battery valve portable offering LW, MW, SW (band spread 31 to 49 metres) and VHF (87.5 to 100 MHz) wavebands. It was released in Germany in 1956 and in The Netherlands a year later as the virtually identical 'Clipper' L5X62AB model. At the time of its release the set was an expensive top-of-the-range offering, with some quite unusual and innovative features.



The set makes use of 10 miniature battery valves in total and the design employs three IF stages using DF97's, the two IF's used being 10.7 MHz and 460 kHz. The circuit uses two DL96's in 'push-pull' configuration that provides excellent quality audio from a double-coned loudspeaker. An odd feature is the use of a DM71 'magic-eye' as a phase splitter for the output stage. I understand that late on in the production of the set, Philips discovered that the audio quality fell short of expectations. So at the eleventh hour they got around the problem by rewiring the DM71 as a phase splitter. This cured the audio issue but prevented the valve being used as a tuning indicator as originally intended. Consequently, the valve just illuminates to indicate the set is switched on. There is a separate oscillator valve on AM that also provides the bias for the output stage from its grid leak. This valve still has to continue to provide bias when VHF is selected and so is shunted on to 1250 kHz whilst this band is in use. The LT circuit is unusual in that a DEAC ni-cad cell is permanently wired into the LT supply to provide voltage stabilisation and smoothing. Without it the LT voltage can easily rise high enough to destroy all of the valve filaments. A front panel push button is provided, marked 'Laden', to put the ni-cad on charge whilst the set is switched off. On this position there is a 12V, 3W bulb in series with the cell to limit current and to remind you that charging is taking place. The set is powered on batteries by a pair of 1.5 volt D-cells for the LT, together with a 90 volt battery for the HT. The D-cells are connected in parallel with the DEAC ni-cad, and the set is switched over to battery by inserting the 2-pin mains plug into an internal socket on the power supply board. An 'economy' switch is also provided which is operated by pulling out the volume control knob. This switches off half of each of the two DL96 output valve filaments, so prolonging the LT battery life.

Initial Impressions

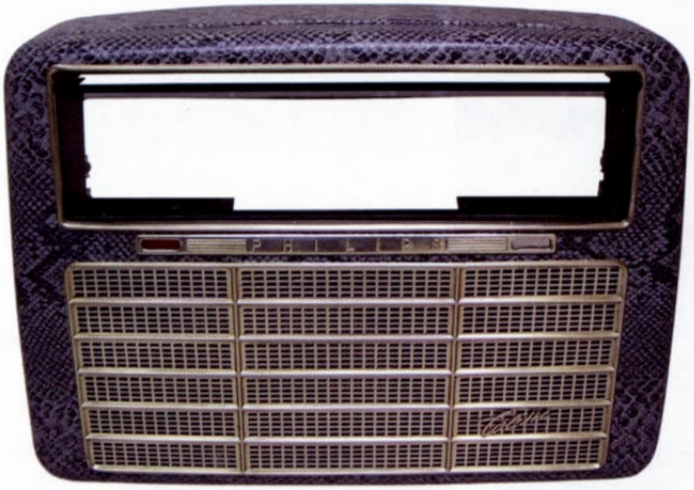
Underneath the cloth covering, the front and back sections of the case are made from bakelite with the middle section being wood. Most noticeable was a large split in the bakelite above the tuning dial that had torn the covering. This area revealed the cloth to be paper thin and extremely brittle with age, repairing the split without tearing the cloth further was going to be virtually impossible. Further scrutiny revealed many smaller tears, especially underneath and on the rounded corners of the case. The metal grille on the front was coming away, most obvious in the top-left corner. Several of its fixing points were broken and there was no obvious way of securing it due to the tension in the metal pushing the grille away from the surface of the case. The bakelite around the tuning dial and the recessed areas of the grille were covered in a dark-reddish paint that had become quite dry in places and was readily flaking off. Internally, the DEAC ni-cad together with all the battery holders and straps were missing. Worse still, a 'Heath Robinson' affair of a LT voltage regulator had been fitted in place of the original ni-cad and in so doing just about every wire going to the main chassis from the power supply board had been disturbed. As expected, my initial repair

attempts to the bakelite with epoxy glue only made the torn covering worse and I quickly decided that if the set was ever to look presentable again then a complete recover of the cloth was going to be necessary.

Case Restoration

Whilst searching for a suitable replacement covering I came across some grey and black vinyl imitation snakeskin material with a cloth backing. Since quite a few other German portables of the period had mock snakeskin coverings, several models by Akkord for example, I decided it would also be acceptable for the 'Colette'. I was further encouraged by the excellent work of well respected Austrian collector Gerhard Heigl [1] who had also restored one of these sets by covering with a similar material and the end result was quite simply superb [2]. In addition I was comforted by the fact that nothing I was about to do would be irreversible. If a more authentic cloth came along at a later date the set could always be reinstated to the original colour scheme if so desired. However, to be honest I wasn't too keen on keeping the red and cream colours, to my eyes they just didn't look right. I began the restoration of the set by completely dismantling the case and removing all of its fixings and trims. I removed the red paint from the grille by immersing it in a shallow tray containing a jelly-type paint stripper. Afterwards the grille was washed clean in warm water and dried. It, along with all the other brass trims were then cleaned with foam cleanser, polished with Brasso wadding, then given a spray coat of clear acrylic lacquer to prevent further tarnish. Paint stripper was similarly used to remove the red paint on the bakelite around the tuning dial, which was then polished with Brasso to a high gloss. I soldered several small pieces of thick gauge copper wire to the rear of the grille in place of the broken metal fixings so that it was possible to secure it firmly to the bakelite front once again. Also at this point I painted over the original red areas inside the wooden middle of the case with a matt black finish.

I removed the old cloth from the case very quickly and easily, it was that dry and brittle that it just peeled away in large pieces with little effort. Suitable sized pieces were cut from the snakeskin material I had obtained, taking care to match the pattern on the front and back sections. To fix the new cloth I used Vinyl Floor Tile Adhesive. This adhesive has the advantage of staying wet for 15 to 20 minutes, giving sufficient time to apply with a small brush and to allow the cloth to be positioned correctly on the case sections. It is also water-based and so any excess can be easily removed with a damp sponge. The two bakelite sections are curved and have rounded corners, so it was necessary to stretch the cloth in order to remove any wrinkling. I found the best approach was to apply a liberal coating of adhesive to the bakelite, position over the laid out cloth, wrap the cloth over the edges of the case and secure temporarily with spring-type wooden clothes pegs. I was then able to smooth out any bubbles of air trapped underneath and gradually work my way around the edges replacing the pegs with strips of tensioned masking tape. After 12 hours or so the adhesive had dried sufficiently so that all the masking tape could be removed. I was then able to trim any excess material and



secure any minor areas that had not stuck down correctly. I found re-tensioning and further gluing where necessary provided a permanent wrinkle free result.

Chassis Restoration

As previously mentioned, virtually every one of the dozen or so wires going between the main chassis and power supply board had been disturbed with several of the wires having been left disconnected. It took quite some time to track and trace everything, but gradually I got the wiring reinstated to how it would have been originally. Finally, I had reached the point when I could safely apply power for the first time. I connected 90 volt and 1.5 volt bench power supplies and switched on. I was greeted by fairly decent quality audio coming from the loudspeaker on the VHF position, most of the other bands appeared to be working too when tried. The MW position appeared to be completely dead though, but I hoped this was just down to dirty switch contacts on that band which later proved to be the case. However, a current check in the HT supply showed the set to be drawing around 37mA instead of the expected 12 to 15 mA as stated in the schematics. So something was definitely amiss somewhere, most likely several leaking capacitors. I began the job of 're-capping', which isn't a quick or easy task with this set. There are around 90 capacitors in total, a few dozen of which are paper/wax types along with perhaps another half-dozen electrolytics. The sheer density of the components and wiring underneath the chassis made for slow progress, but I eventually removed all the suspect capacitors and replaced them with either new polypropylene types or electrolytics as appropriate. All the paper/wax types removed and tested were found to be leaking to some degree or other. The electrolytics when tested seemed to be fine but I replaced them anyway for good measure. After changing each group of capacitors I checked the HT current again, and it was steadily dropping towards the correct range. However, when capacitor replacement was complete the current still stubbornly remained at around 19 to 22 mA despite everything obvious having been changed. After much 'head-scratching' I tried replacing the DF97 employed as the oscillator valve, immediately the HT current consumption dropped to 9 to 11 mA. With hindsight I really should have suspected the valve sooner, as every other component involved with the bias-line to the output stage had either been checked good or replaced. But since the set appeared to be working so well, other than the HT current issue, I had wrongly given the benefit of the doubt that it was the culprit.

Pertrix No.78 battery

DEAC ni-cad and Pertrix No.231 cells

Reproduction batteries

Batteries and the DEAC ni-cad

I managed to obtain original battery holders and straps from a related German AM/FM valve portable that had a case damaged beyond repair. Fortunately they were identical to the missing parts I needed. As part of all my portable valve set restorations, I undertake the construction of an authentic set of reproduction batteries and covers to demonstrate the set operating with the specified battery types as originally intended. The reproduction DEAC D6 contains a modern 1.2 volt ni-cad D-cell in a holder. The other two D-cells have been furnished with Pertrix No.231 covers of the period. The HT battery is a 90 volt Pertrix No.78 battery housing a chain of 10 x 9 volt PP3 batteries in series. Two diodes limit the LT and ensure that it cannot rise high enough to cause damage to the valve filaments whilst the set is operating from mains power. I've managed to incorporate these components into the small cavity above the D-cell holder inside

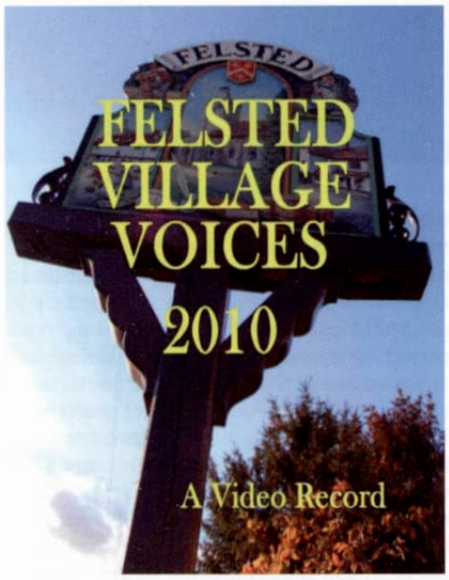
the card case of the reproduction DEAC.

The Finished Result

I am very pleased with how the new cloth covering has turned out, it has more than exceeded my modest expectations. Whilst not retaining the original colour scheme and perhaps not to everyone's taste, I hope others will at least agree that the set is still in keeping with other imitation snakeskin covered sets of the period. Personally I think it enhances what was already a charming and delightful radio.

robert.g0uhf.2@gmail.com

[1] www.radio-ghe.com
[2] www.radiomuseum.org/forum/restauriert_nicht_mehr_original.html



Dicky Howett films John Baker the village butcher (and dog)

Recording the past for the future

Dicky Howett makes a video

A scheme to 'capture' my village on video matured recently when copies of Felsted Village Voices hit the local stands. Easy really. I persuaded several (and mostly at random) citizens of the village where I live to speak their minds, but only for a couple of minutes. Well, not exactly 'their minds'. I was more interested in what they were doing at the precise moment that I interviewed them. So the postman was on his round, the local handy man was being a bit, er handy with a paint brush and the W.I were sewing a brand new tapestry (local views) in the church vestry. Previously during 2010 I had filmed the opening of the village's new multi use games area (referred to unfortunately by the acronym MUGA). This filming was a special service to the parish Council who wanted to 'prove' to the MUGA's sponsors how felicitous the money had been spent. Of course, cash is still required for the project and so I proposed a fund-raising Village Video, incorporating the footage shot of the opening of the MUGA (by lone Atlantic rower Charlie Pitcher, who lives in the village); Adding too, pre-recorded bits of the village panto as well as sylvan scenes of the surrounding countryside and the pre-mentioned yokels. All in all a 55-minute package of exactly the correct length, (or so I've been told).

To film, I used my trusty Sony BVW 300AP Betacam with the 'old fashioned' 4:3 ratio picture format. Editing was done linearly, ie shot- by- shot assembled onto DVD- no computer involved at all. All done with timing and the 'eye', which I used to do at the BBC back in the pre-colour ages with comag negative b/w 16mm film no less. My video is now selling at £6 each in a presentation case. A duplication house handled all the copy work which ensured a trouble free replay, most important considering the past 'compatibility' of the DVD system. No complaints so far...

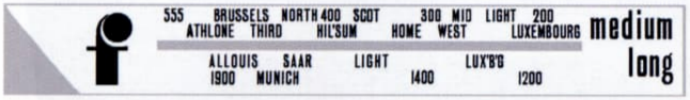
Making dials – the next level

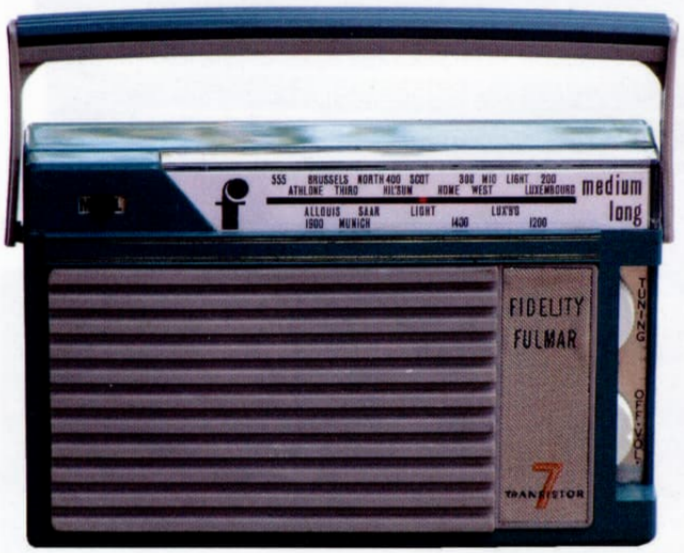
by John Pether

For many years I have looked at the problem of missing letters and numerals or badges on radio dials and cases. Reading the articles that have appeared I realise that we are going down the same path and using similar methods. But now I would like to take this problem one step further. This is how I approached the problem in the early days and what I have achieved so far.

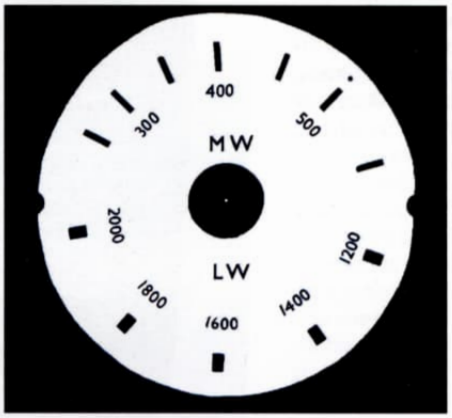
Left: Numerals showing pixels

Below: Fidelity Fulmar new dial





Fidelity Fulmar with new dial in place



Top: Ferguson dial artwork. Above: Ferguson dial in place

I started by choosing dials that could be reasonably simple to make for anyone with a computer and a good photography program like Corel Paintshop Photo which is the program I use. Possibly the same could be achieved using Adobe or a drawing program. The first dial I tackled was for a Fidelity which was discoloured and stained. I began with this particular set as I paid very little for it and had nothing to lose. I begin each time by taking a photograph of the original dial and then use a computer to clean up the image and restore any missing characters. If characters are missing they can often be cloned from another area of the dial. Then I continue by restoring the numerals, figure by figure with the original colour which can take hours. The next step I use the flood fill tool set to white to clean the background. Zoom in to clean up at pixel level and remove all dirty marks from the image. Carefully go round every character changing every pixel that should be white to white. The more time spent on the image the better the result. The final result should leave only the letters and numbers on a perfectly clean white background.

Any mark left will appear on the final artwork so the screen must show only the design that you require. The next step is to open print layout and drag the image onto the workspace which should be an A4 sheet on the computer screen, only as the other materials I have used comes supplied as A4 sheets. Initially guess the size and print it onto a sheet of plain paper. I use this method, as it is cheaper than wasting the other materials that I have purchased to use for the dials. Measure the printed design and then you will know whether to drag the image either larger or smaller. To make the image larger or smaller it must be dragged by the corners as this maintains the aspect ratio.

As this dial has a slot where the pointer can be viewed behind, I decided to laminate the paper it was printed on to make it more rigid. Then with a scalpel trim to size and cut the slot and finally fit to the radio.

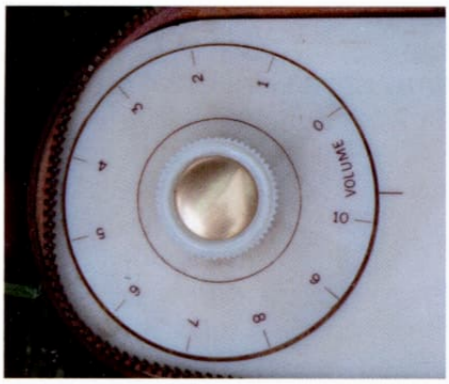
Another method I used on a Ferguson transistor radio was to use the same procedure as before, and this time I printed it onto a clear adhesive sheet.

This consists of a clear sheet which has a printable side and the reverse has a peel off paper to reveal a sticky surface, which, after sizing and printing, I stuck onto gold card purchased from a craft shop. (I found trying to print directly onto gold card did not work as the ink runs.)

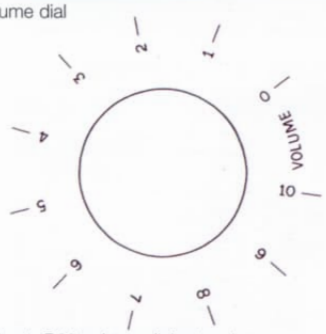
As this dial is situated under a knob it is well protected from wear and tear, and did not require spraying with lacquer to protect it. The next problem was how to place numerals and letters on to other surfaces. Years ago rub–on numerals and letters could be purchased from Letraset in various colours and sizes. These were then rubbed on to the aluminium front panel that had been cut out. The letters were rubbed on one by one and then the finished article was sprayed with clear lacquer to prevent them rubbing off. To make the panel look professional took a great deal of patience and time. I have tried craft shops and places like Hobbycraft searching for ideas, and asking receives the same reply that it now possible to do this on a computer. Which is not the case for printing onto plastic or metal. So very few rub on letters are available, unless you are making cards. These are never in the size or colour that's required. At last I have discovered an answer to the problem whilst searching the Internet for ideas. Again first start by taking a photograph of a good or reasonable example, In my case the radio I wanted to restore is a Roberts R88. I divided the photo into the volume dial, the station dial the switch positions, and finally the Roberts badge. I have included a Photograph of the set before work commenced so it's apparent what can be achieved with this method.

As the station dial was missing a few characters I decided to polish the surface clean and start again. I then used the same method as above to clean all the images one by one. I have shown a cleaned up image of the volume dial, it's the same procedure for the others.

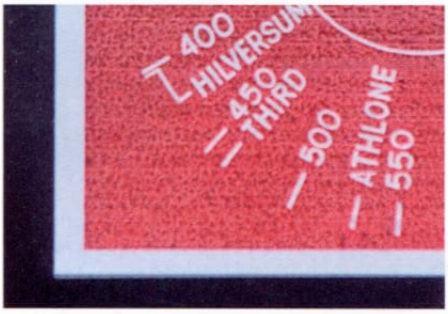
The next step when all the images are ready, is to take one image at a time



Volume dial

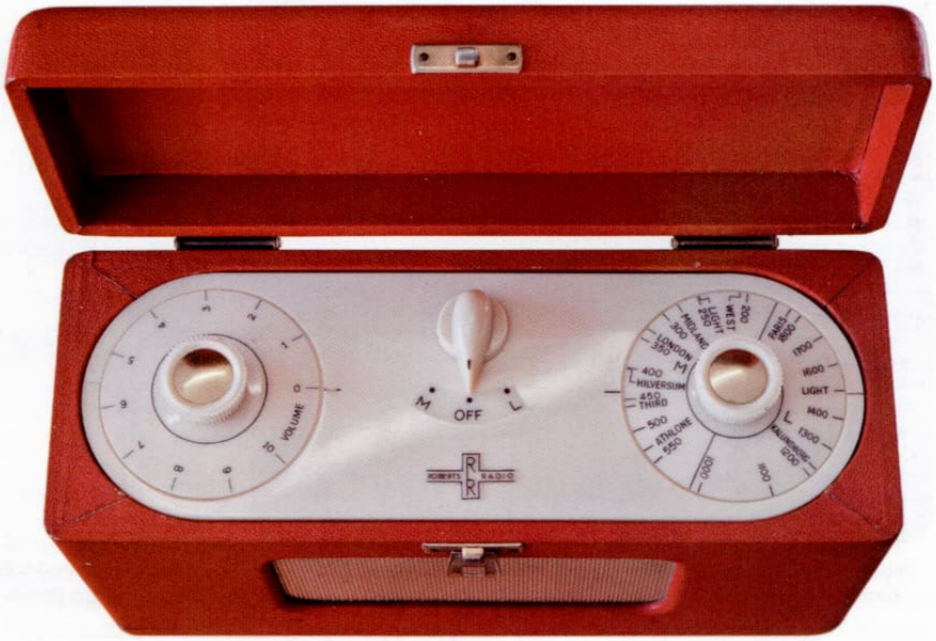


Roberts R88 volume dial artwork



White characters

Roberts R88 'before'



Roberts R88 'after'

and use the function Mirror Image.

Use this only for this material as It must be turned over and rubbed on to the surface of the control or cabinet. Measure carefully each time you print the image, again using plain paper. Or you can hold it against the object it is to be rubbed on to, and you will soon arrive at the right size. When the image is correct print it onto the clear sheet of rub on material and repeat the procedure for other images, making sure to position them on the plain paper first. The layout is achieved by dragging them into suitable positions on the computer screen. Print onto the plain paper each time checking against the clear sheet that the images don't overlap. I use this procedure as this can only be done one image at a time. It makes sure that I don't print one design over the edge of the next. The product I am using can be purchased clear or white, I have used the clear as the other leaves a white background. In the case of the Roberts a clear background is necessary, as you don't want to lay down the design on a white background. The phone number and website is given at the end of this article and they can be purchased single or in packs of five. It consists of two sheets one which is printed on, and leaving for an hour for the ink to dry. Then the other sheet is peeled and stuck to the printed surface. After again leaving for another hour they are peeled apart and the sticky side with the design is rubbed down onto the surface. Then the material is peeled off leaving the design to dry. After drying the design appears to be fairly robust as I have tried rubbing with a finger to test how solid it is. The sheets are A4 size so a number of images can be printed on to one sheet. I only used half a sheet and I doubled up on the images, so if I made a mess of it I could start again. Good instructions are supplied and it worked well for me. The only drawback it leaves a dull surface between the letters so cut away as close to the printed design that is possible. The dials I cut around the edge to the correct size, and also I cut out the middle before rubbing them onto the plastic discs. With these methods as long as the computer printer will print the colours the radio can be restored to an acceptable level, case or dials. As the gold discs in the centre of the knobs did not match, I cut out two brass discs and pressed them between dies in the vice, polished them and then sprayed them with clear lacquer. The dies are two short lengths of one inch aluminium bar, one concave the other convex. These were turned in a lathe to fit each other, and to the right shape. The final top panel is hard to distinguish from an original and makes a very acceptable job.

The company also supply water slide transfer paper which may be an alternative solution. This I have not tried yet as it would require spraying with lacquer to prevent the design from being rubbed off, and lacquer and some plastics don't mix. As a footnote it dawned on me that if I used the white rub on sheet and made a negative image. By this I mean a coloured background and make the letters white on the computer screen. If this was then applied to the white sheets of rub on material this would leave white letters or numerals on any coloured background. I have included a photograph of a small area of the Roberts tuning dial which, I rubbed onto the rear of a CD case which is black plastic as an example. This is only to demonstrate what can be achieved. I have deliberately left a white border which could have been cut off before rubbing down.

Another trick I have used in the past whilst making printed circuit board negatives, is to print the design and let it dry. Then put it back into the printer and print again over the top, this strengthens the image and improves the negative; this may also be another useful method in some cases when it is necessary to increase the boldness of the image. Unfortunately I have not found a solution to printing white letters on a clear background so it's back to the shed to see what other radios I can now apply these techniques to. I hope this article will be of interest for those who wish to take this further and duplicate this approach.

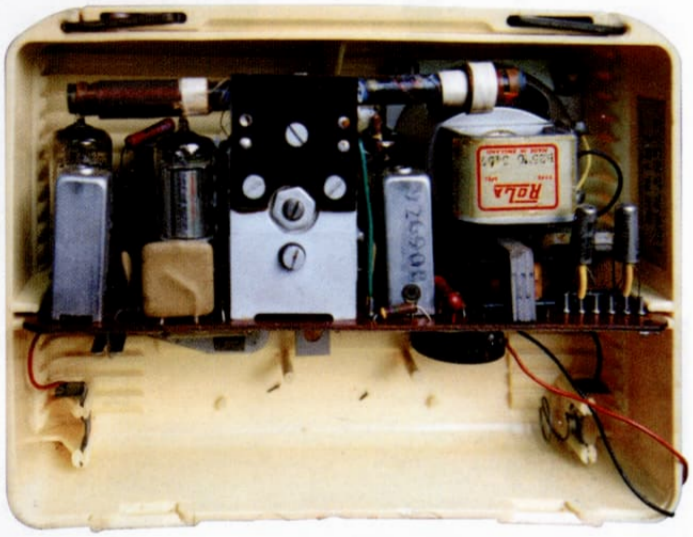
The paper can be purchased from:-
Crafty Computer Paper
Tel: 0116 269 0960
www.craftycomputerpaper.co.uk

Hybrid radios: lovable 'mongrels' of radio design

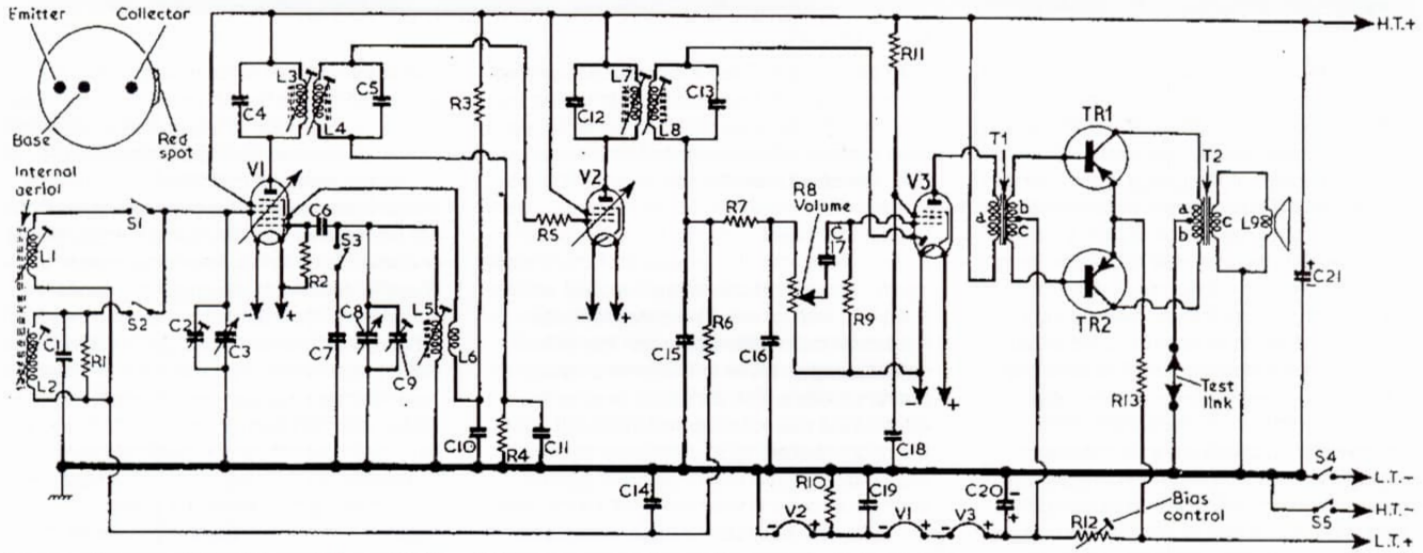
by Stef Niewiadomski

A couple of years ago I was lucky enough to be the winning bidder for a 'Valve Car Radio' on eBay. I could see from the photos that there were only three valves on the chassis and no vibrator, so it looked like a fair bet that the valves were intended for operation with 12V on their anodes, and that the radio had a transistorised audio section. Sure enough when the radio arrived the valve line up proved to be ECH83, ECH83 and EBF83 (all manufactured by Mullard) and an OC26 power transistor was mounted on the back panel. This radio, and the publication of the article on the Marconiphone P60B in The BVWS Bulletin for Summer 2009, stimulated my interest in these cross-breed radios, which as far as I know aren't particularly sought after and collected purely for their 'mongrel' (used here in an affectionate sense) nature. This article is the result of my investigations into these radios and hopefully it will stimulate some interest and the uncovering of more radios of this type.

1: The Marconiphone P60B, introduced in June 1957, showing its comparatively modern-looking lines and cream-coloured plastic case.



2: Rear view of the P60B: the valves can clearly be seen on the left hand side of the chassis and the transistors on the right hand side



Circuit diagram of the Marconiphone P60B. Valve bases are shown above at the left. **R4, C11** *provides bias for V2.* **R12** *may be 12Ω.*

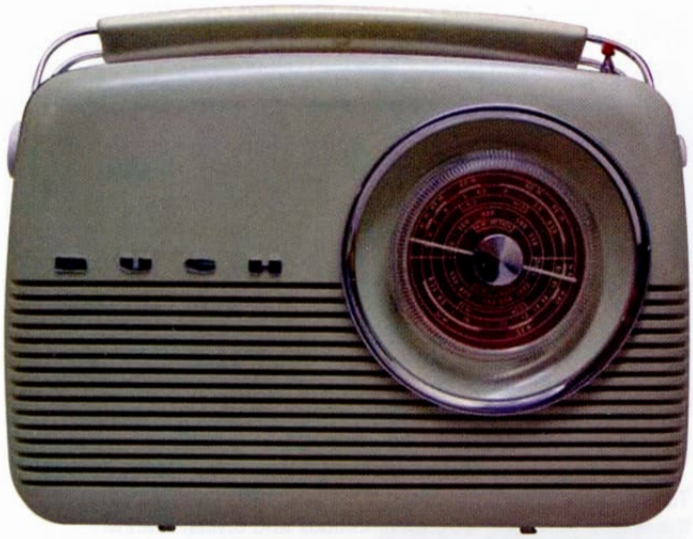
3: P60B Schematic diagram. The anode of the DAF96 drives an audio transformer whose secondary drives in anti-phase the bases of the two OC72 push-pull output transistors.

What is a Hybrid Radio?

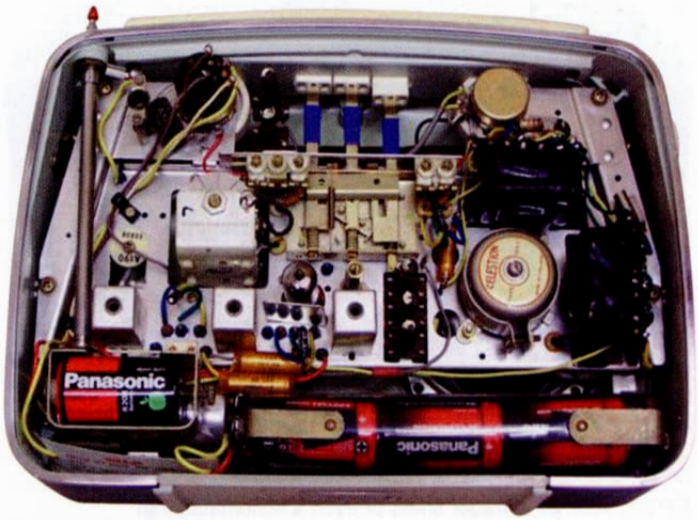
Maybe I should be clear by what I mean by a 'hybrid' radio. The germanium 'crystal diode' arrived on the commercial scene before the transistor and so strictly speaking sets like the Vidor CN436 'Vanguard' AM/FM set (arriving in September 1957) and using six valves plus two OA79 diodes in the FM ratio-detector stage, can accurately be described as 'hybrids', that is having both valve and solid state technology in the same radio. Stretching the definition even further: how about the CN431 'Marquisa' with four valves plus a metal rectifier - definitely a 'solid state' device. I'm going to limit my definition by the 'solid state' device(s) having to be active, that is a transistor, and this considerably reduces the number of sets that can be included in the 'hybrid' category. I'm also going to exclude the class of radios or tuners (such as some Quad and Leak products) which were essentially all-valve line-ups but with transistorised stereo decoders.

Marconiphone P60B

Let's start with the Marconiphone P60B, introduced in June 1957. A photo of the set is shown in Figure 1, which shows its comparatively modern-looking lines and cream-coloured (it was also available in grey) case. The P60B appeared in the 1958 Marconiphone brochure, alongside several other modern looking, and 100% valved, radios such as the T69DA (in the role of the main home radio), an AM/FM 6-valve superhet receiver, capable of receiving



4: The front of the Bush ETR82 export portable, covering the MW and two SW bands, and sharing the same iconic TR82-type case as something like 13 Bush radio variants. Reproduced by kind permission of Robert Darwent.



5: A rear view of the ETR82 showing the DK96 approximately in the centre of the chassis. The inverter (in a silvery-can) generating the HT for the valve can just be seen lurking behind the single D-cell at the bottom left. Reproduced by kind permission of Robert Darwent.

the VHF transmissions which had started in the UK in 1955. Marconi's 'companion' set of the day was the mains-powered T70A, a 4-valve superhet, covering LW and MW from a ferrite rod aerial, in an ivory-coloured moulded cabinet.

The 'attaché case' portable radio in the brochure was a new mains/battery portable, the T73DAB. The set used the conventional DK96, DF96, DAF96 and DL96 miniature valve line-up plus metal rectifier (for when it was plugged into the mains), and, in a sign of things to come, used a PCB mounting all the major components.

There was a second portable, the very interesting and significant P60B 'personal' radio, in the range, and this was a hybrid valve/transistor set. Despite being a hybrid radio, the set looked like a typical early transistor radio, with an upright plastic case, a round dial and a carrying strap, and covered the normal MW and LW bands. This set was a couple of guineas cheaper than the all-valve T73DAB, maybe to stimulate market demand for transistor sets.

The set represented what was to come, in that it used all the features (battery-only, ferrite rod aerial, moulded plastic case, employing a PCB, etc) used in the classic 'tranny' radio, which was just about to revolutionise the radio industry, and listening habits.

The P60B used three valves: DK96, DF96 and DAF96 - just like the T73DAB, operating from a B139 67V HT battery - and a matched pair of OC72 PNP transistors running off a 4.5V supply provided by three 1.5V U11 batteries. These U11s also supplied the heaters of the three valves, which were connected in series. Figure 2 is a rear view of the P60B: the valves can clearly be seen on the left hand side of the chassis (as viewed from the rear) and the transistors on the right hand side. Figure 3 shows the schematic diagram of the P60B. Note that the anode of the DAF96 drives an audio transformer whose secondary drives the bases of the two OC72 output transistors operating in push-pull.

The set is described in more detail in Peter Nash's article 'Marconi's Hybrid – the P60B' in the Summer 2009 issue of The BVWS Bulletin.

According to the 'Trader' sheet for the P60B the 1957 HMV 1410B/G receivers used the same chassis as the P60B and were housed in blue and grey plastic cabinets respectively.

The Bush ETR82

This rare Bush portable set shares the same TR82-type case as something like 15 variants. To be more accurate, it was the all-valve portable/mains MB60 which first used the iconic David Ogle case design, but it is the TR82B and C, and the VTR103 (including the FM/VHF band), which most commonly survive today and with which we associate this shape.

The ETR82 was an export set, and covered MW and two SW bands instead of the more commonly found MW and LW bands, and employing a hybrid one valve, six transistor circuit. See Figure 4 for a photo of this radio (courtesy of Robert Darwent, G0UHF). The radio appears to have been manufactured for only about twelve months or so, from about mid-1959 to mid-1960, and consequently is very rare these days. By this period the OC45 had eliminated the need for valves in the IF amplifier stages, but the ETR82's front end, which needed to operate above the MW limits of most transistorised sets of the day, was still beyond the reach of any transistor in production. See reference 4 for Robert's comprehensive article on the ETR82 in the context of the Bush sets of the period.

The waveband switching and DK96 valve (as a 'front end' mixer/oscillator) from the earlier all-valve EBM60 design was used, followed by a pair of OC45s as IF amplifiers, then an OC71 as an AF amplifier, an OC78D as a driver, and a pair of OC78s in a push-pull output arrangement, all taken from the TR82B circuit. At first sight it seems strange that Bush produced a hybrid radio in the same year that the fully transistorised sets (ie the TR82B and C, also introduced in 1959) were just entering production.

The 1959 TR82B and C only covered the LW and MW bands and these frequencies were within the capability of the OC44 transistor in the local oscillator / frequency changer stage. However the SW bands (3-9Mc/s and 9-18Mc/s) of the export ETR82 were not, hence the use of a DK96.

The ETR82 was powered by seven D-size batteries. One cell is in a separate holder and is the LT (nominally 1.4V) supply for the DK96. The other six cells are connected in series to make up a 9 volt supply for the transistor circuitry, and to feed an inverter which produces around 65 volts to power the anode circuit of the DK96. In the picture shown in Figure 5 (again reproduced by courtesy of Robert Darwent) you can see the DK96 approximately in the centre of the chassis, and the inverter (in a silvery-can) can just be seen lurking behind the single D-cell at the bottom left.

The reason for the set's very short manufacturing period was due to the speed of suitable transistors becoming available on the market that could reliably work at the higher shortwave frequencies. Bush designed the EBM60, an all battery valve export model having MW and two SW ranges, in 1957. This was superseded by the ETR82, having the same tuning ranges but replacing all but the first valve with transistors, in 1959. And this in turn was superseded by the ETR92 model, the all transistor version which first appeared in the second half of 1960. It was the introduction of the OC171 transistor that made the ETR92 possible and rang the death knell for the ETR82.

Today we can only imagine the excitement in Bush's design department as these rapid developments were made, and the probable headaches in the factory as the new technology and circuit innovations were rolled into production so quickly. There was much trepidation in just soldering expensive germanium transistors at the time and this skill had to be learned quickly by the production staff.

Unfortunately it appears that any official documentation on the

6: The 1959 Transola-Lux 59 by Akkord-Radio of Germany

ETR82, such as a Trader sheet or even a schematic, that may have been produced by Bush have either not survived to the present or may never have been released.

So iconic is the MB60 shape that modern reproductions are still available, even in the form of an analogue MW/LW/VHF plus DAB digital radio from Argos (which I believe now owns the 'Bush' and 'Alba' names).

Evolution of the Portable Radio to the 'Tranny'

As an aside an interesting website is: vintageradio.me.uk/, the 'portable radio index' of which shows the evolution of the portable radio from 1946 to 1966, regarded as being the 'classic' years for this type of radio. You can see the sets with 100% valve line-ups in 1955, then a single all-transistor portable (the PAM 710, using Pye V6/ and V10/ transistors, regarded as being the first British portable transistor radio) in March 1956, and progressively more transistorised and less valved designs in subsequent years. The only criticism I have of the site is the lack of any hybrid radios.

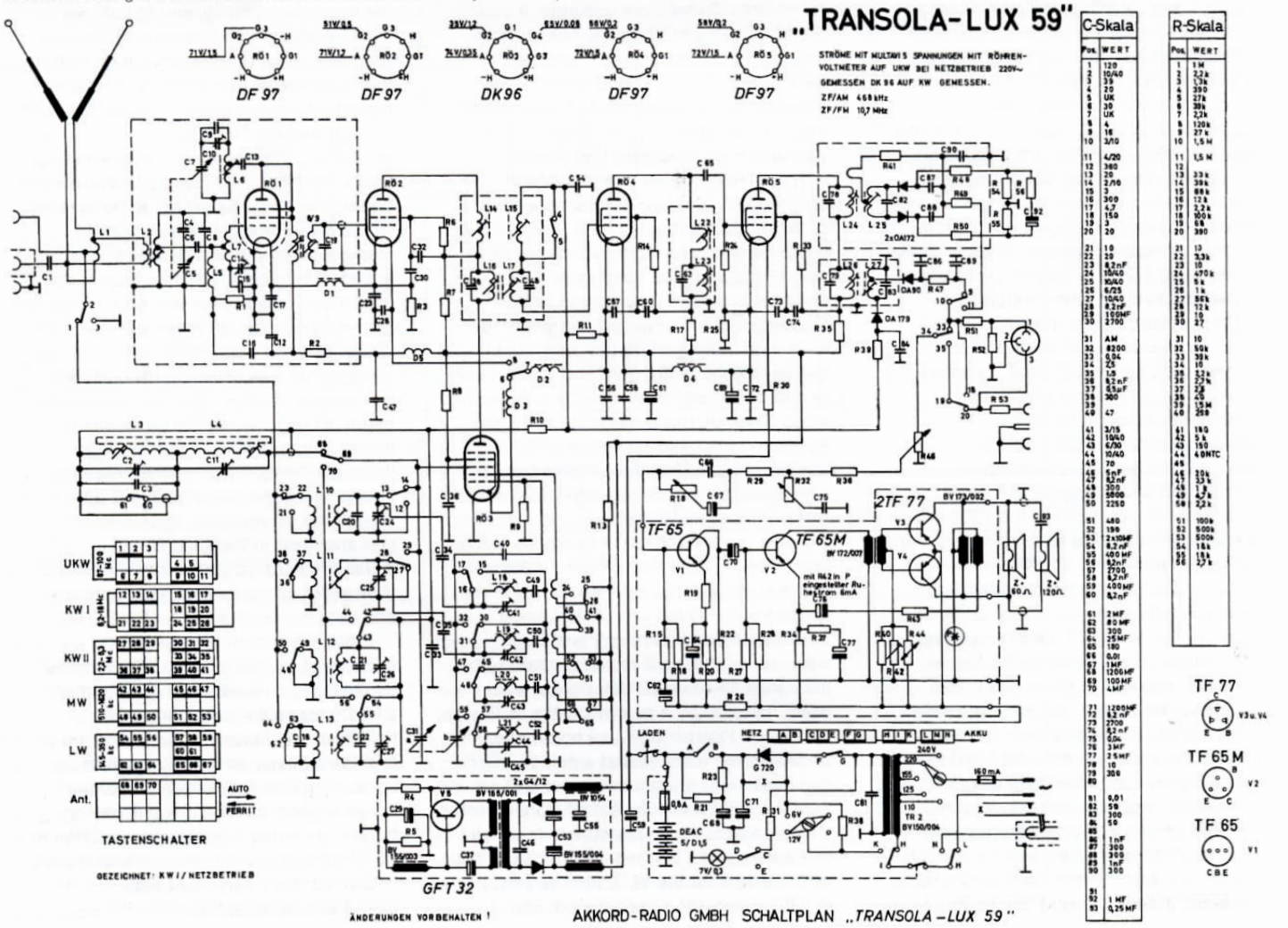
On the Continent

Mainland Europe seemed to grasp the transistor nettle early and notably Philips and Grundig produced several hybrid models from 1956 onwards. The B4X74BT of 1957 is fairly typical of several hybrid portable radios produced by Philips in this period. Its line-up of DK96, DF96, DF97, DM71 (magic eye tuning indicator), OC71 and a pair of OC72s was driven by dry batteries and gave MW, LW and SW coverage with an IF frequency of 452kHz. The batteries needed were a 45V anode battery (supplying about 2.5mA) for the valves and 6V for the valve heaters and the transistors. This radio was 416mm x 173mm x 272mm in size (about 16" x 6.8" x 10.7" in old money) so it was pretty big for a 'portable' and as far as I can tell it didn't have the option of being powered from the mains.

The German manufacturer Grundig (now owned by the Turkish Beko group) produced 1958 and 1959 versions of the Teddy-Transistor Boy, an ambitious and stylish AM/FM plastic-cased battery/mains portable. Still in production at the same time were the all-valve (with a DL96 audio output stage) Teddy-Boy and Teddy-Boy Luxus portables for those who didn't feel comfortable with the partial switch to transistors. An all-transistor Teddy-Boy appeared in the early 1960s and that was the end of valves in the 'Teddy-Boy' series of radios.

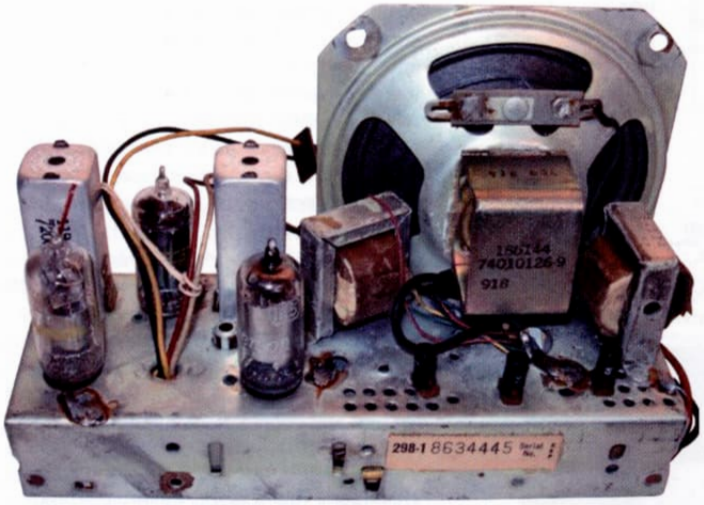
In 1957 Akkord-Radio of Germany produced the Transola-Lux (see Figures 6 and 7 for a picture and schematic of the 1959 model), with a line-up of DF97, 3-off DK96, 3-off OC71, a pair of OC72s and an OC602. The 1958 model used the same valve line-up but substituted the made-in-Germany GFTxx range of germanium audio transistors. MW, LW, SW and VHF FM ranges were covered with an IF of 468kHz (for AM) and 6750kHz (for FM). The set could be mains powered, or used in 'portable mode'

7: Schematic diagram of the Transola-Lux 59. At the bottom left you should just be able to see a GFT32 transistor used in an inverter circuit generating the HT for the valves.



8: The complete line-up of Crosley JM-8 novelty 'book' radios, reproduced by courtesy of 'Sonny the RadiolaGuy'.

9: The Emerson model 838, reproduced by kind permission of Bob McGarrah.



10: The chassis of the Emerson 843, showing the way the transistors were inserted into sockets on a very valve looking metal chassis.

11: The Automatic Radio Company's Tom Thumb TT-600 hybrid radio of 1956. You can make out the triangular 'pips' on the dial at 640kHz and 1240kHz that marked the frequencies of the Conelrad alert stations which were intended to transmit in times of national emergency, for example nuclear war.

powered by the internal rechargeable DEAC cells. On the schematic you should just be able to see a GFT32 transistor used in an inverter circuit generating the HT for the valves. Again there was an all-valve version of the set in production at the same time as the hybrid.

Also in Germany the Lorenz company produced the MW, LW and SW Bambi portable radio with a DK96, DF96, 2-off OC71 and 2-off OC72 line-up. Amongst the other continental manufacturers who also produced DKxx, OCxx hybrid sets were Radione (the R25T) in Austria and Mediator in Switzerland.

The Crosley JM-8 series of Hybrid Book Novelty Radios

I was alerted to the existence of the Crosley (of Cincinnati, Ohio) JM-8xx series of hybrid book novelty radios when one came up for sale on eBay in February 2009. The radios were introduced in 1956 and the suffix after the JM-8 code indicated the colour of the leather binding of the 'book' and its 'title', using a two-letter code that Crosley had previously used for other radios. There were seven variants in the range, namely: JM-8GN (green) 'Magic Mood'; JM-8BG (burgundy) 'Musical Memories'; JM-8BN (brown) 'As You Like It'; JM-8MN (maroon) 'Fantasy'; JM-8BK (black) 'Enchantment'; JM-8BE (blue) 'The World of Music'; and JM-8WE (white) 'Treasure Island'. The 'author' of the book was shown as Crosley. The 'title' and 'author' were embossed in gold on the spine, giving the 'book' a classy look. I'm not sure why you would want to hide the fact that you had bought a rather expensive radio: maybe it was to surprise your friends when they discovered why music was mysteriously coming from your bookshelf? Figure 8 shows the complete line-up of 'books', courtesy of 'Sonny the RadiolaGuy'. His website at: *www.radiolaguy.com/Showcase/CrosleyBooks.htm* also shows the internals of these fascinating radios.

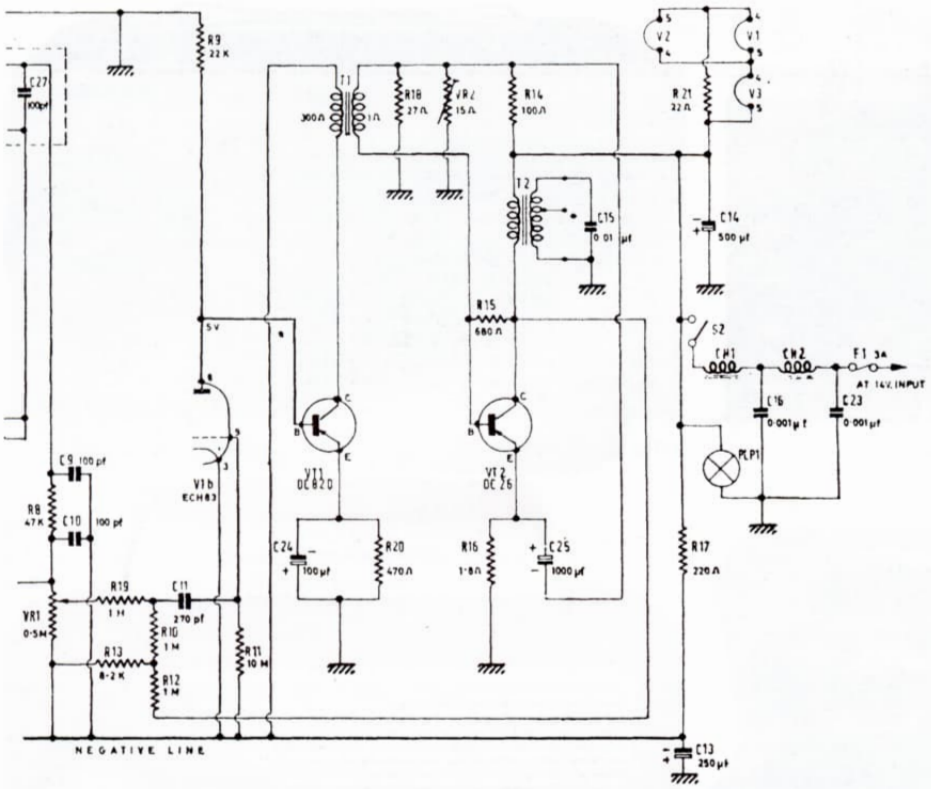
Inside the gold-embossed 'book' was a fairly conventional looking front panel and set of controls. This quirky radio used 1V6 (triode-pentode frequency changer), 1AH4 (pentode IF amplifier), 1AJ5 (diode detector, AVC and pentode AF pre-amp) valves plus 2-off 2N109 PNP germanium alloy transistors. The valves are in a subminiature B5A wire-ended flat envelope and each have a 1.25V 40mA heater wired in series and fed from a 4.5V battery. The valves' anode supply was from a 45V battery.

Maybe Crosley's book radios don't look so strange in context with many their other radio designs of the 1930s to the 1950s: mostly of eccentric appearance, and making use of strong colours. There were colourful Art Deco 'Dashboard' radios (reflecting strong 1950s car styling), the 'Dynamic' or 'Bulls Eye' radio models, and full size and table-top jukeboxes. Reproductions of these 'retro' radios, jukeboxes, turntables, telephones and music boxes are available today, using up-to-date technology.

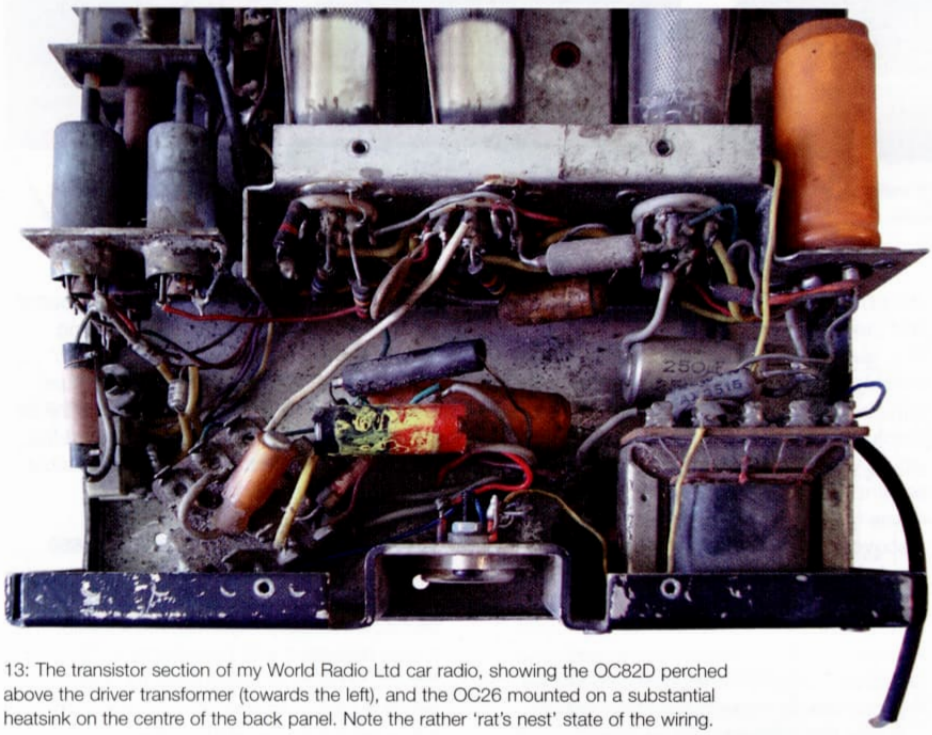
The Emerson Models 838, 843 and 856

It's commonly accepted that the US-produced Regency TR-1 was the first commercially-sold transistor radio. It was designed and manufactured in the US starting in November 1954 for about a year, and was a four transistor superhet, using Texas Instruments devices. About 100,000 were sold in that year at the not-inconsiderable price of $49.95, a large proportion of which was the cost of the transistors themselves. Although to us transistors are now cheap, and valves relatively expensive, at that time the opposite was true as valves had been manufactured for many years and the industry was just mastering the skills of making transistors in volume.

Rather than taking the immediate step to an all transistor design in mid-1955 the US-based Emerson Company produced a hybrid radio, namely the model 838. This model was an evolution from the all-valve



12: Schematic of my World Radio Ltd car radio (of Edgware Road, London, NW2, England). As you may be able to spot the circuit of the valves' heater connections doesn't make sense and has a ground connection missing.



13: The transistor section of my World Radio Ltd car radio, showing the OC82D perched above the driver transformer (towards the left), and the OC26 mounted on a substantial heatsink on the centre of the back panel. Note the rather 'rat's nest' state of the wiring.

model 747 and used 1V6, 1AH4 and 1AJ5 valves plus 2-off PNP germanium alloy transistors (mounted in sockets) for the audio output stage. This reduced the battery drain from 160mA down to 50mA, more than doubling battery life. A matched pair of Emerson's own transistors were used to minimize distortion. Figure 9 shows an Emerson 838, taken from: *http://transistorhistory.50webs.com/emer838.html*, reproduced by kind permission of Bob McGarrah. This website shows an interesting sequence of photos as the set is dismantled, showing how the set was put together mechanically.

The model 856 was a further Emerson development from the 838, this time using only two valves and three transistors. There was also the 843 using a bigger case than the 838 and which looked more luxurious with a leather case and carrying handle, and used three valves and three transistors. Figure 10 shows the chassis of the 843: you can see the way the transistors were inserted into sockets on a metal chassis owing much to conventional valve chassis design. Although this radio was intended as a 'table' model it was purely battery powered and had no provision for mains operation.

Automatic Radio Company Tom Thumb TT-600 Radio

This 1956 radio by the Automatic Radio Company of Boston used 1V6, 1AH4 and 1AJ5 valves plus 2-off PNP germanium alloy transistors, in a similar (identical?) line-up to the Crosley and Emerson hybrid radios. It was offered in red, blue, melon and charcoal coloured cases, and evolved from the all-valve Tom Thumb TT-528. Figure 11 shows a red TT-600, taken from: http://transistorhistory.50webs.com/auto-tt600.html again reproduced by kind permission of Bob McGarrah.

An interesting feature of the TT-600 is that it used an 8-pin hybrid component which combined several discrete resistors and capacitors into a single package, thereby saving considerable PCB area. The example of the TT-600 shown on Bob's website shows a pair of OC71 transistors plugged into a single sub miniature valve socket, thereby avoiding any soldering / heat issues. Assuming these are not replacements fitted sometime since the radio was built, these Philips devices must have been imported from Europe for use in this set.

Car Radios

Hybrid valve/transistor line-ups seem to have been more commonly used in car radios than in 'static' radios. In a car there is a different problem to be solved than exists in a portable or mains radio. The electrical system in a car is capable of supplying lots of amps, but only at the comparatively low voltage of 12V (or even 6V in some cars). This meant that running valve-based radios in a car had been a design challenge for many years. The most common solution was to use a mechanical vibrator that rapidly switched the 12V supply on and off, emulating an AC supply which could then be 'stepped up' via a transformer, or a rotary converter. The output of the transformer was then rectified and smoothed as in a mains set to produce the HT supply at about 200-250V DC for the valves. The radio itself was normally a conventional superhet-type design. Being a mechanical component the vibrator was relatively unreliable and electrically noisy, and so its elimination, if this could be achieved, was definitely a good idea.

In the mid-1950s RCA introduced a series of valves characterised to operate from a 12V anode and heater supply, specifically for use in car radios. Although many valves had been designed over the years for battery-operated portables, with anode voltages of 90V, 67.5V, 45V and even 22.5V, this was the first time a range of valves had been specified for such a low anode voltage. In fact similar valves offered at the time by Mullard (with 6.3V heaters) were even capable of operating efficiently with an anode voltage of only 6.3V!

These valves are loosely referred to by amateurs (including me) as 'space charge valves', though the manufacturers' data (see for example: *http://wa2ise.home.netcom.com/radios/12AC6.pdf* do not mention this phrase, but describe the valves as 'designed for operation where the heater, plate and screen voltages are supplied directly from a 12 volt automotive storage

battery'. In fact only the 12K5 tetrode was described as 'designed for space-charge grid operation' in its data sheet. Mullard's 'low voltage' ECH83 and EBF83 were the 'normal' ECH81 and EBF89 valves respectively, characterised and re-specified in their data sheet for low voltage operation.

Of course car batteries do not generate a steady 12V under all load and temperature conditions, and the designers of car radios needed to be aware of this, in particular the way the heater voltage is specified. Helpfully the Sylvania data sheet for the 12AC6 (remote cut off pentode) states 'This tube is intended for use in automobile radios operated from a nominal 12 volt battery. Design of the tube is such that the heater will operate satisfactorily over the range 10.0 volts to 15.9 volts, and that the maximum ratings will provide a safety factor for the wide voltage variation encountered with this type of supply'. The Mullard data for the EBF83 is decidedly mean with offering any spread on the nominally-6.3V supply, and simply specifies it as 6.3V at 300mA, apparently oblivious to the environment that this valve was likely to find itself in. The fact that this valve is really the EBF89 probably explains this. Presumably the heaters of EBF83s in car radios didn't burn out any more often than those of EBF89s in 'static' radios, showing the inherent ruggedness of heaters, which we tend to think of as being relatively delicate.

Although the RF, frequency changer and IF stages of a radio using these valves operate very well at 12V it was difficult to get any reasonable audio power out of a valve with only 12V on its anode. One technique employed was to use two output valves, such as 12K5s (specified in its data sheet as capable of only 40mW of audio output power), in parallel. See reference 6 for an example of such a design. The appearance of early germanium power transistors must have seemed like a God-send to the designers of these radios, and this led naturally to the development of hybrid car radios.

World Radio Ltd Car Radio

Now we come to the car radio that sparked my interest in hybrid radios. The radio is labeled 'Made under license from Motorola Inc Chicago USA by World Radio Ltd. Edgware Road, London, NW2, England' and 'Warning Positive Ground Only'. I wonder if anyone remembers this London-based company? The set is in fact electrically identical to the Motorola 77M car radio.

The line-up of the set is fully Mullard: V1 is an ECH83 (pentode RF amplifier, triode AF amplifier); V2 is an ECH83 (frequency changer); V3 is an EBF83 (pentode IF amplifier, detector and AGC diode); then an OC82D (VT1 on the schematic, see Figure 12) audio driver and finally an OC26 class 'A' output power transistor stage (VT2).

As you can see from the line-up above, there are an odd number of 6.3V heaters which could be awkward with a 12V car power supply. However there is a front panel mounted dial lamp, so initially I presumed this is wired in series with one of the valve heaters. This turned out not to

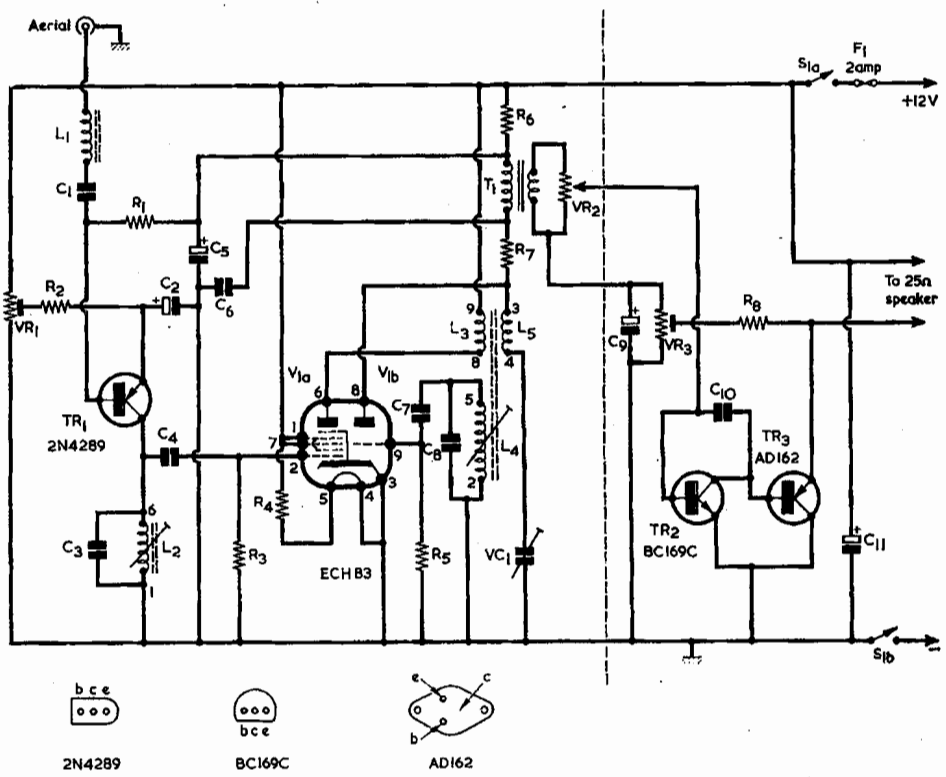
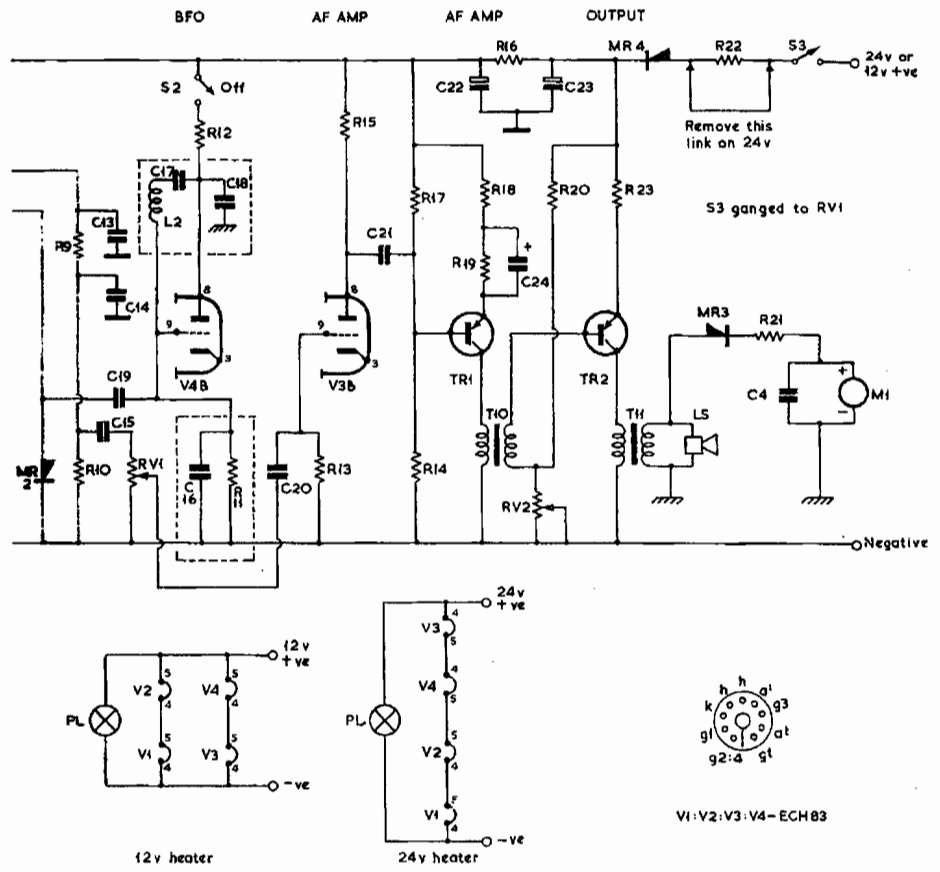


Fig. 1. The circuit of the 'Droitwich' Car Radio. The vertical dashed line is not a screen; the tuner section appears to the left of it and the a.f. amplifier section to the right. A negative battery earth is assumed

14: Sir Douglas Hall's 'Droitwich' car radio for reception of Radio 2, published in Radio Constructor November 1971.



15: The valved BFO, AF pre-amp and transistorised AF driver and AF output stages of G3KWG's hybrid receiver published in Short Wave Magazine in September 1962.

be so, and in fact a 22Ω resistor (R21) is used. I suppose there is no problem with 'throwing away' power in a car radio where there are normally lots of amps to spare.

The valves and IF transformers, along with a hefty decoupling capacitor are mounted on a sub chassis next to the permeability tuning mechanism, concentric with a LW/

MW switch. This allows the valves to lie on their sides, giving an overall height for the radio of about 2 inches, just about what we would expect for dashboard mounting.

The Mullard OC26 is mounted on a substantial heatsink on the back panel, needed to dissipate the power 'wasted' by the high standing current of about 400mA. Input and output audio transformers are prominent in the audio section, as well as the OC82D audio pre-amp / driver transistor. The audio section in my radio had several broken wire connections and reference to the schematic was necessary to make the repairs, after which the radio works well. See Figure 13 for a photo showing the fairly chaotic and dusty wiring in the area of the transistors.

As you can see from Figure 12 the base of VT1 is connected directly to the anode of V1b (the triode section of the ECH83, acting as an audio pre-amplifier) as I guess the DC voltage on the anode was set to be just right for the transistor, eliminating a DC-blocking capacitor and a couple of biasing resistors, thereby saving a few pence. You may be able to spot the circuit of the valves' heater connections doesn't seem to be correct, and indeed there is a ground connection missing on the schematic.

Other Car Radios

Many manufacturers produced hybrid car radios, showing how appropriate the mixed technology was for use in cars. For example, Pye produced the TCR1000, TCR2000 and TCR16. Philips had their N3G82VT-100 hybrid car radio; Ekco produced the CR901, CR903, CR915 and CR917 before they got to the CR921, when suitable transistors were available and this set contained no valves; and Radiomobile had its 500T hybrid car radio. I suspect many of these radios are 'clones' of each other and hence have identical line-ups and schematics.

The Motorola 'M1' series, featuring many models (for example the 505, 606, 707 and 808) with various combinations of single-ended and push-pull output stages, and with MW/LW or MW-only coverage, were all hybrids. Another Motorola car radio, the TR127 used a typical hybrid line-up - ECH83, ECH83, EBF83 (the pentode stage of which was the IF amplifier at the rather odd IF of 480kc/s used by Motorola), EF89 (audio driver stage), then a single-ended output stage using a 2N351 transistor. For this output transistor either Motorola or Mullard types were fitted, according to the service sheet. The TR227 used a pair of 2N351 output transistors in push-pull. There were also the TR229 and TR239 models.

Continental car radio manufacturers adopted the same hybrid techniques as those in the UK and US. For example Blaupunkt in Germany used valve / transistor line-ups in the 'Frankfurt' range of car radios between 1959 and 1962. They contained six valves and two or three power transistors, covering the MW, LW and VHF bands.

Car Radios with VHF Coverage

As demand for FM VHF reception in cars developed, and with no VHF transistors yet available, Mullard introduced the 12V ECC86 VHF twin triode, typically operated in grounded-grid configuration. The EF97 and EF98 pentodes were also introduced to operate in the corresponding FM section's IF strip. I'm currently not sure whether these three valves were new designs, or simply re-characterised 'normal' valves.

The Philips Paladin 581 car radio, introduced in 1958, and in production until about 1961, used these devices and could operate from 6V vehicle supplies as well as the (then) newer standard of 12V. In this design one half of the ECC86 operated as a VHF grounded grid amplifier, and the other half as a self oscillating mixer. The first and second IF strip had five stages: EF97, ECH83, EF97, and 2-off EF98. Two germanium OA72 diodes acted as a demodulator stage. The AF pre-amplifier used another EF98, which was transformer coupled to an OC74 driving the AF output stage which used a couple of OC30s in push pull. Many other car radio manufacturers used the ECC86 in various all-valve and hybrid line-ups.

Amateur Designs

An interesting hybrid transistor / valve design, the 'Cadet 7Watt Hybrid Amplifier' appeared in the March 1965 issue of Practical Wireless. Though not a radio and therefore not within the scope of this article, it nevertheless shows appropriate technology being used where its strength can be exploited. A pair of OC71s are used in the pre-amp stages, powered from a -9V supply derived from the heater winding on the mains transformer. As long as a well smoothed supply could be generated for the transistors this seems like a good way of eliminating the risk of mains hum being picked up by the pre-amp stage. The following stages are a 6J5 driver followed by a 6L6 power output stage. It has to be said that this was not a normal use of transistors: in the vast majority of valve based audio amplifiers a low noise EF86 valve was used for the pre-amp stage.

To get back to the hybrid radio theme in amateur literature, there was the 'Droitwich' car radio, receiving Radio 2 only on 200kHz, designed by Sir Douglas Hall (knighted for his services to the British diplomatic service, mainly in Africa) and described in Radio Constructor as late as November 1971. As was typical of Sir Douglas' circuits there's a novel element to the use of transistors and valves which makes the circuit difficult to understand (for me anyway) exactly how it works. Figure 14 shows the schematic of this set. I'll leave it to you to work out the details of operation.

For those interested here's a link to a website dedicated to the works of Sir Douglas, including several valve/transistor hybrids: *http://www.spontaflex.free-online.co.uk/.*

The radio amateur fraternity didn't ignore the potential of hybrid line-ups, especially for mobile operation where power supply requirements are somewhat similar to those for a car radio. For example, in September 1962 the article 'Hybrid Receiver for Mobile Operation', by J A H Spratt, G3KWG, appeared in The Short Wave Magazine (see Figure 15). The receiver used a string of ECH83s for RF amplifier, mixer / local oscillator, IF amplifier, BFO, detector and AF pre-amp, and then transformer-coupled GET102/OC71/OC72 and NKT452/OC16/OC26/etc for the main audio stages.

Conclusions

In the realms of professional radio design and production in the mid-1950s there was considerable inertia against the immediate adoption of transistors, even though reliable solid state devices were available by then, and the advantage of longer battery life-time for portables was well understood. As described here some manufacturers decided to 'get their feet wet' by using transistors in just the audio stages of their radios, while retaining good old valve technology for the RF and IF portions, and these sets now occupy a niche in radio design history. It seems that many other manufacturers waited for a further year or two before adopting fully-transistorised line-ups, and never went through the brief hybrid stage.

When transistors capable of operating in MW frequency changers, such as the Mullard OC44 and the Ediswan-Mazda XA102, appeared, the headlong rush to the fully transistorised 'tranny radio' as we understand it proceeded apace. Even so, valve-based radios continued to be designed and stayed in production for many more years, especially in the form of the mains-powered set in the house where there was as yet no significant advantage of switching to a fully-transistor line-up. Many of these sets incorporated an FM range and it was a while before a transistor (or an IC) was available that could replace the valve(s) in the VHF tuner.

In car radios the introduction of valves capable of being run with nominally 12V HT supplies greatly helped to prolong the use of valves in this application. The use of power transistors solved the problem of how to get reasonable power out of the audio stages. These mobile hybrid radios stayed in production for much longer than their static cousins, presumably because their hybrid nature resulted in a cost-effective and rugged radio, and produced more than adequate audio volume in a car.

On the continent Philips and Grundig seem to be more accepting of the opportunity that early audio transistors presented and produced many hybrid designs in the period 1956-59. If you are looking for examples of these radios, it seems to me that you are more likely to be successful if you look amongst the ranks of Philips or Grundig.

Although the 'window' of design for hybrid radios seems to have been very narrow, and consequently not too many designs were produced in the UK, I'm sure I haven't managed to track them all down. If you know of more of these UK 'mongrels' please let me know at stef@altera.com, or by writing to The Bulletin.

My thanks go to Robert Darwent, G0UHF, for the information and photos of the ETR82, and other contributors on the Vintage Radio Repair and Restoration forum at: http://www.vintage-radio.net/forum/.

Additional References

Reference 1: More details of Marconi radios in the 1950s can be found in my article: 'The Marconi Product Ranges of the 1950s' published in the Spring 2009 issue of The BVWS Bulletin.

Reference 2: Information on the design and uses of valves intended for use from 12V (or lower) anode voltages can be found by Googling 'space charge tubes' on the internet, or referring to the article 'Space Charge Valves' in the Christmas 2009 issue (no.122) of Radio Bygones.

Reference 3: An excellent description and restoration of a Bush TR82C can be found in 'Bush TR82C' by Paul Stenning, in the summer 2006 issue of The BVWS Bulletin.

Reference 4: Robert Darwent's article 'Variations on a Theme: The Bush MB60 family' in the winter 2010 issue of The BVWS Bulletin describes the Bush ETR82 in the context of the Bush sets of the period.

Reference 5: The Swiss Radio Museum website at: http://www.radiomuseum.org/ allows the user to search for model number, model type, country of origin, manufacturer/brand, date period and most usefully for my purposes here, by valves/ tubes or semiconductors included in the design. A search for daf96; oc72 (note the ';' separator and that it likes a letter 'o' in the transistor's code rather than the numeral '0') brings up the Marconiphone P60B and numerous similar Grundig designs of the 1956-59 period.

Reference 6: An example of a radio design using only low voltage valves, including a dual-12K5 (a true space charge valve) audio output stage can be found at: HYPERLINK "http://oldradiobuilder.com/12vdiagram.pdf" http://oldradiobuilder.com/12vdiagram.pdf

Reference 7: I wrote about the US-based Conelrad system in 'The Conelrad Alert System' in the February/March 2007 issue of Radio Bygones.

Reference 8: Sir Douglas Hall also had his article 'Hybrid Transportable Receiver' published in the November 1969 issue of Radio Constructor. The receiver was described as 'Another unusual and ingenious design from our popular contributor'. The design was a true mixture of valve and transistor technology and used a 2N4058 (PNP silicon), a pair of EF97s, a BC168 (NPN silicon) and an OC22 (PNP germanium of course).

An Interesting Radio or transport for a lesser life form

By R.J.Grant.

While in the process of selling a fully restored Ekco RS2 to a fellow collector, we reached the point where he removed the back for a look inside. Suddenly with a look of great horror and fear on his face he exclaimed "It's got wood worm", the speaker baffle board had a few old worm holes in it. After I explained that it had been treated and he now seemed less likely to leg it in panic, the conversation turned to the wood worm and its' treatment. I noticed that he was now standing a good yard away and the look on his face was one of disbelief almost as if one of these creatures were about to jump out and bite him. Needless to say he didn't buy the set.

I first encountered the beast with the modernisation of my present house. 1930's built, the kitchen floor was laid with typical 1970's Marley tiles, these were laid over hard-board to make the floor flat over the floorboards. Underneath that, my unwanted sitting tenants were busily munching away at my floorboards and joists, unnoticed by all including my surveyor. At the time my reaction was similar to the one of my fellow collector with the RS2 and my immediate reaction was to quickly seek professional advice.

With a plethora of panic stricken questions and the rapid replacement of the affected floorboards and joists the panic was over and the rest of the house was checked soon after and found to be all clear.

In the light of this experience I got to know the creatures quite well (Anobium Punctatum) so when I encountered the evidence of woodworm in vintage radios, the treatment by then had become just a restoration procedure. A question of knowing your enemy.

Woodworm, the larva of the little brown furniture beetle, like to live in a warm moist atmosphere, just like that in a Southern England home where it's very common. Their life cycle is very slow and they don't travel very far under their own steam so they are not likely to eat your house over-night. Most infestations are imported by their hosts in furniture and an old radio is ideal. With a variety of different woods all in one place, a sort of business class travel for them. In the case of my kitchen the level of damage was a radius of just over a metre from the point of first infestation and estimated by the company I consulted to be about ten years old, this gives you an idea of how far they travel in this period of time at one location. In this case a kitchen extension had been added about ten years earlier and the new wood used in this was assumed to be the source of infestation.

It is usually a couple of years before there's any evidence of an infestation, a few holes as the adults emerge leaving a small pile of finely powdered wood, called dross, this is the evidence of a live infestation. I'm told that with a stethoscope you can hear the little blighters munching away but I haven't tried this myself. They then mate and lay eggs in the grain of the same wood usually not more than a few feet away and the next generation is started. Hundreds of holes means many generations over several years, a nice wooden cabinet radio nearby is just what they need to emigrate to a new loft or cellar. The radio becomes a jumbo jet to take them to these pastures new to start a new colony. At this stage adults may not yet have emerged, leaving no evidence for the unsuspecting collector to pick up, allowing them to sneak in unnoticed. Places like Harpenden or any other places where wooden articles change hands is a sort of transit lounge.

Treatment is quite simple and effective, most DIY stores will supply woodworm killer in small amounts, a one litre tin being the norm, this clear liquid similar to white spirit with a strong pong is just painted or sprayed on. This soaks into the wood and leaves it oily looking and very smelly for a few days and then seems to disappear completely. If the wood is varnished or polished in some way this liquid can be squirted into the holes using a syringe, the worm is killed on contact or when it consumes the treated wood. The treatment is also quite long lasting, some manufactures claim effectiveness for up to twenty five years.

If I discover any holes during the restoration of a radio, I treat them anyway just as a precaution and to add future protection. A 1 litre tin lasts for ages and will do lots of radios, as for my house, I treated all the timbers as I went round modernising and decorating, including the loft where my radio collection lives. This is highly recommended in the area where I live and I periodically keep an eye on my collection new and old.

In over thirty years of collecting I have seen lots of radios with holes but have only come across live woodworm once, this was in a purchase from a boot fair. The set was a Philips 577A in poor condition, I discovered the tell tale little piles of dust in the boot of my car when I got home so the whole radio was removed to the back garden in a sealed polythene bag. The outside of the cabinet was free of holes, I guess they didn't like the taste of the lacquer but the lower part of the inside of the cabinet was riddled with them, not clearly seen until the chassis was removed.

With the chassis, Bakelite trim, knobs and back removed for spares, the cabinet was thrown on a bonfire more or less immediately as it was beyond restoration. This is the other way of getting rid of them!

While restoring sets I have tried to fill or cover up the holes with not much success. The inside of the hole is usually a bit larger than the outside, this cavity behind the hole is where the fully grown larva pupates before emergence. The filler eventually falls in after a period of time as it is almost impossible to completely fill this cavity from the outside. I find the best way to disguise them is to fill the holes with melted wax from a syringe, removing the surplus when it solidifies. Wax crayons are a good source of already coloured wax, red and green gives a base brown and then the colour is adjusted with black, white and or yellow to match the surrounding area. The holes don't disappear completely but you do get to keep the original finish of the cabinet. So if you haven't encountered the shock of discovering these creatures yet, then don't panic it's treatable!

Book review: Tickling the Crystal 5

By Ian Sanders. Reviewed by Lorne Clark

Since his interest in crystal sets began in 1974, Ian Sanders has amassed a wealth of information on the subject and has been good enough to share this with us in his 'Tickling the Crystal' series of books. The history of early broadcasting and radio manufacture in the UK is the better for it.

'Tickling the Crystal 5' is a rich and sumptuous addition to Ian's previous four volumes and, like them, is a delight to read and a joy to own. We have come to expect outstanding text and superb illustrations and photography and 'Tickling the Crystal 5' does not disappoint. Taken together, the five volumes represent a vast and comprehensive treatment of what was hitherto a somewhat neglected area of broadcasting history. It is difficult to imagine how such a work could ever be surpassed. Ian is to be congratulated for adding to the rich tapestry of broadcasting history.

Full colour throughout.
Strictly Limited Edition! only 500 copies printed
£5 discount for BVWS members

252 pages of GPO No. era British crystal sets and many previously–unseen models in print for the very first time. £29.95 (£24.95 for BVWS members) plus £7 p&p for UK, £13 EEC (rest of world £15)

The Spies who lost the Battle of Britain (DVD 2010) by Brian Marshall

On the brink of the Second World War a top-secret invention joined Britain's frontline. Chain Home was the radar network that gave the RAF its vital early warning and enabled Dowding and Park to put their fighters exactly where they needed to be. In just four frantic years Watson Watt's brilliant team of boffins had designed and built Chain Home the radar system that was to play such a decisive role in the victory of 1940. After the war the experts concluded that Chain Home had effectively doubled the size of the RAF.

But the rapid construction of the huge radar towers had not escaped the attention of the Germans. On 3rd August 1939 the Graf Zeppelin crossed the North Sea on a daring spy mission. The Luftwaffe's top wireless experts scoured the airwaves from Essex to Scapa Flow looking for evidence of British radar. From the moment the Graf appeared on British radar screens the Fighter Command feared its greatest secret was lost. When war was declared just four weeks later the radar stations braced themselves for a knockout blow - but it never came.

Why the Germans failed to destroy Chain Home before the Battle of Britain has been an enduring mystery. The full story is finally revealed as wartime boffin Ned Fennessy recalls his chance encounter with the architect of the fateful spy mission, General Wolfgang Martini.

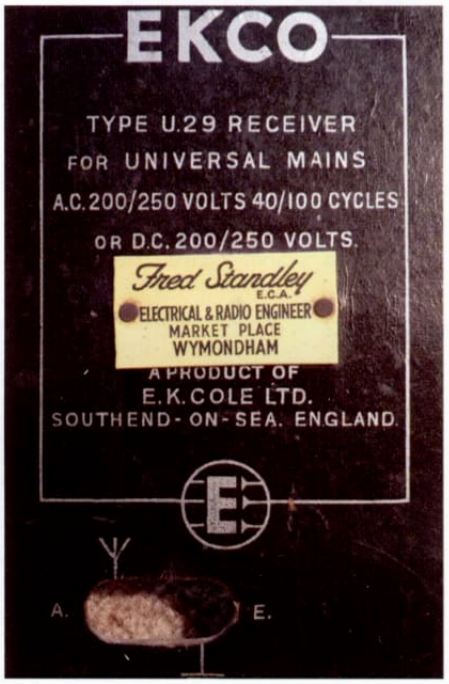
With reconstructions, expert analysis and exclusive interviews with the surviving pioneers of radar we tell the incredible story of British radar. Finally we reveal how the Zeppelin spies came to make the greatest intelligence blunder of the war.

This is an independently produced high quality documentary available direct from the producers. For further infomation visit www.boffinstv.co.uk

An AC/DC radio which had seen better days.

A short story about the resurrection of an abused EKCO model U29 By Richard Allan

The U29 was originally released in June 1946 and this one which is serial number 00840 must have been one of the earliest. It is a 3 valve plus rectifier long and medium waveband superhet with internal frame aerial. The valves have 200mA heaters and are octal based. In this one they are: CCH35, EF39, CBL31 and CY31. Some models are equipped with a Mazda PEN453DD in place of the Mullard CBL31.



This valve radio was in a poor condition when it was given to me, the case was broken and the greater part of the right hand side was absent and there were cracks in the rest of the case. It was complete with knobs, back and valves, though the mains lead and little logo from the front were missing. Short of making a new case for it I wondered whether it was worth doing anything with at all except for salvaging the valves and one or two components. I was subsequently given the larger of the missing pieces which can be seen below in position prior to fixing with 'superglue'. A piece of thin aluminium was attached to the inside of the case with double sided adhesive tape and the missing portion was filled with a two part wood filler (which I happened to have) and smoothed and shaped when set. The filler was white so the repair was coated with acrylic paint mixed to be a near match to the brown colour of the original moulding. The finished result, though still not perfect is also illustrated. A small button has been used to cover up the hole where the missing Ekco logo should have been.

Having repaired the case I then turned my attention to the radio itself. Apart from the dirt and dust on the top of the chassis it was apparent that the dial cord had broken, several wax covered capacitors had been very hot at some time in the past and the wave change switch needed attention to limit the rotation of the wafer. It was also noted that some of the rubber insulation on the wiring had become very brittle and in a few places had come away. As far as I could tell the only thing that had been replaced was the cathode bypass electrolytic capacitor.

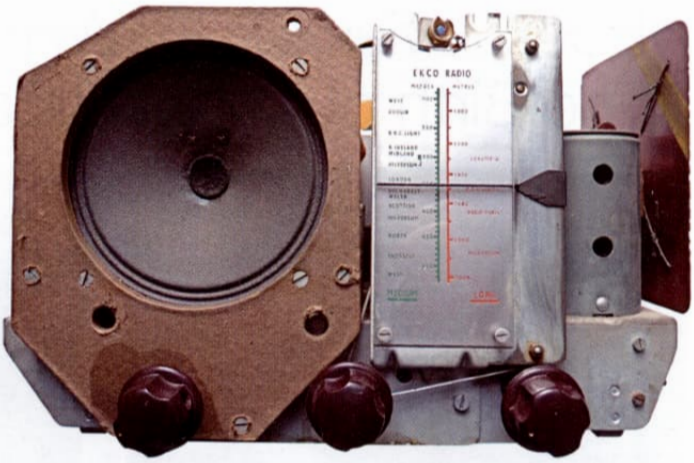
The whole scale and drive assembly has to be removed to replace the cord. After removing the dial lamp holder, two set screws on the tuning capacitor shaft have to be slackened, three screws at the rear and two at the front then have to be removed to do this. One of the two screws at the front can be seen below the scale on the front view of the chassis and two of the three rear screws can be seen either side of the dial lamp on the rear view of the chassis. Before re-assembling I took the opportunity to carefully clean the scale and lubricate the pulleys.

The valves were then removed and cleaned and the bulk of the dust removed from the chassis and the holders were given a blast of switch cleaner before they were put back.

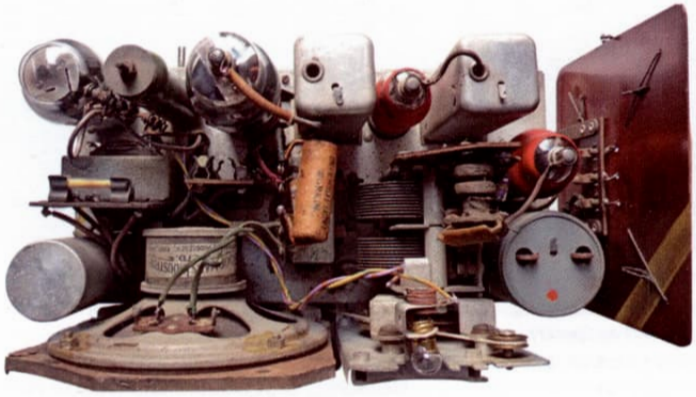
When I energised the set nothing happened, complete silence and no glowing valve heaters or dial lamp. I checked the fuses, the dropper resistor and the in-line RF filter chokes, everything was in order, but I found that the double pole switch on the rear of the volume control seemed to be stuck in the open position. When this was taken apart two pieces of broken spring fell out. I have a 1 megohm log potentiometer with a single pole switch but as this is a universal set a double pole switch is essential. With some ingenuity I managed to fit the 1 megohm track into the housing of a similarly sized potentiometer with a double pole switch. As this was a smaller unit than the one originally fitted I had to remove the locating pip and solder a replacement on the case to match up with the original hole in the chassis. I also soldered a small piece of bent copper to the wave change switch to prevent movement of the wafer beyond the stops.

With the valves back in place I again switched it on and as before nothing happened so I checked the one thing that I had not done previously, yes, an open circuit heater and heater cathode short on the CCH35 frequency changer. Rummaging through my box of octal valves I found a very scruffy replacement. Things did not seem to be going well so I decided to test each of the valves in my AVO valve tester. This showed that they were all functioning, though not as well as the makers intended. With the valves yet again back in place and switching on once more, smoke emanated from the upturned chassis. These wax capacitors had to go! One by one I disconnected one side of every capacitor and tested them with my megger, and I found that even the ones that had not been dripping wax were showing resistance of less than 500k. Reluctantly I decided that wholesale replacement seemed to be in order except for the cathode bypass

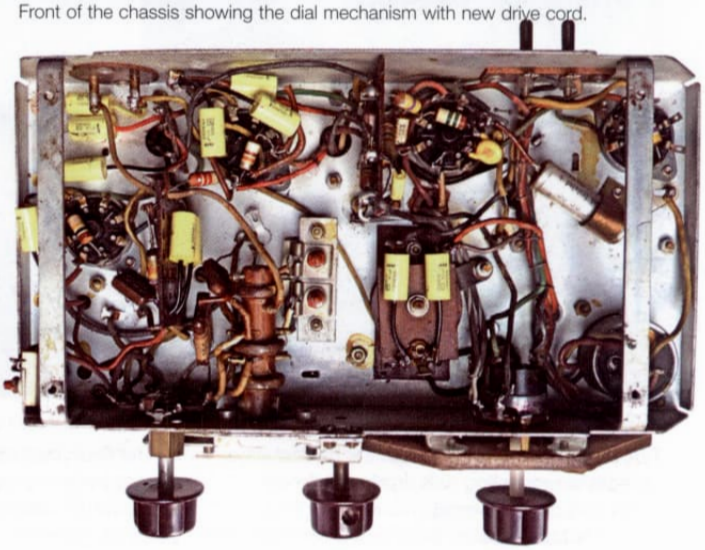
The chassis as received.



Front of the chassis showing the dial mechanism with new drive cord.



Top of chassis.



Chassis showing new capacitors, volume control and new screened wiring.

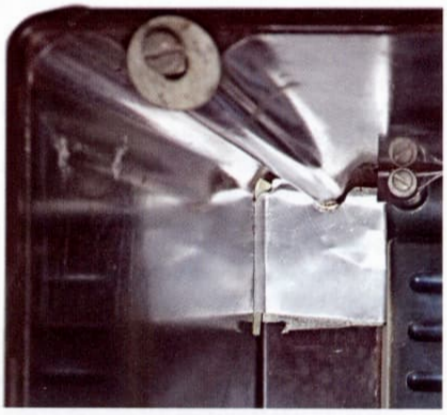
electrolytic on the output valve and the tone corrector capacitor across the primary of the output transformer which tested OK.

Now feeling optimistic, yet cautious, I fed the set via a variable transformer and gradually increased the voltage. The dial lamp glowed and for the first time noise came from the speaker and when an aerial was plugged in I found that it picked up plenty of stations on both wavebands and that I had replaced the pointer on the dial cord in the correct position. Whilst the set was left working merrily on the bench top I set about making a lead with a female two pin plug and drilling out and tapping the fixing holes for the back cover for 4BA screws as the long gone originals must have been of some odd size.

The set was to test me further, for when I had it all assembled in its now shiny case complete with knobs and back, it steadfastly remained silent. I found that there was no signal getting to the grid of the output valve and this was because the rubber insulation in the screened lead to the top cap had perished and the grid was effectively earthed. This and the screened lead from the preceding stage was replaced, but in doing so I had inadvertently disturbed the insulation on the wiring to the heater ballast resistor and it had decided to touch the chassis, blow one of the fuses and the dial lamp when next I switched it on. After replacing this, the wires to the dial lamp the fuse and 6 volt dial lamp the radio functioned properly both outside and inside its case. A replacement CCH35 would probably improve its performance.

Wise after the event, from a search on the internet I see that the problems I found on this model are not unique. Others have discovered the problems with brittle insulation, failed wax capacitors, broken dial cord, failed volume control and long warm up time. My set takes a full 60 seconds from switch on for sound to come from the speaker.

I have also discovered that the firm which supplied the radio back in 1946 still exists: at 31-33 Market Street, Wymondham, Norfolk. The firm was established in 1928 by Mr Fred Standley. He learnt his trade in the Royal Navy, and opened a shop on the Market Place in Wymondham selling radios and all types of electrical appliances, cookers, boilers etc. He also carried out all sorts of electrical work for local farms and councils. In the late 40's often wiring complete villages and employing up to eleven electricians. In the 50's the firm moved into Television Sales and Rental, installing Aerials etc. The firm relocated to the present address in Market Street in the mid 60's. In the early 1990's They joined the Euronics buying group and have never looked back. Four generations of the family have run the company. Fred Standley's son David continued the business until his retirement and David's son, Chris and now his nephew run it today.



Inside showing support for filler.

Book review: 2MT WRITTLE – The Birth of British Broadcasting

By Tim Wander

Dame Nellie Melba sings for MZX Chelmsford - July 1920

The Writtle team

Tim Wander's all new book on the earliest days of radio broadcasting was finally published at the end of October after several printing problems due to its increase in size and the high number of photographs had delayed it. Also I know Tim found it very hard to put the final text 'to bed'. However the wonders of modern digital Print-on-Demand will allow a revised edition to be produced one day, as the books are now printed to order like about 95% of all books today! He does ask in the book's introduction for all corrections, new information and photographs to be sent to him by email, although hopefully it will not take 21 years.

I know that Tim has lived with the 2MT Writtle story for over 25 years, and has written, lectured, produced several radio plays and proof read other peoples books. He is probably now one of the world's leading experts on the subject. With the new work, Tim has produced a book that is both comprehensive and detailed, coupled with an easy, readable style and conveys with every line his enthusiasm and depth of knowledge with the subject. As one of his proof readers over the past two years I have had many discussions about keeping the flow of the story and not getting distracted by side issues and events, however fascinating.

The advent of the second book within the main book on the early pioneers, American broadcasting and other stations such as PCGG and OTL was a good one, and these chapters are equally detailed. For a while I know Tim considered publishing this as a separate volume in its own right – but it stayed in and the book is really two in one. I think, after many versions he has hit a good balance – please read the appendices and even the huge glossary – they are stand alone essays in their own right!

The final product is an immense work, detailed in every way but still eminently readable. My background has always been historical research and teaching, but I was enthralled by the story of how Broadcasting came to these shores and indeed the rest of the world.

I have recently seen a copy of the first edition of the book, from 1988, For its time it was excellent but it is a mere shadow of the new book which includes a huge array of over 240 photographs, many of them published for the first time anywhere. Although not referenced in detail like some historical tomes I believe that this is a significant and important addition to our understanding of those amazing times

Peter Monaghan, December 2010.

"Wireless is a thrilling pastime. Fancy a boy sitting in his room at home with his fingers on a telegraph key and a telephone receiver to his ear listening-in to the news of the world as it is flashed out from the great coast stations or by ships far out at sea! It's a great experience. Yet thousands of boys are doing this wonderful thing every day and night of the year, and you, my young friend, can do it as easily as they, for any boy can own a real wireless station, if he really wants to."

A. Frederick Collins, The Book of Wireless, 1915.

"The wireless music box has no imaginable commercial value... ...who would pay for a message sent to nobody in particular..."

Unnamed US Business man when deciding not to invest in radio – 1920.

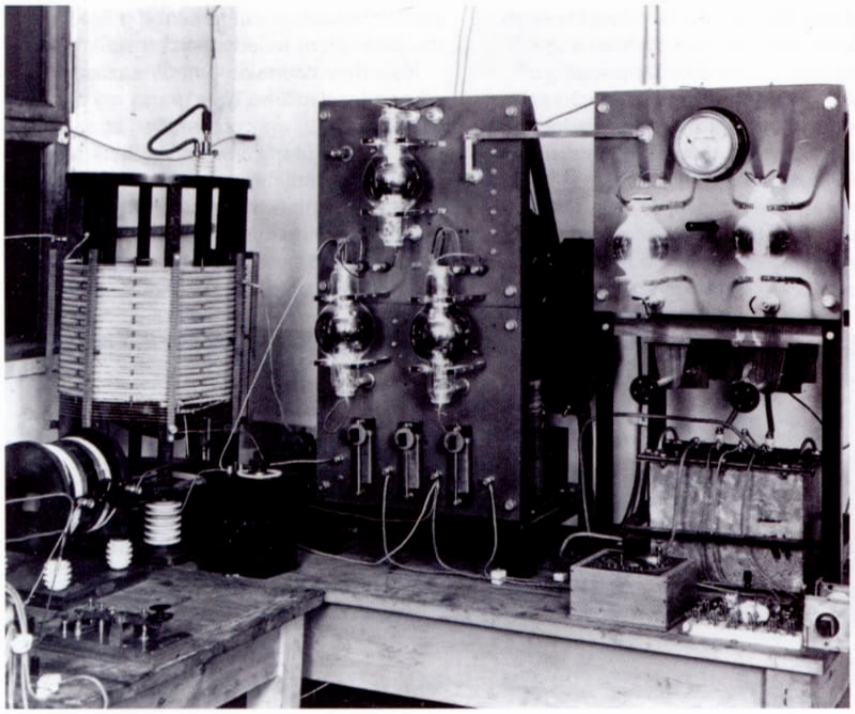
Myles Eckersley, PPE's son wrote:-

Tim Wander is an unusual man. When a young electronics engineer he also started to become an enthusiast for the history of wireless (not the later term, radio) and became an expert on the history of the small Essex village of Writtle and indeed, the roots of British broadcasting. In his time at the Marconi Company his enthusiasm for more contemporary matters took him into senior management.

In this book he delves into the period from directly after the ending of the First World War up to 1923 and the formation of the BBC. It was in 1919 that the Marconi Company gave a small group of ex-service wireless experts, led by my father, the task of installing and testing wirelesses in aircraft. To house the group they took over an ex-army hut in a small landing field next to the Writtle village sewage works. The field had been a base for Royal Flying Corps, later the RAF, flying fighters destined to shoot down Zeppelins on their way to bomb London. By an extraordinary coincidence, one of these Zeppelins dropped a bomb on a building in Savoy Hill that made room for the future home of the BBC.

In the early 1920's the Government of the time decided there would be no wireless service of any kind for public use until they had thrashed out what acceptable form it should take. The prospect of the allegedly awful American commercial radio outraging the august British airwaves was unacceptable, but a powerful head of steam was building up in the amateur radio societies, largely made up of former service trained personnel.

The combined weight of the amateur radio societies petitioned the Government in a letter from the Chairman of the London Society. It requested that there be set up unspecified



Broadcast equipment inside the Writtle hut

Nora Scott performing at Writtle

wireless experts to broadcast gramophone records, once a week, for half an hour. The purpose, to allow the members to 'calibrate their wireless sets'. This was a posh way of saying 'tuning in' and all that implied.

The request was granted and the time came to start. The contract went to the Marconi Company. The job was passed to the wireless experts in the Writtle hut. Firstly they were to build the transmitter and secondly, to broadcast every Tuesday evening for half an hour. It came as a great surprise to my father, Peter Eckersley, as his team were really very busy wireless engineers, not 'disc jockeys.'

In the first edition of his book Tim called the story 'The Birth of British Broadcasting'. I think this is right. Radio Station 2MT Writtle became greatly popular. The wit of my father Peter Eckersley and his engineering team was breaking new ground. Hilarity and satire were being aired for the first time. It was the birth of a new form of publishing. It was indeed the birthplace of the new BBC.

Over twenty years have passed since Tim first told the story of radio station 2MT. In that time I know he has moved on from the world of electronics but has long harboured a determination to finish the story. I am so pleased that he has managed to do it.

Welcome then to the revised story of the 'Birth of British Broadcasting' and the radio station that became known as Two Emma Toc….. I recommend it to you.

Myles Eckersley, Romsey, Hants

And Martin Trump, son of one of the 2MT Writtle pioneering engineers, Edward Trump wrote:
I am 72 year old Martin, youngest child of Edward Trump. Although born some 16 years after the creation of 2MT Writtle I feel I have strong associations with it. My father was born in 1893 and volunteered for the Royal Flying Corps in 1914 as a wireless engineer, a rare occupation at that time. He served in France and Belgium and while there became the first person to install a transmitter in an aircraft.

Since there were no electrical systems in the planes, the engines used magnetos, the power for the spark transmitters was provided by a wind turbine and generator mounted between the upper and lower wings of the biplanes.

He left what had then become the Royal Air Force in 1919 and joined the Marconi Wireless Telegraph Company. After some time in Spain fitting transmitters to flying boats, he returned to England where he equipped land based aircraft with transmitters in Croydon, then to tanks in Chobham. Next he was posted to Writtle in preparation for 2MT. He took up lodgings at the local pub, the Cock and Bell where my maternal grandfather was the landlord. You may guess the rest of the story. One of his daughters was Doris, my mother. Another was my aunt Elizabeth, always known as Bessie, who became the secretary to the 2MT team. She continued to work for the company many years as secretary to Basil Maclarty. Grandfather also had sons Dick and Harry. Thereafter father was always known by family and friends as Tom.

Because of his wartime experience when Morse Code was the only means of wireless communication, it was he who used to send the identifying 2MT signal, dit-dit-dah-dah-dah dah-dah dah required by the authorities at the time.

As a teenager, I sometimes used to cycle out to Writtle from Chelmsford where we lived to meet my father at the end of the working day. The policeman on the gate would turn a blind eye and let me in. I remember well seeing the hut where 2MT operated, sadly now gone. I feel it should have been preserved. I recall father reminiscing about 2MT, particularly of Capt. Peter Eckersley who he always referred to as PP. I regret that the passage of time has dimmed many of my memories.

While other members of the 2MT went on to senior positions in Marconi and 2LO (later to become the BBC) my father had no interest in power, position or wealth. His life centred around his children, his work and his hobbies, drawing, wood carving and archaeology. The rest of his working life was spent with Marconi, later to become part of the English Electric group.

My father's enthusiasms must have been passed on. My brother David become an archaeologist while I entered a career in computing and electronics. When I was quite young father had taught me the Morse Code, useful when I took the amateur radio exams. It went further as my son Matthew also became a radio amateur and later entered the computing industry. However, he went on to be commissioned in the Royal Signals Regiment, Territorial Army.

Should I be blessed with grandchildren I have to wonder what they will do. Sadly father died in 1974 but we remain immensely proud of him for the pioneering work done by him and the 2MT team.

I hope you enjoy this book as much as I have.

Martin Trump, September 2009.

Details for ordering the book can be found on page 48

Letters

Dear Editor

My answer to the digital menace

I read Mike's leader in a recent issue with interest. I blush to admit that I have not yet written to my MP.
I have a DAB set (Fig 1). As Mike suggests, it doesn't sound very good, bit like a wasp in a bottle, as Gerald would say. However, the signal at the headphone jack is, presumably, the best the system is capable of.

I have a small, one valve, transmitter. John Holloway and I both built the same model at the same time. It's an American design, I modified it a bit to accept a more easily obtainable valve and added some switchery to accept various modulation signals,and a depth of modulation control. It sits in the bottom of my entertainment rack (fig 2) and, with these switches and another I've put in one of the units, I can modulate the transmitter with 1: the audio output of my computer, 2: the AM or FM signals from the tuner. 3: an audio cassette, 4: a CD. There is still an unused modulator input, the very thing to accept the headphone output from the DAB set.

My transmitter works on a wavelength of 535 metres,John's a little different, I believe. I've tried a few different aerials including a vertical whip and a horizontal wire in the garden but this arrangement (fig 3) works the best. Slant polarisation, obviously.

Now they can take the MW stations off and I will still be able to use my sets at will but with only one station at a time. Not all of my sets will pick it up.In many cases I think it shows up the fact that I haven't got the tracking right. These are some of the sets that do pick it up. The Osram Music Magnet (fig 4) picks it up a treat on my long aerial

Fig. 1

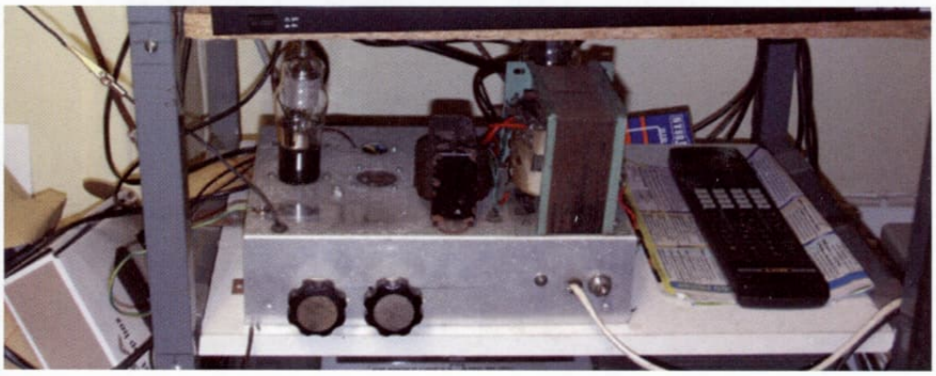


Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

down the garden. But, of course it's got two RF stages. The Bush DAC 90 that Nigel Pollicott found for me (fig 5). this is indoors and, on its' frame aerial, it's fine

The Ekco AC85 (fig 6) doesn't receive it. It's got a sensitivity / noise muting knob. I call it an 'All Stations, Some stations, No stations' control. I expect that has something to do with it.

The Ekco 'gram, (fig 7) which John Holloway helped me to carry back from the Audiojumble,receives it well,on the horizontal garden aerial albeit it's a bit bassy otherwise the quality is quite good although I'm no judge, my ears are shot!

Upstairs, in my loft, I have 30/40 sets. now you won't want a blow by blow account of each set so I'll just select two. First the Marconi Silver Jubilee set (fig 8) that Fred Watts gave me ten or maybe twenty years ago . It worked then and it still works now. Great receiver for the transmitter. The Stella (fig 9) This is the first offering from the new Philips subsidiary. It was left over when I closed my shop sixty years ago.Daphne and I used to listen to 'Journey into space' on it .It still sounds the same and it has no problem picking the transmitter up.

The Sobell 626 WF (fig 10) I consider this the apogee of wireless reception. FM, large eliptical speaker. Real valves,and a solid wooden case. You should hear Patsy Cline on it,if ever they transmit Patsy Cline on DAB.

Finally, the last of two! The Bush (fig 11).This picks it up easily with batteries and a frame aerial. Tracey is unable to hear it ,however.

By and large this is a highly sucessful experiment. These tests were all done in the daytime when I would expect any demonstrations to be done. However, after dark, when the Heaviside Layer comes down (or whatever happens) my transmitter is practically wiped out by various stations. I am thinking of writing to the Postmaster General about it.

When I was with EMI I worked for a short time on their Radio Distribution System. My job was to maintain installations in apartment buildings and hotels in the West End. If memory serves, these took the form of an aerial on the roof feeding a number (say 4) off RF amplifiers, each tuned to a selected station, all valves, of course, and thereafter combined and sent down a primitive coaxial cable with paper dielectric and copper or lead screening. Now ,it occurs to me that this is the sort of thing we could do with. A complete unit, about the size of a digibox, with a number (say 4) off DAB receivers feeding 4 modulators, AM, medium or long waveband, combined, ostensiby for feeding down a distribution cable but, depending what happens to the said wavebands in the future, you and I might well let it radiate round the house!

Peter Brunning

Dear Editor

Somewhat to my surprise, I recently received a reply from the Department for Culture, Media and Sport (DCMS) to my critique (The Bulletin Vol 35 No. 4). I enclose a copy of their response No. 155641 for members' information.

The Department has addressed the points I raised in a more serious and comprehensive way than the original CMS Fact Sheet. Clearly the government has not yet made up its mind on a number of important issues. I would draw members' attention to item No. 2 ("No decision has been made on the future of Longwave") and item No. 9 ("...no Digital switchover date has been set, nor has a decision been made whether to set such a date...").

I would urge members to continue lobbying their constituent MPs to reverse the Government's plans to switch off analogue radio at some date in the near future.

Yours faithfully
Gordon Bussey

Copy of response No. 155641 from the DCMS (2 pages)

1. The criterion for switchover is 50% of listening to be to digital radio. However a significant amount of household penetration would be necessary to achieve 50% of of digital listening. For example, at present 24.6% of radio listening is digital, but over 35% of households have access to a DAB radio. Therefore by the time 50% listening is achieved, digital radio is likely to be reaching the majority of listeners. We expect a switchover process to be the driver in converting the remaining households.

2. No decision has been made on the future of Long Wave.

3. Radio listening, including listening to digital radio (and thereby the extent of DAB usage), is measured by RAJAR (Radio Joint Audience Research Limited). RAJAR's most recent research shows that 24.6% of all radio listening is to digital sources; of which 15.8% is to DAB. If you are interested in further information about how RAJAR collects its data you may wish to contact them directly at Radio Joint Audience Research Ltd, 2nd Floor, 5 Golden Square, London W1 9BS, or email info@rajar.co.uk.

4. Regarding your points on the energy consumption of digital radios, whilst it is true that older models tend to be more energy–hungry, and many of the existing 11 million models on the market are likely to be older models, the research indicates that energy efficiency is improving. As this issue is clearly a concern for customers, it will be in manufacturers' interests to continue to seek to improve energy efficiency. We will be conducting further research into the energy consumption of digital radios.

5. Regarding the cost to the consumer of upgrading their domestic radios, we have committed to conducting a full impact assessment, including a costbenefit analysis, which will examine the costs to consumers to convert their homes and cars to digital radio.

6. On the cost of building out DAB coverage to match existing FM coverage, Government has stated its view that in areas where the BBC's requirement for universality is not matched by the economic realities of the commercial market, the BBC will need to bear a significant portion of the costs. We are working closely with the BBC and commercial operators to ensure coverage of DAB is comparable with FM as a switchover.

7. Regarding converting car radios to digital, Government recognises that succesful conversion of analogue radios in vehicles is an important factor in a switchover to digital radio. Some manufacturers have already committed to ensuring DAB is fitted in all new cars as standard by 2013, and many existing car owners have also chosen to convert their analogue car radios to digital. As more devices come to market we expect more drivers to convert, particularly as improvements in content and coverage become apparent.

8. The survey was carried out for the Digital Radio Development Bureau by Oliver Rowe Research, and conducted last year in the form of a questionnaire completed by almost 8,000 people who had experienced listening to DAB. Digital radio UK will be able to provide further information about the research and can be contacted at 2nd Floor, 5 Golden Square, London W1F 9BS, or email info@getdigitalradio.com.

9. Following a switchover to digital radio, FM will be retained for use by local and community radio stations. It will continue for as long as it is needed. However, at this time, no Digital Radio Switchover date has been set, nor has a decision ben made whether to set such a date. On DAB+, the benefit of DAB+ is primarily more capacity for more services: it offers little in terms of data services and functionality which can't be achieved through DAB. For that reason, we believe DAB is the most appropriate digital broadcast platform for the UK.

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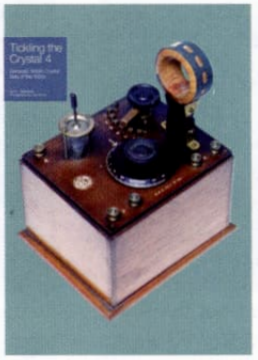

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BVWS Books

2MT Writtle – The Birth of British Broadcasting

Tim Wanders' book charts the full story of the early struggle to achieve a national broadcasting service in this country – from the famous 1920 broadcast of Dame Nellie Melba in Chelmsford, through Writtle's sparkling success to the birth of the BBC in 1923. It has been written for a wide readership, not just lovers of historic tomes and technical journals. The book also includes separate technical/historical appendices on the Writtle, Chelmsford and 2LO transmitters, the Dutch station PCGG, and early pioneers such as Grindell Matthews, Reginald Fessenden and David Hughes. It has new sections on the History of Writtle village and the Cock and Bell Pub. and charts the development of speech transmission during the First World War. It also covers the start of broadcasting in America, and provides non technical explanations for the mysteries of radio transmission.

22 years ago, Tim Wander published the first edition of '*2MT Writtle – The Birth of British Broadcasting*' - drawing on much previously unpublished archive material and photographs. The first print run sold out within a year. This completely rewritten new edition benefits from 21 years more research, including the internet and modern technology, and now has over 550 pages and 240 photographs, many previously unpublished. It is without doubt the definitive story of the early New street broadcasts and the 2MT station.

2MT Writtle. The Birth of British Broadcasting.
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There are 50 remaining BVWS calendars left over from the copies sent free with last years Winter Bulletin. If anybody wishes to have an extra copy of the 2011 BVWS calendar please send a cheque for £5 made out to 'British Vintage Wireless Society' sent to: Graham Terry, 26 Castleton Road, Swindon, Wilts SN5 5GD. Tel: 01793 886062 membership@bvws.org.uk.

Funds raised from BVWS calendar sales is used to help run and maintain the British Vintage Wireless and Television Museum in West Dulwich, London.

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Back issues

Vol 10 Numbers 2, 3 & 4 Inc. The KB Masterpiece, Extinct Species "A Monster Defiant".

Vol 11 Numbers 1, 2, 3, 4 Inc. BTH VR3 (1924) receiver, Marconi's 1897 tests, Origin of the term 'Radio', Baird or Jenkins first with TV?

Vol 12 Numbers 1, 2, 3, 4 Inc. the Emor Globe, The Fultograph, Ekco Coloured Cabinets.

Vol 13 Numbers 1, 2, 3 Inc. Direct action tuning, The Philips 2514, Noctovision.

Vol 14 Numbers 1, 2, 3, 4 Inc. Cable broadcasting in the 1930's, The story of the Screen Grid.

Vol 15 Numbers 2, 3, 4 Inc. The wartime Civilian Receiver, Coherers in action, Vintage Vision.

Vol 16 Numbers 1, 2, 3, 4 Inc. The Stenode, The Philips 2511, Inside the Round Ekcos.

Vol 17 Numbers 1, 3, 4, 5, 6 Inc. Wattless Mains Droppers, The First Philips set, Receiver Techniques.

Vol 18 Numbers 3, 4, 5 Inc. The First Transistor radio, The AVO Valve tester, The way it was.

Vol 19 Numbers 1, 2, 3, 4, 5, 6 Inc. The Birth of the Transistor, Super Inductance and all that, reflex circuits, A Murphy Radio display, restoration.

Vol 20 Numbers 1, 2, 4, 5, 6 Inc. Radio Instruments Ltd., Japanese shirt pocket radios, Philco 'peoples set', notes on piano-keys, the story of Pilot Radio, the Ever Ready company from the inside, the Cambridge international, the AWA Radiolette, this Murphy tunes itself!

Vol 21 Numbers 1, 2, 3, 4 Inc. Marconi in postcards, the Defiant M900, GPO registration No.s, Personal portables, the transmission of time signals by wireless, the Ekco A23, historic equipment from the early marine era, the birth pains of radio, inside the BM20, plastics, Ferdinand Braun, pioneer of wireless telegraphy, that was the weekend that was, the first bakelite radios, BVWS - the first five years, the world of cathedrals, Pam 710.

Vol 22 Numbers 1, 2, 3, 4 Inc. Another AD65 story, the Marconiphone P20B & P17B, listening in, communication with wires, the story of Sudbury radio supply, French collection, Zenith Trans-oceanics, Farnham show, Alba's baby, the first Murphy television receiver, AJS receivers, Fellows magneto Company, Ekco RS3, Black Propaganda.

Vol 23 Numbers 1, 2, 3, 4 Inc. Sonora Sonorette, Bush SUG3, RNAS Transmitter type 52b, North American 'Woodies', Why collect catalin, Pilot Little Maestro, Theremin or Electronde, The Radio Communication Company, Early FM receivers, an odd Melody Maker, Black propaganda.

Vol 24 Numbers 1, 2, 3, 4 Inc. The Superhet for beginners, Triode valves in radio receivers, History of GEC and the Marconi - Osram valve, KB FB10, Great Scotts!, Riders manuals.

Vol 25 Numbers 1, 2, 3, 4 Inc. Repair of an Aerodyne 302, Henry Jackson, pioneer of Wireless communication at sea, Zenith 500 series, Confessions of a wireless fiend, RGD B2351, John Bailey 1938 Alexandra palace and the BBC, Ekco during the phoney war, Repairing a BTH loudspeaker, The portable radio in British life.

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

Supplements:

1 'The story of Burndept'.
2 'WW 1927 data sheet'
3 'Seeing by wireless' the story of Baird Television
4 Reproduction Marconi catalogue

Earlier Bulletins and supplements are priced at £2:00 each + postage. Bulletins from volume 21 onwards are priced at £2.50 each. + postage.

Postage: for individual Bulletins add 50p, for 2-5 bulletins add £1, for 6 or more add an extra 20p each.
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Cheques to be made payable to 'The Vintage Wireless Museum'.

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

2011 Meetings

February 13th Audiojumble
March 6th Harpenden
April 10th Golborne
May 15th NVCF
June 4th BVWS Garden Party
July 3rd Wootton Bassett
August 12th Museum Music Night
September 11th Table Top Sale at The British Vintage Wireless and Television Museum
September 18th Murphy Day at Mill Green Museum
September 25th Harpenden
October 9th Audiojumble
November 20th Golborne
November 25th Festive Music Night at The British Vintage Wireless and Television Museum
December 4th Wootton Bassett

The British Vintage Wireless and Television Museum:
For location and phone see advert in Bulletin.
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
Golborne: Golborne: Golborne Parkside Sports & Community Club.
Rivington Avenue, Golborne, Warrington. WA3 3HG
contact Mark Ryding 01942 729005
For more details with maps to locations see the BVWS Website:
www.bvws.org.uk/events/locations.htm

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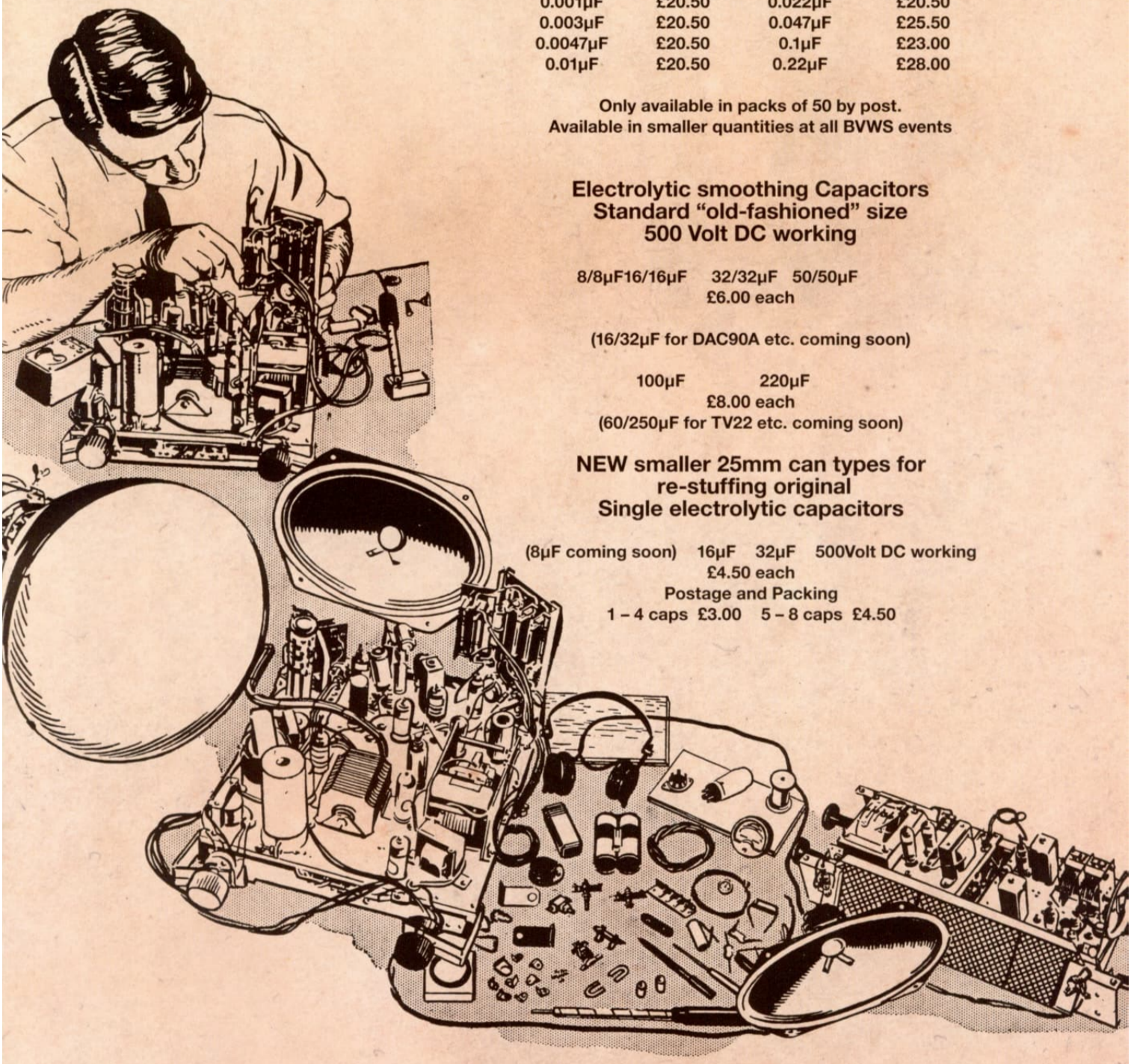

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