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Bulletin of the British Vintage Wireless Society
Volume 24 No.1 Spring 1999

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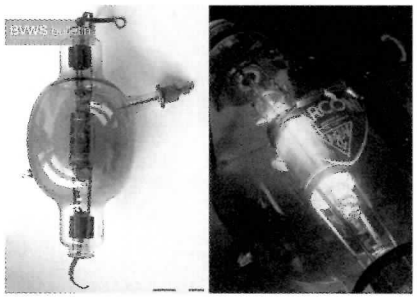
Separations by Cutting Edge
Printed by Apollo



Front Cover: Marconi Type MT14 valve.
Rear cover: Marconi Type MT14 valve lit at night.

Cover photography by Mark Groep.
Graphic Design by Carl Glover

Contents

From the chair

A new year has arrived and with it a new Committee. Since no valid nominations were received for the 1999 elections, there were no contested Committee positions and, therefore, postal elections were not needed and the new Committee may be regarded as, de facto, already in place. Fortunately all Committee members (with the exception of myself) had agreed to continue in one role or another and the new Committee will be confirmed at the AGM at the Harpenden meeting of March 7th.

When I took up the Chairmanship, I made it clear that I would not seek the job in the next round of elections. Fortunately for the Society, Mike Barker has taken on the role and is very well qualified to do so having several years Committee experience including Membership Secretary, as well as running the excellent regional meeting at Wootton Bassett. The other Committee Members are: Editor, Carl Glover; Treasurer, Jeffrey Borinsky; Events Organiser, Steve Sidaway; Members' Avertisements Secretary, Ian Higginbottom and Society Secretary, Guy Peskett. I am also standing down as the Society's Treasurer, so for the first time since the very first AGM more than 20 years ago I will be free of specific Committee duties. It has been more than long enough and I will be pleased to continue writing for the Bulletin as well as helping the Committee in a general or strategic sense if asked to do so.

David Read in 1977 and his wife Gill who with a few otherCommittee wives did all the refreshments at Harpenden in those far-off days

1998 was a difficult year for the Committee with unavoidable changes of personnel and the death of Pat Leggatt towards the end. 1999 could well be even more difficult for the Committee (and therefore the Society) unless two very important jobs are filled. Firstly, with Pat gone we are without a Membership Secretary. Mike Barker has agreed to do the job 'unofficially' until someone is found. This is a wholly unreasonable load on Mike and I urge any member with simple database experience and a home computer to consider helping the BVWS in this vital respect. Secondly, the Society needs a Publications Secretary to help get in articles for the Bulletin, and work with an editorial panel to help to ensure a well balanced content of interesting material. The Bulletin is the face of the Society and it does not produce itself. This new job was detailed in the 'Call for Elections' and is vitally necessary to help Carl. Again, I urge any member who would like to help to come forward.

Finally, to make a lasting memorial to Pat and his extraordinary contribution of articles to the Bulletin, the Committee has agreed to make an annual award of a years' free membership for the best all round article in each membership year. It will be called the Pat Leggatt award.
I wish you all a happy and prosperous year.

David Read.

New Honorary Member

The Committee has the greatest of pleasure in rewarding Mr. Jonathan Hill with Honorary lifetime Membership of the Society. Jonathan has devoted many years to the study of all facets of radio communications. From the very earliest experiments to the latest technology. Most notably known for the publication of 'Radio Radio' and 'Audio Audio' and the organisation of the National Vintage Communications Fair each year. Jonathan is a founder member of the BVWS, an avid collector, and has supported the Society in every way possible over the years. He is regularly seen at meetings with camera in hand to record the hustle and bustle of people and items.

Jonathan Hill in action

Million Radio Sets Idle!

by Mike Barker

A Million wireless sets are continuously out of use in this country. This is one set in eight, and the number is growing. Because of the number of wireless engineers who are being taken in to the Services, repairs never catch up with breakdowns. The Board of Trade has given permission for the completion by next spring of 125,000 sets in course of production, provided labour is available. The introduction of a utility set is out of the question at present.

MILLION RADIO SETS IDLE

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The introduction of a utility set is out of the question at present.

This statement in the Press of 1942 shows just how desperate things had got in the Radio, and Radio Service industry.

The most effective method of keeping the British public connected with the BBC Wartime announcements. Yet it was for another 2 years to pass before the final release for sale of the new Civilian Receiver.

Designed by Dr. G.D. Reynolds of Murphy Radio, in two versions, for AC Mains and Battery. A Medium Wave only receiver, effecting every possible saving in components and labour, while still retaining a satisfactory performance and a high standard of reliability.

After the years of little or no supplies of components and valves for the millions of domestic receivers in use, and the exhaustion of manufacturers issuing notes on modifications to their receivers to, as Murphy put it, "Keep it Going".

First deliveries to dealers were made in June 1944. It was proposed that the first production would run to 250,000 sets, with another 250,000 later, tailored to the demand. In fact only 175,000 or so were produced before the end of the War.

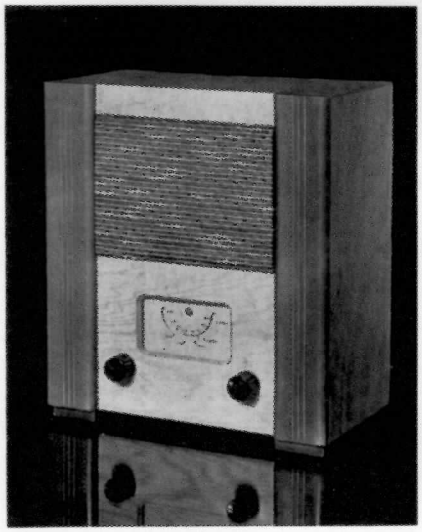
The sets were manufactured by some 42 different manufacturers, each being given a specification that the receiver was to meet, and using standard components throughout, so if any parts should fail in use, which could not be repaired, they would be interchangeable.

All receivers were to have the same external appearance, as directed by drawings supplied by the British Radio Cabinet Makers' Association. Although license was given for manufacturers to use up existing supplies of speaker cloth and knobs and other items that kept within the design specification and saved the use of new materials. I have however come across just one of these sets that looks like it has been thinly white washed down the two front pillars. This seemed to be a period addition to the standard look, and I have heard of other sets with much the same.

AC Mains Model: £12-3-4 (inc. tax)

The mains set is a very straightforward 3-valve circuit of Frequency Changer, IF amplifier and Output stage, and used the Westector WX6 for second detector stage. Economies were made in the use of a Permanent magnet speaker. A resistance-capacity filter for smoothing instead of the more commonly used energised speaker or choke for the HT smoothing, which saved on copper and reduced the weight of the set. The Westector was selected as the more usual double diode-pentode output valve

★ Here it is!



Above is the A.C. Mains model of the R.M.A. Civilian War-time Receiver. It is of extremely simple design, and much thought has been devoted to the saving of all unnecessary components. Below is the battery model.

the NEW RECEIVER

● *The set is designed by the Radio Manufacturers' Association, and is being manufactured to that design by a number of radio manufacturers. There are no "individual" models.*

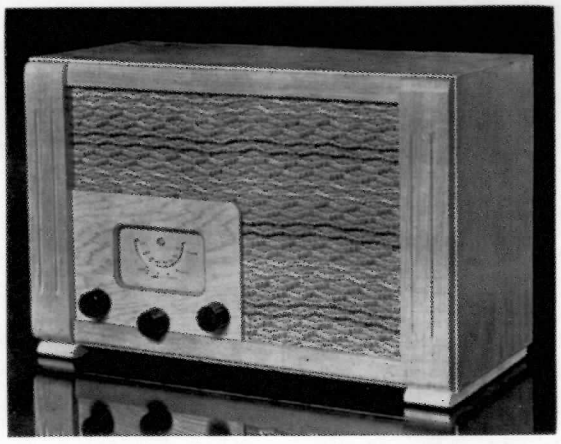
● *The full official title of this set is the "Civilian War-time Receiver." Two versions only are being manufactured—A.C. Mains and Battery.*

● *Some 250,000 of these sets are being produced, and there is the possibility of a further 250,000. The first models are already being delivered by some manufacturers.*

HERE, after many rumours and much waiting, we are at last able to give you details of the Civilian War-time Receiver, as it is officially called. We should emphasize that the sets illustrated and described here represent a standard design, approved by the Board of Trade and designed by a Technical committee of the Radio Manufacturers' Association. Sets are being produced to this design by a large number of different manufacturers.

Two versions of the receiver are being made: a battery model and an A.C. mains' model. Both versions have the same wave-range (190-560 metres) and are not provided with short or long wavebands.

The main object of the designers has been to effect every possible saving in components and in labour, while still retaining a satisfactory performance and a high standard of reliability. The omission of wave-range switching gives a considerable economy in components, and in the mains set a resistance-capacity filter has been used for smoothing, in conjunction with a PM speaker



What about a SPARE set?

Not so crazy as you might think. When someone is ill; when Father wants the Symphony Concert and the kids want jazz; when the family set goes away for overhaul. . . Yes, it's a good investment to have a simple, easily movable, inexpensive "spare". And now is the time to get one. We have a few — and only a few — Wartime Civilian Receivers. Call in and hear one but make it soon as we shan't be able to get any further supplies.

Prices, Including Purchase Tax:
A.C. Mains model £12 . 3 . 4
Battery model £10 . 19 . 0

K. J. THOMAS
Radio and Electrical Engineers
9 THE PARKWAY, PARADE
WINTON. Tel: Winton 247

Page 4, Large Picture: front of 'Keep it Going!' leaflet published during World War Two by Murphy Radio Limited. Described by the publishers as: A handbook of helpful information for all listeners, compiled from the experience gained by radio dealers whose job it was to "keep it going" for you in peacetime.
Page 4, small picture: News clipping illustrating the quantity of non-functioning wirelesses during World War Two.
This page, Left: Page reproduced from 'The War-time Murphy News, volume 19 No.6
Top right: Advertisment selling Wartime utility sets after cessation of hostilies
Lower right: cover from 'The War-time Murphy News, volume 19 No.7

were not being made for the Forces.
The aerial and oscillator circuits being conventional, with only a minimum of components, using shared Decoupling for oscillator anode and the screens of the first two valves. The padding condenser for the oscillator also acts as the grid condenser for the oscillator valve, removing the need for yet more components.

The Westector detector receives a steady current from the second IF transformer, which has extra coupling turns, arranged to compensate for the heavy damping effect imposed by the detector circuit.

A Delayed AVC system had to be employed because of the direct feed used to the output valve. This method produced a sufficiently large DC voltage to load the output valve, using a standard AVC circuit would have 'held down' the set, with only strong signals loading the output valve. The usual arrangement would have used another diode, but no such luxury was available, and instead a very curious, but effective method of using the suppressor-cathode path within the IF amplifier valve simply as a diode was used.

Battery Model: £10-19-00 (inc. tax)

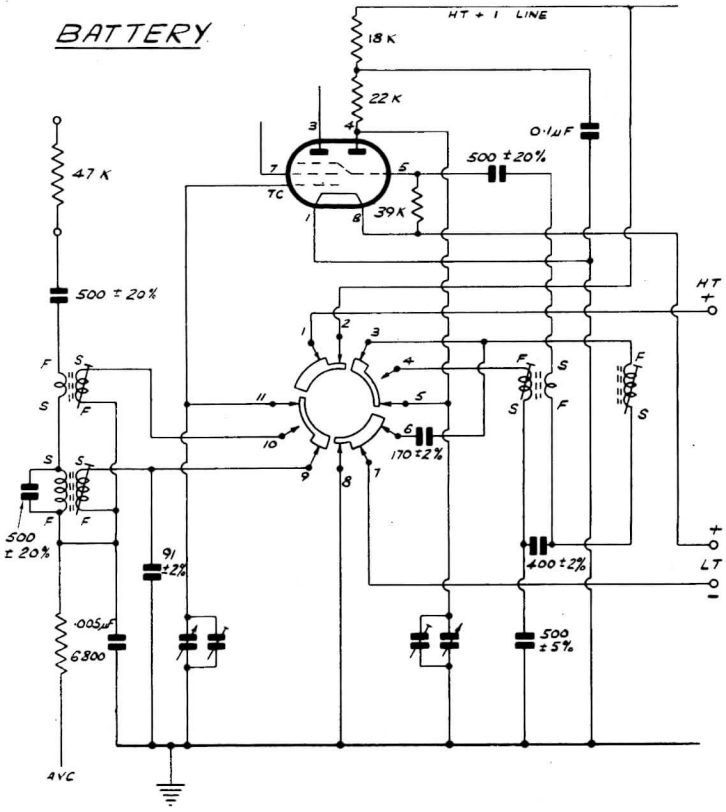
The battery version, a straightforward 4-valve superhet of Frequency changer, IF amplifier, detector + AF amplifier and Output stage. The battery set differed, by using a more conventional circuit. This was mainly due to the lower slope of the battery valves, giving insufficient gain with a 3-valve circuit, so a LF amplifier was included. The double diode triode valve was also in production for Forces receivers and was available. The Aerial circuit is identical to that of the Mains receiver. The same oscillator coil is also used but the oscillator is anode tuned. Decoupling in the battery receiver is common to the first two valves and arranged so that no electrolytics were needed.

Performance Specification AC Receiver:
Sensitivity: Not less than 325 microvolts at 220 metres, 625 microvolts at 500 metres.
Selectivity: Bandwidth not to exceed 11Kc at 50% response, 21Kc at 10% response.
Overall response: Not more than 7 decibels down at 100 cycles or 9 decibels down at 4000 cycles. This to be measured with a RF input of 10 milivolts, modulation of 30% applied at the aerial and volume adjusted to 50 miliwatts at 400 cycles.

AVC Threshold: Delayed to commence when the output is 1 watt on a signal with a modulation depth of 50%.

IF Rejection Ratio: IF rejection should not be worse than 5 to 1 at any band point.

continued on next page

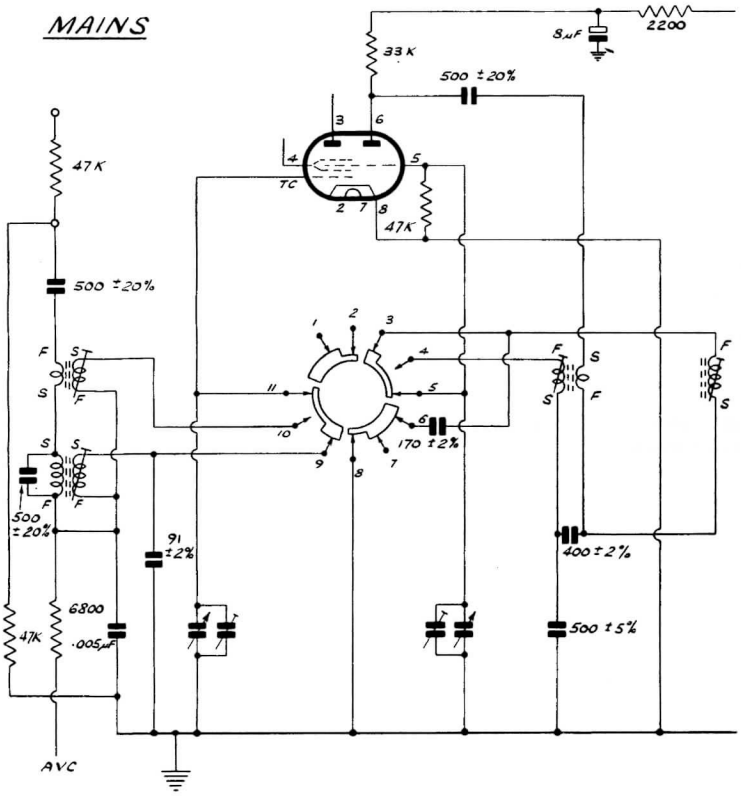


Top: Circuit showing conversions for LW on battery set.

Below: Circuit showing conversions for LW on mains operated set, circuits reproduced from 'Murphy News, volume 20 No.8, August 1945.

Right: Two pages reproduced from 'The war-time Murphy News', Volume 19, No. 6, June 1944 illustrating the 'some details of the new civilian war-time receiver'.

Lower right: cover of 'The war-time Murphy News', Volume 19, No. 6, June 1944.



to avoid the use of large quantities of copper wire in a speaker filter or smoothing choke. The A.C. and battery sets have many components in common. The performance of the sets is good and compares favourably with that of pre-war receivers of a similar class.

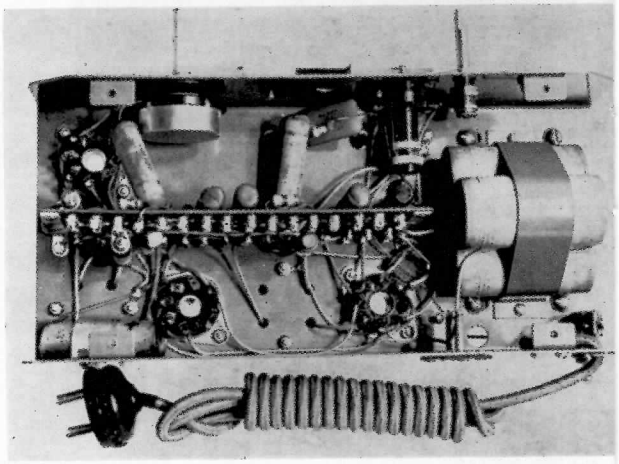
The mains version has only two panel controls, volume and tuning, and the on-off switch is at the back of the set. The battery set has three controls, the on-off switch being in the centre position and clearly marked to show when the set is "on."

A simple string drive gives a slow motion tuning ratio of about 7-1. The tuning scale itself comprises two printed metal plates—one fixed and one moving, and fits flush against the cabinet, thus avoiding the need for a glass panel.

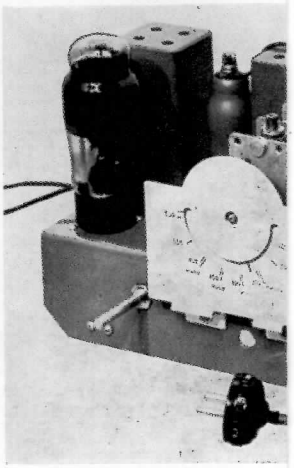
SOME DETAI

The intermediate frequency of b sets is 460 kc/s, and the IF transf mers are permeability tuned. The se provided with alternative aerial socke one being connected *via* a high res tance so as to avoid overloading wh the set is used near a powerful tra mitter.

The layout of both sets is clear a accessible, so that any service w

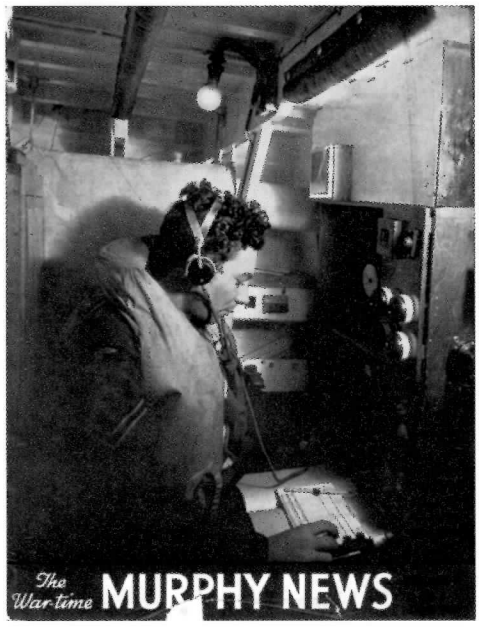


The photograph below is of t set chassis. The simple tuning drive is particularly intere



THE MAINS SET

- A simple, straightforward three-valve superhet. Frequency-changer, I.F. amplifier. Output (plus Rectifier valve).
- Two panel controls: "Volume" and "Tuning." The "on-off" switch is located at the back of the set.
- Two aerial sockets—for "local" and "distant" stations.
- Second detector stage is a Westector, WX6.
- Mains smoothing is by capacity and resistance only. No chokes are used.
- Permanent Magnet Speaker.
- Medium waves only. 190 metres to 560 metres.



LS OF THE NEW CIVILIAN WAR-TIME RECEIVER

should be quite easy. Reliability has been carefully considered—as an example the mains transformer is of generous design and has a temperature rise of 35-40° C. under actual working conditions. Economy of battery consumption was also looked after in the battery set; it takes 8mA at 120 volts and 0.45 amps at 2 volts.

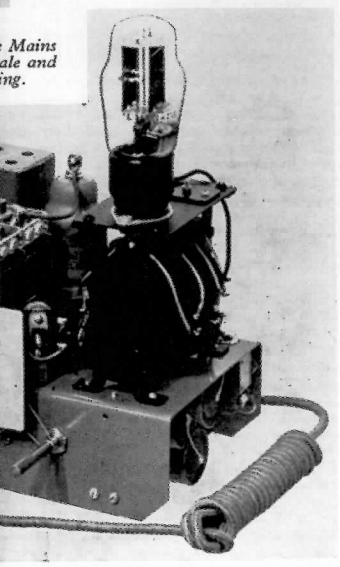
For the interest and information of dealers we quote here from the notes and specifications supplied by the R.M.A. to all the setmaker members taking part in the scheme.

Scope of Data Supplied

The drawings, data, and photographs supplied by the R.M.A. are intended to provide those details which are necessary to enable a radio set manufacturer to make a set substantially the same as the original model designed by the R.M.A. and approved by the Board of Trade. It is not intended to supply a complete set of detailed working drawings.

The set, as designed, has been so laid out that a standard kit of spare components can be used for repairing sets from any manufacturer, and to this end all parts which may fail in use, and which cannot easily be repaired, should be interchangeable.

On the left is the chassis of the Mains set, seen from below. The simple design and the accessibility of components for servicing are most noticeable. Note the three separate electrolytics, grouped together.



Above is the chassis of the battery model and, below, the underside view. An example of the general economy in design is the use of the same chassis frame for both sets.

Appearance

The cabinets used by all manufacturers must, as nearly as possible, have the same appearance. A drawing of the cabinet has been prepared by the British Radio Cabinet Makers' Association, and a sample cabinet will be kept at the R.M.A. offices.

The tuning scale assemblies must be finished in the standard manner, and have the same appearance as the original model.

Performance Specification A.C. Set

(i) *Sensitivity*. The sensitivity shall be not less than 325 μV at 220 metres, and 625 μV at 500 metres (output measured at the speech coil terminals, 50 mW).

(ii) *Selectivity*. The band width shall not exceed 11 kc/s at 50% response, and 21 kc/s at 10% response.

(iii) *Overall response*. The overall response shall be not more than 7 decibels down at 100 cycles or 9 decibels down at 4,000 cycles with respect to the level at 400 cycles. The response shall be measured on a resistive output load, and using an R.F. input of 10 mV, modulation of 30%, applied to the aerial terminal A1 and the volume control adjusted to an output of 50 mW at 400 cycles.

(iv) *A.V.C. Threshold*. The A.V.C. shall be delayed so that it commences to operate when the output is approximately 1 watt on a signal with a modulation depth of 50%.

(v) *I.F. Rejection Ratio*. The I.F. rejection ratio at any point of the band shall not be worse than 5 to 1.

Performance Specification Battery Set

(i) *Sensitivity*. The sensitivity shall be not less than 300 μV at 200 metres, and 600 μV at 500 metres for an output of 50 mW across the speech coil terminals (H.T. 120 volts).

(ii) *Selectivity*. The band width shall not exceed 11 kc/s at 50% response and 21 kc/s at 10% response.

(iii) *Overall response*. The overall response shall not be more than 10 decibels down at 100 cycles, or 14 decibels down at 3,000 cycles, with respect to the level at 400 cycles. The response shall be measured on a resistive output load, and using an R.F. input of 10 mW, modulation of 30%, applied to the aerial terminal A1 and the volume control adjusted to an output of 50 mW at 400 cycles.

(iv) The I.F. rejection ratio at any point of the band shall be not worse than 5 to 1.

(v) The oscillator Section of the frequency changer must continue to operate when the set is fed from a 60 volt H.T. battery, with 2,200 ohms in series.

THE BATTERY SET

- A straightforward, four-valve superhet. Frequency-changer, I.F. amplifier. Detector. A.F. amplifier and output.
- Three panel controls: "Volume," "Tuning," "On-off" switch.
- Two aerial sockets for "local" and "distant" stations.
- Medium waves only. 190 metres to 560 metres.
- Permanent Magnet speaker.

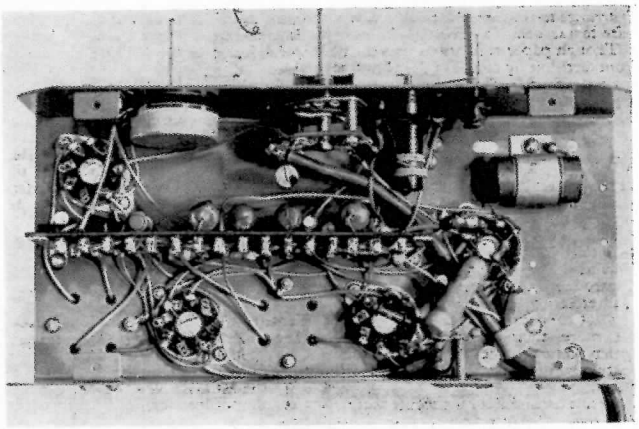
General Quality of the Product

In view of the difficulty of producing a sufficiently detailed specification to cover such points as loudspeaker performance, or the durability and workmanship of the receiver, the R.M.A. wishes to draw the attention of manufacturers to the fact that the sets will be so coded that defective apparatus can be traced to its source ,and it is therefore in the interests of each individual manufacturer to adhere to the spirit of the specification.

RETAIL PRICES

Battery Model . . . £10-19-0 (incl. Purchase Tax £1-19-0). Batts. extra.

A. C. Model . . . £12-3-4 (incl. Purchase Tax £2-3-4).



Performance Specification
Battery Receiver:
Sensitivity: Not less than 300 microvolts at 200 metres, 600 microvolts at 500 metres.
Selectivity: Same as mains version.

Overall response: Not more than 10 decibels down at 100 cycles, or 14 decibels down at 3000 cycles, with respect to the level at 400 cycles. This to be measured with a RF input of 10 milivolts, modulation of 30% applied at the aerial and volume adjusted to 50 miliwatts at 400 cycles.

IF Rejection Ratio: Same as mains version. The oscillator section of the frequency changer must continue to operate when the set is fed from a 60 volt HT battery, with 2200 ohms in series.

LONG WAVES for the W.C.R
Although the new Light programme on 1500 metres, was also broadcast on 261 metres, there were many areas of the country where reception on MW was too bad to listen to, or even not available at all. For all the owners of the Civilian receivers this meant being deprived of the new BBC broadcasts. Requests from the public were made for a solution to the problem. A few different methods appeared, ranging from a small tuner unit that replaced the first stage of the receiver, where an adapter on a flexible cable plugged into the frequency changer socket, and the valve was transferred to a socket in the tuner unit. Kits for conversion of existing sets were available, but required a service engineer to install and re-align the set. Unfortunately, many of the sets that survive with a LW conversion, will probably have been done poorly, and have unmatched knobs and poor soldering.

The industry did however supply conversion kits to dealers with full instructions, and by the end of August 1945 this service was offered to all Murphy registered owners of the WCR. The conversion entailed about 2.5 hours of an engineer's time (if done correctly) and gave a fully integrated LW band, with new and additional coils and components.

I have had many of these sets for repair and restoration, although all but my own battery model, have been mains sets, of a variety of manufacturers. Many of the sets with standard plated chassis have suffered from corrosion and rust where the chassis were open to the elements, but usually behind the back cover, the sets have been remarkably well preserved, except one, which had been "Restored" and no longer worked. I use the word restored with tongue in cheek, as the owner had been charged a princely sum for work that could only be described as shoddy. The set failed because the original electrolytics were left connected, with new Radio Spares capacitors soldered across the wiring, thus getting rid of the terrible hum for a short period of time, until the end of one was blown apart, due to ripple current.

Much re-soldering and the correct value components were needed to revive the set to its former glory.

continued on next page

THE CIVILIAN WAR-TIME RECEIVER

PRELIMINARY TECHNICAL NOTES

by G. DAVID REYNOLDS, Ph.D. A.M.I.E.E., A.I.C.

THE circuit of the A.C. Receiver is shown in Figure 1 below. It will be seen that in general design it is a straightforward superheterodyne with detail departures from standard pre-war practice in order to use fewer components, and to accommodate a Westector and an ordinary output pentode in place of the usual double-diode-pentode of pre-war sets. This double-diode-pentode is not made for the Services, and it was not possible to make valves especially for the Civilian War-Time Receivers.

The aerial circuit uses a combination of inductive and capacitive coupling—the coupling coil being effective at the high frequency end of the band and the coupling condenser (0.005 μF) at the low frequency end.

The frequency changer circuit is conventional except that some economy in condensers and resistances has been achieved by using a common decoupling circuit for the oscillator anode, and for the screens of the frequency changer and intermediate frequency valves. The padding condenser for the oscillator circuit also acts as a grid condenser for the oscillator valve.

The Westector circuit works best with fairly low load, and with a small steady current flowing through the Westector. The second intermediate frequency transformer has been given a step-down ratio of 1½/1 in order to chieve a satisfactory I.F. performance with this low load, and since the rather heavy damping imposed by the detector circuit lowers the Q of the secondary, and hence the effective coupling of the transformer, it is necessary to add coupling turns in order to get the usual order of coupling (about 90 per cent of critical). The detector load is returned to the output valve cathode, and the bottom end of the tuned circuit is returned to the bottom end of the cathode bias resistor (180 ohms), so as to give the necessary steady bias on the Westector.

Automatic Volume Control

When the output valve of the receiver is fed directly from the detector, it is necessary to use a delayed A.V.C. system because the D.C. voltage on the diode load has to become quite large before the output valve is fully loaded, and with a straight A.V.C. system the set would be "held down," so that it would be difficult to load the output valve on any but very strong signals. Delayed A.V.C. is usually obtained from a separate diode when a pentode valve is used, but in this set it was necessary to find a separate diode for the delayed A.V.C. system without putting in an additional Westector. The scheme finally adopted uses the suppressor-cathode path of the I.F. valve as a diode, and it is quite easy to understand if it is realized that this suppressor is used simply as a diode.

Referring to Fig. 3, which shows the A.V.C. system, let us take the case where there is no signal input to the receiver. The voltage across R11 is about 4 volts, and across R12 about 8.5 volts. Since the resistance of the Westector is small in the forward direction, and the resistance of the I.F. secondary coil is only a few ohms, the potential at the point A will be about 9 volts (i.e. the voltage drop across R12 plus a small fraction of the drop across R11). This voltage (the delay voltage) is positive with respect to chassis, and is applied to the suppressor of the I.F. valve through R6. This grid, *acting as a diode*, will conduct because its anode is positive, and since the resistance of this "diode" is low compared with R6, the potential of the "diode" anode will be a very small positive potential to chassis (the cathode of this "diode" is connected to chassis).

The resistance R13 is in the H.T. negative feed to the receiver, and has a potential of approximately —10 volts at the end C, remote from the chassis, and the two resistors R7 and R8 form a potentiometer between this point and the anode of the "diode." Since R8 is three times R7, the voltage appearing at the point B will be approximately one quarter of —10 (i.e. —2.5 volts), and this is applied to the frequency changer and I.F. valve grids as standing bias.

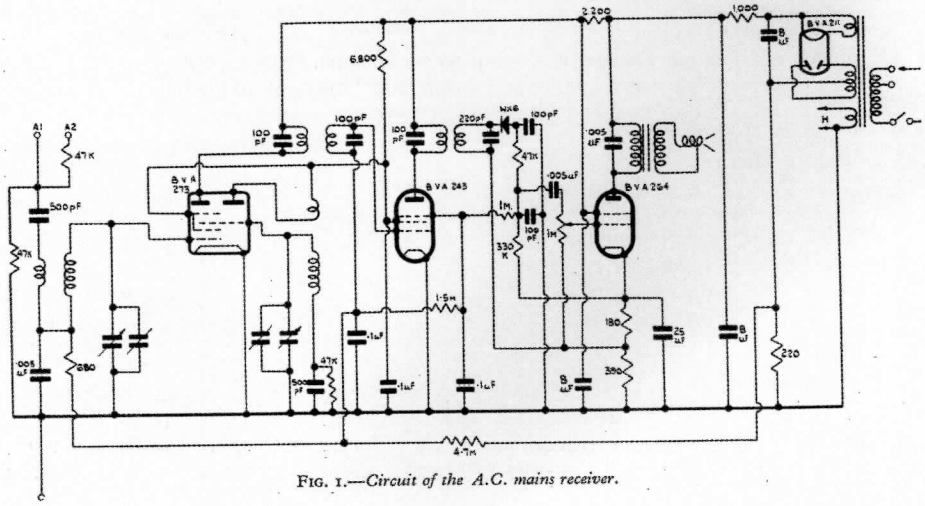


FIG. 1.—*Circuit of the A.C. mains receiver.*

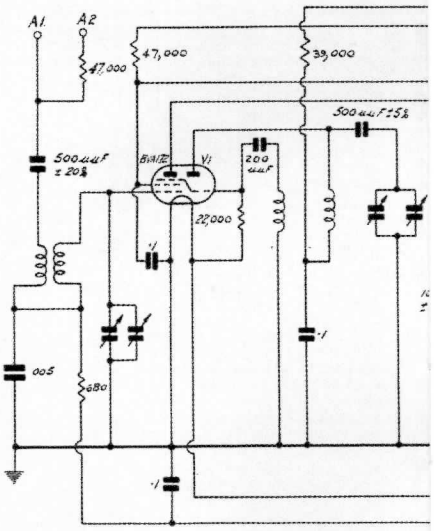


FIG. 2.—*Circ*

A.V.C. Operation Explained

As the signal input to the receiver is slowly increased, the D.C. voltage across R9 from the rectified I.F. signal steadily increases. It is in opposition to the delay bias, so that as the signal increases, the point A becomes less and less positive to chassis, but so long as it is at all positive the "diode" will conduct, and the junction of R6 and R7 remains at a very small, positive potential to chassis, and the bias of the first two valves remains unchanged at —2.5 volts.

When the rectified signal voltage across R9 becomes greater than the delay bias, the voltage at A becomes negative to chassis, and the "diode" ceases to conduct because its anode is at a negative potential to its cathode. As soon as this happens, a proportion of the negative voltage at A will be applied to the A.V.C. line, B, as A.V.C. bias, the actual voltage between B and chassis depending on the values of the three resistances R6, R7, and R8, and on the voltage across R9, the delay voltage and the voltage between C and chassis.

In an average set the delay voltage is 9 volts, and the voltage from C to chassis —10 volts, so
voltage develo
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be 19+E, an
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A.V.C. volta

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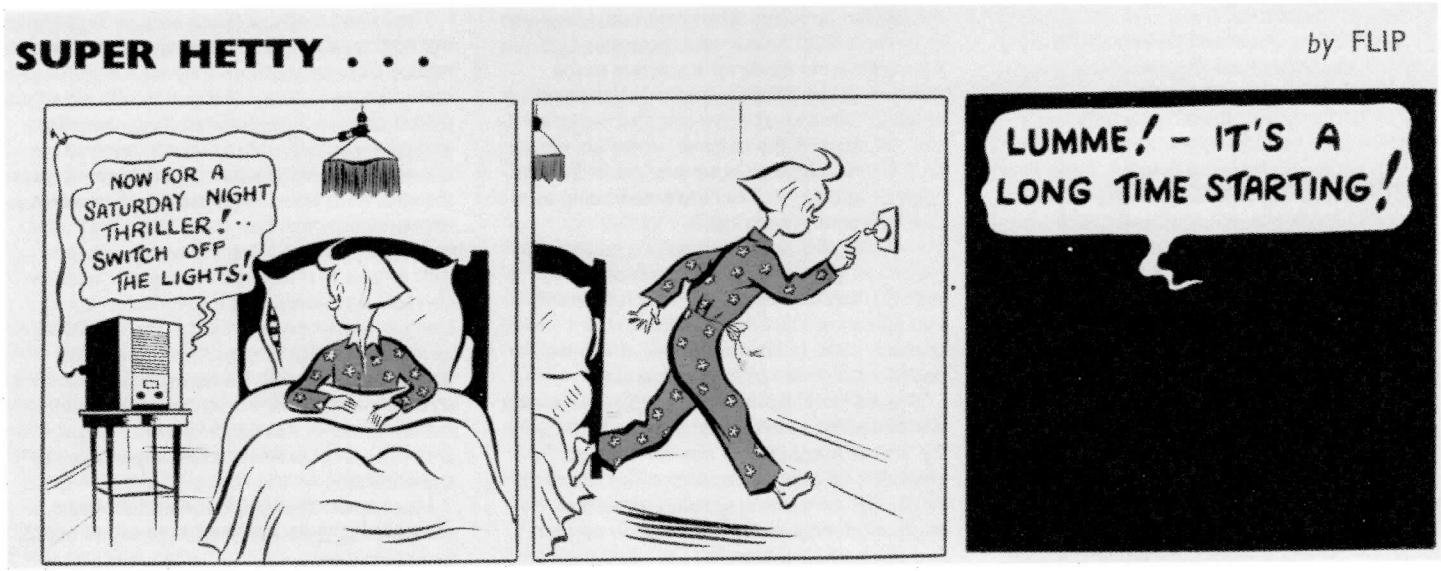
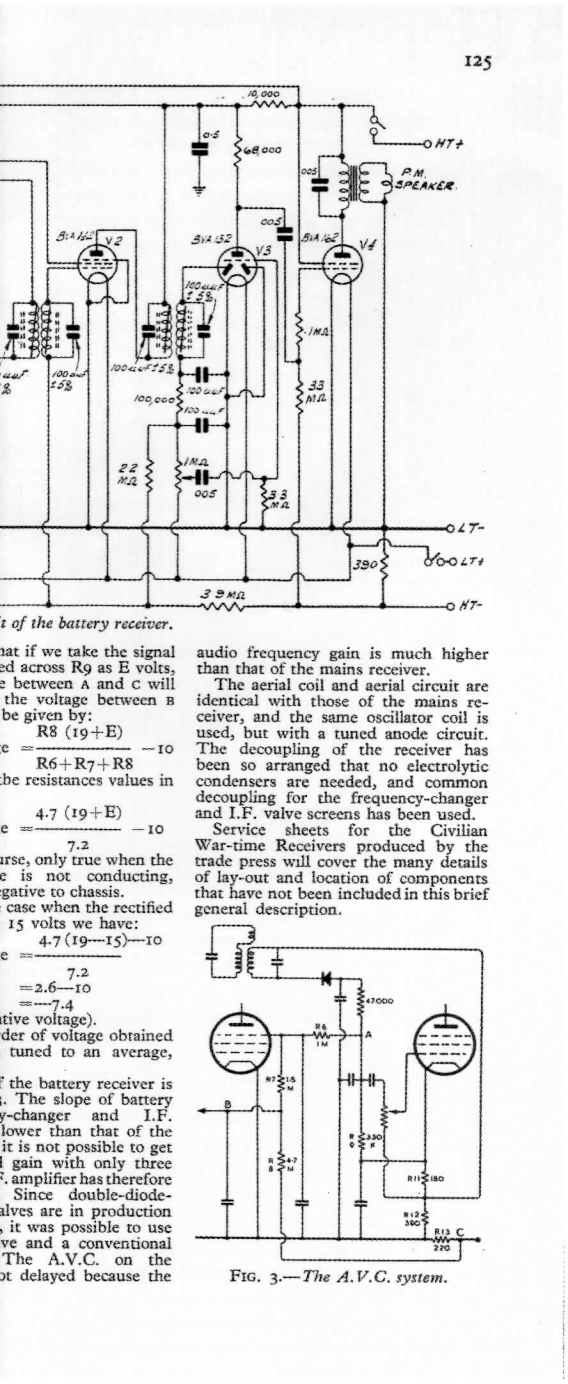
this type of v
diode circuit.
battery set is

Top: Preliminary technical notes on the Civilian Wartime Receiver, reproduced from 'The War-time Murphy News', volume 19 No. 7 July 1944.
Below: 'Super Hetty...' reproduced from 'Murphy News, volume 20 No.8, August 1945 illustrating a Civilian Wartime Receiver.
Lower right: 'Murphy News', Volume 20, No. 4, August 1945.





125

t of the battery receiver.

hat if we take the signal ed across R9 as E volts, e between A and C will the voltage between B be given by:

$$e = \frac{R8\ (19+E)}{R6+R7+R8} - 10$$

the resistances values in

$$e = \frac{4.7\ (19+E)}{7.2} - 10$$

urse, only true when the e is not conducting, gative to chassis.

case when the rectified 15 volts we have:

$$e = \frac{4.7\ (19-15)}{7.2} - 10$$

$$= 2.6 - 10$$

$$= -7.4$$

tive voltage).

der of voltage obtained tuned to an average,

f the battery receiver is . The slope of battery y-changer and I.F. lower than that of the it is not possible to get l gain with only three F. amplifier has therefore Since double-diode- alves are in production , it was possible to use ve and a conventional The A.V.C. on the ot delayed because the audio frequency gain is much higher than that of the mains receiver.

The aerial coil and aerial circuit are identical with those of the mains receiver, and the same oscillator coil is used, but with a tuned anode circuit. The decoupling of the receiver has been so arranged that no electrolytic condensers are needed, and common decoupling for the frequency-changer and I.F. valve screens has been used.

Service sheets for the Civilian War-time Receivers produced by the trade press will cover the many details of lay-out and location of components that have not been included in this brief general description.

FIG. 3.—*The A.V.C. system.*

To Restore or Not To Restore - A Very Personal Question

By Fraser Donachie

When visitors call at my house and they gain entry to the 'radio room', I can always, without fail, guess what they are going to say. They'll start with "Wow, they're brilliant!" and finish on the question "Do they work?". I'm always delighted to hear the initial praise, but the subsequent query sends an uneasy shiver down my spine. You see, excepting the odd DAC9OA, the majority of my collection comprises merely 'static exhibits'.

This is obviously disappointing for the expectant visitor who wants the thrill of hearing valve radio sets in action and I'm forced to make various excuses and try to explain this state of affairs. I feel sure, however, that the majority of Bulletin readers will appreciate why it is perfectly acceptable to possess non-functioning wireless sets. For the tiny minority of you who may be having some difficulty with this concept, then I offer the following advice.

For starters, each defunct and un-restored set is 'original' and un-tampered with. Who amongst us has not witnessed the ruination that can be caused by a 'bodger'? These pages have already hosted a debate on this subject, and I think I know where I stand! Many years ago I had an un-restored Ultra 121 and I asked my mother to clean the dial glass for me. I have still not forgiven her for wiping it clean, both of grime and station names! This was a hard lesson, which taught me never to trust my mother and never to fiddle with my prized possessions. Attempted restoration surely brings with it a plethora of risks; a ruined cabinet here, a cracked Bakelite fitting there. Why must we fiddle? No good can come of it!

And then there is the financial angle. One day, un-restored sets will surely become a rarity and be prized more highly than 'restored' sets which will flood the halls of Harpenden. Picture the scene in the year 2015, when Christies auction off "the last known un-restored example of a Philips 630A". Make no mistake, I stand to make a fortune with my used and tatty examples of wireless history! Bear in mind, also, that un-restored sets cost nothing to maintain; simply stick them somewhere and forget about them. Of course, the author does not advocate sheer neglect, but it does represent one approach to collecting which, he suspects, is practised covertly by many of us!

And finally, and more importantly, why would anyone in their right mind want modern radio signals to be processed by their sets? Each time I stare at my redundant artefacts I invariably daydream about the myriad of signals that have passed through them. The inductors, capacitors, resistors and valves have each reacted to a continuous flow of electronic history; pre-war dance bands beamed from Paris, Churchill's speeches from the BBC, black propaganda from Germany, and a myriad of weak signals from all corners of the Empire have sped through the circuits. I often wonder if the electrons, buried deep inside the ageing components, are still the same ones that once oscillated with joy all those years ago.

Which of us has not dreamt of being transported back in time to listen-in to the programmes of the 1920's or 1930's? I know that certain collectors attempt a re-creation of this using home-built AM modulators and tapes of vintage music, but this reproduces just a fraction ot the dream and doesn't really cut the ice. Using such a system is bound to let the odd 'stray' into the set - with disastrous consequences, as modern-day 'beat music' may suddenly come bursting from the speaker. Far better then, to put up with a silent non-working set in the knowledge that ones integrity has been maintained.

It seems strange that we, in the BVWS, do not place a greater emphasis on examining the history of wireless programmes. Could it be that broadband recordings of entire slices of the radio spectrum exist? If so, perhaps it would be possible to re-play these directly into a receiver and, hey presto, a complete and tuneable piece of spectrum could be explored as of old. Perhaps we could use modern video tape recorders to start a craze of LW or MW recording as a service to future spectrum historians? They would surely thank us!

So, restoration does have it's risks, particularly if you are ham-fisted or think that delegation to an elder is a wise choice. Un-restored sets will surely gain you a vast fortune in the future and the collector with his or her 'restored' set simply has nothing to listen to! But... and this is a big but... I have a niggling problem with dial lamps. Dial lamps are perhaps the single biggest factor that could tip the balance in favour of restoration.

Yes, we may all like to look into the rear of a set and see the red glimmer of a filament or two. I also accept that some of us enjoy the smell of damp dust slowly drying out or the occasional burst of smoke and flames as a component fails. But these are hardly reasons to restore! No, it is the warm golden glow of a dial lamp that lures us towards the ruination of an un-restored wireless set. Remember these wise words and know your weaknesses. To own and, nay, enjoy un-restored sets is not a crime. With conviction of mind and a strong will, you too can resist the temptation and reap the benefits!

'In the interests of better Radio Reproduction'
Alfred Graham & Company - 'Amplion'

By David Read, photography by Mark Groep

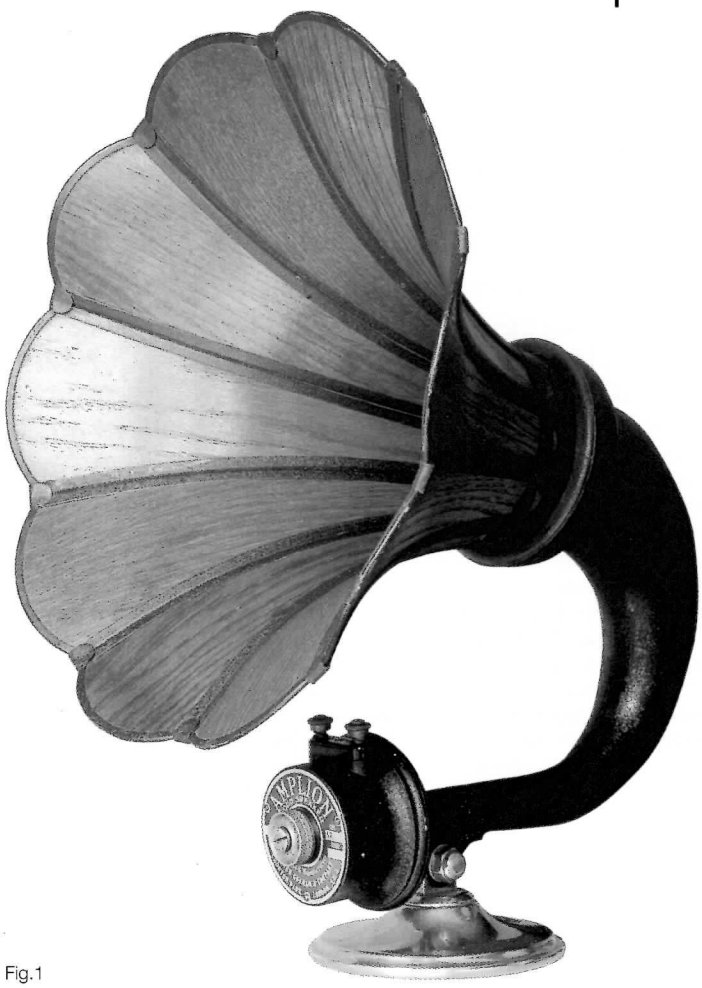


Fig.1

Fig.2

Fig 1: Amplion AR 19 'Dragon.'
Fig 2: Amplion 'New junior'. The Junior models use drive unit AR43.
Fig 3: Junior De-Luxe badged for RCC. 'Cosmos'.
Fig 4: Amplion 'Radioluxe' Type RS 10. The cabinet contains a folded metal horn.
Fig 5: 'Garden party' speaker by river at Egham, Surrey.
Fig 6: Open air or 'Garden Party' speaker in camera and tripod format. Folded horn with AR 61 drive unit.
Fig 7: Alfred Graham, founder of A. Graham and Co.
Fig 8: Edward Graham, Alfred's son and creator of the Amplion brand.
Fig 9: Cover of 'Amplion Magazine', July 1925.

Cup your hands, shout 'Ahoy there!', and you have an acoustic amplifier of sorts. The practice of achieving greater acoustic efficiency in the transfer of energy by horn loading was known from the earliest times in the form of ear trumpets and speaking trumpets. In the 19th century the horn became a common domestic feature of the phonograph and gramophone, and later, with the growth of the telephone business, manufacturers of telephone apparatus referred to horn loaded receivers (earpieces) as loudspeaking telephones. Before about 1920 the term 'loudspeaker' was probably unknown but seems to have come into use with wireless broadcasting. For wireless work the great sensitivity of the telephone earpiece when wound to an appropriate impedance made it an ideal transducer (after rectification) of the audio signal impressed on the wireless carrier wave. Adding a straight horn to an enlarged type of headphone provided the basis for the earliest type of loudspeaking telephone and the apparatus was soon referred to as a horn speaker or loudspeaker. The sound was definitely 'lo-fi' and some wags referred to such items as loudsqueakers.

There can be few collectors of vintage wireless who do not know of the Amplion loudspeaker, one of the first quality trademarks in early radio. In fact the trademark or brand was not registered until 1920 when the name was introduced by Alfred Graham & Co. for the emerging consumer market in public broadcasting. Alfred Graham, however, had already achieved 35 years of prior research and development in the telephone business culminating in successful professional contracts for the supply of telephone exchanges and equipment to the navies of the world. By 1919 no less than 12,000 ships were using Alfred Graham's installations for shipboard communications, replacing the air tube or 'Blower'.

The late 18th and early 20th century saw an explosion in ideas and patents. Some so called inventors and entrepreneurs occupied the limelight with a genius for self presentation and marketing that equalled their technical achievements, whilst others were of course in reality no more than quacks selling techno-magic of the domestic electro-therapy variety. The miracles of a generation ago are accepted today as commonplace but the telephone, telegraph, gramophone and wireless have human stories behind them that demonstrate that whilst originality

Fig.3

Fig.4

Fig.5

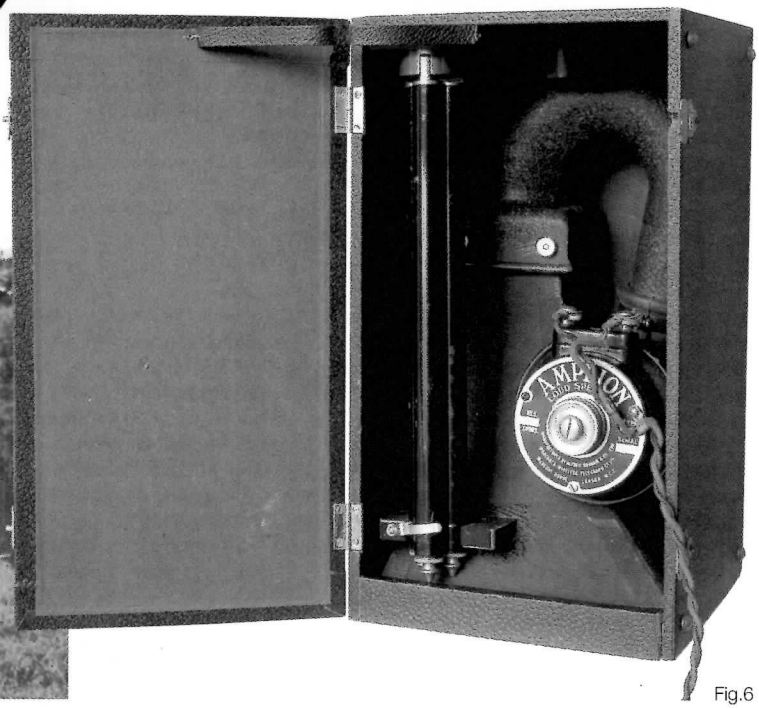


Fig.6

Fig.7

Fig.8

Fig.9

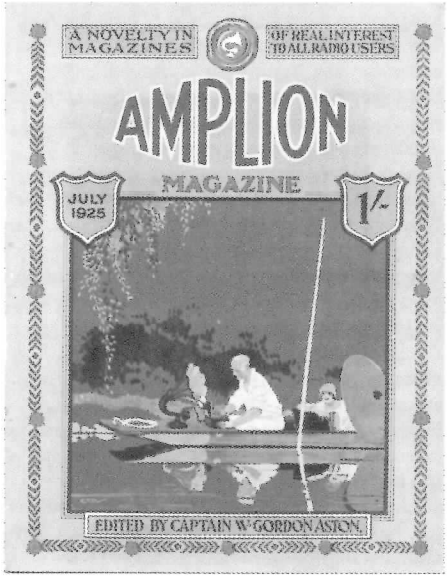


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Fig. 10

Fig. 11

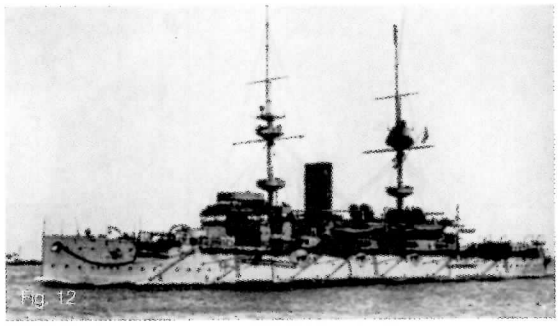


Fig. 10: Amplion speakers installed and suitably decorated for the Pope's address at the Holy Year ceremonies at St. Peter's in Rome, 1925.
Fig. 11: Advert illustrating usage of Amplion equipment on HMS Hood.
Fig. 12: HMS Caesar, 1897, the first British warship to be fitted with a complete loudspeaking telephone installation.
Fig. 13: Alfred Graham's experimental loudspeaking telephone, 1887
Fig. 14: Andia Chinese Scribe reflex speaker in painted papier maché. Andia speakers were made in a wide variety of styles and maufactured by Art Andia using Amplion drive units.

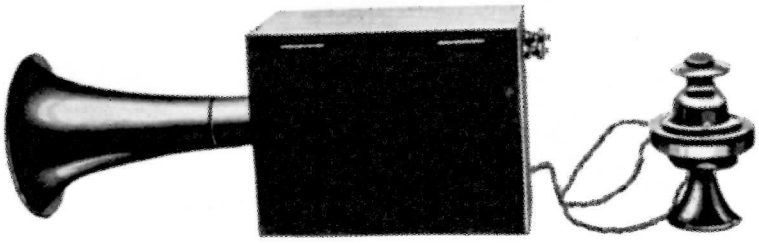


Fig. 13

might be important, the Patent Office is also bursting with crazy ideas that could never have become successful products. A good practical design that demonstrates fitness for purpose, sound production engineering, successful marketing, and results from an infinite capacity for taking pains, remains the key criterion for anything more than a fashionable or hyped moment of success, and Alfred Graham exemplified these necessary qualities.

It was in 1887 that he demonstrated the first telephone instrument to which the description 'loud speaking' could be fairly applied, but not until 1893, however, was the loud speaking telephone produced on a satisfactory commercial basis and successful systems were sold to warehouses, factories and other situations were ordinary telephones were found to be of little service. *The Times* led a general chorus of press comment and approval and the Admiralty became interested in its application for Naval purposes. Practically all the ships of the Japanese Navy, which were engaged in the Russo-Japanese War, were equipped with 'Graham' Navy telephone equipment. In 1894 Graham Speakers were first used in the British Navy, and in the same year transmitters were applied to phonographs for loud speaker reproduction and demonstrated by Professor McKendrick at the Royal Society.(In 1896 the British Admiraly standardised on Graham Telephone installations and a year later watertight loudspeakers were patented and fitted on board warships and mercantile vessels. In the same year the Graham telephonic submarine signalling system was devised. (Graham later credited Prof. McKendrick with establishing the term 'loudspeaker').

In 1899 Alfred Graham's son Edward Alfred, an inventor who was obstinate in his refusal to 'meet the press' or indeed indulge in any personal flights of ego, joined the Company and developed the complete communications exchange system for H.M.S. Dreadnought which was installed in 1907. This basic system, passing through several modifications in detail, was employed on all Capital Ships of the British as well as many foreign navies through the First World War and into the 1920s. In the case of Battleships and Battle-Cruisers the installation comprised more than 700 instruments of various types with appropriate intercom for gunfire, torpedoes, searchlights and other functions including general communications. Associated with the communications installation, A. Graham & Co. also supplied the complex switchgear and controls for torpedo operations and submarine signalling. This was the firm that entered the First World War with enormous responsibilities at the very heart of naval on-board communications and controls, and it was through the complementary business of ship to ship and ship to shore communications that Edward Graham will have met Basil Binyon the founder and Managing Director of the Radio Communication Company, manufacturers of Polar and Polar-Blok radio transmitters, receivers and components for the marine market. The two men were to form a friendly association and the R.C.C. recommended Amplion Speakers as standard accessories for their receivers. (See my article on Basil Binyon and the R.C.C. in BVWS Bulletin Volume 23 No.3, Autumn 1998, with the Polar Twin on the cover)

With the end of the 1914/18 war the world of commercial opportunity was dramatically changed by two developments which have become fundamental to the world we know today. The motor car as a practical means of transport and the birth of public broadcasting. An Automobile Accessories Department was formed at Graham's and set about selling equipment that needed to withstand continuous vibrations and be waterproof in the driving rain. Such specifications which had been mastered at sea were now successfully manufactured at consumer market prices, and by the mid 1920s Alfred Graham & Co. had become one of the largest suppliers of horns and drive units for the electrical motor horn industry in the UK. Where public broadcasting was concerned the marketplace was the general public. This was very different to being a supplier to governments or the manufacturers of motor cars. A trademark that would fix the brand in the mind of the ordinary citizen was needed and Edward Graham came up with a winner as far as loudspeakers were concerned. The name Amplion was registered in 1920 and loudspeakers for the emerging domestic wireless business came to the market. To go with the new brand Edward Graham coined a phrase for the Company which today would no doubt be called a mission statement. It was *'In the interests of Better Radio Reproduction'*. For the first time the general public was able to buy a Graham product off the shelf. It was 35 years after Alfred had first demonstrated the first practical loudspeaking telephone, and his company had learned how to produce a quality product at a competitive price. By 1924 the sale of Amplion loudspeakers in the U.K. exceeded all other makes put together, an extraordinary achievement. A high point of international

Fig. 15: Amplion 'Delegate' Model HU 610, an AC/DC set made in 1947.
Fig. 16: The Graham Loudspeaking Telephone, 1893.
Fig. 17: The Alfred Graham Multiphone. Naval Loudspeaker and drive unit. Shown 1/6 actual size.

Fig. 14

Fig. 15

Fig. 16

Fig. 17

business and useful publicity occurred at the canonisation of St. Teresa at the Holy Year Ceremonies at St. Peter's in Rome at which 50,000 people from all corners of the globe attended. The following extract from *La Tribuna* of May 19th 1925 provides the flavour: *'Yesterday was really a historical day. The sanctification in St. Peter's will be remembered as a very special event by reason of the fact that the voice of the Pope has been heard strong, clear and marvellously close through the whole of the Basilica and as far as the vestibule.*

The immense crowd of the faithful, and especially those furthest, experienced a wonderful sensation when the great silence was animated in the most unexpected manner by the Vicar of Christ, which, during pontifical ceremonies and in view of the vastness of the Basilica, had up to present only reached the restricted circles of those nearest.

This was made possible by modern apparatus installed and operated by representatives of the firm of Graham of London. And a wonder it has really been.

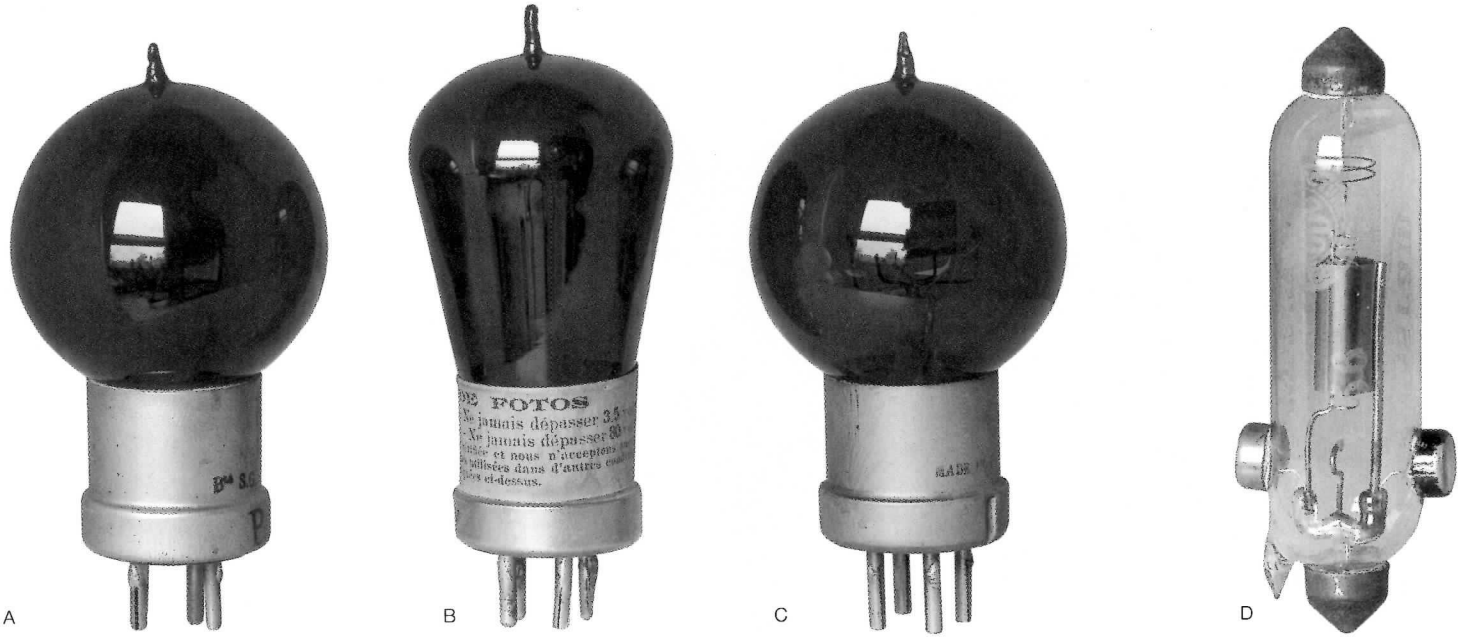
At first Amplion speakers were sold by Type No. under the umbrella of the Amplion brand name. Soon, however, various speakers were marketed with their own names, such as the Dragonfly, first shown at the All British Wireless Exhibition at the Albert Hall in 1924. The name Dragon was first used to denote the new C shape as a design, and therefore applied to the 'Dragon Range'. Its later use seems to have been restricted to certain sizes and is somewhat confusing. In 1925, six main sizes were offered ranging from the enormous Concert Grand wooden horn models, the AR 21-23 (Concert 19 inch bell mouth) through the AR 17-19 (Dragon) and AR 113-114 (New Amplion Junior), all with wood flare horns and descending in size. The AR 110-111 range was the all metal equivalent of the AR 113-114 whilst the tiny AR 101-102 (Dragonfly) range was usually in metal only. The original Junior and Junior-de-Luxe with straight horns and the various swan neck models such as the AR 15 were replaced with 'new' models in a uniform house style based on the 'C' shape. Retailers catalogues, however, continued to show the earlier swan neck AR 15 for some years.

This new range kept the well known Junior and the Junior-de-Luxe names but, interestingly, advertisements for the more serious end of the market often used the Type No. without a name to give it personality. For instance the AR 19, one size down from the Concert models, was the speaker of choice and was recommended by the R.C.C. to go alongside their larger 'Polar' cabinet sets. In addition to their production of own brands, Alfred Graham & Co. were a major supplier of drive units to speakers manufactured by other companies. The Art Andia range of papier maché and pottery loudspeakers such as the Chinese Scribe and the Parrot are perhaps the best known examples.

It is clear from contemporary descriptions of Alfred Graham & Co in the 1920s that the firm owed at least part of its success to an enlightened management with respect to the workforce. A contemporary article in 'Radio' published by Radio Intelligence, says that *'no one could visit the two factories without feeling conscious of the excellent atmosphere of general cheerfulness prevailing. Mere financial success cannot produce such a spirit of bon-camaraderie without the guiding influence of sympathetic human direction'*. In choosing his management team, Graham found like-minds whose main interest outside business was in the League of Nations and the English Speaking Union; two movements with the objectives of breaking down the prejudices of the past and dispelling the suspicions which lead to international misunderstanding and strife. But all this was no longer enough in a changing world. In the late 1920s rationalisation gripped the industry and mergers gave rise to vast international corporations in the telecommunications and electronics fields. In addition, the 1930s were the years that saw the successful combination of the mains set with integral cone speaker, which were increasingly made by specialised consumer market companies under methods of mass production. The habitat for smaller companies was under systematic destruction and extinction was in the air. Soon the Amplion name was only to be found on a limited range of radios plus a few accessories including valves of uncertain origin. One attractive line of mains sets in Art-Deco style was made for Kensitas in 1933/34 to be acquired via cigarette coupons, and in spite of this it seems to have been very well made from good quality bought in components. (See The *Kensitas Coupon Set*, a well-written and interesting article by Don Turner in BVWS Bulletin Volume 12 No. 2.) Much later in the 1950s, Alfred Graham & Co. was still alive and engaged in the manufacture of battery eliminators for portables and between 1959 and 1962 four transistor radios were produced (A226, A230, A236 and A253). However the best days for the company had been over for many years.

Triode Valves in

or 'Valves, and the Juice to give Them'



Photographs left to Right: A and C: French bright emitters Type TM (Télégraphie Militaire) made by Compagnie Général des Lampes (Métal). T.M. valve construction became the basis for the British 'R'. B: French 0.06 amp dull emitter Type 'Micro' made by E.C & A Grammont (Fotos) D: Marconi/Osram Type V24. This type of construction was designed to reduce capacitance between electrodes, and used generally in sets made by the Marconi Scientific Instrument Co. E: M-O-V Type DEV. F: M-O-V Type DEVC. G: Telefunken bright emitting triode Type ENV 171 made in 1917. H: Siemens & Halske early bright emitting triode type A made in 1917.

1 Introduction

The sub-title "Valves, and the Juice to give Them" was the title of an article that appeared in "Wireless World" for July 15th., 1922 by G.P. Kendall. He began *"The first thing that the purchaser of a valve wants to know is what voltage to apply to filament and plate. The experienced valve fancier, of course, obtains this information for himself by experiment..."* (author's italics). If the experienced went about "lighting" valves this way, what of the rest? Valve abuse was probably compounded by a mistake in Kendall's table (V_f = 6v for M-O 'R' type) which possibly brought about some rapid premature failures.

The objective of this text is therefore to assist today's collector to understand something of the physical basis behind the valve adjustments made by the early amateur users of broadcast radio receivers and to provide references to practices. An extensive set of references for further reading is given. Every attempt has been made to avoid using single references and generalising from them. Attempts have been made to present contrasting references and the author has not always been able to reconcile them, but he has emphasised the relevance of the references only where he has other knowledge suggesting it was right and proper to do so.

What became fairly clear when the research began was that for the home experimenter the valve and the circuit were not considered at the design stage as a unified entity. For many home experimenters, the emphasis used to be on 'circuits', tried empirically and valves tried in them equally empirically. Hence it was a matter of experimentally determining the best operating conditions through trial end error. Whilst good results may have resulted, problems abounded as evidenced by the "Readers Problems" and "Letters to the Editor" columns in early "Wireless World" issues.

The professionals took a very different approach; even as early as 1920 in "The Thermionic Vacuum Tube", Van der Bijl published enough theory to show that the valve and the circuit were capable of being designed as a single entity. Perhaps it was the variable nature of early valve characteristics, one batch to another, that dissuaded the amateur from a more rigorous approach to design. Possibly it was technical ignorance. Probably a little of both covering a spectrum of amateur skills.

The author has included little about dynamic characteristics as there was little evidence that there was much of an understanding about these in amateur circles, although by the end of the decade the matching of anode load and valve impedance was probably widely understood at popular level.

For readers who wish to know what the professional design engineers understood, the text books referenced in Appendix III and "Experimental Wireless" illustrate the differences in approach to that of amateur experimenters.

The listener of the early 1920's whether scientifically minded or not did not have it all that easy. Signal strengths were low and patchy, the listener was often obliged to coax the receiver into satisfactory reception of other than the local station. For today's collectors of radios the use of post-1930 valves in receivers designed in the '20s can give misleading ideas of the then contemporaneous performance, either all but untamable, or at best unusually sensitive. Changing from modern valves to early valves, as the latter are acquired, can give initially disappointing results until the performance limitations are better understood.

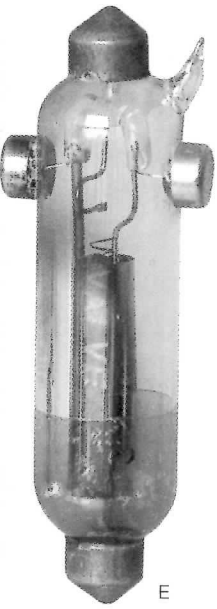
The pace of valve development was such that the guidance in this text ought to relate to production batches in each year. This is impossible, and the accurate data which existed in factory valve standardisation notices is likely to have been destroyed decades ago. In the broadest terms, valves made after 1926 were sufficiently similar one sample to another and were sufficiently good in an absolute sense that some of the excesses of critical adjustment referred to in this text were no longer necessary. But old practices had a habit of dying hard even when improvements in technology had rendered such practices unnecessary.

Any text with many references looks 'scholarly' and suggests superior knowledge. This text is not like that. Mistakes are bound to exist, especially in dates when concepts were understood. The research is possibly incomplete and there may even be errors of technical fact although the number of proof readers should have eliminated most. However, the text is assuredly more right than wrong and much more likely to help than mislead. It would be welcomed if readers can offer other additional substantiated evidence of the old practices.

Radio Receivers

1922 to 1930 part 1

by Ian MacWhirter. Valves supplied by David Read. Photography by Mark Groep



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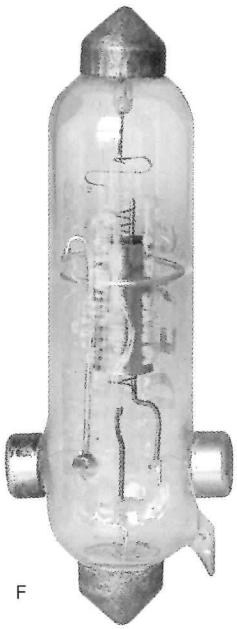

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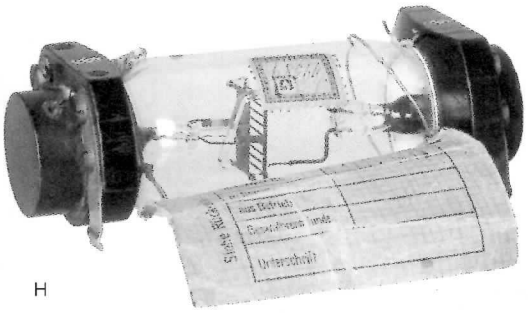

H

TRIODE VALVES IN RADIO RECEIVERS 1922 TO 1930

2 Basic Characteristics

Electrons are evaporated from an incandescent filament in quantities depending upon the surface coating of the filament and in non-linear proportion to filament voltage V_f. In normal operation, a cloud of electrons surrounds the filament forming a dense "space charge" from which the anode can draw space current.

Figure 1 shows the oxide coated filament to be, comparatively, a prolific emitter and that the least variation in emission for a given change in temperature strongly favours this class of filament. (Ref. 1)

The control by the grid over the anode current I_a is shown in Figure 2 (Ref. 2). This is usually called the mutual characteristic. The graph shows appreciable positive grid current I_g for a hard vacuum tungsten filament valve such as the French WW1 army 'S' type or the early broadcast 'R' type, even when the grid is slightly negative with respect to the mean filament potential.

Whereas the slope of the I_a/V_g curve is determined to a large extent by the electrode dimensions and the voltages applied, the I_g/V_g curve and with particular reference to the onset of grid current is dependent upon the metals used for the filament and grid electrodes, usually referred to as the effect of "contact potential" analagous to a simple primary cell.

A valve with an oxide coated filament has characteristic curves as shown in Figure 3 (Ref. 3). This shows that, with an oxide coated filament, grid current does not flow until V_g is positive with respect to negative filament potential. This, and that I_g varies inversely with V_a, are important points to remember when adjusting leaky grid detectors. This is particularly true if a modern oxide coated filament valve is used in a leaky grid detector stage originally designed for a tungsten filament valve.

Figure 3 was selected to show the grid current characteristic clearly; it might be pointed out that, aside from leaky grid detection, oxide coated valves are not normally biassed positively.

In the case of valves which are slightly soft (low vacuum), the grid current is generally negative in the vicinity of zero grid voltage.

The I_a/V_g curve is also controlled by V_f, see Figure 4 (Ref. 4). Figure 3 also shows that an inadequately high anode voltage fails to draw

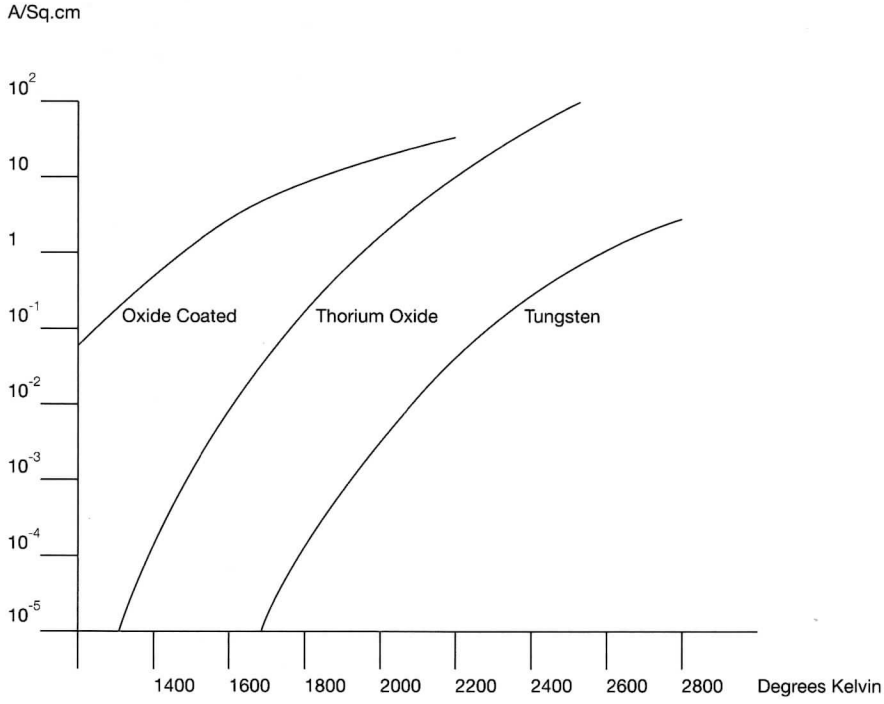

Fig. 1

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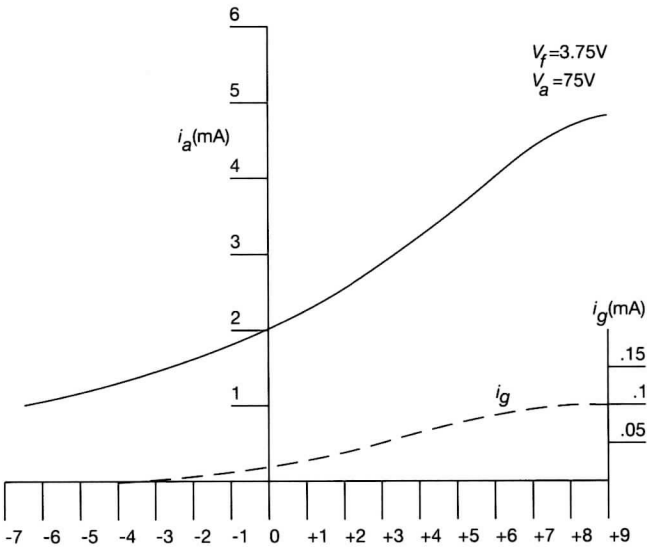

Fig. 2

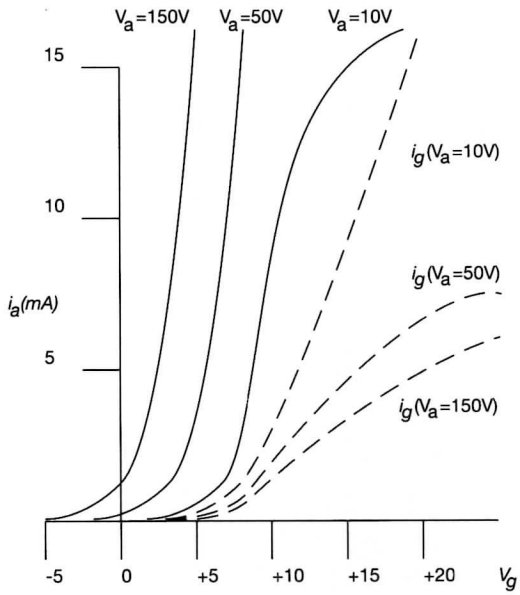

Fig. 3

the maximum current, i.e., it fails to draw all it could from the space charge. Figure 4 illustrates a different effect, that an inadequately heated filament fails to deliver its maximum emission and the space charge is destroyed causing a saturation in emission. Both show how the length of the straight part of the mutual characteristic, so important for final LF stages where the grid swing may be large, can be improved.

The principal valve parameters μ and ra (voltage amplification factor and anode impedance) are functions of I_a and V_a. Lessons may be learned from their characteristics as shown in Figure 5 (Ref. 5) which are those of the M-O DER, but the general shapes are typical for a wide variety of triode valves.

Increasing V_a above the manufacturers' rating in order to secure a higher μ is dangerous, the use of too high a V_a increasing any ion current and leading to premature valve failure by ionic bombardment of the filament.

A set of generalized mutual characteristics is shown in Figure 6 which illustrate the effect of variations in V_a, V_g and V_f. In the early days of broadcasting, inconstant characteristics of valve samples one to another were said to be such that new valves had sometimes to be checked in circuits (Ref. 17). One 1923 recommendation was to try a set of the same type valves in different stages which sometimes effected an improvement. (Ref. 18).

3. Soft Valves - intended and otherwise

Soft valves, that is those that were manufactured to be of low vacuum, were popular in the pre-broadcasting period, but fell progressively into disuse thereafter. Their characteristics are comparatively scantily documented, one such is Ref. 6.

Soft valves show negative grid current until the grid moves positive; and Ia rises to a maximum at around zero grid bias before falling with further increase in positive grid potential. These valves were used as detectors and were biassed in the region of the Ia inversion so that both positive and negative half cycles of the applied radio frequency signal combined to reduce the mean value of I_a. That is the current that operates telephones and this was one reason for their apparently high sensitivity as detectors. (Ref. 6a). The adjustments of HT, grid and filament voltages were critical (Ref. 87) and the ionic bombardment of the filament continually changed the valve characteristics. (Ref. 6b)

The early Round valves were used in Marconi receiver designs as hf amplifiers with a crystal detector. This valve was also found to be superior to the high vacuum World War I French valve in the then popular double magnification or reflex circuits. (Ref. 6c).

Some valves which were designed to have a hard vacuum may now found to be marginally soft, as evidenced by traces of reverse grid current at zero bias, were possibly always soft—probably on account of the getter having been fired too early. But one 1929 report claims that such valves harden slightly after some 15 to 20 minutes use. (Ref. 59). The presence of a good shining getter on the inside of the bulb provides no certainty whatsoever of a good vacuum; the magnesium getter used up to about 1940 became 'blocked' once it had landed on the bulb. This was a principal reason for the replacement of magnesium by barium for getters, the latter continuing to combine with residual gas. As far as the author knows, the barium getter first appeared in W.W. II valves of U.S. origin, but could have been developed much earlier. It might be added that valves of the 1925 period which appear today with slightly 'milky' getters may well be very hard and the recollections of those who used valves at that time suggests they were made that way if the getter was fired too early.

4. Factors Affecting Life

4.1 Bright Emitters

Filament temperature was adjusted to be high enough to achieve a mutual characteristic appropriate to the required valve function and from that followed the valve life and battery recharging intervals.

To give enough emission for a satisfactory mutual characteristic to be achieved, the filament temperature was normally set between 2400° and 2500°K (Ref. 11). Although well below the melting point of tungsten (3540°K), there was a steady evaporation of tungsten from the filament to cooler parts of the electrodes including the bulb. One 1925 report explained that at sustained high temperatures the grain size of the tungsten filament became larger, causing an increase in brittleness and even flaking of the filament. The effect was retarded by the introduction of a trace of thoria in the filament metal. (Ref. 12). The evaporisation occurred least rapidly where the filament was coolest, adjacent to its supports. Evaporisation resulted in an increase in filament resistance. Since emission was a function of temperature (Figure 1) and temperature a function of current, it would be necessary to increase the applied voltage across the filament during life to maintain the mutual characteristic. According to James, this was offset to some extent by a physical effect which tended to maintain emission at lower temperature the longer the filament was used (Refs. 13 & 13a). James' experimental evidence showed that the filament life was halved or doubled with a ±5% variation about the recommended filament voltage, but only a ±3% variation in rated current.

Period recommendations of 1924 were very clear e.g., "to ensure the maximum possible life when working with valves fitted with tungsten filaments, always remember on no account to exceed the rated filament voltage and always operate the tube with as low a filament current as possible consistent with satisfactory signals". (Ref. 14).

Small receiving valves of the early bright emitter (tungsten wire filament) kind were characterised by reports of lives a little as a few hundred hours. (Refs. 8 &9). One reference to the "early days of broadcasting" made in 1927 alleged as little as 6 months "with luck" and one year as "exceptional". (Ref. 10). One 1924 reference points to a filament life of only a fortnight if the valve was over-run at 6 volts (Ref. 15). Even worse was a reference to 1913 valves which were said to have had such poor vacua that not only was operation inconsistent, but the valves lasted a few hours only (Ref. 15). As always, there were exceptions, an Ediswan 'AR' being reported to have lasted 6,500 hours. (Ref X1).

Conflicting reports about the life of early valves caused by vacuum deficiency and filament design make it difficult to write today with any real authority. There is no question but that Van der Bijl, using theoretically

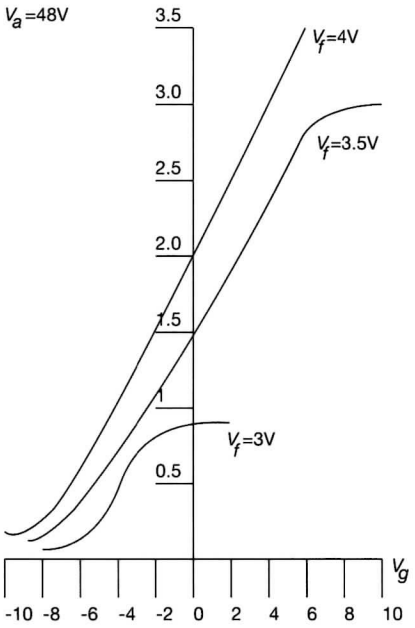

Fig. 4

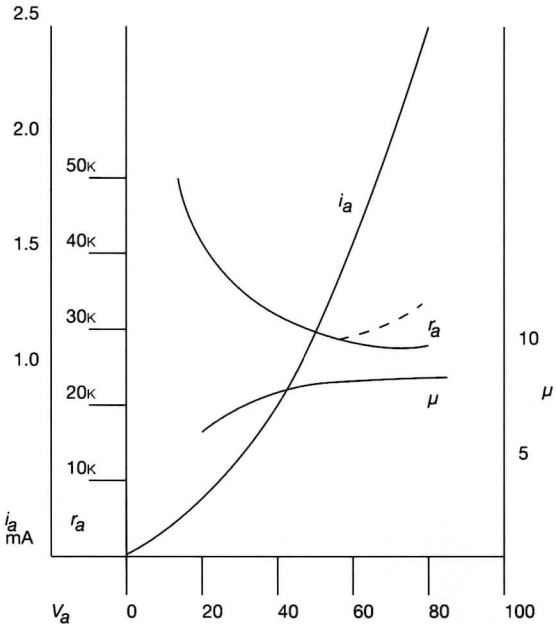

Fig. 5

based design changes combined with high quality production standards for telephone repeater valves, brought major improvements in filament life. (Ref. 15b). The last word (to date) goes to Dr. D. Thackeray who has pointed out to the author the order of magnitude difference in vacuum between laboratory made devices and commercial production of the early days. (Ref. 15c).

Some advice to the amateur gave the choice of performance or life, especially where filaments had become thin by evaporation, "the output of the valve may be maintained by increasing the filament voltage as the filament becomes old, but if long life of the valve is desired, the applied potential should be held constant, and the output allowed to fall off". (Ref. 19).

Again, this time supporting the need to maintain performance, "when the valve is old a little over 4 volts is required, and in order to provide this voltage and also to allow the for voltage drop in the wiring and filament resistance, it is necessary that the filament supply should be 6 volts". (Ref. 20).

How the average amateur was supposed to know that performance was failing on account of filament evaporation rather than through failing batteries or bad contacts is not recorded and one can but guess that filaments were sometimes given an over voltage quite unnecessarily.

The emission current loading on filaments was non-uniform along its length on account of both temperature variation (cooler at the filament supports) and the potential gradient which acted as bias, see section 6.1, Figure 8. Such was the concern over life that one 1922 suggestion was to reverse the filament current which *"will naturally increase the life of a valve"* - authors italics - (Ref. 21a) and a further recommendation in 1924 to reverse the filament current "every month or two" in an attempt to equalize the loading. The later reference is unclear whether the recommendation was for all filament constructions, but it is likely it would have been of greater benefit for thoriated filaments. (Ref. 21). All too typically of this kind of advice, the practice was deprecated by another 'expert' in 1925. (Ref. 21b). The advice may have originated from amateur transmitters where the effect of higher anode currents would have resulted in additional heating of the negative side of the filament.

Filament evaporation was also aggravated by ionic bombardment caused by inadequate vacuum. Early bright emitter valves of the French S or Army R types had no internal getter to improve upon the vacuum attainable by the then pumps. Early broadcasting R type bright valves of the magnesium gettered kind were reported by Risdon in 1922 to have vacua in the range 10.4 to 10.6 mm Hg (Ref. 22), but Fleming reported in 1924 that the vacua were not softer than 10.5 mm Hg (Ref. 23). By the end of the decade manufacturing techniques allowed a vacuum in the region of 10.7 mm Hg. Any traces of gas would result in excessive ion production and bombardment of the filament. Hence life for such valves would be improved with low values of V_a to reduce the velocity of the positively charged ions which bombarded the filament. Provided the space charge was not fully depleted, this would also have some retarding effect upon ions.

Finally, the filament life was curtailed by current surges and it was recommended that V_f should be increased gradually to reduce the risk of crystalline change in the filaments and equally importantly upon switch off. The ratio of filament current from cold to hot upon a sudden switch on to rated voltage was typically 8:1 i.e., typically an instantaneous 5 Amperes or so.

It was customary to fit a series rheostat in filament circuits, mainly to control filament temperature—hence the emission—within safe limits and as a means of setting the valve on a suitable part of the mutual characteristic, with compensation as necessary for falling accumulator voltage during discharge. Other uses of the rheostat were to provide some negative bias, to minimise accumulator drain and to enable gradual change of filamant temperature at switch on and switch off. All this was good, but the filament rheostat was full of danger for the unwary.

It was also customary to use 6 volt accumulators with 4 volt rated bright emitter valves, mainly to ensure that 4 volts could be delivered to the filament pins after the voltage losses along connecting leads, indifferent switch and valve holder contacts etc This also allowed an over-voltage to be applied as the valve aged (by filament evaporation) and provided grid bias across the dropping resistance. (Ref. 20). The use of 6 volt accumulators with 4 volt valves was used as early as 1920 designs fitted with Fleming diode rectifiers. (Ref. 25). One 1924 reference refers to the frequent short life of 4 volt bright valves used with 6 volt accumulators and implied this was a reason for the introduction of the 5 volt bright valve e.g. M-O R5V. (Ref. 26).

One 1919 text book in referring to World War I army practice showed that the type R (receiving) valve could be run with 6 volts on the filament and with 100 volts on the anode with substantially improved performance for low power transmitters. (Ref. 27). But the extra heat dissipated at the anode could raise its temperature sufficiently to release occluded gas, depending upon how high the valve maker had raised the anode temperature during pumping. The effect would be to tend to make the valve progressively soft. (Ref. 28).

The emission characteristics of all the competing types were said in 1924 to be similar, possibly in part due to their origin in a single Government specification for World War I use. (Ref. 29).

New types of bright emitters appeared on the market, long after the appearance of dull emitters - probably because they were so much cheaper to produce. Examples include the Mullard 'Master' red and green types, with impedances suited to h.f. and l.f. work respectively, in late 1924. The Cosmos A45 bright valve appeared in 1925. The new Mullard valves in 1924 were introduced using bottom pinch exhausts.

4.2 Dull Emitters

By dull emitters are meant valves fitted with thoria (Thorium Oxide) doped tungsten filaments which were activated to present an emitting surface of pure thorium. The layer was exceedingly thin and opinion is that it was mono-molecular. Visually the valves were far from dull and gave a moderately visible orange glow.

The filament diameters, certainly those of the early specimens, were comparable with those of bright emitters, the M-O DER filament was 2.3 x 10^{-3} ins. in diameter and the M-O DE3 was 0.7 x 10^{-3} ins. (Ref. 30). The filaments were heated to around only 1850°K since for the same electron emission,

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The Loewe 3NF and Receiver OE 3

By David Read, photography by Mark Groep

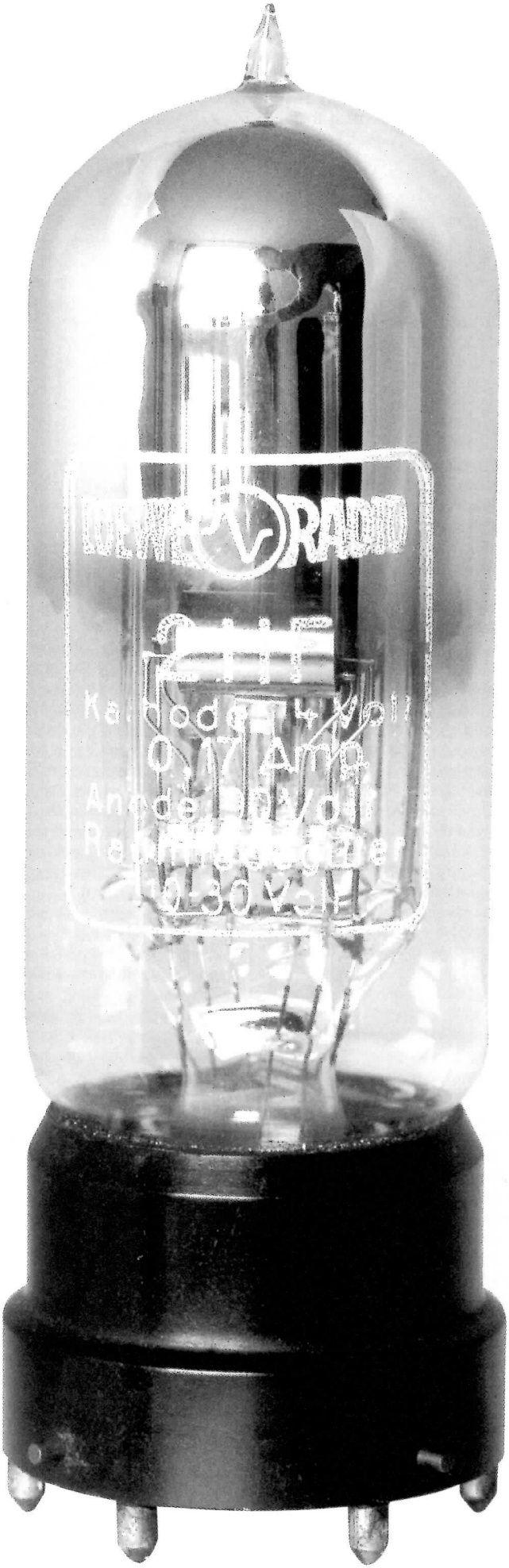

Fig 1

Ian MacWhirter's article on triodes in this issue provides a good excuse to revisit the Loewe 3NF and a couple of matters related to other multiple valves. The 3NF is an unrivalled example of virtuoso glass blowing combined with vacuum tube technology. It was the worlds first - albeit rather large - integrated circuit, consisting of three discrete triodes each with its own cathode (filament), grid and anode, complete with RC coupling components, all within one glass envelope. All you had to do was provide a coil and tuning condenser and you had a complete radio. Unique, and remarkable to behold it was exhibited at the Berlin Wireless Exhibition of September 1926 together with the OE333 receiver that was made for it. Loewe also introduced the 2HF at the same exhibition consisting of two bigrid stages of RF amplification for their 2 valve set which was also exhibited. These innovations apparently stole the show, but according to Tony Constable who described the valves and receivers in the first BVWS Bulletin Volume 1 No.1, Loewe, who had replaced their conventional triodes with these revolutionary valves, were disappointed that they made little impact apart from their novelty. Today these sets and valves are very rare indeed.

333 and some other Multiple Valves

Fig 2

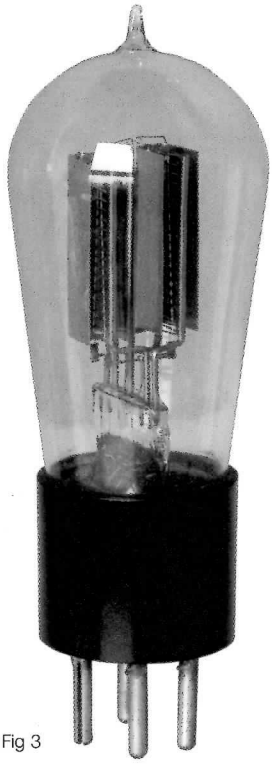
Fig 3


Fig 4


Fig 5

Fig 1: Loewe 2HF double triode with bigrids forming two integrated HF stages
Figs. 2:& 3: Double triode dull emitters made by TKD.
Fig. 4:anonymous twin filament dull emitting triode
Fig. 5: Anonymous bigrid bright emitter

Extreme rarity of the OE 333 combined with its simplicity and high value brought about a sad and inevitable result; at one period in the earlier days of the BVWS a number of fakes of the one valve set were circulating in the U.K. In 1983 five sets were taken to a Harpenden meeting for the purpose of comparing small detail differences of the sort that might arise in different production runs. Under the careful eye of Tony Constable it emerged that two of these were fakes. As a foreign set, probably reproduced on the Continent, it was difficult for experienced dealers and collectors in the U.K. to spot the difference, and one can only imagine the feelings of the buyers who had been stung. For BVWS members who might have acquired this set since 1983 and anyone who gets a buying opportunity it is worth while to repeat here the lessons learned: look out for case corners which should have tongued and grooved joints rather than simple butted corners; the coil holder should be a casting and not fabricated by other means; the original tuning condenser should be aluminium and mica dialectric; and finally make sure that the terminals are nickel plated rather than varnished or chromed brass. The valves themselves are of course far from simple and it is hard to imagine a fake 3NF or 2 HF. Tony Constables' article and early correspondence refered to the 2 HF as containing two tetrodes within the envelope and indeed both Gerald Tyne's and John Stokes' books on valves described them as such. In fact the presence of two grids misled the writers and the valves are actually bigrids of the sort that were around at the time. This question was nailed by Pat Leggatt who was the owner of a Loewe receiver using both the 2HF and the 3NF valves. By careful examination of the electrode structure he was able to show that the RF signal is applied to the second (outer) grid whilst the first (inner) grid is taken to the +22 volt supply proving that the valve is indeed a space charge bigrid, and that Loewe however did not precede Captain Round in the development of the S625 screen grid tetrode.

Loewe might indeed have been disappointed at the lack of commercial success associated with these valves but Stokes pointed out in the correspondence columns of the BVWS Bulletin that they went on to produce many different types of multiple valves with indirectly heated cathodes including such extraordinary ones as a three-in-one RF pentode, a triode detector, and an output pentode together with many of the interstage components all inside the same envelope. English collectors will also be familiar with the multiple valves produced by the German company T.K.D. (TeKaDe) although they did not attempt to incorporate interstage components as well.

Whilst in Europe it was the Germans who specialised in multiple valves, a couple of strange ventures in England deserve mention. The first by Edison Swan was the ONE-DER receiver made to exploit the ES 220 double triode made by the Ediswan valve company. I happen to have a ONE-DER which I found long ago at Harpenden in a distressed condition as well as without coils and the crucial double triode valve. One can make coils but the ES 220 was never listed and cannot be found, so in order to make the set work I decided to use a TeKaDe VT 126 double triode made in about 1927. This involved making a valve adapter so that the connections to the T.K.D. double triode suited the ONE-DER set, but that was good fun and it worked rather well. Any members interested in the ONE-DER should read the articles by Tony Constable in Bulletin Volume 5 No. 4 and Volume 10 No. 4. By the time of his second article he had acquired an instruction booklet which contained the inscrutable sentence, *'It must be understood that this valve is primarily designed as a single valve loudspeaker receiver, and it is in no sense a Wireless Set'*. The second contender for the strangest multiple valve made in England was the 'Four In One' made by the Quadruple Valve Co. of Northampton. The large pip topped vacuum tube containing four triodes was mounted on a twelve pin base. Should anyone be able to enlighten me as to pin connections or indeed anything about this valve or its maker I should be most grateful to hear from you.

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Fig 6

Fig 7

Fig 8

Fig 11

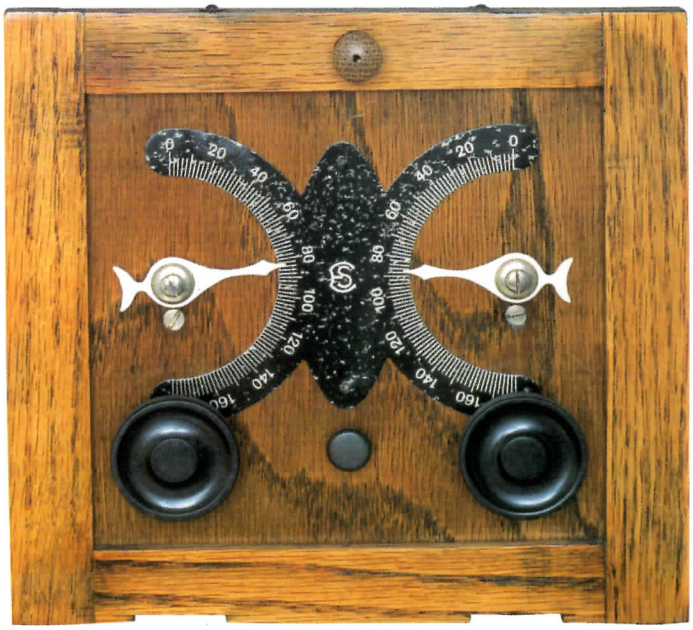


Fig 12

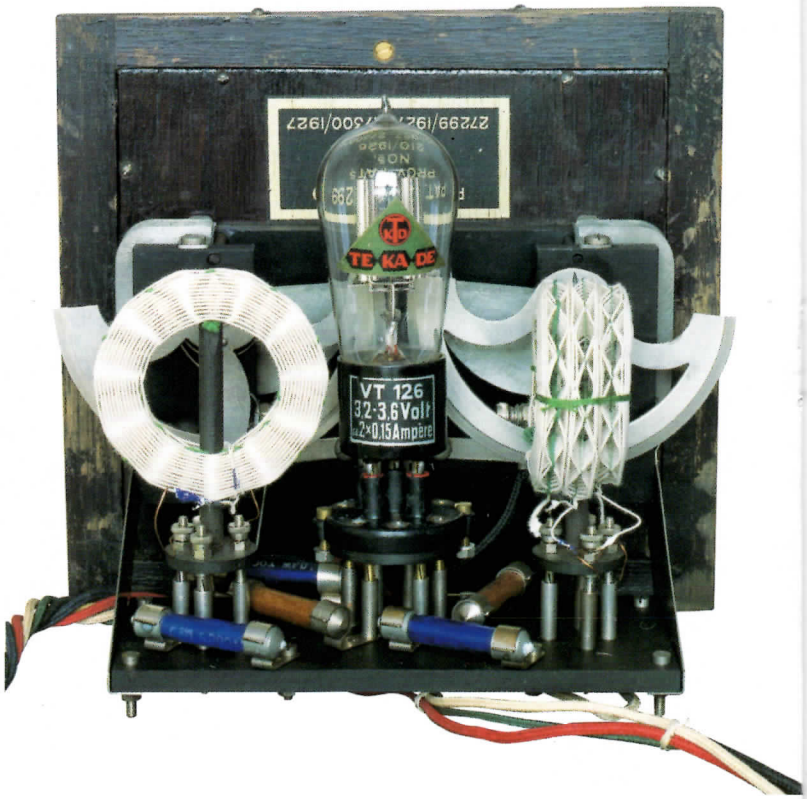


Fig 9

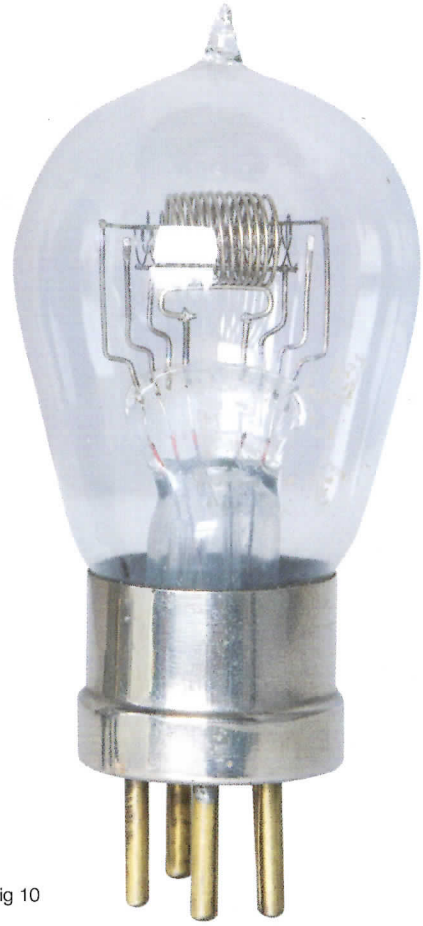
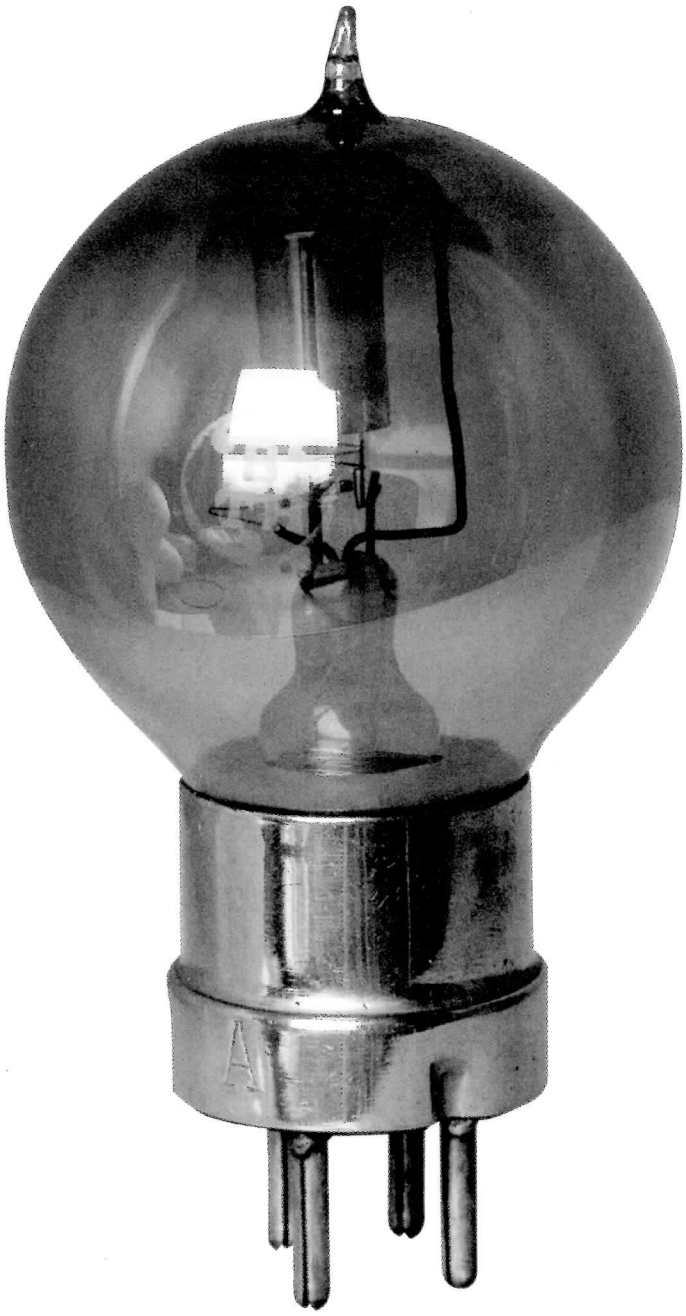
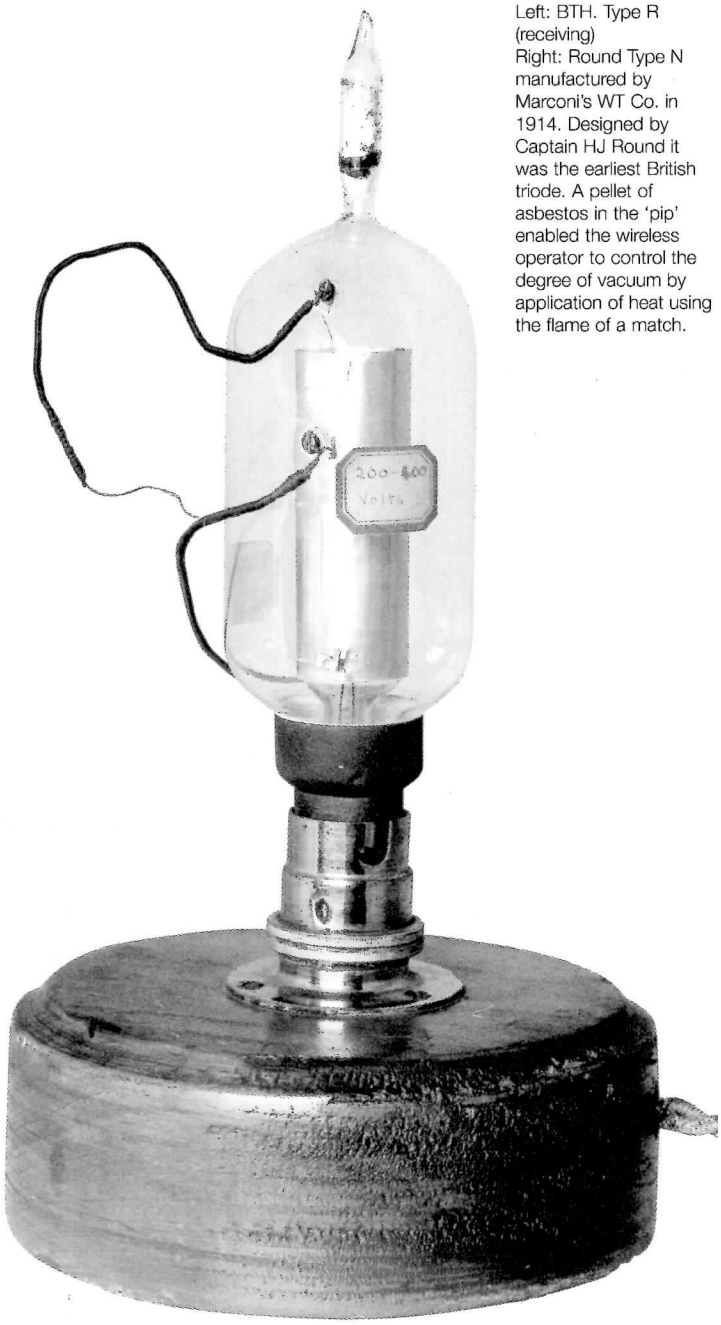


Fig 10

Fig. 6: The 'Four-In-One' a rarity made by the quadruple valve Co. in Northampton, England.
Fig. 7: Triotron TS4 dull emitter. 3.5 volts - 0.2 amp.
Fig. 8: Triotron TS 0.06 dull emitter. 3,5 volts - 0.06 amp.
Fig. 9: The Nelson Multi, a dull emitter with 3 switchable filaments enabling 'power operation' or single filament use with 'spares'.
Fig. 10: Thorpe K4, a bright emitter bigrid for 'Unidyne' operation.
Fig. 11: Ediswan ONE-DER front panel. A set exploiting two valves in one.
Fig. 12: ONE-DER chassis showing the VT 126 double triode and the home-made adaptor to enable its use.
Fig. 13: Loewe OE 333 reciver with 3NF triple triode enabling loudspeaker operation. Shown with contemporary moving iron transparent diaphragm speaker.

Fig 13





Left: BTH. Type R (receiving)
Right: Round Type N manufactured by Marconi's WT Co. in 1914. Designed by Captain HJ Round it was the earliest British triode. A pellet of asbestos in the 'pip' enabled the wireless operator to control the degree of vacuum by application of heat using the flame of a match.

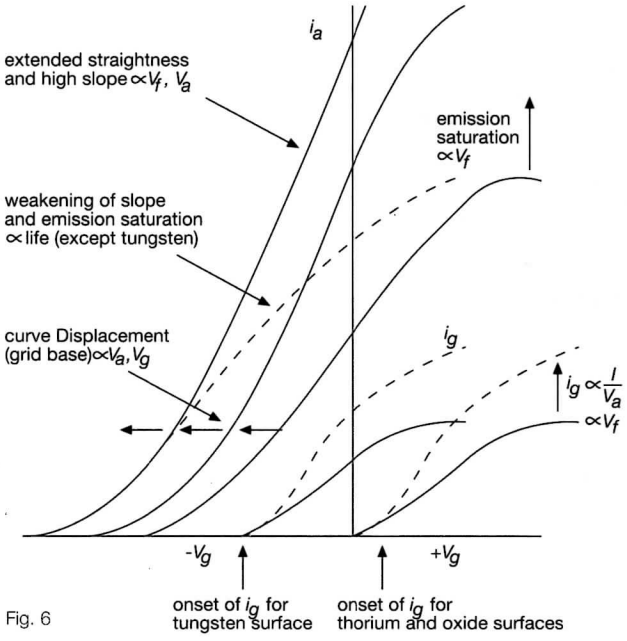


Fig. 6

thorium could be run about 600°K cooler than tungsten.

Filament evaporation below 2400°K is comparatively slow, but rises rapidly at higher temperatures, hence dull emitters had the potential to last longer (Ref. 31). Life predictions of over 1000 hours were made in 1923 and 1924 (Refs. 33, 34) with user reports over large sample batches of lives over twice that of bright emitter valves.

There is some indication that the early dull emitters did not always win reputations for longevity: Wireless World in 1926 saying that early dull emitters "....losing their emission rapidly in spite of the utmost care being taken with them". (Ref. 65) This criticism was unlikely to have been merely thorium surface depletion that could have been replaced by further ageing, in view of their praise for then contemporaneous types. Again, Wireless World in 1925 said that over 50% of the 60mA class of dull emitters had short lives through abuse by overrunning of the filament. (Ref. 65a).

Rheostat filament control was carried over to dull emitter valves, and recommendations for keeping filament voltage V_f as low as was adequate for satisfactory operation were given and for much the same reasons as for bright valves. For example, for the BTH B5 valve, the maker's instructions in 1925 read "the filament voltage of 2.8 volts is the maximum voltage at which the filament should be worked if a long life is expected. Switch on the filament with the resistance all in and always maintain the lowest filament current which will give good results".

Dull emitters would have shown current surges of between 4.5:1 and 2.2:1, depending upon type, had the filament been switched on to rated voltage from cold.

In the broadest of terms, the considerations given to life expectancy of bright valves applies to dull emitters. Operationally, the differing filament surface created a different contact potential and caused the onset of grid current to occur with a more positive value of V_g. Hence the valves were not necessarily used quite in the same way.

By early 1924 the valve types additional to the bright valve numbered three: two of these used thoria doped filaments (Ref. 35) and the third used oxide coated filaments.

The first of the doped filament valves were built around bright emitter electrode construction. This group took a high filament current, but at much lower voltages than their bright counterparts. Examples include the M-O LT1 (later released as the DER), Mullard LF ORA (If 0.4A, Vf 1.8V), Ediswan ARDE (If 0.25A, Vf 1.5 to 1.8V). This first group, like the bright valves, had to be supplied by secondary cells for V_f in order to secure the necessary high current. The 2 volt versions of the thoria doped filament were never as easy to make as the 6 volt versions (Ref. 36); not the least reason being the necessity to aim for as high a total emission from a shorter filament length.

Possibly the most famous of the 5/6 volt class was the U.S. UV201A which greatly influenced the design of the BTH type B4 first marketed in 1923. M-O followed with the DE5 which was substantially similar. These power valves were very expensive, approximately 3 times the cost of a standard bright emitter and the M-O type L.S.5 introduced in 1922 cost even more. It is the author's conjecture that many amateurs could not afford these and forced the type R to operate loudspeakers. The BTH B4 was arguably the first power valve in common use for those who wanted audio output of tolerable quality. It was rated by contemporaries as the most important advance of 1923, although the 0.06A class and "WECOVALVE" with an oxide coated strip filament secured far more publicity. (Ref. 37).

The first group of high current dull emitter valves required secondary cells for filament lighting. Not all would-be receiver users had easy access to battery charging stations and their demand was met by designing a filament which could be powered by a high capacity primary cell, usually of the dry Leclanché kind. This second group of dull emitter valves with reduced filament current included the M-O DEV and DEQ (If 0.18A, Vf 3V), M-O DE3, BTH B5, Ediswan AR-06 and Mullard DF ORA (all at If 0.06A, Vf 2.5 to 2.8V). This type of filament manufacture was enabled only after a change to eddy current heating of the anode and grid during the evacuation process. (Ref. 32).

For the filament supply to the 60mA class, the 3 volt source of two cells in series was frequently augmented by a third cell brought into circuit after it was judged the first pair had fallen below 2 volts. Volt meters were not in widespread use by amateurs, and the timing of the third cell addition must have been rather hit and miss. (Ref. 32a).

The 60mA class survived for a very few years and two 1927 references comment upon their obsolescence on account of the fragility of the filament, the ease of over-running and permanently spoiling the emission when used with 3 dry cells or with a 4 volt accumulator, excessive microphony, but in particular because the 2 volt 0.1A and 0.075A oxide coated valves were becoming so very much better with lower anode impedance r_a and higher voltage amplification factor μ. (Refs. 38, 39).

The 60mA class were microphonic. A tungsten filament is very elastic and remains so when hot at dull emitter temperatures. The very thin 60mA filaments could, therefore, vibrate excessively. It is worth noting that above a critical temperature which is below the bright emitter temperatures, tungsten becomes very rigid and this probably explains the non-microphonic characteristic of bright valves. (Ref. 30).

The doping, in which about 2% thorium oxide was added to the tungsten powder prior to sintering (the making of the metallic filament), Ref. 30a, was sufficient to ensure enough thoria migration to the filament surface for a long life, provided that filament voltage V_f was maintained at or near the recommended value. The mechanism by which thorium diffused through the tungsten substrate at just the right speed was automatically controlled by a surface tension effect. (Ref. 49). Lives of up to 3600 hours and still operating satisfactorily were reported (Ref. 40), but this is suspected to be higher than the average. Both excessive and insufficient filament voltage would deplete the surface thorium resulting in a short life due to failing emission. However, it was widely reported that it was not essential to run V_f as high as its published value to maintain emission and subsequential emission weakening could generally be corrected (Ref. 41). Excessive voltages, however, caused irreversible damage. Conflicting advice can, as ever, be found to suggest that the filament of thoriated tungsten valves lasted best by running them at the highest rating given by the makers, (Ref. 42, 43).

After weakening of emission, it was sometimes found to be possible to re-activate the filament emission with simple techniques which simulated the manufacturers activation process (Refs. 44, 45, 46). A less violent procedure was to run the filament at rated voltage for between 0.5 and 3 hours with no other electrode voltages (Ref. 47). Any of these processes worked by allowing a space charge to build up and allowed time for the surface to be reactivated by diffusion. The process could usually be repeated many times before the thoria supply became exhausted, after that the valve could then be run as a 'brighter' valve for a few hours before filament evaporation led to fracture. (Ref. 48).

The life superiority of the thoria doped filament invites the question why the tungsten bright emitter valve existed until around 1926, especially as the first British dull emitter was marketed in March 1921. After all, thorium doping was developed for the very early lamp bulb manufacturers to give some resistance to early filament crystallisation leading to fracture, especially upon switch off.

The problem appeared to centre upon developing manufacturing techniques to stabilise the enhanced emission that thorium gave. (Ref. 51). Another factor was the realisation of a sufficiently high vacuum. One report points out that thorium has a great affinity for electro-negative gases which would destroy the filament surface. (Ref. 52). Indeed, transmitting valves with thorium doped filaments were not developed because of the ion risk from the anode at high voltage. R & D recovery and higher manufacturing cost is probably the reason for the ratio of prices of dull to bright valves to be around 6.7:1 in 1922 reducing to around 1.8:1 in 1927. As E.Y. Robinson put it "filament manufacture was very much an experimental science". (Ref. 36).

The purchase cost advantage of a bright emitter was lessened by the cost of frequent re-charging of accumulators. The cost disadvantage of dull emitters was exacerbated by the higher rate of sulphating that was said to arise from the use of older style accumulators with dull emitters; these did not receive regular enough charging. Chloride had introduced their type HZ accumulator in 1923 to overcome this problem. (Ref 36a). As late as 1926 'Oldham' were still exploiting this with their new slow discharge accumulator (Ref. 64).

4.3 Oxide Coated Valves

Valves with the most advanced filament construction of all, had a ribbon of Nickel, Platinum or Molybdenum base coated prior to activation with oxides and carbonates. Normal operating temperature lay between 1100°K and 1200°K and in some cases below 1000°K. The superior emission properties of the coated class is shown in Figure 1. However, filament design was very much an experimental science and yearly progress resulted in gradual reduction in necessary operating temperature.

This coated class provided in time the basic method for structuring all valve filaments and indirectly heated cathodes and continues to this day in cathode ray tubes. Yet at the time the supporters of the thorium doped filament claimed their filament to make for a better valve. (Ref. 49). Marconi-Osram made a remarkable about-face in the years from 1925 (Ref. 53) to 1929 (Ref. 54). Despite the copious emitting properties of an oxide coated filament being known in 1906 by de Forest, the production problems remained insuperable for all but Met-Vick and Cossor in the days prior to 1924, although it is guessed that the M-O delay may have been due to their even earlier commitment to the thoria doped filament. E.Y. Robinson said scathingly of M-O that they had "backed the wrong horse". (Ref. 36).

Examples of the earliest British manufactured oxide coated valves include the Cossor WUNCELL (1923), the Met-Vick (formerly the British Westinghouse Co.) type DE11 (1924) modelled upon the U.S. Westinghouse WD11 which was available in 1923 and the Mullard WECO valve (1924), modelled upon the US Western Electric type 215A.

The life of the oxide coated filament was longer than the earlier dull emitters: for example, Mullard claimed 4000 hours for the WECO valve. However, the thin coating on the filament could easily be permanently damaged either by running at an excessive temperature or at too low a temperature combined with an anode voltage high enough to saturate the space charge. (Ref. 55).

The shortening of life from this cause was even more marked in the oxide coated indirectly heated valve. Unfortunately the physical reason is not known, several valve designers offering a number of reasons to the writer of which none are really satisfactory. It is probably connected with the electrostatic field of the anode reaching the

continued on next page

emitting surface when the anode current has exhausted the protective space charge. The lack of adequate space charge would provide inadequate protection against positive ions bombarding the filament (Ref. 56). It was known as early as 1920 that these ions would cause excessive local heating of the filament, possibly resulting in surface disintegration, but the reported result was that the local heating resulted in an excess of electron emission, and without a space charge to limit the anode current the valve would suffer from an effective thermal runaway. (Ref. 57).

Yet despite the caution of later years to maintain a good (saturated) space charge, Mullard in 1927/28 recommended the dimming of even the PM2 and PM6 oxide coated filament power valves as a means to reduce gain. (Ref. 58). Mullard had ceased this recommendation for the 1930 PM2 production, possibly because filament dimming had become an almost archaic practice. Even more surprisingly Mullard in 1926 recommended for the PM2 "lower (filament) voltages (than 1.8V) give a corresponding longer life!".

As Figure 1 suggests, given a low enough operating filament temperature, variations in filament voltage V_f caused by ageing filament batteries do not significantly change the emission of a valve in good condition. This benefit was compounded with the copious emission of the oxide coated filament which created a space charge substantially in excess of that needed by any operational anode voltage V_a, hence any small variation in applied filament voltage would be less likely to reduce the operating anode current I_a. (Ref. 60).

4.4 Carbonised Filament Valves

Some M-O valves in the early to mid 1920s were built around a carbonised filament. Examples include the DEV (but not the DEQ) and LS5. The author knows little about any special characteristic directly attributable to the filament e.g., contact potential.

4.5 The Filament Rheostat and Filament Voltage

The author has heard people dating sets from the presence of rheostats and, like "pip tops", they seem to be regarded as an indication of an "early" set and necessary if the set is to be seen as authentically old. Whilst they served a necessary purpose in the adjustment of sets with early valves of indifferent performance and different from one sample to another, they were probably the cause of many premature valve failures due to over running the filament.

Reyner in 1926 argued that variable filament resistances were not necessary with dull emitters, their repeatability of performance being so much better than that of bright valves. To avoid the comparative ease of emission ruin by over-heating, he argued the case for the use of fixed filament resistances. (Ref. 50). As early as 1925, some designs for LF amplifiers used fixed resistances in filament circuits, variable resistances being said to be "quite unneccessary". (Ref. 50a)

The use of filament current controls for the improved valves became more associated with saving on power consumed from the filament battery rather than assisting to set an optimum working point, probably on account of the huge space charge. Wireless World in 1925 said "modern valves are not as a rule sensitive to filament control" and suggested similar valve types in similar functions of multi-valve sets could share filament rheostats. (Ref. 50b). By early 1926, filament resistors were frequently baseboard mounted and pre-set to correct for differences in rated filament voltage V_f and the filament supply voltage. The panel filament control was retained to control the gain of an h.f. stage and examples continued until at least 1932 e.g. Cossor Empire Melody Maker model 234.

One December 1927 reference makes it clear that critical control over temperature was 'not required with modern valves', excepting panel control over an h.f. stage. (Ref. 61).

Cossor were almost alone in claiming in early 1927 that valves in their nominal 1.8 volt class (Stentor 215P and others) could be connected directly to even a fully charged 2 volt accumulator, with the implication that the space charge under normal working conditions was probably adequate just below 1.8 volts (Ref. 62). Radions were also among the few to point to direct connection to secondary cells. Yet old practices died hard: despite their advertisement to the contrary, Cossor retained a single (master) baseboard mounted rheostat in their 1927 design for a home constructed set. On the question of gradually raising filament current, advice from Dr. Roberts in 1925 that dull emitters in particular should never be switched on suddenly to the rated voltage must have weighed heavily with cost conscious amateurs. (Ref. 63).

The Mullard PM range were rated at below standard secondary cell voltages e.g. PM2 1.8V etc., even into 1927. But by late 1927, these valves and their competitors in the oxide coated class had filament voltages standardised on 2V, 4V and 6 volts.

It is sometimes asked why the makers of early valves published filament voltages always some 200mV below the nominal e.m.f. of secondary and primary cells. Fig. 1 shows the considerable variation in emission with temperature of bright and dull emitter valves; hence the valve designer optimised the filament performance at the lower end of battery output, 1.8V in the case of a discharged secondary cells and around 0.9V for primary cells. The filaments were therefore made with a wire gauge and doping suitable for nominal ratings of 1.6V to 1.8V for single cell accumulators, 2.5V to 2.8V for twin series primary cells and so on. (Ref. 36).

For "one-cell" valves such as the DE11 (If 0.25A, Vf 1.1V) the useful life of the on-load primary cell was considered to range from 1.5V (new) to 0.9V at the end of life and the filament was designed to give good performance with a nominal 1.1 volts. Again a variable resistance was needed in the filament circuit, not now to maintain current to compensate for filament evaporation, but to compensate for falling battery e.m.f.

The above resulted from makers' design criteria which recognised that, although fully charged accumulators delivered 2.2V per cell, by the time one took into account the voltage drop in the connecting leads and some ampere-hours from the accumulator, what was delivered at the filament pins was more often than not something in the region of 1.8V and similarly reduced for primary cells. Although the factor became less important as more and more low current filaments were designed, the early practice of the valve designers was to cut filament lengths to suit 'typical' operating conditions. The circuit designers such as those contributing to "Wireless World" set about frustrating the valve designers' intents (as exampled in Ref 36b) by suggesting that for multi-valve dull emitter circuits, the 2 Volt class should be fed from a 4 Volt supply via suitably controlled resistance to overcome losses. This was quickly retracted (ref 36c) in view of the confusion it occasioned. That multi-valve sets created a real problem to ensure correct filament voltage applied to the valve pins, is shown by the fact that one Wireless World reader suggested splitting the valves into independent filament circuits, each with its own accumulator and rheostat. (Ref. 36b).

Part two (next issue) deals with the use valves in receiver stages, testing and how to ensure the longest life.

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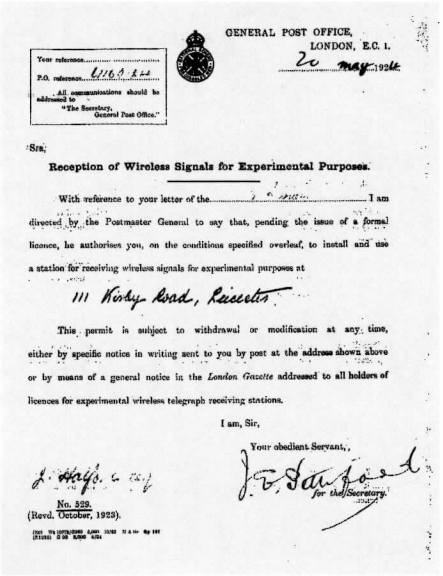
Buying a Radio 1926-1999

By Harold Page

Last week my daughter bought a new radio.. The one in the kitchen had been with her since her student days and had done gallant service in several countries, but it had gasped its last breath. The cost of repair would be greater than replacement. This time she wanted a model that would be suitable for camping, and also on the boat,in addition to being a kitchen companion.



GENERAL POST OFFICE,
LONDON, E.C. 1.

Your reference.....
P.O. reference.....
All communications should be addressed to "The Secretary, General Post Office."

20 May 1924

Sir,

Reception of Wireless Signals for Experimental Purposes.

With reference to your letter of the..... I am directed by the Postmaster General to say that, pending the issue of a formal licence, he authorises you, on the conditions specified overleaf, to install and use a station for receiving wireless signals for experimental purposes at

111 Kirby Road, Rescetts

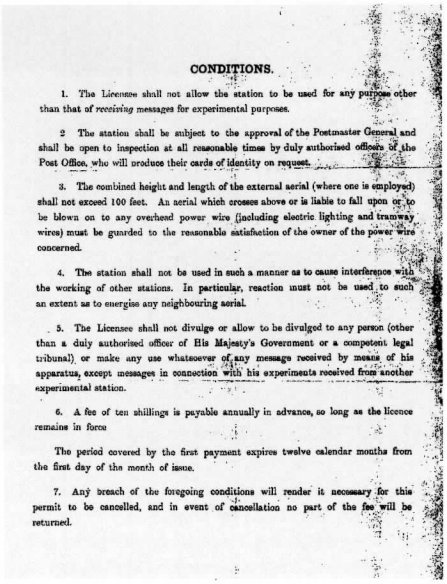
This permit is subject to withdrawal or modification at any time, either by specific notice in writing sent to you by post at the address shown above or by means of a general notice in the *London Gazette* addressed to all holders of licences for experimental wireless telegraph receiving stations.

I am, Sir,

Your obedient Servant,

for the Secretary.

No. 529.
(Revd. October, 1923).



CONDITIONS.

1. The Licensee shall not allow the station to be used for any purpose other than that of *receiving* messages for experimental purposes.

2 The station shall be subject to the approval of the Postmaster General and shall be open to inspection at all reasonable times by duly authorised officers of the Post Office, who will produce their cards of identity on request.

3. The combined height and length of the external aerial (where one is employed) shall not exceed 100 feet. An aerial which crosses above or is liable to fall upon or to be blown on to any overhead power wire (including electric lighting and tramway wires) must be guarded to the reasonable satisfaction of the owner of the power wire concerned.

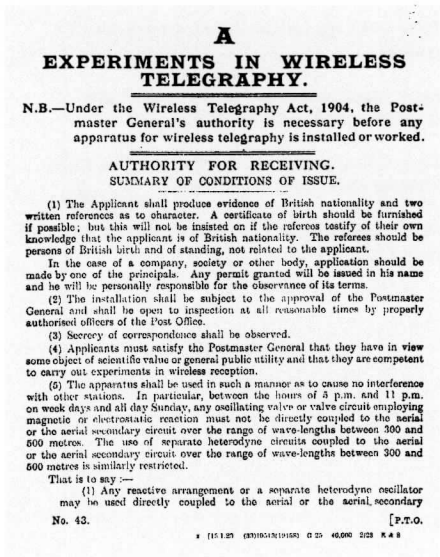
4. The station shall not be used in such a manner as to cause interference with the working of other stations. In particular, reaction must not be used to such an extent as to energise any neighbouring aerial.

5. The Licensee shall not divulge or allow to be divulged to any person (other than a duly authorised officer of His Majesty's Government or a competent legal tribunal), or make any use whatsoever of any message received by means of his apparatus, except messages in connection with his experiments received from another experimental station.

6. A fee of ten shillings is payable annually in advance, so long as the licence remains in force

The period covered by the first payment expires twelve calendar months from the first day of the month of issue.

7. Any breach of the foregoing conditions will render it necessary for this permit to be cancelled, and in event of cancellation no part of the fee will be returned.



A

EXPERIMENTS IN WIRELESS TELEGRAPHY.

N.B.—Under the Wireless Telegraphy Act, 1904, the Postmaster General's authority is necessary before any apparatus for wireless telegraphy is installed or worked.

AUTHORITY FOR RECEIVING.
SUMMARY OF CONDITIONS OF ISSUE.

(1) The Applicant shall produce evidence of British nationality and two written references as to character. A certificate of birth should be furnished if possible; but this will not be insisted on if the referees testify of their own knowledge that the applicant is of British nationality. The referees should be persons of British birth and of standing, not related to the applicant.

In the case of a company, society or other body, application should be made by one of the principals. Any permit granted will be issued in his name and he will be personally responsible for the observance of its terms.

(2) The installation shall be subject to the approval of the Postmaster General and shall be open to inspection at all reasonable times by properly authorised officers of the Post Office.

(3) Secrecy of correspondence shall be observed.

(4) Applicants must satisfy the Postmaster General that they have in view some object of scientific value or general public utility and that they are competent to carry out experiments in wireless reception.

(5) The apparatus shall be used in such a manner as to cause no interference with other stations. In particular, between the hours of 5 p.m. and 11 p.m. on week days and all day Sunday, any oscillating valve or valve circuit employing magnetic or electrostatic reaction must not be directly coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres. The use of separate heterodyne circuits coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres is similarly restricted.

That is to say :—

(1) Any reactive arrangement or a separate heterodyne oscillator may be used directly coupled to the aerial or the aerial secondary

No. 43. [P.T.O.

[15.1.27] (37)10543(19158) G 25 40,000 2/23 K & S

She had read in a back copy of 'Which' about a suitable model by Philips, so she added it to her shopping list. Along with the Kellogs, soap powder, ham, bacon, sausages and spuds, she picked it from the shelves, popped it on to the trolley, grabbed a packet of batteries at the check out, paid, and away she went.

At home, the boys inserted the batteries, the 13 amp plug was already moulded on, and that was that. Q.E.D. So What?

I just wonder how her Grandfather in 1926 would have tackled the same task. I say Grandfather because her Grandmother, despite her masterful prowess at running the home, would never have been given the responsibility of making such a decision requiring at the time, a large amount of technical advice.

His first move would have been to visit his local Wireless Shop. The shopkeeper would tell him about the latest models and circuits and which of a range of horn loudspeakers to use. Having decided upon the detail, the cabinet finish, oak, mahogany or walnut would be chosen. Away he would go, leaving the wireless man a couple of weeks or so to make up the circuit, and the cabinet maker to construct the box.

I remember,as a small boy, going with my father on Sunday mornings for a walk to see Mr. Pugh, the cabinet maker. A social call with the object of spurring him on to make more cabinets. Craftsmen in those days always took their time, only proceeding when the correct timber was to hand. I called him Mr. Poo because he lived at a house on the corner.

During the waiting period the anxious purchaser would make application for his Receiving Licence. This involved a visit to the General Post Office for a form which had to be signed by a responsible person, a Justice of the Peace, Vicar or local M.P.

The aerial and earth had to be installed in advance: we employed a small builder to do this work. It involved procuring a flag pole to be mounted at the bottom of the garden, a long length of copper wire to be fed through porcelain egg insulators and a pulley at the house end. Just inside the house we had to fit a fairly large 'U' shaped throw switch to permit the circuit to be broken in time of thunder and lightning. The earth wire went down to a copper rod or pipe, about two feet in length, knocked into the earth, preferably in a damp patch if one could be found. For the aerial passage through the window frame, a brass rod with terminals at either end had wrapped around it a tube of insulation - bakelite or xylonite possibly. The horizontal copper always had to slope slightly towards the house. Perhaps they believed that gravity would help the sound waves to run better down hill.

The instrument, now complete, arrangements would be made for the installation. Father would accompany the driver in a bull-nosed Morris van, possibly in the evening, to give tuition in tuning and seal the deal.

Programmes were printed in the newspapers. Yes, there was a Radio Times in those days and I have a copy printed in the year of my birth, 1923. Old favourites Christopher Stone, the B.B.C.'s first disc jockey, and an article by Mr. Reith. I wonder what happened to him.

When I tell this story to my grandchildren or to pupils when I visit them at school,and show them a picture of the family seated around the fireplace and the old-fashioned box in the corner,they frequently ask me "what did they look at when they listened to the radio?" As always, the simple questions are the most difficult to answer.

There followed weekly visits to the shop,usually on Saturday afternoons, by the proud purchasers to report reception of Paris or Hilversum on a good night, if the wind, tide and cloud base were all in the right position. Sometimes several proud customers would arrive simultaneously, all swapping their tales of listening out, which was almost as fascinating as listening in; quite a different exercise. One listened out in order to discover a new station. You listened in to a programme already detailed in printed form.

F. O. Read, maker of Wireless Controlled Clocks

by David J. Boulin

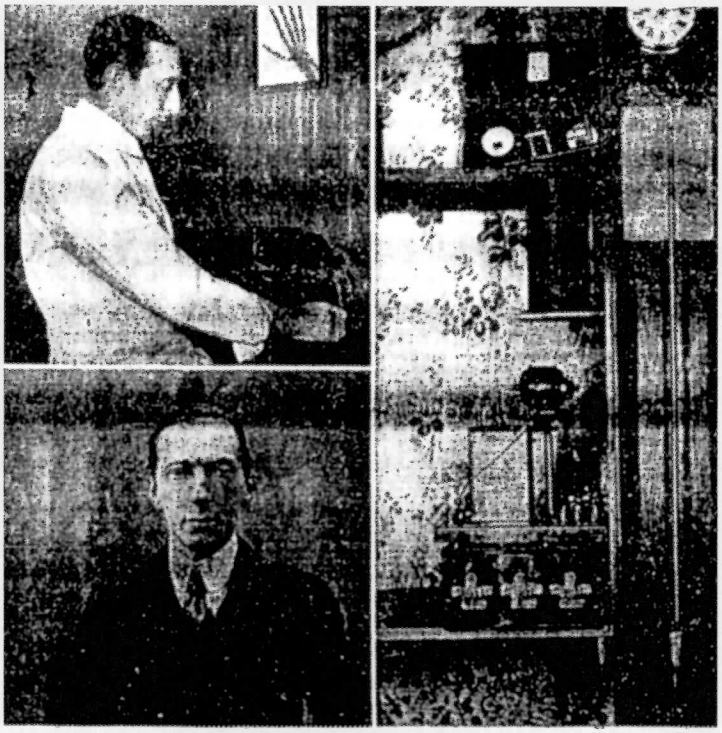


Fig 1

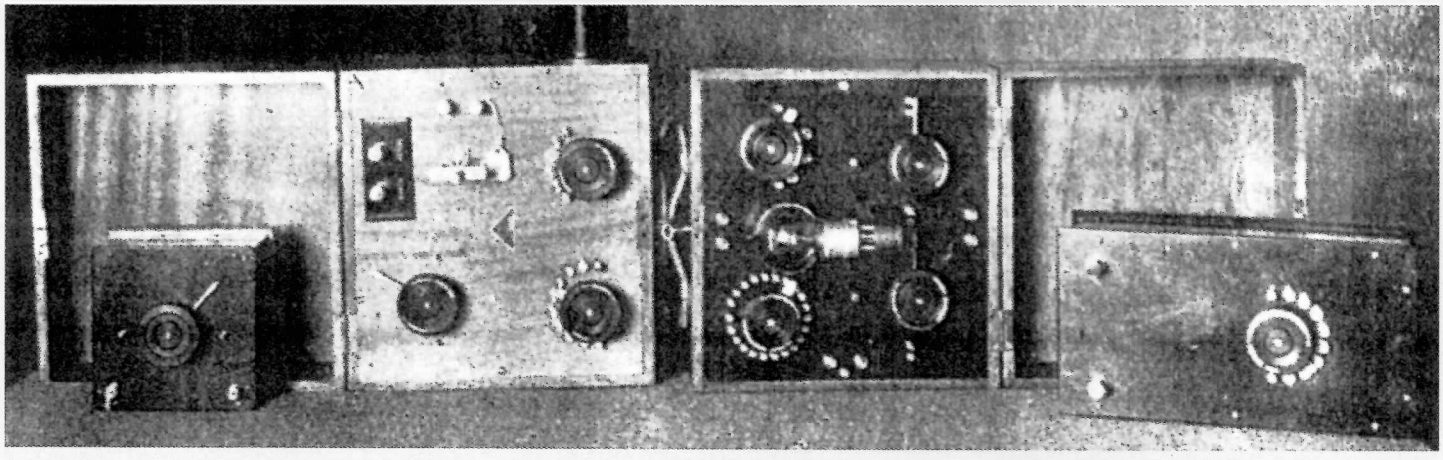


Fig 2

Fig 1: photo of F. O. Read from the Daily Sketch, October 4th 1912. The illustrations show: 1, top left, Mr Read at work with the spark coil he uses in connection with his wireless experiments 2, (bottom left), a portrait of the inventor. 3, (right) a wireless clock in Mr Read's house.

Fig 2: Apparatus of F. Reed (sic) shown at Wireless Society of London meeting. 28th October 1919.

Fig 3: WR 146a cabinet receiving set, price 75 guineas

Fig 4: Read's well-known WR 160 two-valve amplifying panel, price £5.5.0

Fig 5: WR 150 telephone transmitter (advertised in Wireless World, 21st August 1920).

Fig 6: Complete Long and Short Wave set WR 114 price £20

On Friday October 4 1912 a picture was published on the front page of the London Daily sketch. It is the first illustration of any clock said to be under wireless control. The caption to the illustration reads:

After fifteen years of experimental work Mr F. O. Read, a Londoner, has nearly perfected his system by which it will be possible to control all our clocks and watches by wireless power. Mr Read has already established a complete system of wireless clocks at his private residence, and is convinced that before very long the present day clocks, with their complicated mechanism, will be scrapped, and that all timepieces of the world will be regulated from one centre.

Who was F. 0. Read and how did he link clockmaking with wireless?

There is not a great deal of information, but his career falls into two parts, divided by the Great War. Prior to 1914 he seems to have been involved primarily in the construction of electric clocks and attempts to regulate their timekeeping by wireless time signals sent out from the Eiffel Tower (call-sign FL) starting in 1909, with regular service from 1910.

Clearly his wireless controlled clock of 1912 must have been something of a sensation and his remarks cited above were certainly prophetic of the future, although radio controlled clocks were not commercially available until 1986.

Before the Great War F. O. Read worked on electric clocks and in 1915 patented an electric clock mechanism (#9981 of July 8 1915) and what he termed the NOTIC Super Clock. Virtually nothing is known of the NOTIC. A trade brochure described it as:

...a timepiece recording absolutely uniform time with none of the drawbacks of other so-called electric clocks, ...It is essentially the electric clock par excellence, being the only one having direct electro-magnetic propulsion of pendulum, with every part of the mechanism controlled by electricity.

Only the phrase: ...a timepiece recording absolutely uniform... suggests timekeeping regulated by radio, and whether it had any connection with the clock regulated by wireless waves in his home is not known. We hear nothing more of this or any other clock by F. O. Read after the war, but we do know that he had a transmitting and receiving licence before 1914, presumably so he could

Fig 3

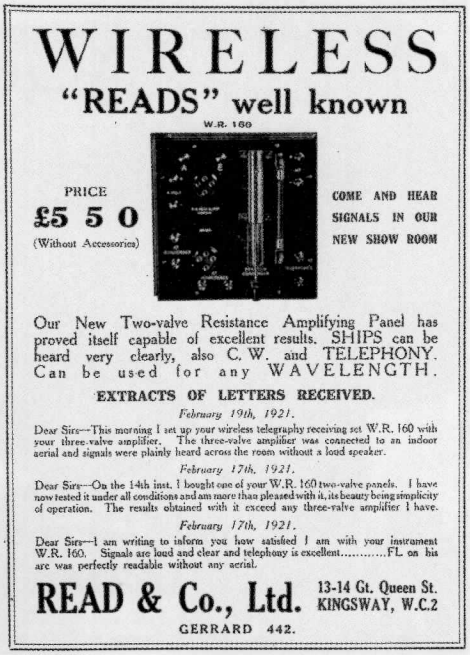


Fig 4

Fig 5

Fig 6

carry out his experiments of regulating clocks by wireless time signals.

Licences were required in those days for both transmission and reception of radio waves, under the terms of the Wireless Telegraphy Act, 1904. The first list of such licence holders was published by A. W. Gamage in 1913 with an amended list in 1914. The second edition of Gamage's 'Directory of Experimental Wireless Stations In the United Kingdom', published in March 1914, (ref. 1) lists F. O. Read as holding the official call letters FRX. His address is given as 118, Cranbrook Road, Chiswick (London W4); in 1912 he had been living in the same area at 26 Flanders Road, Bedford Park, London, W4.

After the war, he played a very active role in commercial wireless, and manufactured numerous wireless sets, with the emphasis at first on the scientific aspects; reception of time signals, weather reports and morse code generally. His name as F. O. Read & Co Ltd, 13/14 Great Queen Street, Kingsway, London WC2, first appears in journals in early 1920 when he had an advertisement that is written rather than illustrated, entitled 'Wireless Enthusiasts' (Ref 2); this described his firm's WR 139 set for spark & continuous wave (CW) for 400-20000 metre reception.

His receiving crystal set could pick up signals in the range of wavelengths from 100 to 7000 meters over a range of 1000 miles ...obviously he could pick up time signals from the Eiffel Tower (station FL) and the German time signal station Norddeich.

I do not know when he started this business but by 1919 F. O. Read & Co Ltd was to the fore. On 28 October 1919 there was an important meeting of the Wireless Society of London at which various items of equipment were shown. These included crystal and valve receivers by one F. REED (figure 2); there was no member of the Society with the name F. REED, only F. O. Read, so we must presume that REED was a typographical error for Read. F. O. Read was showing his own wireless sets capable of receiving time signals.

Over the succeeding two years until January 1922 his firm of F. O. Read & Co Ltd, 13/14 Great Queen Street, Kingsway, London WC4 advertised twenty-five times in 'Wireless World' alone in addition to placing advertisements in other wireless journals and on page xxii of 'The Year Book of Wireless Telegraphy and Telephony', published by Wireless Press, London, 1/13 Henrietta St, Strand WC2 in 1920.

His 'Wireless World' advertisements portray a variety of wireless sets from complete sets in cabinets to 'panels' for insertion into the cabinet made or purchased by the user. In those days virtually all amateur users made their own sets unless they were rich. F. O. Read & Co Ltd also included components in his advertisements, together with other matters. It would be tiresome to give the whole list and I mention only salient advertisements.

His most expensive set was the WR146A advertised on October 30 1920 (figure 3); this was a complete 3-valve set for long and short wave:

'Can be used as Single Valve Receiver, or with Three Valve Amplifier, the change over operated by one switch only. Fitted with Variable Condenser Filament Rheostat, H. T. Batteries and Switchboard. Accumulators, Brown's Loud Speaker, Four Valves, Phones, everything complete in lock-up mahogany cabinet. READY to fit to aerial and earth for signals. 75 guineas.'

Another apparently well-known item was his WR 160 'panel' price five guineas (£5/5/- = £5.25 today, see figure 4). This was advertised several times and his advertisement of April 2 1921 shows the 'panel' plus three testimonial

continued on next page

Fig 7

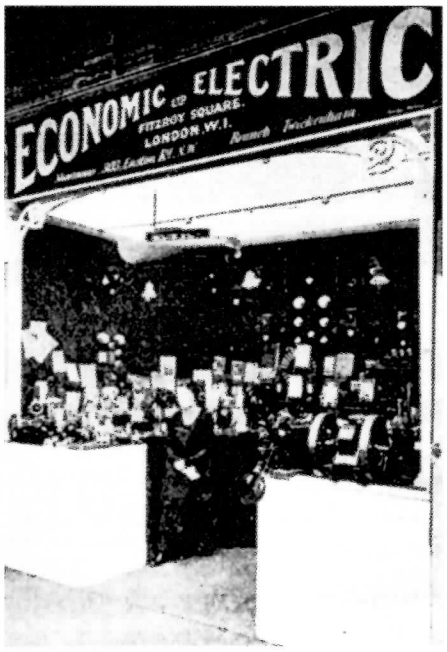


Fig 8

letters. The third (lower) of these letters states that' ...FL on his arc was perfectly readable without any aerial.'

Other sets included the WR 139 for spark and continuous wave (CW) reception; WR 140 for CW reception, the WR 150 telephone transmitter [figure 5] and the WR114 which was a complete cabinet set probably based on the 146A but single valve only. This was priced at £20, still a high price (figure 6). Described as:

COMPLETE LONG AND SHORT WAVE SET, 'using one valve only signals are exceptionally loud and clear. It is a well-known fact that it is almost impossible to get the best results on long and short wave with any single tuner. The above will give you any wavelength now in use from the very shortest to the very longest it is possible to receive with the range of your aerial. It is actually two machines in one - the short wave side being entirely separate from the long wave side; therefore ships come in extremely loud and clear. When receiving on the 'long wave' tuner the 'short wave' tuner is cut out altogether. It will be seen therefore, how efficient this machine is.'

'When applying for a Licence to Receive wireless Signals it is quite unnecessary to give a diagram. Quote our model number, as the G.P.O. have full details.

So too did the Marconi Company 'have full details' as will soon become apparent.

Customers were encouraged to come and 'Hear Signals In Our New Show Room', and this show room was illustrated in July 1921 (Wireless World, 9 July 1921, page xviii); It appears in the style of a 'drawing room' with typical domestic furniture of the 1920s in Jacobean Style (see figure 7).

Finally in February 1922 F. O. Read & Co Ltd '13/14 Great Queen Street, Kingsway, WC2' had stand 4 at the Model Engineering Exhibition at the Royal Horticultural Society Hall, Westminster, in company with other important wireless apparatus manufacturers of the day including A. W. Gamage & Leslie McMichael.

The description of the display (figure 8) was given in 'Wireless World' for 18th February:

'F. O. Read showed a large number of complete instruments including high frequency and low frequency amplifiers in various combinations as well as a large selection of accessory apparatus.'

Following this successful exhibition, disaster struck. F. O. Read & Co Ltd. never advertised again, and on 1st March 1922 they were prosecuted by Marconi for patent infringements, along with A. C. Cossor at the same sitting. Whereas Cossor carried on and became very large and well-known in later years, F. O. Read seems to have gone under. The firm either moved, was taken over or closed.

Wates Bros occupied the Great Queen Street address later in 1922, and nothing more is heard of F. O. Read & Co as a commercial concern. The products sold by Wates Bros were quite different from those of Read, and only one rather primitive set was sold.

Wireless and control of clocks

I believe that F. O. Read & Co. Ltd. ceased trading entirely, but possibly F. O. Read himself carried on for a couple of years with his wireless interests and wireless regulated timekeeping? We may never know the answer to that question.

I wonder if throughout his life from 1912 until his death circa 1925 Read was experimenting with wireless control of clocks in addition to making electric clocks and for a short period after the Great War building up his successful business in the wireless trade.

During pre-war days, he was probably attempting to trigger his 1912 clock to respond to wireless signals by sending out his own signals from his own transmitter. His clock was at his home and presumably his transmitter was also there, so he could have experimented by sending out his own signals. W. H. Shortt, the inventor of the Shortt Free Pendulum clock that became the observatory time standard in the 1920s/1930s, apparently also experimented with transmission of wireless signals to regulate his own clocks. At the October 1921 meeting of the Wireless Society of London that F. O. Read attended Mr Shortt demonstrated paper chronograph records of the Eiffel Tower 'beats' with the times of the first and last beats, plus the circuit diagram of the recording circuit [Ref 4].

Regarding Read's transmitter licences in 1921 and 1922 F. O. Read & Co were listed as holders of the call sign 2HR; previously Read had call-sign 2 FO (Ref 5). He broadcasted with a radiated power of 30 watts, from accumulators, transmitting on a wavelength of 150 meters, giving a range of 15-20 miles between 8 and 10 pm, using a '3 inch coil, high note, loosely coupled'.

Read's station 2HR continued to be listed at the Great Queen Street address and was heard broadcasting on 12th September 1923 by station ONY in Holland, and 5YB Birmingham. A private correspondent states that Read died circa 1925.

Conclusions

1 Read did not market wireless controlled clocks. There is no evidence that the patent of 1915 refers to a wireless controlled clock and he does not appear to have produced clocks commercially.

2 The firm of F. O. Read & Co was very active from 1919 to 1922 manufacturing wireless sets for reception of time signals and Morse code. This was in the days before wireless had entertainment value, which began with the 'Dutch Concerts' in 1922.

3 A search should be made for any clock by F. O. Read, and wireless sets by Read should be sought to find out if there is any evidence for use as time signal receivers, with particular reference to wireless control of timekeeping; possibly written instructions with the sets might indicate specific uses with clocks.

(Some information was contributed by Mr Bertrand A. Best, Beverley, Yorkshire).

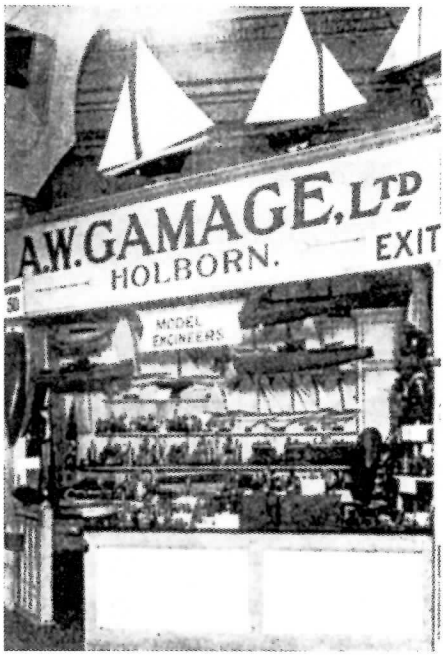


Fig 8a

Fig 8b

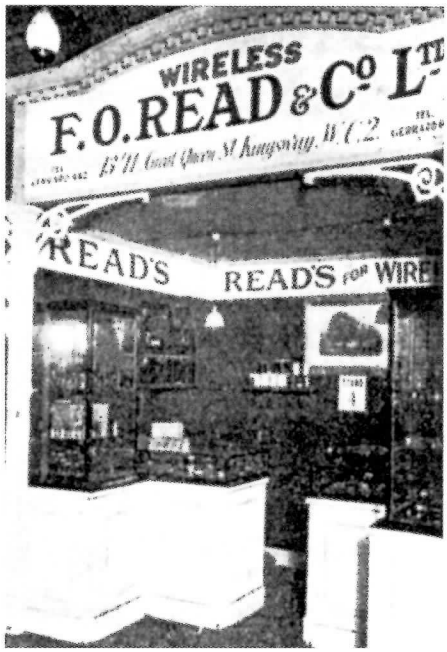


Fig 8c

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Ref 5, 'W. H. Shortt and Wireless Control of Timekeeping' Radio Time, 9/2, issue 26 pp 81-83, 1998.

Additional note
Since this article was written David Read has informed me that he saw a wireless set by F. O. Read at the National Vintage Communications Fair, National Exhibition Centre, Birmingham, May 1998. He states that it has no BBC stamp and had probably been made prior to the start of official broadcasting. It is the first set he has seen and concluded that it has no other functions than as a receiver.

Fig 7: The showroom of F. O. Read & Co Ltd, 13/14 Great Queen Street, Kingsway, London WC2, where customers were invited to 'come and hear Signals'.

Figs 8, a, b & c: Stands at the Model Engineering Exhibition at the Royal Horticultural Society Hall, Westminster, 1922. 8: Economic Electric Ltd, Fitzroy Square, London W1 & 322 Euston Road N.W showing model steam engines etc. 8a: Stand 50, A. W. Gamage, Holborn, Model Engineers, showing toy soldiers, trains and boats. 8b: Leslie McMichael, Wireless Apparatus, tel Hampstead 1261, Providence Place, Kilburn NW6. 8c: Stand 4, F. O. Read & Co Ltd 13/14 Great Queen Street, Kingsway, WC2 (from 'Wireless World February 18 12922, page 722)

THE GOLDEN AGE OF TELEVISIONS by Philip Collins.

Reviewed by Andy Emmerson.
Published by General Publishing Group, Inc. (Los Angeles), 1997 at $15.95. ISBN 1-57544-019-9. Paperback, 132 pages. Available in the UK at £16.95 from Old Time Supplies, P.O. Box 209, Banbury, 0X16 7GR (0973-144041).

I suppose the reason why I read book reviews is to help me decide just one thing-would I want to buy this book? I certainly don't read reviews just to see the critic point out the errors in the book he or she has just perused.

Well, let's start by saying this is a sumptuous book, in the same mould as the author's previous books on radios, smoking accessories and cocktail gadgets. The impeccable photography, the rich colour photography and the heavyweight glossy art paper all put this book in a class of its own. Seeing this book, you cannot fail to be stunned by the work that has gone into it, putting all other picture albums of television receivers into the shade. And the photos are not just of television receivers; the settings include period periodicals, TV-related toys and so on, showing that a great deal of care has gone into the book.

Coverage is broad, both in time-from Baird's Televisor of 1920 (well, that's what the book says!) to 1990-and in the range of makes embraced-American, European and Japanese. All the real classic sets are here: British and American mirror-lids, the perspex-cabinet RCA set shown at the 1939 World's Fair, the Bush TV22, the first Sony, the Philco Predicta, the Keracolour and the JVC Videosphere. Captions generally tell you little about the sets themselves but go into the social culture of the respective periods.

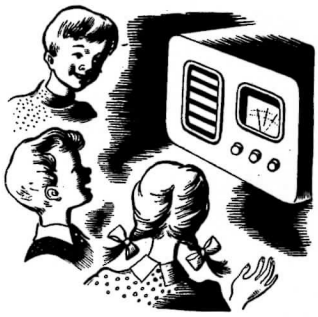
Earlier I said a lot of care had gone into this book and that's right-but not quite enough. Mistakes often occur at production stage, after the author has handed over the manuscript, but there are a number of unfortunate sillies that will fool some readers. We spell Ferguson with one 's', not two, and there is no 'e' in Cossor. More importantly, Teleavia sets came from France, not Italy. The Keracolour is attributed to Decca but that company made only the chassis.

The verdict: there's no doubt that this is the ultimate coffee table book of televisions and mistakes aside, no lover of television could fail to be enthralled by it. Oh yes; the author is not the singer of the same name, or if he is, he's keeping it remarkably quiet!

Entering the spirit of the age

Andy Emmerson urges a broader approach to enjoying vintage entertainment

Ask most collectors about the state of the vintage wireless business at the moment and they'll tell you there's no decent material to be had-at any price! This may or may not be really true but there's no denying that your chances of just bowling up to a Harpenden swapmeet or the National Vintage Communications Fair and picking up a nice 1920s wireless set for a song is pretty minimal. Your chances are better elsewhere-but that's another story!



The Nine o' Clock News and Children's Hour hold powerful memories for many collectors so why not relive some vintage listening on your old set? A wide variety of vintage programmes are available on cassette tape from commercial suppliers and on loan through tape clubs.

So, do you give up and start collecting new stamps instead? Probably not; leopards seldom change their spots. The answer then is to broaden your interests and extend them into a field where there's less competition and more material to be had-but still related to vintage sound (and vision!) and the equipment that produced this enjoyment.

Enjoyment is the word; after all our objects of passion were all made originally to provide entertainment, not to be set up on shelves, inanimate, like a row of tombstones. Of course, I have met many radio collectors with marvellous collections of sets, all dead, incapable of uttering another sound. By this I mean the sets, not the collectors, but I feel the collectors have something dead in their soul as well if they have never let their imagination run a little further and embrace the lore-and joys-of old radio (or television or whatever) in its broadest context.

Surely the whole point of keeping something beyond its rational working life is to allow our successors in future times to see how things worked and to experience life (and enjoy entertainment) the way people used to. By this token people who merely preserve items without keeping them in working order are cheating the generations to come.

This applies to us already because the treasures in our collections are already relics of an era gone by. The first thing to do therefore is to make sure your favourite relics work-have them restored and make them function as they were intended. You can then take this a stage further and argue that the only way of truly appreciating an artefact of the past is to put it in its proper context - in the past. And if we are to recapture a golden age of times gone by, then that means putting yourself into the mindset of that era. Try and enjoy the music and entertainment of that era, read the technical literature of the period in old magazines and books, try soaking it up! Eventually you'll get to understand much better why a particular radio, television or telephone turned out to be the shape it was, why it was made of that material and why it had a particular feature-set.

New sounds for old sets

What do I mean? How do you go about it? For a start, old radio sets give more pleasure if they work. Why, I'm not sure. It may be the enforced delay and anticipation while you wait for the valves to warm up, perhaps the mingled smell of burning dust and wax capacitors, or else the mellow sound of the speaker in a decent-sized cabinet. Most transmitting bands are unchanged so a set of fifty, sixty or seventy years ago will still pick up today's programmes, and if you are unhappy with most of the programmes on the medium wave, there are the Radaptor converters that will convert FM programmes on VHF so they can be heard on a medium wave set (enquiries to Vytek-Radiocraft Ltd, 56 Main Street, Sedgeberrow, Evesham, Worcs. WR11 6UF. Telephone/fax 01386-882280).

You can go one stage further if your radio has a GRAM or AUX input; it can play vintage programmes for you! As explained in an earlier chapter, playing period programmes on vintage sets completes the recreation process; it can also be a lot of fun and an introduction into a rewarding and fascinating interest area - almost a whole new hobby, generally known to its devotees as Old Time Radio or OTR. OTR has its own clubs, for pre-war and early post-war programming on the one hand, whilst on the other hand there are also a whole raft of organisations devoted to the offshore radio phenomenon of the 1960s and 70s. Large chunks of the Internet are also devoted to the OTR hobby. Television nostalgia has its devotees as well, again with clubs and Internet areas.

Tap(p)ing the archives

Archive programme material need not be inaccessible. If you don't feel like joining an organisation yet-a-while, perhaps all you need do is scour the Radio Times more closely than usual. In recent years the BBC has made a good job of repeating archive

programme material, both on radio and television, although it can be extremely frustrating if you missed the programme you wanted. There's no simple mechanism for buying copies of past programmes from the BBC (the charges are high and the criteria exclude most enquirers), and other than advertising in the newsletters of the societies listed in this chapter, there's no proper forum for swapping tapes with other enthusiasts.

You can of course buy a number of old shows on tape and CD. For radio the BBC has released a few old programmes (look in your local branch of W.H. Smith for these), whilst other material is available abroad, especially in the USA. ORCA, the Oldtime Radioshow Collectors Association has a big lending library of old radio programmes and their £5 membership fee is modest enough to deter nobody from joining. You might also care to check out the other societies for programme collectors.

The same applies to television. There are groups both in the UK and in America devoted to trading old programmes, whilst there are now a wide range of old programmes re-released on sell-through video tape. Purists of course run these through a standards converter and view them in soothing 405 lines and restful black-and-white. The selection of tapes available commercially in this country is not desperately broad, however, whereas in America there is a huge range (and they don't have the problem of changed line standards either, the 525-line system has been in use there since 1941).

Other nostalgia items

The field of radio and television nostalgia is wider than archive programmes, though. It starts with old copies of the Radio Times and other programme papers and runs (in the printed matter field) through photo albums of the stars, Christmas annuals and cigarette card albums to pre-war radio licences and the large colour advertising placards on cardboard which used to hang up in radio and TV dealers' shops. Then we find picture postcards with radio-related cartoons or photographs of radio station buildings, advertising novelties such as china models of the His Master's Voice 'Nipper' dog, cigarette lighters in the shape of a radio valve and all manner of other gimmicks. Add to this the hundreds of disc and tape recordings, both original and re-issues, and you have a huge potential field to hunt down and collect.

Some collectors take this a stage further and recreate 'retro' room settings around their period radios, televisions, hi-fi or phones. Table or TV lights can be very characteristic of a period, whilst another essential is a television trolley or table, the latter in the obligatory 'contemporary' style of rich glossy brown wood and tapering splayed legs in black, capped with lacquered brass ferrules.

Other accessories are decorated leather covers for your copies of the Radio Times and TV Times and stick-on screens that gave a 'lifelike' colour impression to TV programmes ('winner of the Brussels Inventors Fair', no less). It's worth recalling that at a time when colour television was still no more than a laboratory novelty in this country, some people were so desperate to have colour television that they bought these garish affairs of translucent multi-coloured plastic to give their monochrome screens a 'coloured' effect!

None of this stuff need be expensive unless you want to pay top-notch prices at auction. But because it's one of the less well organised collecting hobbies, you'll have to track down your quarry at boot fairs, general antiques and bygones fairs, ephemera swapmeets, second-hand bookshops... and not just specialist vintage wireless events, where prices are inevitably higher.

Theme music and more

There is a growing interest in all kinds of radio, film and TV music, not just the classic main themes but in sound tracks, interludes, library and production music (used as incidental music in films and TV programmes, also for the background to newsreels, even the background music to the test card on television (joy of joy, there are now several CDs of Test Card Classics). Soundtracks are only part of the story, therefore; the other music used in films and broadcasts is categorised either as 'presentation' or 'production' music, depending on whether it identifies the production or is merely incidental to it.

Soundtrack albums have always been fairly accessible (so long as you bought them whilst still available) but the production or 'library' music used incidentally in programmes was not to be had for love or money since they were made available only for professional users. Gradually the specialist music libraries recognised there was a market for this as well and many of these original performances are now being made available to the public as well. You can now find them on commercial recordings in the form of limited edition albums available either through specialist labels or by special arrangement through organisations such as the Robert Farnon Society (which is allowed to sell library music CDs to members only-a good enough reason for joining!).

Old-Time Radio Show Collectors Association (ORCA).
Membership secretary: John Wolstenholme, 56 Melbourne Avenue, Dronfield Woodhouse, Sheffield, S18 5YW. ORCA runs a lending library of old radio shows and welcomes donations (send copies, not original recordings).

Programme Preservation Society: Richard Berry, 230 Selsdon Road, Croydon, Surrey CR2 6PL. The PPS aims to help members lend each other copies of old television and radio programmes.

Robert Farnon Society, Stone Gables, Upton Lane, Seavington St. Michael, Ilminster, TA19 0PZ. The Farnon Society was founded in 1956, and its aims remain to publicise the work of Robert Farnon in particular and similar musicians involved in light and film music. The society is also the forum for people interested in library music, used (for example) as incidental and background music in the soundtracks of films and radio and TV programmes. At least four magazines are published each year, and London meetings are held in April and November. Free sample magazine available.

STARS (Savers of Television And Radio Shows), 96 Meadvale Road, London, W5 1NR. Members lend each other copies of old programmes.

Vintage Radio Programme Collectors Circle, Roger Bickerton, 3 Park Edge, Harrogate, HG2 8JU (01423-887452). Caters for collectors of spoken word and other radio broadcasts.

*Adapted from the author's book ELECTRONIC CLASSICS, published by Newnes (ISBN 0-7506-3788-9).

The Superhet for beginners

by Dave Adams

An attempt to explain the principle without mathematics and with the minimum of jargon. Criticism invited.

'SUPERHET' is the name of a circuit. Its performance surpasses that of its predecessor (the 'straight' or 'tuned radio frequency' circuit). It was a wonderful, elegant solution to a problem. There was a need for much greater sensitivity and selectivity than had been required in the early days. Transmitting stations were increasing in number and in power. The very popular commercial stations, which were located on the continent, were now on the air. These did not come in as strongly as the BBC stations and were very difficult to receive on the old-fashioned sets.

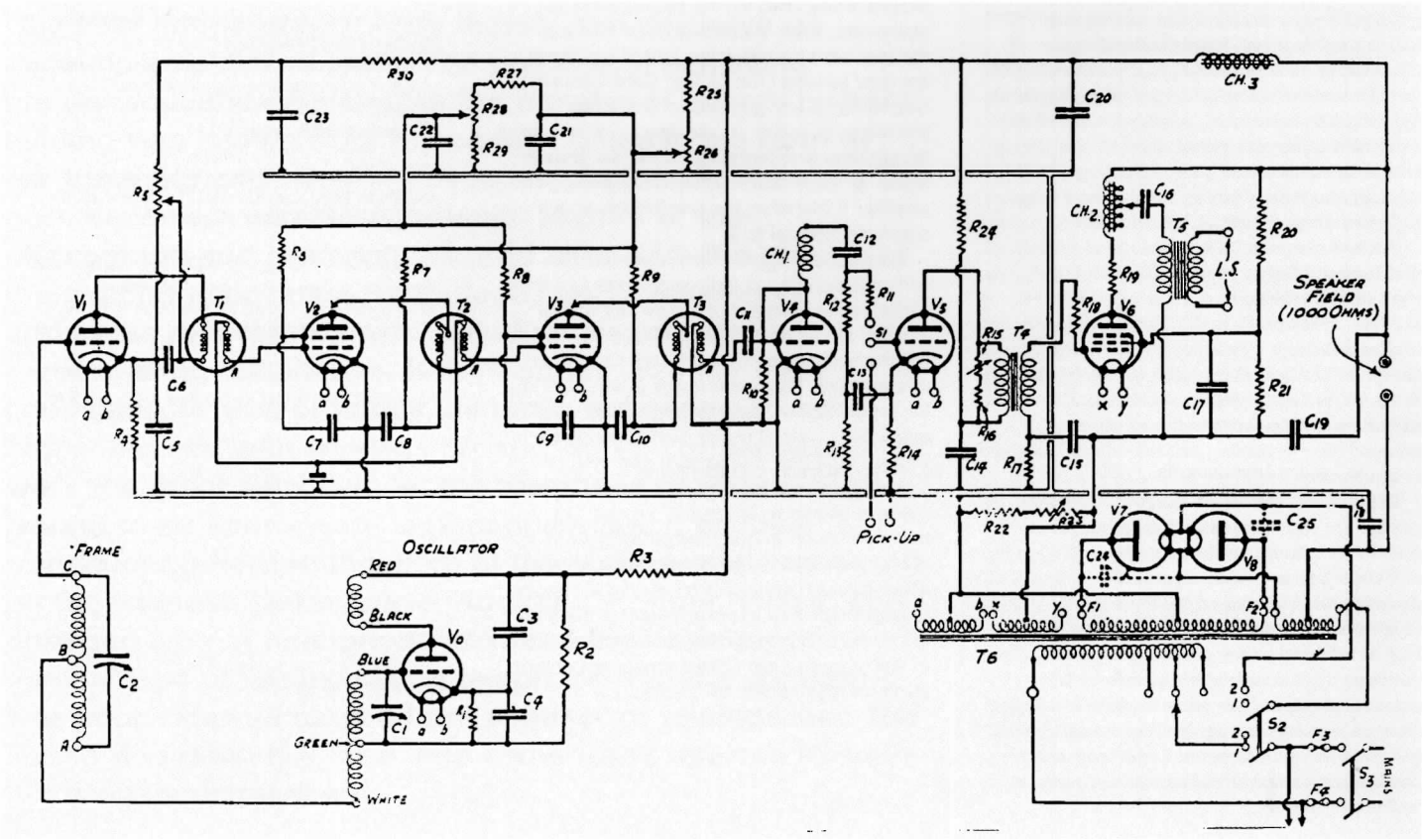
The superhet arrived, to stay, in the thirties. One or two manufacturers had put such sets on the market a decade earlier but they were very expensive and difficult to operate. They were not, as we would now say, 'user-friendly'.

So, what had happened in the meantime? It was the development in valves. It was now possible to produce a superhet at an affordable price. It was welcomed wholeheartedly because it was easy to operate and it brought in all the stations likely to be wanted. One or two manufacturers did, for a time, try to match its performance using the old-fashioned circuit. The best known of these were Philips' 'Superinductance' sets. By using ingenious circuitry and the highest quality components they did achieve a comparable performance - at a price. The trade began to produce superhets using three, four or five valves but four was found to give the optimum of performance as against cost. (I am always reminded of the car industry in their choice of four cylinders.)

There was, about this time, one other development that set the seal on the success of the superhet. This was AVC - 'automatic volume control' - (now known as 'automatic gain control'). This had the effect of bringing every station in at approximately the same volume level. So here, at last, was a set that would bring in foreign stations and the local station would not blast their heads off when they happened to tune through it. The set did not make any whistles or squeals (as the old ones were liable to). Its behaviour was impeccable - 'user-friendly' at last.

Well, what is this superhet circuit? Please look at the circuit of the modem superhet and note the area shaded. Here is where the miracle is performed. Can you identify four tuned circuits? They are all tuned to the same frequency! They are set at the factory and, barring accidents, will not need be touched again. These are known as the 'IFT' s: the 'intermediate frequency transformers'. These with their amplifying valve achieve the sensitivity and selectivity required. This is achieved as a result of their tuning never having to be altered! (Please accept this without further explanation at this stage.)

How then does the set tune to all the different stations? There is at the beginning of the set an ordinary tuning circuit that selects the desired station and then the first valve (the 'frequency changer') changes the frequency of that station to the 'intermediate frequency'. This, then, is further amplified and sharply tuned in the 'IF' stage, as



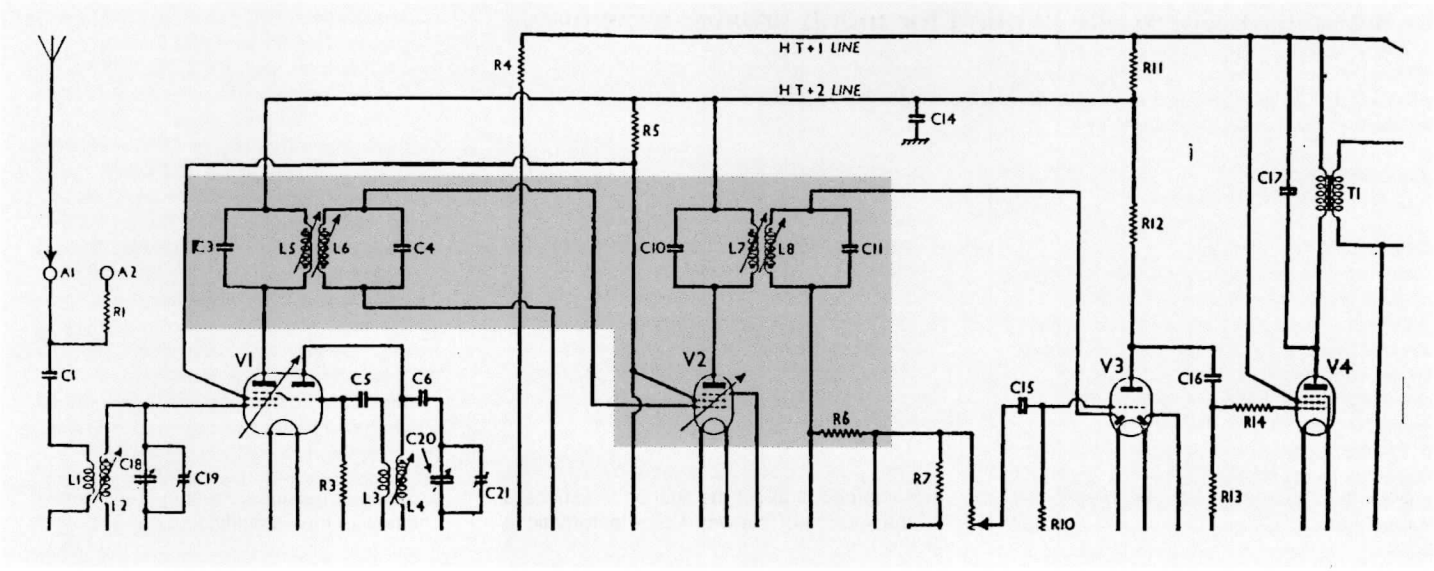
Above: TRF Circuit

described above. (The rest of the set is identical to its predecessor - detector, audio amplifier and output valve.)

That then is the principle of the superhet. There is still more to be explained and I am sure there are questions coming into your mind. But this, I think, is enough for one session. I will end with an explanation of the word 'superhet'.

It is actually short for 'supersonic heterodyne'. (Are you sorry you asked?). 'Supersonic' refers to the fact that the intermediate frequency is above the audio range. (The most popular choice for the 'IF' is 465kc.) 'Heterodyne' refers to the process of producing a third frequency by mixing two together. This was done in the early days of wireless to make morse signals audible. (That was an instance of 'sonic' heterodyne.) The 'intermediate frequency' is so called as it lies between the incoming (radio) frequencies and the audio frequencies.

Below: Modern Superhet (Wartime Civilian Receiver)



continued from page 24

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Letters

Dear Editor,
For me, BVWS Bulletin volume 23/4 is one of the best issues I have ever received. In particular I liked the following articles: 'Marconi centenaries in 1998', 'why collect catalin?' (and the superb colour photographs), '405 questions and answers', 'return to Rochester' (I hope I can go there one day) and 'the origins of the valve'.

Many thanks to the writers of the above articles and of course to all the others who produce for our pleasure and enlightenment, let them know that we appreciate it!

Yours sincerely,
Fons Vanden Berghen, Belgium

Dear Editor,
I was very sorry to hear of the death of Pat Leggatt reported in the recent Bulletin. Although I never met him we did correspond several times in 1997 and I was impressed by his encouragement and kindness, expressed in the letters, and did learn something of the man from these.

Pat first wrote to me in January 1997 in response to my first article for the Bulletin - the 'Amateur Repairer' published in the Winter 1996 issue. His letter was congratulatory on my efforts as a self-confessed amateur. Several letters were exchanged during the rest of the year. In one letter I told him that my lifelong interest had been the collection of recorded jazz music, the interest in vintage gramophones and wireless coming much later. In response to this Pat sent me a jazz cassette which I played several times and eventually returned. He subsequently replied that the tape was intended for me to keep. In another letter he invited me to lunch or dinner, should I ever be in his neighbourhood. Unfortunately I never was but these acts of generosity were greatly appreciated.

I had no idea of his distinguished career in radio and television until I read his obituary. Pat had never mentioned this. Obviously I was aware of his expertise from the many articles he wrote for the Bulletin, but that was all. I just found it refreshing that such an expert in his field took the trouble to encourage an absolute beginner.

My last correspondence with Pat was an exchange of Christmas cards last year. In his he stated that he was no longer leaving the BVWS - I had expressed concern over this in a previous letter - and was looking forward to the continued success of the Society.

I am sure you will receive many letters from Pat's friends and colleagues but hope that a small tribute from someone who never met him is also acceptable.

Yours sincerely,
Tony Voysey

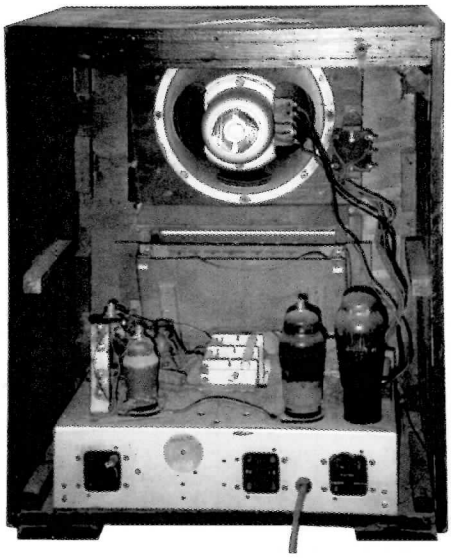
Dear Editor,
With very great regret I read of the sudden death of Mr Pat Leggatt in the last issue of the Bulletin. I had several telephone conversations with him and had been invited to visit him to discuss a receiver I have.

Unfortunately his journey(s) abroad and my own heavy commitments in the last six months caused me to postpone my visit until it was too late. Notwithstanding the general impression conveyed in the Bulletin that he could be formidable and 'did not suffer fools gladly', I immediately found him a most courteous and affable person with whom one could converse with interest, enjoyment and at length.

On a different subject altogether, I read with interest the letter from Mr David Bickerton about finding a signed wireless meeting programme from Sir Oliver Lodge. Lucky Mr Bickerton! He might refer to Jonathan Hill's well-known book "Radiol Radio". There is much about Sir Oliver Lodge in the section on the very early pre-Marconi history of radio. Mr Bickerton will find that Sir Oliver Lodge was one of the principal pioneers in the fields of electricity and wireless. He died in 1940 at the age of 89.

Yours sincerely
James de la Mare

Dear Editor,
I was most interested in the article by Mr Williamson in the last issue on the Invicta radios. For the record, I thought that you might like to have these photographs of one that a friend bought for me for £3 at a local auction. Two of the knobs are not matching and two wires from the speaker transformer



are not connected up, but there is a circuit diagram pasted on to the inside of the back board. The valve line up is:
EC113, EF9, EBL1 and AZ, it is serial 489789, Model A40, A4OC, A4ORG, and on the paper are K.H.K. 9/39 and 5/40, which I assume are dates?

Yours sincerely,
Bob Wyatt

Dear Editor,
My apologies to Jonathan Hill for implying in my article that he had ignored Invicta Radio in his book. I should have said that my edition of "Radio! Radio!" is an old one (1986 edition) and does not have 259 pages!. I am pleased to learn that the make is so well represented in the later edition.

Incidentally there is a mistake in the captioning in my article. The radio shown as a model 42 is in fact a model 24, the cabinet of which was basically a smaller version of the 40. The later model 42 was quite different in appearance.

Yours Sincerely,
W.J. Williamson

Dear Editor
I read in BVWS Vol 23 No4 a letter, page 34/5 which includes a comment about Black cabinets being considerably more expensive that Walnut, for the Ekco B37. The letter includes a query about the probable cost if made in Ivory.

During my engineering apprenticeship I worked for some while in the Witton Moulded Insulation works (known as WMI) of GEC in Birmingham in the period 1945-49. Almost all the products made there were in Black or Brown Bakelite. Items such as light switches. plug tops (then 15 amp and 5 amp), lampholders etc. etc. were made there. The works also made some cabinets for radios, not only for GEC radio dept.

There was a demand for White mouldings for many of these goods and some manufacture was undertaken in White or Ivory. The material was not usually Bakelite as such but a Urea Formaldehide. There were problems with discolouration of the material in use. That was always put forward as a reason why White was not a preferred colour. However small mouldings, particularly the new 13 amp range were always a problem and cost a lot more. Although the works management would never admit it, in my view the main reason for the price difference was that the moulding presses had to be kept clean.

In those days cleanliness was not the order of the day in factories and the rejection rate for any 'pure' colour was always higher that a mottled one as any fleck tended not to be noticed.

Thus a Black cabinet would have a higher rejection rate that a mottled one and an Ivory one even higher. That was reflected in the cost. Later on in my career when working at GEC HQ at Magnet House in Kingsway London I was involved with a major argument to persuade WMI to mould in Ivory for fluorescent tube lampholders and of course we required vast quantities. So troublesome was this that for a time we had Black outer mouldings, which were hidden from view by the luminaire design, with Ivory inserts where the tube base could be seen. Of course. like most manufacture the numbers made/sold reflected the costs as well.

Yours sincerely,
Peter D Parker

Dear Editor,
I am sure that many of the Bulletin readers have, as I have, experienced great difficulty in sourcing suitable drive cord when replacing broken or or 'tired' cords on vintage radios.

Since Radio Spares and Maplin Electronics have discontinued offering this commodity in their catalogues, alternatives which may work but which are cosmetically unsuitable have had to be adopted by us all at some time or another.

At long last, I have found an acceptable replacement cord after a long and protracted but succesful bit of sleuthing worthy of a Sherlock Holmes epic!

In view of my success in this search, I am sure many of your readers will wish to share in my discovery and use this eminently suitable cord for their own restoration work.

I may add that this nylon cord has been specially made up by the firm I have discovered to match the dimensions of cords used between the 1930's — 1960's,

consequently they lend an authentic appearance to any 're-hash' that is required. It could even be 'antiquated' by staining thus 'gilding the lily' if necessary.

The firm to contact is:
Messrs Jackson Twines Ltd.
Unit 19/20, Etheron House, Etheron Industrial Estate, Woolley Bridge Road, Glossop SK13 2NS

Yours Sincerely
Paul J. Bemrose

Dear Editor
In the Summer of 1999 I shall be holding an exhibition of my radio collection covering the years 1918-1999. The venue is to be the Long Shop Museum, Main Street, Leiston, Suffolk.

In 1944 a company called Camton Ltd. of Cambridge was set up with Pye Ltd. of Cambridge to make radio sets for a sister company — Invicta ltd., also domestic appliances for L.G. Hawkins & Co Ltd., another Pye company.

If any BVWS member has any knowledge of this liason or details of any other radio activities at the Long Shop at Leiston, I will be most interested to hear from them.

The exhibition will be opened some time in July, an announcement will be made as soon as details are completed.

Harold Page
81 Dale Hall Lane
Ipswich 1P1 4LW
tel/fax 01473 255152

Visiting France?

by Gordon Williams

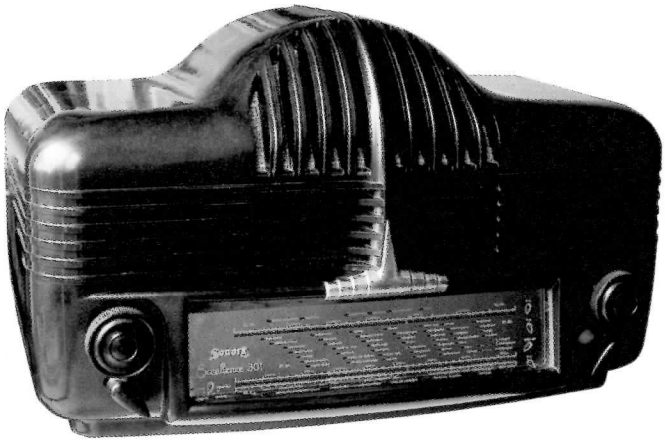
It is much easier to find those old wirelesses for restoration in France than in England. With more Channel hopping and holidaying taking place in France, it gives the enthusiast an opportunity to search out a few sets during the summer to keep him busy through the Winter.

Where to look?
The junk shop, as we know it, is usually marked as a *brocante* or a *dépôt de vente*, sometimes you may be lucky enough to come across a *vide grenier* (an emptying of the attic), which are more akin to our car boot sales. Vide greniers are better for the real bargain since there are normally genuine householders cleaning out their 'rubbish' and few dealers involved. If you can find a charity store called *Emmaus* then search there.

What to pay?
Normally you can pick up a decent wireless for restoration for 200 Francs, broken ones for spares normally go for around 50 to 150 Francs. I always buy whatever the condition for the valves. If you want something a bit above the ordinary, in style and and condition, then expect to pay around 600 Francs. I keep looking for that really rare item but it has eluded me so far.

What are the makes?
The pioneer of French wireless was Eugène Ducretet so you may find Ducretets, or Ducretet-Thomsons. Other common makes are: Schneider, Radiola, Radialva, Desmet, Philips, Sonora, Radiovox, La Voix de Son Maître (His Master's Voice) etc. You will also find many unmarked sets which were made locally, with the local radio engineer making the chassis and the local cabinet maker making the case.

Vocabulary
Most dictionaries don't have the specialised vocabulary that you will need, so, armed your basic school French and the following list, you should be able to complete a purchase.



Wireless	TSF (la téléphonie
sans fil)	
radio	le poste à radio
old radios	les radios
anciennes?	
receiver	le receptuer
crystal set	poste à galène
the case	le coffret
valves	les lampes
dial	le cadran
dial lamp	ampoule de cadran
LW (long wave)	GO (grande onde)
MW (medium wave)	PO (petit onde)
SW (short wave)	OC (onde court)
knobs	les boutons
circuit diagram	schéma général
loudspeaker	haut-parleur
components	les composants
for sale	á vendre
to buy	acheter
the make	la marque
broken	casser
good condition	bon état
bad condition	mauvais état
missing	manquant
does it work?	ça marche?
have you any old radios?	avez vous des radios anciennes?
how much?	combien?
thank you very much?	merci beaucoup

French radio museums

Musée de la TSF - Radio Ardennes
184 Av Ch. de Gaulle, 08000 Charleville-Mézières.
Tel: 03 24 56 12 41

Musée de la radio
Château de Cruelly, 14480 Creully
Tel: 02 31 80 18 65

Musée de la radio et du Phonographe
route du Château de Val, 15270 Lanobre
Tel: 04 71 40 32 89

Musée de la Radio TSM
ZA de Grossines, 17320 Marennes
Tel: 05 46 85 37 60

Musée de la Radio et du Phonographe de Belvoir
rue du bourg, Les Prélots, 25430 Belvoir
Tel: 03 81 86 80 18

Mini-musée de la radio
Rue Hippolyte Parrenin 25130 Villers Le Lac
Tel 03 81 68 44 03

Collection-Expo Transmissions Militaires 'Les Stéphanois'
Jean Gonneaud, 3 rue de l'Eglise, 30170 Saint Hippolyte du Fort
30 years of collecting military radio.
Appointments only
Tel: 04 66 77 25 70

Musé Joël Lacrouts
33720 Podensac
Appointment only, preferably Saturday or Monday afternoon.

Musée de la Radio-TSF
42520 Saint Appolinard (opposite the mairie)
Appointment only
Tel: 04 74 87 37 46 (René Mallet) or
04 74 87 3002 (Jean Giraud)
Entrance fee payable

Musée de la Radio
43500 St Victor Sur Arlanc
Afternoons only 1430 to 1900
Groups welcome by appointment
Tel: 04 71 03 34 25, Fax: 04 71 03 36 77

Musée Européen de la Communication
Château de Pignerolle, 49124 St. Barthélémy d'Anjou
Tel: 02 41 93 38 38

Musée Cocset
35 rue Charles de Gaulle
51420 Cernay Les Reims
Tel: 03 26 07 30 58

Musée 'Les Sanglots longs'
Règuiny 56500 (opposite the lake)
Open March 1st to October 31st
Tel: 02 97 38 61 11

Musée de l'histoire de PTT
68340 Riquewihr
Tel: 03 89 47 93 80

Musée de Radio France
116 Av du President Kennedy
75116 Paris Cedex
Tel: 01 42 30 15 16

Musée de la TSF TH.B
136 rue de Charnay, 79400 Nanteuil
Tel: 05 49 05 55 93

BVWS Minutes

BVWS Committee meeting held on Thursday 1st October 1998 at 5 Templewood, Ealing

Present: David Read (Chairman), Carl Glover, Ian Higginbottom, Pat Leggatt, Guy Peskett

1. Apologies: Jeffrey Borinsky, Steve Sidaway, Mike Barker

2. The minutes of the meeting held on 27 August were approved and signed by the chairman.

3. Matters arising (not returned to later)
CG reported a quotation of £350 received for the reproduction of 500 sets (3) of Norman Jacksons posters. It was agreed that the purchase of these should go ahead. The backgrounds would be in colours similar to those in the previous sets and some inaccuracies in a few of the captions present in earlier versions would be corrected.

4. Production of Committee minutes It was agreed that the procedure should be:
(i) first draft sent to Chairman on day after meeting,
(ii) second draft sent out with agenda for next meeting,
(iii) Final version sent to Publications Secretary after meeting.

5. PL reported that Keith Geddes, one of our honorary members had died. It was agreed that PL should write an obituary after talking to members who knew Keith. PL reported that the membership currently stood at 1203.

6. Some errors in the data used to generate the membership list were noticed after the list had been produced. These have now been corrected. It was decided not to re-issue the list as it is now late in the membership year.

7. GP reminded the Committee that it had not been possible to publish the members interest keywords (collected on the renewal and application forms this year) because an error in the design of the form meant that authorisation for publication was not obtained. GP proposed that this be corrected this year. This was not agreed.

8. DR tabled a proposal that subscription income should in future cover the costs of administration and of providing the Society's regular publications and that the less predictable income from sources such as meetings and auctions should be used for projects such as special events and publications. This was approved. The new subscription rates would be £19 ordinary; £21 European (air mail); £25 worldwide (air mail).

9. DR reported that Jonathan Hill's BVWS History was now in proof and was expected to be available in the new year.

10. There was no time for discussion of the proposed changes to the Constitution.

11. AOB
(i) CG agreed to produce membership cards.
(ii) PL suggested that selected material from early Bulletins be put onto CD.
(iii) Date of next meeting, 3 December at Rosendale Road.

The meeting closed at 11.35 pm

Minutes of BVWS Committee meeting held at Southborough on Sunday 8 November 1998 at 12.30 pm

Present:- Mike Barker, Steve Sidaway, Carl Glover, Ian Higginbottom, David Read (in the chair), Guy Peskett

1. Apology, Jeff Borinsky

2. Minutes of last meeting
The minutes of the meeting held on 1st October were approved after minor changes

3. Arrangements for early 1999 DR reported that MB had shouldered the burden of running the membership administration following the untimely death of Pat Leggatt. Pat's computer containing the data base would be transferred to MB after the meeting. MB reported that the membership renewal forms had been produced ready for circulation with the Christmas Bulletin. DR reported that he had prepared an explanation of the basis on which the subscriptions for 1999-2000 were calculated. DR reported that he had also written a short piece for the Bulletin urging members to consider serving on the Committee following the lack of nominations received for 1999-2000.

4. Data on Members interests
GP agreed to produce a form to gather keywords summarising members interests and prepare copies for circulation with the Christmas Bulletin. GP agreed to enter the data collected into the membership data base in time for it to be included in the Members Handbook.

5. Bulletin deadline
CG reported that the Christmas Bulletin had been delivered to the printers. It was agreed that papers for circulation with the Bulletin should reach the Vintage Wireless Museum by 18 Nov.

6. Arrangements for next Harpenden
SS reported that the arrangemeents were in hand and reminded the Committee that this would be the 20th anniversary of meetings at Harpenden. SS would produce a back cloth for the admissions table drawing members attention to this. Discussion of the possibility of also producing a banner would continue outside the meeting. SS announced his intention of holding an exhibition of restoration at the coming meeting and holding restoration contests at following meetings.

7. Jonathan Hill's History of the BVWS DR confirmed that it was expected in the spring.

8. Constitutional Matters
Responding to Pat Leggatt's death had absorbed the Committee's attention and had left insufficient time to consider proposed amendments to the Constitution. It was agreed that no amendments would be proposed this year.

9. AOB
DR reported that he had received a letter from Duncan Neale suggesting that a memorial should be made to Pat Leggatt. DR suggested that an appropriate memorial would be an annual award for the best Bulletin article of the year, the prize to be a year's free membership. This was agreed. DR also reported that he had received a letter from Geoff Hanham in Scotland requesting Society support for meetings in the Borders. It was agreed that the Society would publicise the first such meeting.

The date and venue of the next Committee meeting were confirmed as 3 December at Rosendale Road.

The meeting closed at 13.35pm.

Minutes of BVWS Committee meeting held at 23 Rosendale Road on Thursday 3 December 1998 at 8.0 pm

Present:- Mike Barker (in the chair), Carl Glover, Ian Higginbottom, Jeff Borinsky, Guy Peskett

1. Apologies: Steve Sidaway, David Read

2. Minutes of last meeting
The minutes of the meeting held on 8th November 1998 were approved after minor corrections. Concerning the Pat Leggatt award, it was suggested that the best Bulletin article of the previous year be chosen by a ballot of members by including a box for this on the renewal form. This was agreed.

3. MB reported that the membership stood at 1212.

4. CG reported that the next Bulletin was about one quarter done. It will feature the first of a series of articles on valves.

5. It was agreed that, on a temporary basis, the technical library assembled by Pat Leggatt should be held by Alan P Carter until a permanent home is found and the items relating to BVWS history should be held by GP. MB and GP agreed to review the material they were currently holding and to pass on appropriate items to the two custodians. MB would approach Alan Carter to confirm his willingness to hold the library. MB reported that Martin Bennett had agreed to take over the task of maintaining the Bulletin index and the list of GPO registration numbers.

6. Reports of undesirable trading practices at a recent meeting and resulting from a recent advertisement in the newsletter were discussed. The discussion was adjourned with the intention of contiuing it at the next opportunity.

7. New ways of encouraging members to take on the office of Membership Secretary were discussed and will be pursued after Christmas if no volunteer has come forward by then. CG reported that he would seek an assistant and report back on progress.

8. AOB
A letter from David Read to a member clarifying the position on elegibility for the office of Chairman was tabled.

CG tabled examples of membership card designs for the next four years.

It had been brought to the attention of the Committee that some enclosures had been omitted from some members Christmas mailing. It was hoped that these were just isolated instances. MB will take this up with the mailing team.

The next meeting was scheduled for 28 January at Templewood, Ealing

The meeting closed at 10.10 pm

Left: the clock which used to hang in Rupert Loftus-Brigham's shop in Ealing for about fifteen years or so before it was closed permanently. Probably of late 30's vintage, it features a Smiths 'Bijou' movement, when plugged in the clock gives an eerie dim glow due to the green pygmy bulb inside. The clock is now in the hands of BVWS member Roger Grant who is considering reproducing copies. Roger can be contacted via the membership list.

A few words from the incoming Chairman

When David Read made public, his decision to take a well earned break from Committee duties, I was suprised and flattered at suggestions from people at Harpenden last year, that I should stand for the position of Chairman. This was not something that I had ever given any thought. I decided that there were many things that still needed attention and I was capable of directing these to a sucessful conclusion. Things that I beleive need immediate attention are:

Representation. BVWS stall at all meetings, Internet Website expansion, advertising and a presence at special occasions, exhibitions and museums.

Information. Re-instate information services and access to archive material.

Celebrations. Millennium, 1901 Marconi Atlantic transmission centenary, 1904 Fleming Diode etc...

Publications. New Posters, Servicing items, varied re-prints, newsletter overhaul and Membership list extension to make it a useful companion for every member.

Interests at meetings. Displays, demonstrations, competitions, challenges, workshops, projects etc...

This just scratches the surface of my list of "things to do". With many good ideas being submitted from the members on the interest forms just returned, the list grows daily ! It's going to be a busy and difficult year ahead but not impossible!

On top of all this, I must find time to build a new workshop at my home, as the old one, I built 19 years ago at my parents house is bulging to the limits, and if emptied would surely just fall down !

Mike Barker.

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 Ekco's.

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.

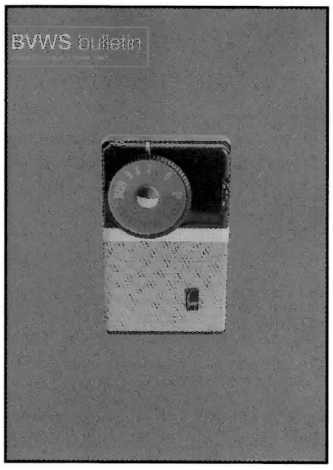
Vol 19 Numbers 1, 2, 3, 4, 5, 6 Inc. The Birth of the Transistor, Super Inductance and all that, reflex circuits, A Murphy Radio display, restoration.

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 Number 1, 2, 3, 4 inc. Sonora Sonorette, Bush SUG3, RNAS Transmitter type 52b, North American 'Woodies'.



Supplements:

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

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

Postage:
for individual bulletins add 50p, for 2-5 bulletins add £1, for 6 or more add an extra 20p each. 23 Rosendale Road, West Dulwich London SE21 8DS Telephone 0181 670 3667. Cheques to be made payable to 'The Vintage Wireless Museum'.

News and Meetings

GEC makes Marconi collection safe in Chelmsford

The unique collection of archive materials and artefacts reflecting the life and times of Guglielmo Marconiwill be preserved for the nation and displayed at the new Essex Record Office, Chelsford, due for completion in Spring 2000.

'Gwefra Gwifrau' Wireless in Wales

A small collection of domestic radio receivers from the 1920s and 1930s will be on show at Denbigh Library, North Wales, from 12th March until the end of June 1999. The radios will be part of an exhibition depicting a concise view of the history of broadcasting in Wales up until the outbreak of war in 1939. It is hoped that this will eventually be part of a permanent display at Canolfan Iaith Clwyd (Clwyd Language Centre) also in Denbigh.

For further information please contact:
Rose McMahon Curator and Research Officer
Denbighshire Records Office, Rhuthun. Tel. 01824703648

David Jones, Canolfan Iaith Clwyd, Pwll y Grawys, Denbigh LLI6 3LF.
Tel. 01745813402

Christies Auction

The wireless collection of the late-departed Pat leggatt will be auctioned off at Christies on **April 8.**

Wootton Bassett meetings

Mike Barker will be organising a swapmeet on **4th July** and **5th December.**

Harpenden meetings

There will be an auction, a restoration contest and the AGM on Sunday **7th of March.** Sunday the **6th June** hosts a swapmeet. Autumn is heralded with a swapmeet on **5th September**, and the year finishes with a swapmeet on the **28th of November**.

Portishead meetings

There will be a swapmeet on Sunday the **18th of April** and Sunday the **3rd of October**.

NEC Meetings

Jonathan Hill's 'National Vintage Communication Fair' meeting will occur on the **8th May** and **October 24th**. For further details on the NVCF please refer to the advertisement on page 2.

Southborough Meetings

John Howes will be holding a Southborough swapmeet on **October 17th.** Bookings/enquiries (01892) 540022.

Shifnal Meetings

Chas Miller of 'Radiophile' fame will be holding meetings on the **21st March** and **3rd October.** There will be a Sambrook "Summer Special" on **25th July.**

American meetings

4th - 7th August: ARCI Radiofest XVIII, Elgin, Illinois. Further details to follow when known

Gerald Wells' garden party

Gerry Wells will be having a garden party on Saturday **5th June** at the Vintage Wireless Museum, 23 Rosendale Road, West Dulwich, London SE21 8DS. Telephone 0181 670 3667.

New Articles

If you have anything interesting to say concerning Wireless, Television, Broadcasting, Collecting etc. please send it to the Editor for future publication in the BVWS Bulletin, as the Bulletin is only as interesting as the articles that comprise it. We welcome all suggestions and comments regarding the new appearance of the Bulletin and hope that it is catering to your needs as a collector / enthusiast / historian. Your article can be just a few paragraphs long as long as you think it conveys its message across to your fellow members.

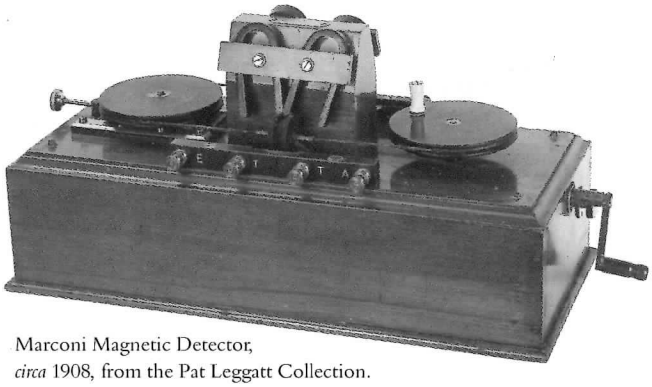
Also if you have any photographic material that would look good in the Bulletin, don't hesitate to post it to the Editor. The chances are that I will definitely use it!

Please send all articles to: Carl Glover, c/o Runciter Corporation, 33 Rangers Square, London SE10 8HR.

MECHANICAL MUSIC

including the

Pat Leggatt Wireless Collection



Marconi Magnetic Detector,
circa 1908, from the Pat Leggatt Collection.
Estimate: £4,000–£6,000

AUCTION:

8 April 1999 at 2.00 p.m.

ENQUIRIES: Christopher Proudfoot on (0171) 321 3272

CATALOGUES: (0171) 321 3152/(0171) 389 2820

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85 Old Brompton Road, London SW7 3LD
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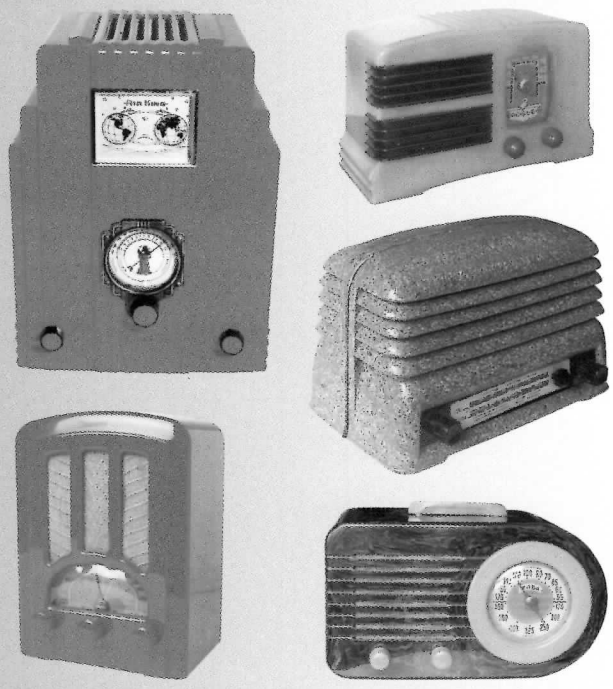

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Swapmeet at

Wootten Bassett

The Memorial Hall, Station Road, Wootton Bassett
(3 miles from M4 Junction 16, turn left after Town Hall)

4th July 1999

doors open at 10.30 to 4.30

£2 entry - no booking required
£12 for stall plus helper

stallholders please book by telephone or letter
phonecalls after 6pm please

Mike Barker: 59 Dunsford Close, Hillside Park, Swindon. Wilts SN1 4PW. Telephone 01793 536040

Swapmeet at

Portishead

18th April 1999

Clarence House, High Street, Portishead
doors open at 10.am
Hot meals served throughout the day • bring and buy stall
auction at 1pm

£2 entry - no booking required
£10 for stall plus helper
stallholders please book by telephone or letter

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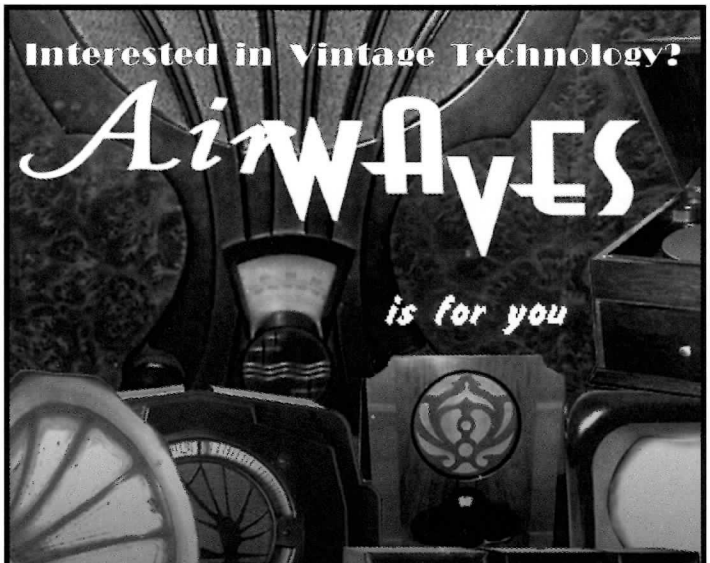

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