BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

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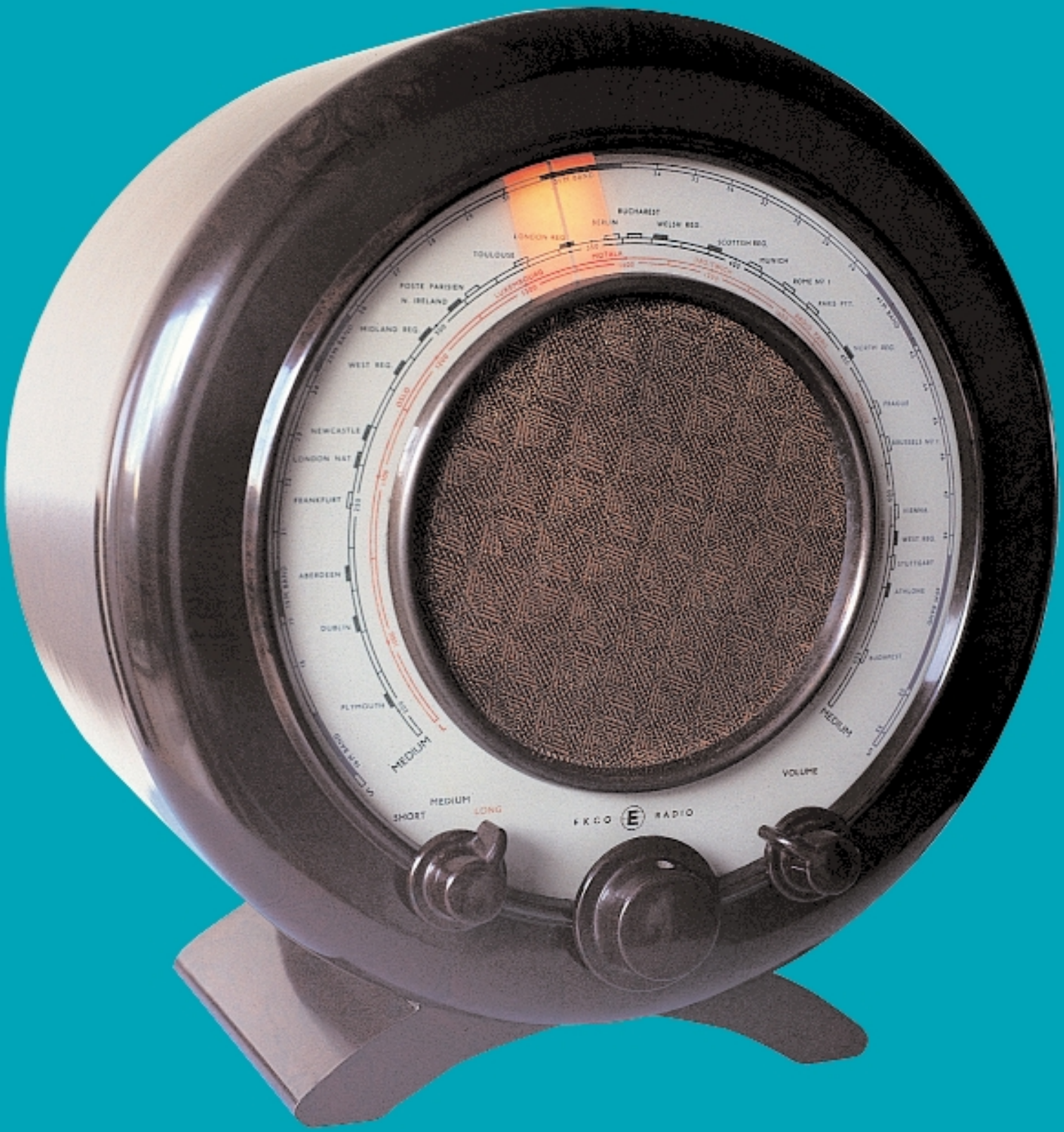
BVWS

BULLETIN



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BULLETIN OF THE BRITISH VINTAGE WIRELESS SOCIETY

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Contents:
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Volume 20 No.1 February 1995

Front Cover: An Ekco A22 in Walnut Bakelite with bronze trim.
Photography by Mark Groep

Rear Cover: Gecophone Advertisment

In Passing

From Robert Hawes To the Emergency Committee and Members of the BVWS

After 13 years as Editor of the BVWS Bulletin I have decided to hang up my gloves and withdraw from running again for office.
I do so in the light of my satisfaction in bringing about a more democratic process to the appointment of BVWS officers; and as a result of this a new Committee for 1995 with plenty of new and well qualified people. It will also enable me to concentrate fully on the publishing of my next book as well as leave me free to develop fresh ideas and personal opportunities.
I wish all my friends well and look forward to my continued and friendly association within the BVWS.

The membership will wish to express its thanks to Bob Hawes who retired at the end of 1994 after serving for 13 years as Editor. His experience in journalism and publishing together with his interest in design did much to transform the appearance and content of the Bulletin during his editorship.

Bob will also be remembered for his work as the organiser of the Harpenden meetings where those attending found him an unfailing source of help and advice. His work with the Society also took him to many regional meetings where he presided over the sale of BVWS publications and badges.

For all his efforts in so many aspects of the Society's affairs he not only received but earned his honorary membership. Thank you again Bob, and our best wishes for the future.

Gordon Bussey

Editorial

Most members will by now know of Bob Hawes' retirement, and reading his letter and the Appreciation in this bulletin, may be curious to know what alternative arrangements are in store. It is appropriate therefore to put the current affairs of the Society into a broader context and reflect on the transition that is taking place.

Firstly concerning the Society's publications. Our Bulletin is largely the work of those members who write letters, contribute articles and generally provide the balance of information and content which makes for an enjoyable product. Under a new Editor the Bulletin will have a new look, as befits a new personality, but its success will as before depend on the membership to submit material. It is commonplace in all organisations that its critics outnumber the few who are prepared to give their time; so you are all urged to write letters, stories or articles about the things that interest you, and send them in so that the Editor is able to select, edit and produce from as wide a choice as possible.

As the Society has grown, and we are now over a thousand strong, old methods of production and printing must give way to new. Computer typesetting with scanned illustrations and screen controlled layout will be managed by the Editor so that the printer need only be provided with a disk. It is our intention by these means to provide the best product at a significantly lower cost to our members, and we have the technical resources and skills to do it.

The next Bulletin as well as this one will be produced by the Emergency Committee. This will not only restore our 1995 timetable, but enable us to give you the result of the elections in the next edition, and as soon as possible after the results are in. These Bulletins represent a transitional stage and we are grateful to Carl Glover for standing in at short notice and helping to produce them. Subsequent editions will be the responsibility of the New Committee and Editor, and in this respect you will have seen from your voting papers that Carl is to be elected to the editorship unopposed. Members should be confident therefore that the Bulletin will continue as usual, but to a standard that satisfies the essential requirements of quality, balanced content and timeliness at the lowest possible cost.

Turning next to the Society's meetings. These will carry on as the friendly events they have always been. The major meetings will continue at the traditional Harpenden Hall venue under the direct control of the Events Organiser. As the membership has grown the Hall's capacity has sometimes been stretched to bursting point and the new Committee will no doubt keep this under review. A new and larger venue may well be needed at some time in the future.

Our regional meetings have always been organised by local members under the umbrella of the Society's events calendar, general code and public liability insurance cover. The profit from local meetings has been a valuable contribution to BVWS funds as shown in the accounts circulated with the last Bulletin, and the local organisers are to be congratulated and thanked for the effort they put in on behalf of our members. For the future some of these regional meetings may be run on an affiliated basis (and Portishead is a case in point). We would expect these to be the usual friendly meetings and members should notice little if any difference.

Lastly, members are reminded what the Society is since it is undeniable that its members have felt uncomfortable and uncertain about the events that closed 1994. It is a club and not a political organisation. Our purpose is to provide a forum for those with a historical and collectors interest in the subject of radio and TV, not to provide a channel for ambition or commercial opportunity. Over the years at AGM's members have been regularly urged to stand for Office on the Committee. To come inside and do, rather than stay outside and criticise, since people become suspicious when the same old faces seem to be in charge year after year. Unfortunately few came forward until it was too late to avoid the trouble that hit the Committee of 1994, and nearly all of it quite undeserved. Care will be taken that this does not happen again.

The Emergency Committee places on record its thanks to the outgoing Chairman Pat Leggatt. The BVWS has not known a more honourable and decent individual. We are confident that the new Committee under a newly elected Chairman will ensure the continuing health of the BVWS in 1995 and in future years. We join you in drinking to that.

David Read
for the Emergency Committee

VALVES: WHAT THEY DO AND HOW THEY DO IT PART 2

By: Pat Leggatt

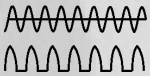


Figure 1

Thermionic Emission

A simple model of an atom is a central nucleus surrounded by a number of electrons spinning round it. An electron is a minute negatively-charged particle of electricity, and it is a flow of electrons which constitutes an electric current in a conductor.

Some of the electrons spin in orbits quite close to the nucleus and stay that way in a well-behaved fashion. But some electrons are in outer orbits and not so tightly tied to mother nucleus's apron strings: these comparatively free electrons can fairly easily wander away and it is they which may flow along a conductor when a battery is connected to lure them away from their parent atom.

If a metal wire - perhaps coated with a special mineral - is made red or even white hot, the 'free' electrons get very agitated and start dashing about. Some move so violently that they shoot out from the surface of the wire and this is known as thermionic emission 'therm' to do with heat and 'ionic' to do with charged particles.

The electrons emitted from the hot wire can, under suitable conditions. be used for all sorts of purposes; and all valves, apart from some rather specialised kinds depend on thermionic emission for their operation. One of the necessary conditions is that molecules of air or other gases do not get in the way of the emitted electrons, so a valve is enclosed in a glass or metal envelope which is highly evacuated to remove as far as possible, all traces of gas. Because of this, Americans call valves 'vacuum tubes' or just 'tubes' for short. In the UK we also use this term when speaking of the cathode ray tube in a TV set, which is indeed a special variety of valve.

The Diode

All valves have at least two electrodes, a filament (or cathode) and a plate (or anode). The diode (two-electrode) is the simplest sort of valve, since a 'monode' with only a filament would be just a light-bulb and not a valve at all!

The filament in a battery valve - or a metal tube with a heating filament inside in the case of an indirectly heated mains valve - is known as the cathode; and the plate is known as the anode. The filament, or heater in a mains valve, is fed from a low tension (LT) supply to heat it up.

The cathode (filament wire or tube) is coated with special minerals which readily emit electrons when heated. The valve as a whole is enclosed in a glass, or sometimes metal, envelope which is highly evacuated.

The basic operation of any valve may be easily understood if one remembers that "like charges repel; unlike charges attract". Thus if the anode of a diode is made positive to the cathode, the negatively-charged electrons emitted from the hot cathode will be attracted to the positive anode and current will flow through the valve. If, on the other hand, the anode is made negative to the cathode, then electrons will be repelled by the anode and no current will flow.

We can now see how the diode acts as a rectifier. If an alternating voltage is applied to the anode, the cathode electrons will flow to the anode during the half-cycles when the anode votage is positive; but no current will flow during the other half-cycles when the anode becomes negative. The anode current is a series of half-cycle pulses flowing only one way (Fig. 1), from cathode to anode, and the AC on the anode has been 'rectified' into a uni-directional current of DC.

Wehnelt used this rectifying action to derive DC from an AC source for charging accumulators or for driving motors: Fleming used it to derive DC from a high-frequency radio signal for indication on a meter or other device: and radio receivers use it to extract the programme speech or music from a broadcast transmission, and to provide the necessary DC voltages for receivers working from AC mains.

INVESTING IN EKCOS

By: 'Trickle Charger'

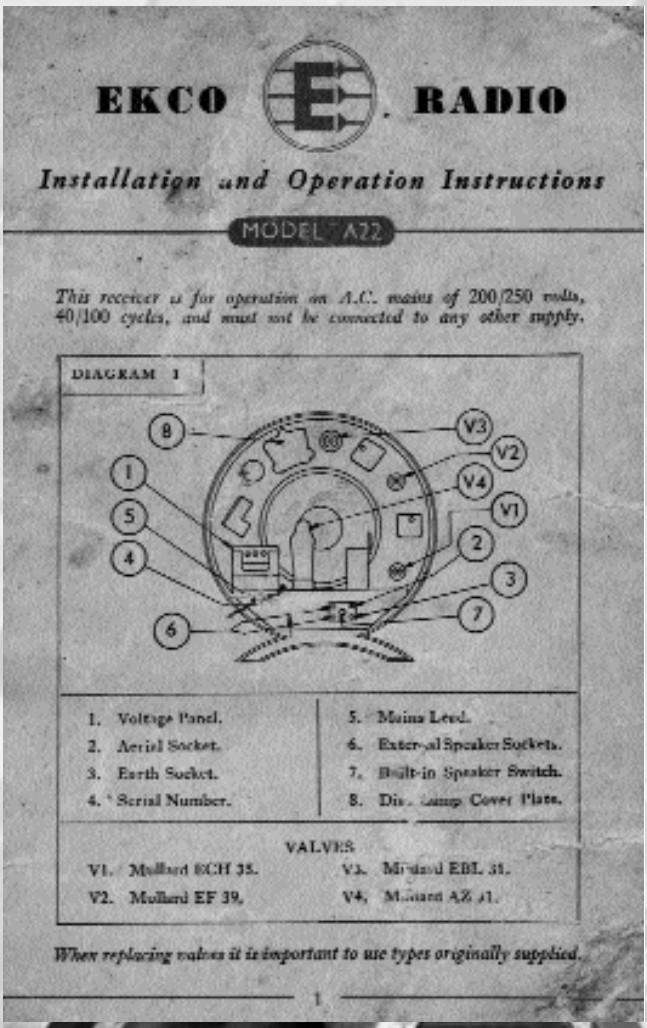
The prices fetched at auctions are interestingly unpredictable; that is their fascination. I have been attending Christie's Mechanical Music auctions for some years, and recommend them. I hardly ever buy anything, but at viewing time one is allowed to play with all sorts of bizarre mechanisms which emit unexpected noises, and besides so many B.V.W.S. members are there that it is almost an unofficial meeting.

Comparing prices from sale to sale is not easy, but over the years the most commonly recurring model is the Ekco A22. This, to my mind, is over-rated, and if it wasn't round would not attract any interest, but collectors who know nothing about radio have been told that Round Ekcos are interesting, and some silly bids result.

Over the years I have been looking at prices, and here they are:

April	1989	**£110**
August	1989	**£286**
November	1989	**£715**
April	1990	**£418**
July	1990	**£528**
April	1991	**£462**
December	1991	**£352**
December	1992	**£330**
December	1993	**£360**

These prices include the buyers premium.



EKCO RADIO

Installation and Operation Instructions

MODEL A22

This receiver is for operation on A.C. mains of 200/250 volts, 40/100 cycles, and must not be connected to any other supply.

DIAGRAM 1

1. Voltage Panel.
2. Aerial Socket.
3. Earth Socket.
4. Serial Number.
5. Mains Lead.
6. External Speaker Sockets.
7. Built-in Speaker Switch.
8. Dial Lamp Cover Plate.

VALVES

V1. Mullard ECH 35. V3. Mullard EBL 31.
V2. Mullard EF 39. V4. Mullard AZ 31.

When replacing valves it is important to use types originally supplied.

1

Left:
An Ekco A22 Instruction booklet

Right:
The Ekco A22 In Walnut bakelite with Bronze trim

Below Left:
The Ekco factory viewed from the air circa 1946

Well, what happened in November 89? Whoever bought that one is probably kicking himself. It is interesting, though, that apart from April 90 the prices show a slow decline thereafter.

Of course, condition has a lot to do with it, but none of these sets were in bad shape, in fact a cracked A22 went for £40 not so long ago.

Readers can draw their own conclusions, but would anybody like to guess what an A22 will fetch in, say, ten year's time? By then this set should have reached its proper price. Those who regard old radios as an investment should take notice!

The Classics: The Double Decca

By: Geoffrey Dixon-Nuttall

Previous sets in this series have been chosen for their merit. The Double Decca, however, is not famous but notorious. Anyone who has spent hours trying to get one of these things to go will have it engraved on his mind, and will occasionally have a nightmare in which one climbs through the window.

The original model came out in 1939. It was one of the few British mains-battery portables. The name was clever, but inaccurate, as it was actually treble - A.C, D.C, or battery, although there is some doubt as to whether they ever operated properly on 100 volts D.C.

In the States where this sort of set originated, there was something to be said for the idea, as the low mains voltage meant that there was less heat dissipated, and the low cost of valves meant that the odd accident could be forgiven.

The original design ran the filaments in parallel on battery, and in series/parallel on mains. A valve rectifier was used, with a line cord to feed its heater. Various modifications followed, including a perfectly horrid line cord with five connections at one end. The filaments were now operated in series on mains, but still in parallel on battery.

Dealers were wise to the habits of the Double Deccas, and during the War it was general practice to refuse to fit valves to them, as these usually had a short life.

After the war a new version appeared (Model 46). You would have thought they had had enough by now ! This was re-styled and looked very smart, being selected for the “Britain can Make it “ exhibition, presumably on this basis alone. The chassis was quite new; the filaments were now permanently in series, and a selenium rectifier was fitted. The batteries were permanently connected to the set; this was a bad idea because

as the rectifier lost output, which it inevitably did, the set ran on batteries even if it was connected to the mains. A 30 ohm resistor was fitted in series with the filaments on battery, which in effect turned the 7.5V battery into 6 volts, and so resulted in it being thrown away prematurely. Later versions of this set used miniature valves.

Another re-design took place in 1950 (model M/L). The short wave band was dropped (the 1R5 was not too good on SW), and, at last, bleeder resistors were fitted to allow for the cathode current, and the series resistor was reduced to 10 ohms.

The batteries now were disconnected completely on mains. The mains-battery switching was operated when the mains connector was inserted, which must have produced a healthy splat if the set was switched on at the time!

This idea, however, was dropped in the final version (Model 51,1951) and the short wave band returned, also the series resistor was removed.

What was the trouble with it? It is difficult to know where to start. One glaring fault was the lack of provision for the anode current. If you have filaments in series, the output valve is usually at the positive end, so as to provide bias by returning its grid to earth. Its anode current then flows through the other filaments, which act as its cathode resistor. This current was not allowed for in the earlier versions, and consequently the valves at the bottom end had a hard time of it.

There were other snags. When the filaments are at different voltages, returning the grids to a common A.V.C. line can be full of pitfalls. The postwar set, for example, has the valves returned to chassis in the order in which they are used in the circuit. This means that the A.V.C. line is three volts positive, as it is returned to V3 filament by the diode load. Therefore the grids of V1 and V2 are positive, and, worse, the detector diode is biassed negatively. This produces an effect like a round Ekco with the noise supressor on; a very quiet background out of which strong stations appear.

There was also the usual casual attitude to safety. The chassis screws were supposed to be covered with tape to stop them touching anything, but it didn't always get replaced. (The chassis, was, of course, live).

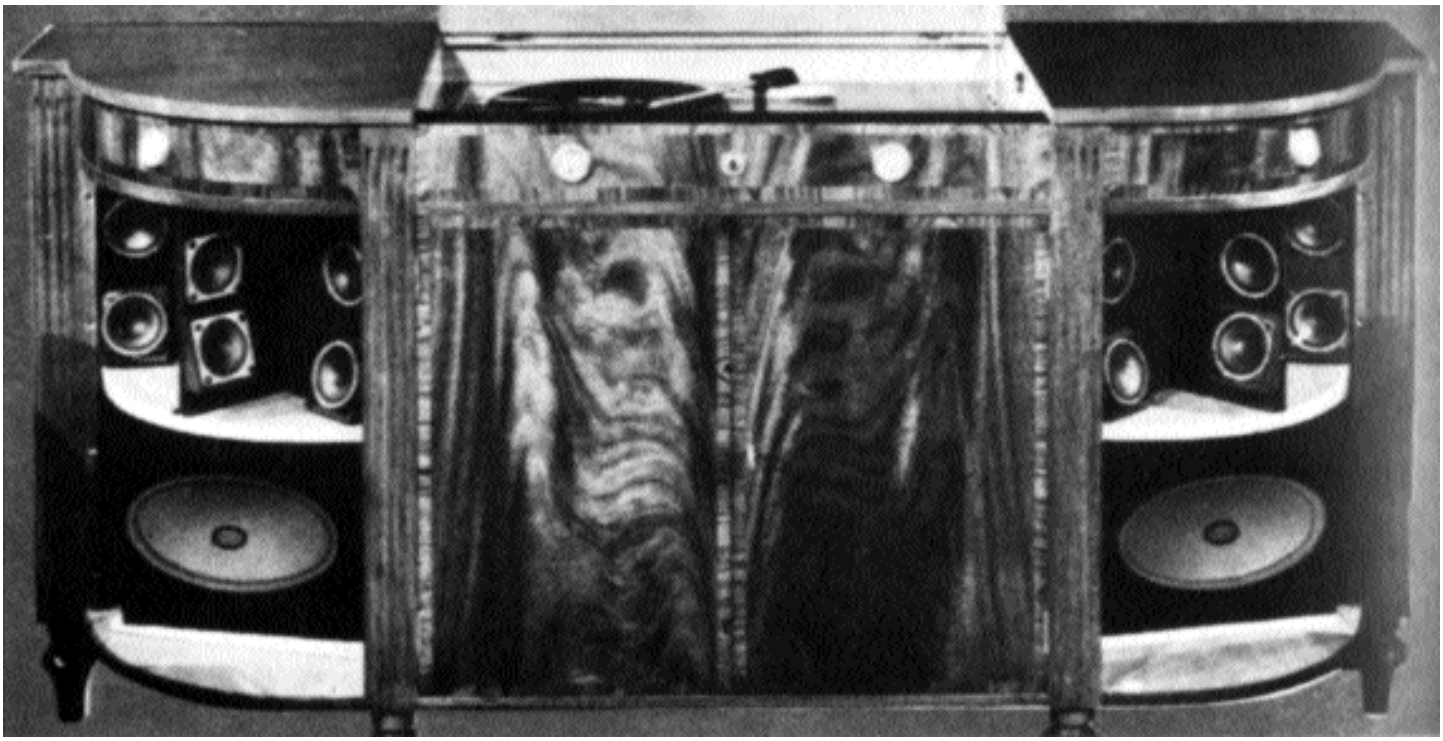
A peculiarity of all these sets was the I.F., which was 382 kHz before the war, and 380 after. The reason for this is a mystery, unless it gave a bit more gain.

The whole subject of mains-battery sets is fraught with danger. These valves are rated at 1.4V; they will actually work at 1.6, which is equivalent to a new battery, but they are not intended to stand this for very long. On mains-battery sets they are usually run in series from a 7.5V battery, which is O.K. if the volts are equally distributed, but if they are not, the valves are soon destroyed. It is also interesting to contemplate what happens if the filament of the output valve should break; the L.T. volts will then rise to the mains peak (350 volts)as there is no current. The L.T. smoothing capacitor is rated at 200 UFd at 15 volts, and should produce a good bang! Which reminds me that the last of these sets I had anything to do with detonated its mains-battery switch with a loud report. It is a small wafer type, with very little gap between sections.

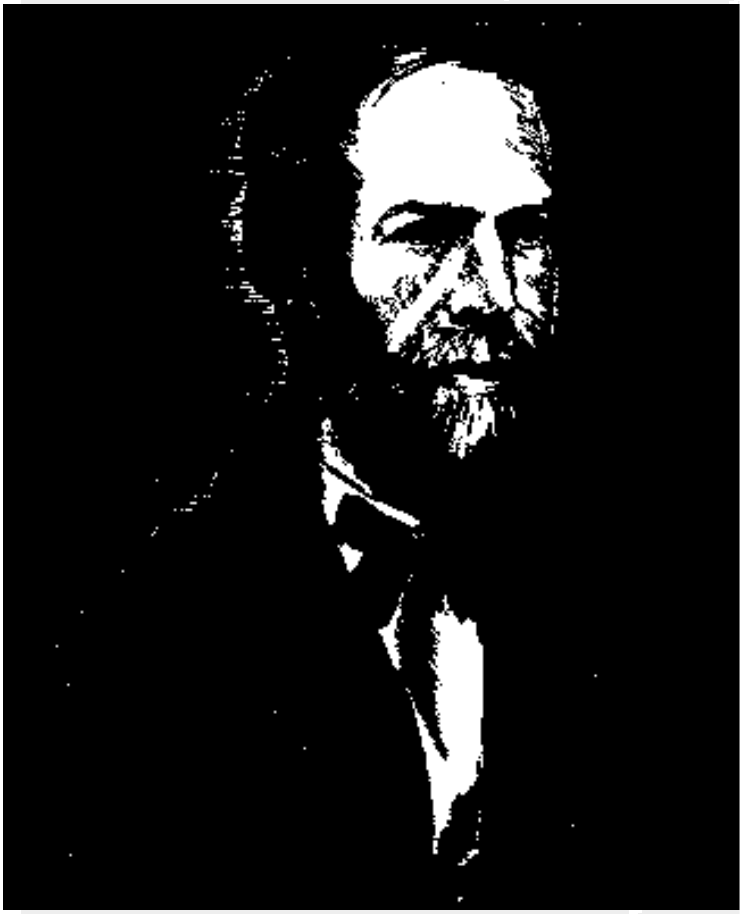
Early versions of the postwar model had an electrolytic capacitor connected to the mains L.T. supply. This meant that this would charge up, and when the set was switched over from batteries, the resultant discharge did in another filament. This was soon modified, the capacitor being fitted across the filaments, so that it absorbed the surge, instead of supplying it !

One of the advantages of the transistor receiver is that this sort of nasty design is a thing of the past but some collectors might like to keep a Double Decca as a pet, if only to remind themselves that things do occasionally get better. They are, luckily, quite rare.

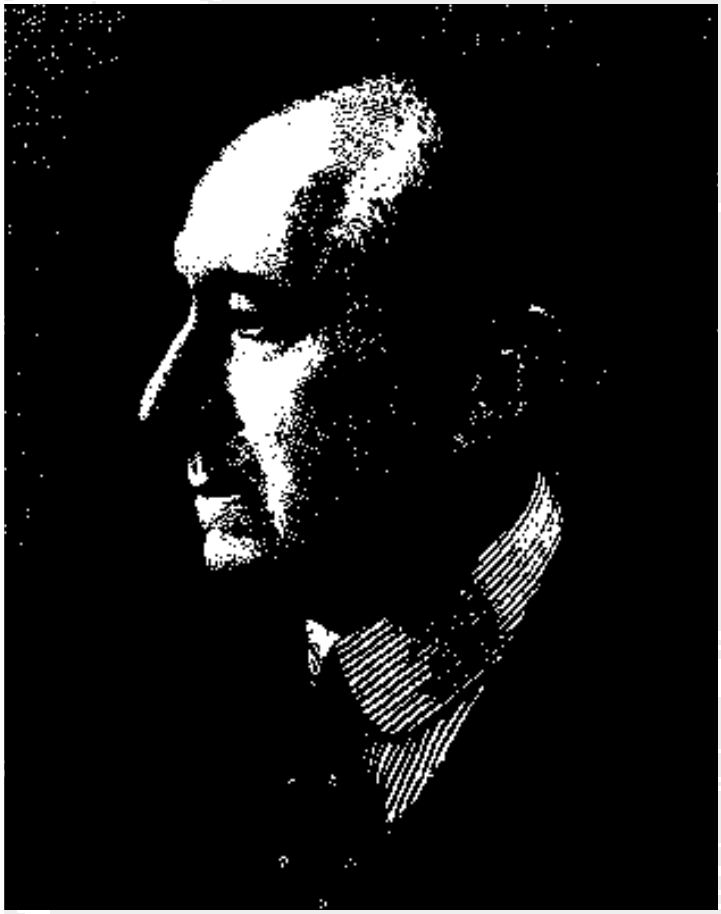
Below: The Stereo Decola of 1958 shown with the decorative grilles removed



Why Did Hertz Demon



Heinrich Hertz
1857 - 1894



Guglielmo Marconi
1874 - 1937

The story of the origins of the radio has often been told, sometimes in rather simplified form on the following lines. Michael Faraday in 1831 suggested that magnetic and electric forces might be propagated through space as some sort of wave motion. Clerk Maxwell in the 1860s gave a rigorous mathematical basis to this concept of electro-magnetic waves. In 1888 the brilliant experimentalist Heinrich Hertz demonstrated that these waves did actually exist. And in the 1890s Guglielmo Marconi developed a wireless communication system utilising these Hertzian waves.

This version of events should be taken with a pinch of salt; not because it is untrue but because, as we all know, a bit of salt helps to bring out the real flavour of things. In fact the background is rather more interesting than the bare bones above would indicate; and in particular what Hertz had in mind when carrying out his classic experiments is not often discussed.

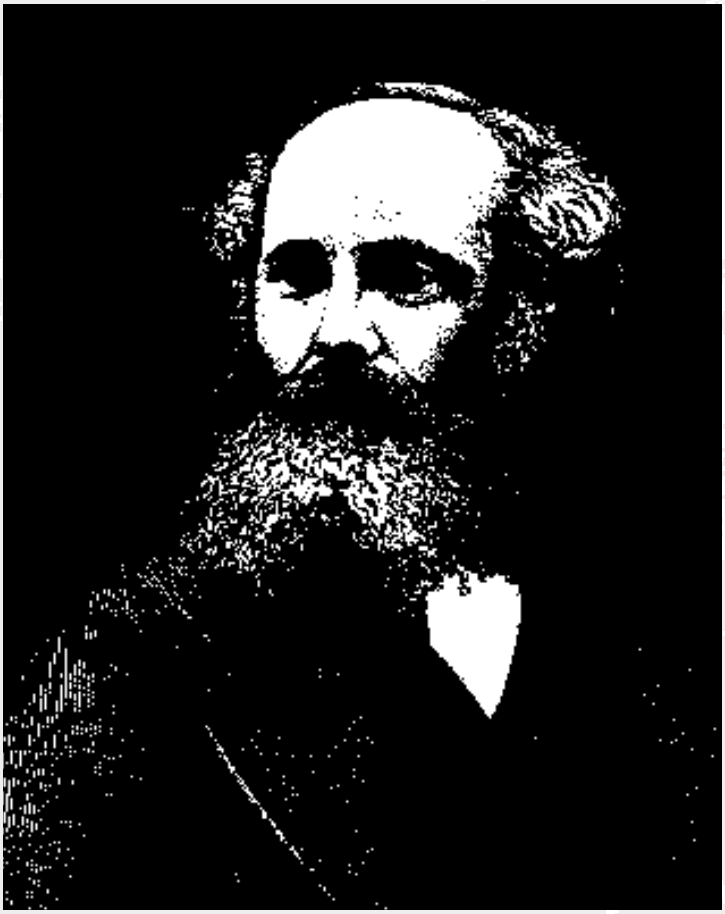
A number of people had observed electromagnetic radiation in the years before Hertz's experiments, notably David Hughes in 1879, but without relating their observations to Maxwell's equations. In fact Maxwell's writings were quite obscure in parts and clouded with some rather strange analogies of electric fluids in the ether: while he declared that light and heat waves were electromagnetic in nature, he did not very clearly draw attention to the whole spectrum of electromagnetic waves which were implied in the equations, nor did he consider the possibility of generating them by electrical means.

Maxwell's Treatise on Electricity and Magnetism of 1873 was a brilliant piece of work and was enthusiastically welcomed as such by the very few physicists with the intellectual ability to understand it, such as FitzGerald in Ireland and Lodge and Heaviside in England. It was these 'Maxwellians' who first recognised the full implications: in particular FitzGerald, after a couple of false starts, predicted the propagation of electromagnetic waves through space and suggested how they might be detected electrically; and Lodge conducted practical experiments to demonstrate their existence and thereby almost anticipated the findings of Hertz.

These men, including Hertz, were physicists pursuing fundamental advances in scientific knowledge, with experiments

STRATE WAVES IN 1888?

By: Local Oscillator



JAMES CLERK MAXWELL
1831 - 1879

to prove the theories; and they were most excited by Maxwell's work. What was really crucial to them,was that the electromagnetic wave propagation implicit in Maxwell's equations indicated that the old theories of 'action at a distance' should be discarded. In their role as physicists they had no reason to concern themselves with possible practical applications of electromagnetic waves in the way of communication systems, even though Lodge perhaps was more of an experimental physicist with some degree of interest in applications, and Heaviside had started as a very able telephone engineer.

Before Maxwell's mathematical justification of Faraday's tentative theories of wave propagation, electrostatic and magnetic effects were commonly thought to transfer energy instantaneously at a distance through space, with no apparent means by which the energy could be transported: this view was particularly prevalent amongst physicists in Germany. On philosophical grounds it is very difficult to imagine how something happening at point A could affect the state of things at a distant point B with nothing actually passing between the two. But with Maxwell's analysis it could then be postulated that something did in fact pass from A to B in the shape of electromagnetic wave energy.

Hertz had been brought up in the 'instantaneous action at a distance' school of thought, but fairly early in his career he was introduced to Maxwell's theories by his professor von Helmholtz who encouraged him to attempt experimental proof of Maxwell's postulated 'displacement current' in air or empty space. Hertz did not immediately take this up, but he was intrigued by the possibility that the concepts of displacement currents and electromagnetic waves could fundamentally change action at a distance theories.

A few years later he began to devote much effort to theoretical clarification of Maxwell's equations and became increasingly convinced that the equations could indeed give the true explanation of electric and magnetic field phenomena: by 1884 he wrote "I think we may infer without error that if the choice rests only between the usual system of electromagnetics and Maxwell's, the latter is certainly to be preferred". But the physical existence of electromagnetic waves, and especially their finite velocity of propagation, needed to be established by practical demonstration, so Hertz undertook a series of experiments culminating in the famous ones of 1888 which proved the point beyond all doubt.

After his experiments Hertz undertook further theoretical interpretation and development of the Maxwell concepts, much helped by his correspondence with FitzGerald, Lodge and Heaviside which revealed significant earlier work by these Maxwellians which he had not previously heard of. Hertz's papers in 1890 were particularly important in the field of theoretical physics and were influential in setting the scene for the later achievements of Lorentz and Einstein.

Events then waited on the go-getting vision and single-mindedness of Marconi to put together the discoveries of the Maxwellians and Hertz into a workable wireless communication system.

To sum up, Hertz was not primarily an experimentalist seeking to demonstrate the existence of electromagnetic waves. He was a theoretical physicist who conducted his famous experiments as a means of justifying his firm conclusion on a matter of fundamental scientific importance. So the waves were not important to Hertz for their own sake: he saw them simply as affording proof that Maxwell's equations gave the true picture and that hitherto accepted theories of 'action at a distance' must therefore be regarded as obsolete.

THE PHILIPS V7 REVISITED

By: Geoffrey Dixon-Nuttall

I confess that re-reading my piece on the Philips V7 (Vol.7 No .1) I feel that I was a little unfair. On that occasion I treated it as a joke, but although it looks like one there is more to it than that.

The first time that I met one of these I seriously thought it had been vandalised, because I didn't think any reputable company could turn out any product that looked so awful. But since then I have dealt with many of the things and have a certain grudging respect for them.

(Anybody who has never met one of these may wonder what the fuss is about. In 1937 Philips wanted to produce a cheap set, as a counter blast to the Philco People's set, among others. What they decided to leave out was the metalwork, and the V series were built into the bakelite cabinet with only a few metal brackets to hold the bits. The outcome was a three-band receiver, with bandpass input, for seven guineas. Not bad, but the set has exerted a sort of horrified fascination for collectors ever since.)

This is one of those designs that started from a clean sheet of paper, like that other cheap

monster, the Citroen 2CV. Every part of it has been looked at with the question “Can we do it cheaper?”.

Some of the ideas were counter-productive. For example the original I.F. transformers were wound as two pairs of coils, one fixed and one free on the former, and they were aligned by varying the spacing. To provide a purchase for the special tool used there is a series of “pimples” on the plastic. The scheme, however, must have been more trouble than it was worth, and they soon reverted to trimmers, even if they were those ever-to-be-cursed wire things that only work one way.

For a three-band superhet there are remarkably few trimmers, two and a half in fact, and the oscillator coil for example must have been very accurately wound to get the calibration as good as it is. This coil is very small and mounted in the wiring, but works well. The half trimmer mentioned is made of two bits of twisted wire!

Like most Philips designs this set is only just strong enough, but the only heavy component carried by the plastic case is the output transformer, the mains transformer being mounted on the wooden base.

The assembly cannot have been easy. Luckily labour was cheap otherwise the assembly costs would have cancelled the gain in press tools and metal work. Some of the details are clever; for example the detector circuit is so designed that the last I.F. coil is returned to earth (one can’t say to chassis - there isn’t one) so that it will not pick up hum and doesn’t need screening. The I.F. transformers have no cans and are screened from each other by the speaker frame.

As one cannot remove the chassis there are servicing problems. It appears that replacing the dial cord (or the dial bulb) is impossible, but the trick is to take off the bottom of the case, whereupon it just becomes very difficult. There is, of course, no mention of the cord in the service data, which is up to the usual unhelpful Philips standard. I can tell you that the correct length is 99mm. from loop to loop, from bitter experience. The pointer drive, by the way, is very clever, being a sort of perverted Watt linkage. Its travel is controlled by a plate with a carefully calculated groove in it, which can be adjusted so that the pointer travels parallel to the dial. This bracket obviously wasn’t quite rigid enough, and a bit of thick wire has been added to strut it onto the mains input panel.

Mention of the service data reminds me that none of the sets I have met conform to the circuit given. The original design had bias resistors in each of the first three cathodes, each with its own capacitor, but all the production ones seem to have the cathodes earthed and there is a resistor in the H.T. negative line. This adds one resistor and removes three, and three capacitors, so was obviously a good thing. There is a note in the service data but they never got around to altering the drawing.

There were three versions of this set. The original V4 was marketed in France (according to Guy Biraud) but seems to be almost the same as the V5. This in turn is very similar to the V7, apart from the addition of a tone control. This removed what little there was of the treble! There were also AC/DC versions, V5U & V7U. These had a barretter in place of the mains transformer, and I am informed that these had a short life, due to the iron filament being bent by the field from the speaker magnet.

The performance is very creditable, there being a nice solid bass which sounds like box resonance, but the shallowness of the cabinet rules this out. The calibration, as already mentioned, is good and stays that way, which is good because nothing much can be done about it!

Negative feedback is applied at no cost, by omitting the capacitor on the output valve cathode. In fact this design does what it was intended to do, and was probably only meant to have a life of five years. If by now the rubber wire has degenerated into something disgusting, who are we to complain? It is amazing that so many of them have survived so long at all.

LETTER FROM REV. LESLIE STEAD

I have read the history of Hacker radio with very great interest & I thank you for producing it & letting me have my copy.

My time with the firm really only amounted to two brief periods but I knew Ron & Arthur during our school days. I am not a radio man, but on leaving school early, first went to the G.W.K. car firm as an office boy. After about a year I began an apprenticeship with an engineering firm in Slough trading estate, This widened my experience to include electric motors, gear cutting plant & a variety of pumping plant etc., In due course this second firm underwent changes, and for a time I was unemployed around 1930. Work with a firm of flexible hose makers was not my style & I went to Hacker Snr. at his Queen Street shop & enquired whether his two sons would find a mechanical engineer of use in their obviously expanding radio manufacturing business. Apparently this was exactly what they were urgently needing so I joined them at once. Plant & tools, not quite non-existent, were laughable & the wages paid quite horrific, but it was a really happy arrangement. I enjoyed my time with them. It could not have been more than 18 months to 2 years at most. There were probably 10 employees, all only recently out of school, Ron being the oldest and of course the boss along with Arthur.

My job was to take over the mechanical matters, - allowing Ron & Arthur to devote themselves to all the electronic side. The policy was to buy only components of the highest quality, but there still some items we made ourselves such as transformers and the switch which changed the set from LW to MW -and so on, there were other items of course the chassis with many small holes. Jigs were made & hand punches were used. Part of my job was to instruct two or three lads in carrying out this work & urging them to aim at proper standards. Up to then many details of a Hacker radio were decidedly amateurish in appearance. Also, working methods were alright for one-offs, or twos or threes but when batches of 20 to 30 sets were expected, real problems arose, So these were early development days.

The Hackers had a Ford “A” commercial traveller’s car with the door at the back like a van. One day when possibly cash was short & Ron did not drive at that time, I took him to High Wycombe with one of their sets & he dived into a dealers’ & soon emerged with glee having made a sale & brandishing a cheque in his hand. Before long a young salesman was employed. He was a pleasant chap & rather public schoolboy type.

Some large radiograms were installed in a few of the high brow luxury apartments in West London. As an outside aerial was needed to get good reception from distant & foreign stations, Arthur & I spent some happy hours clambering on to roofs & secreting aerials where they could not be spotted. White porcelain insulators were sprayed black to be less conspicuous. Property owners banned outside aerials on prestigious buildings. Incidentally, in those days brothers Ron & Arthur were invariably seen in their boiler suits in normal working hours. In the summer time the low roofed Perfecta works became unbearably hot even with all the doors and windows open. The time for the Radio Show at Olympia coincided with a real heat wave. On the first day salesmen & reps in dark business suits all looked thoroughly uncomfortable. For the second day the Dynatron team called in at John Barker’s Kensington store & were kitted out in spruce tennis whites. Their appearance on the stand caused quite a stir & we were the envy of staffs on other stands.

Ron and Arthur Hacker with their fiancees in 1944

The publicity gained was, of course, a bonus.

About this time an amplifier or sound system was made for Manchester City Hall & there was a radio dealer in Manchester (name possibly Halliday?) who came to Maidenhead & was anxious to take the entire production, everything we could turn out. The temptation was firmly resisted and he had to be content with a reasonable share.

Roads near the river Thames & the lower part of Maidenhead were subject to flooding in the winter days. When this happened 10 to 15 inches depth of water covered Ray Lea Road and a wide area around. We could just manage to get through to work on bicycles. Fortunately the floor was above flood level & no damage was suffered. However, there was one problem. A stable with loft next door had been rented to store radio & radio gram cabinets, these now being required in larger numbers. The stable was flooded but some rapid action saved the day & all cabinets were raised well above water level, but the damp affected them & a local French polisher (another school friend!) was called in to remedy things.

I think it was early in 1932 that I left Dynatron to prepare for missionary service in the Far East. A young fellow was now fairly competent to do most of the routine work I had been doing & both Ron & Arthur, though appearing to be without a trace of religious faith or feeling, were nevertheless most kind & assured me that if plans did not materialise I would be warmly welcomed back to Dynatron.

I was not to return to England until 1945 after 8 years in West China & temporary work in Australia with the Rola Co. in Melbourne. (Dynatron fitted Rola speakers when I was there). Rola in Australia during the war was a large wire drawing & enamelling plant & also made permanent magnets.

Some time after returning to England & now married with two children, I joined Hackers once more. Several jobs were offered, but the firm had changed so much that the whole atmosphere was very different. Most operations had now moved to premises several 100 yds. to the South on Ray Lea Road. They had workshops belonging to one of the major car dealers in Maidenhead & possibly another of the hundreds of small munitions factories form the first World War. Buildings had been renovated & extended greatly. I took up work in the Inspection Dept. which was satisfactory for a short time. All the ills of a larger concern soon showed up. Jealousies between department heads & bureaucratic attitudes & so on. This was a great disappointment. At inspection, there were sub-contracted components which should have been rejected, but were pushed through as the cost of scrapping or time lost in obtaining replacements was too great. These were items for aircraft too! I think this must have wrung the Hacker brothers' hearts - if they knew. Several other employers in the district were advertising for staff & offering greatly increased rates of pay at that time, so with a family to keep, I regretfully moved to a firm making plastics moulding machinery. Later I was able to return to the Far East for a time.

Automatic Volume Control

By: 'Dull Emitter'

Principles

Some people like to call it Automatic Gain Control (AGC), but since the volume output from a receiver is determined by the overall gain from aerial to loudspeaker, I am content with the term Automatic Volume Control (AVC) which most of us prefer. I suspect the AGC brigade are just trying to suggest that in some way they are a little cleverer than the rest of us.

AVC has two main purposes. First it aims at fairly constant volume from the loudspeaker despite changes in the strength of the received signal. And second it prevents overloading on RF and IF stages when very strong signals are received from local stations.

The system is quite straightforward. The detector, fed from the last IF stage in a superhet, produces not only the programme speech and music but also a negative direct voltage equal to the peak amplitude of the modulated carrier signal from the IF amplifier. This negative DC is applied as grid bias to the valves in the RF and IF stages, so that a bigger signal produces greater negative bias, reducing the RF and IF gain and so tending to limit the increase in signal arriving at the detector.

So it all seems very simple; but there are a few odd snakes lurking in the grass!

Range of Control

To prevent overloading by the strongest local signals, the variable-mu valves in the RF and IF stages may well need grid bias up to -20V to reduce their gain sufficiently; and of course this means that the detector diode must receive a 20V input signal to produce the acquired AVC voltage. A diode detector is essential, since leaky-grid or anode-bend detectors could not handle a 20V signal without gross distortion.

A weak distant station may give only about IV of signal at the detector, so the audio passed on to the output stage may vary by a factor of 20:1 in voltage which, since power is proportional to the square of voltage, represents a change of 400:1 in power output from the loudspeaker. Clearly this AVC system is not freeing us from the need to ride the manual volume control.

Another drawback of the basic AVC system is that even fairly weak signals will produce some AVC bias, so that the full sensitivity of the receiver will never come into play except on signals so weak that they are almost lost in the general 'mush' and offer no entertainment value.

Delayed AVC

So we turn to a system of delayed AVC. This means that we decide on some minimum signal level at the detector which will provide an output of acceptable entertainment value, and allow the AVC system to work only on signals which are equal to or greater than this minimum. To do this we must introduce a second diode, separate from the detector, to rectify the IF signals and produce the AVC control voltage: and we apply a DC 'delay' bias to this AVC diode such that it is turned off (anode negative to cathode) until the incoming signal is greater than the delay bias and starts the diode working to control the gain of the RF and IF stages. It is worth noting that 'delay' here does not imply a delay in time, just that operation of the AVC is held back (delayed) until the incoming signal reaches a certain amplitude.

Let us suppose we choose 5V at the detector input as the minimum signal for good quality listening. On strong local signals we shall still need -20V of AVC bias to cut back the gain of the RF and IF stages; which means that the detector and AVC diodes must receive 25V of input signal - that is 5V to overcome the delay voltage and then 20V to produce the -20V on the AVC line. But now the ratio between the 5V minimum satisfactory signal and the maximum 25V from the local station has been reduced to only 5:1, compared with the 20:1 of the undelayed system. So we shall not need to whirl the manual volume control nearly so much when changing from a station of medium strength to the strong local station.

At this point we should recognise that we are in fact settling for a compromise. We have abandoned the benefits of AVC on all signals lower than our arbitrary minimum of 5V at the detector, and agreed to put with the consequent volume variations and fading effects on these fainter stations. In return we have secured much more effective automatic volume control on stations that come in at reasonable strength; and we can benefit from the full sensitivity of the receiver to pull in any weaker stations we may still wish to listen to in spite of the absence of AVC on these. On balance, the advantages are considered to outweigh the disadvantages and a delayed AVC system is generally regarded as good practice.

Amplified AVC

In the systems described, an increase in AVC voltage to reduce RF and IF gain can come about only as a result of some increase in the signal reaching the AVC and detector diodes: so no AVC system can give absolutely constant output volume with varying received signal strengths.

But almost perfect control can be achieved if the AVC control voltage is amplified before it is applied as bias to the variable-mu valves. A further advantage of this amplification is that the IF stage does not have to handle such a large signal to feed the detector and AVC diodes, and a possible cause of distortion is thus eliminated. An amplified AVC system can be devised by using the triode section of the usual double diode triode value as a DC amplifier in addition to its normal function

as AF amplifier. But this requires a further HT supply of about -100V and because of the extra complexity the system is found only in the more elaborate sets.

IF Signal Feed to AVC Diode

Sometimes you will notice that the AVC diode is fed with IF signal from the anode of the IF amplifier valve rather than sharing the detector feed from the IF transformer secondary. One reason for this is that the response curve at the last IF transformer secondary may have very steep sides, so that a slight mis-tuning of the receiver will cause a significant drop in signal level. This of course is the set designer's intention, to give good selectivity, but it means that if the AVC diode is fed from this point then slight mis-tuning will considerably reduce the AVC control voltage and the receiver gain will rise: in this event the relevant sideband amplitude will be much enhanced relative to the carrier, and distortion will result.

The effect can be reduced by feeding the AVC diode from the IF amplifier anode where the response curve is not so sharp - since it precedes the IF transformer secondary tuned circuit - so that slight mis-tuning will produce less change in the AVC voltage.

Smoothing the AVC Line

It is important to include adequate smoothing in the AVC line to obtain a pure DC control voltage without superimposed RF or AF ripple: this is effected by a high resistance of IMΩ or so in series with the AVC line, followed by a shunt condenser of about 0.1µfd to earth: it is of course vital that the leakage resistance of the condenser is not less than several megohms.

Smoothing is necessary for two reasons. First, all RF must be removed to avoid unwanted feedback to the RF and IF amplifier grid circuits which could give rise to instability. Second, all audio must be removed, since if this were left on the AVC control voltage it would represent negative feedback and reduce the effective gain of the receiver. This last point can be explained on the grounds that when the carrier amplitude fed to the AVC diode is increased by the programme modulation, the AVC negative control bias would increase (if the audio were left on it) and reduce the gain of the RF and IF stages. The signal at the detector would consequently become less than expected, partially annulling the intended increase which is the programme modulation. So with an old set it may be worth checking that the AVC line smoothing condenser is still presenting its normal 0.1µfd or thereabouts.

Amendment

Would those wishing to purchase the special issue of "new Crystal Palace matters" (No. 6, Winter 1994 - Baird articles issue) note that the postage and packing is extra on the price quoted, i.e. £2.25 + 85p p&p. Cheques payable to "Crystal Palace Foundation", please c/o Melvyn Harrison, Crystal Palace Museum, 84 Anerley Road, London SE19 2BA.

N E W S

Marconi Exhibition

Hove Radio Museum is planning to mark the centenary of radio by staging an exhibition of Marconi memorabilia at Hove library, Church road, Hove. The exhibition will commence on Tuesday 11th of April (the library is closed on Mondays) and it will last until Saturday the 22nd of April.

There is also an Exhibition of novelty Transistor radios at Hove library from the 4th to the 15th of July. For more information regarding the many exhibitions and activities organised by Hove radio museum please contact Enrico Tedeschi at:
54 Easthill Drive, Portslade, Hove, BN41 2FD
Tel / Fax: (01273) 410749 and 0850 104725 (Mobile)

Further Harpenden meetings

More dates for your diary - mark them in now! Swapmeetings are coming up on Sunday June 11th, Sunday 24th September, and Sunday 26th November, and the forms for the first of these meetings will be distributed with the next Bulletin. NB! Note carefully the return address which will be given for your Harpenden applications.

Marketplace

Phillips (Bayswater) are scheduled to include a collection of rare Adey sets in their auction of Mechanical Music, Cameras and Apparatus on May 23rd. These Adey sets include a hand painted lacquered three wave band receiver, and two four valve receivers (one deluxe) and two cigar box sets, one with "policeman's helmet". For further details telephone 0171 229 9090.

New Articles

If you have anything interesting to say concerning Wireless, Television, broadcasting etc. please send it to the Editor for possible 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 towards 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.

Please send all articles to:
Carl Glover, c/o BSS, 1 Rothsay Street, London SE1 4UD

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