RADIO BYGONES

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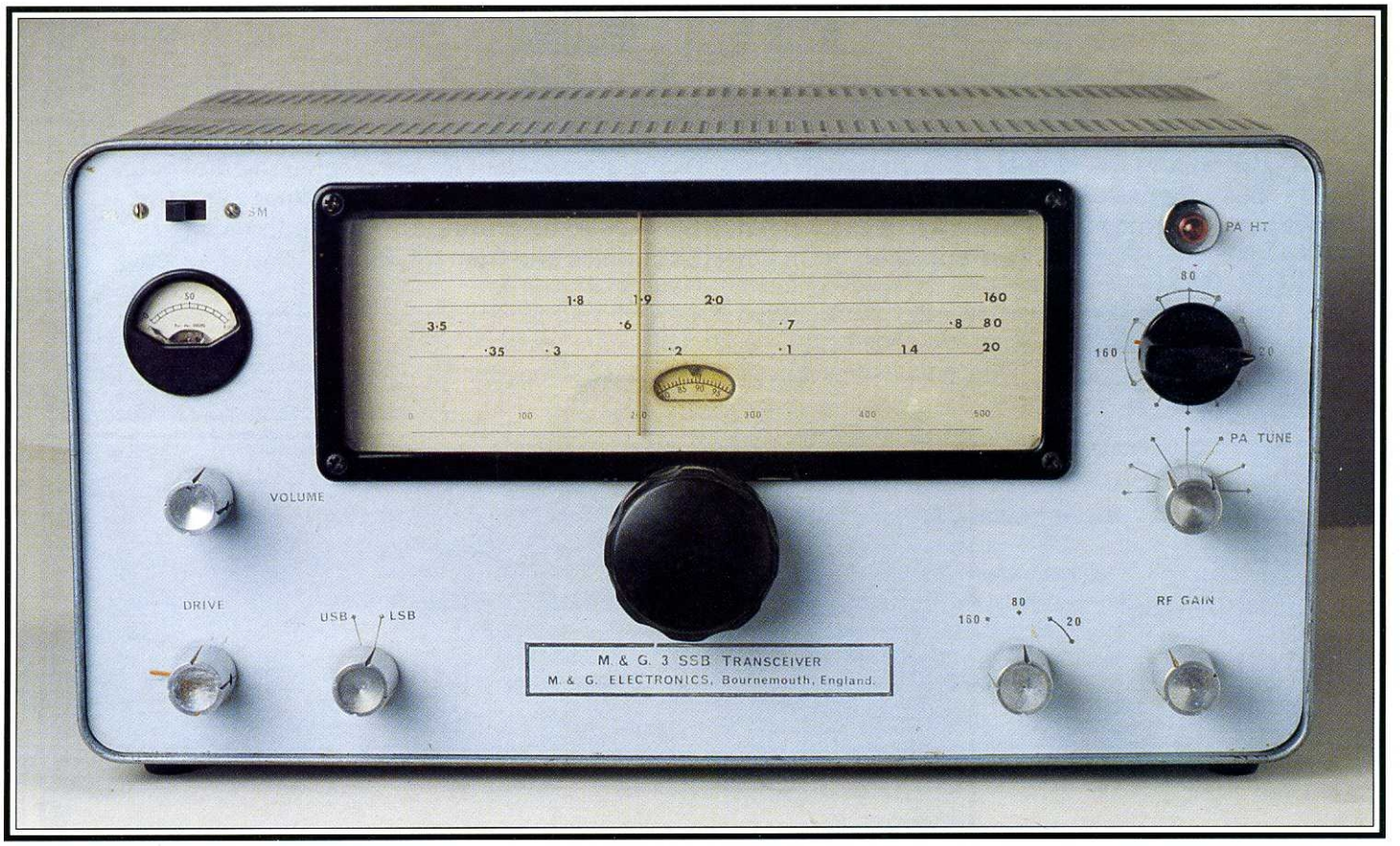
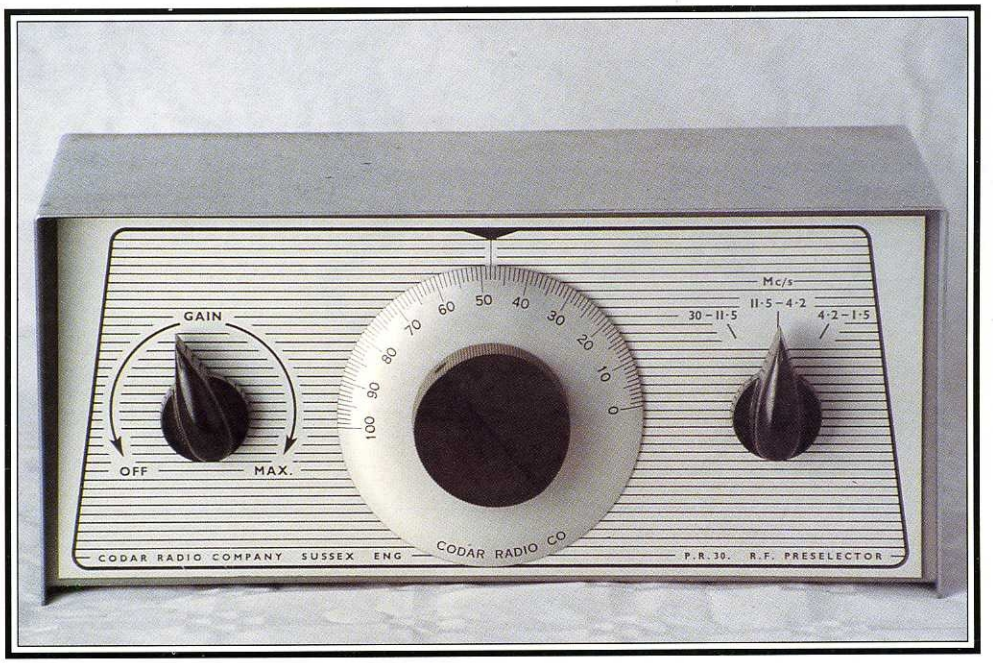
No. 5 – April/May 1990

The M & G 3 HF SSB Transceiver



Birth of Airborne Wireless ☐ Days with Pye & Ekco
The Hague Concerts from PCGG ☐
First Stereo Transmission via Amateur Radio



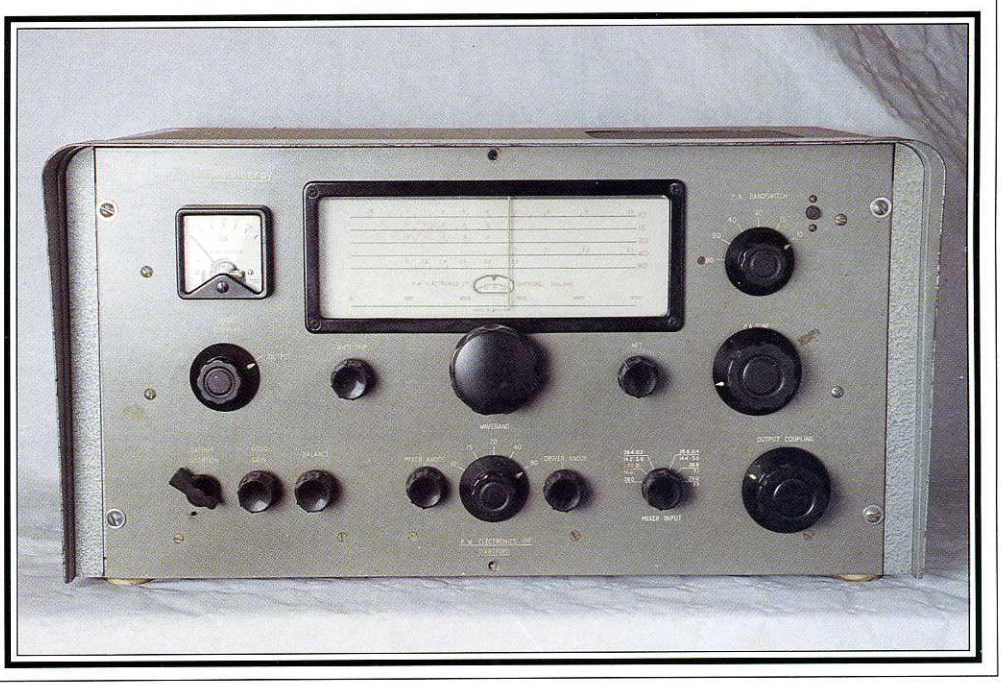
The Codar Radio Company PR30 RF pre-selector, giving up to 20dB gain over the range 1.5 – 30Mc/s, improved signal/noise ratio and selectivity, plus substantial image rejection. The PR30 was advertised in 1967 at £5 10s.

CPM

MUSEUM PIECES

In this issue, our colour photo feature is devoted to amateur radio equipment produced in the UK during the 1950 and 60s. Although some ancillary equipment for the amateur market has been made here since that time, major items have been almost exclusively Japanese imports, and it is only very recently that anything in the way of home-grown receivers or transmitters have appeared, from Lowe Electronics and from Navico

CPM



The KW Viceroy CW/SSB transmitter, covering the pre-WARC amateur bands from 10 to 80 metres

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Eagle-eyed readers may have noticed that there is a slight change in the details to be found in the box on the left – the letters after my name have changed. The reason for this is that the Society of Electronic and Radio Technicians (SERT), to which I have belonged for the past twenty years, has merged with the Institution of Electrical and Electronics Incorporated Engineers (IEEIE) to form the Institution of Electronics and Electrical Incorporated Engineers (IEEIE).

The idea behind the merger is to produce a larger and stronger body to represent the interests of Incorporated Engineers and Engineering Technicians, that body of men and women who back up the Chartered Engineers in industry and the professions, and it was endorsed by a very large majority of the existing membership of the two bodies.

Another change in a closely related area is the decision to rename The Radio, Television and Electronics Examination Board, the body which has organised and run practical tests for the servicing trade for many years. It will henceforth be known as the 'The Electronics Examination Board'

Being principally a 'radio' man, I cannot help mourning the passing of these 'radio' institutions. It seems strange in an age when radio communication is becoming ever more widely available to industry and the man and woman in the street, in the form of various radio extensions to the public telephone system, that we should seem to be hell-bent on eliminating the word radio from the vocabulary.

Is it going the way of 'wireless', now to be found mainly in magazine titles or cult radio programmes? The name 'wireless' has always been the butt of jokes, along the lines of 'You call that wireless? I've never seen so many wires!' but at least the origins of the term, in its reference to communication at a distance without wires joining the two points, were reasonable.

You may rest assured that there are no plans to change the title of *Radio Bygones*. Our articles may from time to time stray slightly over the borders of radio into audio, recording, even perhaps electronics – after all, for the most part they each developed out of wireless or radio engineering technology in the first place – but change our name? No! Somehow 'Electronic Bygones' just doesn't have the same ring to it!

Geoff Arnold

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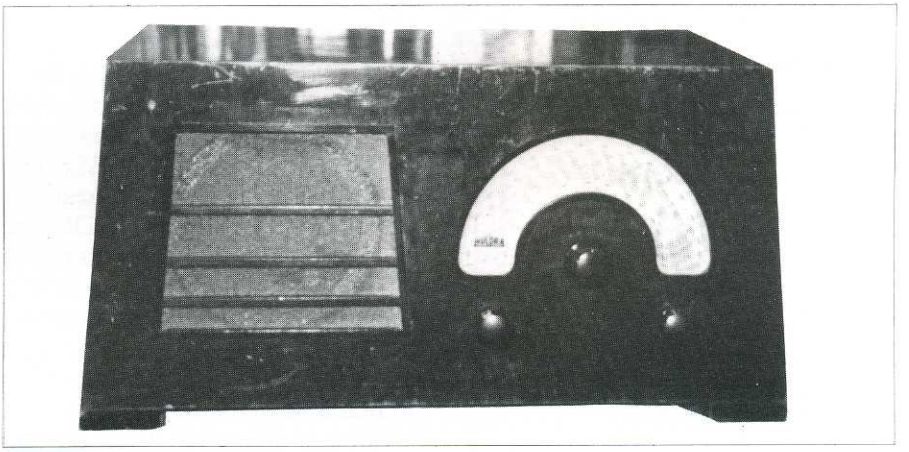
News & Events

Norwegian Gem

A set very much sought after by collectors in Norway is the Tandberg Huldra 1 (right). Produced in 1935, it is a single-band, double-conversion receiver based on *Wireless World* articles published around that time.

The photograph is taken from the 1989 Christmas card of NRHF, the Norwegian vintage radio society.



Eddystone Users Group

Eddystone enthusiasts will be interested to hear of plans by W. E. Moore, who has owned and operated a variety of Eddystone receivers for almost forty years, to form a Users Group.

Eddystone Radio Ltd has agreed to the inclusion of facts and data from their manuals in a group newsletter, which would be sent to members, and would be operated on a non profit basis, with only a nominal charge for post and printing.

Anyone interested is invited to write to ***Mr W. E. Moore, 112 Edgeside Lane, Waterfoot, Rossendale BB4 9TR***, preferably enclosing a stamped addressed envelope.

Coil Stock

Have you ever looked longingly at RF designs in ARRL and other US publications and then pondered, 'but where would I get some of the specialised bits?'

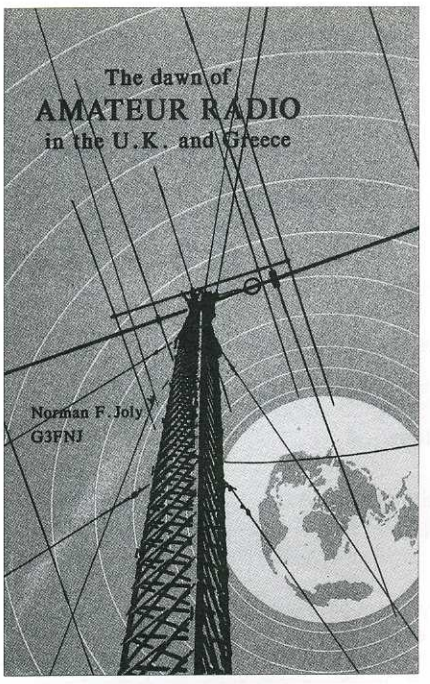
Quite a few of those designs for things like transmitters, amplifiers and ATUs specify inductors cut from coil stock manufactured by the American firm Barker & Williamson Inc, or B & W as they are usually known. Trying to reproduce such stock accurately using home workshop or even kitchen table facilities is difficult, to say the least!

Now, your problems could be over, for a UK company has begun importing B & W coil stock, plus items from the B & W range of antennas and antenna fittings, ATUs, etc. For further details or a quotation against a particular B & W item you are interested in, contact ***R F Engineering Ltd, 2 Elizabeth Drive, Helmshore, Rossendale, Lancs BB4 4JB, telephone 0706 214118.***

New Book

A book on amateur radio which starts off by talking about the exploits of one of the Seven Sages of Ancient Greece in 640BC just has to be a little different to the norm. *The Dawn of Amateur Radio in the UK and Greece* by Norman F. Joly G3FNJ (formerly SV1RX, SU1RX, YI2RX and ZC4RX) is certainly that!

The chapter headings give a fair idea of the content, which is, as G3FNJ says, very much a personal view. After The Prologue come The Development of Electricity; The Birth of Radio Communications; What is a Radio Amateur?; The 1921 Amateur Transatlantic Tests; The First Greek Radio Amateurs; World War II and After in Greece; Pioneers in Greece; Personal Reminiscences and Anecdotes; and finally Miscellany.



The book is very much a collection of potted biographies, of anecdotes and reminiscences, of achievements in amateur radio, and of historical photographs both well-known and unusual. It gives an insight also into the difficulties which beset amateur radio enthusiasts in a country which for many decades was officially opposed to the very idea of amateur radio. I personally found it fascinating. *Geoff Arnold*

The Dawn of Amateur Radio in the UK and Greece is published in paperback, 152 pages, size 8⅜ x 5⅞in.
It is available by post, price £9.95 including p. & p. to UK addresses, from the author and publisher, **N. F. Joly, 28 Oakington Avenue, Harrow, Middlesex HA2 7JJ.**

The Dragon at Penrhyn

Any readers likely to be in the vicinity of Penrhyn Castle, Bangor, Gwynedd (National Trust) during the period June 20 – 24 should make a note in their diaries of the 3rd Annual Exhibition of vintage radio equipment staged there by the Dragon Amateur Radio Club.

Exhibits include radio equipment ranging from an 1899 spark transmitter to early 1950s sets, magazines, telephones, etc. DARC will also be running a special event station, callsign GB2CPC, from the Castle on June 15 – 17 and 23, and July 27 – 29.

Clang!

In the February/March issue of *Radio Bygones*, in the R390A block diagram on page 5, the four boxes labelled Mechanical Filters should, of course, have read 2, 4, 8 and 16**kHz**, not MHz.

On page 7, the computer gremlins had another go at the Free Readers' Advertisements, swapping over the headings of For Sale and Wanted. Apologies to anyone confused, though luckily the mistake was fairly obvious!

RAOTA

The Radio Amateur Old Timers' Association, originally founded in 1959 as the British Old Timer's Association, was formally re-established in April 1985 under its present title, and is now affiliated to the RSGB and the Australian Old Timers' Association (RAOTC).

Membership is open to all persons who have been actively interested in amateur radio for over twenty-five years, either as a licensed amateur or a short wave listener. Members receive a quarterly journal *OT News*, which carries some fascinating tales and recollections from members of radio matters both amateur and professional.

Further details of the Association, including times and frequencies of the regular 80m RAOTA Nets, from the Hon. Sec./Treasurer, ***Sheila Gabriel G3HCQ, Millbrook House, 3 Mill Drove, Bourne, Lincs. PE10 9BX***

RADIO BYGONES

IN OUR NEXT ISSUE
Due out June 21

Army Wireless Set No. 38

Reaction!

Radio & TV Interference Work in the 1950s

A Visit to the Vintage Wireless Museum, Dulwich

Contents subject to last-minute revision

MM...

If you enjoy sending, receiving or just reading about communications by Morse code, you should see page 27.

RB Binders

Several readers have been enquiring whether we plan to have binders for *Radio Bygones*. To give us some idea of demand, please drop a line to the Editor if you would be interested. Likely cost is around £5 to £6 for a binder to hold two years' issues.

The Birth of Airborne Wireless

The 'Brooklands' Wireless Testing Park

by Tim Wander

A couple of years ago I documented the amazing story of the radio station known as '2MT at Writtle' and its claim to be the birthplace of British Broadcasting.

As part of that story I briefly wrote about the Royal Flying Corps Airborne Wireless Development Unit originally based at Brooklands. At the end of the War the Unit was 'transferred' to the Marconi Company and eventually hosted the Writtle station.

By coincidence I came across some more information about the wartime travels of this development section.

The Brooklands motor track was built in 1906/1907 by the Honourable Hugh Locke King on his own land near Weybridge in Surrey and the first aeroplane flight in England was made there by A.V. Roe in 1908. On 22 July 1911 the *Daily Mail* Round-Britain Air Race started there and when in 1912 Vickers opened a flying school, Brooklands was established as the 'home' of British aviation. Many distinguished pupils passed through its doors, including Viscount Trenchard and Air Chief Marshal Lord Dowding.

Despite its success the aerodrome was really unsuitable for training as it was located in the centre of a 4730 yard long (100ft wide) motor racing track. On three sides there were high tension cables and to the east two 95 feet high chimneys. The small town of Byfleet lay in the south-west corner, Weybridge was to the north and it was close to the railway station and main line. However, during the First World War the site was taken over by the Royal Flying Club and Brooklands became a training station for embryo pilots. The main aircraft in use were Maurice Farman Shorthorns and AVRO 504s.

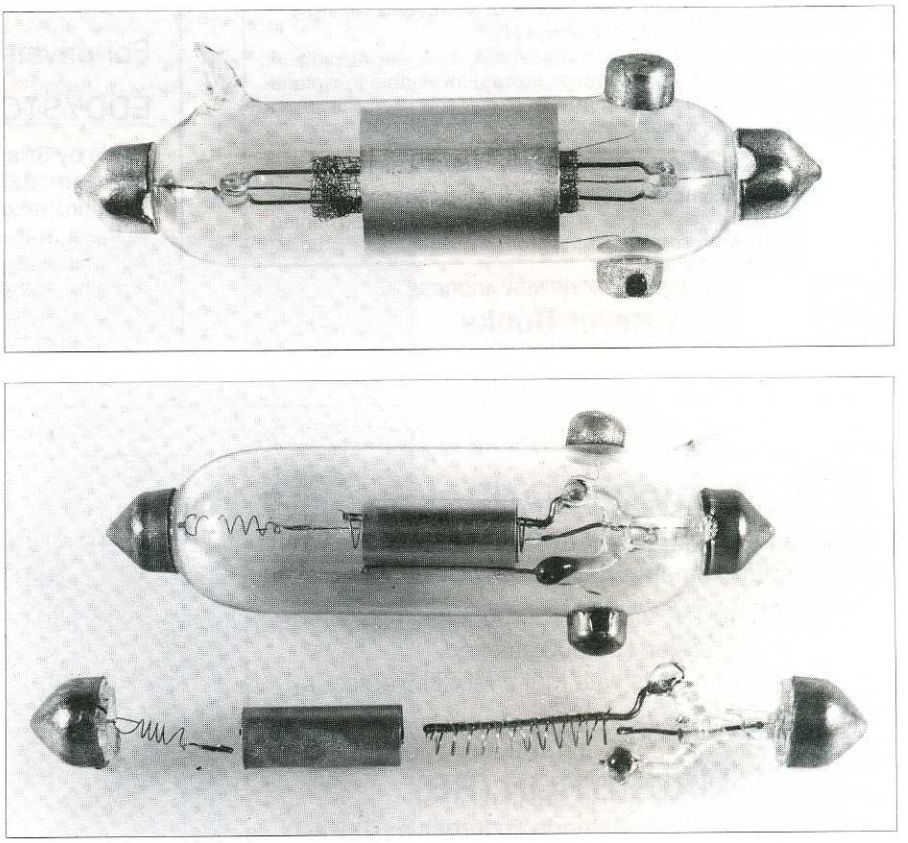
Sparks and Crystals

The early war years relied on wireless communication using the crudest of equipment with no thermionic valves. Attempts at aircraft wireless systems consisted of a spark set in the plane and a massive crystal receiver on the ground. It was quickly found that in an open cockpit, against the roar of engine, wind and gunfire, it was almost impossible to understand Morse code sent using this equipment or any other. Consequently the first RFC units that arrived in France were equipped with only one airborne spark transmitter and one ground based receiver between them.

Speech on the other hand seemed to provide the solution to this barrage of noise, so a team of engineers was assembled to develop a practical method of ground to air telephony. This airborne telephony research department never really formed, Captain (later Major) C. E. Prince, then serving with the Westmorland-Cumberland Yeomanry was simply sent down to Brooklands to 'co-operate' with the Flying Corps. Under his command in early 1915 the Brooklands 'Wireless Testing Park' was formed by the RFC with the prime aim of developing wireless telephony for ground to air wireless communication.

To speed the development process qualified wireless engineers from all over the country were commissioned as officers and Prince was soon joined by Captain Whiddington, Captain Furnival and Captain Peter Eckersley. Even though the technology was still in its earliest stages the work of the research department was considered top secret. Everyone who entered Prince's workshop had to sign the Official Secrets Act, and swear the following oath.

'I ... do hereby swear I will not divulge now or at any time hereafter, by word of mouth, writing, photography or any other means, any information regarding "Wireless Telephony" that I have acquired or may acquire at any time during my employment by the Government, except to persons authorised by my commanding officer. So help me God.'



The Marconi Q valve (top) and V24 valve (bottom)

Photographs by kind permission of GEC – Marconi Limited

This hung in Prince's office in a plain wooden frame, with the signatures preserved under glass.

The expansion of Brooklands as a pilot training school and the growth of the Wireless Testing Park led to its transfer in August 1915 to Joyce Green in Kent which was located between Dartford and the River Thames.

This airfield had been built in 1911 again by Messrs Vickers Ltd. to test aircraft built in their Erith Works. It was also an unsuitable site for a training airfield as there were numerous drainage ditches crossing the Dartford Salt Marshes. However at the outbreak of war, Joyce Green became an 'air defence' airfield to house a permanent RFC unit (No. 6 Wing). In mid April 1915, No. 39 Home Defence Squadron was formed bringing together all units and detachments detailed for anti-Zeppelin duties in the London area.

Hangars, workshops and ground staff quarters were erected at the northern edge of the landing field alongside the Long Reach Tavern. The work was completed in early 1915 and the first occupants were No. 10 Reserve Squadron with a variety of aircraft including Henry Farmans, Vickers FB5 and FB9, DH2 and FE8 machines. The role of this unit was to receive pupils from preliminary training schools for final training for their wings. Each course consisted of about 20 pupils and lasted two or three weeks. This included time spent at Lydd where aerial gunnery was practised at the range at Hythe. On gaining their wings the young pilots would get a 48 hour pass before being posted to the Front.

The Wireless Testing Park moved to this busy airfield in August 1915 on a convoy of trucks. Training, testing and wireless experiments then started immediately while around them young men practised war, throwing flour bombs as they tried to make their cumbersome Henry Farman Trainers fly.

Enter the Valve

The problems with any airborne wireless system are two-fold, namely size and weight. The canvas covered 'stringbags' had extremely cramped cockpits, and early aero-engines were notoriously inadequate and unreliable. Despite the extremely poor power to weight ratio, a practical aircraft telephony set was produced towards the close of 1915, known as the Mark One. It was Captain H. J. Round who used his pre-war work to produce the valves for the receiver and the transmitter, the first of which was designated the V24.

The V24 was specifically used as an HF amplifier valve. It represented a new design attempting to reduce parasitic capacitances by enclosing the electrode in a tight-fitting glass tube and bringing the grid and anode connections out at opposite ends of the tube on small caps. The valve had a filament current of 0.75 amps at 5 volts, with an anode voltage of between 20 and 60 volts. Such was the success of the valve that replacement valves for equipment (especially Marconi Type 55 amplifiers) were being made up until 1937.

The Marconi Type Q valve was the companion valve to the V24, also designed by Round. The Q valve looked similar to the V24, the difference being mainly in grid construction which was a fine mesh gauze carried on two glass beads through which the filament leads passed. The Q valve had a higher amplification and internal impedance and required a higher anode voltage up to 150 volts to operate.

In February 1916 Major Prince crossed the English Channel and demonstrated the Mark One in France to a party of senior officers, including Lord Kitchener himself. For the development of the wireless 'telephone' Prince after the war was awarded the OBE and a grant of one thousand pounds.

The range achieved during the early wartime tests with the Mark One was almost 20 miles on a wavelength of 300 metres. To do this the aircraft had to tow some 250 feet of aerial wire let out by hand from the observer's cockpit. This in itself created several serious problems. In the event of attack it was impossible to reel the aerial wire in, so it had to be cut away. The increased drag made the aeroplane very difficult to fly at the best of times, in combat it could become a death-trap. The wire also had a tendency to wrap itself around the aeroplane's control surfaces if its end weight twisted loose. To cut down on engine interference the ignition cables also had to be screened with metal piping and sheeting, which not only added unwelcome weight, but also tended to make the aeroplane power unit even more unreliable.

By 1917 the Joyce Green flying school had an output of 36 fighter pilots per week who were also fully trained in the use of wireless telephony equipment. They were also taught the essential art of clear articulation under the extremely noisy conditions of an aircraft in flight. *(This aspect is further explored in a follow-up article by David Pritchard in our next issue – Ed.)*

However, the prevalent mists on the Joyce Green field made take-off and landing very difficult. Numerous accidents and several fatalities led to the Wireless Testing Park eventually being moved in February 1917 to the newly opened Biggin Hill airfield.

Biggin Hill in Kent, on the east side of the A233, is perhaps one of the most famous airfields of the Second World War through its front line involvement with the Battle of Britain.

Situated on a plateau on top of the North Downs, the site was some 80 acres, approximately 1.5 miles north of the village of Aperfield. Biggin Hill was officially opened on 14 February 1917 as an RFC Radio Signals Unit: (A coincidental date with the night of 2MT Writtle's first broadcast five years later). Later in that year the station was established as part of the inner patrol zone of the London Air Defence Area with No. 141 Squadron and Bristol Fighters arriving on 8 February 1918.

It is tragic to remember that there was an average of 400 casualties per year among RFC wireless operators, rising to nearly 500 lives lost during the months of May to November 1918. Despite their losses, by the end of the war, the Royal Air Force had 600 aeroplanes fitted with wireless equipment, 1000 ground stations, and over 18 000 trained wireless operators.

Having entered the war as little more than a curiosity, wireless communication had in four short years become essential for the conduct of any military force be it army, navy or airforce. The team who pioneered this development had built a technology that directly led to the allied victory and one of them, Peter Eckersley went on to build the Writtle Station 2MT and later, to be Chief Engineer of the British Broadcasting Company.

The end of Prince's Wireless Testing Park is somewhat sketchy and any reader who could supply any further information would be most appreciated.

Reference

Tim Wander, *2MT Writtle – The Birth of British Broadcasting*. **RB**

The Hague Concerts from PCGG

The Bitter-sweet Story of Hanso Idzerda

by Pat Hawker

Holland, the first week of November 1944. The start of that terrible 'hunger-winter' when 15 000 Dutch civilians in the still-occupied northern provinces literally starved or froze to death. Many others were summarily executed or perished in the prisons and concentration camps as members of the Underground organisations – OD, RvV, LKP, etc. – or shot as hostages following the assassination of members of the occupation forces or Dutch NSB collaborators.

That week a jeep brought me, as a radio operator for British Intelligence, to Nijmegen where, by chance, I was to become marginally involved in a further attempt – Pegasus 2 – to bring back Arnhem evaders across the rivers that separated occupied from liberated Holland. Pegasus 2 ended in tragedy when the Arnhem survivors and their Dutch guides were ambushed and many shot down on their way to the rivers.

In the north, on the Friday/Saturday night of November 3/4, a more private tragedy was being enacted: the execution by shooting of the Dutch engineer Hanso Henricus Schotanus à Steringa Idzerda, pioneer of broadcasting whose 'Hague Concerts' from his station PCGG were the *first* regular broadcasts for British 'wireless' enthusiasts in the years before the establishment of the British Broadcasting Company in 1922.

Idzerda at the microphone of PCGG. At the left the aerial tuning coil can partly be seen

Musical Evenings

There are several claims and counter-claims surrounding the birth of radio broadcasting but there can be no doubt that for British listeners full credit belongs to Hanso Idzerda who launched the first of his 'musical evenings' on Thursday, 6 November 1919, with broadcasts specifically intended for British enthusiasts from April 1920. Although the name Idzerda is seldom found in history books, 'The Hague Concerts' are often mentioned, for example: 'This station was well received in England and was, for a considerable time, one of the most popular broadcasting stations amongst the early wireless enthusiasts in this country.' [1]

Nor is it often recognised that his broadcasts preceded the experimental radiotelephony 'broadcasts' from Chelmsford by the Marconi Company from February 1920. There is plenty of evidence that from November 1919 PCGG broadcasts went out regularly at scheduled times with the musical programmes often announced in advance. PCGG thus began almost a year before KDKA Pittsburgh (27 October 1920) often credited with being the world's first broadcasting station.

There were of course earlier experimental transmissions of speech and music; the Canadian Professor Reginald Fessenden on Christmas Eve, 1906 using his steam-driven high-frequency alternator at Brant Rock, Massachusetts, USA was almost certainly the first. De Forest and his Radio Telephone Company made experimental transmissions from about 1908 – 12 and again in 1916 – 17.

An authenticated claim can also be advanced on behalf of a group of Belgian experimenters (Raymond Braillard, Robert Goldschmidt, etc.) who set up a transmitter in the grounds of the Royal Castle at Laeken and broadcast programmes of music for public reception every Saturday from 28 March 1914 until August 1914 when their transmitter was hurriedly destroyed shortly before the Germans entered Brussels.

However, Idzerda seems to have been the first to build a transmitter specifically for broadcasting, using a patented modulation system that produced a mixture of AM and narrow-band FM, on a semi-commercial basis with the firm intention of expanding the sale of the crystal sets, valved amplifiers and components made or marketed by his own firm (Ned. Radio-Industrie (N R-I).

But it seldom pays to be a pioneer: Hanso Idzerda and PCGG were gradually to be squeezed out as the popularity of wireless grew. As Professor Swierstra has written [2]: 'The pity is that, in his single-minded devotion to his work, he failed to hear or heed the danger signs emanating from circles more commercially minded. Consequently, as the big manufacturers moved also into this field and took control, Idzerda, too proud to adopt the

principles of the business world, was on a losing ticket... the memories of those glorious pioneer achievements faded also.'

Hanso Idzerda was not a man to go along with the crowd; fiercely individualistic he rebelled constantly against established authority. Born at Weidum, Friesland, in the north of Holland in September 1885, son of a country doctor, his secondary education was at a school noted for its strict discipline in an era when strict meant extremely strict.But he did not learn to conform although he later graduated with an engineering degree from one of the excellent German technical universities.

As early as 1905 he built one of the first European single-engined aircraft, though whether it ever got off the ground is uncertain. But soon he was enthralled with the equally new science of 'wireless' and became one of the early experimenters who took advantage of the liberal spirit whereby the Dutch authorities permitted wireless telegraphy experiments in the days when many European governments endeavoured to restrict radio to military and official communications. In 1913 he set up a 'Technical Wireless Bureau' in the Hague assisting and helping the small band of Dutch enthusiasts, firmly establishing a lasting reputation as friend and mentor. On the outbreak of the First World War in August 1914, Holland, although remaining a neutral country throughout, withdrew the experimental privileges. But three years later, in September 1917 – still 14 months before the Armistice – the ban was lifted: 'Holland became for a time the only country in the world where "radio" listening was legally permitted... broadcasting assumed the dimensions of a real possibility.' [2]

5 November | RADIO | 1919

Soireé-Musicale.

(Donderdagavond 8—11 uur n.m.)

PROGRAMMA:

1.	Turf in je ransel	Parademarsch.
2.	Valse Bauffy	Cigare.
3.	Rigoletto	Quatuor.
4.	Een meisje dat men nooit vergeet	Speenhoff.
5.	Los Banderilles	Marche Espagnole
6.	The Holy City	Cornet Solo.
7.	Le Barbier de Séville	Air de Rosine.
8.	Ave Maria	per Violino.
9.	Carmen	Marsch.
10.	De Erfenis	Soiree en Hesse.

en andere nummers.

Programma wordt gegeven met behulp van een pathefoon door middel van een

Philips-Iduret-Generatorlamp,

gemonteerd in een

Radio-Telefonie Zendstation der „Ned. Radio-Industrie"

op een golflengte van 670 Meter.

Iedereen die in het bezit is van een eenvoudig Radio-ontvangtoestel kan deze muziek rustig thuis hooren. 35664/114

Bij gebruik van onze versterkers kan deze muziek door het geheele vertrek hoorbaar gemaakt worden.

Voor nadere inlichtingen en levering van ontvangtoestellen, versterkers, telefonie zendstations enz. wende men zich tot de

„Ned. Radio-Industrie"

Beukstraat 8 - 10,

's-Gravenhage.

Advertisement as it appeared in the Nieuwe Rotterdamse Courant *of 5 November 1919, announcing the first PCGG Radio concert. The small print at the bottom reads:*

'Everybody in the possession of a simple radio receiver can easily listen to this music at home. When using our amplifiers the music can be heard in the whole room. For more information and supply of receivers, amplifiers, telephone transmitting stations, etc., please apply to "Ned. Radio-Industrie", Beukstraat 8 – 10, The Hague'

Thermionic Valves

Idzerda had friends among the military and was aware of the progress being made in the use of thermionic valves although none was available to Dutch civilians. Late in 1917 he tried unsuccessfully to obtain some from the 'Holland' factory in Utrecht where a few valves were then being manufactured for the Dutch forces, based on a German Telefunken valve taken from a German aircraft that had landed by mistake in Holland. Idzerda had or obtained one of the original De Forest 'Audion' triodes and he took this to N V Philips Gloeilampenfabrieken at Eindhoven. The family firm of Philips (a family related incidentally to Karl Marx) had in 1891 changed from a tobacco and coffee processing business into making incandescent electric lamps.

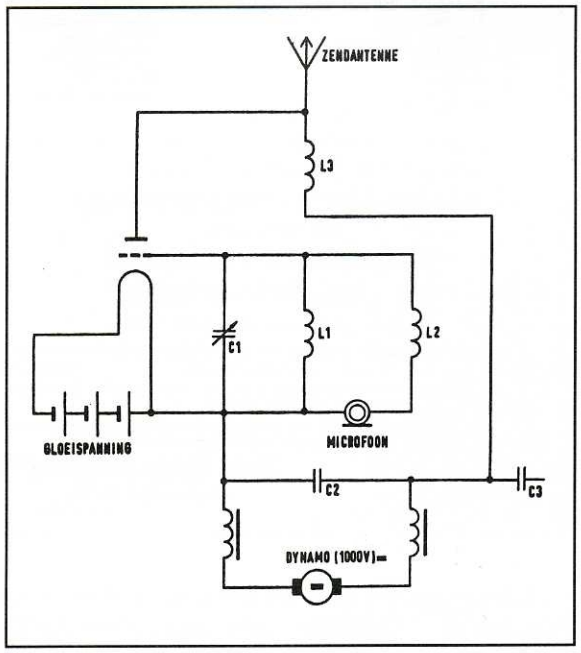
Idzerda found Philips initially very reluctant to enter the valve business, but they finally agreed to make near copies of the Audion provided that he would contract to buy a minimum of 180 per year. By early 1918 the first Philips-Ideezet valves were being delivered to him (Ideezet represents the sound in Dutch of the first three letters of his name). By December 1918 over 1200 had been sold at fl12.50 each. Philips soon realised that there was a promising future in valve manufacture and by July 1919 were themselves marketing the Philips-Ideezet 'soft' triodes independently of N R-I, and were also producing 'hard' valves for transmitters, although initially their 'Zendlampe' gave only 5 – 10 watts RF output. Idzerda thus launched Philips into electronics in which they were to become among the world's giants. In this period, Philips seem to have had very close links with GEC in England. N R-I appointed the British firm W. Burnham & Co, Deptford as their British agents after PCGG became established. Soon Philips were rivals rather than partners.

By late 1918 Idzerda was experimenting with a home-made valve 'continuous-wave' (i.e. not spark) transmitter and on February 7, 1919 he wrote to the Minister of Waterways seeking permission to demonstrate radiotelegraphy and radiotelephony at a Netherlands Trade Fair in Utrecht (24 February to 8 March 1919) and also to be allowed to make regular transmissions. This was granted on 14 August 1919, subject to tests in conjunction with the military: N R-I being granted the callsign PCGG and Philips PCJJ (later to become famous as an early HF broadcast callsign). On September 1 the Dutch monthly magazine *Radio News* announced: 'Every Thursday evening there will be continuous wave transmissions from 8 – 10pm'. In practice, the first broadcast with a selection of musical items was on November 6 with details announced on November 5 in the daily newspaper *De Nieuwe Rotterdamse Courant*.

This was on a wavelength of 670 metres but this was soon changed, first to about 800 metres and then about 1050 metres where PCGG stayed. This frequency band was later made available for a time to British amateur experimenters. By the end of 1919 PCGG 'broadcasts' were also being made on Sunday afternoons during which Idzerda replied personally to correspondents who reported reception of his transmissions. The single-valve transmitter output was at first only about 75 watts but this was soon pushed up to about 150 watts by running the valve with 1000 volts on the anode. In 1921 a Mullard valve was giving some 250 watts output. When in 1922 the *Daily Mail* sponsored the Hague Concerts, power was increased to

about 1 – 1.5kW and it appears to be this more powerful transmitter that was given to the Netherlands Post Museum in 1940 where it still remains and is occasionally powered into a dummy aerial.

The PCGG aerial was erected on the N R-I building at 8 – 10 Beukstraat, The Hague, and consisted of three wires each about 40 metres long, raised 15 metres high and stretched across a road. The earth consisted of some 24ft of iron pipe sunk in a well. At full load, the early transmitter showed an aerial current of about 1.3 amps on 1000 metres and about 1.6 amps on 800 metres. It was sometimes claimed that PCGG had a range of about 500 miles but this seems to have been based on a single report from Aberdeen. More reliably, PCGG could be heard well in south-east England provided there was no interference from Croydon Airport radio. In May 1921, E. W. Kitchin wrote [3]: 'As regards the strength of PCGG music, the writer gets it ten miles south of London quite nicely, audible with a single valve; and, with three note magnifiers added, it is quite loud on the telephone headgear and can be heard across the room.'



Circuit diagram of the original PCGG transmitter

The Programmes

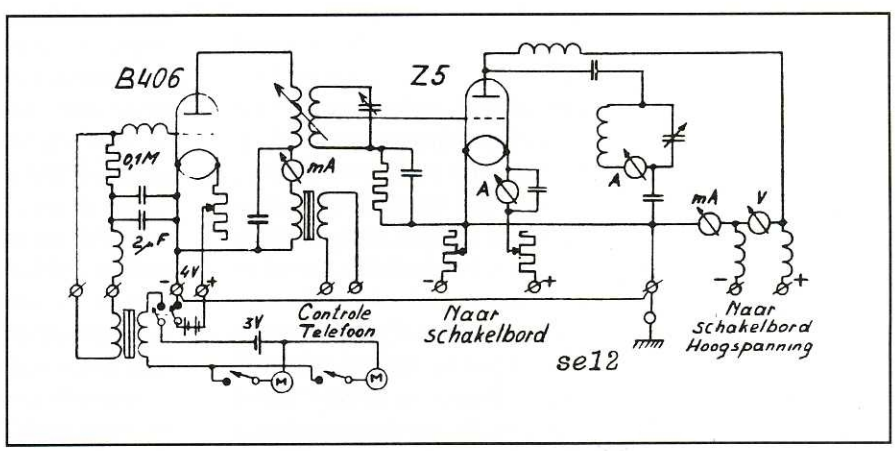
What then were the programmes that so thrilled those early listeners? Gramophone records, 'IDZ speaks... and speak he certainly did! And because Hanso Idzerda was nothing if not critical, what he said over the air often led to difficulties and reprimands' [2]. By April 1921 we read in *Wireless World* [4]: 'The phonographic selections sent out by this station are also interspersed with selections by a small band, and by four mandoline performers; occasionally also some singers take part. The orchestra and singers perform under a large funnel or horn which contains the microphones connected to the transmitting apparatus, so that the voices and music modulate the radiated power in the usual way... These concerts are addressed primarily to British wireless experimenters, as is evidenced by the introductory CW messages addressed to all British amateurs with which they are prefixed.'

The records were played on a wind-up, acoustic gramophone (phonograph) with its horn replaced by a tube in which the microphone was mounted, a second microphone being placed on the table near the gramophone.

With Philips marketing valves and equipment, the funds for PCGG soon became sparse. In 1921 *Wireless World* appealed to its readers for funds to keep 'The Hague Concerts' going; then in 1922 – 23 there was the *Daily Mail* sponsorship but, with the BBC now broadcasting, the newspaper did not receive the promotional rewards that it had expected and did not renew the contract. By about 1923 there were other stations broadcasting to Dutch listeners, including PCUU and PCKK in The Hague. By 1925 or so, Hilversum NSF was on 1050m with 1.5kW with PCGG now listed as 1070m with 1kW with only irregular transmissions. From about 1924, PCGG broadcasts virtually ended and Idzerda and his family drifted out of the public eye. Hanso's wife seems to have found the change hard to bear. Her daughter told Professor Swierstra that Hanso bore it with typical Friesian stoicism. Only the Dutch amateurs seem to have continued to show awareness of his contributions to broadcasting and radio technology.

World War II

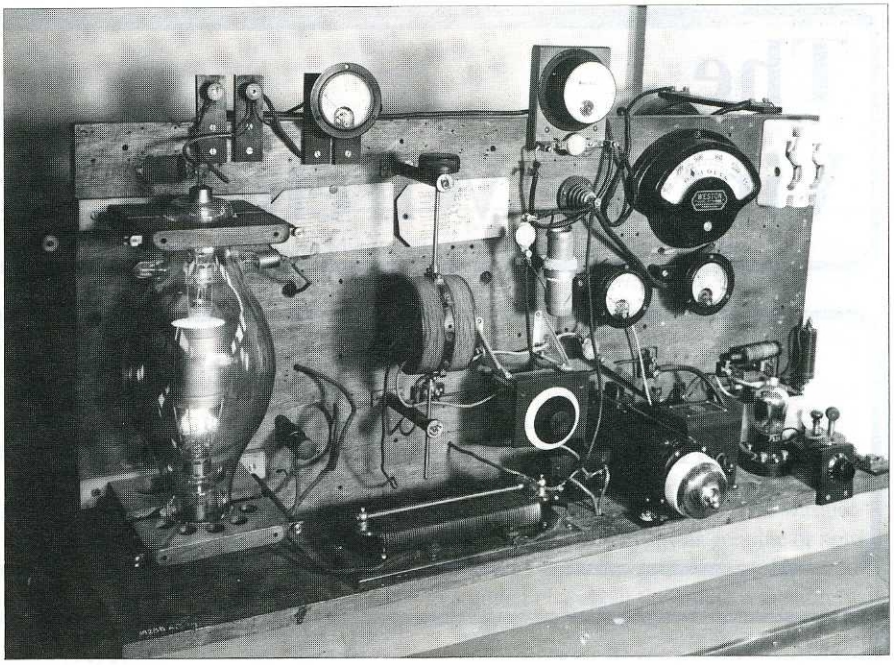
Then came the Second World War, and this time Dutch neutrality was rudely shattered by the German invasion of May 1940. Idzerda did not live to see the liberation: 'By one of those strange cruelties of fate, he fell victim of his own passionate interest in technical developments... First he was caught listening to broadcasts from London – something strictly forbidden by the occupation authorities and more than enough to put him in their black books. But he followed this by committing an even greater *faux pas*. In Holland, as elsewhere, the Germans had set up launching pads from which to direct their infamous V1 and V2 rockets at Britain. When Idzerda was found trespassing on a prohibited area, searching for fragments of an exploded V2, he was immediately arrested by the enemy on suspicion of espionage and, probably without so much as a simple trial, executed by shooting during the night of 3 – 4 November 1944' [2]. There must be some doubt whether this was the exact story and it may be that he was shot simply as a hostage, since the prison where this took place was used for hostages rather than suspected agents. It may thus be that, once more, the dice were loaded against him. Good fortune had eluded him once again.



Circuit diagram of the later PCGG transmitter

Acknowledgements

I gratefully acknowledge the help in supplying illustrations and information of Dick Rollema PA0SE, who has recently published a 70-year survey of the work of Idzerda in *Electron*, November 1989 (Dutch text). Much of the personal detail of Idzerda's life comes from Reference 2, published some 20 years ago in the journal of the European Broadcasting Union. Technical details come from Dick Rollema and many references in *Wireless World* 1920 – 22. Information on the Philips Ideezet valves from *Saga of the Vacuum Tube* by Gerald F. J. Tyne (Howard Sams, 1977).



The 1kW PCGG transmitter now in the Dutch Postal Museum

References

[1] John Clarricoats G6CL, *World at their Fingertips* (RSGB).

[2]N. Tj. Swierstra, 'The Birth of Broadcasting', *EBU Review*, No. 114B, March 1969 with letters from others in *EBU Review*, Nos. 116, 117 and 120 (March 1970).

[3] E. W. Kitchin, 'Notes on reception of the Dutch concerts', *Wireless World*, 14 May, 1921.

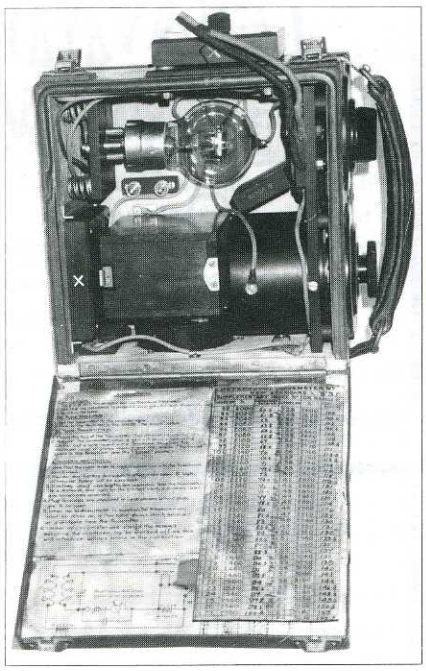
[4] Philip R. Coursey, 'The Hague Concerts', *Wireless World*, 30 April, 1921.

RB

TEST EQUIPMENT

WWI Heterodyne Wavemeter

by Rod Burman



This wavemeter of World War I vintage covers the wavelengths 500 to 3000 metres (100 to 600kc/s) in two ranges. The frequency band is set by plugging on an external coil block giving either 500 to 1500m (200 to 600kc/s) or 1200 to 3000m (100 to 250kc/s). The spare coil block is kept within the unit.

The oscillator makes use of an 'R' type bright emitter triode which requires a 6V LT battery, there being an internal resistance to drop this voltage to the 4.5 to 5.0 volts required by the valve. An HT supply of 9 volts is derived from two 4.5V flat-lamp batteries fitted in a wooden box inside the wavemeter.

The grid to filament circuit negative return has provision for connecting low-impedance telephones and has a sensitive undamped galvanometer in series so that zero beat can be seen as well as heard.

Tuning is accomplished by means of an air-spaced variable condenser of approximately 1500pF (0.0015µF) maximum value. This capacitor is adjusted by a knob pointing to a scale calibrated 0 – 180 degrees. The wavelength is then read off from the charts (one for each coil) pasted in the lid of the wavemeter.

The lid also contains the circuit diagram and, in the writer's particular instrument – Serial Number 531 – some hand-written instructions and cautionary notes, one of which reads as follows: 'If entirely wrong wavelengths are recorded, take the wavemeter to a distance and look for the correct wave, subsidiary waves are sometimes observed.' Also in red ink on the calibration charts are written the following words of stern warning, which might equally well have appeared on a National Insurance form: 'Keep this card carefully, without it you cannot work.'

When first acquired the wavemeter had the wrong valve, which in any case had an open circuit filament, and the unit had obviously been dropped at some time causing the internal ebonite panel to break and the main tuning condenser to come loose. A complete strip-down, glueing back the broken pieces of panel which fortunately were still in the box, and a general clean-up of corroded terminals restored the unit to health and vigour. An 'R' valve was plugged in, two flat batteries put in the box and off it went. The calibration is a little bit out but not bad considering the wavemeter is more than 70 years old. Probably it performs better than I will at that age!

RB

Ever Been Had?

The custom of playing harmless jokes on friends on the first day of April each year can be traced back over 200 years, to 1752 when the Julian calendar was replaced by the Gregorian. Up to that time, the New Year had started on March 25, and was marked by a week-long celebration which ended with feasting and merrymaking on April 1.

The growth since then of what we now call the media has increased enormously the opportunity to play tricks on an ever-widening circle of people, with radio and television broadcasting providing the ultimate in mass audiences and in immediacy.

Surely one of the most famous April Fool's Day tricks was Richard Dimbleby's *Panorama* programme on BBC TV, in which he reported on the bumper crop being harvested that year from the spaghetti trees in Switzerland. The accompanying film showed peasant farmers collecting the crop and laying it out in the sun to dry. Following the programme, BBC switchboards across the country were jammed with calls from viewers wanting to know where they could buy the spaghetti plants!

Technical magazines, too, have succumbed to the temptation to tease their readers each spring. The problem in doing this, though, is judging just how convincing to make the published item. Some years ago, when working on another magazine, I had the unpleasant task of telling a telephone caller, as diplomatically as I could, that the article which he wished to reprint in a book of new technological developments was in fact a joke. It is difficult to know which of us was the more embarrassed.

Sometimes, too, an event or technology described in April Fool articles, or something very like it, has a disturbing tendency to come true a few years later – holes in the ionosphere, for example!

My personal all-time favourite April-Fool article was one which appeared in *Wireless World* in 1970. It was so good that I was not entirely convinced on first reading whether it was genuine or not. Perhaps it was the brilliantly conceived author's name which was the real give-away – everything else about the article was entirely plausible, if somewhat eccentric!

By kind permission of *Electronics World + Wireless World*, I reproduce that article here, together with a delightful response from the readers' letters column of the following issue. I enjoy reading them still, and hope that your enjoyment of them will not be spoiled by knowing their secret in advance.

Geoff Arnold

Dynamic Range versus Ambient Noise

A practical solution involving metal-cone loudspeakers and high-power amplifiers

by George Izzard O'Veering

The essential requirements for a high quality sound reproduction system are adequate power and adequate bandwidth. Since loudspeakers are inefficient, and the attainment of wide bandwidth systems is generally incompatible with high efficiency, the achievement of the desired acoustic spectrum from the subsonic to the ultrasonic makes heavy demands on amplifier output.

Moreover, it will be apparent on reflection that many of the musical and other instruments, the acoustic output of which it is desired to reproduce, are themselves both powerful and developed to a high degree of acoustic efficiency. It is clearly laughable to suppose that the majestic splendour of a full orchestral fortissimo or the lung power of a Wagnerian tenor in full cry can be represented adequately on an acoustic budget of a few hundred milliwatts. Inconvenient though it may be, there can be no doubt that to recreate the true dynamic range of much recorded sound over the required sonic spectrum makes demands on the output power of the audio amplifier/reproducer system which are well beyond the capabilities of most, if not all, of the equipment at present on the market.

Calculation of required power

The quietest sound which can be heard in a given environment depends entirely upon the background noise level of that environment. Unfortunately, most people live in close proximity to traffic, neighbours with television sets, dogs, and noisy children, and these things, together with the normal background sounds of the home, combine to give an ambient noise level of around 50dB. The minimum sound level which can be distinguished clearly above this background level is therefore 53dB. The dynamic range of orchestral music can be as much as 70dB, therefore in order to be able to hear the pianissimo as well as the fortissimo passages, a peak level of 123dB is required.

The acoustic power in watts required to produce a sound intensity level of 53dB is about 6μW for an average-size living room. Since a 10dB increase in power output requires a tenfold increase in power, the 123dB peak-power level will therefore require a maximum acoustic output of some 50W. If the loudspeaker efficiency is 5% (and this is significantly better than is obtained from most commercially available loudspeaker systems) a peak-power output of 1000W per stereo channel is obviously required if the total dynamic range of a symphony orchestra is to be heard in comfort.

It was clear from discussions both with manufacturers and distributors that no serious attempt had been made to meet the requirement for drive units capable of handling as little as 250W. Initial trials made with some of the more likely units, were generally unsatisfactory. In particular there was a tendency for the cone and speech coil to become detached, and for fraying of the surround. In addition, the failure was often made more serious by partial combustion of the inflammable materials within or in proximity to the speech-coil assembly.

When more substantial reproducer units had been evolved, this only brought to light the flimsy nature of the housings which had been supplied, and considerable annoyance was caused by a minor injury sustained when one of the cabinets burst during an orchestral transient and the room was filled with flying splinters. At this stage it was accepted that the cabinets used would require to be of comparable strength to the reproducers, and the assistance of the specialist who constructed the metal cone loudspeaker assemblies was sought to manufacture four sheet-steel column-loaded units, of a suitable type to take the 23in x 14in elliptical wide-band speakers. These were situated at the four corners of the listening room and the opposite units are connected in parallel but in antiphase. This has the effect of increasing the apparent dimensions of the listening room, in addition to reducing the I^2R losses in the speaker wires.

Each unit is rated at 500W, with a nominal 20Ω impedance. The required output from the amplifier is therefore 10A at 100V r.m.s. (282 volts pk-pk) per channel.

Power amplifier design

The use of a solid-state, transformerless amplifier to provide an output of 1kW into a 10Ω load imposes certain limitations on the designer. In particular, the normal complementary or quasi-complementary output stage configurations are no longer practicable since the only useful and relatively cheap high-voltage transistors which are available are all of the n-p-n construction.

The basic output stage configuration employed, to provide a fully symmetrical push-pull class B output stage using only n-p-n transistors, is shown in Fig. 1. As shown, this would be satisfactory for power outputs up to about 50W.

In this circuit arrangement, Tr2/Tr3 and Tr4/Tr5 are Darlington pairs with Tr2 and Tr4 being normal small-power driver transistors. Tr1, in combination with R1 and R2, provides the necessary signal level and amplitude transformation for the lower half of the output stage, and ZD1 effectively stabilises the voltage level at the power output point. This is chosen so that the largest symmetrical voltage swing is obtainable. The symmetry of this stage is maintained up to a frequency determined by the resistance of R1 and R2 and the input shunt capacitance of Tr1. This will normally be well above the audible spectrum.

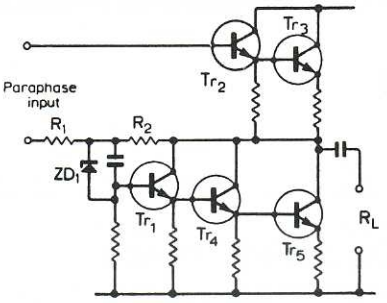


Fig. 1. Symmetrical output stage using only n-p-n transistors.

The final circuit employed is shown in Fig. 2. Although for simplicity only four parallel-connected output transistors are shown in each half of the output stage, this is only adequate for intermittent use at 1kW output. In practice six parallel-connected transistors are required in each half of the output stage.

The paraphase input is obtained from two medium-power high-voltage transistors, Tr3 and Tr4, the HT supply for which is obtained from a separately smoothed 400V line, because bootstrapping is not practicable with this type of driver stage.

The input is derived from a long-tailed pair of n-p-n transistors, of a type chosen for high-voltage linearity, and freedom from avalanche or collector leakage (Early effect) distortion. Although 150V is applied to the end of the 'tail', the maximum collector-emitter voltage is limited to about 52V, because the base of Tr2 is returned to the 50V tap on the Zener diode chain. A variable resistor is included in the 'tail' to set the current through Tr1 and Tr2. This controls the current through Tr3 and Tr4, and, since the output DC level is determined by ZD1, thereby controls the quiescent current of the output stage. This should be set to about 200mA. Because of the absence of coupling or bootstrapping capacitors the gain of the circuit from the base of Tr1 to the output of the power transistors is constant from the HF roll-off point down to DC. The LF roll-off point is therefore determined solely by the 2μF input capacitor and the output time constant.

The input impedance is 2kΩ in series with 2μF. The HF roll-off point and the phase stability margin is determined by C1, (the input-lag capacitor) C2 and R3, and C3 and R5. The loop gain is determined by resistors R1 and R2 and is approximately 100. The full output is given by an input of 1V RMS, which can be obtained from any suitable high-quality pre-amp capable of operating into a 2kΩ load.

Constructional details

The construction of the power amplifier unit follows conventional lines, and no unusual precautions are required apart from the need for generous heat sinks. Very satisfactory results were given in the prototype by the use of a pair of old cast-iron radiators, such as can be found second-hand for a few pounds in a builder's yard, to which the transistors can be individually attached by small bridges made from a suitably substantial gauge of copper sheet. The bottom and sides of an old copper preserving pan would be ideal. Care should, of course, be taken in drilling the attachment holes to make sure that the radiator shell is still capable of retaining water without leakage.

If such radiators cannot be found, a copper hot-water storage cylinder would serve admirably, but it would probably be more difficult to introduce such an item inconspicuously into the listening room. The siting of the output transistors should combine shortness of signal leads with the required thermal separation of the power transistors one from another. It should also be borne in mind that the circulating currents at full power are of the order of 30A. The leads to the loudspeaker terminal bosses – for which old car battery connectors are suggested – to the collector and emitter rails of the output transistors, and to the HT and earthy ends of the HT decoupling capacitor block must be substantial. A ⅜in x ¼in bore copper pipe is preferable, but as an alternative, lengths of 12SWG copper wire may be plaited together.

After assembly, it is recommended that the amplifier units be bench-tested on a dummy load before attachment to the speaker units, since quite trifling faults can lead to a surprising amount of energy being released. For example, in preliminary listening trials with the prototype, an intermittent open circuit in the earth braiding on an input to the pre-amp, led to the necessity for the listening room ceiling to be substantially restored and replastered.

Listening arrangements

Although the results obtained with good quality gramophone recordings have been most astonishing, and have brought home to the author in the most vivid way the qualities of stamina and emotional detachment required of an instrumental player situated, as the fortunate listener, in the midst of a large orchestra, it is clear

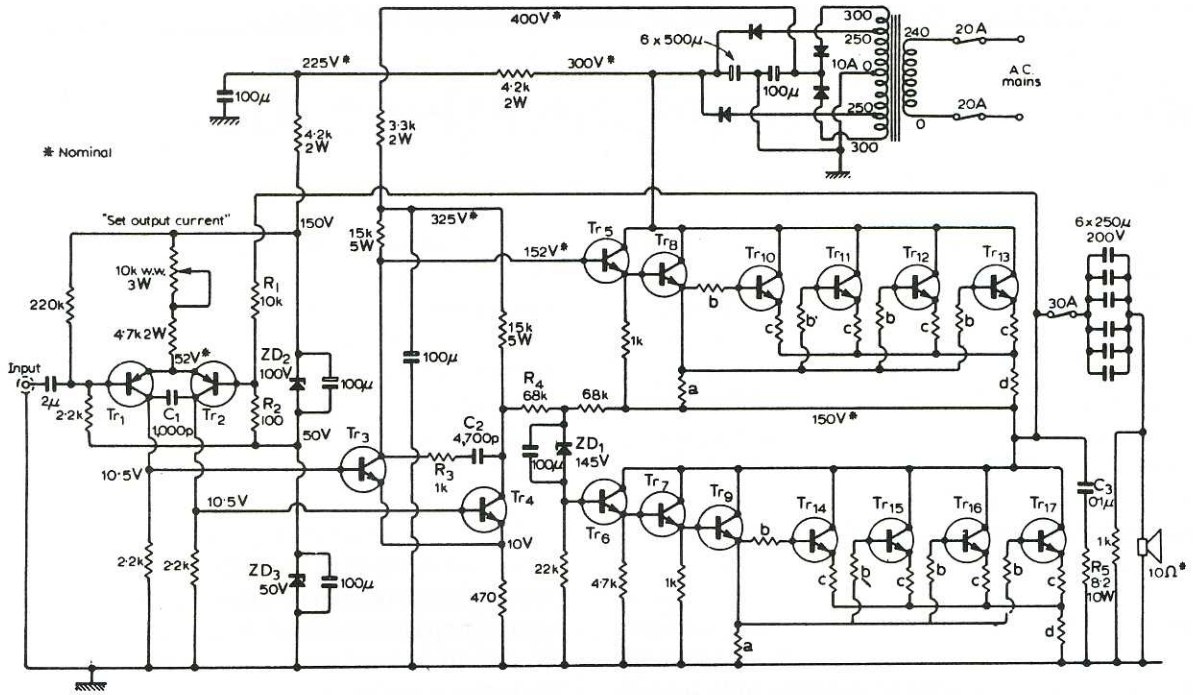


Fig. 2. Expanded version of Fig. 1 employing a Darlington triple as the output device. Tr_1, Tr_2—R.C.A. 38496; Tr_3 to Tr_7—MJE340; Tr_8 to Tr_{17}—MJ413. Lettered resistor values: a = 22Ω, 2W; b = 10Ω, 2W; c = 0.5Ω, 5W; and d = 0.1Ω, 5W.

that there are a number of residual problems in the life-like reproduction of disc recordings, of which the major one is the avoidance of acoustic feedback. As with many other of these problems, it is suspected that the manufacturers of the equipment have not really got down to serious thought on this matter, and the solution which the author feels most people must adopt, that of housing the record player unit in some detached building, such as a small garden shed, is inconvenient and prevents the listener from hearing the beginning of the recorded piece. Moreover, if in one's hurry to return to the audition room, the pickup cartridge is let fall too rapidly upon the record, extensive damage can be caused to windows and other glazing.

Summing up

The performance of the equipment as installed is entirely satisfactory, and a wide variety of sound sources have been explored during the assessment of the scope of this system, and many sounds have been recaptured with a degree of realism not previously encountered. However, the development of this apparatus has not been without difficulty, scepticism and expense, and it has been suspected at times that unnecessary difficulties have been placed in the author's way. For these reasons, it is thought unlikely to appeal to those for whom high-fidelity reproduction is merely a passing interest. On the other hand, it has proved possible to purchase several of the adjoining properties at a very advantageous price, and this has undoubtedly offset a large part of the constructional costs.

The problem of dynamic range – a reader comments:

I was interested to read Mr O'Veering's article in the April issue of *Wireless World* since I too have evolved a practical solution to the problem of dynamic range, but have approached the problem from a different angle.

I have developed the 'Ultimate Fidelity Listening Chair'. The basic chassis on which ten loudspeakers are mounted is conveniently provided by a heavy oak-framed wing-arm chair. Mounted on each wing are five units, two 15in bass units, two 5in mid-range units and one 2in high-flux tweeter, together capable of handling 120 watts RMS per channel. A special steel framework supports the pre-stressed concrete baffles from within the heavily upholstered armchair wings, since each baffle complete with units weighs just over 1 cwt.

The amplifiers are commercially available 150 watt laboratory units fed from equally conventional sound sources.

Initial experiments showed that nylon reinforced seat belts were necessary to prevent the listener's nervous reflexes propelling him from the chair under heavy transients, and missing the most exciting musical passages.

On the advice of the local family doctor, however, I have now replaced them with an ex-RAF ejector seat, triggered by electrodes placed on the listener's temples. Although the listener is restrained during normal nervous spasms, when the sound pressure approaches that considered to be detrimental to the brain, the rocket propelled ejector seat is triggered by the induced skin potentials, propelling the listener from the listening area and out of danger through a specially constructed roof trap within 10 milliseconds. This arrangement has proved most effective, in fact during the Prom season last year, and as a result of the excellent transmissions from the Albert Hall, I was ejected no less than eight times to the great amusement of my children and the annoyance of my neighbour on whose greenhouse I landed on one occasion, on re-entry.

The big drawback of this method of musical enjoyment however is that, like headphones, full benefit can be experienced by only one person at a time. It is for this reason that I am busy developing the 'Ultimate Fidelity Settee' which I hope to report on in due course.

IVOR NEDAKE
Beaconsfield, Bucks.

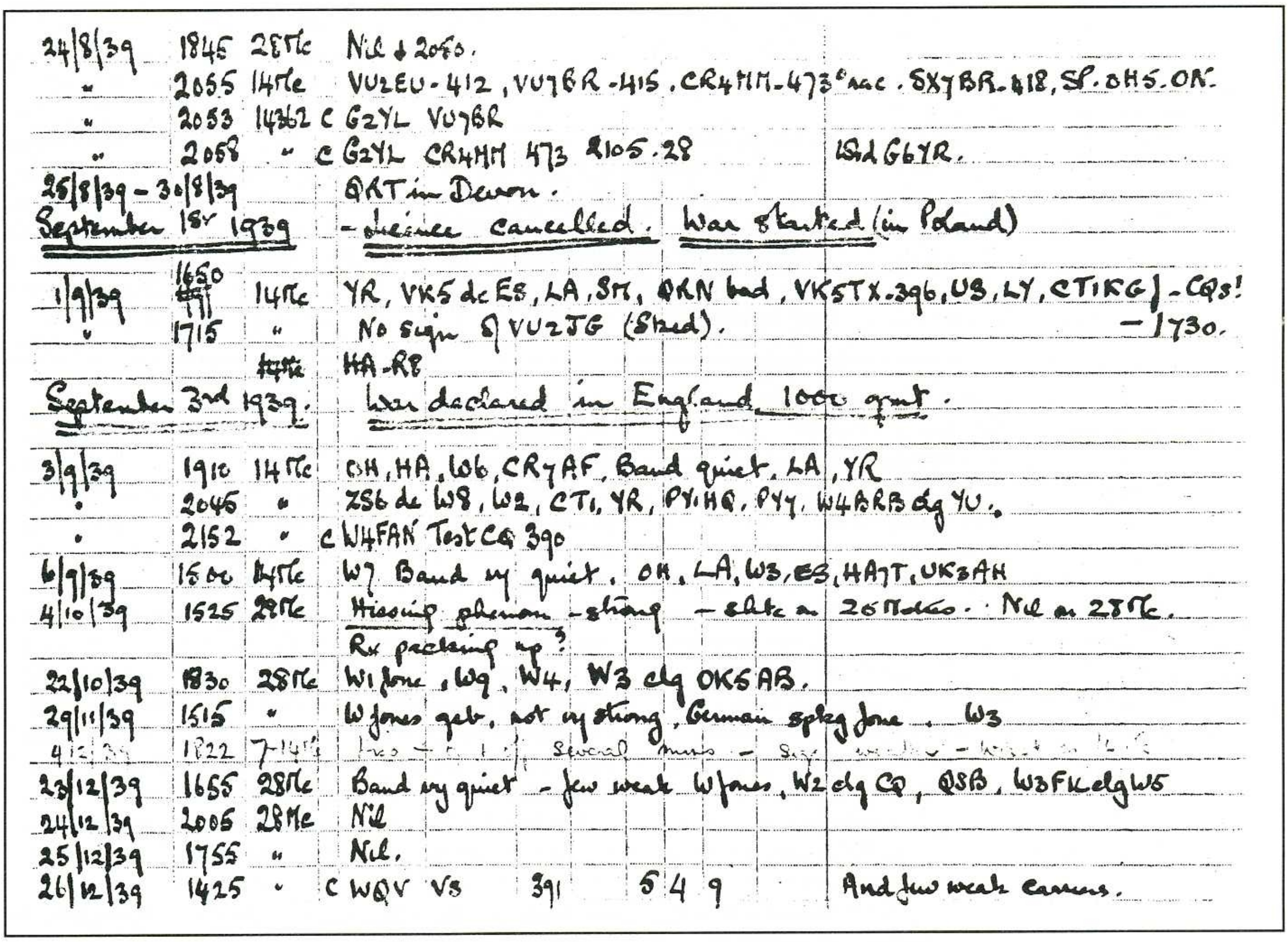
Wireless and Communications Archives

by Joan Ham

One of the unseen collections at the Chalk Pits Museum is the library and archives – a most necessary adjunct to a museum, but one which has grown almost by default. Books and papers, accumulated piecemeal, were housed in one tiny room next to the toilets, and the wireless section was tucked away in a windowless room behind this with other material.

It was decided that the library should be moved 'next door', where some old cart-sheds full of material in storage offered much more space. In addition to the main area, two small 'rooms' which had once housed a fuel storage tank and machinery could be included. This was all cleared out, the uneven earth floor concreted, the ceiling lined and the walls plastered and painted. The new library lent itself beautifully to fitting out with sections for different interests, and it was possible for the wireless section to have the little separate room where the fuel tank had once been.

Over the years we have collected a unique archive. There are two original signed photographs of Marconi presented by the great man to his colleague Kemp, which have been, until now, in a box of unprotected photographs. Mrs Irene Marwood donated the collection of the late Gerald Marcuse, pioneer of Empire Broadcasting, which led the BBC to start its own famous World Service. Other irreplaceable photographs record events in the history of wireless that were the first of their kind. There are runs of magazines, which we had taken in some trepidation knowing our storage problems, but which were vital to future studies, and which include a near complete run of the unique *T & R Bulletin* from 1926 to 1947, a valuable history of radio amateurs and their work in the fore-front of the communications field. There are miscellaneous copies of the old wireless publications of the early years which evoke times past as the pages are turned. Another collection which we shall be able to sort and shelve is the late Dr Harold Brodribb's complete run of *Short Wave Magazine*. Quite apart from the textual and pictorial content, the contemporary adverts provide a vast fund of information which can often assist in identification of artefacts. We have military manuals and circuits covering most of the service equipment on display in our section.



24/8/39 1845 28Mc Nil + 2050.
" 2055 14Mc VU2EU-412, VU7BR-415, CR4MM-473 [illegible] SX7BR-418, SP. OH5. OK.
" 2053 14362 C G2YL VU7BR
" 2058 " C G2YL CR4MM 473 2105.28 [illegible] G6YR.
25/8/39 – 30/8/39 QRT in Devon.
September 1st 1939 – licence cancelled. War started (in Poland)
1/9/39 1650 14Mc YR, VK5 de ES, LA, SM, QRN bad, VK5TX-396, U3, LY, CT1KG] – CQs!
" 1715 " No sign of VU2JG (Shed). –1730.
HA-R8
September 3rd 1939. War declared in England 1000 gmt.
3/9/39 1910 14Mc OH, HA, W6, CR7AF. Band quiet. LA, YR
" 2046 " ZS6 de W8, W2, CT1, YR, PY1HQ, PY7, W4BRB dg YU.
" 2152 " C W4FAN Test CQ 390
6/9/39 1500 14Mc W7 Band v quiet. OH, LA, W3, ES, HA7T, UK3AH
4/10/39 1525 28Mc Hissing phenom – strong – also on 26Mcs. Nil on 28Mc.
Rx packing up?
22/10/39 1830 28Mc W1 fone, W9, W4, W3 dg OK5AB.
29/11/39 1515 " W fones good, not v strong, German speaking fone. W3
4/12/39 1822 7-14Mc [illegible]
23/12/39 1655 28Mc Band v quiet – few weak W fones, W2 dg CQ, QSB, W3FK dg W5
24/12/39 2005 28Mc Nil
25/12/39 1755 " Nil.
26/12/39 1425 " C WQV V3 391 5 4 9 And few weak carriers.

Some treasures from the Chalk Pits Museum archives – Above, a historic page from Nell Corry's 1939 log. On the facing page, the front cover of a booklet given to Marconi's colleague G. S. Kemp and passed on to his son, and Letters Patent granted to Capt. P. P. Eckersley in 1934, for Asymmetric Sideband Broadcasting

A particular prize which we acquired recently was photographs and documents concerning Capt. Peter Eckersley, the BBC's first chief engineer and the 'father of the BBC'. There is the entire collection of log-books of Barbara Dunn and Nell Corry, the first two lady radio amateurs, who were amateur in name only. Their contribution to pre-war scientific observation and experimentation, and their unsung war service are without equal. We are very fortunate to have this valuable material. Also in the 'amateur' field, we have several collections of old QSL cards which we can now file properly into drawers. These confirmations of contacts which amateurs sent to each other are more than just old postcards – some are from countries which no longer exist, others are from parts of the world which required a special expedition to reach and which was often done simply for the thrill of sending and receiving radio signals there! They record the development of science in their descriptions and often photographs of equipment, and are a monument to the dedication of these unpaid spare-time scientists.

Among our printed books we have a wide range of early wireless books by such well-known authors as F. J. Camm, a pristine set of *Harmsworth's Wireless Encyclopedia*, *The World at Their Fingertips* which records the history of the Radio Society of Great Britain – our copy was signed by the author John Clarricoats and presented to Gerald Marcuse – and many others covering all aspects of communications from telegraphy to television.

The archive is not restricted to the printed word, as we have sound and film of special people and events, including one lively old lady who actually worked with Marconi. That is really shaking hands with history! Our own set of photographs in a set of albums cover the site, exhibits and special events from before 'Day One'. It is astonishing to look back and see just how much hard work has gone into making the museum in the past ten years. We are delighted to have charge of our own library and archive, but neither we nor the museum stand still. We have the space to reorganise ourselves now, but there is a law of physics which states that books expand to fill the space available. Perhaps at the end of another ten years, the museum library will be moving to new premises so that we can move into the rest of the present space! **RB**

SIGNAL HILL, NEWFOUNDLAND, DECEMBER 12th, 1901.

C. S. Kemp

With Best Wishes for many Very Happy New Years from

C. S. Kemp

ISSUED BY THE MARCONI INTERNATIONAL MARINE COMMUNICATION COMPANY LIMITED IN COMMEMORATION OF THE THIRTIETH ANNIVERSARY OF THE FIRST WIRELESS SIGNAL TO BE RECEIVED ACROSS THE ATLANTIC OCEAN

Letters Patent.

.....

Country Great Britain.

Number 445,431. Date 17/10/34.

Patentee P.P. Eckersley.

Invention Asymmetric Sideband Broadcastin

Duration 16 years. Renewal fees due 17/10/38 and annually thereafter.

Working

Marking "Patent No. 445431".

Gill, Jennings & Every-Clayton,

Chartered Patent Agents,

51 & 52, Chancery Lane, London,

A Rare Bird!

The 'M & G 3' Amateur Bands SSB Transceiver

by Geoff Arnold

The M & G 3 is an all-valve SSB transceiver which was designed and manufactured by M & G Electronics of Bournemouth in the mid-1960s.

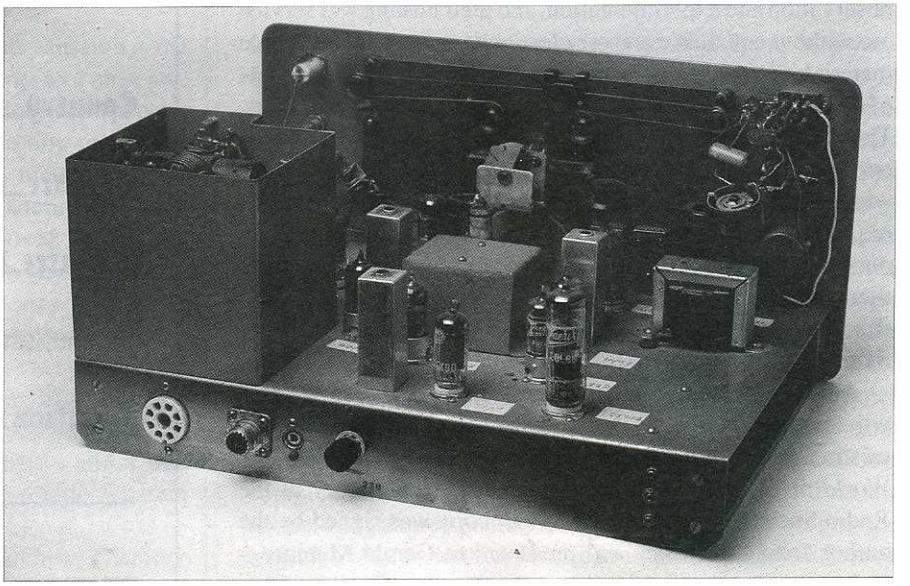
It covers the amateur bands of 160, 80 and 20 metres with a VFO based on an electron-coupled Hartley oscillator. The sideband generator uses a modified ring type balanced modulator, of the form originated by W2KUJ (see *RSGB Radio Communication Handbook*, 5th Edn., page 6.70) followed by a cascaded half-lattice crystal sideband filter. The PA is a single 6146 with 900 volts on the anode.

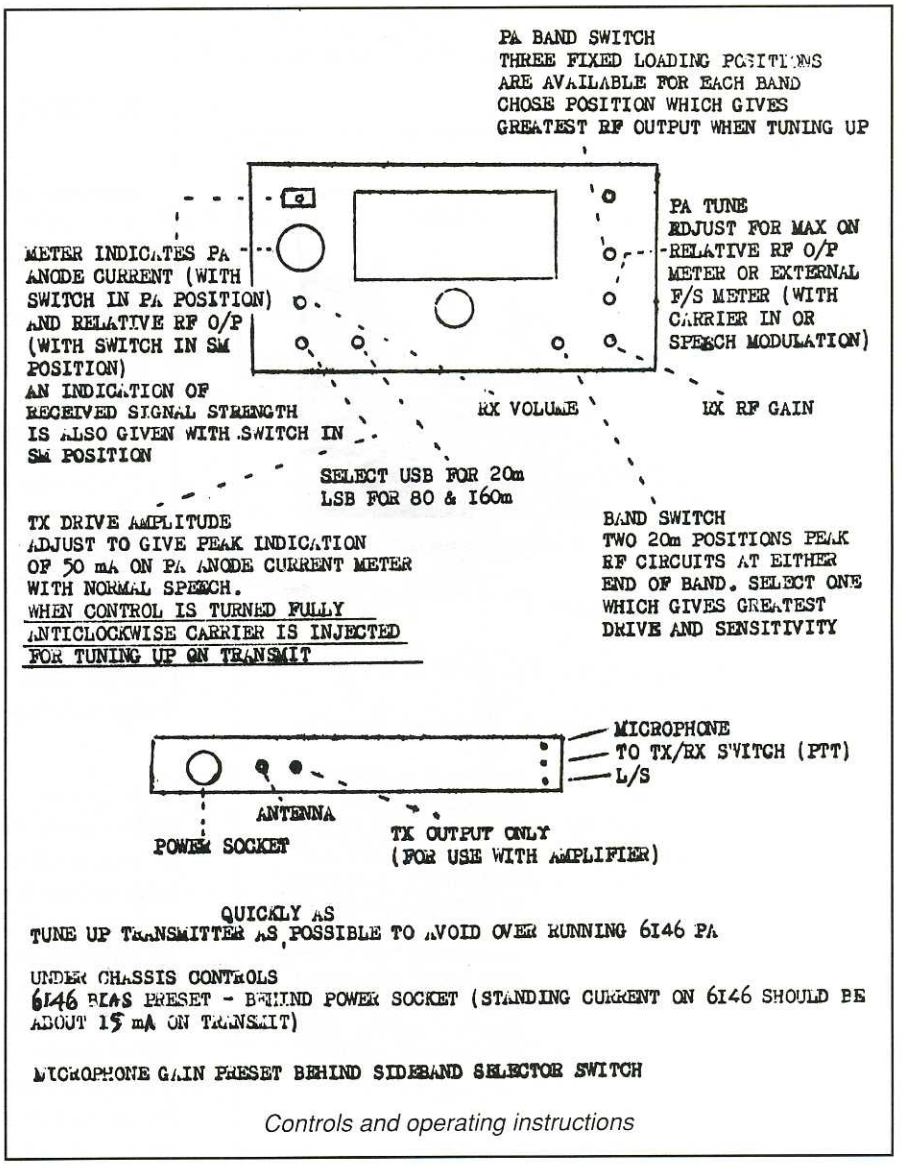
Around fifty of the M & G 3 were made. A similar design using crystal control in place of the VFO was produced to operate in the commercial HF bands on point to point services.

The M & G 3 pictured here and on the front cover of this issue was manufactured to order around 23 years ago for G3DZX, at a cost of £100. Previously, he had been using a Panda Cub, and heard about the M & G 3 from a GPO Station Inspector. At that time the only other British SSB transmitters and receivers were being made by K W Electronics. The set was delivered to the house and set up by M & G staff, an operation that took approximately two hours.

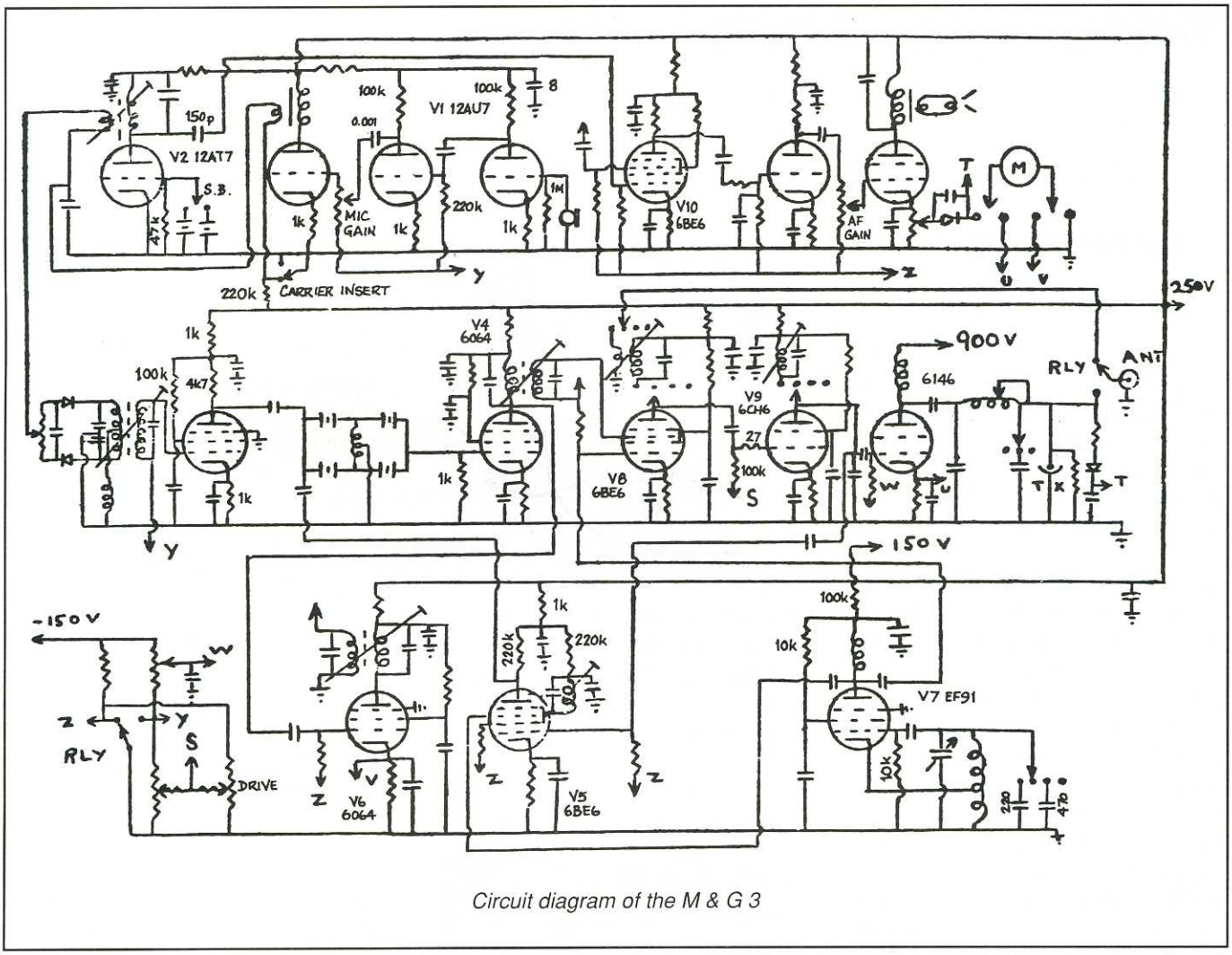
G3DZX used his M & G for 18 years. He then loaned it to the late G4EKA, who carried out some modifications to the circuitry. Since that time, though it still works, its performance has never quite been the same.

The set, together with its separate AC mains power supply unit, has now passed into the ownership of Mike Owen G4YTA, who is keen to obtain full circuit details and alignment procedures so that it can be restored internally to its original condition. Any information, please, to G4YTA direct (QTHR) or via *Radio Bygones*. **RB**

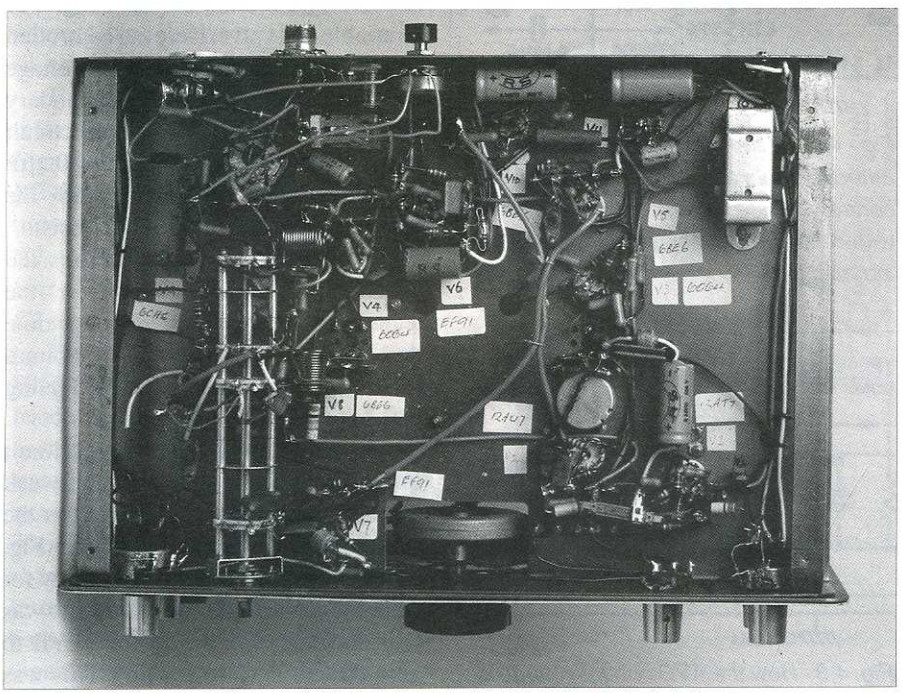




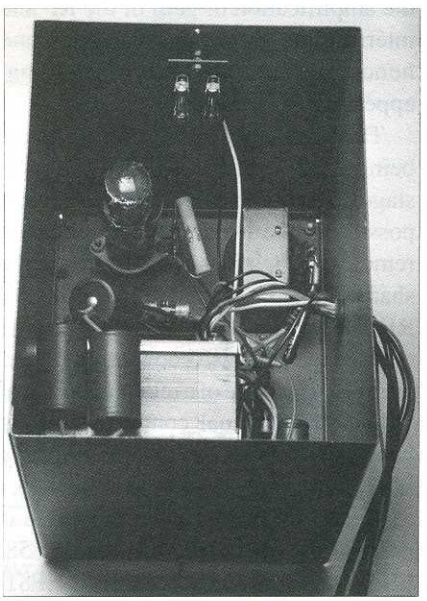
Controls and operating instructions



Circuit diagram of the M & G 3



Under-chassis layout of the transceiver



An internal view of the PSU

Yesterday's Circuits - No. 4

by Gordon J. King, IEng, G4VFV

Automatic Volume Control

The difference of a million times or more between the strength of signals arriving at an early receiver often called for a couple of manual controls which could be operated while tuning. These were to adjust independently the amplification of the radio frequency (RF) and audio frequency (AF) stages to avoid overloading and excessive blasting on strong signals and to provide maximum amplification on weak signals.

Automatic volume control (AVC) was one of the first 'dynamic' circuits (i.e., relying on the signal for its control operation) to appear in early receivers. Indeed, the technique is still used today, but is now more accurately known as automatic gain control (AGC). With amplitude modulation, the strength of the audio at the output of the detector depends on the amplitude of the modulated carrier-wave. The AVC circuit (as with AGC) samples this amplitude and produces a direct voltage whose strength is proportional to it, and it is this voltage which is used to adjust the amplification or gain of the RF and intermediate frequency (IF) stages, and hence the amplitude of the signal appearing at the detector.

This is achieved by the control voltage being used as a bias for valves in the stages under control, which was made possible by the development of so-called remote cutoff valves as distinct from the sharp cutoff characteristic of ordinary RF and IF amplifier valves. Remote cutoff valves are also known as variable-mu valves because of a relatively gradual reduction in mutual conductance (and hence gain) with increase in negative bias on the control grid (see **Fig. 4.1**).

A well-known variable-mu valve is the 6K7. Earlier ones are the 35, 58, 6D6, etc., while others include EF81, EF85, EF93, 6NK7 and so forth. When finding a valve for an early set which employs AVC it is important to make sure that the substitute valve in one of the controlled stages does in fact have variable-mu characteristics. If a sharp cutoff valve is employed, the stage might well be cutoff altogether when a strong signal is tuned! A common sharp cutoff valve is the 6J7. Others are the 24, 57, 6C6, etc. The signal section of many frequency changer valves also has variable-mu characteristics, so that this stage as well as an IF stage can be controlled.

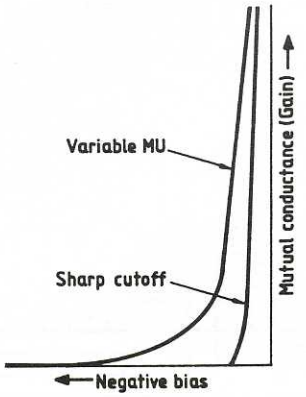


Fig. 4.1 - Comparing the variable-mu characteristic of a remote cutoff valve with the characteristic of a sharp cutoff valve. Only the former is suitable for AVC applications

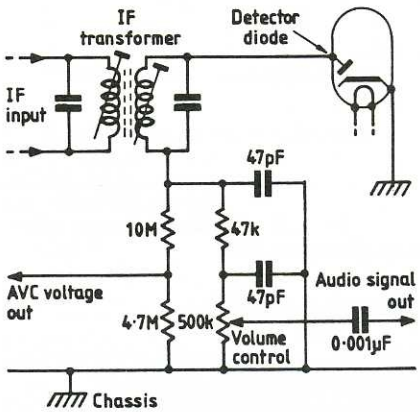


Fig. 4.2 - This circuit uses the signal detector diode also to produce the AVC control voltage, which rises negatively with respect to chassis with increasing aerial signal

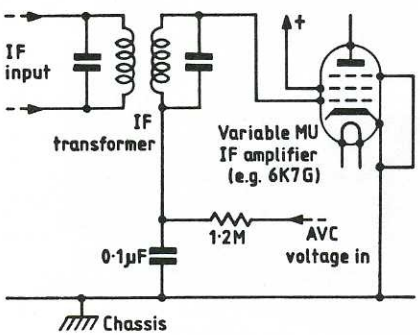


Fig. 4.3 - How the AVC control voltage is applied to the control grid(s) of the RF/IF stages

When AVC first appeared the control voltage was often obtained from the detector diode circuit, using filtering to rid the DC voltage of the audio component and RF. A simple circuit of this scheme is given in **Fig. 4.2**. Here most of the AF is developed across the volume control, while the 47kΩ resistor and the two 47pF capacitors eliminate the RF. The negative (relative to chassis) DC at the top of the 47kΩ resistor is divided down by the 10MΩ and 4.7MΩ resistors and then fed to the controlled valves as the AVC voltage.

The circuit in **Fig. 4.3** shows how the AVC voltage is fed to the control grid of a variable-mu valve. Here the controlled stage is an IF amplifier, and the voltage is fed in at the bottom of the secondary winding of the IF transformer, the circuit being bypassed for IF by the 0.1µF capacitor, which also helps with the filtering, as does the 1.2MΩ resistor. With a controlled RF amplifier (e.g., the signal stage of a frequency changer), the technique is just the same, but this time the control voltage is fed in at the bottom (cold end) of the aerial or RF coupling coil.

A shortfall of the simple AVC circuit in Fig. 4.2 is that as soon as even a weak signal is received the bias reduces the set's sensitivity, as shown at (a) in **Fig. 4.4**. To retain the highest sensitivity for weak signals an operating threshold was built into the circuit prior to WWII to give the curve shown at (b). This was called delayed AVC and is still used today. The threshold voltage is set so

that rectification of the signal, and hence production of bias, occurs only when the input signal is sufficiently strong.

It was no longer possible to achieve this requirement using only the detector diode. Thus, a separate diode was used for AVC, and valves with two or three diodes incorporated into the same envelope as a triode or pentode were developed. The circuit in **Fig. 4.5** illustrates the basic features of delayed AVC where, in this case, the delay is provided by a battery. Since the cathode is made positive with respect to the anode, the diode will conduct and hence produce the AVC control voltage only when the anode swings more positive than the cathode. Receivers employed various artifices to attain the delay. Sometimes the anode of the diode was given a negative bias to provide the delay. In the Regentone ARG359, for example, the centre-tap of the HT winding on the mains transformer was passed through a resistor network and bypassed by a 25µF electrolytic. This gave a voltage negative with respect to chassis which was then resistively linked to the AVC diode anode, to provide the delay.

Some early, especially American, sets boasted what was called quiet AVC (QAVC) whose curve is shown at (c) in Fig. 4.4. This indicated that the output or sensitivity of the receiver is greatly reduced until the input signal reaches a certain predetermined (squelch) level. With this arrangement it was possible to achieve a relatively quiet background when tuning between stations, rather like the 'mute' facility of FM sets.

This feature is illustrated in **Fig. 4.6**, relevant parts of the early RCA R78. Signal is coupled to the control grid of V2 through C1. Diode D2 of V3 is the normal AVC diode, receiving signal via C2 and yielding the negative-going AVC bias across network R1, R2 and R3, with C3 and C4 as filter capacitors.

The 'quieting' arrangement is worked by diode D1, in conjunction with the triode section of V3. This diode is in receipt of IF signal from the IF transformer, and as the diode load is R4 a negative voltage biases V3 triode grid. The IF signal is bypassed by C5. A significant aspect of the circuit is the return of V3 cathode to chassis via the cathode resistor, R5, of V1, which is the signal IF amplifier valve.

Now, on weak signals the negative bias on V3 grid will be low thus causing a relatively heavy cathode current to flow through R5. The cathode of V1 is therefore made more positive, which is tantamount to the control grid of V1 going relatively more negative (with respect to the cathode). Since V1 is a variable-mu valve, the gain of the stage is greatly decreased, thereby decreasing the audio output and providing the 'quieting' function.

On stronger signals the increasing negative bias at V3 grid reduces the cathode current through R5. The cathode voltage of V1 swings less positive, which is reflected as a reduction in negative bias at V1 control grid. The quieting function is thus lifted and the receiver's sensitivity is restored with normal AVC action!

A number of circuits were evolved in bygone days for AVC and QAVC, and it is historically interesting to see how such control circuits rapidly evolved with the advent of the superhet receiver.

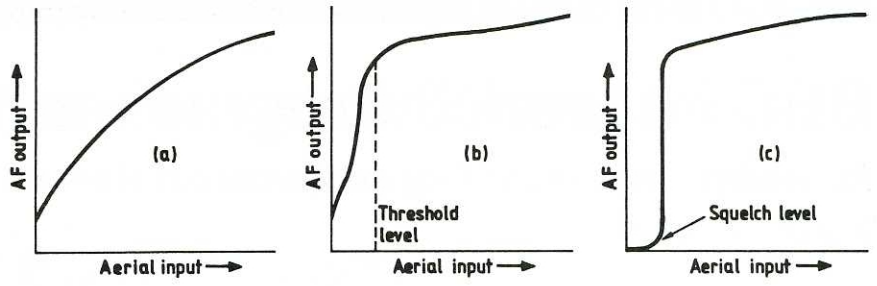


Fig. 4.4 (above) - AVC operating characteristics: (a) simple AVC, (b) delayed AVC, and (c) quiet AVC

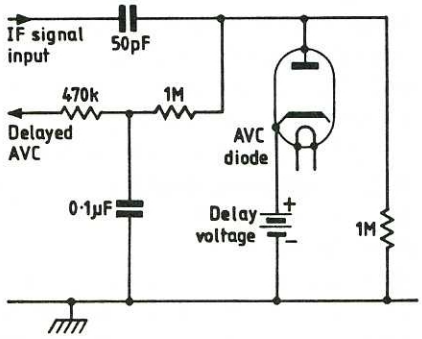


Fig. 4.5 (right) - Circuit showing how the bias is used to 'hold-off' the production of the AVC control voltage until the aerial signal reaches a certain level

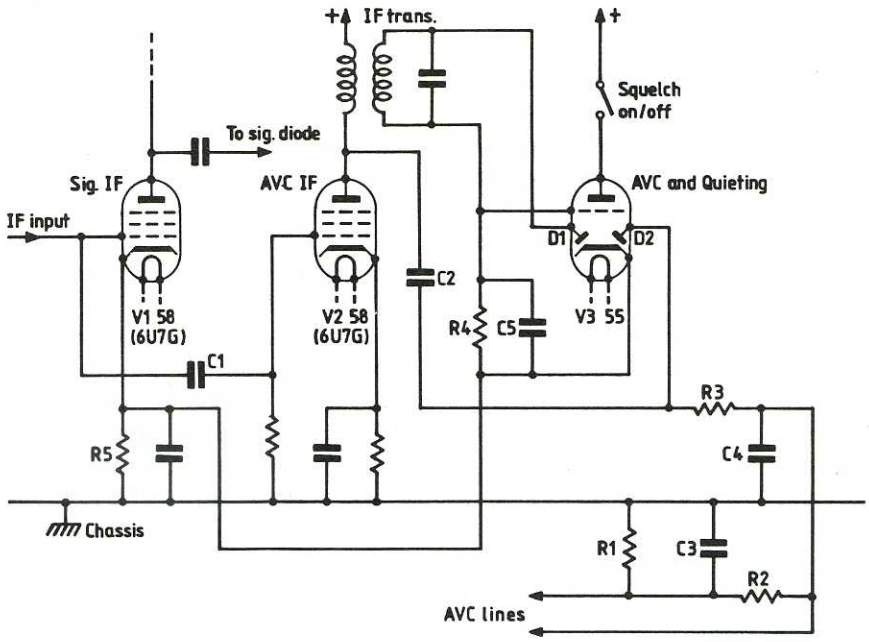


Fig. 4.6 - Basic circuit for QAVC

BBC Network 3 Programme 'Sound'

for Audio, Tape recording and Amateur Radio Enthusiasts (1962 to 1966)

by F. C. Judd G2BCX

During the 1950s and 60s both high fidelity sound reproduction, more commonly known as hi-fi, and magnetic tape recording not only became well and truly 'domesticated', but also very absorbing and time-consuming hobbies.

Clubs and societies were formed and there were numerous monthly magazines like *The Gramophone*, *Audio and Record Review*, *Hi-Fi Sound*, *Practical Hi-Fi*, *Tape Recording*, *Tape Magazine* and *Amateur Tape Recording* which, between them, covered just about every aspect of these two very closely associated hobbies. Clubs and societies were formed all over the country. These had monthly meetings, often with a lecture and/or demonstration of equipment by known experts or knowledgeable members, as well as competitions for members, including outdoor sound recording activity: birdsong, wild animal sounds, steam railway engines and so on.

World-wide Participation

At one time there were nearly 200 clubs and societies in the UK alone, as well as three national organisations, but tape recording soon began to enjoy a world-wide interest. For instance, there was 'tapesponding', a form of international communication, rather like amateur radio except that messages and exchanges of news, views and music between people of all ages and nationalities were made with the aid of tape recording. The small 3 inch reels of ¼ inch tape became very useful for this pastime as the postal cost was low, even to distant countries – 'DX' on tape, you might say. Compact cassettes came later.

Then there was the annual British Amateur Tape Recording Contest, open to enthusiasts in other countries as well as the UK. As Editor of *Amateur Tape Recording* magazine during those years, I was one of the panel of judges for the BATR contest.

Someone also conceived the idea of tape recorded programmes for hospitals,

Seated around the table in BBC Studio 3A for the last programme were John Borwick (in shirt-sleeves) and, reading clockwise, John Gilbert, Donald Aldous, Peter Walker, Douglas Brown, Burrell Haddon, and the author

piped to the patients through the normal radio headphone circuits. Another service was 'Talking Books for the Blind'; voice recorded popular books by well known authors, technical and scientific articles, etc., all on magnetic tape and distributed to blind persons. This activity too, became popular, and continues today in the UK.

A BBC Programme for the Enthusiasts

It wasn't long before the BBC made an approach to selected people with the suggestion that a special monthly programme might be devoted to the hi-fi and tape-recording enthusiasts. As a result a 'team' was formed consisting mainly of editors and technical editors of the magazines mentioned above. It was also suggested that amateur radio could be included (a second reason why I was invited to become one of the team). The programme was called *Sound*, and the first series was produced by Marguerite Cutforth (wife of broadcaster Rene Cutforth). The compère for all the programmes during the four years the series ran was Douglas Brown, Editor of *Tape Recording* magazine.

A special programme devoted entirely to amateur radio was broadcast in March 1964, in which I dealt with just about every aspect of the subject. Although the guest radio amateurs who took part in that programme are now all 'silent keys', I can still hear their voices from the off-air recording which I made of the broadcast programme.

The Last Programme

Hi-fi and tape recording were destined to lose popularity as 'hobbies' and become commonplace media for entertainment in the home. The number of listeners to the *Sound* programme became too small to make it worthwhile so the BBC decided to discontinue it.

The last *Sound* programme was produced by Richard Keen and broadcast during June 1966. Those who took part, as shown in the photograph, were five of the original team and two guests, Peter Walker of Quad amplifiers and Burrell Haddon of the BBC stereo broadcasts department. The compère, as always, was Douglas Brown. The programme, unscripted, was devoted to a general discussion on design trends and performance of what was then modern high fidelity audio and sound recording equipment, the merits of stereo broadcasting and, last but not least, the future of amateur radio. **RB**

The Vintage Years of Amateur Wireless

Part 4

by Stan Crabtree

As the achievements of wireless telegraphy became more widely known, more members of the public became interested in this new form of communication. But it was still very much a middle-class hobby, taken up generally by persons having some professional electrical knowledge. Of the younger generation, the fortunate ones were those having a school master interested in wireless who was prepared to spend time with and encourage his pupils in experimenting with the new technique. Getting started had become marginally easier as wireless components became available from commercial manufacturers and for the enthusiast with money there was now no need to resort to constructing the basic items. The question was: 'How much technical knowledge was needed to put together the apparatus and how much would it cost?'

This was a favourite query put to Mr S. R. Bottone, leading W/T expert in the columns of the *English Mechanic & World of Science* journal. In August 1906 he replied to a budding experimenter that there should be no difficulty to the intelligent amateur to make the entire apparatus. He pointed out that the winding of the coils was the most tedious part. He estimated that the cost of two complete stations capable of communicating with each other would be £15 if all the components were bought. There would be a saving of £5 if the items were home constructed.

Sky Rods

The aerial or 'sky rod' as it was termed at this time was a grey area to many enthusiasts. The idea of the greater height attaining the furthest distance was accepted but what of the constructional detail? Answering a lengthy question from 'CY' (Madrid) who apparently submitted a diagram, the editor of the *Model Engineer* described a typical system in the September edition of that journal. Each aerial consisted of a network of insulated copper wire forming what resembled the design of the Union Jack. This was a rectangle of 20 feet by 17 feet with wires from the centres of each side forming a cross and a further two wires running crosswise to opposite corners. This arrangement was suspended horizontally about 13 feet above the roof of the house which was about 40 feet high. A wire was brought down from the centre of the network and inboard via a window on the ground floor. (The majority of the true gentlemen model makers at this time were apparently already proficient at making a hole through the glass!). The earth wire was run out and connected to a row of iron railings. It was stressed that the aerial wire should be kept clear of lead in the roof and of metal water pipes at the side of the house.

Continuing, the editor criticised 'CY's 'three ball oscillator, apparently immersed in oil'. He pointed out that these had now been entirely abandoned. All that was required were two plain brass balls ½" or ¾" in diameter. And if a good aerial was to be used there would be no need to polish them.

Lost in the Post

'HW' (Nuneaton) had a bit of bad luck. In a letter to the *Model Engineer* in September 1906 he listed a string of problems he was experiencing with a coherer and made the mistake of sending it to the magazine by mail. The editor regretted he could not answer all his queries on the coherer as 'the latter had let out its filings in the post'. He did however suggest a metal plug at the ends instead of tinfoil.

In February 1907 'GNCS' (Torquay) obviously wanted to keep up with the times. He wrote to the editor of the *Model Engineer* asking 'what kind of transmitter and receiver Mr Marconi was using now for wireless telegraphy?' He wanted to know if the magnetic detector was now always used instead of the coherer. The editor replied he was not aware of any important changes – the magnetic detector was much used but had not entirely replaced the coherer. In this respect he was correct as the 'maggie' had by now completely replaced the coherer on seagoing vessels. But it was an extremely intricate piece of mechanical as well as electrical engineering and it is not surprising that few experimenters would have the home workshop facilities to produce a working copy. On reflection it must have been rather satisfying for the editor, to know that his readers considered him to be moving in the same circles as Mr Marconi!

Another question on aerials was put by 'EWT' (Sunderland) who apparently wanted to exploit his coastal location. He wanted to know the types of aerial used by liners and war vessels and whether there was any difference in their orientation if a ship was lying abreast or astern. He ended by enquiring that if he had wireless telegraphy capable of a range of two miles, would he be able to communicate with any liner passing within that distance. If so what equipment would he need.

The editor supplied a diagram and included all relays and the Morse inker but pointed out that all the items would need careful adjustment. He advised that the magnetic detector was now used a good deal at sea. There was no great difference in aerials – they were longer and having a greater capacity were capable of greater radiation of energy. Yes, he thought 'EWT' could communicate with vessels. As if realising he had perhaps gone a little too far he ended by writing: 'We do not know how the law stands for working on the High Seas but no apparatus can be set up on land without a licence'.

'ALM' (Bowden) asked whether an aerial could be effective if the wires were lower than the top of a hill. It is understandable that the newly initiated were still mystified by the path and radiation pattern of the wireless waves. The editor reassured him by stating that

this obstacle could be overcome simply by using sufficient power and having a sensitive receiver.

He added that recent tests had confirmed this. Using a Lodge-Muirhead receiving apparatus, communication had been conducted between one side of Snowdon and the other – a distance of 19 miles – through a height of 3200 feet with aerials of only 42 feet. No excessive power had been used.

Now more than ever a knowledge of the Morse code was needed to derive the greatest benefit of this new hobby. A few were still inclined to carry on using the apparatus to ring a bell at some distance and then confirm the results by telephone. But the true experimenter taught himself the code.

Ambition

'WI' (London) asked a few questions on this topic which appeared to have devious implications. 1. 'Can I learn to read by sound, a printed telegraph message coming through the Exchange Telegraph Company without going through the communication procedure of telegraphy?' 2. 'Is sound and the alphabet the same code as used by GPO?' and 3. 'Can I learn by books?'

He went on to explain that he worked at an office where an Exchange Telegraph machine was receiving messages all day and 'if I could learn to read this I would increase my salary considerably'. The editor avoided the first query but pointed out that the code could only by learned by practice – and not from books. His reply to the third query showed some concern. 'We do not understand your last question. However, if a salary gain is due by telegraphy eavesdropping we advise you to be careful'.

During the latter part of 1907 the *Model Engineer* published three articles by V. W. Delves-Broughton (later to use the callsign BAX and be elected to the committee of the Wireless Society of London in the Autumn of 1913). The series covered in detail the construction of a sensitive non-polarised relay, a coherer and a typical aerial installation.

Delves-Broughton was obviously a perfectionist and a model constructor of the old school. His design for the coherer was painstaking and utilised precision engineering of a very high degree, but like the thousands of amateurs to follow him he was able to improvise when necessary. This was apparent when he pointed out that the finished instrument would need to be screened. His suggestion for a cover was an 'empty 2oz tin of Players Navy Cut Tobacco' which could be made to 'look quite neat if properly japanned'.

The coherer itself was based on the Castelli principle using a 'global of mercury resting between the pole pieces of iron or carbon in a glass tube'.

Delves-Broughton evidently believed in a thorough preparation. On the mercury processing he writes:

'The mercury must be pure... passed through a double thickness of chamois leather folded such that it forms a bag.'

The mercury was 'forced through the leather by screwing up... much as a washerwoman does when wringing out clothes'.

The experimenter was advised to 'avoid wearing rings when undertaking this task'.

Capacity Aerial

The same author's description of a suitable aerial is a similar example of careful thought and precise construction. He explained that he designed the arrangement for the house of a friend whose landlord 'would not allow him to make any permanent attachment beyond driving a few holdfasts'.

He started with his shopping list, as shown below, but later admitted that the installation was made for under £1 10s. as 'old packing cases were used instead of buying new plank'. It is interesting to note that the most expensive item on the list was the motor car high tension wire. Considering a length of only ten feet, this seems an extraordinary high price for a relatively easily produced item. Or were the auto dealers of the day using the mystique of the motor car to cash in on the price of accessories?

The description is comprehensive and well thought out. The support arrangement is shown in **Fig. 1**, which shows the novel guying arrangement of how a single vertical wire can be conveniently brought down the side of the house – a technique that could be usefully employed by today's amateur.

The construction of the actual aerial network (**Fig. 2**) employs the methods considered necessary at the time. The upper ends of the supporting wooden stakes were 'boiled in wax'. The other ends were pointed and 'thoroughly heated and charred in a small wood fire and tarred whilst still hot'. The galvanised wire netting was tinned at the feed point by using 'diluted unkilled spirits of salts'.

Item	£	s	d
Two selected pieces of quartering 15ft long by 2ins square, free from knots, or light scaffold pole would do.			
One ditto 10ft long		4	0
25 yards of 2in mesh 19 gauge galvanised iron netting		4	9
5 lbs stranded copper wire, 7 strands No 22 gauge		7	6
14 lbs No 8 galvanised iron wire		2	4
1 doz terminating holdfasts			9½
12 small galvanised iron thimbles			6
¼ lb tinned iron wire, No 28 gauge			4
One deal plank 12ft by 9ins by ¾in		2	2
Six bamboos, 6ft 6ins by 1in diameter		1	3
Six deal stakes, 3ft by 2ins by 2ins		1	0
3 lbs paraffin wax		1	2
5 lbs gas tar			6
One piece of sheet ebonite, 6ins by 3ins by 5/16in			8½
10 ft high tension wire as used for motor cars		10	0
One hank of spun yarn			6
Nails, cement and sundries		1	6
Total	£1	19	0

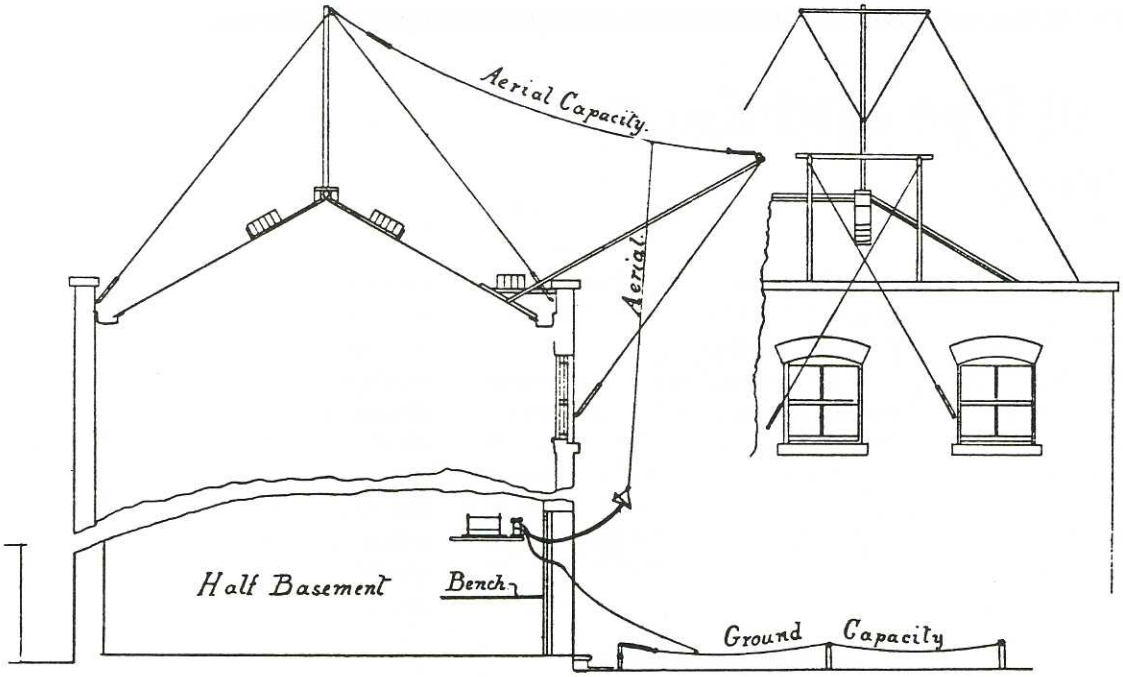


Fig. 1 - A side and end elevation view of the aerial. Note the derrick stay used to ensure that the downlead is well clear of the wall

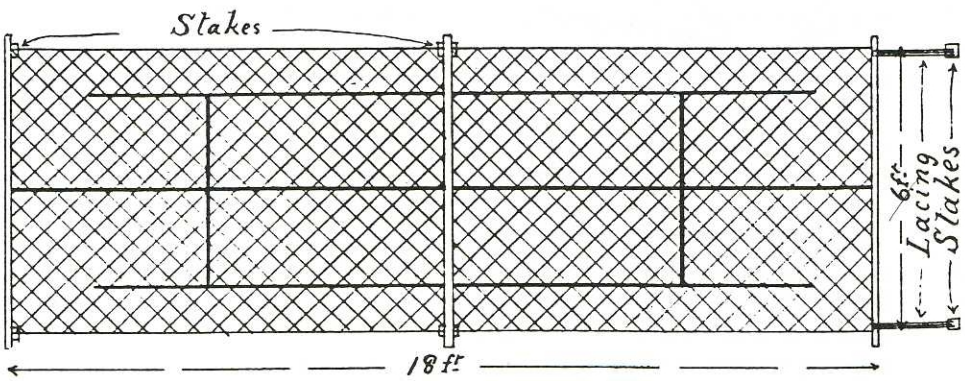


Fig. 2 - Construction of the capacity aerial. The treated stakes were driven into the ground and used to hold the unrolled wire netting. The bamboo cross-pieces retain the arrangement. The thick lines show the stranded copper wire which is threaded in and out of the meshes. The connecting wires attach to a section of this wire. Two complete arrangements were needed; one for the aerial and one for the ground capacity shown in Fig. 1

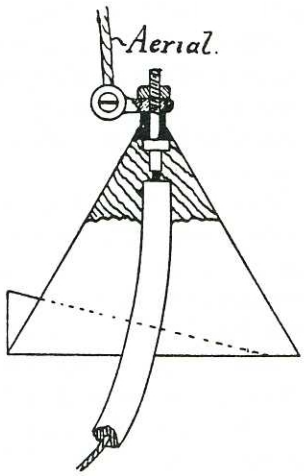


Fig. 3 - Drip cone formed from tinfoil. The aerial indicated is the stranded copper wire feed to the main aerial capacity. The downlead from the cone consists of heavily rubber insulated cable

To drill holes in the walls, the author formed his own 'brace bit out of a piece of square steel, flattened out for about 4 inches to a width of 1 inch and then twisted whilst hot by gripping one end in the vice and the other with a spanner such that a twist drill was formed'.

The drip cone shown in **Fig. 3** served to connect the stranded copper wire of the aerial downlead to the section of expensive high tension wire. A piece of tinfoil was formed into a cone about 6in high with a lip turned up on one side as shown. At the top end a bolt was passed through a piece of ebonite or hard wood. With the cone suspended as shown the water dropped clear of the insulated cable. As will be expected, the cone was painted 'with good quality enamel paint or sealing wax dissolved in methylated spirits'.

Test Here!

Concluding his article, Delves-Broughton commented that there was still a great deal of curiosity on the part of the public in anything to do with wireless. Any installation set up would inevitably have to be shown to a great number of people. The author observed that they would probably visit in groups and 'will want a lot of looking after to keep them out of danger'. He felt that notices advising DANGER were useless. 'The casual stranger likes danger,' he wrote, 'and if he sees a DANGER notice stuck up will probably try to find out what the danger is – just as you are explaining the action of the spark gap to someone else'.

He ended on a mildly chauvinistic note: 'I am sorry to say that ladies are much the worst offenders in this matter!'

RB

My Days at Pye and Ekco

by Raymond W. Edwards

I joined the newly-formed company Pye Radio at their Granta Works in Cambridge as a general clerk on 15 July 1929, shortly before my seventeenth birthday. The original company, W. G. Pye & Co., instrument makers, had just left the premises to go to their new works. The buildings were already quite extensive and ideally laid out for production – not a straggle of buildings like many newly-formed companies. One came in at the big double gates off Cam Road into the yard where material would be brought in and also the finished packaged receivers sent out.

The firm was in a period of transition. The very first sets, right up to 1925, had been built as instruments by a firm that started in a back garden shed! The famous rising sun grille on the loudspeaker cabinets had come in about 1927, with a gold silk screen behind. New developments were continually being evolved in their very advanced research and drawing offices. A very good patent was the Pye differential condenser which increased selectivity. It had wide sales.

The old family consideration to prospective customers still held and they would go out of their way to satisfy a 'special' order. The finished receivers were housed in beautifully hand-polished wood cabinets of walnut; none of this bakelite or metal! Should a customer require matching mahogany or oak, this was arranged for. Customers on DC mains would be catered for and where mains voltage or frequency were different, specially tapped transformers would be wound.

The well arranged machine shops turned out most of the machined parts. The men operated the lathes and presses whilst the girls, all in blue overalls and wearing hats, worked on the drills. Small components were assembled and coils were wound by skilled girl operators. The firm purchased its wooden cabinets, loudspeakers, batteries, accumulators and valves, otherwise it produced most of its needs from raw materials – steel, aluminium sheet, copper strip, etc. Tidiness in all departments was strictly maintained. Soundproofed rooms at the ends of the final assembly lines enabled engineers to test each individual receiver prior to packaging.

Every receiver had its own serial number, guarantee card and service book. The books were lavishly produced in Cambridge light blue colours, as also were the cartons with 'Made in Cambridge – British and Best' printed thereon.

The grille of the Pye Model Q (1931)

Reading through one of the early receiver sales books, it was recommended that the set be connected to an outside aerial of 100 feet of 7/22 gauge bare copper wire, extended as high as possible with a lead-in to the point in the house nearest the set. And that the set be properly earthed with a copper plate sunk in the ground, covered with wet charcoal or similar and kept damp!

Going through the different departments as I did, I spent a time in the Service Department, and was often interested to see very early receivers returned for overhaul with their thick ebonite panels and black dials, fixed and variable plug-in coils for tuning.

Production & Progress

I was to spend eleven years with Pye Radio in clerical posts in various departments until finally I was fortunate to be selected in the team by the Production Manager, later Works Manager, Mr L. W. Jones, for the Production and Progress Department.

Mr Jones had a scientific instrument background, having come over from W. G. Pye & Co. His hobby was radio, being a licensed amateur with the callsign G5JO. He was a great ideas and methods man and he introduced a series of movable coloured charts in the Progress Department. These, when worked on, showed in detail the build-up and movement of parts to assembly and on to the final product. The charts were coloured progressively to indicate the position of all the parts at a particular point relevant to the assembly as a whole. Each member of the staff was responsible for a number of models in production, and it was his duty to investigate and take action where a delay or stoppage was apparent. The system worked well and kept things moving, and the work was interesting and absorbing. One's day was never dull! Later, I joined the Buying team on Materials Control, both internally and external.

Many advances had taken place during these years. I remember the 100 foot steel radio mast being erected at the works, having a light on top to warn aircraft at night. This became a landmark in the area, as it was about level with the Chesterton Church spire nearby. In 1933 the Administration block in St Andrews Road was opened.

Production of television sets had got under way before I left, cathode ray tubes being bought from Mullard. In 1936, 9in and 12in models were being produced, and in 1938 a model 817 with a 5in tube.

When I left the firm in February 1940 to join Ekco Radio, trenches had been dug at strategic points and staff performed air-raid warden duties!

I Move to Southend

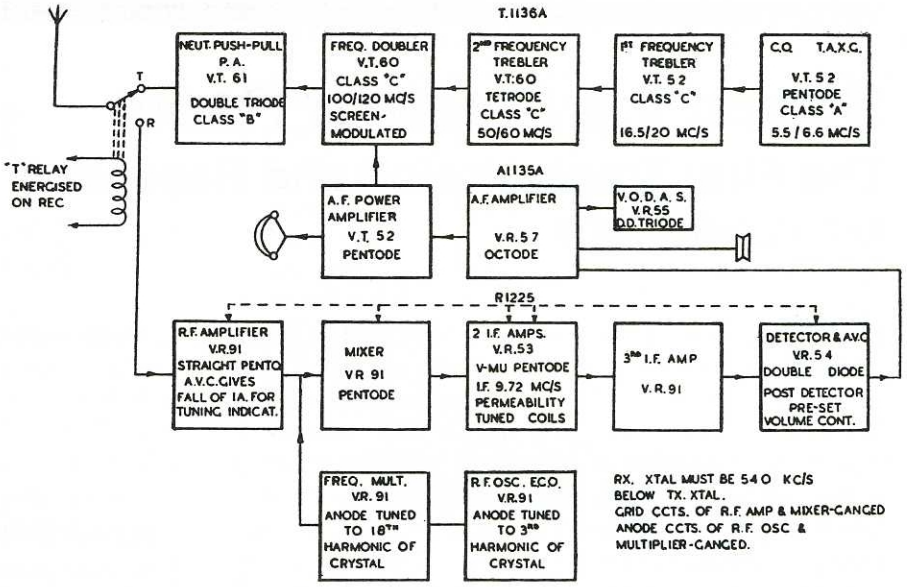
I joined Ekco Radio in Prittlewell, Southend on 5 February 1940 in their Progress Department. Why I took this foolhardy step when I was in a good job, deferred and in a similar category I shall never understand. If only my dear wife had stood out against such a move we would have been saved the trouble and expense it caused. I had married in 1936 and we were fortunate to rent a house just outside Cambridge.

Arriving in Prittlewell I found the Ekco works and offices more extensive than Pye's. My wife joined me a few days later with the remaining furniture from our vacated house. As many people were leaving the town for safer areas we did not find it too difficult to get a flat. It was a bitterly cold winter with much snow. Things were normal in the area, our flat was within walking distance of the works and I settled there. By the end of May however, with the German advance into Belgium and France, things began to get unpleasant. Air raids increased, my wife was now expecting our first baby and although I was in a deferred occupation I was still called to attend a medical examination. I was turned down for active service by reason of very short sight, which I had almost from birth. The air raids got worse and one night a bomb was dropped not far from us. I rushed my wife to the shelter in the garden and in some panic pushed her down a small drop to it. Luckily no harm came of it but the experience shook us both. At the same time an aerial dog-fight was going on overhead. It was about this time, with things worsening, that the Ministry of Aircraft Production decided to move the whole of the works to Aylesbury in Buckinghamshire. This happened at the latter part of July. I arrived in Aylesbury on the 29th and my wife joined me on August 3.

Finding a Home

Board and lodging for myself was arranged by the firm, but when my wife joined me and in her condition it was a different matter. We went through a difficult time before we finally managed to rent a three-bed semi-detached house within walking distance of the Ekco factory. While my wife was busy with the locals trying to get us settled somewhere, I was facing an upheaval at the factory with all the problems of moving in and at the same time helping to get production going.

The firm had acquired single-storey premises along the Bicester Road leading from Aylesbury to Waddeston. On the one side of the road were the assembly lines, stores and offices; on the other side, down a short side road, a large building to house all the machines – presses, drilling machines, lathes, etc., and raw material stores. A large metal-finishing plant was built close by. A loud-hailer from the reception office in



Block diagram of a typical WWII aircraft VHF system, the TR1133E

the main factory could reach any staff travelling between the two. Things eventually got to working normally. The whole of the work was controlled and directed by the Ministry of Aircraft Production, who installed a very strict system of inspection and coding of all parts going through, to the finished article. All processed parts were finished to a high standard, cadmium plating being done on the site. Other finishes; silver, nickel, bronze and gold, were sent out to a specialist contractor.

The receiver R1155 and transmitter T1154, the 19 Set, VHF sets and various other aircraft assemblies were all assembled, wired and tested in the main factory, working to a tight schedule. Also made up there were transmitter racks and decks, push-in plugs and cable assemblies, aerial parts for the Swordfish and other naval and airforce equipment.

I have to mention here that not all the work-force from Southend came to Aylesbury. A depot was built at Woking in Surrey, and an offshoot – Marconi Ekco Instruments – went to Amersham or was it High Wycombe? A courier did the round trip from the Southend headquarters daily by motorcycle. Other branches were established at Malmesbury in Wiltshire, and at Rutherglen, south of Glasgow. The well-known Ekco trucks made deliveries.

Home Guard

When things got really settled, time and motion study was introduced to help speed up production. There was not a lot of air activity in the area. A land-mine was dropped about a mile out, damaging some glass-houses. German recon-naissance planes came over flying low during the day but the buildings were well camouflaged and would have been difficult to spot at night. We all did our nightly chore of roof-spotting. As things worsened I joined the mobile company of the Home Guard and my days and week-ends, when not expected to work, were taken up with exercises and practice drills. When invasion was expected we went on all-night guard duty at local strategic points with full equipment. Searchlight activity was going on most of the night, especially around the Halton Air Camp behind Wendover. When thankfully things got better, the worst activity we experienced was from the flying bombs. Our daughter was born in February 1941 and by the time these things came over she became as anxious as we were. Luckily all of them passed over us.

At the end of the war, arrangements were made to return to Southend. The big presses in the bakelite plant that turned out the familiar circular sun-grille receiver cabinets had remained working there, as had the assembly of the successful Thermovent heater, the finished parts for which were produced in Aylesbury.

My wife and I decided not to make the move back to Essex.Instead, I went to work for Murphy Radio in Welwyn Garden City for a short time, but left the industry in 1946. **RB**

Stereo via Amateur Radio

The First Transmission and Reception

by F. C. Judd G2BCX

By 1958 stereophonic broadcasting was well established. Stereo recordings on disc and tape were available and stereo tape-recorders (using standard ¼in spooled tape) were being sold by hi-fi dealers. Some years before this the BBC made some experimental broadcasts in stereo by using two transmitting stations, one on the medium wave band, and the other the BBC long-wave Droitwich station. This arrangement provided the requisite 'two-channel' stereo information for final reproduction at home via two receivers and amplifiers driving a pair of loudspeakers spaced a few feet apart. If the BBC could do it, why not radio amateurs?

The amateur radio licence did not allow transmission on two different frequencies within the same band simultaneously. However, a formal request to the Post Office Radio Branch (Amateur Radio Dept.) by John Lepper G3JHL, aided and abetted by the writer, resulted in special permission for G3JHL to operate on two different frequencies, these being within the allocated 'Top Band', 1.8 to 2.0MHz, for experimental stereophonic transmissions.

The Transmitting Equipment

The transmitting and audio equipment at G3JHL's station in Leytonstone, London E11 was as follows:
Channel 1: Home-constructed transmitter; 5 watts; amplitude modulation, aerial 120ft end-fed; receiver GEC BRT402.
Channel 2: Modified combined transmitter/receiver; 5 watts; amplitude modulation; aerial 100ft end-fed.

The microphones were moving-coil types, one to modulate each transmitter, and for stereo operation were spaced about 3 or 4ft apart.

Transmissions in Stereo

The dual transmissions were on two frequencies with approximately 100kHz spacing (see extract from G3JHL's log, **Fig. 1**). Three separate stereo transmission were made according to the requirements of the Post Office Radio Branch, each lasting about 10 minutes. The 'programmes' were as follows:
1. A series of conversations in different parts of the room, between John G3JHL and his brother Chris, to produce left, right and centre reproduction.
2. Walking up and down the room (linoleum covered floor) in outdoor shoes, to produce the effect of 'sound' movement.
3. Rolling a cricket ball along the floor, left to right and vice versa, in front of the microphones to produce a more continuous effect of movement.

Various other sound effects in stereo were tried, but music was not permitted.

Reception and Recording

At my station in South Woodford, London E18, the signals for recording and simultaneous listening were taken direct from the detector stages of two receivers, tuned to the G3JHL transmissions. The audio signals were fed to the twin channels of the entirely home-constructed recording equipment shown in **Fig. 2** with monitoring of the two channels by means of split headphones. At the same time these signals were fed to a twin-channel audio power amplifier driving a pair of spaced hi-fi loudspeakers.

The Results

Being located in the East London area, heavily populated with radio amateurs, and having announced when the stereo transmissions would take place, a good 'audience' was assured. Quite a few had two receivers and so could receive the test transmission in stereo. G3JHL received good reports from up to 15 miles away.

At the writer's QTH, about five miles away, RF signals were S9+ and the audio signals unmarred by any QRM. Reproduction of the recordings made on tape were as life-like as the original direct-to-loudspeaker signals, with good quality and quite distinct stereo spatial effects.

After each of the stereo tests, activity was reverted to 'mono' so that reports could be obtained from those of the audience who were licensed to transmit.

Of course the nature of the 'stereo audio' signals generated a few ribald comments, like 'How big was John's ball?', 'Did it hurt rolling it across the floor?' and 'What big boots you have, Grandma!', etc., as well as much argument about what was

continued on page 29

9·2·58	—	11·20–12·40pm	G6HU	—	1960	59-	59-	A3	JIMMY BARKINGSIDE.
9·2·58	—	11·45–12·20 pm	—	G3AGP	1960	59-	57-	A3	FRED. WOOD GREEN
9·2·58	—	11·55–12·46pm	—	G3HWG	1960	59-	58-	A3	NOEL. BARKINGSIDE
9·2·58	—	12·00–12·46am	—	G2BCX	1960	59-	59-	A3	FRED. WOODFORD
9·2·58	—	2·00–3·40pm	G2BCX	—	1960 1885	59- 59-	59-	A3 A3	FRED. WOODFORD. SPECIAL. GPO STERIO-TESTS. NO3. PERMISSION

Fig. 1 - Extract from the logbook of G3JHL. One of the stereo transmissions made with special permission of the then Post Office Radio Branch

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You can advertise your goods for sale or wanted, using up to a maximum of 30 words including whatever details of your name, address, telephone number, etc., that you wish to be published in the advert.

Please ensure that you write your advertisement clearly, preferably in block letters or typewritten, and include the corner flash cut from the current issue of *Radio Bygones*, (see below). Every advertisement sent in **must** have your full name and address attached, even if you do not want those details published in full.

This service is for the use of *Radio Bygones* readers for their private sales and wants only. Any advertisements from traders, or apparent traders, will be rejected.

SEND YOUR ADVERTISEMENT TO:
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Corfe Mullen, Wimborne, Dorset BH21 3LZ,
marking the envelope 'Readers' Advert'.

The closing date for adverts to appear in our next issue, due out on 26 June 1990, is June 4.

WANTED

New valves DW6, RZ1-150, new or used CV1155/NR17, VS24K. Schaub Lorenz music centre model 5001 or 5005. Circuit for RGD 1046G. Philip Taylor, 14 Willow Walk, Canewdon, Rochford, Essex SS4 3QH or phone 0702 257598

Philips remote control N6719 for reel to reel recorder Model N4511. Derek Sheen G4CCW, 3 Foxearth Spur, Selsdon, South Croydon, Surrey CR2 8EP

Circuit and details for Collins TCS15 series RX and TX. T1154 transmitter, any model, etc., considered. Phone Ben on Kidderminster (0562) 743253.

T1154 circuit diagram required, also any plugs for this TX. Phone Mark on Penzance (0736) 795948.

Have AR88D black crackle speaker in exchange for Eddystone diecast speaker or vintage US speaker or WHY. Wanted also 5in field coil speaker. D. Blanchard, 141 Dunes Road, Greatstone-on-Sea, New Romney, Kent.

19 Set plus power supply (12V). Loudspeaking Apparatus No. 9. R109 Manual. Vol. 1 Stanley's WT Textbook. Taylor, 89 Lion Road, Twickenham TW1 4HT.

Volume 1 of BR.1771(13)A, Handbook for AP.61761 AVO Valve Tester CT.160. To buy or borrow (all expenses reimbursed). Phone Geoff on Broadstone (0202) 658474.

FOR SALE

Johnsons 'Globe King' 100/A SW Wireless with HL23 valve, two plug-in coils. What offers? Eric Page GU3HKV, Clos du Murier, Saint Sampson, Guernsey or phone 0481 47278

Naval B40D communications Receiver 640kHz to 30.5MHz. Receives CW, AM, SSB. Mains powered, super condition, £60 collect only. Please telephone Ben on Kidderminster 743253.

Hallicrafters SX28 Skyrider, GWO except S-meter not functioning, £80. 26in Barco Grade 2 monitor, needs new PSU otherwise OK, £35. Phone Pete on Drewsteignton (0647) 21631 or 01-568 0037.

Classic Book Review – No. 2

by Richard Q. Marris G2BZQ

'Golden Classics of Yesteryear' by Dave Ingram K4TWJ

This volume, recently received via an old colleague in the USA, is one of the most interesting and entertaining little radio books I have ever read. Although it was published as recently as 1988, it is already a Classic Book because of its content, ranging from about 1910 to the early 1940s.

Dave Ingram is a columnist in CQ *Magazine* (USA), and is an obvious enthusiast for old receivers and transmitters, of which he has a working collection. Even more interesting is that he has taken some of these old-time breadboard receiver and transmitter designs and replicated them in their original glory, from components found here and there, and then tried them on the air with considerable success. He says that this is 'a book for kids of all urges', which is quite true, and he has written it in a rather happy-go-lucky, light-hearted sort of way, always proceeding at high speed. If you are not too serious minded and really enjoy the finer historical points of our hobby, then you should be enthralled by this little book.

The first couple of pages are taken up with an enthusiastic description of his philosophy, proving to his own satisfaction (and to mine) that there is a very special beauty in old classic radio gear which simply does not exist with modern, impersonal, oriental made stuff. He finishes his introduction with a picture of many of his home-made replicas of old designs, plus a beautiful old National SW-3 receiver.

On page 4 the author sets off at increasing speed on Chapter One entitled 'A Spark from the Past', and describes some 1910 experiments including the Spark Transmitter of Goodman. This was a multi-kilowatt spark transmitter, which among other things produced such lively entertainment as flames arcing from the antenna and setting fire to some tree branches! Presumably the neighbours took to the hills in terror?

A sketch of a typical 1914 style spark transmitter/receiver circuit is shown complete with a 4-wire, flat-top antenna. Drive for the transmitter is provided by batteries and a Ford Model 'A' ignition coil (presumably as used in the early Ford Model 'T' car). The receiver was a galena crystal affair. This equipment transmitted (and presumably received) on all frequencies at once – none of this modern digital frequency read-out stuff!

Having recovered from the 'shocks' found in the previous chapter, we find that Chapter Two covers the transition from 'sparks' to 'tubes' (valves), when most enthusiasts built their own receivers and/or transmitters breadboard style, using both home-made and purchased components. In this chapter is a photograph of the rear view of the exotic National (of HRO fame) 4-tube SW-4 receiver. This appears to have four valves plus plug-in coils in a regenerative circuit. Additionally, there is an excellent view of the 1929 Pilot Super-Wasp, covering from 14 to 500 metres, with plug-in coils. The kit cost $29.50 (then about £7 10s.), which was a lot of money in 1929.

Dave then proceeds to describe his 1920s style QRP (low power) transmitter and receiver, which he built in the original style. Both use a single triode valve and 90 volts HT. With the transmitter Hartley oscillator, running at less than one watt input, he has worked VK (Australia) from the USA on 80m CW. The transmitter uses just eight components and the receiver nine. Breadboard construction is used and details of coil winding are given. The antenna used was a replicated classic 4-wire, flat-top.

Coverage then moves on to some of the goodies of the 1930s, such as the Hammarlund Comet Pro receiver and the Gross Radio 20 watt transmitter kit. Circuit and photographs describe the legendary National SW-3 receiver (1934), covering the 20, 40 and 80 metre

NATIONAL SW-3

The SW-3U Receiver employs a circuit consisting of one R.F. stage transformer coupled to a regenerative detector and one stage of impedance coupled audio. This circuit provides maximum sensitivity and flexibility with the smallest number of tubes and the least auxiliary equipment. The single tuning dial operates a precisely adjusted two gang condenser; the regeneration control is smooth and noiseless, with no backlash or fringe howl; the volume control is calibrated from one to nine in steps corresponding to the R scale.

ONE UNIVERSAL MODEL — The circuit of the SW-3U is arranged for either battery or AC operation without coil substitution or circuit change. Battery operation utilizes two 1N5-G and one 1A5-G tubes. AC operation utilizes two 6J7-G and one 6C5-G tubes. Type 5886 AB power supply is recommended.

SW-3U, Universal model, without coils, phones, tubes or power supply. **List $38.50**

5886-AB, Power Supply, 115 V, 60 cycle, with 80 Rectifier. **List $32.50**

General Coverage Coils

Cat. No.	Range — Meters	List Per Pair
30	9 to 15	$3.85
31	13.5 to 25	3.85
32	23 to 41	3.85
33	40 to 70	3.85
34	65 to 115	3.85
35	115 to 200	3.85
36	200 to 360	4.40
37	350 to 550	4.40
38	500 to 850	5.50
39	850 to 1200	7.25
40	1200 to 1500	7.25
41	1500 to 2000	7.25
42	2000 to 3000	9.50

Band Spread Coils

30A	— 10 meter	$3.85
31A	— 20 meter	3.85
33A	— 40 meter	3.85
34A	— 80 meter	3.85
35A	— 160 meter	3.85

All prices subject to change without notice

A 1942 advertisement for the National SW-3 receiver

amateur bands. This was a 1-V-1 receiver, which was upgraded throughout the 1930s, and was still being advertised in the 1940s *ARRL Handbooks*. I had the pleasure of trying out a mint SW-3 while working in the USA in 1970s, and the construction, appearance and performance were still impressive.

The author next indulges himself with a couple of 1930s transmitter breadboard designs using a large tube and his favourite and impressive large diameter copper-tube coils, producing anything between 5 and 50 watts. Circuits, breadboard sketches and coil winding details are all given. All are recent replica construction and air-tested. He follows this with his terrifying 'Super Fantastic 204A Classic TX' with its one tube using a tuned plate/tuned grid oscillator. With its plate (anode) sucking up 200 milliamps at 2000/2500 volts HT, the large horizontal 204A tube both lights and heats a small room – whew!

Of more practical use to many readers is his home-made 'Classic 30s Receiver'. This is a 2-valve breadboard job using a '24' screened grid tube as detector and a '27' triode audio amplifier. The design is typical of that on which many older readers cut their teeth in the 1930s. Supplied are photographs, circuit, valve connections and coil winding data – it's all there for the home constructor. With such a home-made receiver using a 2 volt filament SG valve and PM2 triode with plug-in coil and bandspread tuning, I was receiving the world while still at school.

Excellent reproductions and descriptions now follow of such goodies as the Hallicrafters Sky Champion and S-53, and the fabled National HRO receivers. For transmitters there are the Stancor ST-202A kit, the business-like Globe Scout and the famous Heathkit DX-100 which is still in use today, here and there. Also the impressive looking KWM-1 SSB transceiver by Collins, reputed to be the first SSB transceiver to reach the market.

A couple of pages are given over to useful information on collecting, restoring and operating classic gear.

The final home-constructed design is the legendary 6L6 crystal controlled transmitter, found in all ARRL and other handbooks, and used by many of us in the 1940s and '50s. The smaller 6V6 was often substituted in the UK, as it was available 'war surplus' to us in huge quantities for pennies. The conventional circuit of this 6L6 transmitter and a 300 volt HT AC PU is provided, complete with plug-in coil winding data.

The volume concludes with illustrated pages and descriptions of the fabulous 'bug' keys, including details of a home-made bug.

Although all the designs and circuits in this fascinating little book have appeared in the older ARRL and other handbooks, and manufacturers' literature, Dave Ingram has taken the trouble to get it all together and present it in entertaining form, and to replicate and air-test many of the designs. He has produced an excellent publication with far more packed into its 60 or so pages than you will find in many larger, glossy, more illustrious publications. It is a must for the real short wave classic transmitter or receiver enthusiast.

Golden Classic of Yesteryear by Dave Ingram K4TWJ is currently available at $9.95 plus packing and postage from MFJ Enterprises Inc., PO Box 494, Mississippi State, MS 39762, USA. Payment by Mastercard or Visa is accepted. **RB**

STEREO VIA AMATEUR RADIO

continued from page 26

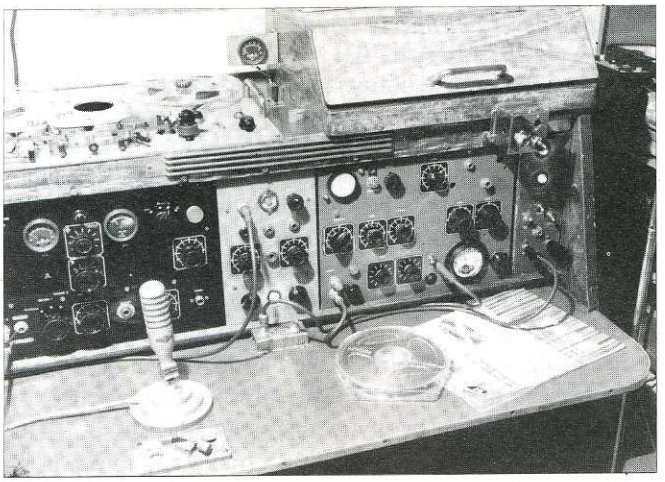


Fig. 2 - The stereo recording equipment used by G2BCX, entirely home constructed including the tape deck. On the left are the replay (head) amplifiers; centre, microphone and high level input pre-amps; right, twin replay power amplifiers and power supply

being heard to the right, or to the left, or in the centre. Everyone agreed, though, that the experiment was not only instructive but also good fun, and made a change from the usual chat on 'Top Band' net QSOs.

Among the audience, who were also able to record the proceedings, were G6HU, now resident in Lowestoft, G3HWG of Woodford Green (now a silent key) and G3AGP, still active but living in Spain. The instigator, G3JHL, is still active and resides in the wilds of Hampshire. There were others of course, but time tends to erase the memory. **RB**

Feedback...

The page where you can air your views

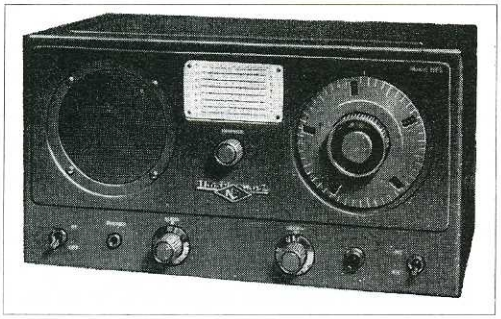
Letters should be original and not copied to or from other magazines

National VHF Receivers

I was interested to read about the National 1-10 receiver, as I have owned one since the mid-1950s, when I bought it in Lisle Street in London. My 1-10 did not have a calibration chart on the front panel, or any sign that one was ever attached.

The set did not come with an instruction book, but I was lucky enough to have a test report on it in a 1930s USA radio magazine. In the old AM days, I used it on 2 metres; also I heard my first 4m signals on it. During the peak of the sunspot cycle in 1979, I could hear the paging stations in the USA.

The 1-10 was replaced by the HFS. This was not a pure super-regen, it was a superhet with a super-regen second detector. This operated at 10.7Mc/s, and an output jack on the rear allowed the HFS to be used as a converter ahead of a suitable HF receiver. Frequency coverage was 27 – 250Mc/s with six sets of plug-in coils.



Acorn valves were not used. The valve line-up was 6AK5 mixer, 9002 oscillator, 6SG7 IF amp, 6SK7 det, 6J5 cathode follower, 6J5 AF amp, 6V6 power output and 5Y3GT rectifier. Another change was the incorporation of a speaker on the front panel. Controls were audio gain, antenna trimmer, regeneration and tuning, the latter using the same micrometer dial and gear-box as the 1-10.

Full details on the HFS appeared in the Howard B. Sams publication *Communications Receiver Manual, CR2, 1st Edition, August 1952*. This book, with its companion *CR1, 2nd Edition, 1947* are Photofact publications and are absolute goldmines of information on these early receivers and converters.

The HFS is very rare in this country. I have never seen one in over 40 years, though I did see a 1-10 at a rally once.

Ron Oakley
Huntingdon, Cambs

CR300

With reference to the excellent photo on the inside back cover of the February/March issue of *Radio Bygones*, it would appear that there is some confusion about the details of the CR300/1.

I have had one of these receivers since January 1965 when I obtained it new, and it has been in daily use ever since. It still performs excellently and has needed no service beyond valve replacements over the years.

It is a CR300/1 and quoting from the manual, the details are: IF – Two frequencies are used, 570kc/s and 98kc/s. The 98kc/s IF is used on the ranges 15 – 85 and 375 – 1000kc/s, whilst the 570kc/s is used on the other six ranges. The calibration crystal frequency is 500kc/s. The CR300/2 is similar in all details except that the calibration crystal is 690kc/s, so that the harmonics will provide markers in the marine HF bands.

Norman Burton
Revesby, NSW, Australia

My thanks to Norman, and my apologies to all who were misled by my mistaken comments about the CR300/1 and /2. They were based on notes given to us on a college course some forty years ago, and carried in my memory ever since as an example of the strange decisions which equipment designers sometimes make. I have checked back on those notes once more, and am totally mystified as to how they could be so wrong.

I used the CR300/2 at sea for a brief while in 1950 and again in 1955, but it was replaced on Marconi-equipped ships by the 'Mercury' and 'Electra' combination, and later by the 'Atalanta'. My lasting recollection of the CR300 is its poor frequency stability whenever the ship was vibrating. The problem could usually be eased by the application of switch-cleaner fluid to each of the rotor contacts on the tuning gang, but could never be entirely cured. – Ed.

Baghdad Morse Mythology

I was most interested to read the letter from Mr Luscombe G0ICR (*Radio Bygones*, February/March). As he rightly says, the RAF Middle East Command HQ was at Habbaniya, near Baghdad, which has its own claim to fame. It was there, in the early 1940s, that there was a German-inspired revolt, and Habbaniya came under siege for several weeks. The British Army being well occupied in the North African desert, this siege became a private RAF war. Obsolete decrepit aircraft took to the air, piloted by anyone crazy enough to do so, and the perimeter banks were manned by all trades and ranks, using anything that would fire a shot. The W/T signals station kept going 'business as usual'. Fortunately, I was never sent to Habbaniya during my career in the Royal Air Force.

On the question of his comments on Baghdad Morse speed and efficiency, well, CW communications of any type are only as good as the operators at either end. Extreme examples are that in 1939 Ted McElroy, of bug key fame, copied 77 words per minute. A little while ago I patiently worked a DH on 80m, struggling along at about 5wpm – it was his first QSO! It can be said that, like the RN, the RAF had its first class operators and those not as proficient. Casting my mind back over 50

years, I can say that with 'expert' Baghdad Morsers very high traffic speeds were reached, while to a non-expert like myself, it was more or less a foreign language.

I only know of it being used on ground point-to-point, and not air-to-ground, though who knows? As G0ICR implies, Baghdad Morse was probably not just invented on a particular day, but was evolved gradually over a period of time. The reasons behind it will probably never become clear, as it all happened so long ago.

Regarding his last paragraph re turbulent air conditions, when 'bumpy' I might tighten the key tension a little, and anchor myself securely in place to ride the bumps. During many hundreds of hours flying, often in vile weather conditions, I had little trouble using the key.

Perhaps someone else will give us some more Baghdad Morse Mythology, and thank you to G0ICR for his excellent contribution to it.

Richard Marris
Slough, Berks

Where is it? – No. 3

The question asked was: Where is this famous plaque? and the answer: 'The Marconi Wireless receiving station on the Lizard, Cornwall. The station was built in 1901, right on the coast about 1.5 miles down the road from the famous Poldhu station, to monitor Poldhu's signals and phone back reports. The station is little known, but traces (apart from the plaque) do still remain.'

Quite a good entry this time, the first out of the editorial biscuit-tin being A. R. Williams of Ryde, Isle-of-Wight, who adds the following further history: 23 January 1901, established communication with Niton, Isle of Wight; 1909, transferred to GPO; 1913, used for GLD on 300m; 1914, closed; 1919, BVY 450m Admiralty direction finding; 1925, 800m GPO direction finding.

Mr Williams wins the prize of a year's subscription to RB.

Bits & Pieces

Keeping the Fun in the Interest

by Dennis Lisney G3MNO

One of those little pieces of writing that I remember with affection was a short précis of the history of electricity. In that piece, the author said that Clerk Maxwell put it all on a mathematical basis and that took half the fun out of electricity. Then later it was found that it could be sold for profit, thus taking any of the remaining fun out of it!

Nowhere does he mention the other 'party pooper': that it can kill you. Since the dawn of wireless it does seem that many developed a false sense of safety after Mr Franklin's experiment with a kite aerial.

One of wireless' grottier inventions was the AC/DC set which introduced a direct mains connection to the chassis and thereby virtually all other metal bits. In some of these sets the only barrier between the hands of the operator and the chassis was a small insert of wax over the knob grub-screws. Attempts to connect the chassis to the neutral (and safer) pole were largely thwarted by the almost universal 2-pin plugs. Even if one got that right then the design of the average AC/DC set was cunningly arranged to compensate! The single-pole switch was almost invariably arranged to be in the lead to the chassis, thus ensuring that the chassis, if not live when the set was working, immediately became so when the set was switched off.

Direct connection 'twixt mains and chassis should remain as deprecated, particularly with any set that was not originally designed for such connections. Old sets which originally did not have an earth connection should have one provided as part of the refurbishment.

It does seem a pity to do this sometimes, but both my eliminators have three-core leads now – to make sure that one of them doesn't misjudge its role in life. I am less worried about myself than about others who might have access to the set. Most sets are restored to be enjoyed; it would be a shame if that enjoyment were to be spoilt by an unfortunate accident, possibly to a wife or a child!

If authenticity is an absolute must, then why not at least invest some £20 in a residual current device (RCD), or earth-leakage circuit-breaker (ELCB) as they used to be called. Using one of these will greatly improve the odds of survival if an accident occurs.

'Oh! But shocks are part of the normal life of the wireless man!' I hear someone say. In fact I heard that said on-air by a former amateur friend who is no longer with us. He died at a ripe old age in spite of such a dodgy philosophy, which only goes to show. ***RB***

Meter Dials

by Robert A. Wilson

When constructing or renovating old valved test equipment, one often comes up against the problem of the meter dials. With the great range of panel-meters on the market today, it is not difficult to obtain one with the correct characteristics for any valved project, but the dial markings can be a problem.

Recently I constructed a valve tester which, for ease of operation, required dials clearly labelled with ANODE VOLTS, ANODE CURRENT, GRID VOLTS, etc. I also required the meters to give a direct reading without having to multiply in my head.

The meters were all selected and when wired with their respective shunts or multipliers their scales had to be changed. In the past this was a difficult thing to do whilst maintaining a professional finish.

The answer lies in the photocopier. Remove the meter from its case and carefully remove the dial plate. Take a photocopy of it on a piece of smooth white paper. Any unwanted figures or lettering may then be painted out with white typewriter correcting fluid. When thoroughly dry, new figures and lettering are added using the well-known rub-down letters which are available in a vast range of sizes at stationers and artists' supply shops. The result is a new dial which has obviously been tampered with, as the white correcting fluid stands out like a sore thumb. All that remains is to photocopy the altered dial again. The result is a good copy where the white paint does not show at all!

Cut out the new dial and glue it onto the back of the original dial plate; trim it up with a sharp knife and put it back on the meter, new dial upwards. In this way the original dial is face down, but undamaged should you ever wish to use it again.

Quite a few shops or libraries are able to undertake photocopying for a few pence a sheet.

To Summarise:

Copy the original dial onto white paper.

Alter the copy with correcting fluid and rub-down lettering.

Copy the corrected copy again for use in the meter. ***RB***

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The Labgear 160 Twin 'phone/CW transmitter for 'Top Band' (1.8 – 2Mc/s)

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MUSEUM PIECES

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The Labgear LG300 CW transmitter, covering the 10, 15, 20, 40 and 80 metre amateur bands

The Heathkit DX40U kit-built HF transmitter from Daystrom Limited of Gloucester, with inputs of 75W CW or 60W peak 'phone, and an output of 40W to the aerial. Price in 1961, £32 10s. 0d.

CPM

MUSEUM PIECES

Our thanks to Chalk Pits Museum, Amberley, West Sussex, and to Peter Cutler for their kind co-operation and assistance in producing the photographs for Museum Pieces in this issue

CPM

The Heathkit VF-1U VFO, companion to the DX40U shown above. The kit price in 1961 was £11 2s. 0d.