50 Years of 50 MHz

Ken Willis, G8VR

Following my article 'A Bit of History' in 'Six News' 67, the Editor suggested I contribute a few pieces under the above title. Few current members of UKSMG will go back fifty years, but some of us do and there were lots of interesting things happening on and around six metres all those years ago. From time to time I will try to relate some of them, though not necessarily in chronological order, selecting topics of general interest which illustrate the huge strides made in radio communication at wavelengths below ten metres over the past half-century. The introduction of Band I television in the UK in the years just prior to and following World War II, meant the 'Magic Band' did not become available to British amateurs until the 1980s. So perhaps I can be forgiven if I sometimes cheat a little by assuming that 50 MHz is only 'Approximately Six Metres' (see 'Six News' 40), thus allowing me to sneak in some interesting related stories.

Ken Ellis, G5KW and MD5KW

If, as the Bible suggests, Man's stay on the planet is three score years and ten, a teenager bitten by the radio bug could hope to experience at least five solar cycles. One man who has already lived through more than his share of solar cycles, and in so doing has written whole chapters of six-metre history, is Major K E S Ellis MBE - better known to us as Ken Ellis G5KW, a founder member with Steve, G4JCC of the UK Six Metre Group.

Ken, pictured in his shack, is now 92 and lives in Kent. He joined the army as

Ken Ellis, G5KW in his shack.

a boy and left it with the rank of Major, Royal Signals. His military and subsequent business career took him into some fascinating parts of the world, and wherever he went his radio equipment was never far away. He held a number of exotic callsigns much in demand on the HF bands, but his particular interest - propagation at frequencies above 28 MHz - was aroused in 1939. By this time he had been posted to Egypt and was operating as SU1KE, but the outbreak of World War II brought his amateur radio activities to a halt. During the war his main sphere of military operations was in the Middle East, an area he came to know and understand very well and where later, as a civilian, he was to spend several years working as a consultant in the communications field.

In 1946, serving with 3GHQ Signal Regiment at Fayid in the Suez Canal Zone, Ken was in control of a military communication network known as the Army Wireless Chain and he had several radio amateurs on his staff. Monitoring 49 MHz television signals from India, together with harmonics of service and commercial stations, in his spare hours led him to conclude that there was potential for long distance propagation on six metres along a north-south path across the equator.

By now, GHQ Middle East had begun to allocate amateur radio licences and calls and Ken received the call MD5KW, which later became so well-known among the 50 MHz fraternity. At the time, operators in a number of countries around the world (notably the USA) were active on the 50 MHz band. But television demands still meant that UK amateurs were excluded from six-metre operation and instead were allocated 58.5-60.0 MHz, a much less attractive part of the spectrum from an MUF standpoint.

To investigate the equatorial path on 50 MHz, MD5KW built a station for 28, 50 and 58.5 MHz. From early 1946 he transmitted a beacon signal on 50 MHz from a four-element directional array which beamed alternately north and south, changing at thirty-minute intervals driven by a modified prop-pitch motor. Less-ancient readers may not know that these motors, which as their name suggests were used to vary the pitch of aircraft propellers during flight, were freely available as surplus items after the war and easily converted into antenna rotors. The MD5KW project attracted considerable interest from various military units in the area, to the extent that the RAF loaned a cabin and a 50-foot wooden tower for the antenna, close to the Officers' Mess.

Initially, the receiving end of the project was located a few miles away. Ken has not told me how he kept a continuous watch on 28.100 MHz for cross-band calls to report reception of his six-metre beacon signal. Perhaps he arranged a 'training' programme to assign all signalmen of the 3GHQ Signal Regiment to man the station on a shift basis! Up to the autumn of 1947 several reports of reception of the beacon had been received from Europe and South Africa and later from German stations. Nothing was heard in the UK until October 19th when it was copied by G5BY in Devon who, lacking a 50 MHz licence, could only reply on 28 MHz.

As mentioned in 'A Bit of History' (Six News 67) great efforts were being made in the UK at this time to obtain a 50 MHz permit for G6DH to allow him to make the first transatlantic contact on the band. This was finally granted on November 5th 1947 and he made the contact with W1HDQ the same day.

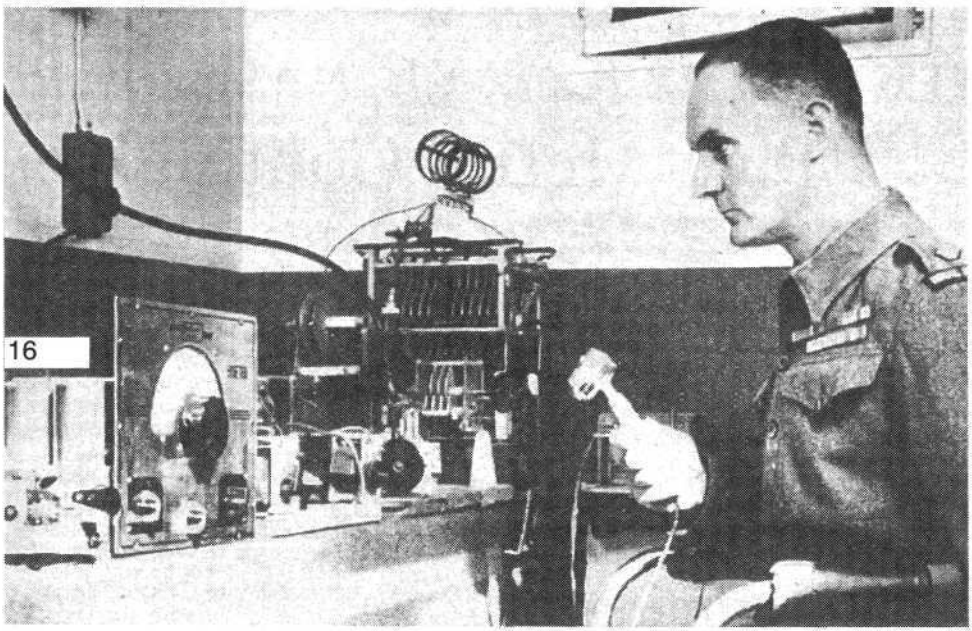
Two days later G6DH worked MD5KW two-way on six metres. Here is how Ken described the moment: "I was on parade

with my squadron at 10.00 am local time for an Annual Review of the Regiment by the Chief Signal Officer. An orderly informed the adjutant that Major Ellis was wanted urgently on the telephone to speak to the Receiving Station. I asked permission to leave the parade and went to the Officers' Mess. Not knowing what to expect, I was told that G6DH had been receiving my six-metre beacon for the past 20 minutes at strength 599. I quickly went outside to the ham shack and started calling. G6DH came back, reporting my CW as 599. His phone was S9 plus 20 dB."

I understand that in the Mess that evening, when the Chief Signal Officer learned the content of the urgent message which had taken Ken from the parade, he was fully appreciative of the significance of the event. He was apparently aware that, to paraphrase a comment attributed to Bill Shankley the late Liverpool FC manager, "Six Metres isn't a matter of life and death-it's much more important than that!"

By today's standards, the equipment at MD5KW was very basic. Only the receiver, a Hallicrafters S27, was a piece of commercial equipment - one of the few available receivers that could tune to VHF frequencies. We didn't know much about noise figures in those days but I would be surprised if it was better than 6 dB.

The transmitter was a 'breadboard' layout typical of the period. It used a VFO (electron-coupled 6V6) into 6V6 doubler stages and finally an 807 driving a single HK24 triode, which was a power amplifier on 28 MHz and a doubler on 50 MHz. Because it was required to operate on both 28 and 56 MHz, the 'tank' or final amplifier coil seen top-right of the rig was a plug-in type, changed between bands. In those days any station worth its salt would have a tank coil at least three inches in diameter wound with copper tubing (the sort used for the petrol supply in Austin

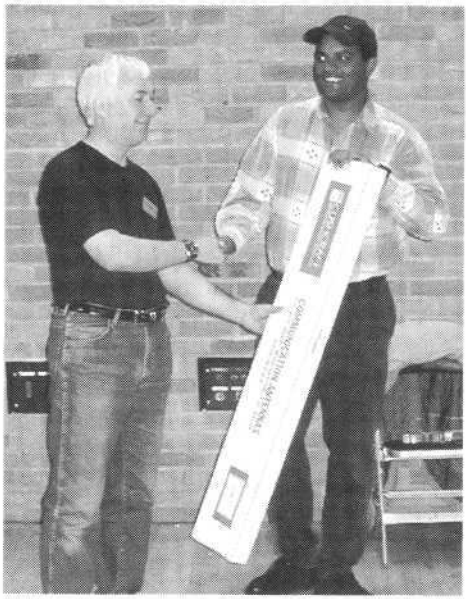


Ken as MD5KW, operating his beacon station in Fayd in 1947.

Seven cars), this being regarded as essential to obtain a high Q. With 35 watts output on 50 MHz, the spacing between vanes of the final tuning capacitor, visible in the photograph, seems adequate to make a flashover an unlikely event.

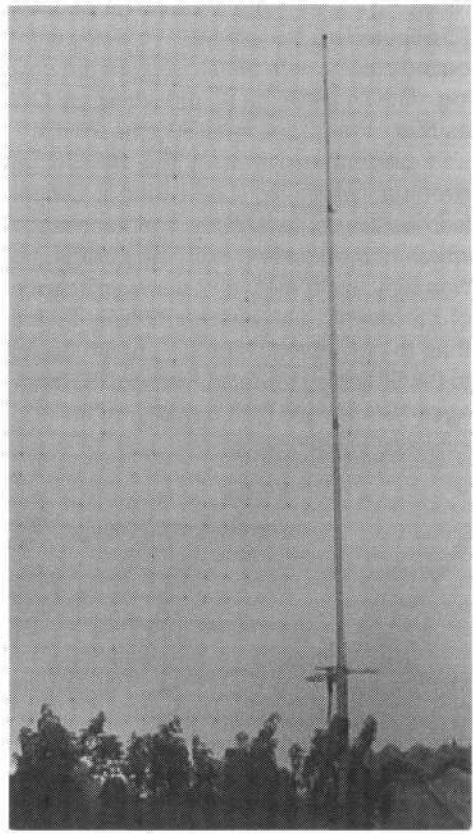
Footnote: On November 5th 1947, following a day's cross-band operating, G5BY built a complete six-metre transmitter overnight, finishing it at 0400 hours! There is much more to tell about G5KW and other six-metre early-birds.

New Antenna for ZD8VHF Beacon



While Chris G3WOS was in ZD8 recently he reported that the ZD8VHF beacon antenna was in a serious state of disrepair and needed replacing (see 'Six News'69). When we heard that Johnny, ZD8KW was coming to the AGM at Bletchley, the committee contacted Nevada Communications and arranged for a replacement antenna to be delivered there for Johnny to take back with him.

We're pleased to acknowledge that Nevada provided the antenna free of charge. The picture shows Mike Devereux, G3SED of Nevada presenting Johnny with the new antenna just after the UKSMG AGM.



The new antenna on the day it was installed on Ascension by Johnny, ZD8KW with the help of Lenny, ZD8JLD.

The new antenna is now in place and working well - reports are requested via the Announcements page on the UKSMG website *www.uksmg.org.* ZD8VHF is in II22tb and can be found on 50.031 MHz.

50 Years of 50 MHz

Ken Willis, G8VR

My short article 'A Bit of History' in Six News No.67 described the first 50 MHz two-way transatlantic contact, which took place when G6DH worked W1HDQ in Connecticut on 5th November 1947, in Solar Cycle 18. This contact was a landmark, demonstrating the possibilities of the 'Magic Band' and triggering the beginning of serious six-metre operation in the UK.

quency for a reply. After a CQ call the whole band had to be searched for a reply; conversely on responding to a CQ one just prayed that you would be the first station heard when the caller tuned the band.

Incredible though it may seem today, UK amateurs at the time were not permitted to call 'CQ'. To comply with the Government's insistence that under the terms

Flash*—50 *mc Open* 26 *October

An excellent East-West 6-metre opening developed 1400-1630 BST on Sunday, October 26. G5BY cross-banded 50/28 me with W1LLL, W1CLS, W1HDQ, W2RGV, W2BYM, W2AMJ, W8RLT, hearing also W1CGY and W3CIR/1— aU operating between 50 and 50*2 me. Peak strengths were very high and several contacts were on 'phone. G6LK heard W1HDQ, W1CLS, W3CIR/1 and W2AMJ. G2BMZ worked W1CLS and W3CIR/1, also receiving W1HDQ and W2BYM. British operators have now cross-banded with ZS1, MD5, Wl, W2, W3 and W8 50 mc stations. Congratulations to all concerned.

Figure 1: This news item - for October 26th 1948 - shows what was considered a big opening in those days.

It is true that prior to this several British amateurs had been experimenting in this part of the spectrum, but equipment in those days was, by present standards, extremely primitive. The day of the transistor and solid-state technology had not yet dawned. Transmitters and receivers used valves, components were large, and rigs were mostly home-constructed. Remember too, that with the components and technology of the era, 50 MHz was considered to be a very high frequency for which variable frequency oscillators of sufficient stability were difficult to construct. We used crystal-controlled transmitters - not for us the luxury of single sideband and listening on one's own fre-

of our licences we were simply experimenters, not communicators setting up in competition with official telegraph agencies, I had to call "Test, Test de G8VR", using either CW or telephony, a pretence that every transmission was a scientific experiment!

The contact between G6DH and W1HDQ, both dedicated 28/50 MHz operators, showed that carefully designed equipment and careful monitoring could bring results. This led to a great surge in interest in "Six" with several stations now devoting their time to building receivers and aerials for the band. At this time, once the special short-term licence issued to G6DH had expired, no British amateur

held a licence permitting transmission 50 MHz band so contacts with overseas six-metre stations could only be achieved by cross-band operation, with UK amateurs transmitting on 28 MHz.

Much envied, and alone in this wilderness, was Harry Wilson EI2W, who was the only station in northern Europe to hold a 50 MHz transmitting licence. UK amateurs had 58 MHz (five-metre) facilities and several built transmitters that would cover both 58 MHz and 50 MHz. Figure 2 shows a typical 50/58/28 MHz AM transmitter using plug-in coils on a standard 19-inch chassis of the era, the crystal being visible at the rear on the left.

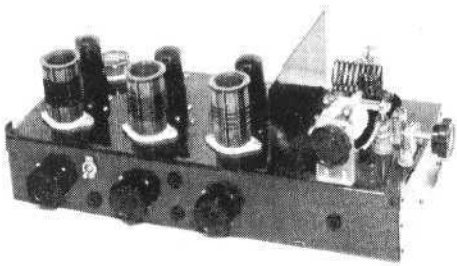


Figure 2: A typical 28/50 MHz transmitter for CW or AM (by G2IN 1947)

As the next solar maximum approached in 1956-57, many British stations were now equipped to make cross-band contacts with 50 MHz stations. EI2W was having a ball, envied by all in his ability to work two-way on Six. With, by now, a large UK contingent of 50 MHz operators there was no dearth of stations to work Stateside, while several Canadian and South African stations were also regularly on the band. Al Slater G3FXB, a legendary contest operator, had by now turned his attention to the band and could be heard working W stations one after another from his QTH in Horsham, Sussex.

By the next solar peak, 1967/68, things had changed. Sideband and compact transceivers had replaced AM, so no longer was it necessary to dig out a signal on a crowded band from a mass of heterodyne whistles produced by adjacent carriers. Better still, spot-frequency working with a modern transceiver did away with the tiresome need to tune the whole band after calling CQ - which incidentally was now permitted, through a change in licence conditions. In this cycle, however, Old Sol decided to take a rest and six-metre propagation proved to be something of a disappointment for the large number of operators who had waited so long and were equipped to listen on the band.

During the quiet years that followed from 1970, six-metre activity in the UK was at a relatively low level, but in 1978 the ever-watchful Ed Tilton, W1HDQ, heard the ZB2BL beacon. This evidence that things might be heating up resulted in plans for a series of transatlantic 50/28 cross-band tests starting in early 1979. Fortunately the tests coincided with favourable conditions, and in the first transatlantic opening since 1958, Brian Bower G3COJ, was first on the scene when on February 10th he contacted WB2RLK/VE1. G3FXB was soon back in action and made several transatlantic contacts on the same day and during the following weeks. Everyone started to have fun with cross-band contacts and EI2W started up again in earnest. Within a year he had brought his total of US states worked two-way on Six to forty, comprising 300-plus stations worked in all USA call-areas.

So far in this story I have not mentioned any participation by Ken Ellis G5KW, who sadly became a silent key recently. He was never far away from the

action. In 1979 Ken was living in a Kent village adjacent to mine, in a good location high up on the Weald and capable of providing good two-metre and 70 cms DX via tropo.

But Ken's band was six metres. Although equipped with good antennas and a sensitive receiver, he was frustrated to hear other stations to his west and southwest in cross-band QSO with W and VE stations that were completely inaudible at his QTH. In particular he noted that Al Slater, his nearest 50 MHz station - located in Horsham some 50 or so miles to the west - was working USA stations one after another on 50 MHz, none of the DX being audible in Kent. There was only one solution. If the DX would not come to him he must go to the DX, but how to do it when his home was in Kent?

He drove up to my house one Sunday evening in a disreputable-looking vehicle that he described as 'a retired ambulance'. He had bought and converted it into a combined shack and living quarters. It was loaded down with a 230-volt AC generator, a 12-volt generator and a pair of very heavy-duty 12-volt batteries. But these were minor loads compared with the sundry items of hardware lashed to the roof. First was the two-section 40-ft tower, then a five-element yagi and a trap dipole for ten metres. For 50 MHz a massive Cushcraft six-element yagi on a 34-ft boom, specially air-freighted from the USA, overhang both ends of the vehicle. Inside were "other small beams for comparison purposes".

Inside, a KW2000B HF transceiver with associated KW1000 linear were fixed to a bench, while for Six there was an ICOM 551 and a Yaesu 620B. Ken briefly outlined his plans, which were to take this caravanserai to the Channel Islands, where, he concluded, he would be nicely situated to catch the transatlantic DX on six metres. I wished him luck as he drove off emitting smoke, while my incredulous neighbours watched from behind lace curtains.

Ken set off in October 1979, but unfortunately he had not done all of his homework. On arrival at the ferry he learned that caravans were not permitted on the Channel Islands. Plan B. He decided that the Scillies would be near enough.

At Land's End, officialdom raised doubts whether he would be allowed to land at St. Mary's. He was permitted on to the ferry only on condition that he would return on the same ferry if refused permission to go ashore. All turned out well and he was given permission to operate from the Garrison Fort, on high ground towards the south-western tip of the island. This was to be the first of three trips to the Scillies where he stayed for months at a time, bracketing the DX season between October and January, though records show that he did go home for Christmas in 1981!

My picture (figure 3) shows how the G5KW set-up expanded beyond the initial caravan installation into a well-equipped barn, access to which he had been given through friends he made locally. He monitored 50 MHz continuously from daybreak until dark. The decision to go to the southwest was justified from the outset, since almost daily contacts with VE1AVX became the norm.

Ken's propagation studies and conclusions have been fully documented elsewhere and would take much space to reproduce. Highlights were a cross-band with VK6OX on 27th October 1980, following Gordon Pheasant, G4BPY and Brian Bower, G3COJ. These were the only three

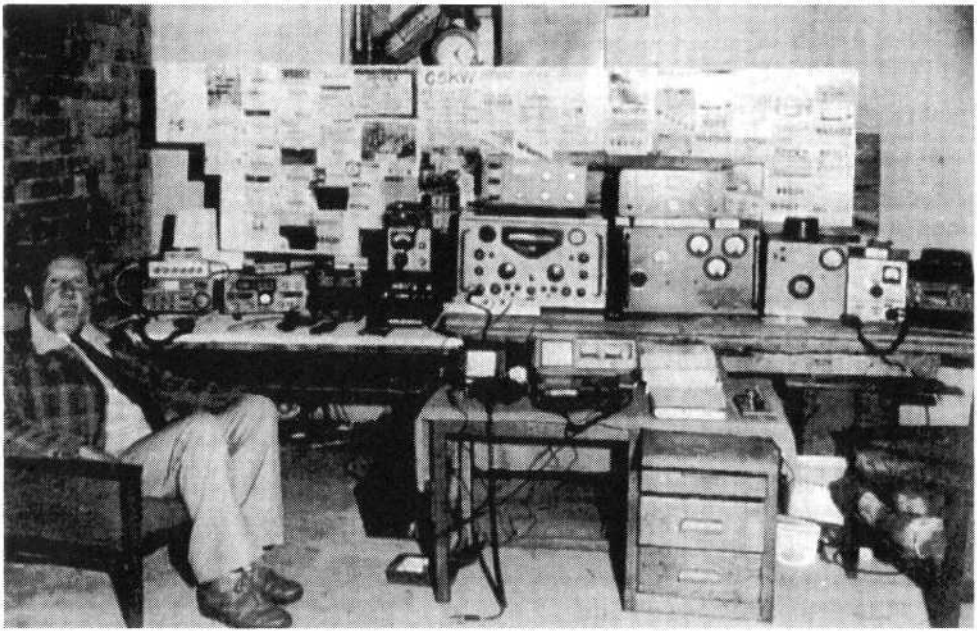


Figure 3: G5KW and part of his VHF set-up on the isles of Stilly. The QSL cards are for 28- 50 MHz crossband contacts.

VK contacts with VK on the 50 MHz band until 1990, by which time it was possible for two-way QSOs to be made.

For me, the achievement which gives an indication of the long hours Ken spent listening to white noise issuing from his speaker is the fact that he had cross-band contacts with all 48 mainland states of the USA from the Scillies.

The last ferry before Christmas 1981 left on December 16th. He planned to operate until 14th, but still needed Utah. Most of the afternoon on that last day he called CQ Utah, for some reason listening for replies only on six metres rather than the cross-band calling channel of 28885 MHz. Meanwhile several American stations were calling desperately to tell him that W5VLJ/7 was trying to raise him on Six from Utah. In the nick of time the contact was completed. .

Next time you fancy going out for a spot of portable operating make sure you don't forget the kitchen stove.

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Transceiver: Part 2, QEX, Sept/Oct, 1999, 3-8. [IF board; notes in QEX, Nov/Dec 2000, p.60.] *http://www.arrl.org/members-only/tis/info/pdf/990910qex003.pdf*

A High-Performance Homebrew Transceiver: Part 3, QEX, Nov/Dec, 1999, 41-51. [RF board; corrections in QEX, Jul/Aug 2000, p.59, and in QEX, Nov/Dec 2000, p.60.] *http://www.arrl.org/members-on/y/tis/info/pdf/991112qexO41.pdf*

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HF Circuits for a Homebrew Transceiver, QEX, Nov/Dec, 2001, 20-42.

Information about obtaining copies of QEX and QST articles may be found at*http://www.arrl.org/qex/#copies,http://www.arrl.org/members-only/artcopies.html*and*reprints@arrl.org.*

50 Years of 50MHz

Ken Willis, G8VR

I would like to go back a bit beyond my fifty-year mandate to introduce some very early work relevant to six metres and thereby acknowledge the efforts of some of the pioneers who carried it out. For simplicity, when mentioning frequencies I will use the term MHz, though in the period I am describing all the surviving literature uses Mc/s ('megacycles per second').

It would probably be fair to assume that the sun has been going through peaks of increased activity at intervals of every 11 years or so (which we now call solar cycles) for the past several million years, but in cosmological terms it was only very recently that the technology to recognise and exploit the situation became available. If we attempt to pick a date when the The Magic Band' came into being, then it is probably safe to say that it originated from early experimental work by amateurs in the late 1920s or early 1930s, by which time 'the wireless' had developed to the point where valves and components were becoming available to the general public. Amateur radio was already alive and well, and inevitably among its ranks were some who were prepared to spend many hours trying to probe beyond the perceived horizons such as attempting to extend the upper frequency at which available equipment could be induced to operate.

By the 1930s it was beginning to be understood that radio propagation at frequencies above 30 MHz could be much affected by the sun. The word 'ionosphere' had not yet entered the language, but the 1931 edition of the very comprehensive Admiralty Handbook of Wireless Telegraphy, a classic text-book of its kind at the time, refers to a part of the earth's atmosphere known as the Kennelly-Heaviside Layer, within which,

it says, "there is ionisation mainly due to free electrons.....its cause still obscure". Apart from noting that this layer seems to have some effect on the refraction of electromagnetic waves, the text accepts the conventional theory of the period, that there must be some intangible thing, 'the aether', permeating all space, since the propagation of electromagnetic waves over long distances with no apparent medium to conduct them would seem to contradict the laws of physics.

This, more or less, was the extent of knowledge of the earth's upper atmosphere at the time. Keen amateur experimenters, uninhibited by or unaware of any influence of the sun's radiation, pressed on regardless. In 1929, G2OD had already contacted American stations on the 28 MHz band. Without denigrating this achievement, but with the advantage of hindsight, we could surmise that he was probably lucky enough to catch a time when what we now call 'the solar flux' was at a high level. In fact my records suggest that it would most likely to have been on a date just after the peak of Cycle 16, certainly not an outstanding one by 1980-82 standards. To digress, I recall my own amazement, one autumn afternoon in the late 1930s soon after I had left school, to find, on my home-brew 3-valve receiver, a ten-metre band full of very strong USA amateur stations, and this on a band previously filled only with white noise. With so much less known about radio communication in those days, we were often surprised by such moments of apparent 'magic', unlike today when everything is analysed and quantified.

In the early 1930s British amateurs held an allocation at 56 MHz, known as the 'Five Metre' band. Attempts to use the band hit several problems due to the limitations of available components, particularly valves, since the emphasis on development and production favoured parts for broadcast receivers and audio amplifiers. Early experimenters commenced operation on the five metre band using self-excited oscillators with valves designed for much lower frequencies. They proved to be not very frequency-stable. To combat this, early receivers were super-regenerative, this type of receiver having the advantage of being very wide-band. By now, on rare occasions, stations had managed to communicate over ranges of 100 miles on this wavelength, though any contact over more than 10 miles was deemed to be worthy of a report.

A typical transmitter would be a pair of triode valves in a push-pull, tuned anode, with a resonant grid circuit and modulated by a suitable audio amplifier. Sometimes the transmitter would be fed from raw AC so that its carrier was easily detectable without speech-generated audio being superimposed, and that often sufficed because these high frequencies were so very exciting to the experimenters, it was enough simply to know that they had heard something identifiable. Co-axial cable had yet to become available; long-wire aerials or dipoles fed with open wire feeders or even twisted flex were the norm.

G2XC reported how he and G6NZ, located only a few miles apart but separated by Portsdown Hill near Portsmouth, spent many hours on the five metre band trying to hear one another through this obstacle. When it proved impossible they persuaded a neighbour to drive one of them around the area in his car with

suitable equipment on board, so that they could plot positions where reception was favourable. G2XC even copied G6NZ when he was transmitting from a moving bus!

All over the country, small groups of enthusiasts were following much the same pattern, going out into the countryside with portable equipment to seek out the high points. In fact it proved so popular in the south, that one Sunday each month was nominated as a field day. Figure 1 shows a typical group. The push-pull transmitting valves (and in this case a push-pull modulator on a separate base) are clearly visible, together with the wide-spaced open-wire feeders using wooden spacers, often impregnated by being dropped into boiling paraffin wax. Note the useful soap-box tables (whatever happened to soap-boxes, those versatile and essential features of my boyhood?).

Figure 1: Five metre band portable operation, 1933. Left to right: G2YD, G2MR, G2NH, G6XM. Note the open wire feeder In the foreground with Its very heavy wooden spacers.

When next you come to switch on your transceiver, take a moment to marvel at the modern technology that, in a very small box, can provide 100-watt multimode multi-band capability. Don't forget, too, that when you flick the dial to settle on a frequency to within a fraction of a kHz, you'll expect the rig to stay there. Then spare a thought for a state-of-the-art five metre transceiver of the 1930s. Figure 2 is the circuit of one built by G6NZ, which used just two valves and no doubt was what he was using when he transmitted to G2XC from a bus.

This circuit has some historic significance since it was drawn by G6NZ himself, part of his 1933 comprehensive paper "A Qualitative Investigation of the 56 Mc/s (sic) Ultra Short Wave Band". Only if you are very elderly might you recognise it immediately as a super-regenerative transmitter/receiver (the word 'transceiver' did not come into use until very much later). The PM2DX valve has a dual purpose, it serves as a quenched detector for receiving and as a free-running Colpitts oscillator when transmitting. The PM2 stage is clearly an audio amplifier with carbon microphone input via a transformer. One of its functions is to amplitude-modulate the PM2DX using so-called 'choke' modulation, achieved by inserting the LF choke C in the high-tension supply line to both valves. This is quite straightforward. However the coupled inductive circuits between the grid and anode of the modulator valve show that it was also used to generate an ultra-sonic frequency to quench the

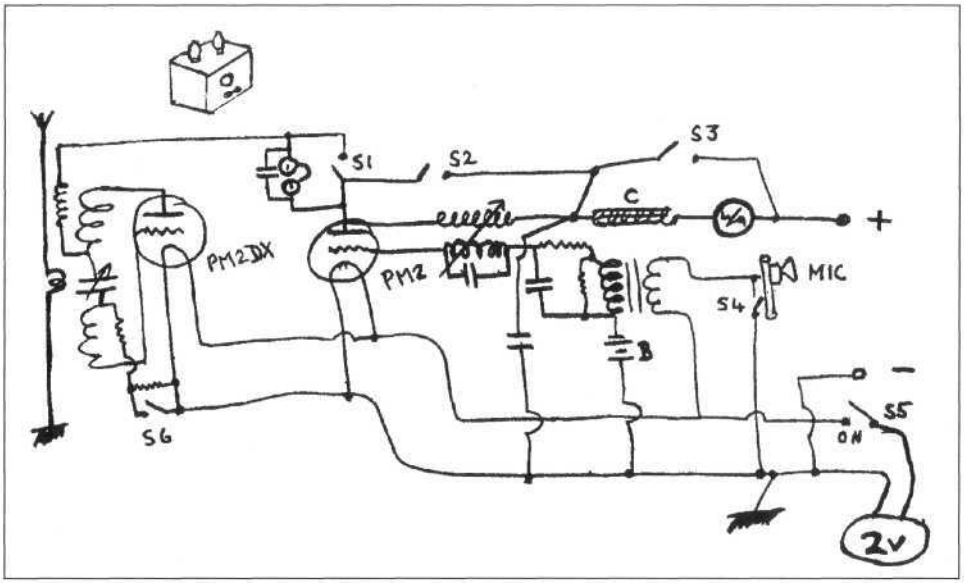


Figure 2: G6NZ's 1933 design for half-watt 56MHz transmitter/receiver, from his original drawing.

detector, giving rise to the pronounced no-signal "hiss" experienced when using this type of circuit. In super-regenerative detector / oscillator circuits the value of the resistor between grid and ground can determine whether the valve oscillates freely or is self-quenched.

I used a simpler version of the circuit a few years later ("Approximately Six Metres", Six News January 1994), with a switch in the S6 position of G6NZ's circuit to allow a megohm or two to be added to the 'grid-leak'. This caused the valve to switch from being a free-running oscillator to a self-quenched detector. For anyone wanting to do a little circuit-tracing, G6NZ's own notes state that "For RX: S1 open, S2 open, S3 closed S4 open. For TX: S1 closed, S2 closed, S3 open, S4 closed". He does not mention S6. Dig out a couple of old triode valves and try building one of these as a weekend project, but remember that super-regenerative receivers radiate a lot of radio-frequency 'hash' when in receive mode!

In the days of these transceivers, one would need a valve-filament supply, normally a two-volt lead-acid accumulator, a 100-volt dry-cell battery for the high tension line and a dry-cell nine-volt grid bias battery, quite a lot to carry around when going portable in a bus or on a bicycle. G6NZ's transceiver was boxed up in the form of a six-inch aluminium cube, and he made the little sketch in the corner of his circuit diagram to show how he intended to shape the final package. I understand the finished model was exhibited in the Science Museum in South Kensington, London.

Experience soon showed that results were likely to be better if near 'line of sight' paths existed between sender and receiver, hence the need to find portable sites at high elevations for best DX. On

May 21st 1933, G6QB took his five metre equipment to the top of the old Crystal Palace in South London. I recall a report in the old T & R Bulletin of the RSGB from an amateur who stayed up overnight to build a two-valve receiver just for the occasion. Finding that it was seriously detuned by hand-capacity effects, and the shops being closed, he cut some lengths of cane from an old chair to fashion extension rods for his variable capacitors. After all this work he was delighted to get brief copy from G6QB.

In the same month, Douglas Walters G5CV, who was radio correspondent of the newspaper the Daily Herald, was experimenting with airborne equipment. Using amateur built equipment, and with financial support from his newspaper, he flew on May 21st in a Puss-Moth aircraft in which were two five metre transceivers, one his own, the other built by George Jessop, G6JR Signals were received from G6QB atop the Crystal Palace at a distance of 130 miles, setting a new record for the band; G6QB's signal was reported as being "colossal". Later in the month the newspaper sponsored a test between two aircraft, each carrying five metre equipment and succeeding in establishing air-to-air communication on the band.

How much these experiments, pioneered by amateurs, contributed to the development of the VHF communication system used by Fighter Command in World War II and generally regarded as a major factor in our winning the Battle of Britain, can only be guessed. Later, during 1934, the team of G5CV/G6JP installed their equipment in a glider, excellent air-to-ground communication resulting.

And so it went on. In 1936, a group made it to the top of Snowdon with five metre gear, soon making a contact at 85 miles. Not to be outdone, another party toiled to the top of Snaefell, Isle of Man, and worked the Snowdon group, an increase in range of two miles. But later in the day the Snowdon team worked EI8G/EI5F in Dublin, 96 miles.

A thick book could be written on the exploits of those two-letter callsigns who contributed so much to our present-day understanding of frequencies above 50 MHz. Some of them were ladies. Barbara Dunn, G6YL, used a long-lines transmitter (can you imagine a self-oscillator with long lines at five metres?) but it was while listening on her 56 MHz receiver that she became the first to hear the 'hissing' sound from a solar burst on this band in July 1939.

Previously this phenomenon had not been heard above 28 MHz (G6DH in 1935). Another YL operator, G8LY, had her 60-year old father climb a tree to fix her 56 MHz vertical, but later graduated to a rotational beam aerial. For a time she contributed the monthly 56 MHz report for the T & R Bulletin, and wrote a paper on the use of Lecher lines for UHF measurements.

By 1939 equipment was becoming more sophisticated, crystal-controlled oscillators with frequency multipliers replacing the simple transmitters (see Six News Issue 71 Page 39) and more stable receivers were beginning to emerge. As a result longer distances were being covered, but not yet exploiting the ionosphere; the actual modes of propagation (including sporadic-E?) still being a matter for debate considering the level of technical knowledge at the time. Up to the outbreak of World War II, which

was to change the scene considerably, five metre overseas 'firsts' were France (G2FA/F8NW March 1936), Italy (G5MQ/ 11 IRA July 1939) and Holland (G2AO/ PA0PN August 1939).

The war then brought to an end all amateur radio activities in the UK and Europe for several years, but resulted in enormous advances in VHF/UHF knowledge and techniques. And when it ended came an incredible flood of services surplus communication equipment to bring joy to the amateur fraternity. And the first amateur band to be released to UK amateurs after the war was 58 MHz! But of this, more anon.

The Hong Kong Six Metre Scene

Neil Carr, G0JHC

lit is eight years since my last visit to Hong Kong and much has changed, including the six metre scene. Those active during cycle 22 might remember VS6BI,VS6WVandVS6XMQ. Now there are upwards of ten six metre operators in Hong Kong, who regularly give this rare DXCC to 'the deserving'.

Charlie, VR2XMT needs no introduction to the majority of us and was kind enough, along with his wife Pansy, to offer his time and hospitality during my recent visit over the New Year.

50MHz in Hong Kong follows the same licensing conditions as the UK. However due to 'local conditions' the majority of operators struggle to install QRO equipment. Dipoles and verticals are much more the norm.

Hong-Kong isn't the DXer's dream QTH due to the high mountains and vast tower blocks, which often block whole continents. Few stations talk about having a good site, it's more a case of finding a QTH which has *at least two* good directions!

The table shows a list of the top Hong-Kong six metre stations and their DXCC scores as of 7th January 2002.

Call	Name	DXCCTotal
VR2XMT	Charlie	141
VR2LC	Ken	139
VR2IL	Sing	103
VR2XMQ	Steve	97
VR2PM	Koo	97
VR2ZXP	Fai	80
VR2DXA	HARDXA	82
VR2XRW	Logan	50
BG7OH	Liu	104

Charlie, VR2XMT (#1) lives in the New Territories, well away from the majority of QRM, and Ken, VR2LC (#2) lives at the top of a tower block with a six-element beam. If you chase IOTA you need to work Sing, VR2IL who is the only active operator on AS-006 right now. Steve, VR2XMQ is also on Hong Kong Island, but has rarely found time to be QRV this cycle; the rest are situated on the mainland.

All current operators live in OL72, but a small part of Hong Kong, called The Gold Coast' is located in OL62. Charlie, VR2XMT took me on a drive to this lovely area which is about 45 minutes drive from Hong Kong Island. A number of years ago there was a six metre operator from

50 Years of 50MHz

Ken Willis, G8VR

News flash, hold the front page! It's official; the 'Magic Band' came into being on June 27th 1945. But hang on, didn't the old codger suggest in the last issue that it was a small group of UK amateurs operating on the old five-metre band in the 1930s which lead to the birth of our six-metre band? Well, yes he did, but that was yesterday's news. That's the trouble with searching the archives - one thing can easily lead to another.

It was my good friend Bob Reif, W1XP who was quickly on the e-mail to remind me that the UK was not the only place where pre-war 56MHz operation was to be found. Other countries had the band, notably the USA where as early as the 1920s 'Five Metres' was a popular and much-used band. The steady progress made on this band in America is evidenced by a contact made on July 22nd 1938 between W1EYM and W6DNS over a path-length of 2500 miles, a new record and far in excess of anything achieved on the band in the UK prior to 1939. But this was Five Metres, so what's the relevance to the Magic Band?

How the 'Magic Band' was born

It came about in this way. In 1944 some decisions were taken by the US Federal Communications Commission (FCC) which, had the outcome been different, could have resulted in there never being a 50MHz amateur band at all and consequently none of those six-metre DXCCs nor any of the spine-tingling rare-prefix contacts which have been features of this and the previous solar cycle. With World War II not yet over, the FCC embarked on a programme of post-war frequency allocations, the 44-108 MHz part of the spectrum being of particular interest. This slot was earmarked for both television and FM broadcast services, where a huge post-war increase in the number of stations was anticipated. There was a single amateur band within this range (56-60MHz) and with so many demands on the spectrum it would have been all too easy for the FCC to have selected an amateur allocation and presented it as a *faitaccompli*'but it did not. Instead the American Radio Relay League (ARRL), representing the American amateur radio movement, was invited to participate in the decision-making process. I believe that this was a further indication of the goodwill that always existed between the FCC and American radio amateurs, though on this occasion FCC may have had a motive in bringing ARRL into their discussions.

The FCC presented the ARRL with three alternative band-plans for study, following which delegates from both sides would attend hearings where the issues would be debated and finalised. In allocating frequencies for FM broadcast stations, FCC was concerned that sporadic-E propagation spanning the continent during summer months might cause havoc through co-channel interference if the wrong band was chosen for the service. It was in this area that some input from the ARRL could be use-

ful, since radio amateurs had enjoyed and exploited this mode of propagation on their 56 MHz band for years. With little or no commercial interest in this part of the spectrum at that time, amateurs probably knew a lot more about sporadic-E than many of the FCC engineers.

In the first of the three alternative plans submitted to the ARRL, the FM broadcast service was placed in the 54 - 68 MHz band, right on top of the existing five-metre allocation. Amateurs would then move down to 44-48 MHz. The second would allow amateurs to retain their existing 56-60 MHz band with FM broadcast assigned to 72-86 MHz. The final proposal offered amateurs 50-54 MHz with FM broadcast on 88-102 MHz. One can imagine how eyes must have lit up at ARRL at the prospect of an amateur band starting at 50MHz. First, however, the League had to present its case and convince FCC that alternative three met a majority of both commercial and amateur requirements.

The ARRL's general manager, Kenneth B Warner, was nominated as its main delegate. Space only allows me only to paraphrase his presentation at the final hearing, but suffice it to say that while it was wholly professional, he could resort to very informal 'ham radio' language in arguing his case. He opened by saying: *"You propose to shift our band of 56-60 MHz, the first ever allocated in that part of the spectrum, to 50-54 MHz. We said that while we embrace that, it must be regarded as the limit of acceptable displacement. "* (That's telling 'em!). He continued: *"FCC Alternative No. 1 is distasteful to us because it would move the amateur band down to 44-48 MHz, and if move we must, we would much prefer not to move below 50MHz. We have done much work in the vicinity of 56MHz observing and studying the behaviour of these waves and we regard that job as incomplete and consider 50MHz to be the lowest frequency to which we could move and permit continuity."*

Warner then showed he knew all about six metres when he said: *"Frequencies in the vicinity of 56-60 MHz have a particular interest for amateurs because they are located at what seems to be a unique transition spot in the spectrum. Sporadic-E occurs just sufficiently often to maintain amateur interest at white heat, and such frequencies are near the top-limit of where F2 transmission ever normally occurs "* Referring to information ARRL had provided earlier, and using slightly emotive language to describe the 56MHz band, he continued: *"We have previously characterised the performance of this band to you as being erratic, unpredictable, unreliable and unexpected, a band where anything can and generally does happen, and we have explained that its very eccentricities give it a peculiar charm for us , though they make it singularly bad for regular service. If we were moved to 41-48 MHz, it would be in a region where both sporadic E and F2 transmission occur so frequently that they would possess small novelty and much of the eager interest of amateur observers would disappear. The band would be neither fish nor fowl but regarded simply as an exceedingly unreliable long-distance band."*

Now came the point where the ARRL hoped to steer the committee towards alternative three and give amateurs the coveted 50-54 MHz allocation. Since he was addressing a group with engineering backgrounds, he could employ a

technical argument and he made a few assumptions. He anticipated that after the war there would be large numbers of radio amateurs living in any typical community. Should either 50-68 MHz or 72-86 MHz bands be given over to FM broadcast, receivers for both of these bands would require an IF in the 10MHz region, with local oscillators probably running on the low frequency side. This would make these receivers very susceptible to interference from amateurs who would then be operating in either the 44 MHz or 56 MHz bands.

Next, to strengthen the case for putting FM in the highest range of 88-102 MHz, he brought up the subject of sporadic-E, commenting that: *"Any person, amateur or not, who has heard sporadic-E bring in signals of local strength from a thousand miles away on the humblest receiver knows that considerations of sporadic-E alone compel the location of the FM service at a sufficiently high frequency to prevent this phenomenon from reaching it "* So here was a powerful American agency, with a large staff of professional engineers, being nudged by a radio amateur towards a decision that would have repercussions throughout US radio and television industry! The ARRL went on record as being opposed to alternative one but accepting alternative three.

The FCC carried out some sporadic-E tests, which must have satisfied them as to Warner's predictions because on June 27th 1945 it was announced that alternative three was to be adopted. The rest is history. US amateurs got 50-54 MHz and the 'Magic Band' was born. We in the UK and much of Europe had to wait forty more years or so for its general release.

Okinawa

Less than two months later, the atomic bombs dropped on Hiroshima and Nagasaki brought to an end the war with Japan, Germany having already surrendered. This left thousands of American military personnel in occupation of Japan and some neighbouring Pacific islands and for many of them it would be a long stay before they got back home.

Among them was a sizeable contingent of radio amateurs, who found themselves surrounded by masses of largely superfluous military radio equipment. It has always been a feature of US amateur licences that they permit the handling of third-party traffic, so the Gl hams were quick to see that amateur radio would be the perfect way to keep in touch with home. The military saw its advantages too, and took swift action. An order was promulgated to the effect that Headquarters Eighth Army would assign calls to allied troops who already held operator licences. Initially it was ruled that operators would use their home calls signing the portable indicator 'J', but this changed when Japan was sub-divided into 9 call areas, similar to the USA system, and three-letter J-calls such as J4AAA started popping up on the HF bands. Many old-timers will recall hearing and working some of the J+3 prefixes from the Pacific on the 14 and 28 MHz bands during 1946-7.

It was inevitable that some of the pre-war 56 MHz addicts now on a Pacific island would want to sample the new six-metre band just as soon as they could find a military radio which could be persuaded to operate on it. They were fortunate in that solar cycle 18 was near its peak, and it was a good one.

Okinawa Island, lying between the East China Sea and the Pacific to the south of Japan, was one of the occupied territories and was assigned the prefix J9.

The several amateurs stationed there formed themselves into a very active group and became well known as the J9'ers Radio Club. Several of them, including J9AAK and J9AAO, were six metre enthusiasts.

These contacts raised the level of six metre activity among the W6's on the American West Coast to fever pitch, with daily schedules now being maintained between California and Okinawa, while strategically placed on Wake Island in mid-Pacific was W6VDG/KW6, a useful 'half-way house'. But the next big surprise which the magic band had in store did not involve the continental USA at all.

The J9'ers Radio Club on Okinawa, 1947. J9AAO is third from the left, **second row.**

Early in 1947, on January 25th, J9AAK had a notable contact with KH6DD in Oahu, Hawaii, over a distance of 4600 miles; this broke all records. They made two contacts during the afternoon with signals briefly peaking at over S9. Reports for the period state that J9AAK was using 68 watts (strange figure!) to a five-element close-spaced array, while KH6DD fed 500 watts into a "Twin-Three" array - an antenna system unknown to me.

Chile

Our scene now shifts to the small copper-mining town of Chuquicamata (try spelling that out phonetically in a pile-up!) in the Andes mountains of Chile, the home of Larry, CE1AH and his wife Ida, CE1AJ, both six metre enthusiasts. In their remote location even the most basic components and materials to build a rig and antenna are non-existent, everything having to be shipped in over the mountains from afar *("Ida, they forgot the*

solder again!"). When the rig is finally built, day after day spent in careful listening results in nothing being heard on the band. Maybe the receiver doesn't work or the antenna is dud, who knows? No test gear within hundreds of miles, no other station to carry out a check.

Then at last, as more six-metre stations become operational, sporadic-E finally climbs the 18,000-foot mountains to reach Chuquicamata and some contacts are made with LU and PY Meanwhile Larry is working the DX on some of the HF bands, and one day on 28 MHz he hooks up with J9AAO on Okinawa - not a bad ten-metre contact in its own right. By now J9AAO's achievements on Six are legendary, so Larry begs for a try on 50MHz, knowing full well that a contact will be impossible of course since the J9 is situated half the world away. Conditions don't seem all that hot in Okinawa either, and the GI at that end is about to leave the house for a date anyway so he's not very interested. But he'll settle for leaving his automatic keyer running while he is out, just to keep CE1AH happy.

Half-way down the pathway to his Jeep, all sorts of pandemonium bursts forth from the vehicle's on-board mobile ten-metre monitoring receiver - frantic calls from Larry saying he is hearing J9AAO's 50MHz beacon. The GI runs back, and with hands a-tremble, switches on the main rig, picks up the mic and

Where do we go from here? (QST December 1947)

puts out a call, knowing for sure that like a thousand others there will be no response. But this time back comes the hoarse voice of Larry who is now copying J9AAO, on voice at S3! They make a two-way contact lasting just seven minutes before signals fade - a new world record, and what a payback for all those months of effort by CE1AH. The date was October 17th 1947, the distance now recognised as 10,500 miles and believed at the time to be virtually unbeatable because the stations were located almost exactly diametrically opposite one another on the planet (see the cartoon which appeared in QST for December 1947).

This was long before we had GPS, computer programs, grids and all that good stuff to calculate distances. In reporting the contact in his Short Wave Magazine column, G2XC tried resorting to trigonometry and came up with 11,300 miles.

Final

What is the world distance record on Six anyway? I once held a record, for about ten minutes, and I have a certificate to prove it.

On 15th February 1992 I worked VK4KK on six metres, over a distance (so the parchment says) of 16416 kilometres which is equivalent to 10202.6 miles, a distance-record for any VK4 station for the band.

Note that 0.6-mile. And hey! that's only 297.4 miles short of the J9AAO-CE1AH contact.

With the certificate came a nice letter from the Wireless Institute of Australia (WIA) saying *"unfortunately,* following your contact with VK4KK, he worked another station about 75 miles to your west, so the record passed to him." What /want to know is how did they *know* it was short path and not long path? Don't you just hate those "unfortunately" type letters?

Ten Reasons to Join the UK Six Metre Group Today

(1) We *help* local amateurs in countries that are not permitted to operate on 50MHz gain permission (Egypt)

(2) We ***organîse*** DXpeditions to activate new countries on 50MHz for the first time (Jordan)

(3) We ***sponsor*** DXpeditions that focus on 50MHz (Sable and St. Paul Islands, Georgia)

(4) We ***encourage*** visitors to a country not active on 50MHz to operate (Western Sahara)

(5) We ***arrange*** *the* provision of equipment to operators who want to operate on 50MHz (Egypt, Jan Mayen)

(6) We *activel/encourage* local amateurs to operate on 50MHz for the first time (Belarus)

(7) \/We ***publish*** a quarterly magazine, **Six News** to provide in-depth articles not available on the Internet

(8) We ***run*** probably the best amateur radio web site in the world dedicated to 50MHz

(9) We ***have*** over 900 members who provide information on all aspects of operation on 50MHz

(10) We have ***establishec/THE*** contest event of the year: UKSMG sporadic-E competition in June

We need money in the form of subscriptions to undertake the above activities. Our subscriptions are very low, why not help us get more activity on the band! You know it will benefit you when you work that new country for the first time!

50 Years of 50 MHz

Ken Willis, G8VR

I was very surprised and of course delighted to have been the recipient of the new G5KW Award. My thanks to Jim, 2E1JIM for accepting it on my behalf at the April Convention, which unfortunately I was unable to attend.

I am especially appreciative of having been given this award because of my very long friendship with the late Ken Ellis G5KW, which started in a time before many current UKSMG members were born. By the time Ken's key became silent, we had lived through years that saw remarkable changes in life-style and incredible technological developments, far beyond anything we would ever have thought possible.

These were years when to be a radio amateur was something rather special, and our simple attempts to operate at very short wavelengths were particularly exciting. Recalling some of them through my articles has brought back many memories and given me much pleasure. But please always remember, I am simply an archivist, not a creative writer. I dig into the past by reading old magazines, journals and reports of all kinds, anything relevant that I can lay my hands on, occasionally mentioning my own activities all those long years ago.

Already my researches have found that some of my earlier articles need correction as a new fact emerges which impacts upon another. I am also very much aware that there must soon come a point at which readers will feel that they have heard enough from me about the 'old days', so I will heed the words of an American friend who would comment: "History, we don't need" when someone tended to dwell too long on a past incident which he preferred not to hear discussed! So have no fear that I have set my cap at winning the G5KW Award next time around. It was never my intention to bore you all to death.

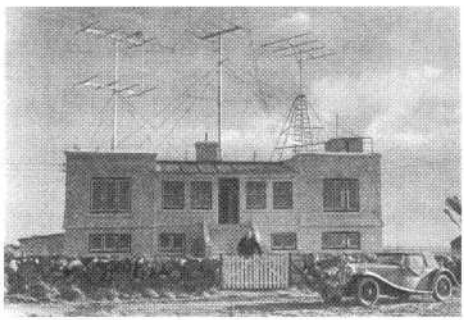
G5BY

One of the early VHF 'greats' was Hilton O'Heffernan G5BY, who probably did more than anyone this side of the Atlantic to open up the possibilities of communicating above 50 MHz.

In 1925, when he received his amateur radio licence, he was a young BBC engineer living in Croydon, within com-

Hilton O'Heffernan, G5BY

muting distance of Broadcasting House, London. I have seen photographs of him standing modestly to one side, immaculately dressed and wearing his soft felt hat (we called them 'trilbies'), while out with one of those Sunday 'five-metre field day' groups that manhandled portable equipment to a vantage point. By 1946 he had clearly prospered and appears then to have had been blessed with almost unlimited time to pursue his fascination with VHF, this time from a location at Bolt Tail in South Devon - a most superbly equipped station on the coast (see photo) to which he travelled every evening and most afternoons from a residence some 12 miles away.

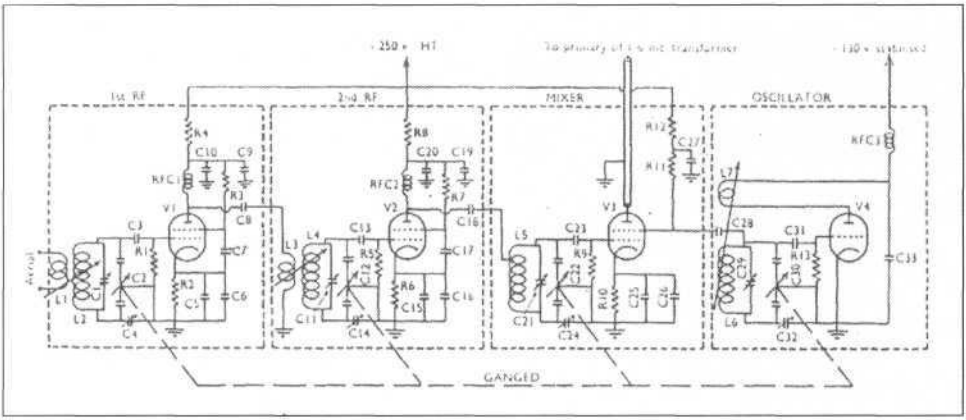


The G5BY station at Bolt Tail, South Devon. To the left are two four-element 58MHz beams. In the centre is a 51 MHz yagi and on the right a 50MHz 'all-metal' array. Beams were frequently home constructed on wooden booms.

In his regular 'Five Metres' column in the magazine Short Wave News for July 1947, the writer 'AJ Devon' (a pen-name for the editor Austin Forsyth, G6FO) described a visit to Bolt Tail saying that/ *"Thesitewasamagnificentonewithclear views in all directions, and 19 acres of headland available for the erection of aerials".* Not only was this site a VHF operator's paradise, the station itself was very spacious - a complete house in fact, fitted out with everything necessary for serious VHF propagation experimentation. The photograph gives an idea of the size of the station and shows various antenna arrays located on the flat roof.

With these facilities, high up on a cliff-top looking southwards over the sea, one can understand how G5BY was to become an international figure among operators using the five and six metre bands. But the location of his station was only one reason for the results he obtained. An accomplished engineer, he designed and built all his own equipment, with everything finished to a very high standard. An example is the 50 - 58 MHz receive converter pictured, which represented state of the art in 1946. In an article describing the converter he commented: *"Full scale drawings were made and re-drawn until I was satisfied withthelayoutachieved.Duringconstruction not a single alteration - either electrical or mechanical — became necessary, so the considerable time spent on the initial design proved to have been really worthwhile".* He was known to work very quickly, so one might guess that he had access to some machine tools. Possibly he sub-contracted some equipment to be built to his specification, but as I will mention again later, on one occasion he stayed up overnight to build a transmitter from scratch to be ready for events planned for the following day.

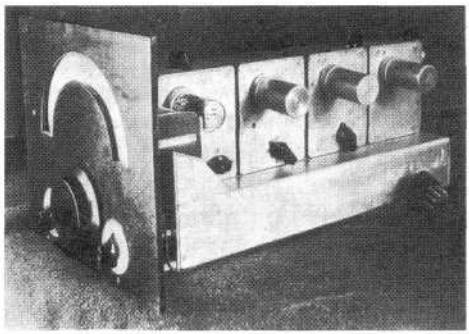
In comparing the circuit of the G5BY converter with that of the simple pre-war two-valve transceiver shown on page 28 in 'Six News' issue 72, one begins to appreciate how equipment for the five and six metre bands had improved in the UK by 1947, no doubt aided by developments in the technology and the availability of valves and components required for war - the latter often finding their way on to the surplus market at very affordable prices. Early super-regenerative receivers were by now giving way to



The circuit of the G5BY receive converter.

front-end VHF converters (one or more RF stages, mixer and tunable local oscillator) typically feeding into an HF-band receiver as the intermediate frequency amplifier. G5BY, though, used a home-brew dedicated 1.6 MHz IF strip, ahead of which he placed a variety of converters covering all the VHF bands in which he was interested (later 70 MHz and 144 MHz later claimed his attention).

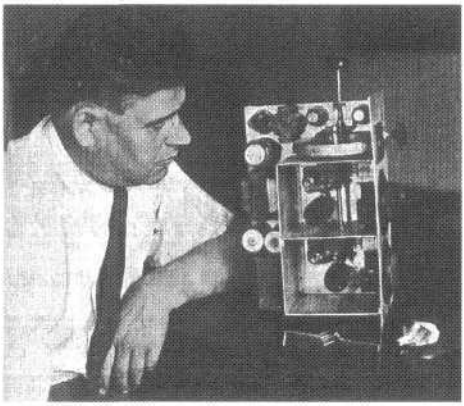
At this time many of us including, according to the records, one 'SWL Listener Bower' (later G3COJ of the UK Six Metre Group) were using surplus RF27 units developed by scientists at the revered Telecommunications Research Establishment, Malvern, for a radio navigation system known as 'Gee'. Produced in large numbers for RAF Bomber Command, and after the war priced at a pound or two (old currency) in the junk shops, these comprised a complete three-valve VHF converter, with RF amplifier, mixer and local oscillator, all stages 'gang' tuned. Being designed for operation in the 65-85 MHz range, only the coils had to be changed for operation on the 58 or 50 MHz bands. But some interesting 'straight' receivers were also being built, a good example being one by Hodinin, OK2MV, who in-



The G5BY high-gain receive converter. Two RF stages, mixer and local oscillator, each stage in a separate die-cast box.

cidentally was the first OK to work England on 58 MHz in June 1947, with G5BY at the other end (who else?). The transmitter used by OK2MV for this CW contact was mite less sophisticated, as the picture shows, but by now crystal- controlled transmitters like that pictured in 'Six News' 71 were more common. Directional high gain arrays (yagis) were replacing wire antennas, and the scene was set for some real DX contacts on frequencies above 50 MHz.

In this part of the spectrum television restrictions still limited UK amateurs to their 58 MHz band, but at least they could listen on the six-metre band for signals from amateurs lucky enough to



A good example of a 58MHz 'straight' receiver by 0K2MV, typically a single RF stage, detector and two-stage audio amplifier. Note the band-setting control on a long spindle emerging from the side of the receiver, with fine tuning knobs on the front panel.

live in countries that had a 50 MHz allocation. Fortunately, in America the television service on a much higher frequency channel continued to expand rapidly, allowing six-metre activity there to increase accordingly to the eventual great benefit to amateurs world-wide. But until the first special permits for 50 MHz operation were issued, UK amateurs could not transmit between 30 and 58 MHz. They knew very well that an MUF high enough for propagation on 58 MHz would occur very infrequently, if at all. Even catching days when the MUF was up was not as easy as it is today; this was long before the inauguration of a service providing daily 'figures', based on the Sun's radio emissions as an indicator of high F2 ionisation.

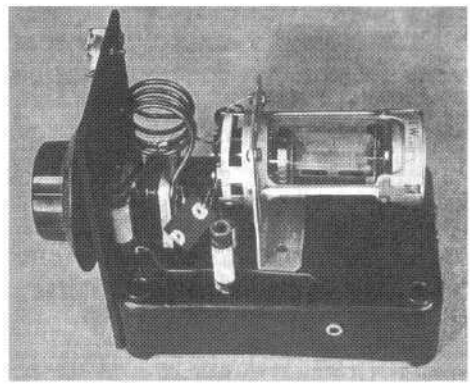
But none of this deterred G5BY, who for hours on end monitored both 50 and 58 MHz relentlessly while keeping a watching brief on 28 MHz for possible cross-band contacts.

Cycle 18

As autumn approached in 1946, solar activity was beginning to rise from a low-point two years earlier. Peaking in 1948, it was not to be an outstanding cycle, certainly not when compared with the more recent Cycle 22 which gifted Britain's newly-licensed six-metre operators with so much DX. But for the first time, amateurs in several parts of the world were ready, in the sense that they now had equipment capable of probing the highest levels of MUF that could reasonably be expected to occur.

The events of November 24th 1946, when G6DH heard W1HDQ on six metres and answered him on ten metres, have received much publicity. I described them in some detail in issue 67 of our journal (November 2000) under the title "A Bit of History", but I now know that G6DH was not the first to hear the USA station.

For some months, G5BY had been following regular listening schedules on 50 MHz while across the pond, Ed Tilton W1HDQ, VHF editor of QST, was running a series of tests involving transmissions on 50 MHz for five minutes in each quarter-hour, meanwhile listening for replies



OK2MV's five-metre CW transmitter, a single self-excited valve oscillator giving 50 watts output. The note was said to be "a little rough", but it was good enough to make the first OK - G contact on 58MHz, with G5BY.

on 28 MHz and 58 MHz. During one of these tests, at 11.16 UTC on the morning of November 24th 1946, W1BEQ in Connecticut telephoned Ed to say that he was in contact on ten metres with G5BY who said he was hearing W1HDQ on Six. A two-way was immediately attempted with G5BY transmitting on 58 MHz, but not surprisingly the MUF was far too low for contact to be made.

Since G5BY was copying Ed's telephony at over S9, it is not clear why he did not immediately go to 28 MHz to make a cross-band contact. But at the same time, G6DH was receiving a carrier but could only positively identify the callsign when Ed resorted to CW. As conditions started to improve, G6DH made his memorable cross-band contact at 11.19, giving a report of S7. G5BY then followed him, and continued to hear the American until 1225 UTC, an opening of 68 minutes. At G6DH however, the signal was lost at noon; an indication, maybe, of the advantage of G5BY's westerly location (remember G5KW's expedition to the Scillies?). Earlier this same day, at 10.17 UTC, G5BY had been listening to what was later identified as auto-transmission from a ship in American waters signing WEDI on 52.9 MHz, the signal reaching well over S9 at times and continuing until 1044. There was naturally a friendly rivalry between G6DH and G5BY, both professional radio engineers, but there is little doubt that G5BY had by far the better station, plus more free time to monitor the frequencies.

Lacking the ability to access the F2 layer, in 1947, progress in the UK on the 58 MHz band was measured either by the distance between stations or by countries worked (mostly via sporadic-E). The country list in 1947 comprised France, Italy, Holland, North Africa, Switzerland, Sweden, Denmark, Belgium, Czechoslovakia, Malta and Gibraltar - that's eleven, not counting UK prefixes. Needless to say, G5BY had at one time or another worked all of them. On six metres however, in those countries having 50 MHz allocations, operators were by now accustomed to working over much greater distances (for instance, within the continental USA and Africa), while the CE1AH - J9AAO contact mentioned in the last issue is an example of the wide-world capability of the 'Magic Band' under the right conditions.

On October 3rd 1947 G5BY completed a cross-band contact with ZS1P in Cape Town, the South African transmitting on 50 MHz and Hilton on 28 MHz, though he also tried on 58 MHz without success. This was the first ever six-metre DX worked from South Africa. By the end of 1947, G5BY had made cross-band contacts with nearly 100 USA/Canadian six metre stations in 13 states and four Canadian provinces. By the end of 1947, armed with his special permit, he was competing with USA stations for WAS having worked 24 states.

Special permits

As a result of pressure being brought to bear following the G6DH/W1HDQ contact a year earlier, limited-period special permits for operation on 50 MHz, were issued to a few selected G stations in 1947, coming into force at midnight on November 4th. Obviously G5BY was one of those who received a permit. Perfectionist that he was, he decided he needed a dedicated transmitter for the band so he stayed up overnight on November 4th/5th to build one, completing it at 4.00 am. The aim was to be ready for any possible band opening to the USA later the same morning. In the event, the first two-way 50 MHz contact between the USA and the UK occurred on

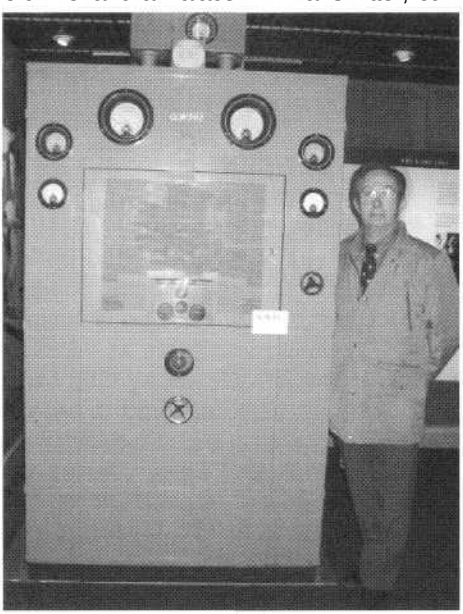
the morning of November 5th 1947, between G6DH and W1HDQ, with several other permit holders following up. Within a few days the excitement was quelled by an ionospheric disturbances which all but wiped out communication until about November 15th, but during November conditions improved sufficiently for several Gs to work Ken Ellis MD5KW, who himself had a field day working into ZS and VQ2PL - the latter hearing a W8 in Cincinnati.

The 'G6DH events' in 1946 and1947 received a lot of publicity. Almost unnoticed in the records, I found a mention of PA0UN who apparently was licensed for six metres and on 28th October 1947 worked four east-coast USA stations and heard a Canadian. So G6DH was not the first European station to bridge the Atlantic on 50 MHz. On November 22nd, F8OL made the first transatlantic six-metre contact from France, and at the time there were nine French and two Algerian stations holding special permits. In the USA interstate contacts alone were clocking up huge distances, but in the UK we were very much down the pecking order and destined to remain there until Cycle 21.

'Big Bottles at Ally Pally'

Peter Jackson, G3KNU

Is this G3KNU with his new amplifier? Well no not really, it's the final stage of the old Alexandra Palace TV Transmitter, currently on display at The National Museum of Photography Film and Television at Bradford. The amplifier was manufactured by Marconi-EMI and commissioned in 1936 when it was employed in the first experimental TV transmissions.



Peter, G3KNU with the (now retired) Alexandra Palace TV transmitter. Are you sure it isn't your home station, Peter?

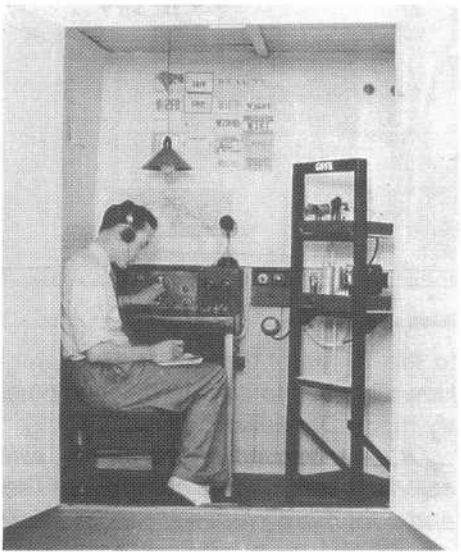
The master oscillator employed a pentode valve, the frequency of which is maintained constant to a degree of accuracy of the order of one part in 20,000. This was accomplished by use of a version of the Franklin temperature compensated coil, in which expansion or the contraction of the inductances mechanically varies tuning capacitors in such a way as to keep the carrier frequency constant. The output frequency of this unit is 22.5MHz ('Mc/s' in those days, of course) and this is followed by a single frequency doubling stage thus producing the desired carrier frequency of 45MHz. Three more amplifying stages are used before the final one, which uses a pair of water-cooled CAT9 valves operating in push-pull. With 6kV on the anodes it produced 17kW peak output, the output varying depending on the picture content - white

50 Years of 50 MHz

Ken Willis, G8VR

Early days

In 1939, my shack (pictured in the photograph) comprised a large cupboard that opened off my attic bedroom. A glass tube in a hole through the outside brick wall insulated my 100- foot long-wire antenna that was attached to a neighbour's tree. As was the norm in those days, all the equipment was home-built. The shelves on my rack may appear to be somewhat empty, but no self-respecting amateur of that period wanted to admit that he lacked a standard 19-inch rack and even a wooden one would suffice if funds so demanded. The cheapest commercial amateur band receiver of the day was the Hallicrafters Sky Buddy, a very basic superhet that in the UK cost around eight (old) pounds sterling, the monthly take-home pay of a bus driver at the time. I drooled over one owned by a school friend, bought for him by his father who was a bank manager. For the past 30-odd years I have been searching for another for myself. My own receiver was a home-brew 3-valve TRF with plug-in coils covering all bands from 5 to 160 metres. At least it was one up on the Sky Buddy, which didn't tune above 30 MHz.



G8VR on the air, 1939

In late August 1939 you could sense the enormous tension throughout the country, as war with Germany was now seen to be inevitable. I can recall the sunny morning of August 31st at 07.20 BST when with my 25 watt two-valve transmitter I had a CW contact with ZL2CI, followed by one with TF5M, both on 14 MHz. I went on the air again later that day, at 21.45 BST, and worked G5YU, a local station. Here, from my log, is what he sent to me:

"Say, OM. I have just heard that all G permits have been cancelled tonight. It was given out on the 9 pm news. Have you heard anything?"

This was a blow, and morale sank to a low ebb a few days later when men in less-than-white coats came to collect all my equipment, which was taken away to be stored for the duration. In her next regular 56 Mc/s column in the old T & R Bulletin (now Radcom), Constance Hall, G8LY composed a ditty to the tune of "pack up your troubles" which ran:

Hang up your headphones on the old shack wall

And cuss, cuss, cuss,

Hang up your headphones on the old shack wall

But do not make a fuss.

What's the use of listening,

It hardly is worth while, so-

Hang up your headphones on the old shack wall

But smile, smile, smile.

The years pass, and it is now January 1946. War indeed came and finally ended, and much water flowed under my personal bridge during the six years it lasted. My equipment was returned, looking, after all those years, strangely like stuff I throw on the local rubbish tip these days.

Then came a cheering letter from the Engineer-in-Chiefs Office, Radio Branch, GPO, London. Its essential paragraphs were:

Dear Sir,

Referring to your application for the issue of an amateur wireless transmitting licence you may be interested to learn that the military authorities have recently agreed to the use of frequencies in the band 28-29 Mc/sec and 58.5-60.0 Mc/sec. The power that may be used is limited to 25 watts in the band 58.5-60 Mc/sec but a power of 100 watts will be permitted in the band 28-29 Mc/sec.

If you wish to avail yourself of the limited frequencies now available, arrangements will be made, on payment of the appropriate charge, for the issue to you of a licence to establish an amateur wireless station.

I like the "Mc/sec" terminology! The charge mentioned was based on a formula related to power levels plus an annual amount. It worked out at one pound ten shillings a year for ten watts, two pounds ten shillings for 25 watts, and three pounds for over 25 watts - the price of a Sky Buddy every 30 months! But I dug deeply into my finances and signed up for the 100-watt ticket because I wanted the ten metre band.

At the time my only equipment for frequencies above 30 MHz was my trusty TRF receiver. But Cycle 18 was about due to peak, and now I had my ticket to 'Magic Band' territory back after the long shutdown.

Equipment

Radio engineering progressed at a very fast rate during the long war, and those of us who were involved in it became associated with a whole range of equipment and techniques far superior to anything we had ever experienced as amateurs.

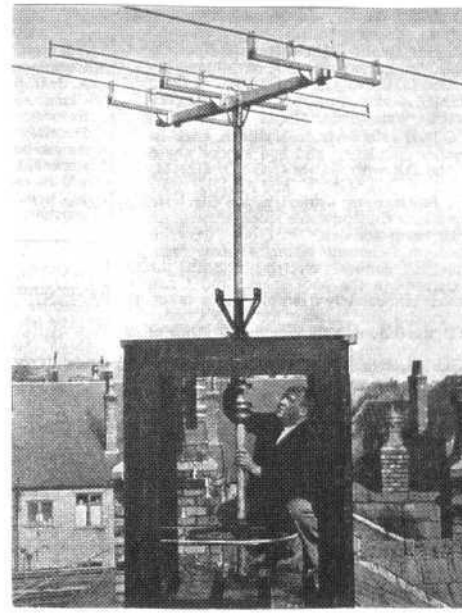
Quite soon I was able to get my hands on a Hallicrafters S27 VHF general coverage receiver. By today's standards it was probably quite deaf, but to handle a receiver which so easily tuned the 50 MHz band as well as airborne VHF communications, and could reliably be set on a given frequency, was a revelation for me after suffering the squeaks which emerged from my three-valve TRF.

I 'listened to' the Battle of Britain on one of these receivers, and soon came to appreciate some of the differences which had existed between five and six metre operation in the UK and the USA. With receivers like the S27 readily available (at least up to the outbreak of war) American amateurs could more rapidly make the leap from early super-regen receivers and self-excited oscillators to more stable rigs similar to those being used on lower frequency bands.

In 1947 the only British receiver with wide VHF coverage was the Eddystone

770R, which had been much used by the military for intercept work. Although superbly built (over-engineered might be a better term), this receiver was never popular as a piece of amateur station equipment. It was not very sensitive and somehow lacked the 'feel' of the much simpler and cheaper Hallicrafters, but above all it was very much in the 'boat-anchor' class as regards weight and portability - a real 'hernia box'.

I had one for a time and needed assistance to lift it on to the bench. Getting one upstairs was a nightmare. In the years immediately following the war UK amateurs using the five metre band quickly caught up as they built receive converters and crystal controlled transmitters to replace their more primitive pre-war equipment.



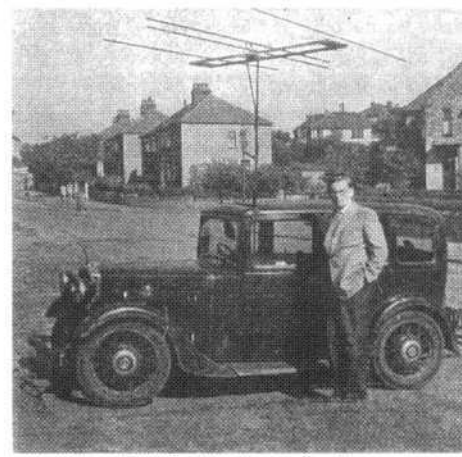
G2IN's novel antenna mounting, rotated by an arrangement of a rope and a bicycle wheel. Owner in residence.

Antennas

By 1947, except for FM, horizontal polarisation had become the accepted standard for six metres. This probably arose from the increased use of yagi antennas, which don't lend themselves to being mounted vertically at the top of the metal masts that were now commonplace in the USA. In the UK, various antenna-mounting methods were being used. One by G2IN, which might be guaranteed to interest the neighbours, is shown here with its owner apparently in residence.

Horizontal antennas have always posed a problem for mobile operators. For the old five metre band, a quarter-wave whip had almost always been used because it was convenient and unobtrusive. But it is by no means an efficient antenna for mobile use at these frequencies. Apart from the effects of cross-polarisation loss when working a base station, ignition noise in a car tends to be vertically polarised.

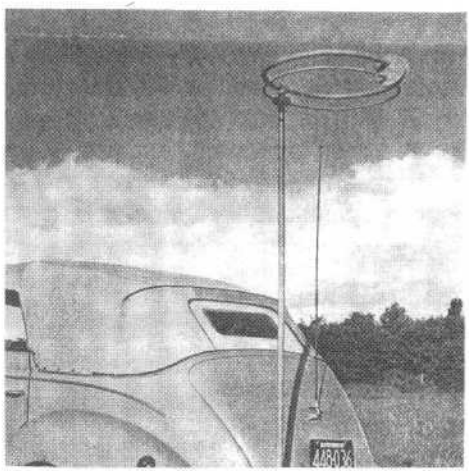
One British amateur addressed the problem by mounting a full-sized three-element yagi on his car (see picture) and it was stated as being a fully mobile in-



The Yagimobile.

stallation. It would have been a bit large for my 1929 Austin Seven, however!

Frank Stites, W1MUX took another approach. He set out to develop a compact horizontally-polarised mobile antenna with a circular radiation pattern. He decided it must tune broadly, be easy to feed and work well when close to the metal body of a vehicle. He soon concluded that only something with a doughnut configuration would suffice. The outcome of much experiment was the Halo, of which Frank was the inventor, and the first ever model is pictured mounted on his car.



The first Halo antenna, invented by Frank Stites, W1MUX.

So the first halo was built for 50 MHz. When he first took it on the road he had to suffer comments such as: "Is it a shower bath?" or: "That's a funny place for a basket ball hoop!" Since Frank developed the halo while on the staff of the Naval Research Laboratory in Washington DC, the patents were assigned to that agency. I have known Frank for some years and have visited his home in Vermont and seen not only his 50 MHz station but an aeroplane which he built and flew himself.

Down Under

I haven't previously mentioned five and six metre activity from 'down under', but there are and always have been VKs just as fascinated by the 'Magic Band' as we are in the UK.

During 1947 there were some outstanding 50 MHz sporadic-E contacts across the continent at distances up to 1000 miles, producing a number of inter-state 'first' claims. These occurred during December and the following month - these of course being summer months in VK-land. It is recorded that, as with some previous openings, the period was marked by violent thunderstorms.

Years later, at the peak of Cycle 21 there were some very big 50 MHz F2 signals from VK6 as well as openings between Europe and the VK 3, 4, 5 and 8 call areas. At the time I noticed that signals from VK6 stations on the NW tip of the Australian continent were much more consistent than those from the Perth area, much further south. There were occasions when Steve, VK6PA was a lone VK calling CQ at S7-8 for an hour or more with virtually no takers, having worked everyone in earshot on the band at the time.

I suspect that experienced six metre operator Graham, VK6RO also knew that this area would be a good spot for 50 MHz DX. I recently unearthed a report of his activities in September 1981, when he drove the 1200 miles from his QTH near Perth to the NW tip of Australia with the intention of stirring up some 50 MHz JA activity by operating from his car with a quarter wave whip antenna.

At the time the VK band was 52-54 MHz. From several different sites during a 12-day expedition, he worked a total of 434 JAs: 233 of them on SSB, 47 on CW, 89 on AM and 65 on FM, some while using just one watt. He found that while the MUF would stay below 43-45 MHz during the day it would rise rapidly at sunset and every night a very strong FM broadcast station appeared on 56.6 MHz, apparently from China.

At the time VK6RO commented "You may have heard a JA pile-up on SSB *(not yet at G8VR, Graham!),* but you haven't heard anything until you hear one on AM".

From October 1979 to September 1981, VK6RO had no fewer than 754 mobile contacts with JA on 52 MHz, worked KG6DX and HL2JD and heard H44, P29 and ZS2. Goodness knows what he would have worked if he'd had one of Frank's halos.

Think of writing out all those QSLs!

Proof positive

Here's a snippet from correspondence between two of the old-time 'Six Metre Greats'.

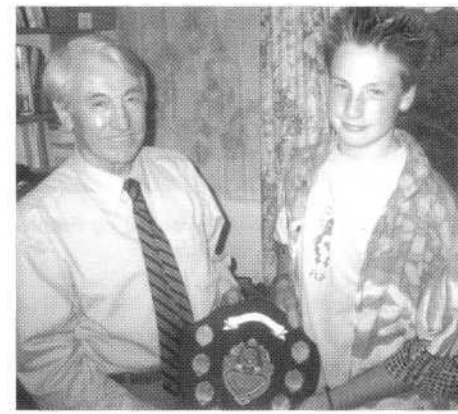
Ed Tilton W1HDQ, whose "The World Above 50 MHz" columns graced the QST journal for many years, was of course the USA station involved in the first 50 MHz transatlantic contacts (see Six News Issues 67 and 74).

I have a letter that Ed Tilton W1HDQ wrote to Ken Ellis G5KW in January 1989, shortly after he had retired from his Connecticut home to one in Florida. He suggests that Ken should "Look for Arnie Bles, VK2AVA. He is former PA0UM who, with his friend PA0UN, made the first two-way six metre QSOs with me in 1947. I helped him get special limited authorisation for two-way 50 MHz work back then".

So now we have further confirmation from the great man himself. While the W1 HDQ - G6DH QSO was the first USA-UK 50 MHz contact, the first transatlantic contact of all time on Six was between PA0UN and W1HDQ on October 28th 1947. G6DH didn't make it until November 5th, and G5BY missed it by just a whisker.

Finale

Performance and manufacturing details for the W1MUX halo for six metres are fully covered in an article in QST for October 1947, and I would gladly send photocopies to anyone needing them if requested via e-mail at *G8vr@aol.com* or QTHR. The halo apparently out-performs a whip antenna by a considerable margin, and with F2 on the decline, mobile operation might blossom. It's a heavy antenna though!



As readers will know, G8VR was awarded the 2002 G5KW memorial trophy for his contributions to Six News. Ken wasn't able to attend this year's AGM so the award was accepted on his behalf by James, 2E1JIM. Recently Ken visited the G4IFX/ 2E1JIM QTH and James presented the award in person.

The Next... 50 Years of 50 MHz

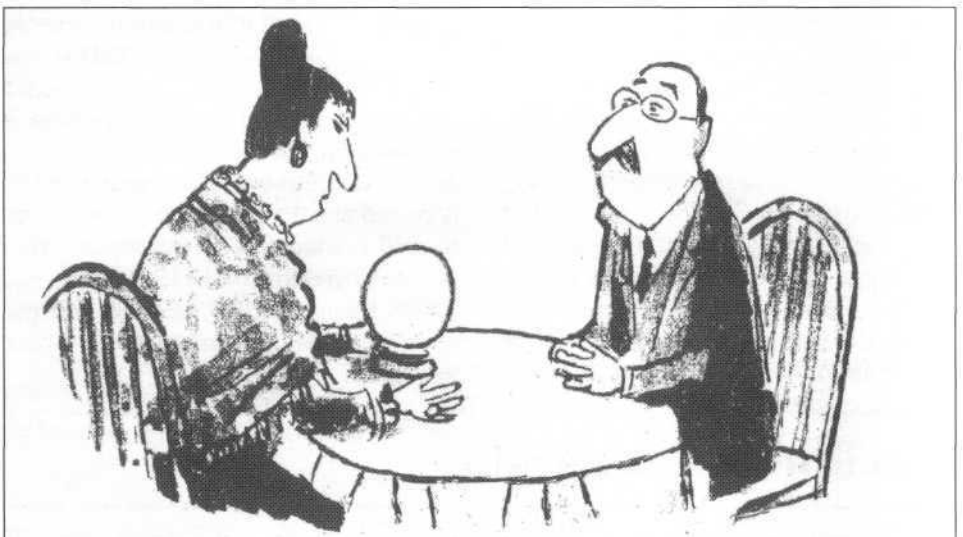
Ken Willis, G8VR

A peep into the crystal ball

For the last in this series of articles, I thought it might be interesting to ponder the future of the 'Magic Band' as the current solar cycle comes to its end and another is born. I have always liked this cartoon by *Ste/g,* which I first saw some thirty-odd years ago in an American magazine. In the original version the lady gazing into the ball is telling her worried-looking client: *"In about a year you will be replaced by an electronic device".*

The caption I have chosen may strike a chord. I purposely selected the VK5 prefix because it was one I missed in similar circumstances. One day during Cycle 22 I was persuaded by the lady of the house at G8VR to take a coach trip (for our American friends, that's a bus) which meant leaving home around 9.30am. Before leaving for the trip I made one last check on the band, and there in the clear on 50.112 was a 559 signal from VK5BC calling CQ. I gave him a short call, but on going over found the frequency deluged with signals from DL, PA and ON, all calling him. Reluctantly it was time to set out and so I had to switch off.

Need I say, the coach trip was a disaster. The driver played excruciating homemade cassette tapes all day long, though not quite loud enough to drown the shouts of kids running up and down the coach. We got home at 10.30pm



"Conditions will be very poor, except on Thursday, when the band will open to VK5 shortly after you have left for work" (with apologies to Steig)

and, as expected, a final check of the band yielded only white noise. Since then I have never heard another VK5. If only there was a crystal ball that could predict when the MUF would reach 50MHz!

Anyone close to my age may already have experienced his last solar-cycle peak since it takes nine or ten years for a new one to build, but with reasonable luck operators like 2E1JIM could be around for five or even six more cycles. Will there still be a 'Magic Band' in the year 2050, and if so what sort of equipment might Jim be using?

One thing I think we can safely predict: changes in the solar system tend to take rather longer than Man's 'three score years and ten' so I have little doubt that the ionosphere will prove to be just as fickle in fifty or even a few thousand years hence. It will continue to behave just as it probably did before *Homo Sapiens* first walked on our planet in blissful ignorance of what was going on 'up there'.

This being the case, no matter what advances may be made in equipment and associated software, the business of communicating *directly* on 50 MHz with a station below one's horizon will always be subject to the same limitations which determine DX conditions today. It would be great if I could be proved wrong!

The next cycle

Of more immediate concern are the coming quiet years before the next solar maximum. The period between the end of Cycle 22 and the onset of the peak of Cycle 23 saw big changes in the UK as the maximum permissible power was raised to 400 watts. Much larger antenna systems also started to appear, resulting in the emergence of British six-metre stations comparable with those anywhere else in the world. Earlier, in the UK a five-element yagi had been a popular (and big?) antenna during Cycle 22, but by the time the flux started to rise in Cycle 23, one or even two seven-element arrays on tall lattice towers were becoming quite commonplace.

Perhaps right now, on the bench, you have one of those big, expensive linear amplifiers and outside, enough aluminium up in the air to bring sleepless nights when the wind reaches gale force. And all this to operate on a single band, which however 'magic' is almost certainly going to be very much quieter for the next seven or eight years, maybe for even longer if the next cycle proves to be a 'dud', like Cycle 16 back in the 1920's when the sunspot number never went above 80!

Hopefully things will be much better than in the 'old days' when so few countries issued 50 MHz permits that unending white noise was all one heard on the band. There will always be that hardcore of specialists who relentlessly monitor the six-metre band to catch any signal that pops up against all the odds, but for the average operator do the potential returns over the next decade justify the investment already made in time and money?

Heresies

When I have my lunchtime skeds with Bob, W1XP on 14 or 28 MHz, we talk about my bad back, the work he is doing on his house, the weather, or the Boston Redsox. In other words, we have *conversations.* When the band is open,

conversations are very rare on the six-metre band.

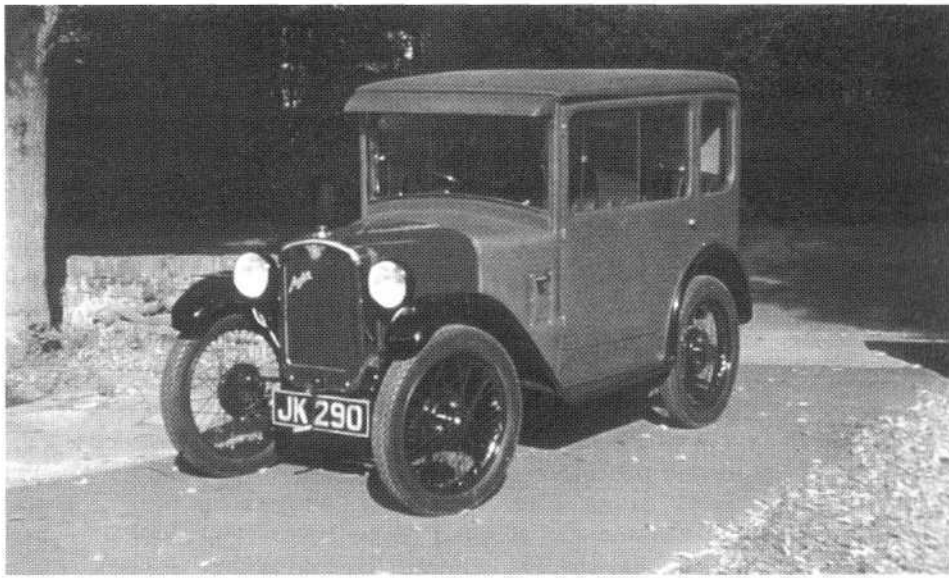
I feel that since permits for Six became more widely-available worldwide, the band has degenerated to the point where nowadays its main function is the collection of new prefixes, just as some folk collect foreign stamps. Listening on the band when any DX signal has appeared one is confronted by a wall of sound: dozens, even hundreds, all calling the same station simultaneously, with an occasional operator bordering on hysteria in attempting to break out of pile and get his call heard. I even suffered verbal abuse on an occasion when I was daft enough to 'waste time' by proffering any information other than my call, square and a report.

This situation encourages the use of more and more power and bigger and bigger antennas on the assumption that the greater your ERP the better your chance of being heard above the masses, and unfortunately it does seem to work. This is a reason why, for the past few years, I have preferred to listen on the band rather than entering a shouting match which, considering my modest station, would be akin to pitting my 1929 Austin Seven against Michael Schumacher's Ferrari.

But of course from time to time I join the pack hunting the DX. I recall one occasion, when coming down to breakfast one day I found Madame, newspaper propped up on the teapot, consuming toast and marmalade. I proudly announced that I had just spoken on Six to someone in the Phillipines. Always the pragmatic one, she asked:

"W*hat did you talk about?"*

Pause for thought. Well, not much. Actually, I had happened upon a pile-up, so joined in simply calling *"Victor Radio, Victor Radio",* and was surprised to get the reply " *The Victor Radio, station you're five seven* ". I quickly re-



Yes, G8VR really does drive a 1929 Austin Seven!

sponded with *"You are five and seven, five and seven in Juliet Oscar Zero One, please confirm your call sign"* (that last bit being necessary because so far I hadn't a clue who I was talking to!). He said he was KE0SC/DU, confirmed my call, gave his own and started another QRZ. Wow! Just a mere 30 seconds and I could now 'tick the box' giving me the prefix DU towards my DXCC, the new square of PK04. I had *"talked"to* someone in the Phillipines on six metres!

If I asked whether or not you feel this to be a harsh assessment of the 50MHz band and its *aficianados* it would be an entirely subjective question, for as they say, one man's meat is another's poison. Amateur radio comes in various shapes and sizes and is meant to be fun. Perhaps when we get quieter conditions the sense of urgency will diminish and lead to longer contacts during which people actually talk to each other.

HF or VHF?

Depending on ionospheric conditions, Six can perform like an HF or a VHF band, or both, so there is always a chance of hearing something other than the nearest beacon. However there's no escaping the fact that if the MUF is low, 'bending' a 50 MHz signal around the curvature of the Earth will need assistance from some mechanism other than the ionosphere.

Are there any options? On the VHF bands they use transponders on orbiting satellites, but 50 MHz does not figure in satellite band-plans and I very much doubt that many dedicated six metre operators would regard satellite communication as an acceptable substitute for making a direct contact, even were it an available option.

So what sort of DX might we work during the quiet sun period with Six in its VHF role? Here are some ballpark figures based on 144MHz. For an average station under totally flat conditions, 50MHz contacts should be possible over a 100-mile path, but when the weather map is right for tropospheric enhancement, this range can increase three or four times, say to 300-400 miles.

The band also supports sporadic-E propagation, which extends coverage to 1200 miles or so and in excess of 2500 miles when multi-hop effects are present. However this mode tends only to make an appearance during a couple of summer months, plus an occasional winter event. Auroral conditions, which are not very frequent and last only for a few hours, are more prevalent in northern latitudes. Their arrival can sometimes be anticipated by watching the 'figures' for signs of a major solar disturbance. Auroras offer the prospect of contacts over 1000 miles (especially when associated with E-layer propagation, auroral-E), but this mode is perhaps more suited to cw contacts in view of the distortion of voice signals associated with it.

Band openings in all these modes are mostly unpredictable, short-lived and tend to come at inconvenient hours, which poses problems for the six metre operator who works for a living and is away from the rig during the day. A bonus for small stations, however, is that a high ERP is not a requisite to get results from these modes.

The UK is badly placed in one respect, since to the west is a very large expanse of ocean with, of course, no amateur radio population for 2000 or more miles. However, for anyone want-

ing to increase his country-count, think how much better off we are than our friends in the USA. I once gave a talk to a group of American amateurs on the subject of two-metre activity in the UK. I was able to show them QSL cards from 50 different countries worked on the band and pointed out that all of these prefixes had been accessible from my location on 144 MHz and were within a range roughly equal to the distance between Boston, Mass, and Houston, Texas.

As I reported at the time, the groans of despair from seasoned American VHF-ers who had never heard a station outside North America on 144 MHz reached S7! So let's count our blessings in the knowledge that even in its VHF mode, Six can still provide lots of contacts with different countries.

Software-assisted modes

The ability to interface a home computer with amateur radio equipment has opened up many possibilities. One example is the introduction of the incredible WSJT/JT44 software by Joe Taylor, K1JT, which has changed the face of weak-signal detection and is immediately applicable to meteor scatter and Earth-Moon-Earth (EME) communication. A dedicated article would be required to describe this software adequately. Suffice to say that WSJT greatly simplifies meteor scatter operation, a mode for which 50 MHz is eminently suited, while JT44 opens up the possibility for relatively small stations to make EME contacts on the band.

I would be very surprised if, within in a couple of years, contacts using WSJT and JT44 and derivatives of this software were not commonplace on all the VHF bands. Two articles on the use of this software have already appeared in 'Six News', one by John Walker WZ8D in Issue 71 and the other by Ian Williams, M0BCG in Issue 74. And if you haven't already done so, download the superb 52-page WSJT colour manual from the Internet for a fascinating read.

There is so much experimental work that can be done even in the trough of a solar cycle. As another example, try the FFTDSP (Fast Fourier Transform Digital Signal Processing) software by Mike Cook, AF9Y, which displays linear traces from very weak signals. Don't be put off by the imposing title of that software; it's simplicity itself to use and fun to identify traces from beacons etc. that are below noise level.

You certainly don't need to be an electronic genius to dabble successfully in any of the new software developments. They present fewer problems than some of those new-fangled video recorders which only one's grand-children seem to be able to use.

Talk to you off the Moon in 2003?

Footnote

Version 3.0 WSJT software (manual) can be downloaded as freeware from *www.vhfdx.de/wsjt.* Omitting the /wsjt in the address will give access to DK5YA's most informative VHF site which contains useful 50 MHz information. .

Mike Cook's web-site is *www.AF9Y.com.* Click on to FFTDSP Software. There is probably a small charge to register this program in your name, after which you have full access to the program. However the initial download will provide a working demonstration.

Drop me a line on e-mail, *G8vr@aol.com* if I can be of any further help.