GLOUCESTER AMATEUR RADIO & ELECTRONICS SOCIETY

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RAGCHEW

MARCH 2020

FROM THE EDITOR

Many thanks to those members who responded to the request for "Ragchew" articles - but I can always do with more!

Richard M0HNK has been designing and building a **VLF (Very Low Frequency) receiver up-converter** suitable for receiving Radio Grimeton on 17.2 kHz, the electromechanical radio station located in Sweden which dates back to the 1920s and part one of his two-part article features in this issue.

Tony G4HBV continues his **RF Notes Column** and in the next few issues will be describing how a typical HF antenna system works.

Malcolm G6UGW starts his new series reviewing the Radio Spectrum from 300Hz - 300GHz and in his first article he describes the Ultra Low Frequency Band 300Hz - 3kHz.

I came across the recently published book **"Maths on the Back of an Envelope : Clever Ways to (Roughly) Calculate Anything" by Rob Eastaway** and it immediately took me back to my schooldays. My review explains all!

Our club nets often raise topics which call for further investigation. In a recent Club on the Air the subject of using mechanical switches at RF was raised and in **Net Topics** I explore the subject in a little more detail. Having drafted the article in early February, I subsequently received my electronic copy of the **March "QST" magazine** and by coincidence there is an article covering the same subject!

I've recently acquired a quantity of RSGB Bulletins and Practical Wireless magazines from the late 1940s to the early 1950s. The first on the pile was **May 1948 RSGB Bulletin** containing a list of NFD entrants for the following month - the page is reproduced in **From the Archives.** Look out for **G3MA/P** and **G2RT/P. Cyril G2RT** was a GARS member for many years before emigrating to Australia in the 1980s. The same magazine featured an article entitled "**A Modified Micromatch"** by **Mick Cragg G2HDU -** also a GARS member many years ago.

73 Brian G4CIB (g4cib@outlook.com)

May 2020 "Ragchew"

Easter will have come and gone by the next issue so if you manage to do some /P operating over the holiday period, do share your experiences with other "Ragchew" readers by way of an article.

COPY PLEASE BY SATURDAY APRIL 19th

Flying Visit to Lundy

Literally a flying visit - Leta and I will be on the helicopter over to Lundy on Monday 9th March and returning on Friday 13th March. I plan to be active on the 432MHz UKAC on 10th March and 50MHz UKAC on 12th March - weather permitting!

More information on the **GARES Members Group Facebook page.**

Contest Roundup by Brian G4CIB

The club finished in **24th place** in the **2019 UKAC Local Clubs table** out of a total entry of **36,** a drop of 2 places compared to 2018. The results of the first UKAC contests of 2020 have been trickling in, and at the time of going to press, the club is in 20th position in the Local Clubs table out of a total entry of 34. Interestingly, the band contributing most to our score is 432MHz, followed by 50MHz, 144MHz and lastly 70MHz

As usual I will make the plea for more entrants. Even if you can only operate for a short time, your score will add to the club total.

Many thanks to the following club members who have supported the UKAC contests so far this year:-

Les G0ULH, Dave G4BCA, Brian G4CIB, Barry M0HFY, Gary M0XAC, and a warm welcome to new participant M0XGL Graham.

Both **Dave G4BCA** and myself have been having a go in the **144MHz and 432MHz FMAC** contests. These are short (approximately 1 hour) contests that precede their UKAC counterparts. If you feel you are not up to speed to take part in the UKAC events then give the FMAC ones a try. At the time of going to press, we are in **11th place out of 19 entries** in the **144MHz FMAC Local Clubs Table** and **9th out of 9 entries** (i.e. last!!) in the **432MHz FMAC Local Clubs Table.**

Martin G4ENZ entered the **ARRL DX CW contest** in the **QRP Section** and in a one hour session on 80 metres on the Saturday morning (it's a 48 hour contest) with 5 watts worked 38 USA stations in 19 states. For a bit of fun I entered using my Icom IC703 running 10 watts and in a couple of sessions totalling 5 hours, I worked at a leisurely pace some 58 USA stations in 21 states on 80m (10), 40m (42) and 20m (6).

Do any club members take part in the **UKEICC series of contests?** If you do, how about a short article to let other club members how you are getting on?

Radio Grimeton and building a VLF upconverter

INTRODUCTION

In early December 2018, I decided I'd like to listen to the Christmas Eve transmission from radio station Grimeton[1] (call sign SAQ), an electromechanical radio station in southern Sweden dating back to the early 1920s and now a World Heritage Site. The station transmits at 17.2 kHz (VLF) on Christmas Eve and also on 'Alexanderson Day' at the end of June or beginning of July as well as on occasional special events.

I don't have any receivers which can directly receive frequencies below 100 kHz so I quickly made myself a simple upconverter using an SA602 mixer and a 4 MHz crystal oscillator. This has the effect of mixing a very low frequency signal (in this case 17.2 kHz) up to a higher frequency signal (in this case 4.0172 MHz) which I am able to receive on one of my HF rigs. The antenna was a wire of around 10 metres strung across the garden. I managed to copy the transmission on Christmas Eve 2018, but the mixer suffers from poor dynamic range and reception was difficult on account of the badly overloaded upconverter. My QTH is around 30 miles from the 500 kW BBC longwave transmitter at Droitwich and BBC Radio 4 insisted on bursting in! I then purchased an upconverter kit, but this was also a disappointment. I tried again last Christmas but failed to copy the 2019 Christmas Eve transmission entirely, despite trying with both my homebrewed SA602 and kit upconverters. I therefore decided to design my own, specifically to allow me to hear Grimeton but also to investigate the world of radio at VLF.

The design criteria of my upconverter were:

1. Sufficiently 'robust' design (in rf terms) to avoid or minimise problems with overloading.
2. Two inputs – one high impedance suitable for a wire antenna and another at 50 Ohms, principally to allow use of a separate tuned ferrite rod or air-core antenna with its own preamplifier and 50 Ohm output.
3. Noise figure low enough to ensure that signal detection is limited by band noise rather than internally generated noise.
4. Minimisation of the amount of breakthrough from the upconverter oscillator through the mixer and into the front end of the hf rig being 'fed' by the upconverter. This is not something that often seems to have been tackled in upconverter design, but if no effort is made to reduce the level of oscillator breakthrough (e.g. at 4 MHz), the signal from the oscillator is likely to be very much more powerful (perhaps by 40-50 dB) than the signals being listened for and these signals may only be a few kHz away from the oscillator frequency. Not all receivers appreciate this kind of treatment.....

THE BASIC DESIGN I ADOPTED

There are two inputs to the mixer (high impedance and 50 Ohms) which are switchable by means of a relay. The high impedance input consists of a push-pull amplifier followed by a low pass filter and a 4 dB 50 Ohm attenuator pad on the input side of the mixer. Although the attenuator pad adds directly to the noise figure of the upconverter, initial investigations suggested that the level of band noise was sufficiently high that the upconverter noise figure was likely to be irrelevant unless

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[1] Grimeton website - https://alexander.n.se/?lang=en

extreme liberties were taken. And the attenuator has the advantage of providing a reasonable termination for both the filter and the mixer. The mixer used was an SBL-1 balanced diode mixer (because I had a spare), and the IF and RF ports were transposed for present purposes because the SBL-1 has a minimum RF frequency of 1 MHz whilst the IF port goes down to DC. The 50 Ohm input is simply a direct connection to the 4dB pad on the mixer input.

From the mixer, the IF goes to a MMIC amplifier stage (a diplexer was investigated to provide a 50 Ohm termination to the IF port of the mixer but the idea was abandoned – see following text) and thence to a band-pass filter and a notch filter to minimise oscillator breakthrough. The 50 ohm output for the HF receiver follows the notch filter. The oscillator is a temperature controlled crystal oscillator obtained secondhand. It was chosen on account of having a frequency with a nice round number (10 MHz) which makes it easy to find the wanted signal on the HF receiver's display (17.2 kHz is found at 10.0172 MHz, for example, so one only has to look at the last few digits to find it) and also because it is a low phase noise model. A simplified block diagram of the upconverter is shown at Figure 1 and a photo of the finished device at Figure 2.

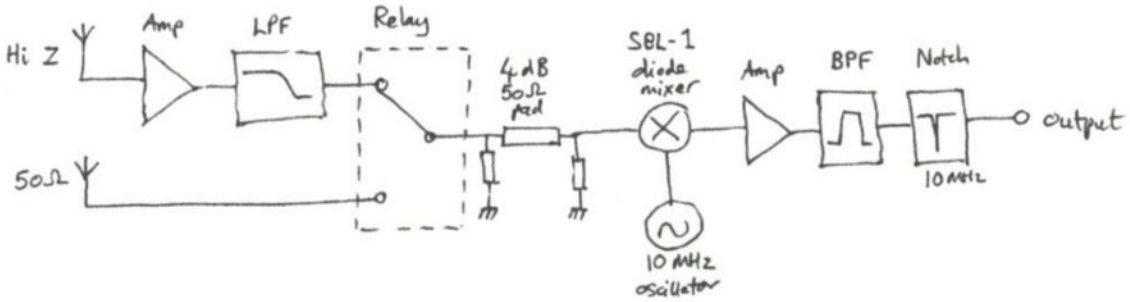

Figure 1: Basic block diagram of design. Note that there are additional attenuator pads associated with the post mixer amplifier, band-pass and notch filters which are not shown here and also transformers either side of the notch filter. Additionally, the switch between 50 Ohm and high impedance antennas also disconnects the power to the amplifier preceding the low pass filter when the 50 Ohm antenna is being used (not shown here), thus saving power. See descriptions of individual sections of circuit for details of these. The power supply comes via a 12V low dropout regulator, again not shown here.

Figure 2: Upconverter.

The main parts of the upconverter are labelled at Figure 3. I built the various sections on separate strips of copper-clad board and then mounted them vertically on a separate board that serves as a base. This was partly to provide some additional shielding and partly to allow testing of the sections before they were connected.

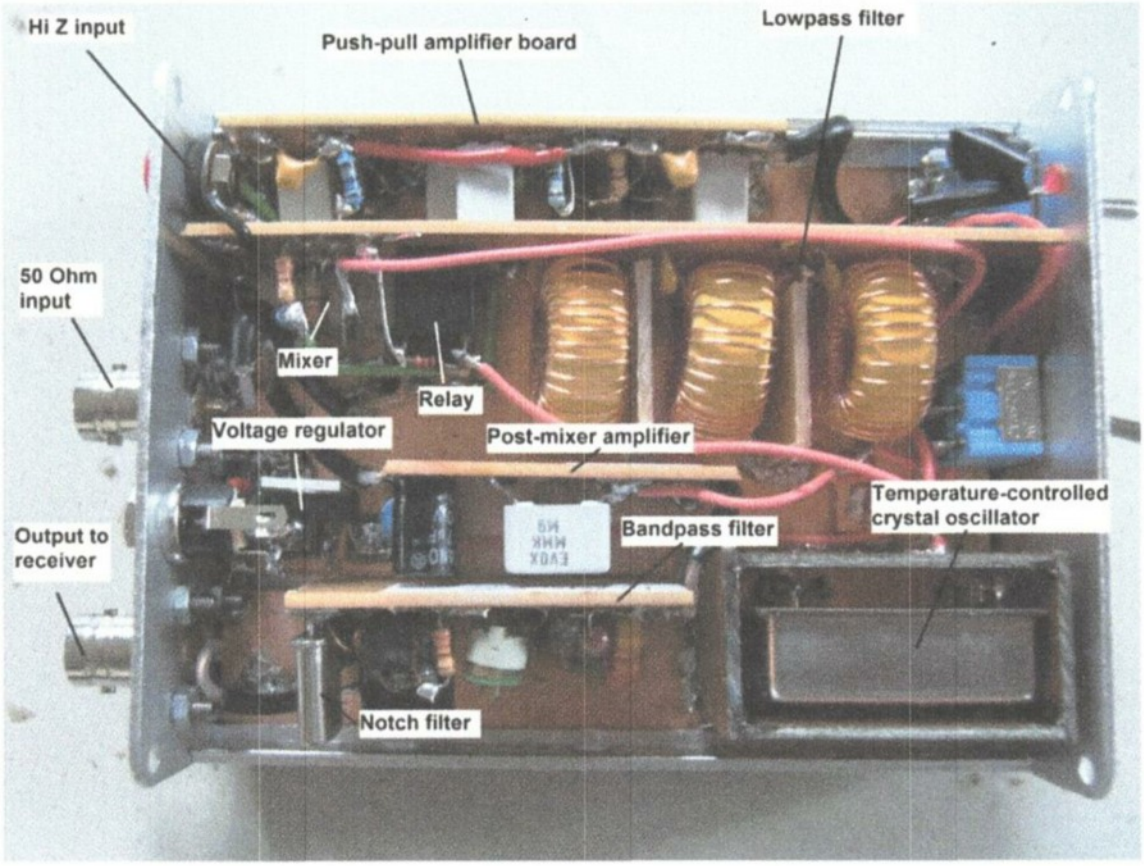

Figure 3: Upconverter with the main parts labelled. Note that the temperature-controlled oscillator is in a shielded box which doesn't yet have its 'tin hat' soldered onto it.

Some more details of the various sections of the upconverter are given below.

FURTHER DETAILS

Push-pull amplifier

The design of this was taken from a publication by Chris Trask (ref 1). It provides a high impedance input and a low impedance output. There is no voltage gain. The amplifier was chosen for its high dynamic range, necessary here to minimise overload since there is no filtering prior to this stage. The schematic is shown at Figure 4. The relay which switches between antennas is controlled by a DPDT switch and this switch also disconnects the 12V supply to the amplifier when the 50 Ohm antenna is being used, thus saving some 50 mA of otherwise unnecessary current drain.

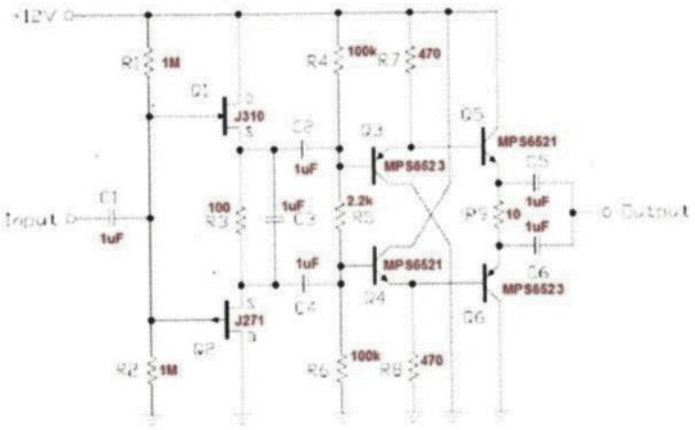

Figure 4: Amplifier with high impedance input and low impedance output.

Low pass filter

This was designed using the AADE filter program[2]. A Chebychev design was adopted with 1dB passband ripple and cut-off a little higher than 100 kHz. 50 Ohm terminations were specified to provide a reasonable match to the output of the preceding amplifier and the diode mixer (with 4 dB attenuator) on the output side. It was modified slightly from the initial design to accommodate preferred value capacitors. The filter design is shown at Figure 5 and the predicted response at Figure 6.

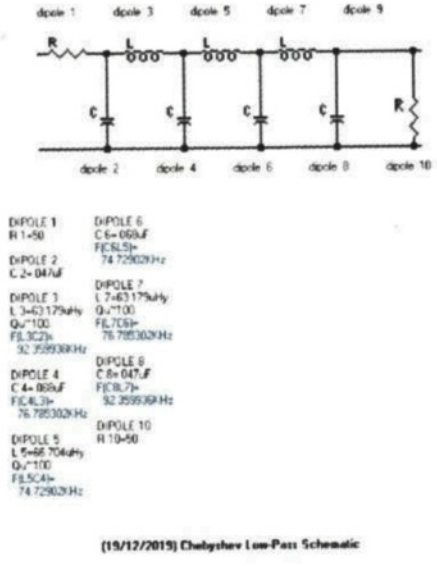

Figure 5: Low pass filter as built, using preferred value capacitors.

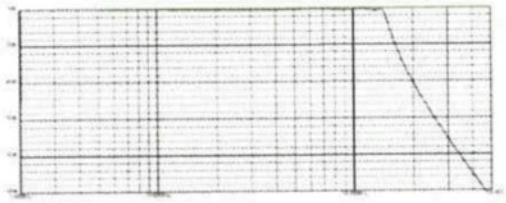

Figure 6: Predicted filter response

[2] An excellent (and free!) program to assist with the design of all sorts of filters, available at http://www.ke5fx.com/aadeflt.htm

The filter (Figure 7) was then built and tested. The inductors were wound on toroids of type 26B material, selected because they have a high Q down to low frequencies.

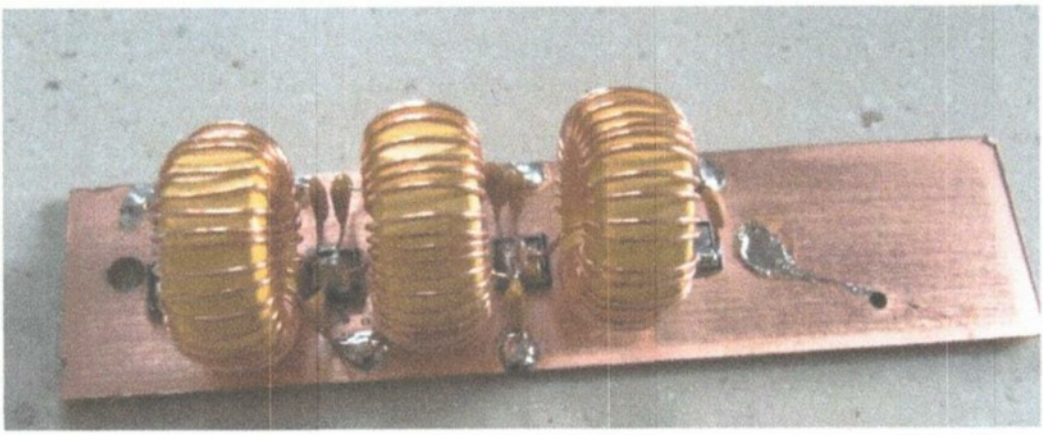

Figure 7: Low pass filter

On testing (Figure 8), the filter showed a much more rounded 'shoulder' than predicted, with attenuation being evident at 100 kHz (about 6dB vs predicted 0.75 dB) although the horizontal axes are different (Figure 6 being logarithmic and Figure 8 being linear) which also changes the appearance. The cause of this is unknown but presumably arises from non-ideal behaviour of the components. This is the lowest frequency lowpass filter I have yet built and, interestingly, it shows the greatest departure from predicted behaviour. Normally I have found good agreement between the AADE software predictions and actual measurements. But, whatever the cause of this, the result was sufficiently close to what was wanted for the filter to be acceptable (less than 1 dB attenuation at VLF but Radio 4 longwave at 198 kHz down by about 50 dB!).

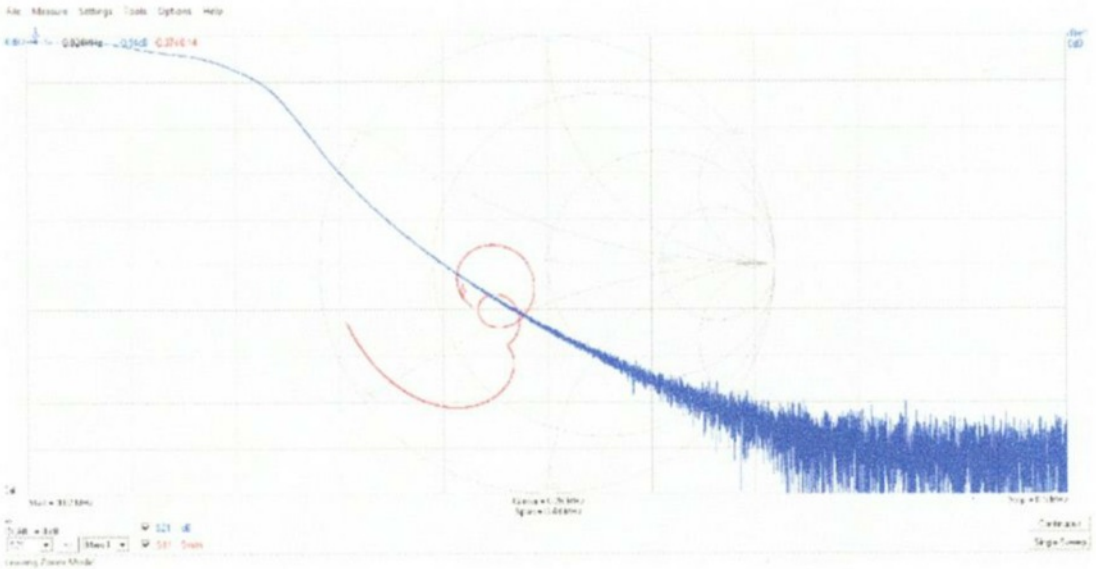

Figure 8: Filter response, swept from 20 kHz to 500 kHz on DG8SAQ Vector Network Analyser.

The second part of this article will appear in the next issue of "Ragchew"

RF Notes by Tony G4HBV

For the next few "RF Notes" I shall describe how a typical HF antenna system works at each point in the system from the transmitter to the antenna, looking at the impedances presented and the "SWR" existing.

First we must imagine a typical system comprising a transceiver, "SWR" bridge, "ATU", feeder and antenna. (Note my inverted commas around SWR and ATU, because neither of these devices really do what their names suggest).

Let's start with the antenna and assume it is a doublet which we shall operate at its resonant frequency and on other non-resonant frequencies. What impedance would we see if we were to measure directly across the antenna terminals? It would be a combination of the radiation resistance and the loss resistance. It is impossible (as far as I know) to separate these two by measurement, so the input impedance of the doublet is NOT exactly the radiation resistance.

Radiation resistance is an imaginary resistance which equates to the power lost by the antenna due to radiation. It is not a physical resistor. It can be calculated for various types of antenna using a mathematical procedure, but as I said it is not individually measurable as such. (The calculation involves dividing the radiating elements into short segments and calculating the power in the radiation field due to each short segment and then adding the whole lot together – called integration). The radiation resistance can be regarded as a measure of how effective the antenna is at coupling energy into the transmission medium.

The loss resistance consists of resistive loss from wire elements and also loss due to capacitive and inductive fields around the antenna, more so if the antenna is not resonant, when the antenna's input impedance will include capacitive or inductive reactance. There will also be loss due to energy dissipated in the antenna's surroundings, such as the ground, other antennas and nearby objects.

Now what about SWR? Again we are considering the antenna itself at this stage. Well, this function (SWR) – so beloved by advertisers of commercial antennas – as the SWR of the antenna – when they mean the SWR ON THE FEEDER, is confusingly enormously high ON THE ANTENNA ITSELF. This is because the doublet is open-ended and so there are very high currents circulating back and forth ON the antenna, a condition necessary for efficient radiation.

This whole SWR business has led to much confusion because of imprecise terminology – a belief that because a device is labelled as an SWR bridge, it actually reads SWR in its position in our notional antenna system I am describing.

(to be continued)

The Radio Spectrum by Malcolm G6UGW

Part 1 - Ultra Low Frequency 300Hz -3kHz

These frequencies correspond to a wavelengths between 1000 to 100km. Because of the ability of these waves to penetrate the earth also sea water, this band is used to communicate in mines also to submerged submarines. Radio amateurs have experimented with conduction fields using audio power amplifiers and inserting widely spaced electrodes into the ground. Using weak-signal reception methods it has been possible to receive signals over a range of a few kilometres.

(to be continued)

From the Archives - NFD Entrants - 1948

(RSGB Bulletin May 1948)

NATIONAL FIELD DAY, 1948

The Rules, as published in the January, 1948, issue of the BULLETIN stand, with the exception of Rule 7 (re power supply), which appears in amended form in the March BULLETIN.

The Newfoundland Amateur Radio Association is holding its Field Day on June 5th, whilst the Swiss Society (U.S.K.A.) will also be active, as in previous years.

All member societies of the I.A.R.U. have been notified of the dates of R.S.G.B. Contests and asked to co-operate.

REGION 3.

Town or Area	Stn.	Call Sign	Location
Birmingham (South)	A	G3LN/P	Geary's Farm, Rednal Road, Northfield.
	B	G5JU/P	As for A station.
Cannock	A	G3CLR/P	White's Hill Farm, Old Hednesford Road, Cannock.
Coventry ..	A	G6TD/P	Home Farm, Eastern Green.
	B	G2LU/P	As for A station.
Oswestry ..	A	G2AUZ/P	Llynclys Hill, Nr. Oswestry.
	B	G2NX/P	Old Racecourse, Oswestry.
Rugby	A	G8RL/P	Bilton, Rugby.
	B	G8VN/P	As for A station.
Stourbridge ..	A	G2NW/P	Mucklow Hill, Halesowen.
	B	G8GF/P	King Edward VI School Playing Fields, Stourbridge.
Worcester ..	A	G8JC/P	Newton Grange Farm Newtown.
	B	G3BDS/P	As for A station.

REGION 4.

Town or Area	Stn.	Call Sign	Location
Boston	A	G6GH/P	Rectory Field, Stickney.
	B	G2BQC/P	Keal Hill, West Keal, Spilsby.
Derby	A	G8RB/P	Woodlands Farm, Chellaston.
	B	G5YY/P	Shandlow Hall, Shandlow.
Grimsby and Cleethorpes	A	G8KH/P	Waltham, Nr. Grimsby (junction of Grimsby and Station Roads).
Leicester	A	G6VD/P	Wyndham, Granville Road, Wigston.
	B	G3BU/P	Adjacent to Sports Field, Gwendolen Road.
Loughborough ..	A	G4BI/P	Walton-le-Wolds.
	B	G4MM/P	Walton-le-Wolds.
Mansfield ..	A	G3APY/P	Kirby Cow Pastures, Kirby Road, Kirby-in-Ashfield, Notts.
	B	G8HX/P	Codnor Lane, Codnor.
Nottingham ..	A	G6CW/P	Kneeton Old Mill.
	B	G8QZ/P	As for A station.
Oakham	A	G2HDU/P	Braunstone Hill, 1 mile S.W. of Oakham.
	B	G3ALC/P	As for A station.

REGION 5.

Town or Area	Stn.	Call Sign	Location
Cambridge ..	A	G6UW/P	Quaker Farm, top of the Gogs.
	B	G8PB/P	Bendall's Farm, Bottisham, Cambs.
Chelmsford ..	A	G5RV/P	Meadow adjoining the Running Mare, Galleywood.
	B	G2HPF/P	As for A station.
Gt. Yarmouth ..	A	G3AMK/P	Southtown Common.
	B	G3CFK/P	As for A station.
Ipswich	A	G2AN/P	Post Office Farm, Stutton.
	B	G8MU/P	As for A station.
King's Lynn ..	A	G3IP/P	Knight's Hill, King's Lynn.
	B	G2JS/P	As for A station.
Lowestoft ..	A	G2YU/P	Grange Farm, Gisleham.
	B	G2CPL/P	As for A station.

REGION 6.

Town or Area	Stn.	Call Sign	Location
Bedford	A	G5PA/P	Bury End Farm, Stagsden.
	B	G4OL/P	As for A station.
High Wycombe ..	A	G8JK/P	Ernest Turner Sports Ground, Totteridge, High Wycombe.
	B	G4NT/P	As for A station.
Luton	A	G3QG/P	Bradger's Hill, Stopsley.
	B	G5RZ/P	As for A station.
Oxford	A	G8PX/P	Watt's Farm, Elsfield,
	B	G5RP/P	As for A station.

REGION 7.

Town or Area	Stn.	Call Sign	Location
Barnes, Putney and Richmond ..	A	G6RC/P	Richmond Park (near Sheen Gate).
	B	G5CI/P	As for A station.
Brentwood ..	A	G2CIW/P	Payne's Farm (junction of Weald Road and Honeypot Lane).
	B	G4AK/P	As for A station.
Bromley and Beckenham	A	G6HD/P	Sundridge Park Golf Links, Bromley.
	B	G4AU/P	As for A station.
Chingford ..	A	G8JM/P	Bury Farm, Sewardstonebury.
	B	G3YF/P	Pole Hill.
Coulsdon ..	A	G2DN/P	Field above Hall & Co.'s Lime Works.
	B	G2KU/P	As for A station.
Croydon ..	A	G2FWA/P	Addington Hills (adjacent to junction of Oaks Road and Coombe Road.)
	B	G6LX/P	As for A station.
Dorking and Leatherhead	A	G3AEZ/P	Ranmore, Nr. Dorking.
Dulwich and New Cross	A	G3CU/P	Rear of Goldsmiths College, New Cross, S.E.14.
	B	G2FKZ/P	Grounds of Crystal Palace, Upper Sydenham, S.E.19.
East Ham ..	A	G2ZZ/P	Fairbairn House Sports Field, Burges Road, E.6.
East Molesey ..	A	G8SM/P	Broadmoor, Nr. Dorking.
	B	G6NB/P	Chobham Common.
Edgware	A	G3HT/P	Weedon's Farm, Highwood Hill, Nr. Mill Hill.
	B	G2IM/P	As for A station.
Finsbury Park ..	A	G2BAB/P	L.C.C. Park, Finsbury Park.
	B	G8PP/P	As for A station.
Hoddesdon ..	A	G5HO/P	Beaumont Manor, Wormley.
	B	G4HJ/P	Hertford Heath, Nr. East India, College Arms.
Ilford	A	G8TL/P	London Mission Field, Lambourn End.
	B	G2QI/P	As for A station.
North Kent ..	A	G4MB/P	Broomfield Road, Bexleyheath.
	B	G2CXO/P	As for A station.
Slough	A	G3FJ/P	Taplow Court, Taplow, Bucks.
	B	G6CJ/P	As for A station.
Southgate ..	A	G5FA/P	Trent Park, Oakwood, N.14.
	B	G2DHR/P	South Herts Golf Club, Totteridge.
Sutton and Cheam	A	G2CZH/P	Wandsworth Gas Co's Sports Ground, Grafton Road, Worcester Park.

REGION 8.

Town or Area	Stn.	Call Sign	Location
Brighton and Hove	A	G3WR/P	Patcham, Brighton.
	B	G3YY/P	As for A station.
Eastbourne ..	A	G4OC/P	Chalk Farm, Willingdon Hill.
Farnham and Farnborough	A	G5US/P	Tunnel Hill, Nr. Frimley.
	B	G8TS/P	Ewshot, Nr. Farnham.
Guildford ..	A	G6NA/P	Worplesdon Common.
	B	G5RS/P	Old Roman Road, Hogs Back.
Medway Towns	A	G6NU/P	Chatham.
	B	G5FN/P	Chatham.
Reading ..	A	G6WQ/P	Turnhams Farm, City Road, Tilehurst.
	B	G8RS/P	Leighton Park Playing Fields, Shinfield Road, Reading.
Southampton ..	A	G3KJ/P	Stoney Cross, Nr. Southampton.
	B	G5LR/P	As for A station.
Tonbridge and Tunbridge Wells	A	G4FB/P	Great Bounds Estate, Southborough.
Worthing ..	A	G2DZF/P	High Salvington, 3 miles North of Worthing.

REGION 9.

Town or Area	Stn.	Call Sign	Location
Bristol	A	G5YK/P	Dundry, Bristol.
	B	G6YA/P	Dundry, Bristol.
Cheltenham ..	A	G6ZQ/P	Hartley Farm Leckhampton Hill.
	B	G8LB/P	St. Marks Community Centre Playing Fields, Brooklyn Road, St. Marks.
Chippenham ..	A	G3BTS/P	The Water Tower, Chippenham Golf Links
Exeter	A	G5QA/P	Pennsylvania Hill.
Falmouth ..	A	G8AW/P	Ashfield, Falmouth.
	B	G6LV/P	As for A station.
Gloucester ..	A	G3MA/P	Painswick Beacon.
	B	G2RT/P	Painswick Beacon.
North Devon ..	A	G6GM/P	Holsworthy.
Penzance ..	A	G2JL/P	Coach & Horses Hotel, Kennegy.
	B	G2WW/P	As for A station.
Plymouth ..	A	G3TX/P	1 mile N.W. of Wembury Church, Wembury.
	B	G5ZT/P	As for A station.
Stroud	A	G5WA/P	Near Lyplatt Park.
	B	G5HC/P	As for A station.
Torquay ..	B	G2GK/P	Little Haldon, Nr. Teignmouth.

REGION 10.

Town or Area	Stn.	Call Sign	Location
Abergavenny ..	A	GW8CT/P	Blackwood.
	B	GW2BG/P	Abergavenny.
Cardiff	A	GW5BI/P	Penarth County School Playing Fields, Penarth.
	B	GW8UH/P	As for A station.
Neath and Port Talbot	A	GW2FRB/P	Mount Pleasant, Nr Maesteg.
	B	GW4NZ/P	Drumau Hill, Nr. Neath.

REGION 12.

Town or Area	Stn.	Call Sign	Location
Aberdeen ..	A	GM6LG/P	Banchory Devenick Kincardineshire.
	B	GM8AT/P	As for A station.

From the Archives

Snipetts from 1948 RSGB Bulletins

Society may be obtained from the Hon. Secretary, Mr. C. N. Smart, 110 Woolmore Road, Erdington, Birmingham, 23.

and copies may be ordered through the Society, price £1 Delivery 4–6 weeks.

WEST REGIONAL MEETING, GRAND HOTEL, BRISTOL, SUNDAY, JULY 17, 1948. Front row, fourth from left, GW8UH, followed by G8TL, Mrs. C. H. L. Edwards, G6CL, Miss May Gadsden, G5VM, G2BAR, G6OM, G2HX.

Owen Rogers G2HX is 5th from the right in the front row (in the light suit)

(August 1948 Bulletin)

The Contests Committee noted the use of MCW (A2) by certain stations. This type of transmission, however, was not prohibited by the Rules.

Five Metre Field Day

Results of the second Five Metre Field Day held on September 26, 1948.

Position	Call	Points	Location
1	G3CQR/P	452	4m. W. Bovey Tracey, Devon.
2	G3MY/P	419	"Sir William" Hill, Derbyshire.
3	G3HW/P	388	8m. S. Exeter, Devon.
4	GW4OS/P	354	Hope Mountain, Flintshire.
5	G3MA/P	315	May Hill, Herefordshire.
6	G6XM/P	313	4m. N.W. Petersfield, Hants.
7	G3BWS/P	304	5m. N.E. Canterbury, Kent.
8	G5MA/P	299	1m. S. Storrington, Sussex.
9	G8QZ/P	276	6m. N.E. Derby.
10	G6NB/P	249	4m. N.W. Woking, Surrey.
11	G4NT/P	200	2m. N.E. High Wycombe, Bucks.
12	G2ATK/P	165	11m. S. Birmingham, Warks.
13	GM2HIK/P	47	8m. S. Forfar, Forfarshire.

Check Logs. The following are thanked for submitting check logs: G2AOL, DHV, LC, 3BLP, 4MR, 6YU.

Representation

1948 Five metre Field Day results from the November 1948 Bulletin. Pat G3MA/P came 5th and interestingly his station was located on May Hill in Herefordshire. As I always thought of May Hill being in Gloucestershire, this prompted me to do a bit of research. It transpires that the summit is in Gloucestershire and its northern slopes are indeed in Herefordshire so I guess this is where Pat's /P station was located.

unit at the recent Manchester O.R.M.

Silent Keys

We record with deep regret the passing of Mr. Raymond Waite, G3PZ, of Cheltenham, Gloucestershire, and Mr. R. Howarth, BRS4609, of Ashton-u-Lyne.

* * *

The death of Raymond Waite, G3PZ, will leave a gap in the ranks of Amateur Radio which will take a long time to fill. His unflagging enthusiasm for the movement, and his never-failing co-operation will always be remembered, not only in his own immediate circle but in a much wider sphere. It is singularly unfortunate that his election as County Representative came too late for him to put his willing help at the disposal of Gloucestershire members. We who knew him intimately realise only too well that we have lost a fine technician, a true "ham" and a wonderful friend. Our deepest sympathies are extended to his widow, daughter and infant son. At the funeral which took place at Golders Green Crematorium, London, Headquarters was represented by Mr. J. P. Hawker, G3VA. Messrs. E. A. Perkins, G3MA, H. F. O'Brien, G3LP, and A. Barber, G5WA, represented local members. G3MA.

* * *

Mr. Howarth was a very willing helper in all spheres of Amateur Radio and was particularly generous with financial assistance to the Ashton-u-Lyne Radio Club.

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The obituary opposite to G3PZ written by Pat G3MA appeared in the November 1948 Bulletin .

Norman O'Brien G3LP, who accompanied Pat to the funeral at Golders Green Crematorium in London was Chairman of GARS for a few years during the 1980s

Net Topics by Brian G4CIB

Recently the subject of mechanical switches suitable for RF use came up on one of the nets, and I mentioned that I was not a great fan of them and Les G0ULH was of the same opinion. I couldn't immediately come up with a reason not to like them but lurking in the back of my mind was the problem of isolation between ports.

Consider a two way switch, with a co-axial input socket and a choice of two output sockets. This set up is fine if you are using a transceiver and wish to select one of two antennas or an antenna and dummy load. If you transmit say 100 watts into the selected port, then depending on the isolation between the ports, a small amount of rf will leak into the unused port. Consider now the converse situation – a single antenna being switched between two transceivers. Now the isolation between the ports becomes of interest. If the isolation is poor then a portion of the transmitted power will appear across the receiver input of the other transceiver. Working with a figure of 50 watts output and assuming that a signal greater than 2Vrms will damage the receiver input, and that the 50 watts is feeding 50 ohms, and knowing that power in watts $=V^2/R$, then our 50 watts gives us 50V rms on the switch. A **minimum** isolation figure will be required of

$$20\log\frac{50}{2}\ \text{dB which is approximately } 20\text{x}1.4 = \textbf{28 dB}$$

if no more than 2Vrms is to appear at the receiver input.

Now transmit 100 watts, you would need a minimum of 31dB of isolation so as not to exceed 2V rms. If, however 1V rms is the maximum input on the receiver input to avoid damage then a minimum isolation of 38dB would be required!

A quick search of the RF coaxial switches available from the usual dealers who advertise in Radcom revealed the alarming fact that **I could find no item that had a figure quoted for isolation**! These cost typically in the range from £15 - £25. A further search of the professional market and a different picture emerges where both insertion loss and isolation is specified. If you want a switch that will handle 400 watts well into the UHF range with an insertion loss of less than 0.20dB and an isolation of 80dB minimum, then be prepared to pay in the region of £700.

So what am I trying to say? Be very wary about using so-called RF switches to select various rigs into a single antenna **unless you are confident that the isolation between ports is sufficient for the power you are handling!**

Addendum

A day or so after penning this article, I received my electronic version of **QST magazine** – the monthly journal of the **ARRL (American Radio Relay League).** Imagine my surprise on opening it to see an article entitled **"Leaky Antenna Switches" by Ellwood (Woody) Brem K3YV.** His article covers similar ground to mine but he takes it a stage further with actual measurements of isolation in dB with respect to the other switch ports and how it decreases with increasing frequency. He also points out that with the range of **MFJ antenna switches, the unused ports are grounded. This of course will minimise the amount of leakage.**

If any member would like a copy of this article, drop me an email **g4cib@outlook.com**

Book Review by Brian G4CIB

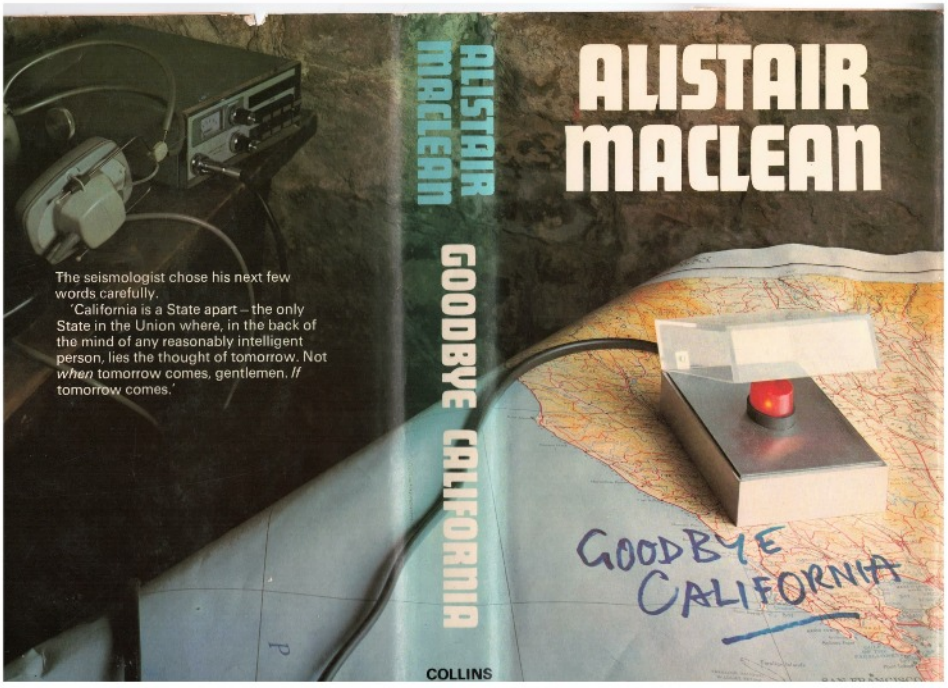
I was lucky in the 1950s at Secondary School (the Central Technical School for Boys, Gloucester)* to have a couple of Physics and Maths masters who were practical, down-to-earth teachers. This was in the era before calculators when slide rules, logarithm tables as well as mental arithmetic were used to carry out calculations. One lesson our Physics master Ted Forsey taught us was to round numbers up or down so that we could mentally work out the order of magnitude of our answer when working out some complicated formula. so when our slide rule or log computation gave us an answer orders of magnitude greater or less than our mental calculation, then we knew we'd slipped a decimal point somewhere. So Ted would have been delighted to see his methods promoted in the recently published book **"Maths on the Back of an Envelope - Clever Ways to (Roughly) Calculate Anything" by Rob Eastaway.** This highly entertaining book takes the reader through the tricks of mental arithmetic, and numerous examples of how to approach and answer seemingly impossible questions such as how often does a teenager say "like" in one year or how many hairs are there on a human head. The author introduces the reader to the concept of "zequals" which means you simplify all numbers before doing any calculations. The symbol is ≈ and before you ask - it's the letter h using the Wingdings font. Have a look at http://www.robeastaway.com/blog/introducing-zequals for more interesting stuff on the concept and application of zequals.

The TV programmes "Who Wants to be a Millionaire" and "Countdown" also feature in this book with examples of questions involving large numbers which contestants could have solved by applying the techniques described by the author. There is even an example of how to determine the length of time you will really be in the queue at Legoland to get on the "Pirate Falls" ride when the sign says the current wait is one hour! Want to estimate the height of a nearby tree? This book shows you how to with the aid of an empty crisp packet.

I knew of the 80:20 rule having been introduced to it years ago in my selling career - 80% of your business comes from 20% of your customers and conversely 80% of your customers give you 20% of your business. It also applies to many other things in life, by the way! But I had never come across the "Rule of 72" - used in finance to work how long it will take you to double your money. It should really be the "Rule of 69" - and the author explains why we use 72. There is plenty in this book to keep you not only entertained but educated and is a "must" for anyone fascinated by numbers!

The book is priced at £9.99 but to club members I can offer it at a special price of £7.00 - see me at club if you would like a copy!

- **Gloucester was one of the few local authorities to implement the tripartite requirements of the 1944 Education Act in full in that it offered all three Secondary education options - Grammar Schools, Technical Schools and Secondary Modern Schools. The editor, or rather the editor's parents, opted for me to attend the Central Technical School in Gloucester.*



Spot the Heathkit!

From the Archives

Several members recently attended the Harwell rally, indeed **Graeme G0EEA** had a sales table there! In 2001 we had a club stand selling, as I recall “Bespoke Junk” - and Graeme was one of the helpers along with **Les G0ULH, Leta G4RHK and myself.**