

G3WSC  
G6RC  
GX3WSC

# CARC News Bulletin

August 2015

Crawley Amateur Radio Club

Editor: John G4PEO

## CARC Dates:

**August 26th (Wednesday)**

TBA (Holiday Season!)

**Sept 20th (Sunday)**

Microwave Round Table

**Sept 23th (Wednesday)**

Space Photography, Chris Suddell

**October 21st (Wednesday)**

The miniVNA - resolving antenna gain issues. Mike Underhill G3LHZ

## Also of Interest/Other Clubs:

**Horsham ARC (HARC)**

[www.harc.org.uk](http://www.harc.org.uk)

**6th Aug:** BBC Outside Broadcast, G00VA

**3rd Sept:** TBA

**Crystal Palace REC**

[www.g3oou.co.uk](http://www.g3oou.co.uk)

**7th August:** 'Build & Buns' Project

**4th Sept:** RSGB Regional Manager Surrey Radio Contact Club

<http://g3src.org.uk>

**3rd Aug:** The Crystal Palace Story

**7th Sept:** TBA

**Sutton & Cheam & District**

<http://scrs.org.uk>

**20th Aug:** Early Wireless

Licences. Dr. Elizabeth Bruton

**17th Sept:** PCB Construction

**Dorking Radio Club**

[www.ddrs.org.uk](http://www.ddrs.org.uk)

**25th August:** Social Evening

**CATS (Coulsdon)**

[www.catsradio.org](http://www.catsradio.org)

**10th August:** BBQ @ G4RWW

**14th Sept:** DMR by Denis G00LX

**Flight Refuelling Hamfest**

**9th August,** Mereley, Wimborne

BH21 1RJ [www.frars.org.uk](http://www.frars.org.uk)

**West Kent Radio & Electronics**

**Fair: 13th Sept.** Tunbridge Wells

Grammer School for Boys,

TN4 9XB [www.wkars.org.uk](http://www.wkars.org.uk)

CARC meetings are held in our club room at Tilgate Park, Crawley, West Sussex.

**Every Wednesday: 8pm**  
**Every Sunday: 11am -1pm**

Formal events are on the last Wednesday of the month, **7-30pm for 8pm.**

*For further information about CARC, please contact the Hon Secretary:*

**Phil, M0TZZ, [secretary@carc.org.uk](mailto:secretary@carc.org.uk)**



Welcome to the **August 2015** edition of the News Bulletin.

Although now well into the (typically English) summer season, there is still plenty going on to grab your attention, as shown in the adjacent column.

In addition, advance notice that the Horsham club, (HARC), are organising a visit to the Mullard Space Science Laboratory at Holmbury St Mary on Friday October 16th. If you would like to go, please contact, ASAP, **Alister, G3ZBU, [g3zbu@hotmail.com](mailto:g3zbu@hotmail.com)**

A reminder of an earlier email sent to members, that **Mike, G8KMP, ([mike.g8kmp@virgin.net](mailto:mike.g8kmp@virgin.net))**, of the Mid Sussex Club, is organising a visit ,(£5 donation), on Thursday 20th August, 7pm-9pm apprx, to the 'Aspidistra' site at Kingstanding, Crowborough. What is 'Aspidistra'? It was built in 1941/2 to hold the worlds most powerful transmitter, to broadcast 'Black Propaganda' to the Germans. In 1983 it was turned into a Cold War bunker able to accommodate 130 people. It is now in use by Sussex Police for staff training purposes. Unfortunately there is no transmitting equipment on site, having been broken up for scrap.... Contact Mike for further details etc..

A meeting was convened by the Mid Sussex Club at the end of July to discuss progress towards the re-instatement of the 70cms repeater **GB3HY** located in the old water tower at the Princess Royal Hospital, Haywards Heath. Regarded as an important 'cog' in the repeater world, there are a number of H&S issues to overcome, currently resulting in severe access restrictions - leaking water tank, rotten wooden stairs and pigeon infestation. Site rental rates have also risen considerably, plus a new NoV , and a revised frequency allocation is required. Further details when known.

Finally, for this edition, thanks to **Richard, G3ZIY**, for putting together an article on everything you wanted to know and more about the decibel (dB).

Updates to the CARC program check:

[www.carconline.blogspot.co.uk](http://www.carconline.blogspot.co.uk)

or contact John G3VLH:

[john.longhurst@hfcom.net](mailto:john.longhurst@hfcom.net)

News Bulletin items contact G4PEO:

[john@t4g4peo.net](mailto:john@t4g4peo.net)

## Local Repeaters

**GB3MH:** 145.625MHz / 88.5 **GB7MH:** 439.6375MHz (**D-Star**)

**GB3WS:** 145.750MHz / 88.5 **GB3NX:** 430.850MHz / 88.5 (Input 438.450MHz)

**GB3NS:** 439.675MHz / 82.5 **GB7NS:** 439.1625MHz (**DMR**)

**President:** Derek Atter (G3GRO)

**Hon Treasurer:** Howard Palmer (G4PFW)

**Hon Secretary:** Phil Moore (M0TZZ)

**Programme Secretary:** John Longhurst (G3VLH)

**Committee Member:** Alex Sheppard (M1YAP)

**Shack Managers:** Mike Davies (G0KAD), Rob Barter (M0ZAF)

**Chairman:** Keith Evans (G3VKW)

**Vice Chairman:** John Longhurst (G3VLH)

**Exam Secretary:** Phil Moore (M0TZZ)

**QSL Manager/News Editor:** John Pitty (G4PEO)

**Training Lead Instructor:** Malcolm Harman (G3NZP)

**Committee Member:** Richard Hadfield (G4ANN)

## Calendar Items

### Microwave Roundtable - CARC Hut - Sunday September 20th.

The following provisional timetable for the event has been taken from the UK Microwave Group website (late July). Go to [www.microwavers.org](http://www.microwavers.org) then 'Events' & 'More Info - Crawley Roundtable' for more up to date information, or contact **Derek, G3GRO**.

- 10:00 Venue opens
- 12:00 UKuG Project contest round judging commences
- 13:00 Lunch (rolls, sandwiches, tea/coffee available)
- 14:00 Opening address and the results of the Project contest heat
- 14:15 Talk-1 - tbc
- 15:00 Talk-2 - tbc
- 15:30 Break (tea & coffee available)
- 16:00 Talk-3 - tbc
- 16:30 End of meeting

### Deep Space Photography, Chris Suddell MOVUE - Wednesday September 23rd.

Reports from other clubs suggest this is definitely a not to be missed presentation by **Chris, MOVUE**. Chris is newly licensed, but his other (very) expensive hobby is astronomy, and in particular, deep space photography. According to Chris, all amateur radio equipment is cheap compared to what he has to pay for special cameras and filters ....



*Images Courtesy  
Chris Suddell*

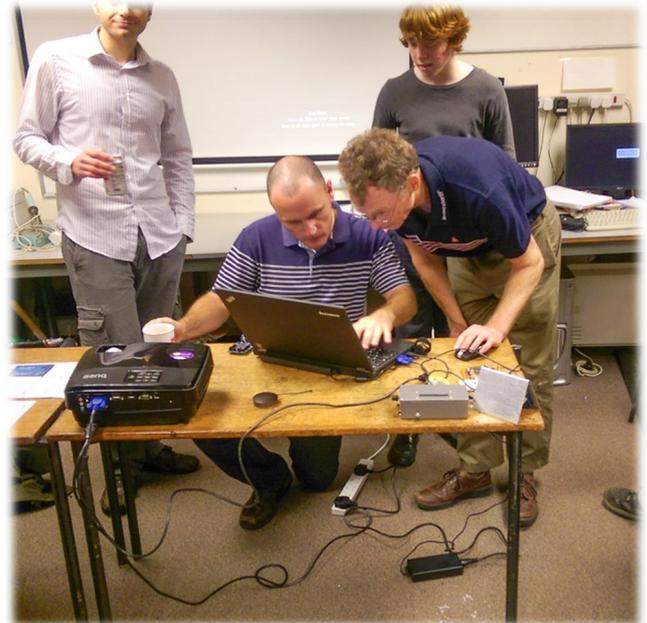
## Previous Meetings & Events

### An Introduction to the Arduino, David, M0WID

Thanks to **David M0WID**, for a very interesting introduction to the Arduino microcontroller, which, in the time available really only scratched the surface relating to the capabilities and versatility of the various Arduino 'flavours'. Anyone attending who was not quite sure what the Arduino is or does, should have gone away from the talk with a much clearer idea, and possibly, considering how cheap they are, enthused to undertake their own Arduino projects..!



David - M0WID



Photos G4PEO

A starting point for further information online can be found here:

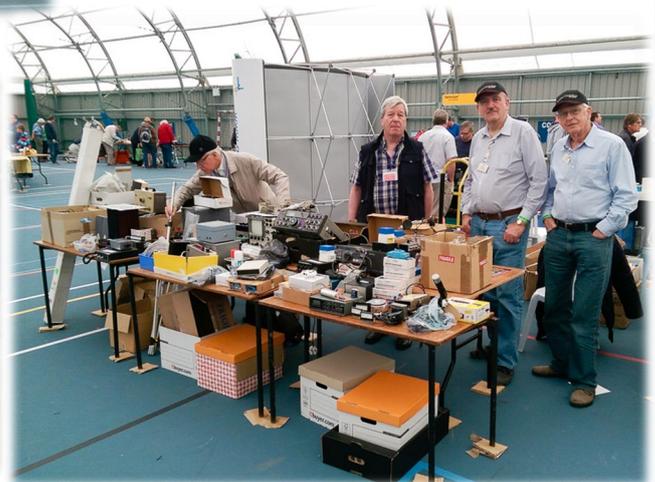
<https://www.arduino.cc>

### Sussex Electronics and Radio Fair, Eastbourne



This was a single day event held in a cavernous sports hall, which swallowed up all the stands with considerable room to spare, as can be seen from the photo on the left. Probably due to the size, it didn't feel as though many people attended, but the event was obviously deemed a success as it will be held over two days next year. We managed to dispose of some 'equipment', but also took a fair amount back to the hut.

Photos G4PEO

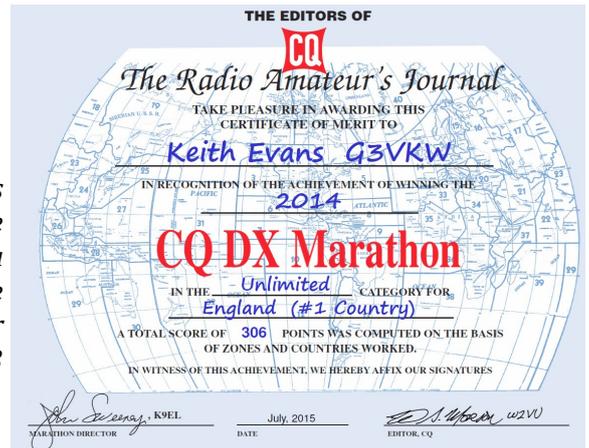




## Member News

Congratulations to **Keith, G3VKW**, who participated in the 2014 CQ Magazine 'CQ DX Marathon', which takes place every year, and who came top in the UK, (2014 Unlimited Category). To quote from CQ Magazine:

*Starting January 1 of each year, simply work as many countries and CQ Zones as you can in each calendar year, regardless of the band or mode. Each country and zone counts only once, so you can concentrate on working new ones rather than working the same ones on multiple bands and modes. Awards are given for the top overall scores in two classes plus the top scores in 3 modes and 10 bands plus low power/small antennas.*



## Chairmans Report - Keith, G3VKW

The Club has been fairly active recently, even though the Council road works are making attending more difficult at times. Hopefully by the time you read this they will be complete and the chicane will be a thing of the past. Many of you will be more comfortable driving to the club on dark nights with the improvement to the road hopefully.

As a Radio Club we are here to make radio both fun and enjoyable, and also to help members who are less experienced so they gain the skills which many of us take for granted.

The Club recently had two "Ex Club House" events: one was Museums on the Air (MoA), and the other was VHF Field Day "VHF NFD." Sadly, although we do well at these sorts of events, they do not seem to attract many members. Even if you wish not to directly participate in events like these, your support is always welcomed/needed behind the scenes. For example, providing transportation, help in the kitchen or just moral support!

Museums on the Air, for example, is not a contest but an activation of a museum intended purely for the purposes of FUN! In events like these there is no pressure to make the maximum number of contacts, but to make connections and working with other museums and the radio community. Days like these are simply an enjoyable day out on the radio!

In comparison, VHF NFD is a contest which the Club always gets a good result in, however in this case the maximum number of QSOs is important. Regardless, if you are unsure of your capability to meet the requirements, there are quiet times during this event which is perfect for those of you who are inexperienced or simply for looking for some practice, and there will always be someone willing to help you if you get slightly overwhelmed! Once again, even if you do not wish to participate, we always use your support in the background! Events like these are perfect for gaining experienced, whether you're a veteran or a newbie!

The crux of this newsletter is to demonstrate two quite different types of event, yet both are poorly attended. Why!/? Please let me know what would make you want to attend events like these or, conversely, what puts you off. I am always open to new ideas and to listen to your views.

On another issue, we are utilising our Club House for about 5 hours a week. For this facility, we pay a large amount of money to the Council, common sense says we should use our facilities more frequently. So another question:

What can we organise that will attract Club Members to attend more often? Do we need a question and answer forum; Morse Code learning sessions; how to work DX coaching; or a technical project, such as building something useful like we did with the WSPR project?

Remember, this is your Radio Club, and both the committee and I try our hardest to put together events and talks we think you will support, but at times we think we have failed due to the poor turnouts.

What exactly do you expect the Radio Club to do for you?

So feedback to me or any other committee members please!

73, Keith, G3VKW Chairman

## Club News

### 2015 VHF NFD Report - Alwyn Seeds, G8DOH

Last year's VHF NFD saw the CARCRATS G5LK/P team move up from 4th place to 3rd in the demanding "Open" section, where there are no limits to the hardware deployed other than the licence limits. This year we wanted to improve our overall performance and try to regain the top spot on 2m, which we have held three times in the last ten years. To this end a remarkable collection of metalwork trundled its way down to the White Cliffs of Dover on the 3rd July in preparation for the contest weekend, including 4 lattice masts, 3 scaffold tube masts, 11 elements on 6m, 7 elements on 4m, 52 elements on 2m, 154 elements on 70 cm and 88 elements on 23 cm, avoiding the hapless lorry drivers stuck in "operation stack".

The weather for set-up was excellent and our own "operation stack" saw all of those 312 elements take to the air safely, despite a strong south-easterly wind which caused our substantial army tent to take flight and have to be re-installed where it could be thoroughly pegged down. The next task was aerial testing and the installation of several van loads of equipment.

This year 2m was accommodated in a spacious tail-lift delivery van provided by Andy G7FWE. We asked him if he could bring a large van, but this was spacious luxury indeed. The 2m station has been the subject of considerable development this year, benefiting from much debate between Mike G0KAD, Peter G0VVE and Alwyn G8DOH to arrive at something that can make full use of multiple aerial arrays, dig out the weakest signals while resisting attack from the huge signals of our nearby competitors and the many kW of broadcast and other out-of-band RF adjacent to our site, whilst still being easy to use under contest conditions. The new system comprises two flight-cases of hardware plus PA, power supplies and transceiver.



*Chris, M6CAO & Peter, G0VVE working the DX on 2m.*

Peter G0VVE has been busy constructing a superb new 2m aerial array that saw its first outing in the May "postcode" contest and proved very effective, netting us 671 contacts at an average distance of 434 km, despite indifferent propagation, and the highest claimed score we have seen in the recent history of VHF NFD.

6m/4m and 23 cm shared the army tent amicably. There was little sporadic E and we had equipment problems on 6m, which lost us points in the 8 hours of allowed operating time on the Saturday. 23 cm started well, with good use being made of the ON4KST chat system for arranging contacts and numbers of contacts being made by aircraft scatter also. We also deployed the CW skills of Gerry G0RTN to great effect, adding OKs and other choice DX to the log, despite poor conditions.

70cm was exiled to its usual location, far enough away not to suffer from harmonic interference from 2m and not to cause harmonic interference to 23cm. The accommodation was Mike G0KAD's excellent hired Ford Transit Van, with tow-hook and floor drains, through which we fed the various cables to the outside world. 2 operators plus computers, transceiver, PA, power supplies and a flight-case full of transverter and filtering hardware kept things nice and cosy.

This year we added a switched 2 x 21 ele search array to the main 4 x 28 ele array.

### *VHF NFD Cont:*

The weather stayed dry through most of the Saturday and the scores marched upwards on all bands. Sunday however, started dark and the first raindrops were falling by 9am. A look at the Blitzortnung web-site was far from re-assuring, with thunderstorms marching their way up the channel. We disconnected the aerials and sat tight as the most tremendous amount of rain dropped on us- 30 mm in a couple of hours. Once the lightning was sufficiently distant to reconnect aerials we found that we had no 23 cm receive. The 4m aerial tower had not been wound up because of the storm, and with the rain pouring down, remedying that was not an attractive prospect. 4m started late and slow, with severe static rain and an absence of sporadic E. When the rain abated sufficiently for us to take down the 23 cm mast-head system we found that a 12V regulator had failed, putting an end to 23cm for the day.

Over at 70cm, the van roof was proving less than watertight, with Gerry G0RTN carefully located so that the drips passed him by and Tim G8JXV's drinks cup being pressed into service to stop drips going into one of the power supplies. Static rain was severe on the high 4 x 28 ele array, followed by its complete failure, causing us to have to rely entirely on the 2 x 21 ele search array.

2m marched on, with our competitors catching up but not quite fast enough.

The rain stopped at lunchtime and the rapid evaporation of so much water put us in thick fog.

By the end of the contest, the sun was out and we were lucky to be able to do the take-down in the dry. Minor mishaps included some damage to the big 2m array and the loss of part of the 4m log, a problem with our first venture in electronic-only logging that we shall take care is remedied for future years.

Many thanks to everyone who operated, logged and helped with the set-up and take-down. Competing at this level would not be possible without your support. For those club members who have not yet made the journey down to Dover for a contest, do give it a try, even if only for a few hours. There is always plenty to do, plenty of sea air, plenty of DX and plenty of fun.

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*More CARC  
(VHF Field Day?)  
Vintage  
Photography  
Courtesy Adrian  
G3VJM*



## dB or not dB – that is The Question!

*By Richard, G3ZIY*

Decibels are one of those subjects that are so central to our hobby, and yet so often misunderstood – by both amateurs and professionals alike.

This unit-less ratio of power levels was developed in the early days of the telephone at the Bell Telephone laboratories in America, to assist in the calculation of signal levels throughout the telephone network. At that time these calculations were often made using slide rules and log tables – both methods prone to errors in use.

Calculations involving linear voltage and power gains and losses involved multiplication (not too hard to do) and division (considerably more difficult – especially if 'long' division). Log tables and slide rules eased these calculations considerably, and they both relied on the power of numbers – their index value.

Taking a simple example:

$$100 \times 1000 = 100000$$

This can be represented in the form:

$$10^2 \times 10^3 = 10^5$$

So adding the indices (2 and 3 in this case) makes 5, the index of the result. Similarly in division:

$$\frac{10^5}{10^3} = 10^2 \quad \text{and} \quad \frac{10^3}{10^5} = 10^{-2} \quad \text{and lastly} \quad \frac{10^3}{10^3} = 10^0 = 1 \quad \text{when indices are subtracted from each other.}$$

In fact *any number raised to the power of 0 is equal to 1*, and this is an important point to remember, as will be seen later.

John Napier calculated a set of log tables in the early 17<sup>th</sup> century and they were rapidly adopted by people such as navigators and engineers who had to make accurate calculations involving multiplication and division. His tables were simply a set of the index value that you raise a base number to, to get a value. For example  $10^{0.301} = 2$ , so the common logarithm of 2 is 0.301. There are other logarithms based on numbers other than 10, for example  $e$  and 2, used in various disciplines such as mathematics and computing.

So the Bell telephone engineers were faced with the problem of calculating the signal levels between various points in the telephone network. A subscriber's telephone instrument would generate quite a high audio signal level from its carbon microphone, and this would travel along copper wire pairs, via an exchange to the distant telephone instrument. Their dilemma was whether the circuit would need amplifying to produce adequate level to drive the earpiece in the distant telephone.

The source audio voltage, line loss to the exchange, the switching contact losses in the exchange were all known, and the network impedance was  $600\Omega$ , and so on, but what level reached the distant telephone? Losses involved division, and any amplification involved multiplication of the source voltage.

They decided to simplify these calculations to subtraction and addition respectively. And so the Bel was born, which was defined as the index of the common logarithm *power ratio* between two points in a circuit, This was soon discovered to be too large a unit for telephony calculations, and so one tenth of a Bel, the deciBel, was used in practice, and  $dB = 10 \times \log_{10}(\text{power ratio})$ .

I have emphasised that the deciBel is defined as the power ratio between two points in a circuit, but there are many references, particularly on the internet, that mention voltage and current ratios. I have always recommended to my students that they always calculate in power ratios when converting between dB and linear units. But, for the sake of completeness, if you do want to use dB in voltage and current calculations, you can use  $dB = 20 \times \log(\text{voltage ratio})$  or current ratio, **as long as the impedance is identical at the two points measured**. Too often this proviso is forgotten, and the answer is then completely wrong. So I recommend you don't do it!

If we take an example to show how easy it is to get it wrong, imagine a microphone feeding an audio amplifier which is driving a loudspeaker. The microphone and amplifier input are  $600\Omega$  impedance, and speaker and amplifier output are  $8\Omega$ . The safest way to calculate the gain in this circuit in dB, is to work out the power input and output.

So, we measure 100mV across the microphone, and 2 volts across the loudspeaker. Power is calculated as  $\frac{V^2}{R}$ , so the input is  $\frac{0.1^2}{600} = 1.67 \times 10^{-5} \text{ watts}$ , and the output is  $\frac{2^2}{8} = 0.5 \text{ watts}$ . The amplifier therefore has a power gain of  $\frac{0.5}{1.67 \times 10^{-5}} = 29940$ . In dB, this is  $10 \times \log_{10}\left(\frac{0.5}{1.67 \times 10^{-5}}\right) = 44.77 \text{ dB}$ .

Calculated using the 'voltage dB' formula  $20 \times \log_{10}\left(\frac{2}{0.1}\right)$  would give an answer of 26.02dB, which is incorrect, because the input and output impedances are different.

Over the years, various other derived units featuring 'dB' have become prevalent in the literature. These include:

- dBm – a power level of 0dBm=1 milliwatt
- dB $\mu$ V – a voltage level of 0dB $\mu$ V=1 microvolt
- dBW – a power level of 0dBW=1 watt
- dB $\mu$ V/m – a field strength of 0dB $\mu$ V/m=1 microvolt per metre

and many others. There is one rather different unit, dBC, which is not a derived power or voltage level, but a dB value relating unwanted to wanted power levels. If, for example, a transmitter put out 100 watts carrier, and the unwanted third harmonic was measured at a level of 45mW, then the third harmonic would be measured as  $10 \times \log_{10}\left(\frac{0.045}{100}\right) = -33.47 \text{ dBC}$ .

Finally, as is clearly shown in figures 1 and 2, the dB display of the output spectrum of an old signal generator clearly shows unwanted second (-34.3 dBC) and third (-50 dBC) harmonics which are barely visible in the linear display. A good reason for using dB units!

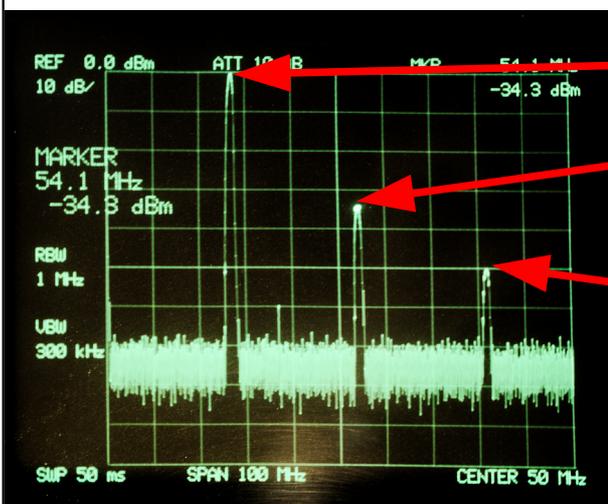


Figure 1: dB display

Wanted signal  
Second harmonic  
Third harmonic ?



Figure 2: Linear display