CPREC


G2LW

# Palace Pulse

The newsletter of the

## Crystal Palace Radio & Electronics Club

Affiliated to the Radio Society of Great Britain

*Established January 1956*

Meetings are held on the first Friday of each month.
The room opens at 7:30pm for an 8pm start at:
All Saints Parish Church,
Beulah Hill, London, SE19 3LG
(opposite the junction with Grange Road).
Visitors are always welcome.

| | | |
|---|---|---|
| Web sites: | Club Admin: | http://cprec.btck.co.uk/ |
| | Club Technical: | http://cprec.btck.co.uk/OurTechnicalSite |
| Email: | cprec.g2lw@gmail.com | |
| Club Net: | Each Wednesday at 20:00 on FM on 145.525MHz (S21) ± QRM | |
| Twitter | @BobFBurns or www.twitter.com/bobfburns | |

Next meeting: Friday 1st March 2019

# *Fundamentals of Amateur Digital Radio by David How G0PAR*

In this issue: *Future Meetings & Events, Recent Event News, 'Cutting Loose' by Theorist, Technical Snippets, Members News, Miscellaneous, Noticeboard, Diary of External Events, News from other Clubs, Local Training Courses and Club Contact Information.*

See page 8 for club contact information

## Dear Reader

## Future 2019 Club Meetings and Events

| | | |
|---|---|---|
| 01 Mar | M | Fundamentals of Amateur Digital Radio by David How G0PAR |
| 05 Apr | M | Construction Evening - Pixie QRP Transceiver |
| 03 May | M | CW Evening and Pixie Test & Maintenance |
| 11/12 May | E | Mills on the Air |
| 07 Jun | M | Antennas and My Home Setup by John G8MNY |
| 05 Jul | M | TBA |
| 02 Aug | M | Summer Social and On the Air |

C = Contest, CM = Committee meeting, E = External event, M = club meeting, R = Rally, T = Training course, V = Visit.

### 01 March 2019 - Fundamentals of Amateur Digital Radio by David How G0PAR

David writes: "*Amateur radio has followed commercial communications technologies, CW, AM, FM, SSB, PSK and now 'Digital Radio' Amateurs have the privilege to experiment with new ideas in radio communications; as a knowledgeable person having received instruction, passing exams and been licensed.*

*Commercial use of radio communications is colloquially known as Private Mobile Radio (PMR)/Land Mobile Radio (LMR) which is a 'One-to-Many' communications; rather than Telephony which is One-to-One communications. PMR has supported old taxi firms, building sites, hospitals, shopping centres etc, in achieving their business goals. Using Walky-Talky (MS-MS). Mobile to Base-station (MS-BS), Multi Base-Station and Trunked systems.*

*Regulatory pressures to use spectrum more efficiently, means 'doing more in less bandwidth'. An answer is to use Digital technologies along with issues of migrate systems from analogue to digital. How do Digital PMR radio technology look different to AM and FM radio? [Digital Radio, Audio, ADC (Pulse Code Modulation), Codec, Forward Error Correction (FEC), Interleaving, Digital Modulation methods.]*

*Digital radio have similarities to Digital wire networks; a look at the ISO 7 Layer Model may help to understand the Digital building blocks and protocol stacks, along with what are Bridges, Repeaters, Gateways and how this applies to 'Hotspots'.*

*Comparison of the digital building blocks between different 'flavours' of Digital Radio (dPMR, Fusion, P25, D-Star, DMR, NXDN). A look at configuration of Digital Radio which leads to Code Plug.*"

### 11/12 May 2019 - Mills on the Air

We are planning to operate a station from Keston Windmill during this weekend so will require assistance in erecting the station and aerials, operating the station and taking everything down at the end of the event. Our Secretary Alan is co-ordinating the various activities so please let him or another member of the committee know what times you are available to help.

The special event callsign GB2KM has already been confirmed by Ofcom as a notice of variation on the club licence G2LW.

Alan and Jim visited the site on Saturday 26th January to carry out a survey and decide where the equipment and aerials could be located. The plan is to apply for a GB call and establish both HF and VHF stations in the room immediately below the mill called the Roundhouse - shown below. The VHF colinear can be mounted near to the top of the windmill structure with a coaxial cable run to the station. There are two possibilities for the HF aerial location so that will be decided on the day.

There is no power in the proposed operating room so this will have to be run in from a nearby building with a long extension cable. Lighting will also be required.

The windmill is located on high ground and Crystal Palace is clearly visible. Parking on the main road is difficult but there is space in a lane next to the mill. The site will be open to the public so care will be required in locating cables. We will need one or more volunteers to 'meet and greet' visitors.

## Recent Event News

**01 January 2019 - Club Subscriptions:** These are now overdue and our Treasurer will take the payment of £12.00 by cash or cheque. If you are going to send cash

please use registered post. Any member who has not paid by the end of March will be deemed to have re-signed.

**01 February 2019 - AGM:**

Our AGM was well attended and we welcomed Alun Cross G4WGE who is RSGB District Representative for District 108 in Region 10.

Apologies were received from our Chairman, Secretary and our Italian member Giorgio Romanin who were unable to attend the meeting.

The 2018 AGM minutes were read and approved. Officers reports for 2018, included in the last member's newsletter, were read and approved. Our Treasurer stated that the club accounts are in good shape and there is no need to increase the subscriptions or meeting fees.

The existing committee were all willing to serve for 2019 and were proposed and seconded en masse. However, your scribe did give notice of his intention to resign as newsletter editor by the end of 2019 at the latest.

At the end of the meeting an informal discussion was held to gather and record suggestions on future meetings, projects and other club activities.

AGM minutes will shortly be available from our Secretary.

## Club Project - The Pixie Transceiver Kit

We plan to hold a construction evening during the April 2019 meeting for members to build a crystal controlled Pixie transceiver purchased in kit form. Our Chairman Damien has already purchased and built one which was on display and demonstrated at the January 2019 meeting.

Photo of a Pixie in a clear plastic case:

The Pixie is a low cost one IC and two transistor crystal controlled QRP single band CW transceiver. If you would like to take part in this project please let our Chairman Damien know as soon as possible so that the correct number of kits can be ordered.

The following meeting in May will be for any remaining construction work, error and fault corrections and some CW practice using the Pixies.

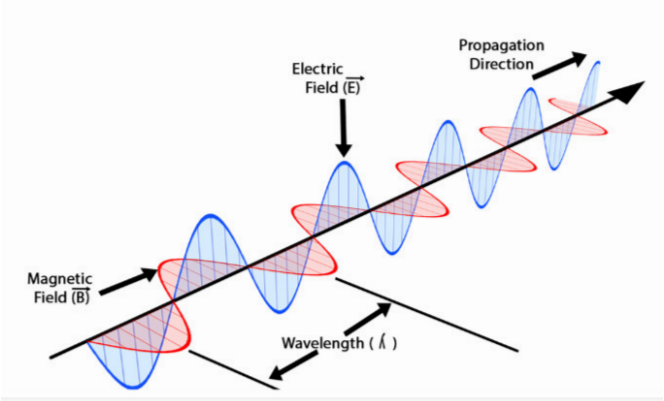
## Cutting Loose by 'Theorist'

Those of you who made it through Nick's talk on Maxwell's equations a few years ago may recall that you can create an electric field by varying a magnetic field. For example if you have a loop of wire and wave a magnet around near the loop, then the magnetic field through the loop will vary. This creates an electric field around the loop, and because metal conducts electricity a current will flow in the loop that can be used to do something like light a lamp. Charged particles like an electron already have an electric field, but you cannot 'tap' the energy in the field; you may like to wonder why not.

Generating magnetic fields is a bit different. You can generate a magnetic field by varying an electric field, but you can also create one simply by having a steady stream of moving charged particles, like the magnetic field generated around a DC current-carrying wire. Of course to vary an electric field you have to move some charges around, which is what is happening when a current flows, but it is necessary to separate out the two for a technical reason. Again, some particles already have a magnetic moment but the field cannot be tapped to do something useful.

Maxwell knew a newish branch of mathematics that enabled him to put his 'famous four' equations in a very useful form. By a clever mathematical trick combining two of the equations, he was able to show that they allowed a solution for electromagnetic (em) waves in 'free space'. Astonishingly he could also calculate the speed of these waves, and it turned out that their speed was the speed of light. It had been suspected by Faraday and others that light had something to do with electromagnetism, but Maxwell's calculations were the proof that this was indeed the case.

The nearby diagram is the sort of illustration that you find in all the physics textbooks about electromagnetism, and represents the form of electromagnetic waves predicted by the equations for free space. The first thing to notice is that the fields are perpendicular to the direction the wave is travelling. Second, that the electric E and



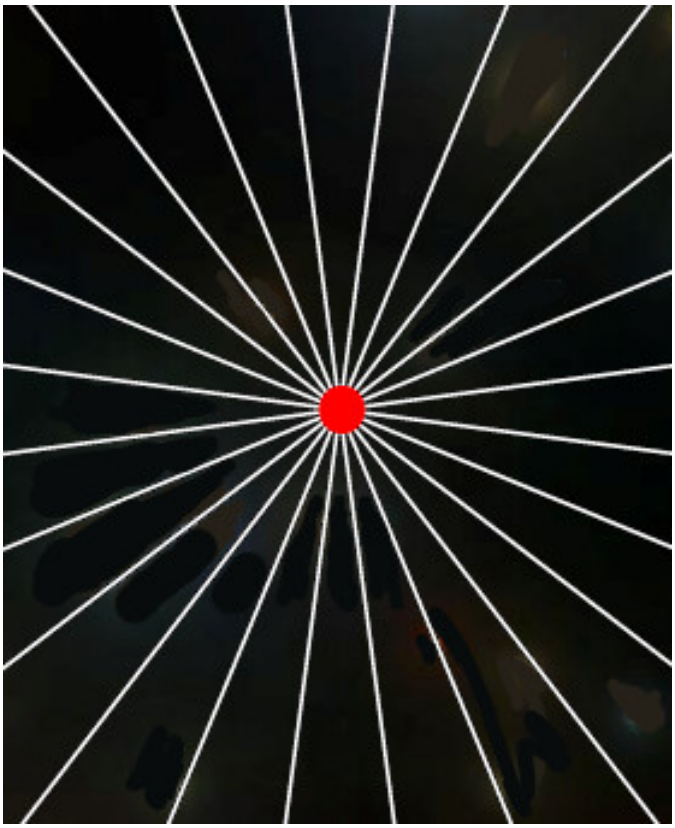

magnetic B fields are at right angles to one another. Finally that the E and B fields rise and fall together. One way of understanding this is that as the electric field

increases it is changing, and will therefore create a magnetic field. This magnetic field is of course also changing, so this will create an electric field which as it happens will oppose the original E field (think of Lenz's law). Eventually the induced E field reduces the original E field which in turn reduces the magnetic field, and so on. You could start the argument from the point of view of the magnetic field if you liked.

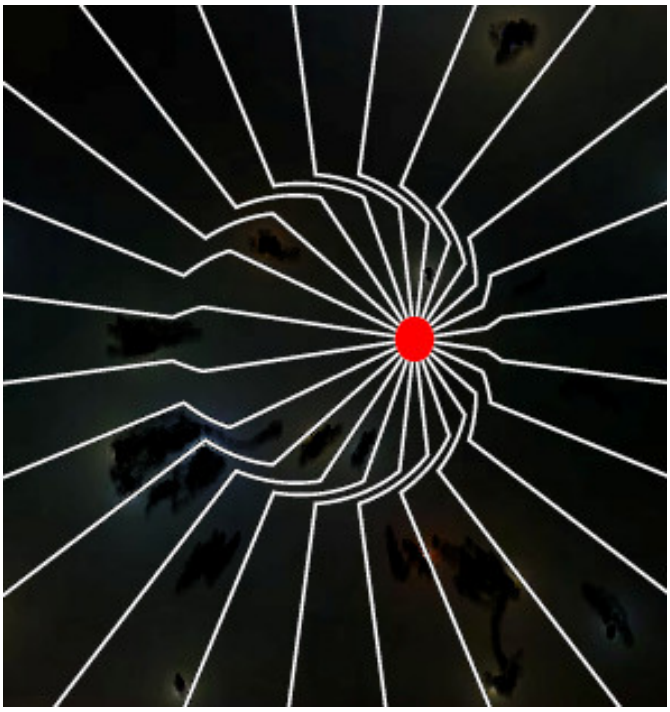
A wire carrying a steady DC current has a magnetic field but will not produce em waves. Maxwell's equations show that these can only be produced by charges that are accelerated in some way, which is why when you first allow a current to flow along a wire (and before a stable DC current flows) you get a transient burst of em waves as the electrons are accelerated along the wire. If you place a battery powered radio near another mains powered electrical appliance and switch it on, you might pick up this as a brief burst of noise.

How though are em waves produced from solid objects? How do they escape or 'cut themselves adrift' as it were? Going back to the wire carrying a steady current, the magnetic field generated does not appear instantaneously everywhere when the current starts to flow. It develops outwards away from the wire limited by the speed of light, *c*. After a time t the limit of the extent of the field is $c\Delta t$. This gives a clue as to how em waves cut loose.

If you look at the figures nearby the first shows the electric field around a stationary charge. Suppose the charge now starts to move, accelerating quickly until it reaches a constant velocity.



As it does so the disturbance – the change – in the E field propagates outwards from the charge at speed *c,* as indicated in the second figure. In this the charge is moving to the right at constant speed having reached its constant final speed some short time before. This



changing E field generates a changing B magnetic field which… well, you have the idea by now. You can see that the disturbance in the field is perpendicular to the outwards direction of its travel; it is transverse as demanded by Maxwell's equations and travels at *c*. The thickness or width of the disturbance is $c\Delta t$ , where $\Delta t$ is the time during which the charge was accelerating. The disturbance is not connected to the charge and is freely travelling through space. It is an em wave.

That is pretty much all there is to it really. Perhaps I should say 'all' there is to it. Except...all this ignores the fact that em waves are made of photons, something I covered in the June 2017 newsletter. Lastly I should add that if you wiggle some charges about in a particular way you create disturbances that contain all the information about the wiggling. A wiggle detector (inexplicably sometimes called an aerial) can recover this and...but you know the rest anyway.

## Members News

**a) A few weeks ago** my eight element 2m beam suddenly developed an infinite SWR so during a recent break in the weather I got up on the roof and moved it from the rotateable mast to the garage for examination. It turned out that the waterproof terminal box at the centre of the driven element was full of water and all of the electrical connections were corroded so the high SWR was not surprising. The coaxial balun was completely water logged and half of the 12m coaxial downlead was waterlogged and corroded.

A new plastic box rated to IP65 (proof against driving rain) was purchased plus some new 20mm waterproof cable glands as both plastic and rubber degrade in sunlight.

The internal cable clamps and solder tags were all badly corroded so they were filed down to clean metal, dipped in plumbers flux, tinned and then cleaned with white spirit to remove any flux residue. The original aluminium driven element had previously been replaced with a new one made from 8mm copper pipe, the connecting screws

soldered in place and the completed element etch primed and top coated.

The half wave coaxial balun was rebuilt using new 50ohm RG8X cable. The new box was drilled and punched to take the three bolts on the driven element and frame, exit for the cable to the shack and two 20mm waterproof glands for the coax balun exit and entry. A completely new RG8X downlead was fitted and run through to the shack.

The refurbished aerial was put back on the mast and works correctly with club member Geoff reporting that it was the best net signal he had heard from yours truly.

**b) Jim M0JFL** and I have done some tests on 6m FM with signals 5&9 both ways. This was carried out to see if 6m would provide an alternative net frequency as our Chairman Damien has some occasional problems hearing all station during the 2m nets.

## Technical Snippets

**a) Samsung** has announced two new memory ICs, a 1TB (1000GB) module for smart phones and a 96 layer 256GB module, the latter running on a 1.2v supply.

**b) Battery Blues**

As most fellow members know I am quite a keen member of SMEE, the model engineering society. On occasion we hold a Rummage sale where surplus items find more appreciative owners and I help the auctioneer relieve the members of their surplus cash.

At the last Rummage I became the owner of an almost new Robin CT 860 clamp meter for a bargain price of £20 (it's made by Fluke I believe).


I needed an instrument to read in the order of 200A DC for my garden tram which has chronic controller problems. On getting it home I found that it was dead, this before I'd put it anywhere near my 200A tram. So checking the 9V " Greencell " dry battery I found a healthy 9.15V so that was all right wasn't it? Out of interest I connected one terminal via it's snapon connecter and the other via an ammeter and found that the meter drew 150 mA so the thing wasn't completely dead, there was a circuit there. I wondered what sort of money the Fluke service centre charged for repairs and if it was worth asking. Then I had the bright idea of putting a volt meter across the re-connected battery with the instrument turned on. It came down from 9.15V to 2v.

I knew, of course, from my experience with electric vehicles that the voltage sagged under load but I didn't know that dry cells had such a high o/c voltage when completely shot. I thought it might be of interest to other members. I should add that all the time the testing and the looking up of Fluke's contact details was going on Doris was urging me to just try a new battery.

73, Jim M0JFL

**c) PIN diodes:** A PIN diode is a semiconductor device that operates as a variable resistor at RF and microwave frequencies. The resistance value of the PIN diode is determined only by the forward biased dc current. In switch and attenuator applications, the PIN diode should ideally control the RF signal level without introducing distortion which might change the shape of the RF signal.

An important additional feature of the PIN diode is its ability to control large RF signals while using much smaller levels of dc excitation. [Source Microsemi]

Each diode of this type consists of a P-region, an Intrinsic layer and an N-region, hence the name PIN. The intrinsic layer has a long carrier lifetime with a resistance that is dependant on the direct current passing through the diode. When used at frequencies whose period is significantly shorter than the carrier lifetime the diode cannot rectify and behaves like a variable resistance.

A low cost example is the BA479 which has a carrier lifetime of typically 4uS and is usable from 10MHz to 1GHz. It has a maximum self capacitance of 0.5pF, a series resistance of 50ohms at 1.5mA forward current and 10,000ohms at 1uA. At much higher power levels, the UM9401 is capable of passing 50W at 50MHz with a forward direct current of only 50mA and the resulting distortion products are -80dB.

A BA479 connected between a 50ohm generator and a 50ohm load provided an insertion loss of 0.5dB at 14mA forward current, 10dB at 230uA, 23dB at 25uA, 35dB at 2.5uA, 42dB at zero current and 45dB when reverse biassed.

PIN diodes may be used as series or shunt attenuators / switches or a combination of the two depending on the exact requirements.

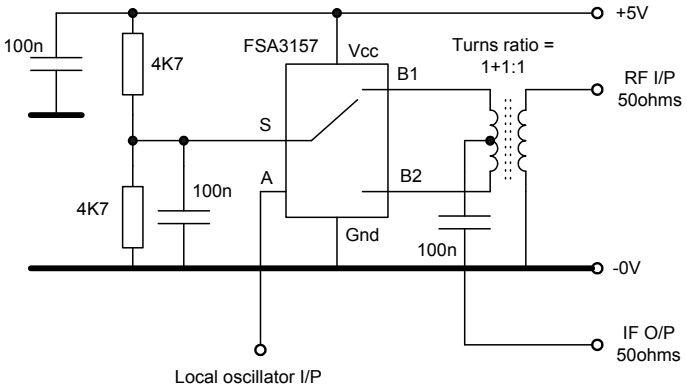
There are a range of diodes available for switch and attenuator applications with power ratings from milliwatts to kilowatts. More next month.

**d) Simple but effective mixer:** An extremely good single balanced mixer can be constructed, as shown below, using one FSA3157 analog gate, a simple RF transformer using two ferrite beads or a ferrite binocular core and a small handful of standard components. This mixer, which is half of an H-Mode mixer may be used in conventional superhet or direct conversion receivers. The dynamic range is high with a claimed third order intermodulation (IP3) rating of +40dBm in the HF bands.

The only downside is that the local oscillator waveform must be 4-5v pk-pk with very fast rise and fall times to get best results but this can be implemented using two or

three ultra high speed CMOS inverters like the NC7SZ04. All of the ICs are typically 20-50p each depending on quantity and supplier and will operate from a single 5v DC supply which should be regulated and low noise.

To minimise local oscillator radiation the circuit should be laid out in a symmetrical manner and screened. The mixer will typically have an insertion loss of around 4-6dB and regardless of the intermediate frequency should be followed by a diplexer and a low noise amplifier.



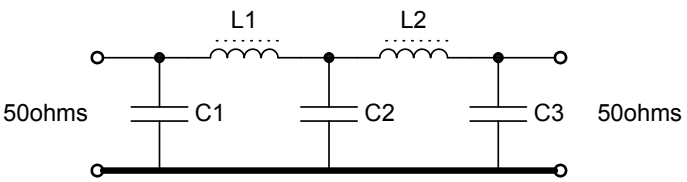

[Circuit courtesy of Chris Trask N7ZWY]

For best intermodulation product results the IF port should be terminated in 50ohms from the lowest frequency to at least five times the highest frquency in use so that there are minimal signals reflected back into the mixer.

The previously mentioned diplexer is a frequency selective device that will ensure that the mixer is terminated in 50ohms at all frequencies outside of the intermediate frequency (IF). The following stage which the mixer sees via the diplexer should have an input impedance of 50ohms. For a direct conversion receiver this could be a low noise grounded base audio amplifier to provide the requisite load impedance to the mixer.

The 100n output capacitor will need to be increased in value for direct conversion applications. Additional isolation between the aerial and mixer may be provided using a low noise RF preamplifier with 6-10dB of gain. Some RF selectivity should be provided.

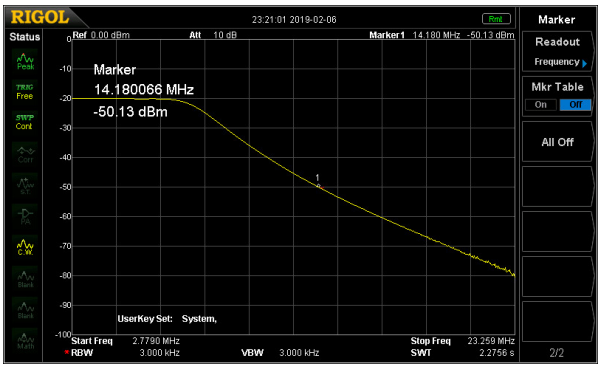
**e) 7MHz Low Pass Filter:** A simple two section constant-k low pass filter that has been developed for the Pixie and similar transceivers is shown below.




**Values:**
7.2MHz: C1 = C3 = 354pF, C2 = 707pF, L1 = L2 = 1.84uH

L1 and L2 are 19t 0.5mm enamelled wire wound on T50-6 (yellow) 0.5inch diameter iron dust toroids and the capacitors may be made up of polystyrene or silver mica standard values in parallel to achieve the total value e.g. 27pF + 680pF = 707pF.

The passband response is shown below with the marker at the second harmonic where the attenuation is approximately 30dB:




Adding another section would increase this to 45dB.

The values may be scaled for other bands. Next month a three section m-derived filter will be shown with a steeper slope into the stopband.

## Miscellaneous

The RSGB HF and VHF contest list may be accessed at https://www.rsgbcc.org/

The 'News from other Clubs' section is being rationalised as it has been difficult to get timely meeting information from some clubs.

## Notice Board – Wanted and For Sale

The Notice Board is for all club members to use so if you have one or more items that you wish to buy or sell then please send in the details. Some of the current list of items may be viewed at:
http://cprec.btck.co.uk/SaleofClubEquipment
All excl P&P.

## For Sale

**CPREC** has a large bank of fundamental and overtone quartz crystals, from 1.0 – 99.91MHz. The list, which is on the club website as a downloadable PDF file. Prices are £1 each to club members and £2 each to non members, excluding P&P. Contact Bob on 01737 552170 or g3oou(at)aol.com.

73

G3OOU

## Diary of External Events

### 24 February 2019 - Rainham Radio Rally

The Victory Academy, Magpie Hall Road, Chatham, Kent, ME4 5JB. Open 10am to 4pm, Entry £2.50, kids free. Local and national Traders, BRATS Kitchen, BRATS Interactive Zone for Kids, BRATS Junk, Talk In Station on 145.550MHz using GB4RRR.

### 24th March 2019 - Hamzilla Radio Fest hosted by Dover Amateur Radio Club

Discovery Science Park, Gateway House, Ramsgate Road, Sandwich, Kent CT13 9FF. RSGB exams, lectures and demonstrations, bring & buy, entry tickets available via the website. Sellers tables available.

Web: http://www.hamzilla.uk

**14th April 2019 - West London Radio & Electronics Show**

Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. A talk-in station will be on air. Car parking is free and doors open at 10am with disabled visitors gaining access 10 minutes earlier. There will be trade stands and a Bring & Buy as well as special interest groups and lectures. Catering is available on site. More details from Paul, M0CJX on 08451 650 351, info@radiofairs.co.uk.

**11/12 May 2019 - Mills On The Air**

This UK wide activity will take place during the weekend of 11/12 May and a considerable number of stations are expected to be active.

## News from other Clubs

**Club Secretaries** – please ensure that your future meeting details are present in your newsletters, on your websites or sent to our newsletter editor Bob G3OOU. Palace Pulse is published about ten days before our club meeting which is on the first Friday of each month and closes for editorial contributions a few days before publication. Due to differing publication dates and short lead times it is getting increasingly difficult to include other clubs' events although we will endeavor to do so if advised in time. If we are regularly unable to obtain the information then that club entry will be removed from this newsletter.

**Readers** - If you plan to visit one of these club meetings please check with the club concerned in case of any last minute changes.

**Bredhurst Receiving and Transmitting Society**

Meet on Thursday night from 8:30pm at the Parkwood Community Centre, Long Catlis Road, Rainham, Kent, ME8 9PN. Contact secretary@brats-qth.org or http://www.brats-qth.org/brats/

21 Feb Pre Rally Meeting
07 Mar Secret Chatham Talk by Philip MacDougal

**Bromley & District Amateur Radio Society**

Meets at 19:30 on the third Tuesday of each month at the Victory Social Club, Kechill Gardens, Hayes, Bromley, BR2 7NH. Contact Andy G4WGZ on 01689 878089 or enquiries(at)bdars.co.uk. Web: www.bdars.co.uk

19 Feb Morse Practice Evening
19 Mar Fix-it Night
16 Apr Exam Syllabus: What's Next?

**Chelmsford Amateur Radio Society (CARS)**

19:30 on the first Tuesday of each month at Oaklands Museum, Moulsham Street, Chelmsford, Essex, CM2 9AQ. Contact: secretary(at)g0mwt.org.uk Web: www.g0mwt.org.uk

05 Mar My Interest in Offshore Radio by Jim Salmon 2E0RMI
02 Apr A Canal Journey by Vic Rogers G6BHE

**Coulsdon Amateur Transmitting Society (CATS)**

8:15pm on 2nd Monday each month. Contact: Andy Briers G0KZT on 07729 866600 or secretary(at)catsradio.org. Web site: http://www.catsradio.org/

11 Mar Apollo 13 (deferred from Nov 2018)
08 Apr The Anderson Powerpole
13 May Construction Evening
10 Jun Annual DF Hunt
08 Jul Operating Evening

**Crawley Amateur Radio Club (CARC)**

Every Wednesday 20:00 – 22:00, every Sunday 11:00 – 13:00. Formal events are on the fourth Wednesday of the month, 7-30pm for 8pm. Phil M0TZZ on 07557 735265 or secretary(at)carc.org.uk or Web: http://www.carc.org.uk/

27 Feb GNU Radio by Stewart G3YSX
20 Mar History of the Magnetron by Mike Underhill G3LHZ
24 Apr The Drake R4C Receiver by Keith G3VKW

**Cray Valley Radio Society (CVRS)**

Meets at 8pm on the 1st and 3rd Thursday of each month at 1st Royal Eltham Scouts HQ, Rear of 61 - 71 Southend Crescent, Eltham, London, SE9 2SD. Contact: Richard on secretary[at]cvrs.org .Web www.cvrs.org

07 Mar Annual Construction Contest
21 Mar Planning, setting and running small scale special event stations
04 Apr Small Transmitting Loops
18 Apr AGM

**Dorking & District Radio Society**

Meetings at 7.45pm. Contact: David Browning (M6DJB) at djb.abraxas(at)btinternet.com. Web site: http://www.ddrs.org.uk

26 Mar Logger 32
23 Apr Element Interactions in Antennas by Garth Swanson
28 May Protecting Earth from the ravages of the sun by Colin Forsyth
25 Jun Morse code by Mary Ashdown

**Echelford Amateur Radio Society**

Meetings on 2nd and 4th Thursdays of each month at the Weybridge Vandals Rugby Football Club. Enquiries to John at jho_g4gsc(at)btinternet.com or 01784 451898. Web site: http://www.qsl.net/g3ues/index.htm

14 Mar Annual Construction Contest

**Hastings Electronics & Radio Club**

Meetings held at the Taplin Centre, Upper Maze Hill, St Leonards on sea, TN38 0LQ, 7pm for 7:30 on the fourth Wednesday of each month. Information from Gordon Sweet M3YXH on 01424 431909, email: sionet3344(at)hotmail.co.uk
Web: http://herc-hastings.org.uk/

27 Feb AGM (Committee Nominations to Terry, G4FET) Followed by "Bring Your Mystery Thing"
27 Mar Video Presentation

**Horsham Amateur Radio Club**

meets on the first Thursday of each month at the Guide Hall, 20 Denne Road, Horsham, West Sussex, RH12 1JF. NRQ TQ172304 at 20.00hrs local time. Contact Alister Watt G3ZBU at g3zbu(at)hotmail.com or http://www.harc.org.uk/

07 Mar Club Junk Sale
04 Apr 50 Years of computer Programming - Jon M0TWM

**Mid-Sussex Amateur Radio Society (MSARS)**

Meet most Fridays in the Millfield Suite, Cyprus Hall, Burgess Hill, RH15 8DX from 7.30pm till 10.00. Contact

Stella on 01273 844511, M6ZRJ(at)msars.org.uk or www.msars.org.uk
08 Mar Talk by John G8JBJ on Earthing
22 Mar AGM
29 Mar Radio Night and Table Top Sale

**North Kent Radio Society**
Meets at the Hurst Community Centre, Room 15, Hurst Place, Bexley, Kent, DA5 3LH. Doors open at 8PM. More information from Stephen G8JZT on secretary@nkrs.info or 07985 753370 evenings or weekends.
05 Mar Millimetric Microwaves by Chris G0FDZ
19 Mar Receivers over the Ages by Bob G3OOU
02 Apr antenna modelling by Ian Keyser G3ROO

**South East Essex Amateur Radio Society (SEARS)**
Contact Mark Callow 2E0RMT on 07842 336444 or secretary(at)southessex-ars.co.uk or http://www.southessex-ars.co.uk/
Meetings: 7pm 2nd Tuesday each month at The White House, Kiln Road, Benfleet, Essex, SS7 1BU.
12 Mar LOG40M: a talk presented by G4POP on this very popular logging software.
09 Apr "Our friends against scams presentation". Toni Baptiste from Natwest Bank will be telling us all about banking scams and how best to not become a victim of this increasingly worrying trend.

**Surrey Radio Contact Club (SRCC)**
7.30 for 7.45pm on 1st. and 3rd. Mondays every Month. Contact John Kennedy G3MCX on 020 8688 3322 or secretary(at)g3src.org.uk. Web: http://g3src.org.uk/
04 Mar Spring Surplus Equipment Sale
01 Apr Annual General Meeting

**Sutton & Cheam Radio Society**
8pm on 3rd Thursday every month. Contact Chris Howard at info(at)scrs.org.uk Web: http://scrs.org.uk/. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.
21 Feb Video Evening
21 Mar Talk by RSGB Regional Representative Keith Bird, G4JED
18 Apr 999 Emergency! Public Safety Communications, Past, Present and Future by Steve Shorey G3ZPS
09 May Annual General Meeting and construction competition
20 Jun Highlights of Dayton 2019 by Chris Howard M0CTH

Please replace the (at) with @ when using any email addresses shown in this newsletter.

Crystal Palace Radio & Electronics Club is a member of the South East Tutors training group.

**Local Training Courses**

| Licence Level | Dates | Location | Club Provider | Format | Further details |
|---|---|---|---|---|---|
| **Intermediate** | 17 Feb - 17 Mar | Bromley BR2 7NH | Bromley & District ARS | 3 days | www.bdars.org |
| **Foundation** | 23, 24 & 30 Mar | 7th Bandstead Scout HQ | Sutton & Cheam | 3 days (Sat/Sun) | Martin@m1mrb.co.uk |
| **Foundation** | 8 & 22 June | Crockenhill Village Hall | Darenth Valley | 2 days (Sat) | http://www.darenthvalleyrs.org |
| **Please note that a new syllabus will apply for all exams from July 2019.** | | | | | |
| **Foundation** | 22 Sep - 6 Oct | Bromley BR2 7NH | Bromley & District ARS | 2 days (Sun) | www.bdars.org |
| **Full** | 07 Oct - 30 Nov | Eltham, SE9 2SD | Cray Valley RS | TBA | www.cvrs.org |
| | = course commenced | | | | |

**CPREC Committee Information**

| **Officers:** | | |
|---|---|---|
| **Chairman:** | **Secretary:** | **Treasurer:** |
| Damien Nolan 2E0EUI | Alan O'Donovan G8NKM | Ian Skeggs M6FZC |
| E: cprec.g2lw(at)gmail.com | E: cprec.g2lw(at)gmail.com | E: cprec.g2lw(at)gmail.com |
| **Committee Members:** | | |
| Bob Burns G3OOU | Newsletter Editor | T: 01737 552170<br>E: g3oou(at)aol.com |
| Nick Stapley | Web Manager | |