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 7th December 2018

Christmas Social

In this issue: *Future Meetings & Events, Recent Event News, 200519 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 Club Meetings and Events

07 Dec 2018	M	Christmas Social
04 Jan 2019	M	Video Evening
01 Feb 2019	M	Annual General Meeting - see Members section in this news-letter
01 Mar 2019	M	TBC
05 Apr 2019	M	Construction Evening - Pixie QRP Transceiver
03 May 2019	M	CW Evening and Pixie Test & Maintenance

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

07 December 2018 - Christmas Social

This meeting will be our Christmas Social to which members, their partners and friends are invited. Some operation on-air will take place if time allows - early assistance would be appreciated with assembly of the station and aerials - the room should be open by 19:00.

Please bring along sufficient food for yourself and your guests to be included in the buffet. The club will provide the usual refreshments and there are heating facilities in the kitchen for sausage rolls, mince pies etc.

Visitors always welcome (with a contribution of course!).

Recent Event News

02 November 2018 - Introduction to Network Radio by Martin Butler M1MRB

This talk was first given to Sutton and Cheam Radio Society earlier in the year on the hot topic of Network Radio. It is important for new entrants into the hobby that we embrace modern technologies as well as those from the past.

Network Radio has been around for some twenty years but has only taken off in the six to twelve months. It is easy to use and the audio quality is excellent.

Network Radio is a new concept in ham radio. No matter where you go, you can still be in touch with your ham friends. It is primarily based on Voice over Internet Protocol (VoIP) and communicates via WiFi and 3G/4G Cellular Radio. This does not require an amateur radio licence but does require a SIM card with a data package and a software application which must provide a push to talk (PTT) control. However, if either end uses an amateur radio band to connect a user to the Internet then an amateur radio licence is required. If there is no WiFi then the user is limited to the local cellular coverage.

There are several software groups, mostly free for private use but commercial use may invoke a charge:

Internation Radio Networks (IRN), originally designed for gamers, is a VoIP/RoIP system using Teamspeak 3 (TS3) that allows radio users to transmit and receive on RF around the World using different devices (Mobile Phones, Tablets, Computers etc) for free.

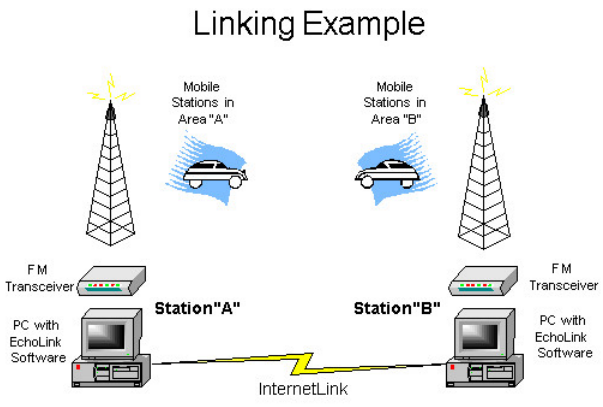
Zello:

- This is an app available for iOS, Android, Windows phone, BlackBerry and PC. The great thing about this mode is that you probably own all you need to get started. If you have a smartphone or a Windows PC then you are good to go.
- Martin recommends using your Amateur Callsign and your Name as your username.
- Requires authorisation by a moderator but receive facilites are immediately available.
- Once you have your account set up, it's time to join us and have your first QSO. Go to the Channels tab in Zello and choose the add button.
- In channels you can then search for us, or look for 'network radios' without the quotes.
- Key up and call for a moderator, giving your call-sign. With luck, one of us will call you back. Having your callsign visible on your profile makes the job of the moderator much easier. Once we are aware of your presence, your account will be authorised for you to start calling.
- Before authorisation, you will be able to hear traffic on the channels but you will only be able to speak to a moderator.

Team Speak 3:

- Teamspeak 3 (TS3) is an application initially designed for gamers.
- As with most technology, us hams like to find a way to adapt it for our own benefit.
- You can download TS3 for free direct from their website (Fee payable for iOs and Google Play only).
- Please note: This system is free to use for both non-licensed* and licensed hams.
- *Non-licensed users **do not have TX capabilities** on any Amateur Radio links or modes.

Echolink:



- Proof of a valid Amateur Radio Licence is required before you can access the network.
- Connections can be any mixture of Voip/RF or Voip / Voip
- Echolink runs on Personal Computers, Mobile Phones and Network Radios

PTT4U:

- Either 1-to-1 or 1-to-many radio communications.
- No range limitations. If you have cellphone coverage, you are connected! This means that each radio can be in different countries, and you are still in touch with your co-workers.

- There is no limit. As far as you have GSM/3G/4G or WiFi (Android models) signal you will be in reach. This means that you are only dependent on the cell-phone carrier service, or a WiFi hotspot.

CQ100:

- Just works right "out of the box" with no need to configure router ports. This means it can be used from hotel rooms, airports, public libraries, internet cafes, etc.
- Covers 5 HF radio bands - 80, 40, 20, 15 and 10 meter bands.
- Computer microphone provides voice modulation.
- Includes built in CW keyer. Simply type on the keyboard to send perfect CW.
- Spectrum graph shows radio activity within a settable sweep range of 50, 100, 200 and 500 kHz.
- Call sign, name, QTH, etc are automatically displayed for current transmitting station.
- Keyboard "Hot Keys" provide a simple interface for vision impaired operators.
- "Round-Table" QSO's are possible because any frequency may have a large number of listeners

Hamsphere:

- HamSphere® is a virtual Ham Radio Transceiver.
- Once installed, you will be able to communicate with thousands of Amateur Radio operators and Radio Enthusiasts in over 250 DXCC countries around the world.
- You can even use HamSphere without a Ham Radio license by using a special HamSphere call sign.
- HamSphere is a highly realistic shortwave simulation based on SDR (Software Defined Radio) technology.

Software Links:
http://www.internationalradionetwork.co.uk/
https://www.teamspeak.com/en/
http://www.echolink.org/
https://network-radios.com/index.php/2018/03/07/what-is-ptt4u/
https://zello.com/
http://www.hamsphere.com/
https://www.qsonet.com/

The last part of the talk featured a question and answer session with the audience also being asked about their opinions on network radio, for example - is it amateur radio?

18 Nov 2018 - CATS Bazaar

The annual CATS Bazaar took place on Sunday 19th November at the Oasis Academy in Coulsdon. For the sale we had many donated items from the estate of silent key David Eaton (G3TAO) plus items from silent key Victor Johnston (G1PKS) which we were selling on behalf of his widow Mary. Helping in manning the two tables we hired were Damien Nolan, Bob Burns, Jim Lugsden, David Howe, Mike Niven and myself.

The sale was well attended with plenty of dealers selling all sorts of electronic bits and pieces. One of the items for disposal from Victor's estate included a box of valves which Damien managed to sell to a dealer for £75. The valves included a new 6146, two new Mullard QQVO3-20s' plus some audio valves in their boxes, however I was surprised at how much people will still pay for old valves these days.

Overall we took approximately £675, with £300 going to club funds and the rest to Victor's estate. The club still has two Drake transceivers to dispose of which are quite valuable but didn't sell on Sunday. Thanks must go David Eaton's widow Jean for donating so much, Geoff Godfrey for coordinating its disposal plus of course Damien for storing and "humping" it to the sale.

Alan G8NKM

200519 by 'Theorist'

When the first Viking probe landed on Mars in July 1976 and started sending back pictures there was a surprise – the sky was blue, very much like that of the Earth. This had not been expected and I recall Patrick Moore and James Burke discussing it. Eventually though somebody noticed that in one photo a bit of the probe was visible, and that an exposed cable known to be red was showing up in a different hue. In other words that there was something wrong with the colour balance of the imaging. When corrected the Martian sky became pink.

For the last 130 years or so the kilogram has been defined as the mass of a cylinder of a platinum alloy held in controlled conditions in Paris. It is known as the international prototype kilogram or IPK, or simply as 'Le Grand K', and was made in 1889 (see photo below). Copies have been made and are held by national standards organisations such as the National Physical Laboratory at Teddington, and Le Grand K itself has 6 copies nearby for reference purposes. The trouble is that Le Grand K has lost mass compared to the 6 copies and the others held around the world, for no good reason. The difference is only detectable by the most sensitive instruments, being of the order of tens of micrograms, but it is real.

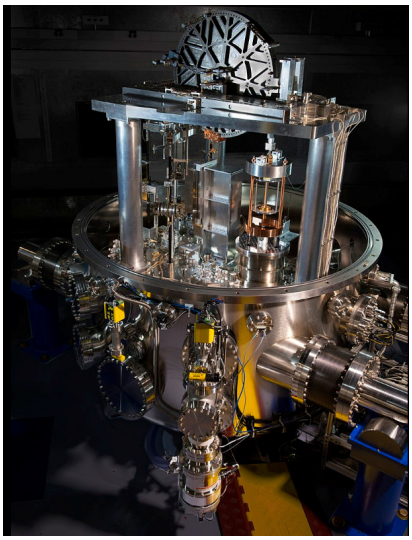
You may have picked up a report in recent months that the kilogram was going to be redefined, and by the time you read this it will have been, as well as the date at which the new standard will be implemented. Weights and measures are obviously important not just so that you know what you are getting when you buy a can of beans or a bottle of wine, but for the scientific community so that all measurements around the world can be reliably and consistently compared. The definition of the 7 fundamental SI units has therefore changed over the years as measurement techniques and technology have improved.

Taking the metre as an example, this was originally defined in 1793 as one ten-millionth of the distance from the equator to the North Pole. A standard meter bar was made in 1799 based on measurements of the shape of the Earth (and thus the relevant distance), but it was eventually realised that there had been a miscalculation with the degree of the Earth's flattening, so a new bar was made in 1889. In 1960, the metre was redefined in terms of a certain number of wavelengths of a particular emission line of Krypton-86, but in 1983 the present definition was adopted as the distance light travels in a vacuum in 1/299,792,458 seconds. This linked the definition of the metre to a fundamental physical constant, the speed of light, and so became *independent of a physical object* or artefact. Note though that this required that the speed of light be *defined* as exactly 299,792,458 m/s rather than measured as somewhere near this value, with an error attached.

In fact the long term ambition of the various world's standards laboratories has been to link the definition of all 7 fundamental SI units to constants of nature, and with the adoption of the new proposed definition of the kilogram this will have been achieved. The metre, second and candela are already linked to physical constants, and the date to adopt new definitions of the Ampere, mole and Kelvin (together with the kilogram) all relying on physical constants has been agreed as 20th May 2019. The Amp will be linked with the charge on the electron, the mole with Avogadro's constant and the Kelvin with Boltzmann's constant.

The new definition of the kilogram will link it with Planck's constant, the fundamental 'quantum of action', in an indirect way. Planck's constant relates the energy of a photon to its frequency by the simple formula $E = hv$ where v is the frequency of the electromagnetic radiation and h is Planck's constant. Since energy and mass are equivalent (think $E = mc^2$) Planck's constant therefore also relates mass to frequency. When the change is implemented next May it will be defined precisely as $6.626070150 \times 10^{-34}$ Js with no error.

A balance/pair of scales is the best historic way to measure mass or weight. Instead of using a physical weight as one side of the balance the new approach/definition will involve balancing a weight by an electromagnetic force generated by a current-carrying coil hung in a magnetic field. The full practical details are just a bit too complex to explain here, and would involve an explanation of the 'quantum Hall effect' and the Josephson effect/Josephson junction. As the voltage and the current used to balance the weight can be related to quantum electrical standards, the kilogram can be defined in terms of the fixed value of the Planck constant plus the existing definitions of the metre and the second. Complicated or what? Incidentally the balance used is called a Kibble balance and was invented at the NPL (see photo to the right).



What has all this to do with Mars? Well there is still some controversy about images returned from probes on the surface of Mars and what colour correction (if any) should be applied. In fact NASA publishes three versions of each image: a RAW image, a colour corrected image which is designed to show what a human on the surface of Mars would see, and a white balanced image that shows what the scene would look like under Earth lighting conditions. There is also no guarantee that after the rigours of a long journey through space, together with a launch and landing, that any sensor will be in the state it left Earth.

This is particularly important for satellite probes in orbit around Earth; there are dozens of instruments investigating things like climate change and forestation, and after a space launch these may not be exactly as calibrated. This is why the next step for the standards agencies is to devise a space-based set of standards and a means of referring to them.

Members News

a) The club subscription year ends on 31st December so subscriptions become due on 1st January 2019. Our Treasurer Ian is always happy to accept your subs early.

b) Len M6KVW is currently exploring ways of learning Morse. Anybody else interested?

c) Jim M0JFL sends his apologies for missing the last few nets as he has a new French lesson on Wednesday evenings.

d) **Budget USB Microscope by Damien 2E0EUI**

I had been looking at these budget microscopes now for sometime (I do love a gadget) and of course with so many now available in different flavours I thought stuff it and pulled the trigger.

This particular model was purchased through Amazon UK for around

£15.00 but you can get them direct from China for around £10.00.

As the name implies this microscope is powered via USB so can be powered from your computer, mobile phone or tablet. The microscope comes with a little stand and has adjustable LED lighting built in (incredible for the price) and a software disk with drivers etc.

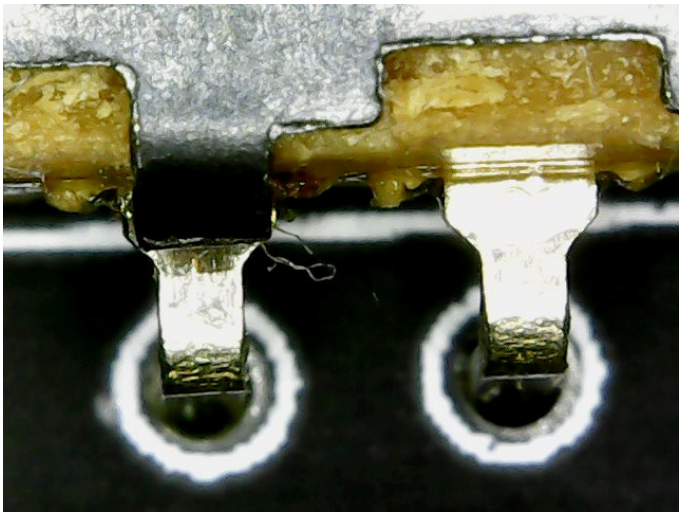
But does it work? Well I have to say that I'm very impressed by the performance of this little micro-scope and for the price it is incredible. It has built in LED lighting, adjustable zoom and photo capture (via software). The build quality is cheap but more than adequate for the price.

This is a great addition to the shack for those of us with failing eye sight or for those tricky SMD jobs. This is the link to the one I purchased on Amazon.co.uk:

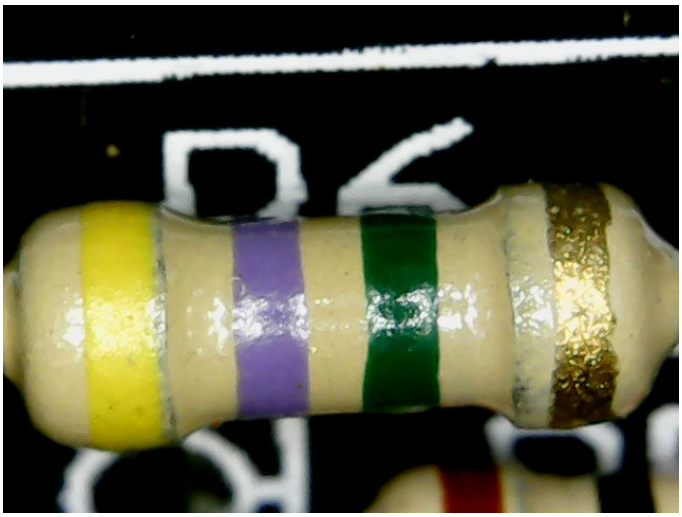
https://www.amazon.co.uk/gp/product/B06WD843ZM/ref=oh_aui_detailpage_o01_s00?ie=UTF8&psc=1

Below is a selection of photos captured via the included software and the Mscope software on android.

Switch Solder Tabs



Resistor Close Up



20p Piece Close Up

73 Damien 2E0EUI

Technical Snippets

a) Temperature Testing: I have just completed the construction and test of a temperature controlled box that will be used for testing electronic modules before they are incorporated into more complex units.

From right to left are the blue control panel holding all of the electronics and fan motor, the narrow compartment holding the heater, temperature sensor and circulation fan, the larger area that will hold items under test on a perforated metal grill and the lower area that will hold the freezer blocks. Air circulates anti-clockwise when viewed from the front.

The temperature sensor is a negative temperature coefficient thermistor mounted on a copper plate with a range of -30°C to +70°C. So far the temperature range resulting from the two internal 25W heaters and thermostatic controller is room temperature (+20°C) to +59°C. Cooling will be implemented by the use of freezer blocks in the lowest compartment which should provide a minimum temperature of 0°C. Anything lower will use the freezer compartment of a fridge (-10°C) or a household freezer (-18°C).

Foam rubber draught excluder is used to seal the gaps between the case and front panel. The front panel is held in place with a piano hinge and a conventional latch. A layer of insulation will be added to the inside surfaces to reduce heat losses.

I learnt a valuable lesson many years ago that electronic items that work correctly at room temperature do not always work correctly at elevated or reduced temperatures or elevated humidity. This will be a useful addition to my test equipment.

b) Texas Instruments have announced the TIDA-01168 bidirectional DC-DC converter reference design for 12v/48V automotive systems. It will take a DC input on either side and produce the appropriate output on the other side. See http://www.ti.com/lit/ug/tiducs2b/tiducs2b.pdf

c) Minikits in Australia have a wide range of RF modules and kits for HF/VHF/UHF communications. See https://www.minikits.com.au/

Miscellaneous

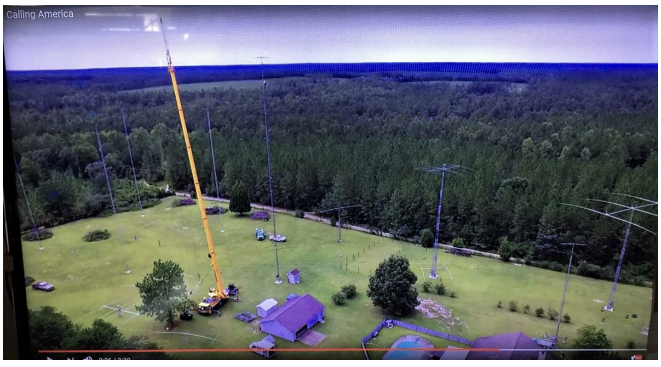
a) Large Amateur Radio Shacks - continued

To accompany a large radio shack you need an appropriate number of HF/VHF aerials.

i) W6LG steerable EME Array of 4 x 8 stacked 15 element Yagis (a total of 480 elements):

ii) Stan KE5EE is a retired professional photographer with an impressive station and antenna farm located in Molino, Florida. There are seven towers including one at 200 feet and a full size Four Square phased array for 160m.

The aerial farm (and crane):



The photo below shows the rotatable 200ft tower containing a stack of six Steppir 3 element yagis - a maximum of 18 elements on each band or can be used in separate groups.

The entire aerial farm installation required thousands of feet of coax and control cables, significant lightning protection and a lot of concrete for the tower and guy foundations. The 200ft tower required a 9ft x 9ft x 9ft hole in the ground filled with reinforced concrete plus supporting guys that must avoid contact with the aerials during rotation.

See https://www.qrz.com/db/KE5EE for more information on his station.

Not sure what the UK planning people would have to say though?

b) Amateurradio.com has published a comprehensive list of kit and component suppliers at:

http://fofio.blogspot.com/2015/07/radio-kit-guide.html

c) Licence Revalidation: if you hold an amateur radio licence you must revalidate it at least every five years by signing on to your account on the Ofcom website and checking or updating your information. If you fail to do so Ofcom will revoke your licence.

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.

Wanted

Quartz crystals on 25.10MHz and 34.10MHz in HC6/u, HC18/u or HC25/u package. Contact Bob on 01737 552170 or g3oou(at)aol.com.

For Sale

a) Mast sections: One 14 foot section and up to eight approximately 4 foot 6 inch sections of two inch nominal diameter aluminium scaffold poles with 2 internal steel couplers. £40 the lot - buyer collects. Contact Bob on 01737 552170 or g3oou(at)aol.com.

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

03 February 2019 - SEARS 35th Canvey Radio & Electronics Rally

Cornelius Vermuyden School, Dinant Avenue, Canvey Island, Essex SS8 9QS. A new venue for 2019, open at 10am, disabled visitors 9:45am. Free car parking, easy level ground floor access to 2 large halls. Admission £3. Tea , coffee and soft drinks will be available, as well as bacon butties. Radio, computing and electronics traders and special interest groups. More details from the rally co-ordinator on tony@tonystreet.net

10 February 2019 - Harwell Radio and Electronics Rally

Didcot Leisure Centre, Mereland Road, Didcot, Oxon, OX11 8AY (3 miles from Milton Interchange on A34). Open 10am to 3pm, admittance £3.00 (under 12s Free). Free car parking , disabled parking and facilities. Traders, Special Interest Groups and RSGB Bookstand. Refreshments available all day. Talk in on 145.550MHz, using G3PIA. Details from Ann, G8NVI on rally@g3pia.net or www.g3pia.net/radio-electronics-rally

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

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/

06 Dec Tx Factor Episode
13 Dec BRATS Christmas Party 2018
17 Jan Bring and Talk

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

18 Dec Quiz and Mince Pies by G0HIQ
15 Jan AGM and Programme

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

04 Dec Xmas Social
08 Jan 19 My Interest in Offshore Radio by Jim Salmon 2E0RMI
05 Feb 19 Sub-Surface Comms – in tunnels etc by Peter Bridgeman G3SUY

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/

10 Dec CATS AGM

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/

28 Nov HARC/CARC Challenge
07 Dec Annual Fish and Chip Supper
23 Jan 19 Club AGM

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

06 Dec Broadcast Radio
13 Dec Christmas Meal
20 Dec Christmas drinks and buffet at the Park Tavern
17 Jan 19 Annual Planning Meeting

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

27 Nov AGM & RSGB Video
07 Dec Christmas Dinner

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
13 Dec Christmas Party - in the bar at the Vandals

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/
28 Nov DVD Show by Tony Lunn G0EYE
Dec No meeting

Hereford Amateur Radio Society
Meets on the first Friday of each month at Hill House, Newton, Nr Leominster, HR6 0PF. Contact: enquiries@herefordradioclub.uk or http://herefordradioclub.uk/

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/
06 Dec Club AGM
08 Dec HARC Christmas Bash
20 Dec Club Social at The Cricketers Arms, Wisborough Green.

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
07 Dec Christmas Dinner in house
14 Dec Christmas Quiz

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.
11 Dec Club Meeting: Christmas social, come along for some nibbles and a brew and a good natter.
08 Jan 19 Club Meeting: IMPORTANT pre-rally meeting, this is the life blood of the club and we should all be involved.
03 Feb 19 Canvey Radio & Electronics Rally.
12 Feb 19 Club Meeting: Post Rally debrief & discussion.

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/
03 Dec Construction evening
17 Dec Informal pre-Christmas get-together

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.
13 Dec Social evening and friendly quiz
17 Jan 19 Practical Fault Finding

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
Foundation	02 - 09 Feb 2019	Eltham, SE9 2SD	Cray Valley RS	2 days (Sat)	www.cvrs.org
Intermediate	17 Feb - 17 Mar 2019	Bromley BR2 7NH	Bromley & District ARS	3 days (Sun)	www.bdars.org
Foundation	Autumn 2019 to be confirmed	Bromley BR2 7NH	Bromley & District ARS	2 days (Sun)	www.bdars.org
Full	Nov 2019	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 E: g3oou(at)aol.com
Nick Stapley	Web Manager	