CPREC

G2LW

Palace Pulse

The newsletter of the

Crystal Palace Radio & Electronics Club

Affiliated to the Radio Society of Great Britain

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:	http://www.g3oou.co.uk/
	Technical:	http://www.qsl.net/g3oou/
Club Net:	Each Wednesday at 20:00 on FM on 145.525MHz (S21) ± QRM	
Twitter	@BobFBurns or www.twitter.com/bobfburns	

Some 2017 subscriptions are now overdue. Members who have not paid by the end of March will be deemed to have resigned. Please send your cheque for £12.00 made out to 'Crystal Palace Radio & Electronics Club' to our Treasurer or pay at the next club meeting.

Next meeting: 7th April 2017

Club project - Frequecy Counter Design Considerations and the use of KiCad by Alan O'Donovan G8NKM

In this issue: *Future & Most Recent Meetings, One Nil by 'Theorist', Technical Snippetts, , Miscellaneous, Noticeboard, Diary of External Events, News from other Clubs, Local Training Courses and Club Contact Information.*

See page 7 for club contact information

Dear Reader

Future Club Meetings and Events

07 Apr	M	Club project - Frequecy Counter Design Considerations and the use of KiCad by Alan O'Donovan G8NKM
10 Apr	CM	Committee meeting at QTH of G3OOU, commencing 19:00.
05 May	M	One Route Through Product Design - Part 1 by Bob Burns G3OOU
04 Aug	M	Summer Social
01 Sep	M	Antenna Modelling by Quin Collier
06 Oct	M	SDR Without Maths by Alan G0TLK
01 Dec	M	Christmas Social

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

07 April 2017 - Club project - Frequecy Counter Design Considerations and the use of KiCad by Alan O'Donovan G8NKM

This talk is a general overview of the steps followed in the design of the recent club project and explores the use of an Arduino as an embedded controller and the problem of performance versus cost encountered. The second half of the talk looks at the use of KiCad, an open source PCB design package which was used to layout the frequency counter's PCB.

30 April 2017 - Kempton Park Rally

Our Secretary Alan has booked two tables for this rally. We have received considerable number of equipment donations and these items are to be sold to benefit club funds and keep subscriptions down (see the end of this newsletter for some of the items).

We will need assistance at this event so please contact Alan with offers of help. There are a limited number of free entry tickets for helpers at this event.

Recent Event News

03 March 2017 - Spectrum Utilisation Efficiency – 4G and Beyond by Ian Clark

This was an extremely interesting and well attended meeting. Ian presented an illustrated talk on the development of mobile phone technology and the spectrum used from 1G (first generation) in the early days to 4G which is now in use and 5G which is in development and expected to be widely available by 2020.

Mobile (or Cell) Phone technology is based on the use of a hexagonal shaped cell with a base station transceiver and aerial on the highest point somewhere near to the centre of the cell. The dimensions of the cell depend on the frequencies in use by the base station and will reduce with increasing frequency. A handover protocol controls the communications between a moving user and their nearest base stations.

The major complaint by mobile phone service providers is lack of spectrum space - more is always needed - as it is always 100% live usage. Television on the other hand, typically has 10% of live usage and the rest is watched from supplier site replays via the Internet or from video recorders.

Because of the relatively limited amount of available frequency spectrum phone designers have had to come up with coding and transmission protocols that enable increasing amounts of information to be compressed into the same or less space and more channels to be handled by a single transmitter. This has had a significant effect on the design of the handset and the base station transeivers and aerials and the amount of computing power needed for encoding and decoding.

The following is a list of abbreviations, coding and transmission protocols:

AMPS	Advanced Mobile Phone System.
Bps	Bits per second.
BPSK	Binary Phase Shift Keying.
Edge	Enhanced Data GSM Environment is a faster version of GSM, 150Kbps.
FDMA	Frequency Division Multiple Acces.
GSM	Global System for Mobile Communications, 9.6Kbps.
GPRS	General Packet Radio Service, 50Kbps.
HSPA (3.5G)	High Speed Packet Access, 10Mbps and 15 frequencies at the same time with 200 negotiations per second.
HSPA+ (3.75G)	A further development of HSPA that offers data speeds of up to 40 Mbps with 1000 negotiations per second.
IP	Internet Protocol.
LDMA	Location Division Multiple Acces.
LTE	Long Term Evolution, 100Mbps.
LTE adv.	Long Term Evolution Advanced, 1Gbps.
MIMO	Multiple Input Multiple Output.
OFDM	Orthogonal Frequency Division Multiplexing. Typically 1200 channels of 15KHz bandwidth.
OFDMA	Orthogonal Frequency-Division Multiple Access is a multi-user version of OFDM.
QPSK	Quadrature Phase Shift Keying.
Spread Spectrum	A method by which a signal may be spread in the frequency domain to enhance security.
TDMA	Time Division Multiple Access.
UMTS	Universal Mobile Telecommunications Service.

Frequency spectrum allocations include:

Unlicensed slots at 866MHz, 2.4GHz, 5GHz and 60GHz

Licensed slots at 800MHz, 900MHz, 1.8GHz, 2.1GHz and 2.6GHz.

First Generation (1G) was an analogue cellular system using FDMA.

Second Generation (2G) is a digital cellular system using FDMA and TDMA with 200KHz channel bandwidth.

Third Generation (3G) is a digital cellular system better known as mobile broadband and uses LDMA to achieve 400Kbps. Each radio channel is 5MHz wide.

Fourth Generation (4G) is a digital cellular system that implements Native IP Networks using LTE with a typical latency of 5mS. The complex waveforms in 4G use fast fourier transforms to separate out the individual channels. Voice only transmissions fall back to 3G at the moment. The current specification is now at release number 14.

Fifth Generation (5G) will reduce the latency to 1mS and increase data speeds to 4Gbps. Communications between the base station and handset will be completely renegotiated every millisecond. It is proposed that the Internet of Things and self drive cars will use 5G.

MIMO can double the number of channels in a given bandwidth but needs the base station aerials to be spaced apart. Massive MIMO requires hundreds of aerials and very high processing power.

Developers are investigating if the television white space could be used for mobile phones.

This talk, although it just scratched the surface of mobile phone technology, made us all realise just how much complex technology and computing power is packed into the small unit that we carry around each day and mostly take for granted.

What's next? According to articles in the technical press, manufacturers, designers and universities are already talking about 6G.

One Nil by 'Theorist'

There are 10 types of people, those who understand binary, and those who don't. In digital electronics at least two voltage levels are needed to represent a binary signal or number. It doesn't matter what the voltage levels are, as long as they are different and can be distinguished.

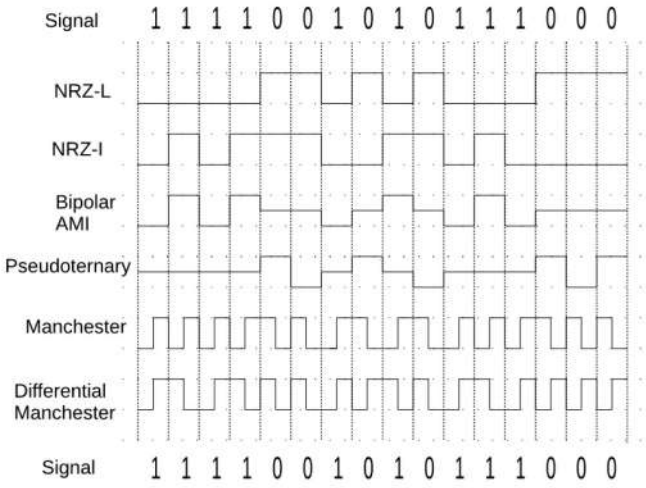
The simplest and obvious method to code a binary signal is to use one voltage level to represent a 0, and another to represent 1, as in the first row in the diagram. Just to make things a bit more interesting, a 1 is represented by the low voltage level and a 0 by the higher voltage level. This method is called the Non-Return-to-Zero Level (NRZL) method. A problem with this is that a long series of 1s or 0s can cause loss of synchronisation with whatever is receiving the signal, as nothing is changing, and it is easy to add or lose a bit.

A partial solution to the synchronisation problem is to use the NRZI 'Non-Return-to-Zero Invert' method, used on CDs and DVDs as noted in the 'Shiny Side Down' article in the February newsletter. This is a 'differential' coding scheme, where differential means that each bit encoded depends in some way on the preceding bit. In NRZI the voltage level changes to encode a 1, but remains unchanged when a 0 is encoded. Because each voltage level depends on the preceding level it is not possible to tell, just by looking at the voltage, what it represents. Both a 1 and a 0 can be represented by either the low or high voltage, so the history of the sequence is needed, as is the start level. In the NRZI row in the diagram I have started with the lower voltage. This coding scheme, and other differential schemes, are useful in the presence of noise since transitions are easy (or easier) to detect, and aid synchronisation.

So called 'Multi-level binary schemes' use three voltages to represent binary. A middle voltage level is needed, midway between the higher and lower voltage level. In the Bipolar-AMI (alternate mark inversion) method a 0 is always represented by the middle level, but a 1 depends on how the previous 1 was encoded. If the previous 1 was represented by the higher voltage level, then the next 1 will be represented by the lower voltage, and vice-versa. An advantage of this method is that by alternating the voltage on a 1, extra synchronisation information is available. However, long sequences of 0s are still problematic.

The 'Pseudoternary' method is the same as Bipolar-AMI, but swopping the roles of 1s and 0s. Thus 1s are represented by the middle level, alternating high and low voltages for a 0. In the Pesudoternary row in the diagram the first 0 encountered is represented by the high level, the second low, the third high, the fourth low, etc. The middle level (assumed to be 0 Volts) is reserved for 1s.

Two other methods, the Manchester and the Differential Manchester, are 'bi-phase schemes' which involve extra voltage transitions in the middle of each interval. The Manchester scheme encodes a 0 by a transition from a high to a low voltage level, a 'downward transition', in the middle of the interval. A 1 is encoded by a transition from a low to a high level in the middle of the interval. At the end of an interval, on the 'beat' as it were, the voltage level may have to change to prepare for the next bit that is to be sent. Every 0 will therefore always have a downward transition in the middle of an interval, but a 1 will always go up mid interval. You can therefore easily tell whether each bit is a 1 or 0 simply by looking at the mid-interval transition direction.



The Differential Manchester method is both bi-phase and differential. A transition is always made mid-interval, as with the Manchester scheme, but a 0 is

encoded by switching voltage level at the start of an interval, while a 1 is represented by no transition at the beginning of an interval.

These bi-phase schemes require an increased data rate to encode the same amount of information as the other schemes mentioned. This is an expensive overhead, but the advantage is that extra synchronisation information is provided by the transitions.

A later article may deal with the advantages and disadvantages of these methods in depth.

Club Membership

a) We welcomed two new members, Carl White and Jonathon Smith at the March meeting.

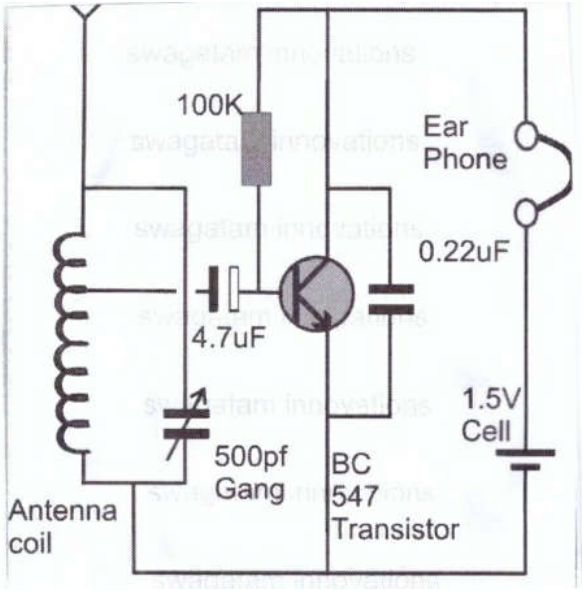
b) Renewals - there are a small number of outstanding subscription renewals. If these are not received by the end of March then those members will be deemed to have resigned, losing all benefits of membership including this newsletter.

Technical Snippets

a) Simple starter receiver for newcomers to radio construction

Following my short article on the one valve radio used in WW2 I looked into the circuits for a one transistor radio. This would mean the 2v wet and HT voltage batteries are no longer be needed. There are many designs dating back to the 1950 when transistors were coming into general use.

The circuit shown below is of a simple design and can be constructed on a piece of copper backed or circuit board.



Do not spend lots of money on the components. Ask your colleagues for items from their junk boxes.

When making the coil the details will depend on the size of you coil former, (perhaps a 1 inch piece of wood, or cardboard,) and the wire thickness. Once you have decided on them details of the number of turns can be found in many of the construction manuals that can be found in your Club's library.

The 500pf gang. These were commonly used in valve radios, usually two or there gangs and may be found in a junk box.

Resistors and capacitors, again are held in many junk boxes. The earphones should be high restance, and earpieces from hearing aid will work.

Lastly the transistor BC547 is available from Farnells at 15p.

You may need a long wire aerial to obtain a good result, but it is worth a try.

All the best.

Victor G1PKS

b) Simple Receivers

The circuit in the above article that Victor has provided uses the active device (npn transistor) as both the signal detector and audio amplifier but does not use any form of regeneration. It will only work with amplitude modulation (AM) signals and the Q of an equivalent tuned circuit at VHF would be insufficient for slope detection of FM signals.

The transistor should be biased just into conduction and have an Ft value of at least ten times the proposed operating frequency. At frequencies in the MediumWave broadcast band almost any modern small signal npn device would be suitable.

As the input impedance at the base will be relatively low the tap on the tuned circuit should be close to the cold end - say 10-20% of the number of turns.

As shown, a short aerial of a few feet in length will be fine for strong local signals but if a much longer wire is to be used, it may need to be tapped down the inductor to avoid loading it excessively and reducing the Q.

A reaction or regenerative detector will provide more gain and increased sensitivity but reduced dynamic range. Its adjustment is much more critical and also affected by the received signal level. In addition, an amplifier is required between the aerial and detector stage to prevent the oscillatory signals from the detector being broadcast by the aerial and causing interference to other local listeners.

It would be possible to add a tuned RF amplifier to the circuit in Victor's article which would increase both the sensitivity and selectivity - this was known as a TRF (Tuned Radio Frequency) receiver.

The increase in selectivity would help in rejecting signals from transmissions close in frequency to the wanted signal. The increase in gain may require some some of AGC (Automatic Gain Control) to prevent overloading the detector with strong local signals.

Propagation on the Medium Wave band improves during the evening and more distant stations will become audible, making increased demands on this simple type of receiver

As ever, experimentation will be required which always helps the learning process.

Miscellaneous

a) TX Factor is a series of high definition TV shows covering all aspects of the hobby of amateur radio - a professionally produced programme, now into its fourth year. See http://www.txfilms.co.uk/txfactor/ for more information and each of the 14 free episodes.

b) A Brain Teaser - can you read this coded message?

7H15 M3554G3 53RV35 70 PR0V3 H0W OUR M1ND5 C4N DO 4M4Z1NG 7H1NG5! 1MPR3551V3 7H1NG5! 1N 7H3 B3G1NN1NG 17 WA5 H4RD BU7 N0W, 0N 7H15 L1N3 Y0UR M1ND 1S R34D1NG 17 4U70M471C4LLY W17H0U7 3V3N 7H1NK1NG 4BOU7 17, B3 PROUD! ONLY C3R741N P30PL3 C4N R3AD 7H15!

c) Historical Publications

If you are interested in researching or just reading older electronic publications there is a collection of Practical Wireless magazines dating from 1932 to 1989 on the following site:

http://www.americanradiohistory.com/Practical_Wireless_Magazine.htm

The cover price was 2^{d} (two old pence) in 1932, 9^{d} in 1945 and £1.30 in 1989.

The site is a vast source of electronics and engineering information in addition to Practical Wireless and well worth exploring.

d) Silent Key Equipment - Alan had a call late last year from the widow of previous club member Jim Alford, asking if Jim's remaining equipment and components could be removed from her home. Alan did so and brought along some of the items to be sold at the March meeting with the proceeds going to club funds.

e) New UK Currency - The old £5 note (paper not polymer) must not be used after 5th May 2017. A new £1 coin will be in use from March 28th 2017. The old £1 coin must not be used after 15th October 2017

The Bank of England is withdrawing the paper £5 note which features a portrait of Elizabeth Fry on the reverse. This has been replaced with a polymer £5 note, featuring Sir Winston Churchill. Some retailers, banks and building societies may still accept these notes, however this is at their own discretion.

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. The current list of items may be viewed at: http://www.g3oou.co.uk/ in the "Notice Board – Wanted and For Sale" section.

For Sale

- Dell Inspiron Mini10 10inch notebook running Windows XP SP3, 149GB hard drive, 1GB of RAM, HDMI, Ethernet and 3 USB ports, WiFi, mains charger, no CD/DVD £50 ono
- Precision permeability tuned solid state VFO with built-in reduction drive, 7.6 - 8.8MHz £75. A photo may be seen at http://www.qsl.net/g3oou/pto.html
- 1.4MHz crystal filters for USB & LSB, all tested, £15 each
- Pye 455KHz LC filter, 15KHz wide, £3

All excl P&P. Contact Bob G3OOU on 01737 552170 or email g3oou(at)aol.com

- Acer 19" - VGA and DVI inputs tested at 1280 x 1024 - £15
- IBM 17" - VGA and DVI inputs tested at 1280 x 1024 - nice stand - £15
- AOC 17" - VGA inputs tested at 12080 x 1024 - £15
- DIX 19" - VGA input, Wide screen, tested at 1440 X 900 - menu button problem but works ok £10.

All excl P&P. Contact Alan G8NMK on 020 8778 9660 or email alan.odonovan(at)btinternet.com

CPREC has a large bank of fundamental and overtone quartz crystals, from 1.0 – 99.91MHz. The list has now been updated, sorted in frequency order and placed on the club web site notice board. Prices are £1 each to club members and £2 each to non members, both plus P&P.

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G3OOU

Diary of External Events

12 Mar 2017 - Dover Radio Rally
Whitfield Village hall, Sandwich Road, Whitfield, Dover, CT16 3LY. Doors open at 10.00am. The auction starts at 12.30pm. The rally ends at 1pm. Entrance is £2.00. Talk in on GB3KS, Bring & Buy table. Selection of Hot and cold refreshments and good parking facilities. Information from Peter G0KOK, email - events@darc.org.uk

30 Apr 2017 & 5 Nov 2017 - West London Radio & Electronics Show (Kempton Rally)
Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. Talk in and on site car parking. Opens 10am. Traders, Bring & Buy and special interest groups. Details from Paul, M0CJX on 0845 165 0351, info@radiofairs.co.uk. www.radiofairs.co.uk

6 MAY 2017 - SERF 2017 – Southern Electronics & Radio Fair (Eastbourne Rally)
Eastbourne Sports Park, Eastbourne, East Sussex BN21 2UF. Open 10am to 4pm. Entry £3 and children under 16 free. Free parking. There will be inside & outside traders, a flea market, boot fair, auction, RSGB bookstall and Special Interest Groups. Hot and cold refreshments. Details from Dave, G8PUO on 078 0707 4538 www.serf.org.uk

19-21 May 2017 - Dayton Hamvention®
(new venue) at Greene County Fair & Exposition Center, Xenia, Dayton, Ohio, USA. Doors open at 8am. There will be trade stands and a huge flea market as well as special interest groups and an RSGB bookstall. A lecture programme will take place each day. There are multiple catering outlets and family attractions on site. US exams are

available and there is a raffle. Details by email to international@hamvention.org. [www.hamvention.org].

21 May 2017 - 34th Dunstable Downs Radio Club Annual National Amateur Radio Car Boot Sale
Stockwood Park, London Road, Luton, Bedfordshire LU1 4LX in Luton on Sunday 21st May 2017. Entry/car park fee is £3. All the usual facilities will be there. [www.ddrcbootsale.org]

11 June 2017 - East Suffolk Wireless Revival (Ipswich Radio Rally)
New venue: Kirton Recreation Ground, Back Road, Kirton. IP10 0PW just off the A14. Opens 9:30, free car parking, entry £2. Trade stands, car boot sale, Bring & Buy, Special interests groups, GB4SWR HF station and RSGB bookstall. Catering is available on site. Contact Kevin, G8MXV,0771 0046 846 [www.eswr.org.uk]

18 June 2017 - 30th Newbury Radio Rally
Newbury Showground, next to Jcn 13 of M4, Berkshire. Free parking on site, entry £2.50 or £12.30 for those in the car boot area. There will be an amateur radio station on display, exhibits, special interest groups, clubs and societies. On site catering and disabled facilities. Open to sellers at 8am and to the public from 9am. Advance bookings (with discount) can be made via www.nadars.org.uk/rally.asp

14-16 JULY 2017 - Ham Radio Show, Friedrichshafen
Messe, Friedrichshafen, Germany. Trade stands, special interest groups and IARU Member Societies all have stands in the main hall. Large flea market. Lectures take place each day, some in English. There will be a large RSGB book stall. [www.hamradio-friedrichshafen.de].

16 JULY 2017 - MCMICHAEL RALLY
Reading Rugby Football Club, Holme Park Farm Lane, Sonning Lane, Sonning on Thames, Reading RG4 6ST Talk in on S22. Opens 9.30am, entry £3. Tabels and car boot spaces are £10. Details, by email, from m5alg@radarc.org
[www.mcmichaelrally.org.uk/]

29-30th SEPTEMBER 2017 - NATIONAL HAMFEST
Newark & Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark, Nottinghamshire NG24 2NY. Brought to you by the RSGB in association with the Lincoln Short Wave Club. Free car parking and disabled facilities. Trade stands, a Bring & Buy, car boot area, flea market, special interest groups and RSGB bookstall. There will also be representatives from the RSGB Services and committees. Morse proficiency test will be available. The venue has catering outlets and a seating area. [www.nationalhamfest.org.uk].

News from other Clubs

Club Secretaries – please send your meeting programs to our newsletter editor Bob G3OOU. This newsletter is published about ten days before our club meeting and closes for editorial contributions a few days before publication. Due to differing publication dates and short lead times it is sometimes difficult to include other clubs' specific events although we will endeavour to do so if advised in time.

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
23 Mar DMR update Talk by Stan G4EGH
13 Apr 'Millimetric Microwaves' by G0FDZ
27 Apr Steam and its uses by G4VSZ Charles

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 Apr Frequency Counter Construction
16 May Fix-it Evening

Chelmsford Amateur Rado 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 Apr "RSGB President" - Nick Henwood G3RWF
02 May "Tricks with Coax" - John Regnault G4SWX
06 Jun "Table Top Sale"

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/

Crawley Amateur Radio Club (CARC)
Every Wednesday 20:00 – 22:00, every Sunday 11:00 – 13:00. Formal events are on the last 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/
26 Apr 3D printing for amateur radio by Stewart, G3YSX
24 May VHF propagation, by Mike, G0KAD

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 Apr Topband to 198kHz by G4AEH
20 Apr Annual General Meeting
04 May Basics of Contesting
18 May A25UK DXpedition to Botswana

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
25 Apr Constructing a 40 meter loop antenna by Colin Berry M0GXV
29 Apr Anniversary lunch - Denbies wine estate
23 May Digital modes demonstration by Keith Bell 2E0GBK & Walter Blanchard G3JKV
27 Jun Wireless, my early days by Ken Tythacott M3CFC

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
27 Apr Annual general Meeting
3/4 Jun National Field Day

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/
26 Apr DVD show at the Taplin Centre
24 May View and discuss online AR YouTube videos
28 Jun Talk by Rodney

Hereford Amateur Radio Society
Meets on the first Friday of each month at Hill House, Newton, Nr Leominster, HR6 0PF. Contact: enquiries@hars.wagnet.co.uk
07 Apr AGM
05 May Home Brew Evening

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 Apr The Magnetron : From Radar to the Kitchen - Mike Underhill G3LHZ
04 May Vive La Difference : Life and Amateur Radio in France - Mike G8CKT/F8VON
01 Jun DMR (Digital Mobile Radio) Dennis Stanton G0OLX

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 Apr Surplus Equipment Sale
05 May Guide Dogs for the Blind
02 Jun Construction Contest

South East Essex Amateur Radio Society (SEARS)
Contact Dave G4UVJ on: 01268 697978 or secretary(at)southessex-ars.co.uk or http://www.southessex-ars.co.uk/
Meetings: 7pm 2nd Tuesday each month at Swans Green Hall in Hart Road, SS7 3PE.
11 Apr Talk by Peter Onion, G0DZB "Using the Raspberry Pi in Amateur Radio.."
09 May Talk with Pete Sipple M0PSX from Essex Ham "My journey into Amateur Radio."
13 Jun Talk with Tim Wander, author and curator of Sandford Mill.

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 Apr Annual General Meeting

Sutton & Cheam RS
8pm on 3rd Thursday every month. Contact John Puttock G0BWV on 020 8644 9945 or email info(at)scrs.org.uk Web: http://scrs.org.uk/. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.
20 Apr Home Construction & Finishing - Bob G3OOU
18 May Annual General Meeting and Constructional Contest
16 Jun The Sun & Sky – How Space Weather Affects Radio Signals – Dr Colin Forsyth. UCL / Mullard Space Science Laboratory.

Wimbledon & District Amateur Radio Society
Meets on the 2nd and last Friday in the month at Matin Way Methodist Church Hall, Martin Way Merton Park, London, SW19 9JZ at 19:30hrs for 20:00hrs. Contact: Andrew G4ADM on 020 8335 3434 or andrew.maish(at)ntlworld.com

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

Local Training Courses					
Licence Level	**Dates**	**Location**	**Club Provider**	**Format**	**Further details**
Intermediate	5 & 19 Mar, 2 Apr 2017	Bromley, Kent	Bromley & District ARS	3 days (Sun)	www.bdars.org
Foundation	10 & 17 Jun 2017	Sidcup	Darenth Valley	2 days (Sat)	http://darenthvalleyrs.org/
Foundation	17 Sep & 8 Oct 2017	Bromley Kent	Bromley & District ARS	2 days (Sun)	www.bdars.org
Full	2, 9, 14 Oct & 4, 11, 18 Nov 2017	Eltham, SE9	Cray Valley RS	2 evenings (Mon) + 4 days (Sat)	www.cvrs.org
	= course commenced				

CPREC Committee Contact Information
Officers:

Chairman:	**Secretary:**	**Treasurer:**
Damien Nolan 2E0EUI	Alan O'Donovan G8NKM	Ian Skeggs M6FZC
7 Fonthill Court	2 Mackenzie Road	Ground Floor Flat, 24 Kendall Road
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