

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 February 2019

Annual General Meeting

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

Dear Reader

Future Club Meetings and Events

01 Feb 2019	M	Annual General Meeting - see Members section in this newsletter
01 Mar 2019	M	Fundamentals of Amateur Digital Radio by David Howe
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.

01 February 2019 - AGM:

The agenda for the AGM is located on the last page of this newsletter - please bring it along to the meeting.

Our Treasurer has advised that although we make a loss on each monthly meeting this have been covered by the donations and sales of equipment so no change in the annual subscription is planned for 2019.

Do come along to the AGM and have your say on club activities and the election of club officers and committee members. Visitors are welcome but only paid up members may vote on motions.

Members copies of this newsletter will find the officers' reports for the AGM on the last two pages.

Recent Event News

We have had some minor issues with the new club email address due to the redirection not working which has now been resolved. If you have sent an email using this address and not received a reply please send it again.

01 January 2019 - Club Subscriptions: These are now due 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.

04 January 2019 - Video Evening

Our Secretary Alan organised three videos:

- **40 Meter QRP CW Pixie Kit Demonstration by Dave KG0ZZ:** A basic Youtube video demonstration of the Pixie very low cost CW QRP transceiver.
- **Making the Pixie QRP Transceiver Kit Slightly Less Appalling by VK3YG:** This Youtube video title is a bit unfair but does show how some simple changes can make significant improvements to performance.
- **Understanding HF Propagation by the RSGB:** A detailed explanation of HF propagation with many charts and pictures.

For further reading on propagation either Google the subject title or look at the following links:

VOACAP is free professional high-frequency (HF) propagation prediction software available from <http://www.voacap.com/>

Web site www.solarcycle24.com automatically redirects to <http://www.solarham.net/> containing a lot of propagation information and software.

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 one IC and two transistor QRP crystal controlled single band CW transceiver, specification below.

If you would like to take part in this project please let our Secretary Alan know as soon as possible so that the correct number of kits can be ordered in time. The cost will be between £4.00 and £9.00 each depending on the supplier - cheaper from China but much longer delivery times.

Specification:

Power Supply:	9V-12V e.g. PP3 9V battery or bench PSU
Antenna:	50 Ω , Unbalanced
Freq Range:	Transmitter Local Oscillator Frequency: 7023kHz
Rx LO Freq:	About 7023-7026KHz
Headphones:	Low-impedance
Transmit Power:	Up to 0.8W using a 9V power supply and 1.2W using a 12V power supply
Spurious output:	-20dB
Size:	Approx. 5cm x 5cm / 1.97" x 1.97"

Damien also demonstrated a very simple microswitch based Morse key kit that can be used with the Pixie and includes a copy of the Morse code. See the next page.



Papyrus to SSD by 'Theorist'

I found an old USB data stick about a year ago. I recognised it as the first one I bought. I can't be certain but I think that it was before 2008. Naturally I plugged it in and found that I had stored some files that were relevant to me at the time, and more to the point were all still perfectly readable. This set me wondering how long data would keep on various forms of media.

All forms of data storage depend on the environment in which they are stored, and the frequency of access. There is a distinction between ideal conditions, suitable for an archive for example where data will only occasionally be accessed, and what could be expected in real everyday conditions where data is being constantly accessed. Other factors such as obsolescence of the equipment necessary to recover data also play a part. How long will video recorders be available for example? They already seem to have disappeared entirely from the high street shops and chain stores and are difficult to find on-line.

Until comparatively recently data storage devices have relied on magnetism - I am obviously excluding papyrus and other forms of writing, although under ideal storage conditions we have proof that these can last for at least 4,000 years! [1] Magnetic materials such as tape (including cassette tape), floppy disks and hard disk drives (HDDs) will all lose magnetism over time however they are stored. It seems that under optimal conditions magnetic/cassette tape could last at least 30 years, but with regular but not frequent use this could be, as low as 10 years.

Floppy disks were never that reliable. It never happened to me but some people experienced getting a whole box of disks where most did not work, although that may have been a fault of the drive. I certainly lost several through regular use (or overuse) within a period of 2 or 3 years. It is not clear how long they would work if stored in ideal conditions, and don't forget you would also need to have a working floppy drive as well. Incidentally the data-stick that inspired this article was in amongst a box of floppy disks. I still have a working floppy drive (I think) so I might give them a spin.

HDD figures are harder to interpret although there is a lot of data available, to the manufacturers at least. HDDs are of course mechanical devices with PCs almost invariably having drives that rotate at 5,200 or 7,400 rpm. They have a lot of moving parts with very close tolerances. A minute speck of dust getting between the head that reads the data and the spinning disc itself will

most likely cause catastrophic failure. The most reliable manufacturers usually quote an MTBF (mean time between failure) figure of about 11 years although it depends on a number of factors, not least the capacity of the disk. However that equates to somewhere between a 2 to 4% *annualised* failure rate, with the highest failure rates when the drive is brand new. This 'early failure' phenomenon is typical of consumer electronic devices, for reasons that I am sure the editor could explain. Incidentally Hitachi seem to make the most reliable drives, followed by Western Digital. An image of the internal structure of a Hitachi Travelstar Z5K500 is shown nearby.

A company like Amazon with a huge number of drives knows a lot

about the reliability of HDDs, although their HDDs are working 24/7, and are not turned on and off very often if at all. They do not disclose their data. Most independent sources report lower MTBFs than the manufactureres of about 5 years before a component fails, but there is a

very little actual data available. Personally I would take all the figures I have quoted with a pinch of salt.

Flash storage, by which I mean USB sticks, the various types of SD cards, and solid state drives (SSDs), are difficult to assess because the memory does not degrade particularly because of its age, but rather because of the number of times the flash memory is written to - the number 'program-erase' or P/E cycles. Commercial flash products seem to be guaranteed to withstand about 100,000 P/E cycles before storage integrity begins to be lost.

Manufacturers often quote a DWPD (device/drive writes per day) figure, which is a measure of the number of complete drive writes over a number of years (say 3 or 5 years) before the device could fail. For example a figure of 30 would mean that you could write over the whole SSD 30 times a day for 3 (or 5 or whatever) years before expected failure. Computers that use SSDs have controllers that even out the number of times each part of the drive is written to, to avoid early failure.

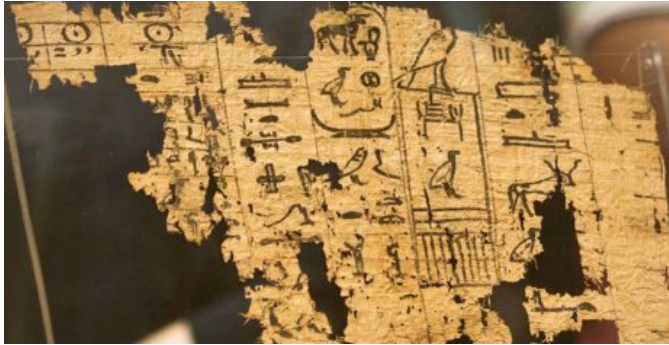
Further complication arises because some drives are intended to hold data that is being read frequently but not written to very often, and others that are intended to be written to intensively. As a rule of thumb most



independent sources reckon on a period of between 5 – 10 years MTBF for this type of memory in a PC/Laptop if in everyday use, although this may be rather conservative, and obviously depends on a lot of factors that differ from individual to individual.

At the end of the day remember Schofield's Second Law of Computing, which states that data does not exist unless it is twice backed up independently in different locations.

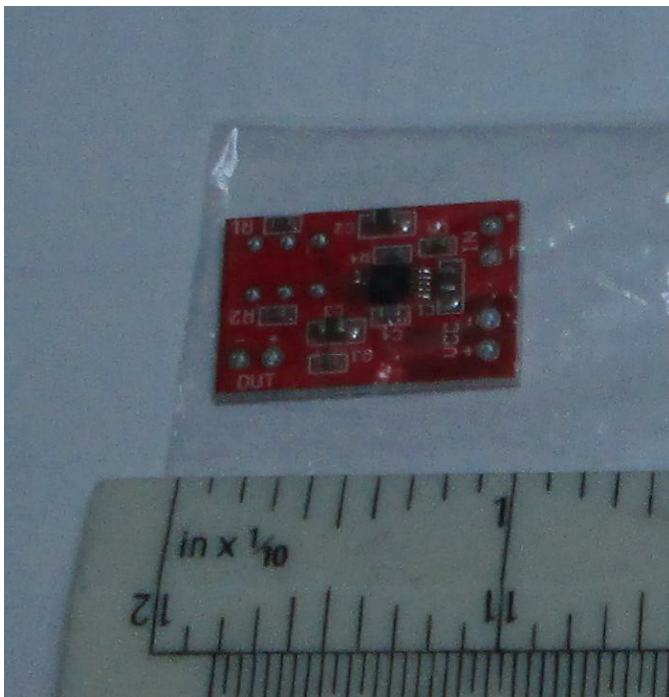
[1] The oldest ever discovered were found in 2013 and are 4,500 years old, being written at the time the great pyramid was being constructed, and describing the lives of the pyramid builders. An example is shown below.



[A hard drive manufacturer has just announced a drive with a capacity of 16TB (16,000GB), cost unknown - Ed]

Technical Snippets

a) SSM2167 VOGAD IC: VOGAD stands for Voice Operated Gain Adjusting Device or in simple terms an audio AGC system. There is a well tested discrete component VOGAD circuit on the technical website but if you would prefer to use an integrated version instead then look at the SL6270 from Plessey or the SSM2167 from Analog Devices. The latter is a surface mount IC that contains a number of audio processing functions and works with a single low current 2.5-5.5v DC supply rail.



Typical threshold sensitivity is 10mV and the processed output level is typically 63mV - these are both adjustable by component values. The compression ratio is adjustable from 1:1 to 10:1 and the typical output distortion including noise is 0.2%.

If you would prefer to purchase a complete module on a small PC board instead of making your own then they are available from eBay and others at prices from £3 - £7.

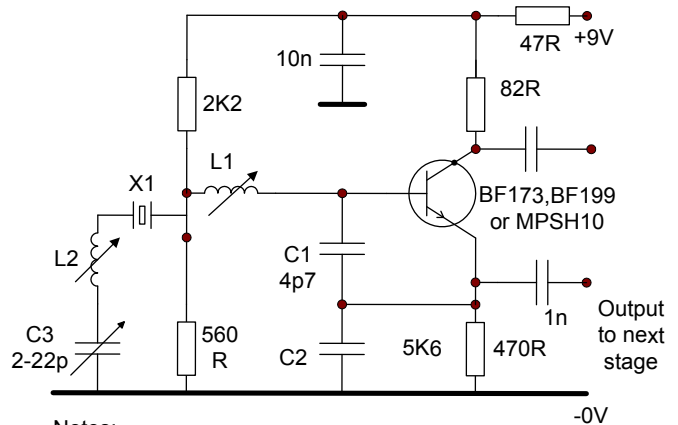
The PCB module is 0.6" x 0.9", includes facilities for using an electret microphone as well as conventional moving coil types and is pre-configured for gain and compression ratio.

No mounting holes have been provided but there are a number of plated through connection holes which may be used to anchor the module to a parent PC board with short lengths of 26swg tinned copper wire.

At maximum sensitivity the AGC onset is around 3mV peak-peak (pk-pk) input level and the output level is about 700mV pk-pk so more than adequate sensitivity for moving coil microphones.

b) Overtone Oscillators:

The following circuit shows a low power Colpitts overtone oscillator that has a reasonable frequency pulling capability and good frequency stability from 20-80MHz with third or fifth overtone crystals.



Notes:

1. C1 not required for 25 or 34MHz
2. L2 increases the effect of C3
3. C2 = 120pF at 34MHz and 220p at 25MHz

The basic oscillator circuit uses inductor L1 together with the transistor base capacitance plus C1 if fitted as an L network to convert the low series impedance of the crystal into a high impedance. The 2K2 and 560R resistors provide the base bias for the transistor and their combined parallel value prevents the crystal from operating on any of its parallel resonant modes.

During development, if you replace the crystal with a short circuit, the oscillator will free run at a frequency controlled by L1 and surrounding device and stray capacitances. Adjust L1 for oscillation at or close to the frequency of the crystal and then replace the short circuit with the crystal. Some minor adjustment of L1 may then be required. C2 will need to be reduced in value as the operational frequency is increased.

At frequencies above 50MHz it may be necessary to place a small inductor in parallel with the crystal to tune out its parallel capacitance, typically 4-5pF otherwise the oscillator may free run.

L1 is adjusted a little down the 'slow' side from its peak to ensure reliable starting. Capacitor C3 provides an amount of frequency pulling which can be increased using L2. However, as you increase L2 the overall frequency stability will worsen and eventually you will reach a point where the oscillator free runs.

Both variable inductors use Neosid screened assemblies in 0.5inch square aluminium screening cans. These are usually available at radio rallies on old mobile radio PC boards.

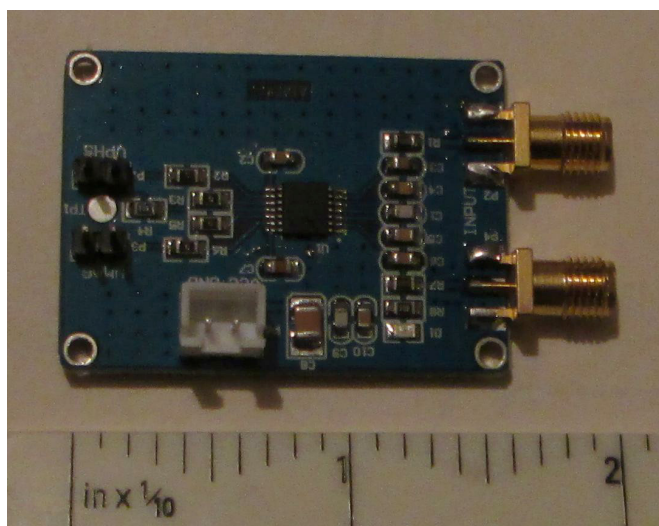
At 25MHz this circuit will provide 2.5KHz of frequency pulling and at 34MHz it will provide 3.6KHz with good frequency stability and reliable starting. If you do not need any frequency pulling facilities then replace L2 and C3 with a short circuit. All connections should be as short as possible and stray capacitances should be minimised.

The output level from the collector is fairly low but reasonably well isolated from the oscillator circuit. The output level from the emitter is much higher but less isolated. I have used this circuit up to 120MHz with a good VHF specified transistor but operation and PCB layout are much more critical.

RF characterised devices should be used in this circuit to ensure consistency. Switching devices may work but tend to be noisy and are less predictable in analogue applications. For example, two manufacturers describe the MPSH10 as an RF device and one describes it as a general purpose switching device.

To make the circuit electronically tunable replace trimmer with one or more pairs of back to back BB405 varicap diodes.

c) Log Detector and Phase Detector: This is another interesting and low cost module based on the Analog Devices AD8302. It contains two 60dB log amplifiers/detectors, one phase detector and covers LF to 2.7GHz. RF input is via two SMA miniature coaxial connectors.



The module PCB dimensions are 1.65" x 1.2" excluding the coaxial connectors. It could be used as part of an automatic ATU by using the phase detector to monitor the phase difference between the current and voltage in the transmission line between the transmitter and ATU in order to determine the correct direction of tuning.

d) PT2399 Echo/Reverberation IC: Another interesting item that surfaced in December 2018 was the PT2399 from Princeton Technology Corp in Taiwan. This IC is intended for applications that require some form of reverberation or echo such as musical instruments, karaoke, toys etc.

It digitises an audio (including music) signal at the input pin, clocks it through a memory pipeline and converts it back to an audio signal which is delivered to the output pin. The delay between input and output is adjustable from 40.6mS with a distortion of 0.14% to 342mS with a distortion of 1%. Maximum output level is 1.5v rms and the overall gain ranges from -0.5dB to +2.5dB. A power supply of 5V at 100mA is required so not suitable for extended battery operation. Two example application circuits are provided in the data sheet with around 22 external resistors and capacitors.

Unit cost is around £2-£4 each and there are several UK sources on the well known auction sites.

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 g30ou(at)aol.com.

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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 our famous bacon butties. Radio, computing and electronics traders and special interest groups. More details from the rally co-ordinator at 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>

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.

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/>

31 Jan The GB3VHF and GB3UHF Story
07 Feb Quiz Night hosted by Nicky

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

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](mailto:secretary(at)g0mwt.org.uk) Web: www.g0mwt.org.uk

05 Feb Sub-Surface Comms – in tunnels etc by Peter Bridgeman G3SUY

Couldson Amateur Transmitting Society (CATS)

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

11 Feb Jam Handy / Club Future Discussion / Social Evening
11 Mar Apollo 13 (deferred from Nov 2018)
08 Apr The Anderson Powerpole
13 May Construction Evening
10 Jun Annual DF Hunt

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](mailto:secretary(at)carc.org.uk) or Web: <http://www.carc.org.uk/>

23 Jan Club AGM
27 Feb GNU Radio by Stewart G3YSX

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](mailto:secretary[at]cvrs.org). Web www.cvrs.org
07 Feb Meteor Scatter – A practical introduction: Mike Davies G0GAD

Dorking & District Radio Society

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

26 Feb Practical evening (Slim-Jim & J-pole antennas)
26 Mar Logger 32

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](mailto: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](mailto: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

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](mailto:g3zbu(at)hotmail.com) or <http://www.harc.org.uk/>

07 Feb From Key to TV! by G3OGP
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](mailto:M6ZRJ(at)msars.org.uk) or www.msars.org.uk

15 Feb Talk by John G8JBJ on The Doublet Antenna
08 Mar Talk by John G8JBJ on Earthing
22 Mar AGM
29 Mar Radio Night and Table Top Sale

South East Essex Amateur Radio Society (SEARS)

Contact Mark Callow 2E0RMT on 07842 336444 or [secretary\(at\)southessex-ars.co.uk](mailto: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.

03 Feb Canvey Radio & Electronics Rally.
12 Feb 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](mailto:secretary(at)g3src.org.uk). Web: <http://g3src.org.uk/>

07 Feb Millimetric Microwaves with Chris G0FDZ
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](mailto:info(at)scrs.org.uk) Web: <http://scrs.org.uk/>. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.

21 Mar Talk by RSGB Regional Representative Keith Bird, G4JED
09 May Annual General Meeting and construction competition

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

Crystal Palace Radio and Electronic Club (CPREC) AGM Agenda

Venue: All Saints Church, Beulah Hill, London SE19 3GL

Date: Friday 1st February 2019

Time: 20.00 Hours

1. Apologies for Absence
2. Minutes of 2018 AGM
3. Chairman's Report
4. Secretary's Report
5. Treasurer's Report
6. CPREC Newsletter
7. Election of the Committee
8. Club Programme for 2019
9. CPREC Web Site
10. Any Other Business

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

Please note that a new syllabus will apply for all exams from July 2019.

Foundation	Autumn 2019 - to be confirmed	Bromley BR2 7NH	Bromley & District ARS	2 days (Sun)	www.bdars.org
Full	07 Oct 19 - 30 Nov 19	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	