CPREC

Palace Pulse

G2LW

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.

A Merry Christmas and Happy New Year to all of our members and readers

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

Next meeting: 6th January 2017
               Digital Mode Radio by Damien 2E0EUI

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

Dear Reader

Future Club Meetings and Events

6th Jan 17   M   Digital Mode Radio by Damien 2E0EUI

19th Jan 17   E   Sutton & Cheam RS Big Quiz

3rd Feb 17   M   Annual General Meeting

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

1st January 2017

This is the date when annual subscriptions become due. Please send your cheque for £12 made out to Crystal Palace Radio & Electronics Club to our Treasurer Doris or pay at a club meeting.

6th Jan 17 - DMR (DIGITAL MOBILE RADIO) FOR BEGINNERS by Damien 2E0EUI

This talk will be a beginners introduction to the world of DMR and the Phoenix network in the UK.

The Phoenix Network website states: Phoenix is the name of the network which may have previously been "known" as DMR MARC UK.

It's wholly owned, operated and managed by UK Repeater Keepers and is the UK's largest open DMR network infrastructure, along with the European Core network infrastructure and the redundant world wide talk group servers which peer with the DMR-MARC network in the USA.

See http://www.dmr-uk.net/index.php/phoenix/ for more information.

19th January 2017 SCRS Big Quiz
CPREC have received an invitation to this event.

On the evening of Thursday 19th January 2017, the SCRS Big Radio Quiz of the Year will take place at Sutton United Football Club. Please join us for a fun evening of radio-related brain teasers, and of course the bar will be open for business as usual. There is a maximum of four people per team and an entry price of £5 per team, with proceeds going towards club funds to help support our outreach programs and other community engagements.

There are currently five quiz rounds planned, including: Radio Knowledge, Radio in Popular Culture, Picture Round, Cryptic Radio, and General Knowledge. A trophy will be awarded to the winning team, and the final results will also be published in our February 2017 newsletter.

If you would like to join a CPREC team please let Alan or Jim know.

3rd February 2017 - Annual General Meeting

This meeting is our members opportunity to have their say on club activities and vote in a new committee for 2017. Our Chairman Jim and Treasurer Doris gave notice at the 2016 AGM that they will be standing down as both officers and committee members (since AGM 2014) and we have two volunteers to take on those roles, subject to members agreement.

An agenda will be published in the next newsletter. In the meantime if you have any topic requests or motions to be considered at the AGM please send them to our Secretary Alan G8NKM.

Committee member Nick has been reviewing at the club constitution to bring it up to date with the RSGB child protection policy and our Treasurer Doris has requested a minor change to the Officers Roles and Responsibilities document which is referred to in the Constitution. Both of these changes will be presented to the AGM for consideration by club members.

Recent Event News

29 November - Congratulations to our Chairman Jim who has just received his new callsign 2E0JFL.

2nd December - Club Project Part II and Christmas Social

The club construction project continued during the first part of this meeting and two further frequency counters have been completed and calibrated using an off air frequency standard.

Alan helping Lawrence to fix a technical problem:

The test area included an off air frequency standard, commercial frequency counter, signal generator and a lap top computer for programming the Arduino cores:

Alan had discovered a bug in the software design which has now been fixed.

The second part of the meeting was the Christmas Social for which thank you to all who contributed some tasty Christmas Fayre

8th December - Sutton & Cheam Junk Sale

I went to this well attended meeting with my usual optimism of finding something small and interesting to buy. Surprisingly the amount of junk (sorry, surplus equipment) was somewhat less than last year but the majority went to new homes. It did give me a chance to catch up with other amateurs that I see annually at this event or at some local radio rallies.

Chairman's Notes for December

I've been very busy of late doing my Intermediate licence with the Cray Valley Club and I'm glad to say I was successful. I found the syllabus very varied in that it ranged from the simple but important, like how not to fall off a ladder to the very complex, like how does a superhet work. I'm still successfully clinging on to my ladder when the occasion demands but I'm still a bit hazy about the superhet.

The Intermediate book is full of interesting information, especially to someone, like me, with no background in radio or electronics.

One thing in the safety element of the course I should have paid more attention to concerned ventilation when using solder. When soldering the frequency counter project I had to use a clip on eyeglass as I'm short sighted. This put my nose right over the flux fumes for quite some time as there are many joints. Next day I did not feel at all well. Whether it was the fumes or some other factor I can't be certain but just to be on the safe side I'm going to buy one of those little bench fans designed to blow the fumes at someone else.

Having passed the exam the RSGB sent me my candidate number which enabled me to apply for my new licence from Ofcom. I found their site easy to use. They offer a choice of taking the next callsign in their list or choosing your own if it's available. I opted for my initials which fortunately was available so I'm now 2E0JFL.

Having decided to never go through all that again I bought the Advanced book at Kempton on the day after the exam. It's an interesting book in that it has a lot of useful calculations like the resonant frequency of a circuit and voltages around a network of resistors. Despite my resolve I dare say I'll be signing on for the full licence course at Cray Valley next year. No willpower!

Happy Christmas and New Year to All, and a big thank you to all the members who turn out and support us on club nights. And especial thanks to the committee and the members who help run the club so well.

73, Jim 2E0JFL.

Squash It by 'Theorist'

Last month I mentioned the JPEG file. This is a compressed file format used to save space when storing images, so that you can store more pictures on the SD card of your digital camera for example. The format is lossy, which means that when the image is decompressed it will have less information in it than the original. The other well known lossy compressed file format is mp3, used for compressing audio, so that your phone or mp3 player can store more tracks [1]. If you play an mp3 file through a hi-fi system the sound is rather flat, with blurred bass and slightly muted top end treble compared to a normal CD format. Yet listening through cheap earphones on a phone there is not much difference between CD and mp3 formats. That is the idea behind mp3; reduce or eliminate audio information that can't really be heard on cheap audio devices, saving space.

Sometimes lossless compression is required, so that the decompressed file must be identical to the original. This means that any lossless compressed file must be decompressed in a unique way. The zip file will be familiar to most readers as an example of a lossless compression file. However with both lossy and lossless algorithms other factors are important, in particular the speed of the algorithm in compressing and decompressing data. An algorithm that took several hours to compress or decompress a file would be of little use to most people, no matter how good the compression ratio achieved.

Compression algorithms are usually designed to work on a particular input. For example in genetics a special compression algorithm called GenCompress can be used to compress DNA sequences, but the mp3 algorithm would not work well on it, and does not work well on text documents either, being specifically designed for audio use. Random data cannot be consistently compressed by lossless algorithms and indeed this is often taken as the definition of 'random' data for computer science applications. Also, small files are less easily compressed than large files.

Data compression is used extensively by the big technology companies that need to store vast amounts of user data, like Facebook. Recently there has been a lot of excitement about a new real-time compression algorithm called Zstandard. This claimed to offer a very wide range of compression/speed trade-off options, backed by a very fast decoder, and good at all three requirements of fast compression, fast decompression, and a good compression ratio as well.

Facebook tested this for six months and found that the claims were true. At the end of August it released its own implementation of Zstandard as open source software, together with statistics showing that with the same compression ratio as zlib (their previous adopted standard), Zstandard was five times faster. Where the compression time was held constant, files were 10 percent smaller than that produced by zlib.

Compression has been the subject of much research by mathematicians. It is easy to prove that for any particular lossless algorithm there are files that cannot be compressed using that algorithm. If there were an algorithm that could compress any file, you could run it on file F1 to produce a smaller file F2. You could then run the algorithm on F2 to produce the smaller file F3, and run the algorithm on that…. etc. Eventually you would have a file of just one bit from which the original file would have to be reconstructed! This is clearly impossible, therefore there must be files that cannot be

compressed. There is also no algorithm that can tell if a file is capable of compression or not.

More surprising is that for any lossless algorithm, there must be at least one file that ends up bigger when you run the algorithm on it. To prove this, assume that we have an algorithm that compresses at least one file into a smaller file, and assume that it won't make any file larger. Since there are files that cannot be compressed, there will be a smallest file that the algorithm can compress. Assume that this file F has N bits before compression, and M bits when compressed. Any file of M bits will not be able to be compressed since M is less than N, and the smallest file that we said could be compressed by the algorithm had N bits.

There are 2M possible files of M bits, essentially all the binary numbers from a string of M consecutive '0s' to a string of M consecutive '1s'. All of these will keep their original size of M bits when compressed by the algorithm, since M is smaller than N and we are assuming that no file can be made larger by our algorithm. But file F will also compress into M bits as well, so there are 2M+1 files each of which will compress into one of the 2M possible files of M bits.

One of the 2M files must therefore be the result of compressing F and the result of compressing one of the 2M M-bit files, so the algorithm cannot be lossless since that file cannot be uniquely decompressed. The original assumption that there could be an algorithm that was lossless and would not make any file bigger is therefore incorrect. Any algorithm must make at least one file bigger. And a happy Christmas to my reader, especially if you got this far.

[1] In the unlikely event that you are less than about 40 years old and reading this, a 'track' is what you would call a 'song'

Technical Snippets

a) In case my comments on power supply design in the last newsletter were not entirely clear I have included a simplified block diagram below showing the three protection mechanisms that were discussed.
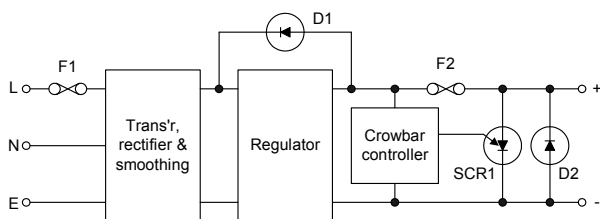
Protection mechanisms:

- Fuse F1, correctly rated, is the absolute minimum that should be provided in any power supply to protect both the external supply, the power supply electronics and to minimise the risk of fire in a fault condition.
- Diode D1 protects the PSU electronics in the event of the output voltage holding up for a longer time than the PSU smoothing capacitors.
- Diode D2 protects against back emf pulses from associated inductive circuits connected to the DC output.
- SCR1 is the final part of the crowbar circuit. The controller trigger voltage will be set to a few percent above the maximum output voltage of the PSU or just

below the point at which damage will occur to the equipment connected to the PSU, whichever is the lower.

All of the protection components must be peak rated for the maximum possible voltages and currents that can occur during the fault condition but their mean current ratings can be much lower. For example the 1N54xx series of diodes are rated at 3 amps mean current and 200 amps non-repetative peak current.

b) Workshop Safety - Jim makes a very important point about avoiding inhaling the byproducts of soldering. Most amateurs still use flux cored tin-lead solder as it is easier to use, melts at a slightly lower temperature compared to lead free solder and results in a 'nicer' looking joint. The fumes from this soldering include small amounts of lead vapour and numerous chemicals from the flux which also occur in lead free solder.

A small 12v DC computer fan will blow the fumes away from the operator and the working environment should be adequately ventilated.

c) The Design Process - I am often reminded of the difficulties and compromises that arise from the various aspects of designing an item of equipment. An overview of the various steps in the design process can be summarised as:

- **Functional Specification** - 'what' the equipment will do when considered as a black box
- **Technical Specification** - 'how' it will work i.e. the technical functionality that is inside the black box
- **Module Breakdown** - modularise, if required, to reduce the complexity of each module to manageable amounts
- **Prototype Design** - design each module as a black box with interfaces to other modules
- **Prototype Construction** - make and test each module as an individual entity
- **Final Construction** - assemble, connect and test all of the modules in the completed unit
- **Pre-production Batch** - make and test a small pre-production batch to test the overall design for tolerances etc
- **Design Finalisation and Documentation** - ensure that the documentation reflects the final state of the proven design

It is really important to keep the first two steps completely separate i.e. do not confuse or combine the 'What' and 'How' steps. Some of the subsequent steps will also depend on the production quantities and operational environments.

Most amateurs will usually only make one unit of a particular type which means that the pre-production batch will not occur, raising the risks of performance spread issues if the design were subsequently copied. Modularisation here is very useful to minimise any risks in performance variation by designing individual sub-assemblies of complex circuits in the form of daughter boards. In this way a single module which gives problems may be redesigned instead of an entire large and and expensive assembly.

High volume production usually means reducing the number of sub-assemblies to the minimum so more time

must be spent at the design stage addressing circuit complexities to reduce costs.

Some compromises are a necessary function of any design. For example, you design the front panel to get the ergonomics right and the internal physical component layout to optimise the signal flows only to find that the user controls are nowhere near to their respective circuits. This is what makes 'designing' an intellectually stimulating, if sometimes difficult, process.

d) Communications Loudspeakers - I am having more difficulties these days in procuring small new speakers of this type for replacements in Heathkit and other older equipment. Most speakers that are easily available are aimed at HiFi applications, mostly for vehicles. These will work in communications applications but to achieve the full audio bandwidth are usually much less efficient so the accoustic output is significantly less for a given audio power.

Loudspeakers that are intended for speech only applications have a much narrower frequency response which peaks around 1KHz and have virtually no bass response but are more efficient in converting electrical eneregy to accoustic energy.

Miscellaneous

We received a mention in the latest RadCom because our callsign G2LW has been registered as a continuous member of the RSGB for 70 years. G2LW was originally owned by club founder member Fred Lawrence who became a silent key some years ago and left his callsign to our club in his will.

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

HP1741A 100MHz dual beam storage scope £60, Heathkit HW-101 HF transceiver with PSU, LS & mic £120, Precision permeability tuned solid state VFO 7.6 - 8.8MHz £75, 1.4MHz crystal filters for AM, USB, LSB & CW £15 each, Pye 455KHz LC filter £3, excl P&P, Bob G3OOU 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 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 plus P&P.

73

G3OOU

Diary of External Events

12 Feb 2017 - HARWELL AMATEUR RADIO SOCIETY RADIO AND ELECTRONICS RALLY
Didcot Leisure Centre, Mereland Road, Didcot, OX11 8AY. Talk-in on 145.550. Free parking. Opens at 10am entry £3

(children under 12 free). Details from from Ann G8NVI on ann.stevens@btinternet.com or www.g3pia.org.uk

26 Feb 2017 - (BRATS) RAINHAM RADIO RALLY
Rainham School for Girls, Derwent Way, Rainham, Kent, ME8 0BX. Just off the A2 and M2 J4. Talk in on 145.550MHz. Opens 10am, entry £2.50. Information from Trev@wig1.co.uk or www.brats-qth.org

30 Apr 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. Trade stations, Bring & Buy and special interest groups. Details from Paul, M0CJX on 0845 165 0351, info@radiofairs.co.uk. www.radiofairs.co.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 the 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.

I am having increasing difficulties in getting future meeting details from the newsletters or websites of some of our corresponding clubs in time for our newsletter publication. Please ensure that the details are available or sent to me in time otherwise the respective club entries will be blank which helps no-one.

If you plan to visit one of these club meetings please check with the club concerned in case any last minute changes have been made.

Bromley & District Amateur Radio Society
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
20 Dec   Quiz and Mince Pies
17 Jan 17 Programme Planning & AGM

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
03 Jan 17 Riding the radio waves - Jane Humphreys
07 Feb 17 Talk on Diplomatic Wireless - by Peter Grimshaw, M0HSG
07 Mar 17 Classic Computers - Andy Chapman, G7TKK

Coulsdon Amateur Transmitting Society (CATS)
8:15pm on 2nd Monday each month. Contact: Mike Buckley, M1CCF on 020 8654 2582, m1ccf(at)talktalk.net or secretary(at)catsradio.org. Web site:
http://www.catsradio.org/
09 Jan 17 CATS Annual Dinner – Chateau Nepolian Croydon

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/
25 Jan 17   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
19 Jan 17   Annual Planning Meeting
16 Feb 17   Radio Astronomy – Paul G4CSD

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

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
22 Dec   No meeting
26 Jan 17   'The Cassini Mission to Saturn & the landing of Huygens on Titan' - Professor David Southwell

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/

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/

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
27 Jan 17 Radio Night & Table Top Sale
03 Feb 17 Air Ambulance Talk

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.
10 Jan 17   32nd Canvey Radio Rally Preparations
14 Feb 17   Confessions of a Radio and TV Engineer, Part 2 PMR Radio with Dave G4UVJ

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/
09 Jan 17   3D Printing by Gareth G4XAT

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.
19 Jan   SCRS Big Radio Quiz of the Year 2017 - details on page 2 of this newsletter
16 Feb 17 What to look for in choosing a VHF/UHF Radio' – Professor Alwyn Seeds – G8DOH

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
Foundation	4 & 11 Feb 2017	Eltham, SE9	Cray Valley RS	2 days (Sat)	www.cvrs.org
Intermediate	5 & 19 Mar, 2 Apr 2017	Bromley, Kent	Bromley & District ARS	3 days (Sun)	www.bdars.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:
Jim Lugsden 2E0JFL	Alan O'Donovan G8NKM	Doris Bailey
21 Overhill Way	2 Mackenzie Road	21 Overhill Way
Beckenham	Beckenham	Beckenham
Kent BR3 6SN	Kent BR3 4RU	Kent BR3 6SN
020 8650 7758	020 8778 9660	020 8650 7758
james.lugsden531(at)btinternet.com	alan.odonovan(at)btinternet.com	doris.bailey531(at)gmail.com
Committee Members:		
Bob Burns G3OOU	Newsletter Editor	01737 552170 or G3OOU(at)AOL.COM
Damien Nolan 2E0EUI		
Nick Stapley		