

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 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.gsl.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: 2nd September 2016

**Geographical Mapping by Nick Stapley and Eutectic Points by
Jim Lugsden**

In this issue: *Future & Most Recent Meetings, Not a Bad as you Think by 'Theorist',
Technical Snippets, Playing with Magnetic Loop Antennas by Damien
2E0EUI, A PIC Processor Application, Miscellaneous, Noticeboard,
Diary of External Events, News from other Clubs, Local Training
Courses Club Contact Information and List of equipment for sale.*

Dear Reader

Future Club Meetings and Events

2 nd Sep	M	Short Talks: Geographical Mapping by Nick Stapley and Eutectic Points by Jim Lugsden
7 th Oct	M	How to use SDR (Software Defined Radio) by Damien 2E0EUI
4 th Nov	M	Club Project - An Arduino Based Frequency Counter by Alan G8NKM
2 nd Dec	M	Christmas Social
6 th Jan 17	M	Digital Mode Radio by Damien 2E0EUI
3 rd Feb 17	M	Annual General Meeting

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

02 September - Short Talks

At this meeting we will feature two short but stimulating talks:

a) How to Make a Map by Nick Stapley

An overview of the stages needed to make an accurate map, from surveying to printing, with particular regard to the familiar Ordnance Survey series. The impact of GPS and Google maps will be considered.

b) Eutectic Points by Jim Lugsden M6BXL

Eutectic point in soft solders. How does it occur and what is its significance? Is lead-free solder really evil? My talk will cover these points with the aid of product information from solder manufacturers.

Recent Event News

05 August - Summer Social and Bring & Buy

We had a good attendance at this event and a fair number of items from Frank's shack were sold. Thank you Doris for an excellent bucket of trifle and Marianthi for an enormous bottle of Ouzo which Jim is guarding - it should reappear at the Christmas Social.

Not as Bad as You Think by 'Theorist'

A certain condition affects 1% of people in your age group. There is a test for the condition which is 95% accurate. If you have the condition then the test will be positive 95% of the time, but give a 'false negative' for the other 5%. If you do not have the condition then the test will be negative 95% of the time, but give a 'false positive' for the other 5%. You take the test and it is positive. What is the probability you have the condition?

You can guess that the answer is not 95% as there would not be much point in anybody writing an article about something so obvious, but what would be your guess? Would it be 90%? or 80%? or as low as 50%? You might be surprised at the real answer, just 16.1%. Yes that's right, it is not a typo, it is a mere smidgeon over 16%.

The key is in that 1% incidence. If 100 people of your age were selected, then on average you would expect just 1 of them to have the condition and the other 99 not to have it. Of the 99, if they were tested, you would expect 5 false positives since 99 is nearly 100 and there is a 5% false positive rate. The 1 person who on average does have the condition would also likely test

positive (with 95% chance). This means that if you test 100 people of your age you would expect to get about 6 positives, 5 of which will be false. This means that if you get a positive test result then there is only about a 1/6th chance you really do have the condition, which amounts to 16.67%, close to the correct answer of 16.1%. The estimate is a bit higher than the correct value because of the approximations made. The accurate answer is found using Bayes' Theorem of conditional probability – I won't give the formula here.

Suppose the test is more accurate. With a 98% accuracy the probability you have the condition (with a positive test result) changes to 33.1%. Yet if the incidence is 1 in a 1000, rather than 1 in a 100, then the probability is 4.7% with a 98% accurate test, and only 1.87% if the test is only 95% accurate. I should point out that most real tests have unequal false positive and false negative rates. For example a real test could have a 3% false negative rate, but a 2% false positive rate, but you get the general idea.

There are some interesting issues here. As the examples show, the rarer the condition the less chance you actually have it if you test positive, so for a very rare condition and a not very accurate test it is probably better not to test at all, to avoid undue alarm to the high number of people who will falsely test positive, and who are not mathematicians. Testing is also expensive, so that must also be taken into consideration. The table gives some additional examples for more accurate tests.

The moral is that if you need a test always ask what the error rate is, AND what percentage of people of your age have it.

Test Reliability %	Incidence One in a:	Probability +ve (in %)
95	Hundred	16.1
98	Hundred	33.1
95	Thousand	1.87
98	Thousand	4.7
99.9	100 Thousand	less than 1
99.99	100 Thousand	9.1
99.99	Million	less than 1
99.999	5 Million	1.96

Technical Snippets

The University of California have developed a new micro-processor with 1000 cores using approximately 621 million transistors. It executes 115 billion instructions per second whilst dissipating only 700 milliwatts. Cores operate individually at a maximum frequency of 1.78GHz and can communicate directly with each other when required.

[Source Electronics Weekly 6th July 2016].

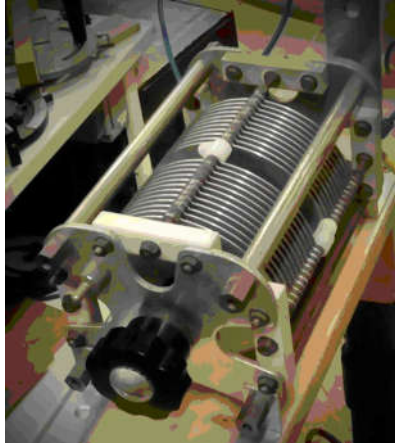
Playing with Magnetic Loop Antennas by Damien 2E0EUI

As some of you may know I have been playing around with magnetic loop antennas on an ad hoc basis for a little while now. A friend and fellow ham Clive 2E0BSL first told me about magnetic loop antennas about a year ago and they peaked my interest because of their relative small size compared to traditional wire antennas for HF.

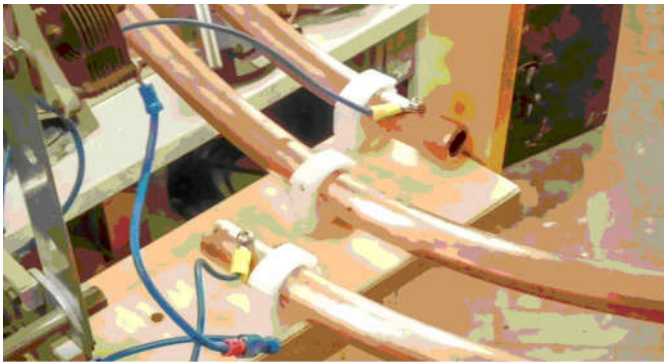
My magnetic loops have been made from various materials, RG213 coax and micro bore copper etc. but for my compact magnetic loop I wanted to use 22mm

copper pipe which makes a better radiator for the antenna.

Some pre-rolled 22mm heating and ventilation copper that was kindly donated by one of the plumbers at work was used. So seeing as the diameter was already set for me all I had to do was get a big enough air spaced capacitor and as luck would have it I was able to pick up a nice one at the Kempton radio fair which when checked with a meter was about 100 – 1300pf.



The double copper loop was then mounted - for this purpose I used some off cuts of Birch ply and some 22mm pipe clips (from eBay).



I then added a smaller air spaced capacitor in line with its bigger brother for fine tuning of the signals. Then I made the blue coupling loop (Faraday Loop) which was 1/5 of the whole circumference of the two loops of copper.

The mag loop assembly was then finished and mounted on a tripod stand rescued from an old building lamp stand.



The magnetic loop antenna had its first real test at a recent club night and it seemed to be working quite well even if the bands weren't in great shape but it did tune up nicely on both 40m and 80m and possibly 160m?

My YAESU FT 817 was used for this test so only 5W QRP was available. Despite tuning up some good signals on both bands no QSOs were made on the night so maybe a bit

more power and better conditions might help next time.

I hope this inspires some of you to have a go at making your own Magnetic loops.

73 Damien M6EUI

[The example results page of the loop calculator has been placed on page 6 of this newsletter to improve readability - Ed]

A PIC Processor Application

I have been looking at how to process switch closures from a series of front panel push buttons with momentary action. One option would be to use CMOS logic but with a total of 21 buttons this would require a large PC board full of components and ICs. A much better option would be to use a PIC processor.

A 16F876 was selected which is housed in a 28 pin DIL package and has sufficient input and output lines for the purpose. Rather than write delay loops to slow down the processor which is capable of operation up to 20MHz the RC oscillator option was used to clock the processor at about 40KHz. Frequency stability is not an issue in this application and the low clock speed means that the power consumption and risks of radiated interference will be very low.

The buttons are grouped in two lots of 9 and 12 on the front panel, each with its own PC board and processor. About two hundred lines of assembler code were required to scan each matrix of push buttons, process and remember each button press, run some simple logic and drive the respective output lines to the external circuits. As the processor output lines have a very limited current capability a 2N7000 MOSFET is used on each line as a buffer.

Two of the push buttons are used to cycle through a number of options (1-4 and 1-12) so the program code counts the number of presses of each button, outputs a binary coded decimal equivalent of each count and resets the count when it tries to exceed the maximum value in each case. This means that two output lines may be used to represent one of four possible selections and four output lines to represent one of twelve selections to simplify the external wiring. Each set of output lines are decoded in the respective external circuits.

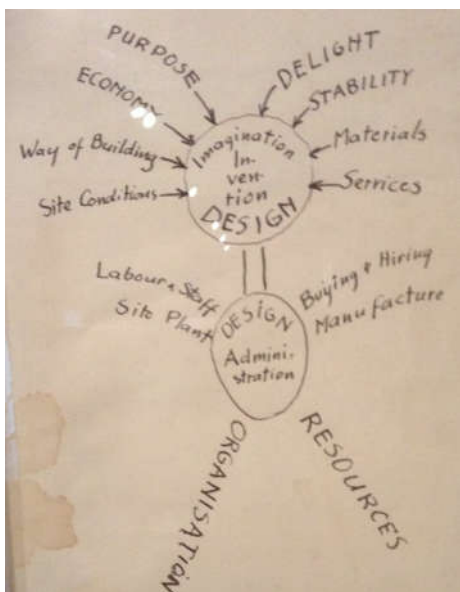
Note: although the 16F876 is still available it is not recommended for new designs. The recommended replacement is the 16F886.

Miscellaneous

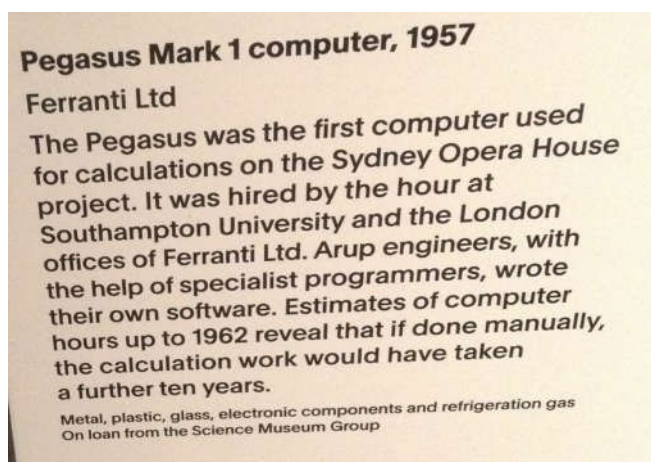
b) Ove Arup exhibition at the V&A

The V&A museum in London is hosting a retrospective of Ove Nyquist Arup (1895 - 1988), the founder of the Arup Consultancy and described as the most influential engineer of the 20th century.

The picture on the right of a doodle by Arup gives some ideas on his philosophies of total design.



At the exhibition is one of the Ferranti Pegasus Mk I computers from 1957. This event runs until Sunday 6th November 2016 and is well worth a visit.



a) New Ofcom Licence Portal

Ofcom have opened their new Amateur Radio and Ships Licencing portal at:

<http://licensing.ofcom.org.uk/radiocommunication-licences/online-licensing-service/>

Even though you may have registered on the previous portal you need to re-register on the new portal using your call sign as your ID. Read the help section first.

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

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 £3 each to non members.

One of Victor's neighbours has donated the following items for sale for which offers are invited with proceeds going to club funds:

1. Armstrong Amplifier 621 (see below)
2. AKAI Compact Disc Player CD-M88
3. Maraz Disc Player CD-67II (see below)



Contact Victor on 020 8653 2946 or [victor\(at\)jmail.co.uk](mailto:victor(at)jmail.co.uk)

73

G300U

Diary of External Events

28 Aug - Milton Keynes Amateur Radio Society Rally

Milton Keynes Irish Centre, Manor Fields, Watling Street, Fenny Stratford, Milton Keynes, MK2 2HX. Opens 07:00 for traders and 10:100 for the public. Entry £3. On-site catering, bar, car boot area, children's play area and large open space. Talk-in on 145.550MHz. Bletchley Park and the National Radio Centre are nearby.

06 Nov - West London Radio & Electronics Show (Kempton Rally)

Kempton Park Racecourse, Staines Road East, Sunbury on Thames, TW16 5AQ. Opens 9.50/10am. Details from Paul, M0CJX on 08451 650 351 or by email to info@radiofairs.co.uk or www.radiofairs.co.uk

20 Nov - CATS 39th Radio & Electronics Bazaar

Location: Oasis Academy Coulsdon, Homefield Road, Old Coulsdon, CR5 1ES. Just £1.50 entry which still includes a free tea/coffee! Second Hand Equipment, Flea Market Tables, Refreshments, Trader Stalls, Fully accessible facilities, CATS Bring & Buy. Contact

enquiries@catsradio.org or visit www.catsradio.org for more information.

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.

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](mailto:enquiries(at)bdars.co.uk). Web: www.bdars.co.uk
20 Sep Digital Mobile Radio
18 Oct Setting up your station
15 Nov "Toilet-roll TRF" (Construction)

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
06 Sep Millimetric Microwaves by Chris Whitmarsh G0FDZ
04 Oct Annual General Meeting
01 Nov 25 minute chats (not 25 @ 1min each...)

Coulsdon Amateur Transmitting Society (CATS)

8:15pm on 2nd Monday each month. Contact: Mike Buckley, M1CCF on 020 8654 2582, [m1ccf\(at\)talktalk.net](mailto:m1ccf(at)talktalk.net) or [secretary\(at\)catsradio.org](mailto:secretary(at)catsradio.org). Web site: <http://www.catsradio.org/>
12 Sep One Man & His Guide Dog by Paul Harman
10 Oct TBA
14 Nov ICQ Podcast by Martin Butler M1MRB/W9ICQ

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](mailto:secretary(at)carc.org.uk) or Web: <http://www.carc.org.uk/>
28 Sep Do you know how your aerial really works? Walter Blanchard G3JKV

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 [secretary\[at\]cvrs.org](mailto:secretary[at]cvrs.org). Web www.cvrs.org
08 Sep '999 Emergency' – Steve G3ZPS
22 Sep Old fashioned 'Junk' Sale - Nigel G1BUO

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>
27 Sep Amateur Radio in Cyprus – Then and Now by Mike Potter G4PFF & 5B4AGX

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>
25 Aug History of KW Electronics by Chris G8GKC

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 at [sionet3344\(at\)hotmail.co.uk](mailto:sionet3344(at)hotmail.co.uk) or <http://herc-hastings.org.uk/>
28 Sep "Learning the Code" by Phil G3MGQ
29 Oct Autumn Auction
23 Nov Digital 2m EME success – it COULD be you' by Peter G4URT

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/>
01 Sep A presentation by Peter Gavin
06 Oct Junk Sale
03 Nov Graham Somerville - Noise cancelling

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
02 Sep Radio Night & Table Top Sale

South East Essex Amateur Radio Society (SEARS)

Contact Dave G4UVJ on: 01268 697978 or email: [secretary\(at\)southessex-ars.co.uk](mailto:secretary(at)southessex-ars.co.uk). Web: <http://www.southessex-ars.co.uk/>
Meetings: 7pm 2nd Tuesday each month at Swans Green Hall in Hart Road, SS7 3PE. See web site.
13 Sep Update on DMR Radio with Mark M6RKC and Vince G8YPK.* TBC
11 Oct Talk by Carl Thomson G3PEM on "Antennas and Propagation."

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/>
05 Sep Test Equipment by Bob G3OOU
03 Oct Autumn Surplus Equipment Sale
07 Nov The GB3XP Repeater Project by Neil, M0ZEY

Sutton & Cheam RS

8pm on 3rd Thursday every month. Contact John Puttock G0BWW on 020 8644 9945 or email [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.
15 Sep AROS (Amateur Radio Observation Service with Vince Shirley – G0ORC

Wimbledon & District Amateur Radio Society

Meet 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](mailto:andrew.maish(at)ntlworld.com)

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

Small Magnetic Loop Antenna Calculator ver. 1.22a

by Steve Yates
AA5TB
aa5tb@yahoo.com
Updated April 28, 2009

Input the following parameters:

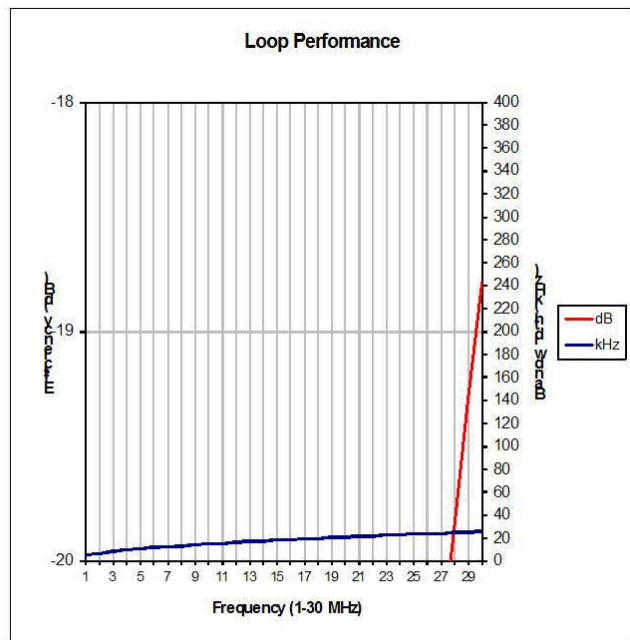
Design Frequency =	7.100 MHz	
Loop Diameter =	0.250 feet	0.076 m
Conductor Diameter =	0.870 inches	22.098 mm
Added Loss Resistance =	0.000 milliohms	
RF Power =	5.000 Watts	

Calculated Results:

Bandwidth =	12.148 kHz (-3 dB points)
Efficiency =	0.009 % -40.636 dB
Loop Area =	0.049 ft ² 0.005 m ²
Radiation Resistance =	0.000 mΩ
Total Loss Resistance =	2.396 mΩ
Loop Circumference =	0.785 ft 0.239 m
Wavelength Percentage =	0.567 % ?
Loop Inductance =	0.063 μH
Distributed Capacitance =	0.644 pF
Q (Quality Factor) =	584.480
Tuning Capacitor =	8003.233 pF
Capacitor Voltage =	90.473 V
Minimum Plate Spacing =	1.206 mils (1/1000 in) 0.031 mm

Notes:

- To truly be considered a small loop, the **Loop Circumference** should be less than 10 % ?. Larger loops will have greater efficiency but smaller nulls.
- To see the effects of bad joints, etc., input realistic values into the **Added Loss Resistance** box.
- The sheets are protected to prevent the user that is unfamiliar with Excel from accidentally corrupting formulas. To unlock the sheets use the password **aa5tb**.
- This application is free to use as you wish. If you modify it and pass it on all that I ask is that you give me credit for my part of the work. Thanks!



Local Training Courses						
Licence Level	Start	End	Location	Club Provider	Format	Further details
Full	28 Aug 2016	20 Nov 2016	Bromley, Kent	Bromley & District ARS	9 half days (Sun)	www.bdars.org
Foundation	14 Sep 2016	28 Oct 2016	Swanley, Kent	Darenth Valley RS	7 evenings (Wed)	www.darenthvalleyrs.org
Foundation	18 Sep 2016	25 Sep 2016	Bromley, Kent	Bromley & District ARS	2 days (Sun)	www.bdars.org
Intermediate	5 Nov 2016	19 November 2016	Eltham, SE9	Cray Valley RS	3 days (Sat)	www.cvrs.org
Foundation	4 Feb 2017	11 Feb 2017	Eltham, SE9	Cray Valley RS	2 days (Sat)	www.cvrs.org
Intermediate	tba Mar 2017		Bromley, Kent	Bromley & District ARS	3 days (Sun)	www.bdars.org
Full	2 Oct 2017	25 Nov 2017	Eltham, SE9	Cray Valley RS	2 evenings (Mon) + 4 days (Sat)	www.cvrs.org

CPREC Committee Contact Information

Officers:

Chairman: Jim Lugsden M6BXL 21 Overhill Way Beckenham Kent BR3 6SN 020 8650 7758 james.lugsden531(at)btinternet.com	Secretary: Alan O'Donovan G8NKM 2 Mackenzie Road Beckenham Kent BR3 4RU 020 8778 9660 alan.odonovan(at)btinternet.com	Treasurer: Doris Bailey 21 Overhill Way Beckenham Kent BR3 6SN 020 8650 7758 doris.bailey531(at)gmail.com
Committee Members: Bob Burns G3OOU Damien Nolan 2E0EUI Nick Stapley	Newsletter Editor	01737 552170 or G3OOU(at)AOL.COM

The following equipment is now available for sale and anything that remains unsold will be taken to Kempton Park and the CATS Bazaar events later in the year. Please contact Jim M6BXL if you are interested in any items. Jim will bring some of these along to the next meeting.

Description	Model or Part No	Manufacturer	Est'd Price
Aerial - 4ft telescopic whip mounted on a PL259 plug			£2.00
Aerial base - Mag mount plus approx 3m of coax and PL259, no whip.			£10.00
ATU - 300W HF type	AT300CN	Palstar	£80.00
ATU - Home made tuner with two large variable capacitors			£2.00
ATU - QRP HF type in black plastic box with 2 x SO-239 connectors			£10.00
ATU - Versa Tuner II, HF type	969	MFJ	£100.00
Batteries - 2 x 12v 7Ah sealed lead acid gel rechargeable type, £5 each			£10.00
Battery charger – large solar type			£5.00
Bench magnifier			£5.00
Bench viewer – swivel type			£5.00
Bhi noise eliminating speaker	NES 10-2 Mk3		£40.00
Book - RSGB Handbook			£5.00
Books - 24 assorted at £1 each minimum			£24.00
Buried cable finder			£5.00
Cable - Approx 20ft of 50ohm coax	RG58		£3.00
Cable - Approx 7m of 300ohm ribbon in 2 lengths			£3.00
Charger 14v 800mA			£5.00
Compass – Lensatic in metal case			£5.00
Components – Blue box of new and used Rs and Cs			£5.00
Components – Grey box of components and small tools			£20.00
Connector – BNC coaxial splitter	TE114949 PNS-F2		£10.00
Connector – CDX coaxial lightning surge protector			£5.00
Connectors – box of approx 40 assorted jack plugs and sockets			£10.00
Connectors – box of approx 50 assorted coax connectors BNC, PL259 few B&Lee			£15.00
CRT - 1inch type with socket	CV2302		£5.00
CW reader, pocket type (flat battery)	MFJ-461	MFJ	
Digital caliper, looks new		Powerfix	£5.00
Drawing compasses, 5 in metal case			£10.00
Drill stand, drill and assorted drill bits			£20.00
Feeder and cable ties			
Ferrite rings - 2 x 1.5inch			£2.00
Frequency Counter - 500MHz with LED display		Microwave Modules	£25.00
GDO boxed with coils but no ear piece	TE-15	Tradiper	£15.00
Headphones – low impedance old style			£5.00
Helping hand tool with magnifier			£6.00
L & C meter			£10.00
LCR meter with LCD display	Atlas LCR40	Peak	£40.00
Log Amp kit of three ICs incl AD8307			£10.00
LPF - 30MHz and small	FL-30		£5.00
LPF - HF type in long case		KW ?	£10.00
LPF - HF type with SO239	TVI-30	Vanco	£5.00
LPF – small, HF bands	FL-30	Palstar	£5.00
Magnifier – Folding magnifier			
Magnifier – folding type on stand Good lens			£6.00
Meters, 6 assorted, 3 x 1mA, 50-0-50uA, 50mA, & 100uA at £1 each			£7.00
Microcode DSP with LCD readout		Cumbria	£15.00
Micrometer (new)		M & W	£12.00
Micrometer 0-1" New cond.		Moor and Wright	£6.00

Description	Model or Part No	Manufacturer	Est'd Price
Microphone – Desktop	444	Shure	£30.00
Microphone - Dynamic type, MH-31 a8j			£10.00
Microphone - fist type	MH-31		£5.00
Microphone – old style with cable (looks like a D104)			£10.00
Miniature drill complete with burrs and grinding discs and stand.(Similar to the Dremmel)		Minicraft	£30.00
Miscellaneous components and small tools priced from £1 each upwards	Misc		
Mitre saw			£10.00
Morse Key - black fully enclosed			£5.00
Morse Key - brass on wooden base			£10.00
Morse Key - Marconi			£25.00
Morse Key - miniature on marble base			£5.00
Multimeter – Analogue type in box	TP-5S	TMK	£5.00
Multimeter – digital type with probes	DD6010	Altai	£10.00
Multimeter – digital type with probes	DT-830B	Hilic	£3.00
Multimeter – Very old V & A, AC & DC			£5.00
Multimeter with LCD display			
Nuts, screws, bolts and washers, assorted in plastic case. Looks new			£5.00
Paddles – Electronic key paddles		Bencher	£80.00
Picaxe micro-controller project with pcb and box			£5.00
Power Meter - 1.8-200MHz Fwd and Ref with SO-239 connectors	SX-200	Diamond	£30.00
Power meter – Forward and reverse QRP type with 2 meters and BNC connectors in two linked boxes			£10.00
Power meter – HF 1-200W FSD		Spectrum Communications	£10.00
Project box – Alloybox			£1.00
Project box – steel with unknown project			£1.00
PSU 0-24v 0.5A in blue steel case – regulator fault			£3.00
PSU 13.8v 3A		Selmar	£3.00
Receiver – unknown condition, has 4 gang variable capacitor and epicyclic drive		Green ECE Ltd	£3.00
RF Analyst with LCD display	RF-1	Autek Research	£30.00
RF Field Indicator tunable with telescopic whip			£3.00
Scope - Single beam 4MHz		Heathkit	£25.00
Solder - 1 large and one small reels of 60/40 solder			£8.00
Solder - Reel of 60/40			£10.00
Soldering Iron - 230v		Henley Solon	£5.00
Soldering iron – 230v		Rawl Plug	£5.00
Soldering Irons - 2 x 230v irons with 3 spare bits and iron holder		Antex	£15.00
Soldering irons – assorted			
Soldering Station - 50W	N78AR	Maplin	£12.00
Soldering station – precision			
Swivel vice with 3" clamp			£5.00
SWR meter SO239 connectors	SWR-3	Hansen	£12.00
Tap and die set Metric New			£7.00
Test leads			
Tone dialler – pocket type		Tandy	£5.00
Transceiver – 100W HF with PSU	KW-2000A	KW	£100.00
Transceiver – QRP HF bands, looks complete	HW-9	Heathkit	£40.00
Vacuum cleaner – mini type			£5.00
Valve 1	ECL80		£1.00
Valve 1	EF85		£1.00
valve, 1 with no matching base	QQVO3-20A	Mullard	£4.00
Valves - 2 with bases, £6 each	832		£12.00
Wire – 3 reels solderable enamelled copper, £2 each			£6.00
Wire - 4 reels assorted tinned copper £1 each			£4.00