

The newsletter of the
Crystal Palace Radio & Electronics Club

Affiliated to the Radio Society of Great Britain

Established 1956

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: 3rd June 2016

Basic Electronics - An Introduction to the Operational Amplifier

In this issue: *Future & Most Recent Meetings, South East Training Group,
Chairman's Notes, Member's News, 'Swap Swop for Swap Part 1' by
Theorist, Technical Snippets, Miscellaneous, Noticeboard, Diary of
External Events and News from other Clubs*

Dear Reader

Future Club Meetings and Events

| | | |
|---------------------|---|--|
| 3 rd Jun | M | Basic Electronics - An Introduction to the Operational Amplifier |
| 1 st Jul | M | The Tracking of Balloons |
| 5 th Aug | M | Summer Social |
| 2 nd Sep | M | Short Talks: Geographical Mapping and Eutectic Points |

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

03 June - Basic Electronics - The Operational Amplifier

The Operational Amplifier or op-amp for short is an extremely useful building block for analogue circuitry. It is an integrated circuit containing a block of gain that may be configured as an inverting or non-inverting amplifier or a unity gain buffer. The input impedance ranges from 50 ohms to over one tera-ohm and the output impedance is generally low.

Early versions had extremely limited frequency characteristics but modern examples can operate at VHF and UHF.

This talk will commence with a short presentation introducing the basic concepts followed by a practical demonstration of a working op-amp and finishing with a construction session where members may gather in up to four teams to build a Maplin N47FL kit op-amp circuit. If you would like to take part please bring a small soldering iron and some basic tools. The kit is shown below:



12 June - 60th Anniversary Special Event Station

The NoV has now arrived from Ofcom and we will be using the callsign GB6CPR to celebrate our anniversary year. The event station will be located at Jim's QTH and open to the public with the club banner advertising our presence. More information in the Chairman's Notes section.

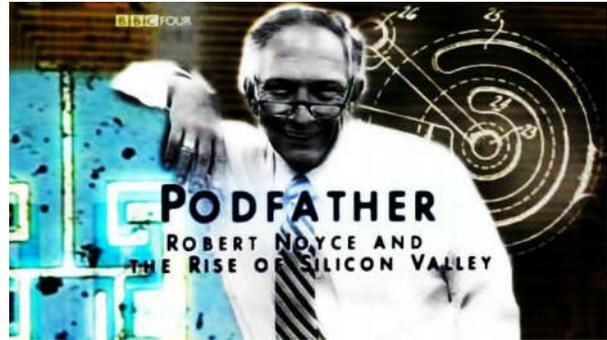
Recent Event News

06 May - The role of amateur radio in WW 1 by Dr Elizabeth Bruton

Friday May 6th's club night had been advertised as The Role of Amateur Radio in WW1 by Dr Elizabeth Bruton. Unfortunately Dr Bruton had a medial emergency and couldn't deliver the talk and I was only informed of the problem on the morning of the 6th. This was most unfortunate as we had advertised the talk quite widely which resulted in one of the biggest turnouts we have seen at a club night for many years.

As a replacement for Dr Bruton's talk I showed a BBC film on Robert Noyce and the rise of Silicon Valley. This film was first aired in October 2009 on BBC 4 and traces Robert Noyce's career from his work with William Shockley to setting up Fairchild Semiconductors, inventing the silicon integrated circuit and setting up Intel with Gordon Moore (as in Moore's law). The byline for the program was "Noyce may be the most important person most people have never heard of".

Robert Noyce:



Apologies to those members and guests who turned up for May's club night and were disappointed. However, for those who stayed I hope the film shown was both informative and educational. The film can still be viewed on Youtube.

Alan G8NKM

20 May - South East Training Group

Jim M6BXL and Bob G300U attended the inaugural meeting of this group which was chaired by Kevin Jennings M0KSJ. The objective was to explore how to enable local clubs to help each other in the provision of training and examinations for the amateur radio licence. Ten people attended this meeting from a number of clubs in the South East.

The Chairman will summarise the points put forward and issue minutes in due course.

Chairman s Notes.

First I must express my regrets for the non appearance of the speaker at the May meeting. Thank you Alan for taking over with your videos and conducting the meeting.

So we had the biggest turnout for ages and no speaker but what is apparent is that publicity pays. As our speaker, Dr Liz Burton, was coming from Oxford we made a special effort to invite family and friends and it worked. Note for future meetings, tell everyone including the works cat.

Our next big event is the anniversary station for which Bob

is organizing a special call sign. It's arranged to take place on Sunday 12th June in Overhill Way, Beckenham at the annual street party "The Big Brunch". The road will be closed for the nosh-up and games and the station will be set up at number 21.

We need a number of volunteers to help set up the aerial and station on Sat. 11th and take down either on the Sunday evening of the party or next day if we wish to keep the station going late into the evening. We also need operators on the day. The club's new posh FT950 HF transceiver will be in use together with my 2m and 6m sets plus anything participants would like to bring along. The party organizers ask attendees to bring something barbecueable. I look forward to seeing a good turnout.

In the meantime our friends at the Cray Valley club are progressing with their plans for the combined training initiative and I will be going to their meeting on Fri. 20th May. I believe Bob is going too so we will keep you informed of progress. I also hear that Bromley are planning to put on an advanced course.

Jim (M6BXL)

[Written before 20th May - Ed]

Members News

For a Christmas present I was given a voucher by my two sons for a conducted tour of the Morgan Car Company factory and museum in Malvern and a one hour drive of a Morgan 4/4 car. Cathy and I decided to delay the visit until the weather was better and we recently spent two days in Malvern looking at National Trust properties and most of the following day at the car company.

The photo below shows Cathy and I next to the car that I drove. Although this car was built and registered in 2016 with a modern Ford 1.6 litre engine and gearbox it is a modern version of a body, chassis and suspension design that is 80 years old.



Driving it took some getting used to as there was no powered steering, the driving position is about eight inches

above the road, clutch and foot brake pedals are fairly heavy and the bonnet seems to go on for ever from the driver's perspective. The suspension is fairly hard so you feel the road surface more but the road grip is excellent. Power to weight ratio is much higher than my own estate car as the engine output power is 110bhp and the total weight is only three quarters of a ton due to the aluminium chassis and wooden sub-frame so the 0-62mph time is about 8 seconds (there is a V8 variant that does 0-62 mph in 4 seconds!). The twin exhausts make a lot of noise. The five speed manual gear shift is extremely precise and has less than half the movement of that in my own car.

After half an hour I had got used to the driving differences and immensely enjoyed the rest of the time driving around the Malvern hills before it was time to return. Grinning from ear to ear is an under-statement!

Despite the age of the body design it looks really great and stands out a mile compared to modern car shapes which mostly seem rather bland and similar to each other.

A side view of the same car is shown below:



The tour around the factory made apparent the vast amount of skills possessed by the Morgan staff. We watched cars being assembled and body panels and wooden sub frames being individually shaped during fitting. Not very often you see a wood plane or wood chisel being used during a car assembly! One of their technicians can build a car from the basic parts in 37.5 hours to the point where it can be driven with a working engine but less the painted body panels which are the last items to be fitted and hand polished.

The museum has photos and examples of early Morgan cars from their first one in 1908 and a video summarising their history. Also on display was their range of three wheeler vehicles - the latest two litre version can do in excess of 100mph - now that is a scary thought.

A photo of a working prototype of the new Morgan electric three wheeler completes this article:



Swap Swop for Swap Part 1 by 'Theorist'

This article is about something that never gets mentioned in science documentaries or anywhere else for that matter, but which is incredibly important in all sorts of ways. I will introduce it by way of an analogy, which happens to take the form of a puzzle, with the solution(s) at the end [1].

Suppose you have three cups labelled C1 C2 and C3. You also have three identical marbles. The puzzle is to count the total number of different ways (or *combinations*) that you can place all three marbles in the cups. You can have as many marbles as you like in a cup, so for example two could be in C1 and one in C3 (call this Case A) or all three could be in C2, or one in each cup, and so on.

If you start to work out the possible combinations one thing might bother you: does it matter which marble goes in which cup? For example in Case A if you swapped the marble in C3 with one of the marbles in C1, would that be a different combination? As any of the three marbles could be in C3 should you count three combinations towards the total for Case A, or just one?

If the marbles were all a different colour it would be obvious that there were three separate combinations for Case A, so it seems logical that there should be three even when the marbles are all identical. However the puzzle did not specify anything about this, so I will have to clarify things a bit. I will say that for marbles you do *not* count swaps as separate combinations, so there is only one combination for Case A. I will say that marbles are *indistinguishable*.

I will now give you three identical buttons and set the same puzzle. A cup can still contain as many buttons as you like, but unlike marbles buttons are *distinguishable*, which means that you *can* count swaps as different combinations, so that you count three combinations towards the total for case A.

Finally I will give you three identical coins, which are indistinguishable like marbles, and again set the same puzzle. However a cup can only ever contain at most one coin. Case A cannot occur, and since you cannot count swaps (as coins are indistinguishable), there is only one possible combination, namely when there is one coin in each of C1, C2, and C3. The solution to the puzzle for coins is therefore 1.

What has this got to do with anything? A lot if you are an electron or any of the other fundamental sub-atomic particles. It turns out that where these are concerned they all behave as if they are *indistinguishable*. If you swapped over two electrons in a crystal, for example, this would not count as a different combination - the fundamental particles are not like buttons.

It also turns out that there are two types of fundamental particles. One group behaves like the marbles and are called bosons [2], examples being the photon and the famous Higgs boson. The other group behaves like the coins and are called fermions [3], examples being the electron, proton and neutron. A 19th Century physicist would have argued strongly that particles *must* behave like buttons and been astonished that they behaved in

any other way, so buttons can be called 'classical particles'.

If marbles are bosons and coins are fermions, what then do the cups represent? They represent the states that particles can occupy. Next month Part 2 will look at all this in greater depth, and consider some of the implications that follow from it.

[1] The solution(s) to the puzzle are that there are 27 ways for the buttons (= $3 \times 3 \times 3$), 10 for the marbles and 1 for the coins.

[2] After the Indian physicist Satyendra Bose. 'Boson' used to be pronounced to rhyme with 'clothes on', but recently seems to be pronounced to rhyme with a ships bosun or bos'un

[3] After Enrico Fermi, a great Italian physicist

Technical Snippets

A gremlin crept into the preparation of the last newsletter and the following two items were omitted:

a) Keysight Technologies, the latest incarnation of Hewlett Packard, have just announced the development of a semiconductor technology based on Indium Phosphide that will enable them to produce integrated circuits for use in the front end of a 100GHz real time digital oscilloscope in 2017.

b) The manual for the wave winding machine mentioned in Jim's article in the last newsletter can be downloaded from <http://www.g1jbg.co.uk/pdf/avowave.pdf> - it requires a lot of gears to cover the full range of wire and wave sizes but the load on the gears is small so plastic would be a suitable gear material.

Early wave winders used standard lathe gears which were easily available in a wide range of teeth numbers in the days before modern plastics were available.

A wave winding machine is the only viable way to efficiently produce wave wound coils where the turns must be laid in a precise pattern and tension in order to obtain a self supporting structure that minimises and also evenly distributes the self capacitance between turns to optimise the Q.

The positioning of the turns depends on the required width of the finished coil, the number of turns per wave and the thickness of the wire being used so a lot of gear combinations are required. The finished item can be wax impregnated - a common technique in early radio equipment - or varnished.

Three examples of wave wound coils are shown to the right, a Wearite PA2 (medium wave), PA1 (long wave) and an unknown long wave item removed from an old radio.



Miscellaneous

a) No matter how well your Windows PC filing system is organised, there will come a time when you need help to find specific files. For example, my four operating systems, technical and development applications and their respective libraries contain over a million files, spread across three hard drives totalling 1.2 Tera Bytes and seventeen disk volumes (drives C: to S:), so searching for one file can be a time consuming process. Thankfully, help is at hand.

There is a very useful utility called "Everything" which is available from <http://www.voidtools.com/> and is free (with optional donations). This is a small application which runs in the Windows background and automatically generates and updates a database containing a list of every file and folder installed on your entire PC that is visible to a Windows operating system. Windows cannot see any Linux installations so they are not included although Linux can see and read Windows installations.

"Everything" includes a File Manager like application that allows you to search for filenames that contain specified characters or phrases and open files using their associated applications. I renamed the "Everything" icon to "Search Everything" to make it more obvious. This is an incredibly useful application.

b) The reason for using multiple disk volumes is to:

- minimise the risk of data loss in the event of a hard disk controller or processor malfunction or over-enthusiastic file deletion
- Minimise the risk of accidental file deletion
- Keep application software and their related data files segregated
- Allow related files to be segregated by easily recognised function e.g. drive H for "Hardware" and drive M for "Manuals"
- Keep volume sizes to a reasonable level for backups - single layer Blu-Ray media will store some 24GB of data, dual layer twice that.

You can create multiple disk volumes using a partition manager for which there are both free and paid for versions available.

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. Marantz 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

4-5 June – Sussex Electronics and Radio Fair (SERF 2016)

Eastbourne Sports Park, Cross Levels Way, Eastbourne, East Sussex BN21 2UF. £3, children free. Open 10am to 4pm. Dave, G8PUO, 07807 074 538, admin@serf.org.uk or www.serf.org.uk

12 JUNE - East Suffolk Wireless Revival (Ipswich Radio Rally)

The Orwell Crossing Lorry Park, A14 Eastbound, Nacton, Ipswich IP10 0DD. Talk in on S22, car parking on site. Opens at 9.30am and admission is £2. RSGB bookstall, car boot area and a Bring & Buy, SIG, licensed bar and catering available. GB4SWR on HF bands. Details from Kevin, G8MXV, 0771 004 6846 or www.eswr.org.uk.

19 JUN – 29th Newbury Radio Rally

Newbury Showground, next to M4 J13. Entry is £2.50 and opens at 9am. On-site catering and a raffle. Details from rally@nadars.org.uk or www.nadars.org.uk
A full list of rallies and events may be found at <http://rsgb.org/main/news/rallies/>

24-26 JUNE - Hamtronic Show, Friedrichshafen

Messe, Friedrichshafen, Germany. Trade stands, SIG, IARU Member Societies stands, large flea market, lectures each day, some in English. Large RSGB book stall. Web: hamradio.friedrichshafen.de

20th 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 G300U. 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. Web: www.bdars.co.uk

- 21 Jun Aerials (Construction and testing)
- 19 July Direction Finding
- 16 Aug Social and On-Air Evening
- 20 Sep Digital Mobile Radio

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

- 7 Jun Table top sale
- 5 Jul Innovantennas by Justin Johnson G0KSC
- 02 Aug Constructors Competition by Carl G3PEM
- 06 Sep Millimetric Microwaves by Chris Whitmarsh G0FDZ

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/>

- 13 Jun 2 Metre DF Hunt organised by Denis M0NDJ
- 11 Jul TBA
- 08 Aug CATS Annual BBQ

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/>

- 22 June Off-air Frequency Standards by Bob Burns, G30OU

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. Web www.cvrs.org

- 02 Jun Making friends with the FT-897 family – Mark G8PHM
- 16 Jun 2016 DF Hunt

Dorking & District Radio Society

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

- 28 Jun Do you know how your antenna really works? By Walter Blanchard G3JKV
- 26 Jul South Downs evening
- 23 Aug Social Evening

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@btinternet.com) or 01784 451898. Web site: <http://www.qsl.net/g3ues/index.htm>

- 4/5 Jun National Field Day

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@hotmail.com) or <http://www.harc.org.uk/>

- 02 Jun BBC's first Satellite Link by Malcolm Harman
- 07 Jul EMC - John Pink - G8MM
- 04 Aug Keith Evans G3VKW - Old Radios
- 01 Sep TBA
- 06 Oct Junk Sale

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 May Construction Contest
- 10 Jun Open Evening for Burgess Hill Town Festival
- 15 Jul Radio Night and Table Top Sale
- 05 Aug Noise cancelling etc by Graham Somerville of bhi ltd

South East Essex Amateur Radio Society (SEARS)

Contact Dave G4UVJ on: 01268 697978 or email: 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.

- 14 Jun Confessions of a Radio and TV Engineer, Part 1 CB Radio with Dave G4UVJ
- 12 July Talk with Dave G4AJY on "Rectification"
- 09 Aug Talk with the members of the Essex CW Club
- 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. Web: <http://g3src.org.uk/>

- 06 Jun How to Use an Oscilloscope by John Stockley G8MNY
- 11 Jul SRCC BBQ
- 03 Oct Autumn Surplus Equipment Sale
- 02 Nov Short Talks Evening

Sutton & Cheam RS

8pm on 3rd Thursday every month. Contact John Puttock G0BWV on 020 8644 9945 or email [info\(at\)scrs.org.uk](mailto:info@scrs.org.uk) Web: <http://scrs.org.uk/>. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.

- 16 Jun TBC
- 21 Jul Fault Finding with Leslie Butterfields, G0CIB

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@ntlworld.com)

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

CPREC Committee Contact Information

Officers:

| | | |
|--|---|--|
| <p>Chairman: Jim Lugsden M6BXL 21 Overhill Way Beckenham Kent BR3 6SN 020 8650 7758 james.lugsden531(at)btinternet.com</p> | <p>Secretary: Alan O'Donovan G8NKM 2 Mackenzie Road Beckenham Kent BR3 4RU 020 8778 9660 alan.odonovan(at)btinternet.com</p> | <p>Treasurer: Doris Bailey 21 Overhill Way Beckenham Kent BR3 6SN 020 8650 7758 doris.bailey531(at)gmail.com</p> |
| <p>Committee Members: Bob Burns G30OU Damien Nolan 2E0EU1 Nick Stapley</p> | | <p>Newsletter Editor 01737 552170 or G30OU(at)AOL.COM</p> |