

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](http://www.twitter.com/bobfburns)

Next meeting: 1st July 2016

## *High Altitude Balloons by Rick M0LEP*

In this issue: *Future & Most Recent Meetings, South East Training Group, Chairman's Notes, Member's News, 'Swap Swop for Swap Part 2' by Theorist, Technical Snippets, Miscellaneous, Noticeboard, Diary of External Events and News from other Clubs*

## Dear Reader

### Future Club Meetings and Events

1 <sup>st</sup> Jul	M	High Altitude Balloons by Rick M0LEP
5 <sup>th</sup> Aug	M	Summer Social
2 <sup>nd</sup> 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.

#### **01 July - High Altitude Balloons by Rick M0LEP**

Rick writes: *You've probably seen headlines like "Ted-dies in Spaaaaace!" and photos to go with them. You might not have realised how much amateur radio has to do with them, and how complicated it gets. Let's find out a bit.*

*There's also a sub-text of "How I got into Amateur Radio".*

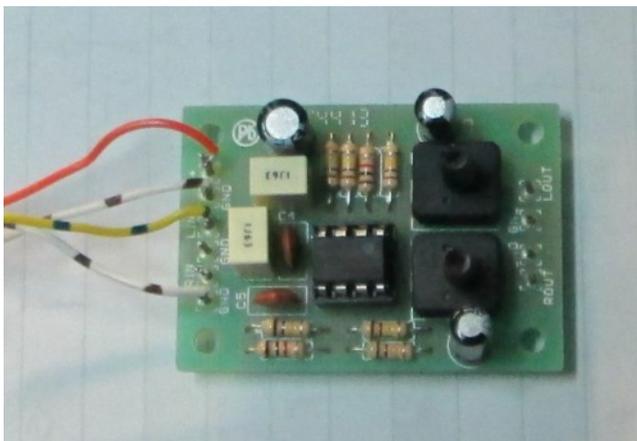
### Recent Event News

#### **03 June - Basic Electronics - The Operational Amplifier**

This meeting commenced with a short illustrated presentation on Operational Amplifiers followed by a demonstration of the performance of the completed Maplin kit. After that the floor was passed over to members who divided up into four teams to build the kits purchased by Jim and sold to club members. The documentation provided with the kits was somewhat sparse so you scribe drew out the circuit and provided a copy with each kit.

Three kits were completed and tested on a 9 volt supply with no problems. The fourth kit was not sufficiently complete to test and was taken home to finish.

The completed kit, shown below, provides two independent (stereo) channels each with a low noise gain of approximately 100x (40dB) in the audio frequency band and works from a single supply. The active device is an NE5532P dual op-amp. If required, the gain of each amplifier may be reduced by changing the feedback resistors.



At the end of the meeting we loaded up Jim's car with the equipment to run the two stations at the GB6CPR event which is described in the following article.

#### **12 June - 60<sup>th</sup> Anniversary Special Event Station**

Six club members arrived at Jim's QTH on the Friday immediately before the Sunday to erect the aerial mast, HF aerial and assemble the HF and VHF stations.

The HF station, shown below, was based on the club FT950 transceiver, 13.5v switching power supply, KW Eazimatch and HF 132ft dipole with open wire feeders.



This station was assembled and operated in the workshop behind Jim's garage with easy access from the road for visitors.

No problems were encountered in tuning up on all bands from 3.5 - 29MHz although a reduction drive on the Coupling control of the KW Eazimatch would make tuning somewhat easier. The G30OU Z-Match was there just in case of problems but was not used.

The club mast was erected using eight out of the ten sections (36ft) and three sets of guys. The house end of the aerial was supported by a halyard passed over the ridge tiles and anchored in the front garden. The neighbours looked on with interest during this time.



The VHF station over the page, shown being operated by Jim in his office, was based on Jim's FT726 transceiver and vertical three band colinear aerial plus the club TRIO TR9130 multimode 2m transceiver to the right and a Kenwood 13.5v power supply.



By 17:00 everything was in place for the event.

On the Sunday the HF bands were extremely noisy and the QSO rate was a lot lower than expected so the operators had to work fairly hard to make contacts. Stations were contacted in nine European countries, mostly on SSB and a few on CW. Just before the station closed down 15m opened to South America and PP1 and PY2 (Brazil) were heard but not contacted. Earlier in the day 4Z6TT (Israel) was heard working big pileup (so called when many stations call at the same time on and around the same channel).

The VHF station put out a reasonable signal and we briefly joined the CATS Sunday morning net before moving off to contact other stations. Damien brought along his DMR 144MHz hand portable and made a number of contacts on that mode.

Damien took the opportunity to test Jim's new HF aerial and FT726 multimode QRP rig and received a 5&9 report from Italy on 15m late in the afternoon.

A collection of home made radio and test equipment was on display for visitors.

We were visited by quite a number of Jim's neighbours who were attending the street party and expressed considerable interest in the station, aerials, Jim's machine workshop and tram. Thank you to Doris for feeding the team after the clearing up was completed.

Damien 2E0EUI writes: *I just wanted to say a big thank you to everyone who was involved with the special event station yesterday and especially to our hosts Doris and Jim. I had a great time and really enjoyed the day and Jim, please pass on my thanks to your neighbours who made us all feel so welcome.*

## **Members News**

a) We welcomed back club member Marianthi to the June meeting.

b) We have been asked to assist with the clearance of two local silent key amateur radio shacks. Once assessments of the contents have been made lists will be published in the 'Pulse'. We have already booked a table at the CATS Bazaar and may also attend at Kempton if the quantity of equipment merits it.

## **Swap Swop for Swap Part 2 by 'Theorist'**

Atoms, like the solar system, are essentially empty space. Two solar systems could pass through each other, albeit with some disturbance, so the question is why can't we walk through a wall? An incorrect explanation which I was given at school and which I have even seen it in some respectable textbooks, is that the electrons orbiting the atoms of a solid form a shield, repelling the electrons of anything that approaches it. Although this sounds perfectly reasonable it is wrong – if it were true then as you walked towards a wall you would feel the Coulomb inverse square law in operation, so that you would find it more and more difficult to approach the wall the closer you got to it. Instead you feel no force as you approach a wall, and then come to an abrupt halt should you actually try to walk into it! Indeed basic calculations suggest that it should be perfectly possible to walk through a wall since there are equal numbers of electrons and protons in neutral material and the electrons can 'move out of the way' if need be.

In last month's article I stated that there are two types of fundamental particle called fermions and bosons, and that there was something funny and different about the way you count them, or rather the 'states' they can be in.

A 20<sup>th</sup> century discovery was that the electrons in an atom can only be in particular states, and that associated with each state is a particular energy. If an electron in an atom gains some energy – perhaps from an electromagnetic field – it can jump into a higher energy state. This is the true meaning of the term 'quantum leap'. However when it subsequently drops back down into a lower energy state, the energy it loses is emitted as a photon with an energy equivalent to the difference in energy between the two states. Since the energy of a photon is related to its frequency or wavelength this explains the existence of discrete atomic spectral lines.

An unwritten rule of physics is that things like to lose energy – think of stones or water rolling/running down hill. At room temperatures virtually all the electrons in atoms are in the lowest possible energy state they can be in. But electrons are fermions, which means that only one electron can be in any one particular state at a time (they are the coins of last month's article). This is called the Pauli exclusion principle, and it is the real reason you cannot walk through walls. As you encounter a wall the electrons of which you are made up cannot occupy the same state at the same time as the electrons of which the wall is made. It is just forbidden. If electrons were bosons (the marbles of last month's article) I cannot think of a reason why you could not pass through a wall, since as many bosons as you like can occupy a particular state simultaneously.

The distinction between bosons and fermions may appear somewhat esoteric but it has real effects in the world. For instance it explains why some materials can become superconductors, with zero resistance, and why others can become superfluid, with zero viscosity. The 'role' that fermions and bosons play in the universe is also distinct – but that will have to wait for another time.

## Technical Snippets

Your scribe's rebuilt off air frequency standard is slowly coming to life.

The original unit had been manufactured in 1973 and was still in good working order when it was acquired a year or two back except that the frequency of the received signal (Radio 4) had changed in 1988 from 200KHz to 198KHz. The receiver was re-crystalled and retuned to 198KHz but the original VCXO (voltage controlled crystal oscillator) and Phase Detector modules had to be replaced with new designs and a new power supply designed and built.

Each of the four PC board assemblies had already been tested and made to work on their own and the now interconnected assemblies are locking the 10MHz oscillator using the incoming 198KHz signal but the phase locked loop is not yet unconditionally stable and the receiver ferrite rod aerial is not tuning correctly so a few corrections are still required.

The main unit, less its lid and aerial, is shown below during the wiring phase.



The receiver and crystal filter is on the left, next to the right is the screened enclosure containing the divider system and phase detector. The 10MHz VCXO, divider and loop filter is immediately behind the meter and the unit at the back right is the power supply module containing the charger and battery holder.

The lid includes a carrying handle containing the ferrite rod aerial and there will be a preset aerial tuning control on the rear panel behind the receiver.

The internal power source will be a nickel metal hydride rechargeable PP3 battery which is now sold as being short circuit proof. A voltage and current limited charger circuit has been included on the power supply module which will allow the battery to be float charged from an external 12v DC source while the instrument is in use.

Three LP2951 low dropout regulator ICs have been used to provide the various supply lines and charger. The instrument consumes a total current of 22mA, most of which is the receiver, so this should mean about 8 hours operation from the internal battery without charging.

Once the loop has been optimised, lock up time is expected to be about 10 - 20 seconds.

The meter may be switched to display received signal strength, internal supply voltage (nominally 8.4v) and the frequency control loop voltage.

The central control knob which provided a manual locking control in the original design is no longer required as the current phase shift detector automatically provides the correct sense control voltage to achieve lock so something decorative is needed to put in its place.

Once complete this unit should provide a stability of at least 1 part in  $10^8$  (1Hz in 100MHz) over a period of a second or two and considerably more over longer periods of time. The 198KHz frequency is derived from a Rubidium standard and is maintained to a typical accuracy of better than 2 parts in  $10^{-11}$  (2Hz in 100GHz).

There are two fairly standard methods to make use of the 198KHz transmission:

- frequency division of both the incoming signal and the VCXO down to 2KHz
- frequency mixing of the received signal with 200KHz derived from division of the VCXO to obtain 2KHz and then further division of the 200KHz down to 2KHz

The two 2KHz signals can then be compared in the phase detector and a correction signal sent to the VCXO.

There is also a standard frequency source on 60KHz which is receivable throughout the UK. Each of these transmissions have their advantages and disadvantages. Google "Off Air Frequency Standard" for more information on all of them including higher frequency standard transmissions.

There are also a number of HF standard frequency transmissions but as these mostly arrive in the UK by skywave they are less useful. Any change of phase of the received signal due to disturbances in the ionosphere equates to a change in frequency so the overall result is a lower frequency accuracy.

## Training

Following this club joining the South East Training group initiative run by Cray Valley Radio Society a table of local training courses has been included on the last page of this newsletter.

## 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.

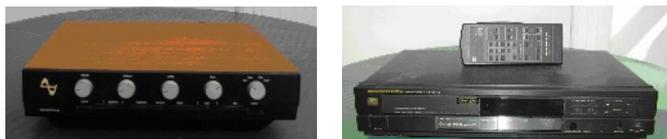
## For Sale

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

73

G300U

## Diary of External Events

### 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

### 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](http://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](mailto:enquiries@catsradio.org) or visit [www.catsradio.org](http://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](mailto:enquiries(at)bdars.co.uk). Web: [www.bdars.co.uk](http://www.bdars.co.uk)  
 19 July Direction Finding  
 16 Aug Social and On-Air Evening  
 20 Sep Digital Mobile Radio

### 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](http://www.g0mwt.org.uk)

- 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](mailto:m1ccf(at)talktalk.net) or [secretary\(at\)catsradio.org](mailto:secretary(at)catsradio.org). Web site:

<http://www.catsradio.org/>

- 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](mailto:secretary(at)carc.org.uk) or Web: <http://www.carc.org.uk/>  
 22 June Off-air Frequency Standards by Bob Burns, G300U

### 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](http://www.cvrs.org)  
 07 Jul A25UK: Botswana 2016 – Nobby G0VJG and Giles M0TGV  
 23 Jul Club BBQ

### 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>  
 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(at)btinternet.com) or 01784 451898. Web site: <http://www.qsl.net/g3ues/index.htm>  
 14 Jul The E6GG DXpedition - Justin Snow, G4TSH  
 28 Jul On-Air / CW Practice / Bring & Buy / Natter Night

### 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/>  
 22 Jun Talk on COMPENDIUM OF ELECTRONIC TOPICS by Rodney  
 27 Jul On air operating and chat  
 24 Aug Construction Contest

### 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 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](http://www.msars.org.uk)

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.  
 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/>  
 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 Web: <http://scrs.org.uk/>. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.  
 21 Jul Fault Finding with Leslie Butterfields, G0CIB

**Wimbledon & District Amateur Radio Society**

Meet on the 2nd and last Friday in the month at Martin 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	Start	End	Location	Club Provider	Format	Further details
Full	28 Aug 2016	20 Nov 2016	Bromley, Kent	Bromley & District ARS	9 half days (Sun)	<a href="http://www.bdars.org">www.bdars.org</a>
Foundation	14 Sep 2016	28 Oct 2016	Swanley, Kent	Darent Valley RS	7 evenings (Wed)	<a href="http://www.darentvalleyrs.org">www.darentvalleyrs.org</a>
Foundation	18 Sep 2016	25 Sep 2016	Bromley, Kent	Bromley & District ARS	2 days (Sun)	<a href="http://www.bdars.org">www.bdars.org</a>
Intermediate	5 Nov 2016	19 November 2016	Eltham, SE9	Cray Valley RS	3 days (Sat)	<a href="http://www.cvrs.org">www.cvrs.org</a>
Foundation	4 Feb 2017	11 Feb 2017	Eltham, SE9	Cray Valley RS	2 days (Sat)	<a href="http://www.cvrs.org">www.cvrs.org</a>
Intermediate	tba Mar 2017		Bromley, Kent	Bromley & District ARS	3 days (Sun)	<a href="http://www.bdars.org">www.bdars.org</a>
Full	2 Oct 2017	25 Nov 2017	Eltham, SE9	Cray Valley RS	2 evenings (Mon) + 4 days (Sat)	<a href="http://www.cvrs.org">www.cvrs.org</a>

**CPREC Committee Contact Information**

**Officers:**

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