

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: 7th October 2016

How to use Software Defined Radio (SDR) by Damien 2E0EUI

In this issue: *Future & Most Recent Meetings, Biros in Space by 'Theorist',
Technical Snippets, , 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

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.

7th October - How to use Software Defined Radio (SDR) by Damien 2E0EUI

Damien writes: *“My talk will be an introduction for beginners and those unfamiliar with Windows based SDR software and the various dongles available for amateurs to use to listen to the various amateur and short wave bands etc.”*

Recent Event News

02 September - Short Talks

a) How to Make a Map by Nick Stapley

Nick described the stages needed to make an accurate map, from surveying to printing, with particular regard to the familiar Ordnance Survey series:

Surveying - define a baseline by measuring the distance between two points, call them A and B many times and averaging the results to reduce the measuring errors.

Triangulation - choose a third point called C and measure the angles between each end of the line AB and point C. Geometry may then be used to calculate the distances AC and BC. That now gives another triangulation or ‘trig’ point. The process may then be repeated as many times as required.

General Roy in the summer of 1784 created a baseline about 5.2 miles long from a point near to Heathrow Airport to a point near to Kempton Park racecourse.

A complication is that the Earth is not a perfect sphere but bulges at the equator so the equatorial diameter is larger than the polar diameter by about 42Km. Its shape is like a rotated ellipse, called logically enough an ellipsoid. Complex maths is needed to determine the ellipsoid from the trig points that have been surveyed.

Datum: We need to associate the idealised ellipsoid with the real earth and for this we use a DATUM. We also need to fix the ellipsoid to a point known as a horizontal datum, usually at an observatory, whose position (“initial point”) is taken as precisely known.

We also need a vertical datum and the combination of this with the ellipsoid form the DATUM. A datum has 8 coordinates: 3 to fix the axes, 3 to fix a point and 2 for the ellipsoid.

From an initial point, known points (e.g. Trig points) form a Terrestrial Reference Frame (TRF) which “realise” the theoretical coordinate system used by the datum. 24 satellites form the TRF for the GPS system, even though moving.

Height: Height is inextricably linked to gravity. We need a surface at right angles to local gravity with the same gravitational strength everywhere.

The “Geoid” is the global ‘zero height’ reference surface that meets this criterion, and is tied to average ocean levels around the globe. There is only one geoid.

Image of the Geoid

The height has been greatly exaggerated. In the diagram to the right, blue = -105m and red = +85m.

Ordnance Survey (OS) uses a height datum determined as mean sea level at Newlyn Cornwall between 1915 and 1921. Heights derived from this are ‘ODN’ heights. There are 190 Fundamental Benchmarks (FBMs) in UK and 700,000 sub benchmarks originally (OSBMs) of which half are still usable. The ODN model is close to the true geoid and about 80 cm lower. Nominal accuracy is 2cm rms.

There is an FBM near Purley that is shown in the following picture and the number reads 449.24ft.

Readers will also be familiar with OSBMs on buildings as shown on the right.

Projection:

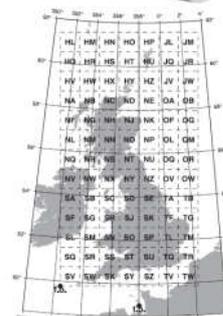
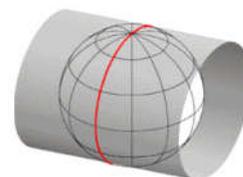
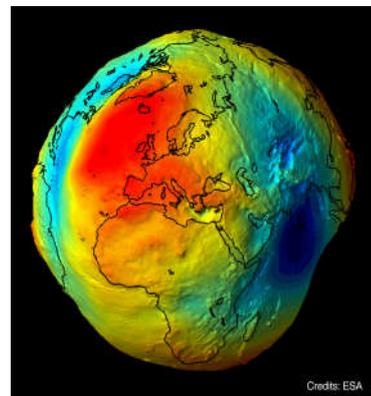
Project out from centre of the earth through the surface onto the cylinder.

OS Use of Transverse Mercator Projection

The contact line for the projection is 2 degrees west of Greenwich. Scaled by 0.9996 so that 2 lines that have +/- 180km have zero error. Nominal scale of 1:50,000 varies from 1:49,980 and 1:50,025

The major squares are assigned pairs of letters which amateur radio operators will recognise as part of the National Grid Reference scheme and the primary identifier of their WAB square.

Finally: Add latitude and longitude marks to the map and print it!



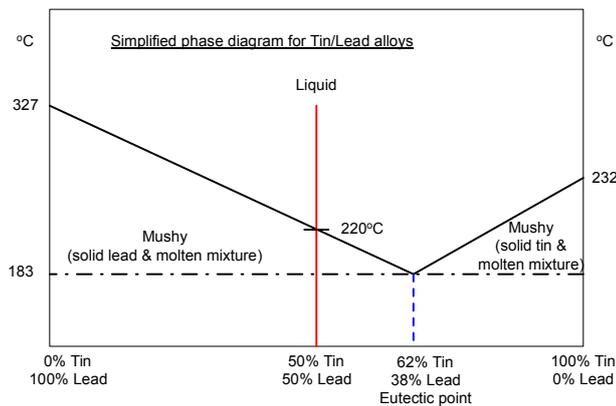
Post Space Age: Today the OS uses the GPS system and has created "OS Net" which uses 100+ GNSS/GPS receivers that are permanently switched on. It is accurate to about 2 mm horizontal and 8 mm vertical. The modern trend is to use global coordinates (e.g. GPS) even for local applications.

Satellites have revealed movements of the earth including:

- Tectonics (ETRS89)
- Atmospheric effects
- Tidal effects
- Ice age effects

b) Eutectic Points by Jim Lugsden M6BXL

Jim talked about Eutectic points in soft solders with the aid of the following diagram.



The eutectic point of an alloy is where there is an immediate transition between the liquid and solid states as the temperature changes but no 'mushy' state.

This occurs in tin-lead solder at a temperature of 183°C with a mix of 62% tin and 38% lead. Conventional tin-lead solder that was used in the electronics industry used a mix of 60% tin and 40% lead so there is a narrow temperature range where it is neither liquid or solid.

Original plumbers solder was deliberately made to have a larger mushy temperature range so that joints could be built up - a process called 'wiping' that used a blow lamp to keep the joint hot and moleskin gloves to insulate the user's hands from the molten joint.

Biros In Space by 'Theorist'

In space no one can hear you scream, and you can't write with a biro either, since that relies on gravity to operate correctly. NASA reputedly spent \$20,000 dollars developing a pen that *would* write in space. Cosmonauts made do with a pencil.

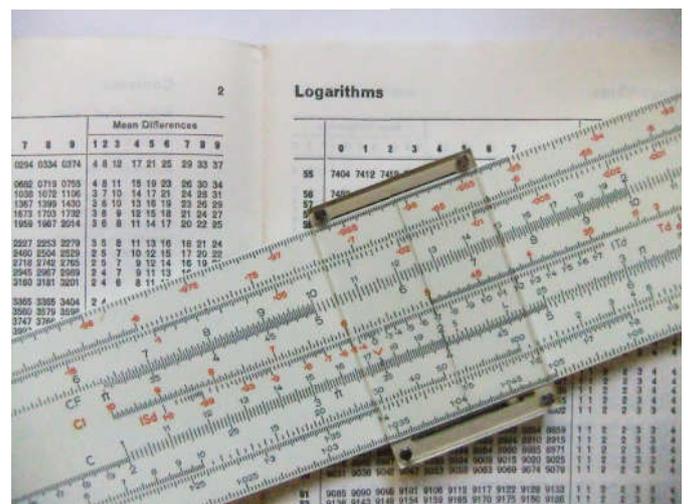
I thought of this recently (by one of those strange chains of thought) when I unearthed my old, and first, calculator. It was a Sinclair Scientific, and out of curiosity I put some batteries in and switched it on. Miraculously it worked, as well as it ever did [1].



It was not the first calculator produced by Sinclair – that was the Sinclair Cambridge, a basic four function device. Contrary to popular belief the Cambridge was not the

world's first pocket calculator, and the Scientific was not the world's first pocket *scientific* calculator either, an accolade which must go to Hewlett-Packard with their HP-35 model of 1972 [2]. Both, however, were British made and cheaper than their US made rivals. The Scientific was originally priced at £49.45 at launch in 1974, although the price dropped rapidly and I only paid £17 for mine at McDonald's in Oxford Street some months later [3]. I could have bought the self-assembly kit form available for £14, which was advertised as only requiring three hours to make, but you needed a soldering iron and cutters, so although a friend had successfully put one together I decided to go with the ready made version.

At school only a year or two earlier we had been taught how to use a slide rule and log tables to perform calculations, in case we should turn out to be engineers (who of course always used a slide rule) or scientists (who of course always used log tables). The dexterity I had with a slide rule incorrectly suggested I would turn out to be an engineer, but I broke with tradition and always used a slide rule by choice. Clive Sinclair himself was famous for using a circular slide rule, although there were quite a few jokes about that around the time the



electric 'car', the C5, came out. As the accompanying photos show, I still have my log tables and slide rule, which amuse (or bemuse) any GCSE students who happen to look at them, and I can still use both [4].

The Scientific had an LED display which was a drain on the four AAA batteries which powered it. However Sinclair had discovered that an LED would remain lit for a brief period after power had been turned off, and worked out that by turning the power to the display on and off very rapidly, the battery life could be considerably extended. Unfortunately there was no auto power off after a period of idleness, so that if the device was accidentally left on for a few hours you needed to replace the batteries. This happened to me a lot.

Internally the calculator used a Texas Instrument TMS0805 chip which could only just perform the four basic arithmetic functions. Yet somehow the managing director of Sinclair Research, Nigel Searle, devised algorithms that would calculate log, sin, cos and tan (and their inverse) functions on a chip that could only hold 320

instructions. To do this some speed and accuracy was sacrificed. According to Wikipedia it took 15 seconds to calculate $\arccos(0.2)$, and accuracy for the scientific functions was limited to three digits, which I can verify. But it was quicker overall than the old methods and overall less prone to making mistakes in use, and there would be no going back. The log function was especially important because using it you could calculate powers and roots of any number.

Calculator technology developed very rapidly. My second calculator cost about £20 in 1980 and had a full range of scientific functions (I think over 100 were claimed) and was fully developed, as good as any modern equivalent, using a power-lite LCD display. It was a top end non-programmable Casio, and I bought it because it had a built-in algorithm that would evaluate definite integrals using Simpson's rule. This saved me months of work. It packed up in 2012, and I replaced it with a top end non-programmable Casio that claims 417 functions, and which you can buy for £16 if you shop around online.

I can't think of a more useful invention for me personally than the pocket calculator. Thanks to Sinclair and Casio I have saved countless hours of time over the years. Moreover it was the ingenuity shown by Sinclair that set off the train of thought that ended with biros in space, and this article.

[1] It's a Sinclair. It still works. That's a miracle. Trust me.

[2] It had 35 keys, hence the name

[3] Not the burger chain, obviously, but a well known store at the time. To give some idea of the cost, £17 was nearly two weeks rent for a college room at the time, breakfast included. The UK inflation index suggests it would be about £100 to £125 in today's money.

[4] The slide rule in the photo is set up to calculate:

$$2 \times 2 = 4$$

Technical Snippets

a) NXP have announced the MRF1K50H dual LDMOS transmitting transistor with a maximum CW output power of 1,550W from a 50V supply at a total drain current of 36A. The device is not internally matched and so has a useable frequency range of 1.8 - 500MHz. The one-off US price is around \$210. The data sheet is available on the Internet. Heat sinking design is much more critical when you consider the problem of moving several hundred watts of energy in the form of heat from a device that is about two inches long.

b) Ceramic Filters - I have been doing some measurements on a series of Murata 455KHz metal cased ceramic ladder filters and was surprised to see that they had aged very little over the years. Bandwidths range from 1.2KHz to 18KHz and all had flat passbands when correctly matched that met their original specifications.

Termination impedances are typically 200ohms resistive so the user may need to use a tuned circuit to remove any significant reactances in the circuit. Given that ceramic resonators are much less stable than quartz crystal resonators this is an impressive result by the designers.

Ceramic resonators behave in very similar ways to quartz crystals in that they exhibit both series and parallel resonances but with much lower Q factors and poorer frequency stability. However, they can be used to construct useful ladder format bandpass filters using the same design methodologies as for quartz crystals. I made a 10KHz wide filter at 1MHz with six resonators and have also used ceramic resonators for BFOs at 455KHz. They can be pulled in frequency significantly more than crystals and for example can be used to cover 3.5 - 3.6MHz in a simple solid state transmitter. One useful ceramic filter I have in stock is 400KHz wide centred on 9MHz which may be used in a pan-adaptor.

Ceramic resonators can be supplied in two or three lead resin encapsulated packages - the latter contain low value capacitors connected from each end of the resonator to the central leg to reduce the component count when used in oscillator applications.

Miscellaneous

a) The Theta Group

My XYL's sister Margaret went on a Norwegian cruise this year and visited Bergen where the Theta Group's secret WWII room at Bryggen has been reconstructed and restored to its 1940-42 state with the help of surviving group members. The group were sympathetic to the British cause in WWII and provided information on German troop and shipping movements to the Norwegian Government in exile in Britain via a short wave transmitter (shown below) that they sourced and built while under German occupation.



Access to the secret room was by a booby trapped 'cupboard' door that held about ten kilograms of hidden explosives. The door had to be opened in a special way otherwise it would explode!

The room contained photographic equipment, a 15 watt short wave radio station, guns and ammunition. It was accidentally discovered when a German military search party fell through some rotten flooring into the room.



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

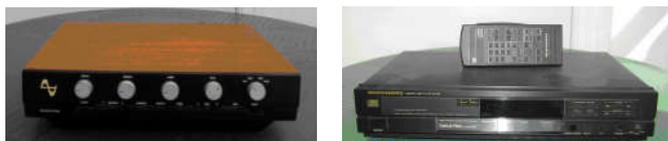
be viewed at: <http://www.g30ou.co.uk/> in the "Notice Board – Wanted and For Sale" section.

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)

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G30OU

Diary of External Events

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 G30OU. 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

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

04 Oct Annual General Meeting

01 Nov Three 25 minute long chats

06 Dec Christmas Social

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/>

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

06 Oct CVRS 70th Anniversary Talk

03 Nov TBA

15 Dec Christmas Social

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>

13 Oct Documentary on WRTC 2014 by Stuart M0SAR

27 Oct On Air/CW Practice/Bring & Buy/Natter Night

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>

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/>

06 Oct Club Junk Sale
 03 Nov Graham Somerville of bhi - Noise cancelling
 01 Dec Club AGM

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

30 Sep Amanda Jane - Indian Hospital and the Chatri - during the First World War
 14 Oct AGM
 04 Nov Surplus Equipment Sale
 25 Nov Talk by Chris Saunders G4ZCS about Smart Phones

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.
 11 Oct Talk by Carl Thomson G3PEM on "Antennas and Propagation" **has been postponed**
 08 Nov AGM
 13 Dec Christmas Social

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/>
 03 Oct Autumn Surplus Equipment Sale
 07 Nov The GB3XP Repeater Project by Neil, M0ZEY
 05 Dec Construction Contest

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(at)scrs.org.uk)
 Web: <http://scrs.org.uk/>. SCRS run a practical group most Monday evenings at the Bandstead Scout Hut.
 20 Oct TBA
 17 Nov Millimetric Microwaves, Chris Whitmarsh – G0FDZ
 08 Dec Christmas Junk Sale (2nd Thursday of the month, this month only)
 19 Jan SCRS Big Radio Quiz of the Year 2017

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.

Local Training Courses						
Licence Level	Start	End	Location	Club Provider	Format	Further details
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
= course commenced						

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 G3OOU Damien Nolan 2E0EUI Nick Stapley</p>	<p>Newsletter Editor</p>	<p>01737 552170 or G3OOU(at)AOL.COM</p>

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
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 lightening 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
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
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
Microcode DSP with LCD readout		Cumbria	£15.00
Micrometer (new)		M & W	£12.00

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 – 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
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