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CCCCC  A  M  M  BBBB  EEEEE  A  M  M
C      A A  MM  MM  B  B  E      A A  MM  MM
C      A  A  M M M M  B  B  E      A  A  M M M M
C      AAAAAA  M  M  M  BBBB  EEEEE  AAAAAA  M  M  M
C      A  A  M  M  B  B  E      A  A  M  M
C      A  A  M  M  B  B  E      A  A  M  M
CCCCC  A  A  M  M  BBBB  EEEEE  A  A  M  M
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CAMBEAM

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20 April 2005

Newsletter of the Cambridge and District Amateur Radio Club

Editorial

At last the outdoor season has started. I hope you have finished all your indoor projects and can now enjoy the fruits of all that hard shack-work over the winter. Coming up over the next few months: the Mills on the Air weekend (HF, 7/8 May), Wimpole Hall Special Event Station (HF, 19 June), NFD (VHF/UHF and up, 2/3 July), annual picnic at Longstowe (HF, probably some time in July) and the September Contest (VHF/HF, 3/4 September), to name only a few. Also, Peter's M0DCV article on the "morning chorus" made me want to go off on a little excursion straight away, even though it involves getting up really early (or staying up that extra bit longer). Maybe we can squeeze in a little field trip.

Apart from contests and portable operation days, we have interesting evenings scheduled for the club meetings. Some favourites are (in no particular order) the visit to Mullard Radio Telescope (please sign up if you would like to come along), Carlo's introduction to satellite operation, Peter's VLF whistlers and, if you always wondered just how your computer works: Steve's talk on bits and bytes, noughts and ones. Following Mike's talk on PIC programming, we will run a whole course on PIC programming about once a month on an informal evening for those who want to look closer into the matter. And, of course, there's much more!

If you don't have access to the internet and need updates on exact dates – or have any ideas, suggestions, articles, pictures etc. for the next CAMBEAM, please get in touch with us! Elisabeth

Daniel Schlieper 2E0CAX and Elisabeth Stratmann 2E0DMR
20 Glebe Road, Cambridge, CB1 7SZ, 07813 985230, editor@cdarc.org.uk

At the AGM CAMBEAM was awarded a trophy! Thank you very much everybody for the support. And remember:

>>> The best way to secure your next CAMBEAM is to pay your subs. <<<

News from the AGM held on 1st April 2005

Subs: The committee proposed a £5 for all (no concessions) membership fee, which was voted for by the vast majority of members. This will be on trial for one year and to be reviewed at the next AGM. We hope that £5 will attract many new members and support from ex-members and friends of the club.

Yet again our **Rally** was a great success, with positive feedback from traders and punters. We took about as much as last year, although expenditures (i.e. rent) have gone up. Thanks to all of you who came to help!

The new committee: Gordon Mallion G0TZQ (president), Mark Wooldridge M1MPW (chairman), Roy Henson M1GRT (secretary), John Bonner G0GKP (treasurer), Ian Alexander G4AKD (programme co-ordinator); ordinary members: Ron

Huntsman G3KBR, Peter Howell M0DCV, Dominic Baines M1KTA, Elisabeth Stratmann 2E0DMR.

Trophies were awarded to the following members: David King G6KWA (Granfield Cup for services to the club), Dominic Baines M1KTA (Davey Trophy for best talk), Elisabeth Stratmann 2E0DMR (Xtal Trophy for winning construction competition), Daniel Schlieper 2E0CAX & Elisabeth Stratmann 2E0DMR (G3TAG Special Trophy for resurrection of CAMBEAM), John Bonner G0GKP (Wilf Dunell Award for Teaching & Training).

Article

Whistlers, Tweeks and the Dawn Chorus by Peter M0DCV

At any time of the day there are about a hundred lightning storms occurring over the globe. These storms launch RF radiation across a wide spectrum of frequencies. Everyone is familiar with the pops and crackles heard on long, medium and short wave receivers when thunder storms are in the locality. Not so widely known are the ethereal (literally!) sounds of these discharges in the RF band between 0 to 10 kHz.

Without doubt the eeriest sounds are those of whistlers. These are descending tones caused when the electro-magnetic energy in a lightning discharge gets “ducted” along the earth’s magnetic lines of force. The ducted energy travels to the opposite hemisphere and then rebounds back to the vicinity of the originating strike. Because of dispersion during the round trip the higher audio frequencies arrive a little before the lower frequencies. When heard on an audio amplifier connected to a suitable receiver they produce the characteristic descending, whistling sound which gives them their name. The storms generating these whistlers can be thousands of kilometres away from the receiving location.

Tweeks are like a “ringing-pinging” sound - almost metallic in quality. They are produced by the same lightning strikes but are ducted instead by the mechanism of the earth’s surface-ionospheric waveguide. They are best heard after sunset until about one or two in the morning local time. The intensity and numbers of tweeks can vary significantly from night to night.

Whistlers are not heard every night or indeed may be absent over several days. They can have a pure tone or be quite “breathless” in their sounds. Tweeks can almost always be heard by listening for one or two minutes on any night.

The “dawn chorus”, as its name suggests, sounds like birdsong. It occurs from the early hours until about sunrise. It is made up from natural radio noises such as tweeks and whistlers but in a greater mix and intensity than by either alone.

There is, however, a problem. Powerlines emit 50 Hz and harmonics all the way into the frequencies around and beyond 2 kHz. The hum field can remain significant up to distances of 6 to 8 kilometres from overhead national grid transmission lines. Being able to go mobile and record in remote areas is therefore the ideal situation. That said, you can still hear strong tweeks and whistlers within a built-up area, particularly if the local HV electrical distribution is buried. Some experimentation with filters will improve the reception. You will need to power the receiver from a battery to avoid introducing even more hum. I use fairly cheap, sealed lead-acid cells. A 3Ah capacity battery should last about a week with the receiver shown before needing a recharge.

Where you site the antenna is important. (I got quite excited at one point when I found several, totally hum-free spots in the garden. Upon mature reflection I noticed that these were inevitably always under the trees. This meant that it was also, alas, totally signal-free as well!) You need to be about 10 to 15 metres from the house if you can. The hum field will vary significantly around your site.

The optimum antenna position is bound to be inconvenient from a signal processing point of view. I am experimenting with using a balanced signal feed system. This will initially be twisted pair cable between two, audio or isolating, transformers, one at the receiver the other at the PC soundcard. I hope that this will help avoid common-mode pick-up of hum. Co-ax might be a possibility. However, I suspect that being able to get a good, consistent, equi-potential earth connection at both ends will be a problem. Some experimenting here.

You can display the output of the receiver using your PC soundcard and a simple spectrogram. (These are available for downloading from the internet. They resemble the waterfall display familiar to PSK31 operators.) The spectrogram will clearly show the descending frequency characteristic of whistlers. If venturing to a radio-quiet site you can record the whistlers and tweeks on a cassette recorder for later playback.

The circuit diagram of my first receiver accompanies this article. It follows the design by Stephen McGreevy (www.auroralchorus.com) which he has published on the internet. This simple circuit works *really* well. The only changes that I made to my prototype were a BC547 transistor rather than the 2N3904 of the original design, and a 130mH fixed inductor for L1.

The circuit operates as follows (see web site for a fuller explanation): The receiver operates in the VLF portion of the spectrum between about 200 Hz to around 12 kHz. The input network ahead of the JFET helps to limit the response of the receiver to below 20 kHz to 30 kHz. At the time that S. McGreevy designed this receiver there were more VLF navigation systems in use (eg OMEGA, LORAN). Without this frequency limit the receiver could overload. With the advent of GPS many of these systems are now obsolete and have ceased working.

The capacitors C4 and C5 together with L1 provide a “pi” filter. This starts to roll-off the frequency response starting at about 7 kHz, for better rejection of VLF navigation aids. The bipolar transistor forms a Class A amplifier to boost the signal to line level.

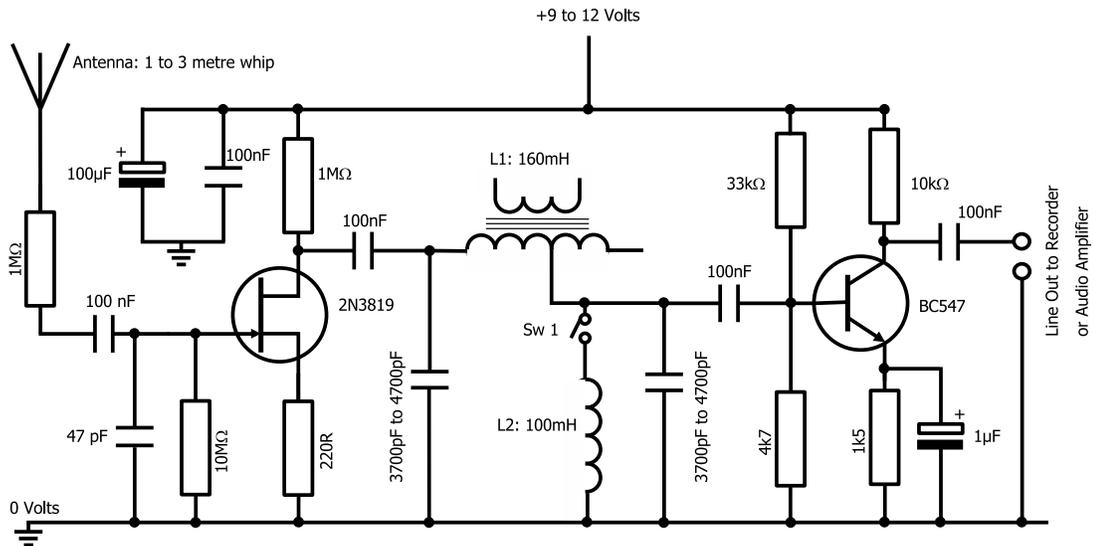
If you want a fascinating, inexpensive, little project to eavesdrop on our planet’s natural transmissions then a whistler receiver is all that you need. A search on the internet for “whistlers” will yield lots of information. There are many sites offering sound files of whistlers, tweeks, aurora and the dawn chorus recorded in remote (hum-free) locations such as Antarctica and Alaska.

The NASA page (see below) has links to a project called INSPIRE (Interactive NASA Space Physics Ionosphere Radio Experiments). This is aimed at secondary school pupils and contains lots of clear, helpful information on the topic of natural VLF emissions and the way that they propagate.

Now that I have a reference receiver which works my next step is to design a second receiver using operational amplifiers with JFET front ends. There is an existing design for such a receiver already on the internet. The circuit diagram is given in this article. (I have used different ICs in my circuit diagram). You should refer to J. H. Davis’ article on the Long Wave Club of America web site for full details. A design with ICs might make the on-board installation of 50 Hz filtering easier. I have created some basic artwork for a PCB for the BBB-4 receiver shown if anyone would like a copy.

Useful References:

http://www.auroralchorus.com	(S.P. McGreevy’s site + links)
http://image.gsfc.nasa.gov/poetry/inspire/includes/faq.html	(NASA’s VLF pages)
http://www.lwca.org/library/hardware/whistlrx.htm	(Article on IC Receiver)
http://www.abelian.demon.co.uk/vlf/	(Hints on VLF Reception)
http://www.antarctica.ac.uk/index.php	(British Antarctic Survey)

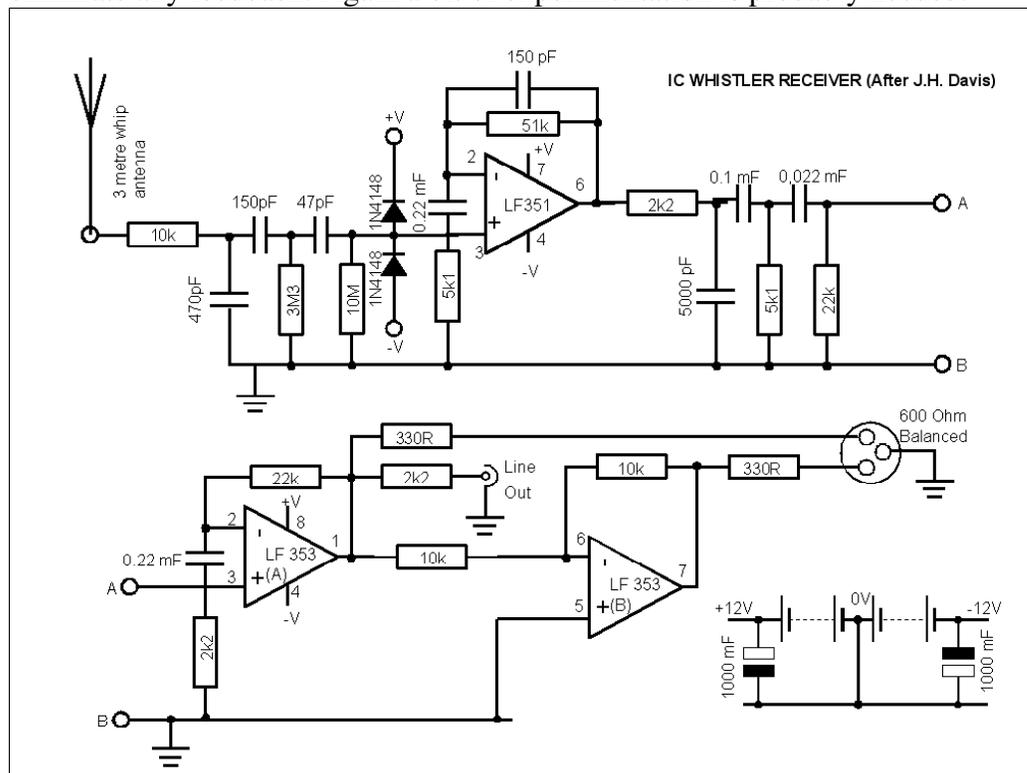


Whistler Receiver (S.P. McGreevy's Bare Bones Basic Receiver Mk 4)

L1 can be made from a common audio transformer. A 1 kΩ primary, centre-tapped, 8Ω secondary audio transformer is suitable. One half of the primary is about 160mH.

L2 is optional. It will help reduce 50 Hz hum when switched in. A small fixed inductor is suitable. You may need to experiment a bit with inductance values in this area. The circuit should be enclosed in a metal case for best performance.

The antenna can be a length of 15 mm diameter copper pipe or thick wire. Grounding is not critical. If using a recorder a 200mm ground spike might help eliminate any feedback. Again a bit of experimentation is probably needed.



A quick report from the Cambridgeshire Repeater Group by Rob M0ZPU

Following our successful first "joint venture" of holding our AGM as part of a CDARC club meeting, I would like to take a minute to let you all know what's happened since the AGM.

I outlined the talks that were going on with Three Valleys Water for the use of their site at Therfield, near Royston. Since then, I have received a draft agreement, and have visited the site to discuss our planned installation there.

At the AGM we agreed to work together on a 10GHz project, which will operate as a beacon at first, and can then evolve into something more exciting. The CRG's side of that project was to provide a site. That site will be Therfield. G8VCN and his team will come up with the hardware.

The water tower at Therfield is 180m ASL, and the base of the aerial tower is approximately 30m AGL, with the top another 15m further up. Comparing that to Barkway, which is 152m ASL, we have almost a 30m head start, putting the top of the aerial tower at 225m, which is 3m taller than Barkway!

Therfield offers us the chance to move GB3PX, our 6m voice repeater (50.780MHz out, +500kHz shift for input, with 77Hz CTCSS required for access), to a "quiet" site. The only other RF customer on the Therfield site is Vodafone, and their aerial arrays are installed around the tower structure, with one small microwave link dish on the upper part of the tower.

We are also aiming to build and install a 10m voice repeater. This requires the use of two sites, and moving PX to Therfield frees up an aerial slot on Barkway. But there lies another tale of negotiation, which is still in progress.

In those negotiations are some changes to the use of Barkway and will require some aerial movements on the tower. Those movements will all be in an upwardly direction. One other move would be out of our exclusive accommodation into a shared area. The downside of that is that the shared area is air-conditioned and only has a massive, now redundant, battery back-up system which we can make use of!! Oh, and that there would be only two customers in that room, us and one of the emergency services.

Moving closer to home, Madingley is home to GB3PY, our 70cm voice repeater on 433.200, and has recently gained the benefit of internet linking, thanks to Daryl, G0ANV. Times of operation for the internet link are variable, based on Daryl's work patterns, because at present he has to attend the link equipment in person when it's active. If you contact Daryl, he can update you on hours of operation (g0anv@ntlworld.com).

Those of you who have used packet radio, may have noticed that GB7PX is not operating at the moment. When we moved from the old hut to our new accommodation at Madingley, I took the kit to my workshop for a bit of a tickle. The old PX radio (a trusty Philips M294) just didn't perform very well, and I set about replacing it with a much more modern PRM80. That went OK until I found a fault with my data-modified PRM80. I'm still trying to source a replacement RF board for it, but as they were specials, and far from standard, it's proving to be a difficult proposal. I am hoping to find another solution in the near future, and return PX-2 and PX-7 back into service. The 23cm (PX-1) unit will go back when it's got somewhere to talk to. No point running a one-ended link!

I have been asked to come over to the CDARC club and present a talk on APRS, so I won't go into much detail here, other than we are looking at installing an APRS relay on one of our hilltop sites. This will be on 2m, with a link to 70cm via GB7PT, which will require some modifications to its logic to cope with APRS data properly. I'll detail that more another time.

If you'd like to know more about the CRG, we have our website - www.gb3pi.org.uk. Membership is only £5 per year (Jan-Dec), and our Membership Secretary is Jane Dyke c/o G0LUC - QTHR in current callbooks (if it says he's in WARE, it's out of date! Contact CAMBEAM editors if you cannot find her address).

Any technical enquiries, offers of help, etc. are always gratefully received. If I don't reply very quickly, as I write this (9th Feb), a 2nd Harmonic is due to split from one of the Fundamentals in the next week or so. I expect things to be a little hectic for a while!

Rob MOZPU, Chairman, Cambridgeshire Repeater Group

Who is best CDARC station in the RSGB 80m Club Championship 2005?

We didn't get round to organise a full-grown club contest last year, which is an awful lot of work – so, let the RSGB do it for us! We could honour the CDARC member who scored highest in his/her category of the RSGB 80m Club Championship. It is a challenging, yet friendly, contest and a great opportunity to practice operating, to test the station (e.g. your Epiphyte transceiver) and to try something new, like data (PSK or RTTY) or CW.

The contest is a series of events lasting only from 20-21:30 UTC. Every contact counts as one point, and local contacts are as good as intercontinental ones. A small station with a low antenna can give good results, just by having some contacts across town. The best is: the contest is only on one band! That simplifies operating as no special strategy is needed – just switch on the rig and exchange RS(T) and serial numbers from 001. As all the points from the members of a club are summed up, everybody can contribute to the final scores. Entering just one or two would be most helpful, even with only very few points!

The official rules can be found in the RSGB yearbook or www.contesting.co.uk/hfcc/ or www.rsgbhfcc.org. But really, all you need to know is this:

Stations may be single or multi-operator. The power levels are (section a) 100W and (section b) 10W maximum output power (Note: that is not “power at the antenna”, as is specified in your licence. But 10W are plenty for inner-UK contacts, and there are some really successful M3 stations in this contest). Entrants may change section from one event to another. Modes are SSB phone, CW, and Data (pick your preferred mode or try something new). The frequencies for SSB are 3.600-3.650 & 3.700-3.775 MHz. CW contests are on 3.520-3.570 MHz, with a slow Morse range for beginners, the “QRS corral” from 3.550 MHz to 3.570 MHz. This is perfect to practice Morse, even if you are very slow or rusty! The data modes are RTTY, PSK31 and PSK63 on 3.580-3.600 MHz. They are most conveniently generated by the soundcard of a computer.

Every evening is one contest on its own, so you don't need to enter all of them. Skeds are not in the spirit of the contest: it won't help to arrange contacts beforehand. Also, if one person holds two callsigns, only one of them counts.

The logs need to be emailed within 10 days to the adjudicators. That makes it necessary to type the log into a computer, during or after the contest. Shout if you need help. The preferred format (Cabrillo) can be generated with any text processor (see www.contesting.co.uk/hfcc/information/cabrillo.shtml) or with logging programs such as SD for Windows (www.ei5di.com) and TLF for Linux (home.iae.nl/users/reinc/TLF-0.2.html). **Please do not forget to mention “Cambridge & DARC”.** The remaining dates for 2005 are: May 2nd SSB, 11th Data, 19th CW; June 6th Data, 15th CW, 23rd SSB; and July 4th CW, 13th SSB, 21st Data. See you on the air during the next 80m Club Competition! Daniel 2E0CAX

Programme — Visitors welcome!

The club meetings are held (almost) every Friday from 7:30 to 9:30pm at the Coleridge Community College, Radegund Road, Cambridge. Morse Code class is available from 7:30pm. Talks start promptly at 8pm. See <http://www.cdarc.org.uk> for updates.

- May 6 Informal/Demonstration DRM Radio, Duncan
 7/8 **Mills on the Air Weekend (Special Event station)**
 13 Whistler Receiver, Peter M0DCV
 20 Informal/PIC programming course (Lesson 1), Mike M0BLP
 21/22 May 144 MHz contest. QRO-rehearsal for September? (TBC)
 27 In Your Shack, Mike M0BLP
- June 3 Informal/Checking and testing club field day leads, David G6KWA
 10 **Visit to Mullard Radio Telescope, Roger Dace. We meet at 18:00 at the Radio Telescope site.**
 12 PW QRP 144MHz Contest (TBC)
 17 Informal/Test foxhunt equipment/PIC programming course (Lesson 2)
 19 Wimpole Hall Special Event Station
 24 Construction evening: 80m portable aerial
- July 1 Informal/Foxhunt equipment/**Contest preparation**
 2/3 **VHF National Field Day. Let's win this one!**
 8 Foxhunt
 15 Informal/ATV operating Sid G6FKS, Paul G8GML, Ian G3KKD
 22 Gunn diode TX construction using club's 10GHz counter (TBC)
 29 Informal/PIC programming course (Lesson 3), Mike M0BLP
 29/31 **G2XV/P's IOTA DXpedition to St. Agnes, Isles of Scilly (EU-011).**
- August 5 IOTA, Martin G3ZAY
 12 Informal/HF operating evening in the club shack
 19 Optimum power to your antenna, Ian G4AKD
 21 70 MHz Trophy. Anybody interested?
 26 Informal/Contest preparation/PIC programming course (Lesson 4)
- Sept. 2 Getting started on satellites, Carlos G0AKI
 3/4 **144 MHz Trophy. A cult event: time to fire up the Big Linear.**
 3/4 **HF SSB contest (TBC)**
 9 Informal/calibrate your gear with the network analyser (TBC)
 16 The club's 2m linear, Dave G6KWA
 23 Informal/PIC programming course (Lesson 5), Mike M0BLP
 30 Echolink refresher, Daryl G0ANV
- Oct. 7 Informal/Organising Quiz Night
 14 Quiz Night
 21 Informal/PIC programming course (Lesson 6), Mike M0BLP
 28 How does a computer work? Steve G4WSZ
- Nov. 11 Repeater Group AGM, APRS, Rob Compton M0ZPU
 12 Annual Club Dinner
- Dec. 16 Christmas party
- Club closed until January 6, 2006

All hands needed for the July Contest

After doing so well last year, we want to win the VHF National Field day this time. We are planning to put up at least 5 stations, some of which will be operating through the night. Please do come and help us, there is much to do: operating, logging, catering,

setting stations up and, most importantly, taking the stations down afterwards. Every help will be much appreciated.

Operators for September Contest

We are looking for volunteers to operate the 144 MHz Trophy. Please contact me if you have one or two hours to spare and would like to get on the rota. We will need as many operators as possible. Daniel 2E0CAX, 07813 985230.

Club Nets are run on Sunday mornings, 09:30–10:00 local time (calling on 144.300 and later moving to around 144.370 MHz USB) and from about 11:00 or 11:30 local time on 145.550 MHz FM. Meet you there!

Are you interested in Amateur Radio but have no licence yet? Ask John G0GKP (01954 200072 or g0gkp@cdarc.org.uk) about his award winning one to one Foundation licence courses.

Advert

I am desperately looking for one of these old Yaesu power plugs for G2XV's FR-101D receiver. Can anybody help? Daniel 2E0CAX, 07813 985230, editor@...

Ofcom threat

By now we have a clearer view of Ofcom's intentions: they indeed want to deregulate (read "abandon") Amateur Radio. Why? To make money out of the Amateur bands, but also to close the licensing office, as Ofcom has the wild idea that they must reduce office space. They talk about saving money, but surely our fees pay for the costs involved. Why do they want to make their own people redundant by all means?

That is what the government told them to do. And being a new office, they aren't very experienced. The consultation was written by one Visiting Professor Webb who is a consultant in "the leading international management, systems and technology consultancy". His job includes the design of a high-speed data network for major cities. He obviously has no clue about Amateur Radio and thought it would be marine radio for landlubbers (Marine radio is surely to be deregulated soon).

So it is of utmost importance to oppose Ofcom's plans to deregulate Amateur Radio. The replies to the Spectrum Framework Review show first signs of success, as Ofcom now finally talks to the RSGB and has postponed its Future of Amateur Radio Licensing Consultation which was scheduled for mid-April. Now they won't publish anything until after the General Election... (The new date for publication is 26th May 2005). Let's hope that Ofcom will understand the nature of Amateur Radio eventually, and will support and protect it. Until then, we need to give full support to the RSGB.

Subs

The subs are now only £5 per year. John G0GKP always welcomes cheques made payable to C&DARC (John Bonner, 40 Lyles Rd, Cottenham, Cambs CB4 8QR, or pay him at one of the club meetings).