

Chelmsford Amateur Radio Society

Affiliated to the RSGB

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Secretary: David Bradley M0BQC

Club Call Sign: G0MWT

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May 2000

The May Meeting - A Small Street Organ by Arthur G3KPJ.

Once again we draw upon the talents of our own Club members to talk to us on a subject of their own choosing. Arthur G3KPJ is one of our longest serving Members. He did a stint as Secretary, he was a DF hunter, a keen constructor and he has run the Top Band Shaving Club for 43 years. Amateur radio is not his only interest. He is skilful with bow and arrow, demonstrating his prowess on Field Days. He comes from a musical background, having pumped the organ for his Mum at West Hanningfield church as a lad. Father was a tenor in the choir. His brother, Silent Key Ernest G3CUH played the clarinet! Combining two of these talents, he has built a pipe organ which is controlled electronically. He says that it is similar to building a CW TX. We have to confess that we are somewhat mystified! Why not come along, hear the full story and see and listen for yourself. He demonstrates said organ at various events and has third party liability amounting to a seven figure sum which should, we hope, reassure the more timid among you!

Chairman John G8DET will introduce Arthur, who will then reveal all the mysteries and demonstrate his organ at **7-30pm on Tuesday 2nd May**. Help to keep us solvent by supporting Ela's raffle!

Dates for Your Diary.

Apl. 29th.	International Marconi Day	Sandford Mill
May 2nd.	Club Meeting 7-30pm	MASC See above.
May 10th	CARS Committee Mtg.	Ela's QTH 7-30pm.
May 14th.	Dunstable Downs RC Rally	Nr. Luton.
May 25th.	GEC Archives.	Marconi's Gt.Baddow 2-30pm.
May 28th.	Ipswich Radio Club Rally.	Foxhall, Ipswich.

Member's Miscellany.

The Net Controller for May is David M0BQC.

Harry G5HF tells us that Louis G5RV is now home from hospital and may be back on the air shortly. We send him our very best wishes.

Don G0LLA has been none too well recently and has had to go in to hospital. It is some time since we last saw him. Get well soon, Don. We miss you!

Members phone numbers and addresses are stored on a computer data base. This information is used for general administrative purposes and News Letter distribution. If any Member objects contact the Editors. We have to do this to comply with the ever increasing rules and regulations.

Don't forget, those of you who are viewing the GEC archives on the 25th!

International Marconi Day - Sat. 29th. May.

This coming Saturday is our one public event. We have been invited by the Chelmsford Museum Service to celebrate the event at their Communications Open Day from 10am. to 5pm.. Members, friends and families are welcome at any time over the 24 hour period from 1am. Saturday morning or, if you can't make it, meet us on the air!

Last Months Meeting.

High Altitude Platforms by Les G3HTF.

The facts came thick and fast when Club Member Professor Les Barclay presented his talk on High Altitude Platform Stations (HAPS). The amounts and the rate of electronically exchanged information are increasing rapidly day by day and the demand will continue to do so, and at ever faster speeds.

All possible methods of transferring information, be it in the form of data, pictures, voice etc., must be used efficiently, employing satellites, terrestrial broadcasting, fibre optics and copper wire etc. We are familiar with these and all have a place in the scheme, but newer methods are always on trial to provide

communication links with mobile sources and this can only be provided by radio. As we are aware, the radio frequency spectrum is pretty full already, but some of what is left is up for sale to the highest bidders and that means something like 12 billion pounds will be required for the five cellphone licences available.

Radio also means antennas and it is well known, of course, that the higher the antenna the greater the coverage achieved. Many ideas to achieve height have been suggested and considered, such as circling aircraft and balloons etc. One possibility receiving much attention is the HAPS idea. This, in essence could be a very large specially constructed airship. A typical craft could be some 150 metres long and some 60 metres in diameter, giving a volume in the order of 212,500 cubic metres. A very special four layer skin of perhaps 22,000 square metres would cover the whole framework and be filled with Helium. This could support a payload of some 1000Kg. The outer top surface may be totally covered with solar cells to provide the many kilowatts of power required to operate the onboard electronics and the positional motors to keep the craft on station with the help of GPS, the motors consuming the majority of the 8MW of available power. A large collection of fuel cells would provide power during the hours of darkness.

Mounted on the underside of the craft would be all the antennas and these would need to be steerable to counteract the movement of the craft due to the varying winds which could vary between 15 and 55 m/s at the possible working height of 21KM. The high gain antennas used have a very narrow beam width focused on a small area of ground below. A very large number of these antennas would be employed to cover an arbitrary pattern of linked areas or 'cells' on the ground. Each hexagon shaped cell in a set of seven, would have a different operating frequency, and this set of 7 frequencies carefully arranged, would be repeated over and over again to cover a very large area. Some 120,000 simultaneous links may be possible with this method. This pattern of transmissions using a fixed antenna and base station in each cell for the cellular telephone network is well known to most of us.

One of the advantages of using HAPS means that a communications network could be started with just one platform aloft covering a large city and its environs. The network could be extended as the requirements and funds became available. A satellite system on the other hand would need all the satellites

in place before operation could begin, requiring an immense initial financial investment without any revenue from users to draw on. The scale of the investment will be appreciated when it is known that some 66 satellites would be required for the Iridium system and 280 for Teledesic. Other advantages include atmosphere friendly operation, and due to the relatively low altitude the power requirements are less, as is the transmission path time compared with a satellite, reducing troublesome time lag problems.

Much work has still to be done on all aspects of HAPS, including the ground stations and several countries including England are carrying out prototype work. Many space agencies are also showing interest in the developments. As more and more services use digital techniques and converge, the platforms may become all purpose units. They may distribute general duplex data, Internet, mobile phone, radio and TV signals and make ideal radio observation posts as well. Live pictures could be sent down showing traffic flows, floods, crop growth and so on. It will be some time before HAPS become a reality, but one company has ideas to launch one airship a week for five years. So watch this space!

Les concluded the evening speaking about his work concerning the Radio Regulations Committee and how very difficult it is to achieve meaningful results with hundreds of regulations effecting some 45 nations, resulting in a myriad of conflicting interests. The discussions cover the use of frequencies from 9kHz to 400GHz with each country pressing for their allocations. Some Amateur bands may well face much increased pressure in the future. Meetings are usually held every two years but with the increasing work load and the vast number of investigations and studies to be carried out in between, this time span will be increased. HAPS also receive much attention along with many other items, but it takes many years to get new ideas accepted, so it is a long slow process.

Our thanks to Les for a very interesting and thought provoking address.

Report by Colin G0TRM.

Small HF Loop Aerials, Earth Rods, Connections & Ground Mats. Pt.2 - Dave G3PEN.

Such are the perils and pitfalls of newsletter publishing that it is all too easy to drop the odd clanger, as is often pointed out to us! We dropped a loud one last time and have, quite rightly, been brought to task. Dave G3PEN was, in fact, the author of last month's article on earthing and loops, which we borrowed from the Braintree Club newsletter. This publication is copyrighted by its editor, David Willicombe G0DEC and it was to him that we gave the credits. We apologise to all concerned. Carry on Dave!

What I do want to get across to you is that the station earthing system needs the same care and attention that the aerial side more usually gets. All connections should be in heavy-gauge cable (not "hook-up wire" or a bit of 18swg tinned copper wire), and protected against corrosion. High-quality plastic sheath on the cable will help, as will physical protection from the weather where possible. (Using spare lengths of 20A or 30A "ring-main" cable, with all three wires joined together, is a good start!)

Heavily varnish any bare parts, and clamped or soldered connections, or use heavy grease to cover mechanical joints. I don't know whether graphited grease helps conductivity, but it sure is sticky! If you use jubilee clamps for connection to pipes or rods, make sure they are rust-proof stainless steel. By all means (PME allowing) use earth-rods for "DC" or safety earthing, particularly next to aerial feeds to the shack, and by or

below any tower or other aerial support, but if possible provide the main station "earthing" by means of a counterpoise system. A counterpoise system can consist of a number of wires, cables or pipes around the garden, located just above ground, and all tied back to the shack with a hefty cable. Running such counterpoises along the fence-lines is a handy way of provision without upsetting the family - but place them where they won't be touched - especially the ends. As it is generally recommended that counterpoises should not be "earthed" at the far ends, the ends in particular can develop quite high voltages, and give rise to nasty burns if touched (even through insulation). QRO can really upset the local moggies, unfortunately. As before, make sure the wires etc. are well protected against corrosion.

Luckily, the more wires you have in a counterpoise system, the lower the voltages per wire tend to be (as the power is shared), so this is a good excuse to be really lavish with your system. Incidentally, have you calculated how long your own back-garden fence is, in total? Even a modest garden can often provide well over a quarter-wavelength counterpoise on Top Band.

Some people tie the shack end of such a counterpoise system to an external earth rod before it enters the shack, but others leave it "floating" right up to the equipment, where it must be earthed. Normally this is a matter of convenience and choice (except with PME mains supplies), but one that might show interesting results if alternatives are tried. A "ground mat" system, where the conductors are buried, may end up heavily corroded very quickly. It is harder to protect in many cases than wires above ground, because of the chemicals in the soil although acidic rain nowadays cannot help any exposed copper wires.

Such systems are also thought to be less efficient than the same conductors installed a few inches above the soil. However, if you can use well-insulated wire, burying it may be neater and safer for the family etc., so it's a matter of choice.

If you revamp your current "earthing system" (or your aerial, for that matter), how will you know whether it is worth the effort (and cost)? One way, hopefully, is in improved Tx signal reports - reception probably won't be noticeably different. Another indicator may be whether you have stray RF problems in the shack - a better earth system should reduce such problems, although probably not if you insist on using end-fed half-wave aerials straight into the shack.

A good indicator is whether you get a stronger RF field around the aerial for the same output power. You will need to use a simple RF field-strength meter "before and after" running the wires out for this to be practical, and it's rather difficult to get consistent results. A better test, therefore, is whether the "Q" of the aerial/earth system has increased. This will result from lower earth losses (which are effectively in series with the aerial, and absorbing some of the RF power), and is best seen by whether the aerial bandwidth is reduced. By this, I mean the amount in kHz you usually can tune away from a given frequency (after "tuning" the aerial and feeder for best match/VSWR), before the VSWR rises to (say) 2:1. The lower the earth (and aerial) conductor losses are, the narrower this bandwidth will become. A bit of a pain, really, but one you should be prepared to accept, to produce a better radiated signal! Incidentally, I've seen it stated that if you can QSY more than 4kHz before the VSWR exceeds 2:1 on an 80m "small" loop, it needs to be re-built properly to reduce the losses!

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