Chelmsford Amateur Radio Society

Affiliated to the RSGB *Club Call Sign: G0MWT*
President: Harry Heap G5HF *Chairman: John Bowen G8DET*
Secretary: David Bradley M0BQC *Treasurer: Brian Thwaites G3CVI*

Newsletter No.431 Web Address: www.g0mwt.free-online.co.uk **December 2001.**

A Very Happy Cristmas and Proseperous New Year To All Our Readers.

The December Meeting - "Kitmaster" by Geoff Carter.

Twenty or thirty years ago amateur radio was a much more 'do it yourself" type of hobby than it is today. This is probably due, in part, to the proliferation of commercially built equipment at affordable prices and with very sophisticated performance specifications. Voice transmission is now virtually all SSB on HF or FM and SSB at VHF. Admittedly SSB equipment probably needs a higher order of constructional skill than AM equipment but it is not impossible. CW equipment is much simpler and quite within the range of the average handyman, particularly QRP gear.

Building from scratch is not quite so easy today. Gone are the days when you could go into the town and buy components. Yes, we have Maplin today but the bulk of their catalogue is manufactured items. One has to go to specialist suppliers to get RF type components or from the junk tables at rallies, but it is still available with a little effort

There's really no excuse for not experimenting in home construction. Why not try your hand at building something from a kit. Believe me, it is very satisfying to build something and get it working and then using it!

This month we have invited **Geoff Carter of 'Kitmaster'** fame to tell us all about kit building. He has a wide variety of kits suitable for all stages of competency, to build projects which range from moisture detectors to four valve radios. He will have a sample of his wares available for sale, so come prepared with a loaded wallet!

Chairman John G8DET will open the meeting and introduce our guest at **7-30pm on Tuesday 4th.December** at the **MASC, Beehive Lane.** The raffle is being run by **Chris G0IPU and Martyn G1EFL** this month, please support it.

Dates For Your Diary.

Dec 4 CARS Meeting. MASC 7-30pm.
Dec 8 Marconi Celebrations. By Saracens Hd. Cfd.
Dec 11 CARS Comm. Mtg. David M0BQC QTH.
Dec 12 Marconi Celebrations Marconi's New Street.
Dec 12 Marconi Celebrations Sandford Mill.
Dec 13 CARS Chritmas Dinner White Horse Pleshey.
Dec 24 Last minute Christmas shopping.
Jan 8 Annual Junk Sale.

Foundation Course.

Chris G0IPU and Trevor M5AKA will be running a Foundation licence course in January. It will be held in the evenings between 7:00 and 9:30 PM in the Village Hall at Danbury starting on Thursday 10th January and will run for 5 weeks.

Those passing the assessment at the end of the course will be able to apply for their Foundation Licence which permits the holder to operate all modes in all the Amateur LF, HF (except 28 MHz), VHF and UHF bands.

Thise wishing to join the course should contact the Club Secretary David M0BQC on 01245-602838 or on Email at davidwbradley1@activemail.co.uk.

Spread the word amongst your friends. This is a wonderful opportunity to get started in amateur radio.

Foundation Course. Morse Assesment.

Congratulations to the following Club Members who wer successful in a recent Morse Assessment;

Bob M1DTA, Clive G1EUC, Big Jim 2E1GUA, Martin G1EFL and last but by not least Simon G7HCD.

The January Meeting.

Annual Junk Sale. Have a look through your shack!

Marconi Celebrations.

To commemorate the sending, and more importantly the receiving, of the famous three dots in Newfounland a number of events have been arranged. The Borough has invited Princess Elletra to unveil a statue of Marconi. Apparently production of the final object has slipped and the ceremony will be performed on a maquette. The Club has been invited to take part in three events. These are as follows:

Saturday 8th.December. A station operating opposite the Saracens Head. We have been fortunate to obtain use of the RSGB GB4FUN vehicle. See November Radcom. The Club has to provide operators and hosts. Contact David M0BQC (01245-602838) or Colin (01245-223835).

Wednesday 12th.December. A station operating from Marconi New Street. This will be using that Company's equipment. This event is being set up and run by Trevor M5AKA. He requires operators. Contact him on 0794 103 9832.

Wednesday 12th.December. One and probably two stations operating from Sandford Mill, the main station using Club equipment. If the weather is suitable Tony YTG may be operating from his new Marconi type kite. Operators required, contact Brian G3CVI on 01245-471919. Visitors welcome.

Please give support to your hard working Committee. This is the last Club operating event before IMD next April.

Lost By the Skin of Their Teeth!

At the invitation of the Dengie Club CARS sported a team to enter their Annual Quiz Night. The team consisted of Geoff EDM, Tony YTG, Ken RFT, their ladies, Colin TRM and Trevor AKA. They scored 60.5 points against the winners, Dengie with 61.5 ponts. Very well done!

Last Month's Meeting.
Over the Horizon HF Radar.
An Illustrated talk by Ken Perry.

If a picture paints a thousand words then Ken delivered the contents of a significant book to us in that he gave an extremely well illustrated lecture. The development of Radar undertaken by Watson-Watt from early 1935 detecting a Heyford aircraft using a short-wave transmitter near Daventry through to the HF Radar network currently going operational in Australia was featured. The understanding of the Ionosphere from 1922 when Appleton used the BBC transmitter in Bournemouth to determine the height and presence of a reflecting layer, through to the latest ideas on the electromagnetic environment around the Earth was illustrated.

Working from Orfordness and later Bawdsey Manor the Chain Home network (CH) was well established over the Thames Estuary by September 1938 using Marconi New Street design expertise and Baddow propagation research. Neville Chamberlain's flights to confer with the Germans in Munich were successfully tracked. Thanks probably due to the inherent corrosion of the structure of the Graf Zeppelin; attempts by the Germans to carry out electronic surveillance along the East Coast in August 1939 were unsuccessful. By 1941 coverage of CH network was complete around the UK, but it was necessary to enhance the low-level coverage with 200MHz tower mounted radars, the system known as Chain Home Low. CH was to detect the arrival of V2 rockets later in the war as the elevation beams used to determine target height were successively penetrated. This allowed calculation of their launch sites and appropriate attention from the RAF. Data from CH was passed to the wartime plotting rooms at Bentley Priory (Stanmore) and combined with other information on aircraft positions from the Observer Corps and other agencies before being passed to the operational fighter airfields.

While CH was HF radar (23 to 30 MHz) and used horizontal polarisation to improve the detectability of essentially horizontal aircraft structures of dimension similar to the transmitted wavelength, it suffered the same limitations as microwave radars in being horizon limited. Post-war development of HF radar employed Vertical Polarisation to launch a surface wave onto the sea surface and this had the advantage of sticking to the sea surface and travelling over the horizon and hence providing coverage against ships, low flying aircraft and sea skimming missiles. Many research projects with strange sounding names exploited these properties and together with the delineation of the noise characteristics of the HF environment by CCIR enabled the development of so called HF Surface Wave radars capable of detecting extremely small targets over the horizon and, incidentally, enabled measurement of the properties of the sea surface as well.

The main characteristic used to discriminate targets is the Doppler shift caused by the target motion. A shift of 30 milliHz per Knot of target velocity at a carrier frequency of 10 MHz is the order of things, The development of digital processing techniques has been an essential driver of this process and it relies heavily on Fourier Transformation whereby a series of amplitude samples of the radar return are transformed into the frequency domain. Ken gave us a short lesson in this technique for those who were concentrating! The target return is analysed in both range (time delay) and bearing (by the use of multi-element antenna arrays using beam forming techniques), the resulting detections in range bearing cell format can then be passed to a plot forming algorithm to give an output not dissimilar to the familiar PPI plot of conventional microwave radar. Computing powers of 10 Megaflops in 1978 up to 50 Gigaflops currently have made these processes possible.

The 1982 Falklands conflict had a considerable effect on development of surface wave HF Radar and this was illustrated by pictures of quickly removable loop antennas on HMS Londonderry, and some interesting tales of the speed with which the Defence Ministry can move in times of crisis.

In contrast the development of HF Sky Wave radars has been another form of over the horizon surveillance with the Americans developing networks of radars such as Conus-B which formed part of the defence against incoming missiles during the 50's and 60's and more recently Australian developments based on the Jindalee project. Marconi has been deeply involved in the provision of this system which gives air and surface cover over an area three times the size of Europe to the north of the Australian continent using three sky wave sites. Ken gave us an over view of the log periodic antenna installations employed together with an insight to the frequency management of the radars which ensures that the vagaries of the Ionosphere and its various layers and the hazards of interference from and with the communications community are controlled to ensure that radar cover is maintained. These radars provide sea state monitoring in addition to target detection and Ken briefly described the Bragg Line structure of the Sea Clutter return from which the sea state is obtained. Mention was made of the Russian Woodpecker radar which thankfully is no longer with us, and emphasised that the techniques currently employed use pulse transmissions with cosine-squared envelopes which ensures that all sideband components fall within a 10 KHz channel being about 100dB down at the channel edges. Despite transmitting 400 KW power levels the system rarely dwells on any particular frequency for more than a few seconds so the interference to other users is minimal. Other aspects covered included the need for low phase noise sources for the transmissions and the hazards of corrosion in antenna structures giving problems with intermodulation, and a brief discussion of the less favourable skywave HF radar environment in the polar regions where the instability of the Ionosphere spoils the party.

In this necessarily brief report I have omitted reference to wire grid modelling, the Radar Equation, iceberg detection, cyclone detection, sea surface pollution detection and the philosophy of multi-sensor combination which Ken covered, and the operational cost benefits of employing HF Radar for large area surveillance

Thank you Ken for presenting a very interesting, informative and well presented talk on a less well known application of radar principles.

Report by Ken G7RFT,

Joint Editors.

Geoff G7KLV 01245-473822 g7klv@hotmail.com
64 Vicarage Lane,Gt.Baddow,CHELMSFORD CM2 8HY
Colin G0TRM 01245-223835
colinpage@ukgateway.net
Deadline for the December N/L is Wed 12th.December.