

HORSHAM AMATEUR RADIO CLUB

# *HARCNEWS*

*Coming Shortly*

July 7 Club Night All about Antennae  
by Tony Wadsworth G3NPF

July 28 Club Event DF Hunt

*July 2005*

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# *June Meeting: European Satellite Navigation, by Wally Blanchard, G3JKV*

This excellent talk by Wally started off with a brief explanation of how to derive one's coordinates from GPS satellites, basically by taking the measurements of time differences between at least 4 satellites. The result is latitude, longitude, height and time, referred to the centre of the planet.

The height of land has been found to vary with time. For example Scotland is rising because of the removal of the vast weight of ice from the last ice age. Various corrections have to be applied because maps are referenced to different points especially between countries.

One way they used to measure

the offset of two maps is to drop a bomb on a coordinate from one reference point, see where the damage physically occurred and plot onto the second map. Please do not try this technique!

Wally explained about the levels of accuracy achievable. The GPS satellites use two wavebands and give a fairly accurate reading for the military and an approximate reading for the general public. The latter signal used to have about 100m of dither applied, but the technique of differential GPS where a fixed receiver at a known location transmits correction figures, made that obsolete.

Further corrections can be

applied to counter the bending effect of radio waves travelling through the troposphere. This and other enhancements are made by a European system called EGNOS which monitors GPS signals around the world and transmits correction data from geostationary satellites, on the same frequency as the GPS.

This is where it gets really clever. GPS satellites all transmit at the same time on the same frequency, but they do not interfere with each other because a spread-spectrum is used. This was classified technology until recently. This also means that the EGNOS signals can co-exist, and no hardware changes are required.

The Americans also use geostationary satellites to enhance GPS signals, so most of the world is covered. As an aside, in the UK all satellites are to the South due to the orbit paths.

So why has this been done? The answer is that it could be

used for monitoring all drivers so they could be charged for road use, parking, accident monitoring etc. However it was pointed out that the Europeans could not legally enforce all motorists to fit GPS receivers because GPS is an American system!

As a result, the European powers will spend billions of Euros on their own system called Gallileo, so named because someone thought he was the most famous European... Fortunately there are a few obstacles in the way such as an insufficient number of frequency allocations. It is likely that the Russian GLONASS GPS system will be asked to shut down prematurely to free some channels.

As a final comment to this superb talk, it will probably be no good covering the GPS antenna with aluminium foil as the car is unlikely to run for very long if the signal disappears so don't stop in the Dartford Tunnel!

## *Jodrell Bank its history to date by Ron Polly G3PYC*

Jodrell Bank radio telescope working on its own produced some very good results as did the Mullard radio telescope at Cambridge.

The Cambridge radio telescope used a log line of dipoles with reflectors, in an East West alignment, and variable in elevation. All of these dipoles were connected together, in Phase, at the control room. Jodrell Bank and Cambridge got together to see if they could couple both radio telescopes together using a Microwave link.

This was successful and a system of phasing using 'correlator cards' was used. Over time this system was expanded to other dishes in the UK and the microwave connecting system was called MERLIN. Multi Element Radio Linked Interferometer Network. The UK effectively had a radio dish some 217km dia which was outperforming

the largest optical telescopes of the time. After a while radio dishes throughout Europe were connected to MERLIN.

Now to accurately transfer the received radio signals via a radio link, the radio link frequency must be many times the received frequency of the radio telescopes. Only the received radio signals from a single source can be used for interferometry. Due to the spread of the receiving dishes each radio telescope has to store its information on 'correlator cards' which has synchronising signals added.

These bits of information are then sent to Jodrell Bank for processing. Despite all this it was realised that a lot of usefull information was being lost in the 'pipeline'. In early 2000 Jodrell Bank was being upgraded to receive radio at 10mm wavelengths, along with a few in Europe, so microwave links are out.

In its place will be a dedicated fibre optic network laid alongside the main telecommunications network and called 'dark fibre'. This is already installed in the UK. A single fibre will transmit 10 gigabits per second and this would improve the sensitivity over microwave by 10 times.

By using Laser modulators at 3 different colour frequencies a total of 30 gigabits per second can be transmitted along this one fibre. This will improve the sensitivity by over 20 times. This new system will be known as e-MERLIN. The computer system at J B has been updated and the first results are mind blowing.

They have discovered a binary pair of Pulsars some 1500 light years distant.

These 2 strong radio emitters orbit one another in only 2.4 hours. Both are approx 30km dia, one rotates at 2800rpm and the other at 22rpm. They are able to say, with reasonable certainty, that their orbit is shrinking by 7mm per day.

As the plane of the orbit is in 'line of site' their radio beams pass through each others magnetosphere so they are able to deduce the conditions present in that environment. Jodrell Bank looks as though it will be the prime research tool in astronomy for the foreseeable future.

## *Day trip across the Channel*

Due to popular demand I have been asked to put together yet another day trip across the Channel. It has been decided that Saturday the 1st of October will be the day, and as usual it will be the now

traditional early start from the Horsham area about 6:15 am, with a return ferry/tunnel crossing about 8 pm. This October visit will hopefully take in two WWII museums, both of which are near to

Calais. And yes there will be time to do some shopping at Cite Europe on the way back home to stock up those essential items for Christmas!

Our first stop will be Le Blockhaus, a large concrete bunker built by the Germans for the construction and delivery of the V2 weapon.

This site would have become fully operational had it not been for a few visits from the Allies bearing gifts such as Barns Wallis's Tallboy bomb! (Two years ago HARC made a visit to Saint-Omer where the V2's were to be launched). The site has now been converted into a museum and contains much of interest (see the museum website at [www.leblockhaus.com](http://www.leblockhaus.com) not forgetting to click on the English icon).

Our second stop will be the underground V3 base at Mimoyecques, where it was

planned to launch the much smaller V3 missiles. Again this site was paid several visits by the Allies to stop this underground fortress becoming operational. This has again been turned into a small museum.

On the way back we will of course stop at Cite Europe for some shopping and a meal, and I suspect a few beers along the way.

As with the last visits we will be taking our own cars, and drive along (pootle along in the chairman's case) in convoy, keeping in contact on 2m (whilst taking the rise out of the chairman!).

So if you would like to come along please contact myself (Adrian G4LRP) or any other committee member and I will find you a seat.

Best Regards Adrian G4LRP

## *Subscriptions*

Subscriptions are now over due so please if you have not paid, can you do so ASAP