EMERGING TECHNOLOGY

100 mW SIGNAL ON 8,970 kHz HEARD OVER 2 873 km

The very low frequency transmissions by DK7FC on 8,970 kHz have been received at a distance of 2 873 km by 4X1RF in Haifa, Israel. Reception at these super low frequencies within the human audio hearing range requires ground rod antennas, low noise preamps and sophisticated decoding software. None the less, the fact that DK7FC's 100 milliwatt of effective radiated power was copied and recorded by 4X1RF at this great a distance indicates that transatlantic amateur VLF reception may indeed be possible in the very near future.

According to DL6QA in a tutorial published by the DARC, the very low frequency part of the radio frequency spectrum (VLF, 3 to 30 kHz) is characterized by a low attenuation rate, high phase and frequency stability, and high signal to noise ratio. Therefore, VLF radio propagation is used for many practical applications, e.g. frequency standardisation, clock synchronization, radio navigation beacons and reliable long-distance radio communications.

VLF waves can also penetrate water to a depth of roughly more or less 10 m to 40 m, depending on the VLF frequency employed, on the salinity of the water as well as on the temperature of the water. VLF is also used for very long-distance radio communications with submerged submarines near the surface.

Commercial VLF radio stations mainly apply very high power transmitters ranging from 5 kW to 500 kW or more. Due to the excellent ground propagation properties of VLF when transmitted vertically polarized and the very long wave length, all transmitters operate with very high antenna towers. Ground wave propagation is effected by the ground conductivity and the dielectric constant of the terrain. At 10 kHz the depth of penetration of VLF radio energy into the ground can be between 2,5 m to 150 m. The ground conductivity and the dielectric constant depends on the surface over which the ground wave propagates (e.g. sea water - fresh water - dry, sandy flat coastal land - marshy, forested flat land - mountainous hills up to 1 000 m - cities - etc.).

Because of the low bandwidth available in the VLF band from 10 kHz to 30 kHz it is not possible to transmit audio signals, therefore most messaging is done with alphanumeric data at very low bit rates.

There is a large group in Europe studying VLF. Is anyone interested in starting a group in South Africa? Hannes Coetzee, ZS6BPZ, recently put out a call for amateurs to join him in experimenting on 137 kHz, a VLF band soon to be available to South Africans. Drop a line with your contact details to armi@sarl.org.za with VLF in the subject line.