

## Trap Dipole for 17, 12 and 6 Metre Amateur Bands.

Having enjoyed my new Yaesu FT-450 Transceiver for eighteen months, I decided it was time to explore the new frequency bands that were not available on my old equipment.

In order to do this, I had to design and build a new Antenna and a decision was made on the new Antenna being in the form of a Trap Dipole. This allowed all the new frequencies to be used for both Transmit and Receive without the need of switching separate Aerials.

Traps are electrical switches in the form of a Parallel Tuned Circuit, which become very high resistance when fed with a radio frequency voltage at the Resonant Frequency.

The Dynamic Resistance ( $R_D$ )

$$R_D = L \text{ (Inductance)} / C \text{ (Capacitance)} \times R \text{ (Resistance)}$$

The unit of Inductance is the Henry, Unit of Capacitance is the Farad and Unit of Resistance is the ohm.

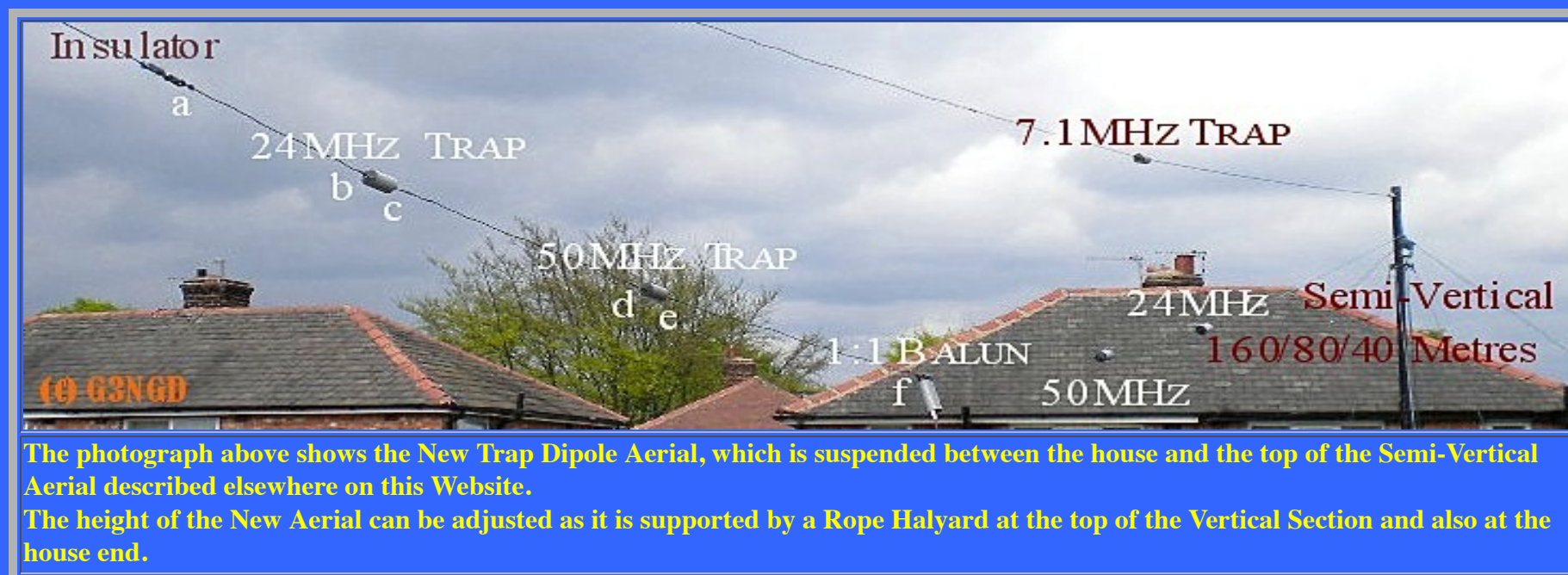
This Trap acts as a switch to cut the extra wire length out of circuit for the band in use, and acts only as a series inductor when a lower frequency band is required.

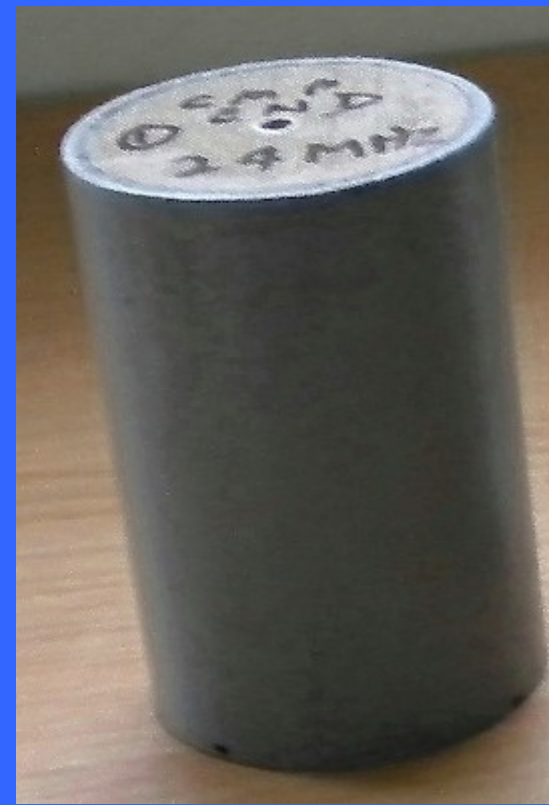
If you are using a computer running Windows XP or a computer running DOS, you can download and use my Tuned Circuits Software.

In order to calculate the number of turns of wire required to make a Trap (Parallel Tuned Circuit) you may find it convenient to use my Software Program '[Tuned Circuits](#)'. This program allows one to use the components available in the 'Junk Box', as the size of any former or gauge of wire, and capacitor, can be included in the calculation.

*Note: This program 'Tuned Circuits' is the only one included on this website, as all others have been removed.*

This program and all the other computer programs written by G3NGD will not work if your Operating System is using Windows VISTA, Windows7, Windows8, or Windows10.





The Coil shown above (LEFT) is a Trap wound for 50MHz. The Coils are wound on a 40mm dia. x 60mm length of Plastic Waste Pipe.  
The coils are wound with 1.25mm dia Insulated Copper Wire.

*RS Components Cat. No.357-794*

The coil is protected with a cover (RIGHT) to keep out the rainwater.

In order to make the Trap Coil Waterproof, a length of 55mm dia Plastic Waste Pipe was used and the Coil was pushed inside it.

'End Caps' were cut from a Plastic sheet and glued on each end of the Cover as shown above.

*If a Plastic sheet isn't in the scrap-box, a plastic plate can be used.*

**There are four Taps to be made, two for the six metre band and two for the 12 metre band.**

The Trap for 6m is wound with 2.25 turns of 1.25mm dia wire and a 30pF 8KV rated capacitor is connected in parallel with the coil. [The resonant frequency is 50.500MHz].

(Yes the Voltage is very high in value; that is why there has to be an insulator on the end of the aerial).

The Trap for 12m is wound with 5.5 turns of 1.25mm dia wire and a 30pF 8KV rated capacitor is connected in parallel with the coil. [The resonant frequency is 24.900MHz].

Note: If High Voltage Capacitors cannot be obtained, it is possible to make HV Capacitors using '[Double Sided Printed Circuit Board](#)'. One could make the coil using Coaxial Cable, the Cable providing the Capacitance.

**For details visit the RAOTA Website on :<http://www.raota.org/downloads.htm>**

*Read the very interesting article written by G3FEW on making Aerial Traps.*

**When the Traps are constructed, it is necessary to tune them to the correct resonant frequency.**

This is done using a GDO (Dip Oscillator). The frequency shown on the GDO is never accurate, so it is important to measure the exact frequency using a 'Frequency Meter' or listening to the 'Beat Note' of oscillation on the station receiver. If the frequency is high in value, then squeeze the turns of the coil closer together. If the frequency is low, then make the turns wider spaced.

When the resonant frequency is correct, apply a little UHU All Purpose Adhesive Glue on the winding in spots. This will hold the winding to the former to prevent it moving at a later date.

*(UHU is available in a BIG Tube at PoundWorld)*

The lengths of the wires between the Traps depend on the length of wire (Inductance) in the Trap. So the lengths given below are approximate.

**I only detail below the wire lengths for one half of the Aerial, as the other half is a 'Mirror Image'.**

***Refer to the Photograph above:***

Length point **a** to point **b** is 65cm (2.5mm<sup>2</sup> single core wire). [17m Band]

Length point **c** to point **d** is 104cm ( " " " " ). [12m Band]

Length point **e** to point **f** is 145cm ( " " " " ). [6m Band]

**Note: point f is at the middle of the Centre Feed-point Insulator.**

The Aerial has a 1:1 Ratio Balun Transformer fitted at the feedpoint.

This is encapsulated within a short length of Plastic Waste Pipe in order to keep the rainwater out of the termination's.

The height of the Antenna is nominally 595cm above the ground (19.34 feet).

It can be increased if necessary, but it affects the Semi-Vertical Aerial due to increased capacitance.

The Standing Wave Ratio (SWR) should be as close to 1:1 as possible.

The Maximum SWR Value should not exceed 3:1 as damage could occur to the Transmitter Power Output Stage. EMC problems (Electromagnetic Compatibility) could arise.

Also, the Transmitter may have in built protection, thus reducing the Power Output substantially.

**The SWR measured on this Antenna is as listed below:**

17 Metre Band; 18.068MHz - 18.168MHz; SWR 1:1 across the band.

12 Metre Band; 24.890MHz - 24.990MHz; SWR 1:1 across the band.

6 Metre Band; 50MHz - 52MHz (the band is very wide (2MHz), so the only place to resonate is at the Low frequency end of the band where the CW and the SSB contacts take place).

The SWR is 1:1 between 50.00MHz and 50.400MHz. and rises slowly to a maximum of 1.8:1 at 52MHz.

This means that all the 6 Metre band can be used without any problems.

*Note: the SSB Calling Frequency in the U.K. is 50.150MHz.*

**The Aerial was tested on all three Amateur Radio Bands and found to work better than expected, taking into consideration that Trapped Dipoles are not as efficient as Half-wave Single Band Dipoles.**

**On the Six Metre Band (50MHz), forty-five different countries were worked in the first month of testing.**

The farthest distance on 50MHz during this time was 5B4MF at Nicosia, Cyprus, 2137 Miles [3439Km], followed by TA7X at Trabzon, Turkey, 2115 Miles [3404Km]. The farthest distance to date on 50MHz is ZS6CCY on 28th October 2012 which is 5692 miles from my QTH.

***Having been delighted with the results, it was decided to build some extra Traps to cover the Twenty Metre Band (14.0MHz - 14.35MHz), Fifteen Metre Band (21.0MHz - 21.45MHz) and Ten Metre Band (28 - 29.7MHz).***

***A photograph of the new Six Band Trapped Dipole is shown below.***

***The Traps were tuned with Home made HV Capacitors using Copper plated Double sided, Fibre Glass, Printed Circuit board - (see G3FEW's Article).***

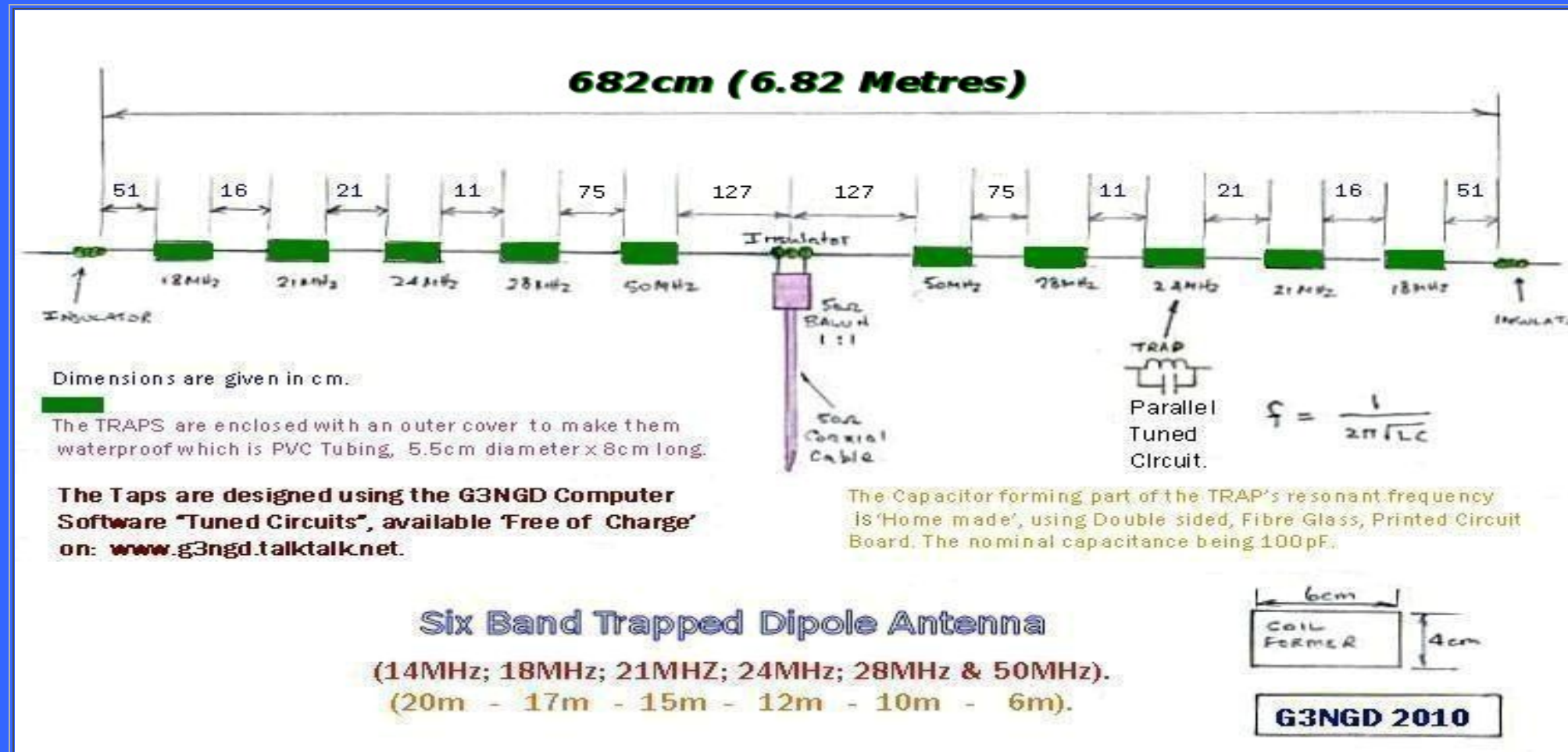
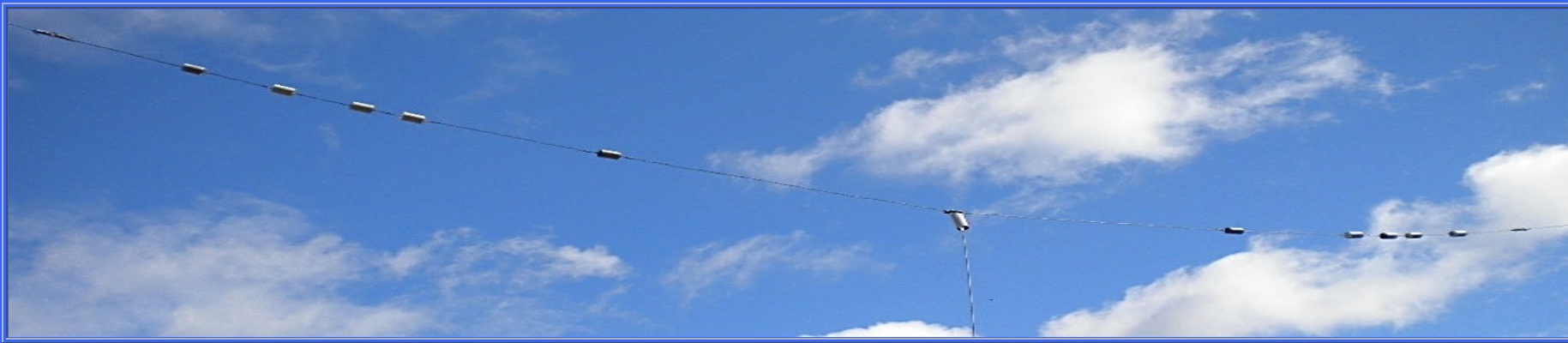
***On completion, Tests proved that the modified Aerial worked equally as well as the original Three Band Version.***

***On the first day of testing, contacts were made with the Hawaiian Islands, Washington (USA) and Greenland on the Twenty Metre band at R5 S9.***

***Consequently, my Inverted 'V' Aerial for 20/15/10m has been taken down and replaced with this new Six Band Trapped Horizontal Dipole.***

***My Aerials are now Semi-Vertical for 1.8MHz - 10MHz and Trapped Dipole for 14MHz - 50MHz Amateur Bands. A Slim-Jim Aerial is used for 2Metres.***

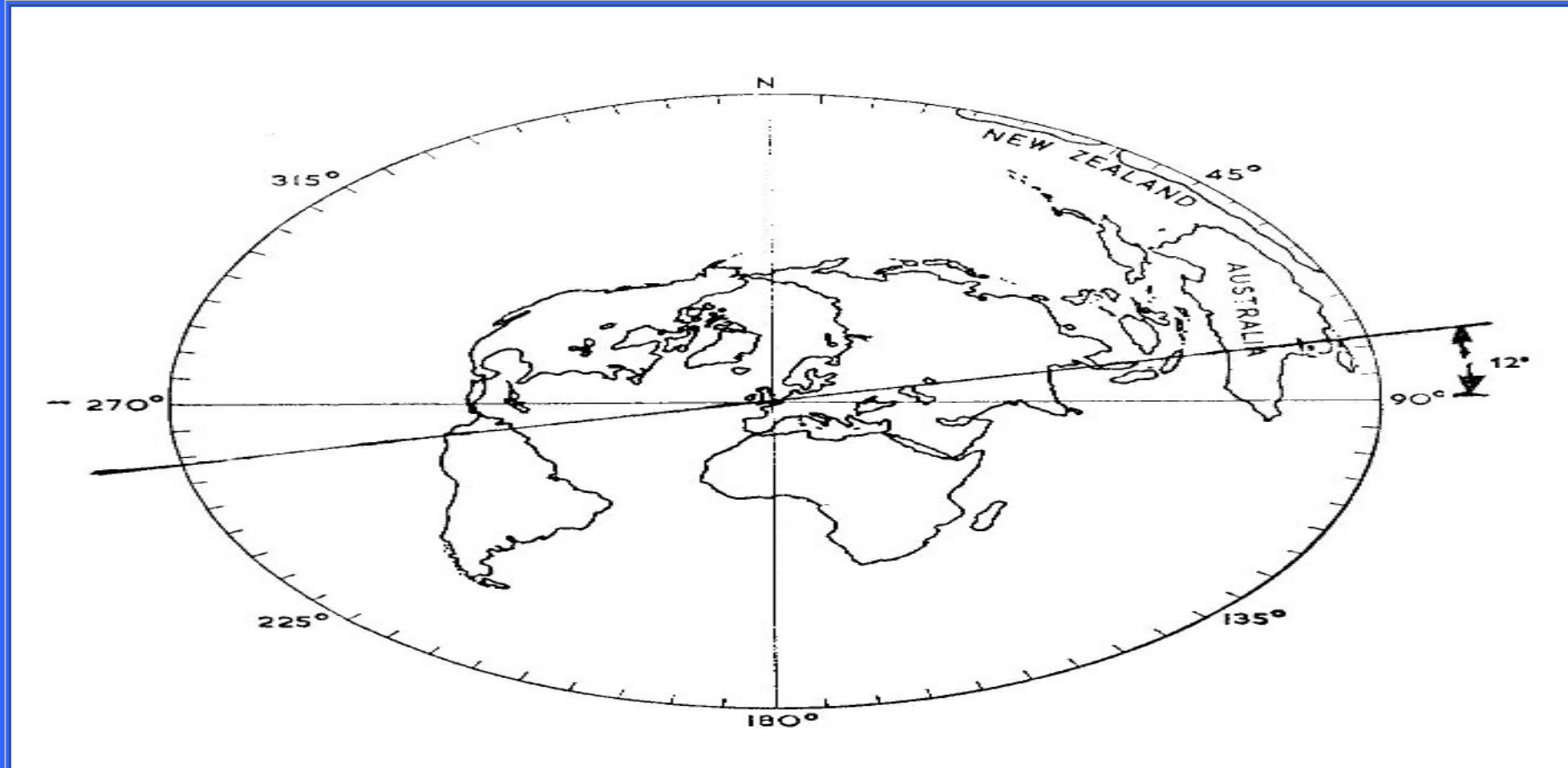




There is an excellent Website on the Internet which shows where all the DX (Long distance) Stations are currently active. Click on the [Radio Arcala Link](#) and select the Amateur Radio Band you are interested in. The 17, 12 and 6 Metre Bands are included. If you click on a Callsign the screen goes to find the details on QRZ.com. If you sign in, then the distance between the station and yourself will be calculated.

*After visiting the Website above, click your mouse on your Back Button to return to this page.*

DX contacts (Long Distance) on 50MHz are possible using Sporadic-E usually between May and mid August. In the old days of VHF Television in the U.K., during the summer months, occasionally there was interference on the picture and a message was announced to say "don't adjust your set, it is Continental Interference". When the VHF Television transmitters were closed down in the U.K. to make way for 'Colour Television', which was transmitted on UHF, Radio Amateurs were given their old 50MHz allocation back (it was originally an Amateur Band) and so this Sporadic-E is now used to advantage. This is why Radio Amateurs in the U.K. and vice versa, are able to make contacts with stations in Europe during this season. Normally, 50MHz is used for Local contacts using line-of-sight, but longer contacts can be made using Yagi Beam Aerials.



Great Circle Map centred on London, showing the orientation of Aerial for maximum world coverage.

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