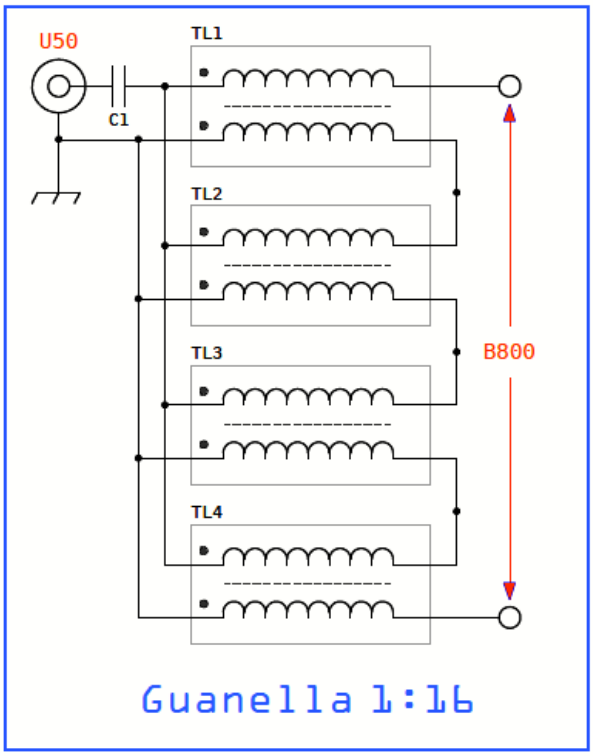
Guanella-type Transmission Line Balun 1:16

This is a wide band current-type balun, used with high impedance balanced transmitting antennas ... V-beams, Rhombic's, T2FD's ... These antennas may produce wide SWR deviation; then you may need to use antenna tuner.

- Unbalanced to Balanced, impedance **1 to 16**, **50Ω to 800Ω**.
- Frequency range **4-52 MHz** (SWR<1.5), **2.5-75 MHz** (SWR<2).
- Power handling over **100 W** (carrier) with proper antenna.



Each of the four transmission lines TL1...TL4 is winded on separate ferrite toroid. These 200 Ω transmission lines are parallel-connected to the 50 Ω coaxial feed ... hopefully with good impedance match. Transmission line outputs are serial-connected to the 800 Ω load.

The lowest usable frequency is limited by the inductance of transmission line: using more turns we get better results on low bands but then the SWR rises on top bands. We can slightly fix the low band SWR with serial capacitor C1... but only slightly.

The ¼ wavelength self resonance seems to be near 90 MHz: this limits the upper usable frequency. However, this balun works with some increased SWR values up to 160MHz.

This construction is compromise with usability of 2 to 4 MHz and low SWR on 10 to 30MHz.

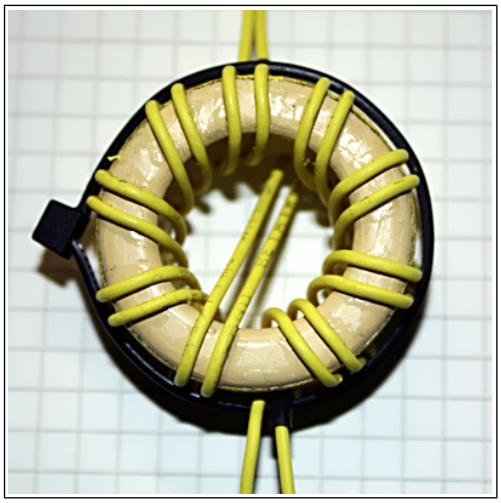
Toroid Cores and Winding

With proto we used **Ferroxcube TX36/23/15-4C65** toroids, material **4C65**, Al=170nH, u=125**.** Similar toroid is **FT140-61.**

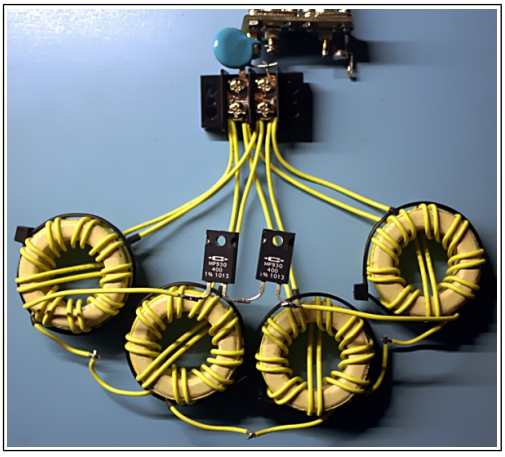
The wire is now 0,5 mm^2 BetaTrans stranded high temperature industrial wire, conductor diameter 0,81mm, insulator diameter 1,41mm. The wire-pair forms a 200 Ω transmission line. On each toroid we wind **4+1+4** turns of transmission line, connected as shown on the circuit diagram and picture. Optimal spacing for 0,5 mm^2 wires is near 3 mm, center to center.

Serial capacitor **C1** is (optionally) used to compensate SWR on lower bands: the coil impedance is far too low on 0-6 MHz. We used here **3300 pF 3kV** ceramic disc capacitor.

Toroid Wiring



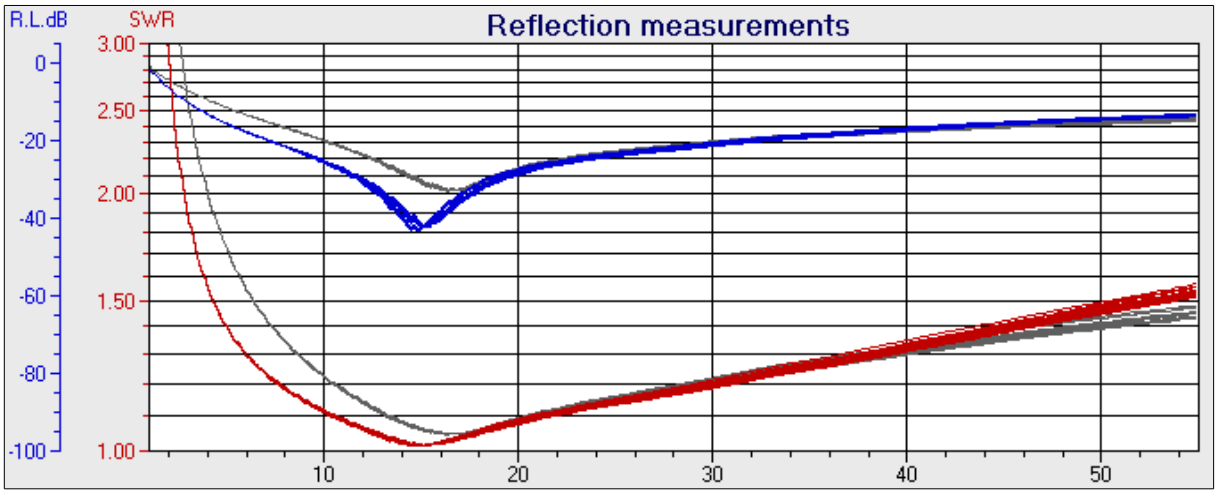
Test Setup



SWR measurements

We measured the following SWR results with MiniVNA Pro instrument. The 800 Ω low-inductance load resistor (thick film) was connected directly across the output wires. Shadow curves without the capacitor C1. *Efficiency and power handling capacity were not measured.*

HF 1-55 MHz SWR and Return Loss



Full Range 1-160 MHz SWR and Return Loss