OLANDESINA 80 to 10M Antenna – Page 1

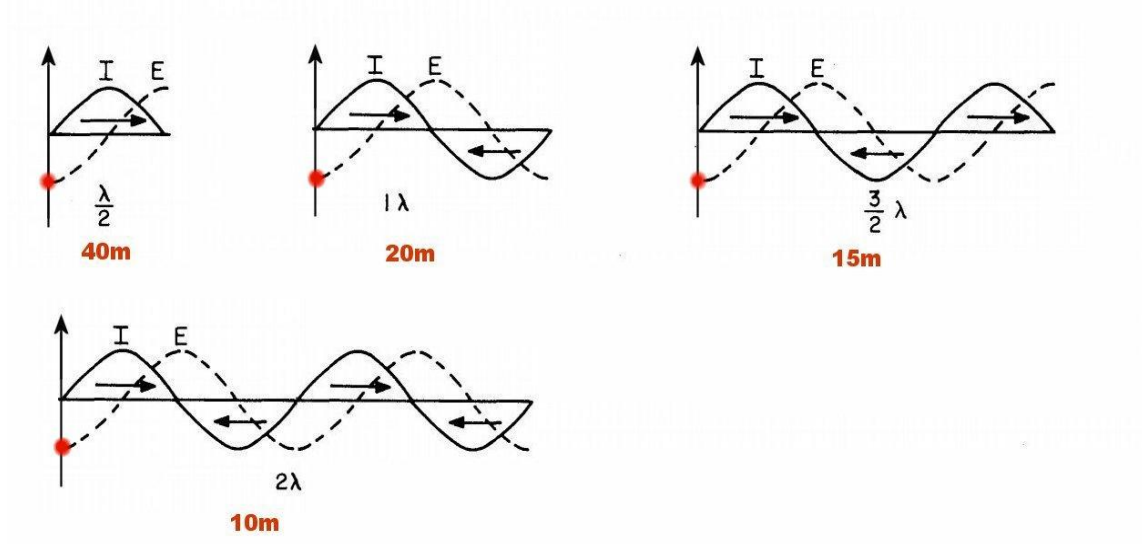
The antenna in question, which we will call "The Olandesina", takes precisely the starting point of a project that I found on the web by a Dutch Amateur. It seems that in these parts this kind of antenna is very common and there are some commercial versions. *This is not the now familiar End Fed antenna powered by a transformer of 9:1 and always in need of a tuner. It is a resonant antenna, fed at one end by a transformer having a high impedance ratio of 1:50.*

Theory

A half-wave dipole at it resonance frequency presents maximum current at its physical centre and, its maximum voltage at the ends. Normally we feed a dipole "in current mode" by a coaxial cable of low impedance, adjusting the length to obtain the minimum SWR.

In this way, however, we get only a “dual band” antenna functioning as a half wave dipole on the fundamental and as a 3/2 lambda dipole (1.5 times the wavelength or three half-waves) on the third harmonic. In fact, if you build a half-wave dipole for 7 MHz you get resonance at 21 MHz.

We come now to the Olandesina antenna. Looking at the simple graphs below, thanks to the harmonious relationship between our bands, a half-wave long wire will show high impedance at both ends on the fundamental and on all the harmonics. At these two points there will always be a maximum voltage, and a node of the current (current almost zero), irrespective of the selected harmonic range. In other words, if the dipole is 20m long it shows a high impedance at both ends on the ranges 7 MHz (half wave), 14 MHz (full wave), 21 MHz (the third harmonic - 3/2 wave - 1.5 lambda) and 28 MHz (two whole wave lengths). In this case we have a resonant antenna on 4 bands that, to work, must only be fed in a certain way.



Plot of voltage (E) and current (I) in a conductor 20 meters long

To operate on the 80 Metre band we add a coil that acts as a load for this range .

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With a total length of about 23 Metres, a little bit more than a simple 40 Metre dipole, we have an antenna that will allow us to operate on the 80, 40, 20, 15, and 10 Metre bands without an antenna tuner. Through the use of a tuner we could also operate on the WARC band frequencies . Here is how the antenna is constructed:

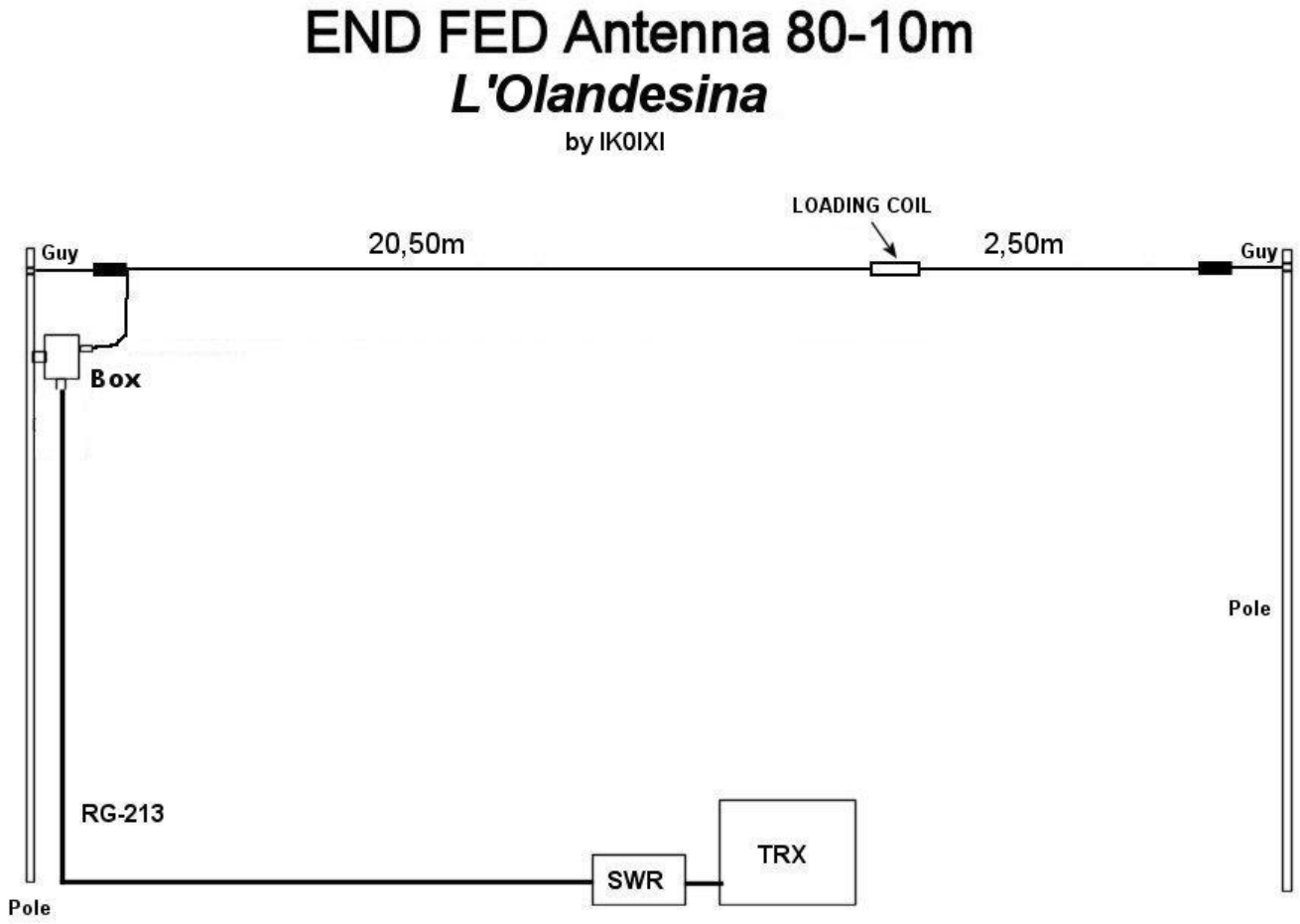

Fig. 1

The antenna has been designed to use common house hold mains wiring yellow/green earth wire with a cross section of 1.5 sq mm

Impedance transformer

The heart of this antenna is the Impedance Transformer. The antenna wire requires a high impedance. In our world of coaxial antenna feed lines, we are used to relating everything to the classic impedance of 50 Ohm. In this antenna we use a 50 Ohm coaxial cable to feed up to the antenna from the shack and a transformer to match to the high impedance of the antenna wire at its end.

We need a transformer to step-up the impedance, converting the 50 ohm coaxial to 2500 Ohm presented by the antenna wire . This is a trivial task , we need a transformer with a ratio of 1:50. This can be done as shown in figure 2 .

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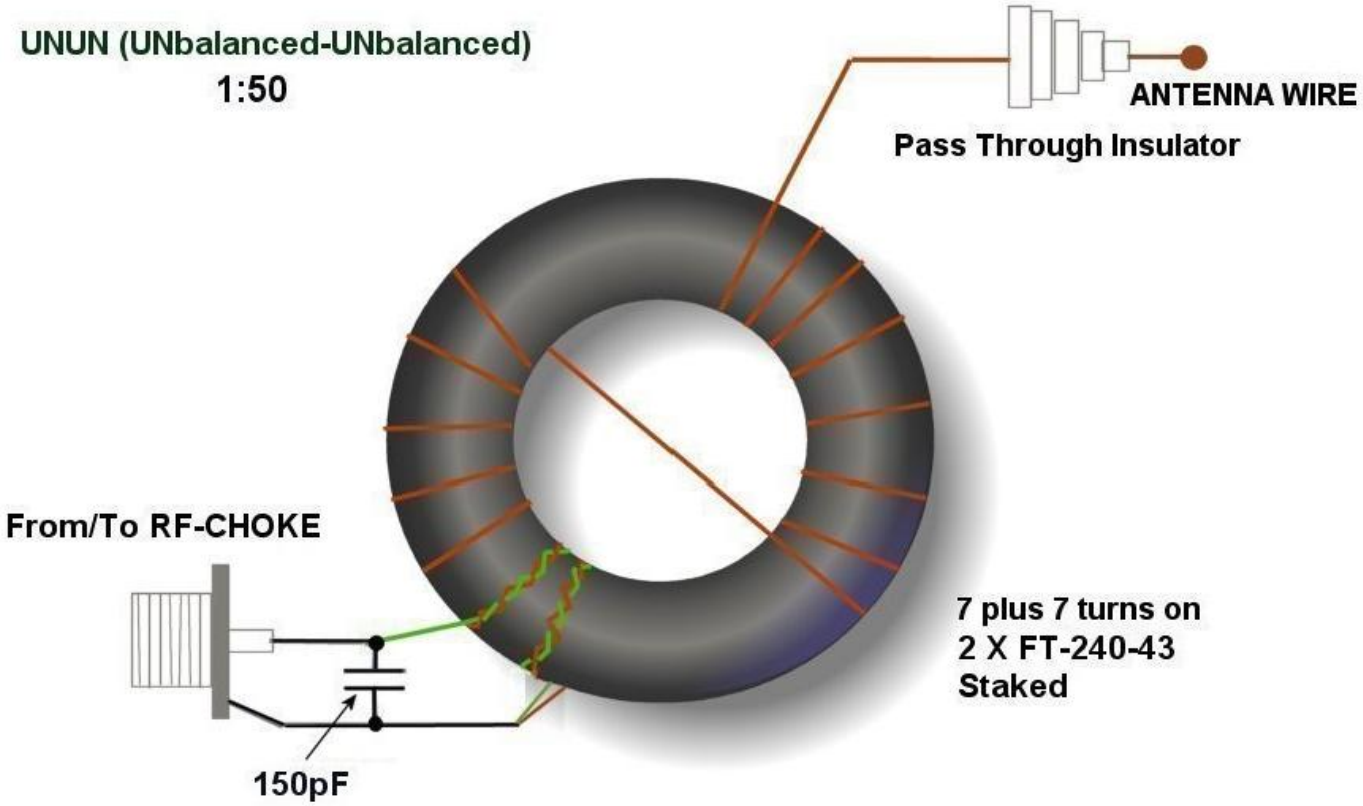

Fig. 2

The turns ratio is 1: 7 whereby the impedance ratio, being quadratic, is 7 X 7 = 49 (about 50). In this way we will have translated the 50 ohm feed line to approximately 2500 Ohm antenna (50 squared = 2500). The transformer should be assembled in a water tight plastic box and installed on the support pole near where the antenna wire terminates. The input can be a common SO-239 coaxial socket and the output can be a 4mm SS bolt or for high power, a feed through porcelain insulator.

The capacitor of 150 pF - 3 kV is used to improve the matching of impedance on the 10m range. In fact at 28 MHz there seems to prevail a certain inductive component on the primary of the transformer, which is offset in large part by the added capacity which improves the matching. Without the capacitor SWR increases slightly, rising to 1: 1.6 on 40 / 20m, while increasing to a greater extent on 10m rising to 1: 3.0 on 28.500 MHz.

The use of two ferrite core FT-240-43 allows the use of this antenna to the maximum legal power of 500W. I have made many QSOs at the maximum power allowed by our legislation without encountering any problems.

Loading coil

The coil is made by close winding 125 turns of 1mm enameled copper on a 32mm diameter gray PVC pipe. The coil has an inductance of about 100 microH. To withstand the elements and UV rays, use SS bolts and the coil should be wound with self vulcanizing tape. The mechanical strain should be supported by 4mm bolts, thimbles and saddle clamps.

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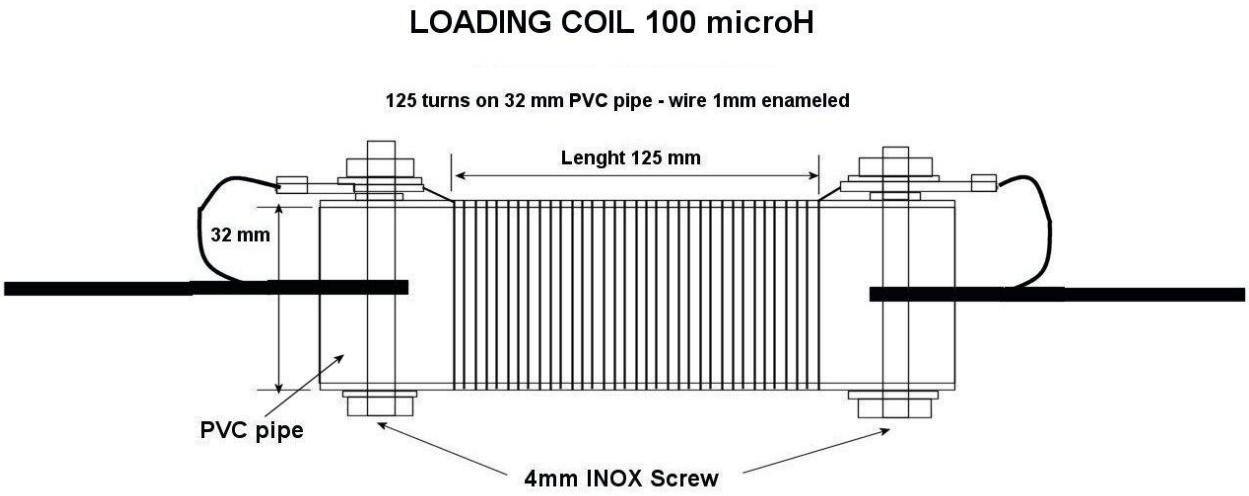

Fig. 3

RF Choke

To prevent any influence between the primary winding of the transformer and the cable shield , is important to include a RF CHOKE just before the matching transformer . This makes the antenna completely isolated from the coaxial cable and prevents any RF "backflow" to the radio shack . The RF CHOKE is constructed with a FT-240-43 toroid, on

which are wound 9 plus 9 turns of RG - 58 coax cable. This is enclosed in the same box containing the matching transformer . See in Fig . 4 .

Fig. 4

Even at full power , there were no returns on any RF range .

Calibration

The antenna , with the measurements provided , I see no need for calibration on the CW portions . However , if one wants , you can make small adjustments to SWR changing the length of the longest part (20.5metre) in the range 7 to 28 MHz, and then adjust the short section (2.5metre) until you find the right balance on the lower range, 80m.

Minor adjustments, are not usually necessary. With the simple automatic tuner built into modern amateur radio equipment , or a simple external ATU, you can bring the SWR to 1 : 1.1 without touching the antenna lengths and without compromising performance .
For WARC bands instead there are adjustments , but only through the use of an antenna tuner. Fig 5 shows the SWR results from my antenna using a Rig Expert Analyzer :

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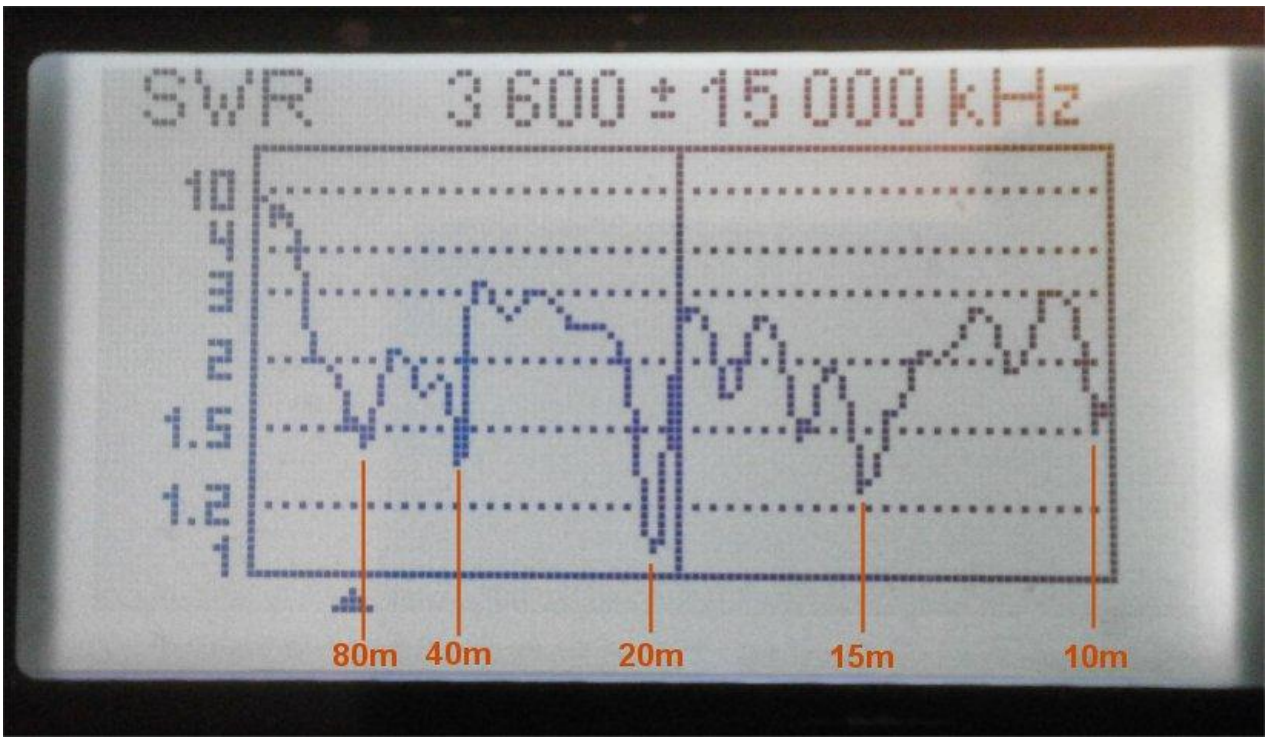

Fig. 5

Performance

I work exclusively on CW with some output AM (40m).
80m - The antenna performs well, allowing normal traffic national and European level without too much trouble. SWR 1: 1.6 (3500-3700). **40m** - Excellent performance, strong signals and good relations throughout the country, Europe and some DX QSO. SWR 1: 1.3
20 m - Very good, tested for several months in the **weekly sked with VK3DBD**. Signal strong and stable, also worked DX. SWR 1: 1.1
15m and 10m - Thanks to it were made many intercontinental QSOs and DX. SWR 1: 1.3 (15m) 1: 1.5 (10m - from 28,500 to 29,000)
WARC - Although officially not working, thanks to the tuner (MFJ-993B) I worked many stations on all ranges.
30m - Mostly QSO Europeans, but there have been QSO with the Philippines and Japan.
17m - Same performance as 20m.
12m - Same performance of approximately 10m.

73 Fabio, IK0IXI - http://nuke.ik0ixi.it/Antenne/LOlandesina/tabid/606/Default.aspx

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https://www.google.com.au/search?q=translate+itailan+to+english&ie=utf-8&oe=utf-8&gws_rd=cr&ei=HkCgVuOHDYa10gTjnb-QDw
With some corrections and additions to the translation by VK5SRP
It has also been published without the diagrams and photos, in the Winter 2015/2016 edition of Sprat, the journal of the GQRP Club.

Olandesina has been translated to “little Dutch girl.