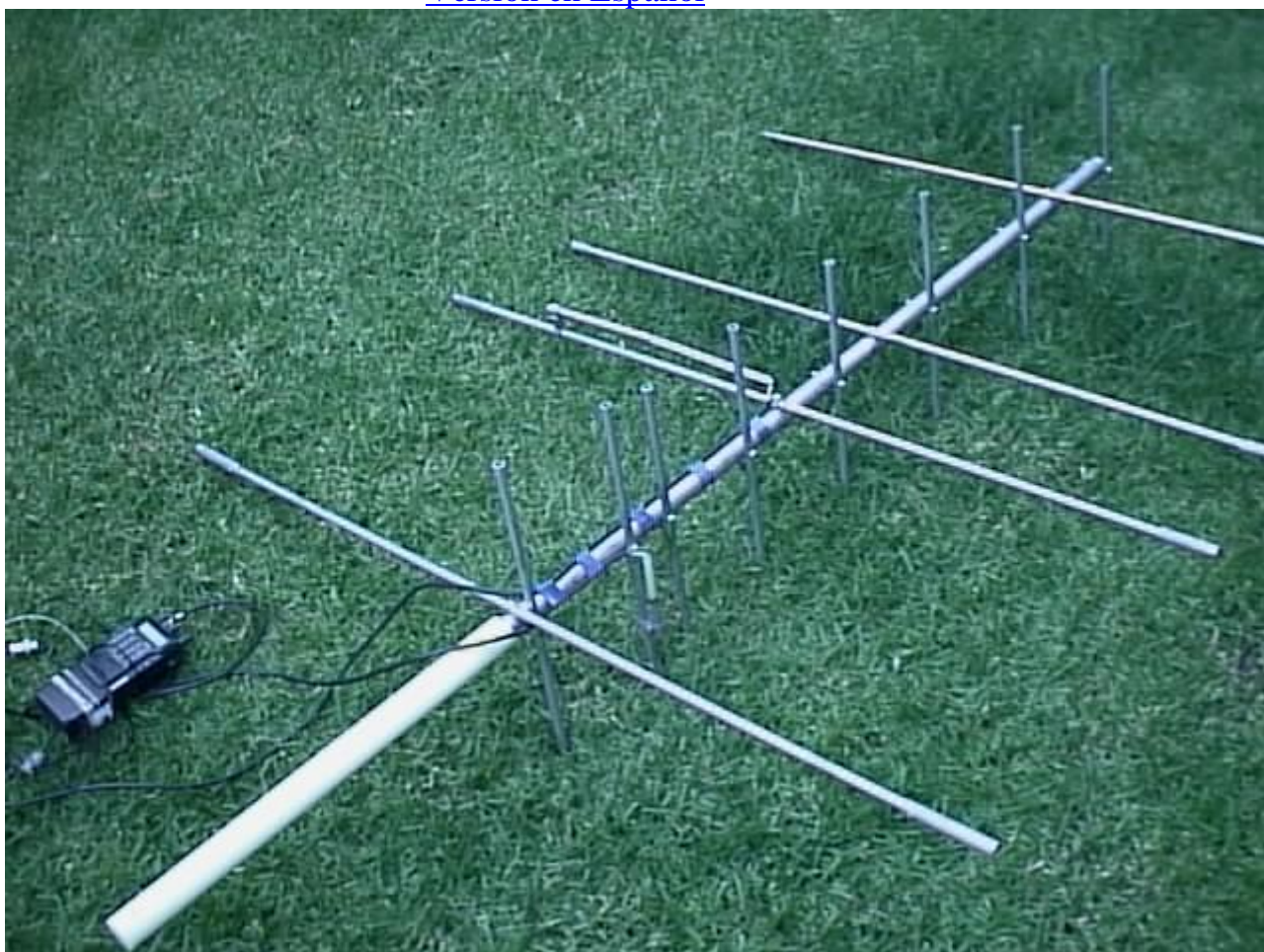


VHF-UHF Portable Yagi-Uda Antenna Design and Construction Notes by XE1MEX

[Versión en Español](#)



Introduction

Since it is very difficult to get a commercial VHF-UHF portable antenna in my town (like the famous Arrow), I decided to build a homebrew antenna as I did it in the past with most of my old HF and VHF antennas. My personal commitment was to get it ready for my holidays in Cancún (May 2 to May 8, 1999) in order to operate from the grid square EL61 using the AO-27 satellite. The antenna performance was excellent and a lot of satellite contacts were made during my stay in Cancún and surrounding areas. Since then I have used it from my home and every time that I have a chance to be out of my home grid square (EK08mu). In 1999: EK09, EL00 and EL61; in 2000: EL60 and EL61; in 2001: EL61, EL50, EL51, EK06, EK07 and DK96.

I have successfully tested this antenna with the satellites [AO-27](#), [SO-35](#), [UO-14](#), [FO-20](#), [FO-29](#) and [AO-10](#) ...please see the updates and photos below.

Software

The GWBasic software program that I used to design my double Yagi-Uda for VHF and UHF was developed by **Guenter Hoch, DL6WU**

In order to use this program please follow these instructions:

1. Decompress the file `antenne.zip` into a new folder in your PC.
2. With the windows explorer try to run the file `Antdl6wu.bas`
3. If a dialog box appears asking you for the program to run it, click in "other" and then select the file `Gwbasic.exe`
4. The program should be running now within Windows 95, 98 or NT in a separate window. Please do a click just ahead of the question Y/N and type Y plus enter. You are in; just follow the instructions and give your design parameters.

Construction Details

Assuming that you have downloaded the program and it is running properly, what I can share with you (just to save time) are the program results for the specific parameters and material that I had available at home:

- Center VHF frequency: 145.850 MHz
- Center UHF frequency: 436.800 MHz
- Number of elements: 8 in UHF (10.5 dBd gain), 4 in VHF (6.46 dBd gain)(longer and heavier than the Arrow but still portable !!)
- Boom diameter: 22 mm
- Elements and gamma pipe diameter: 9 mm
- VHF elements lenghts: R=1017 D=972 D1=917 D2=906
- VHF elements spacing: R to D=380, D to D1=162, D1 to D2=370
- UHF elements lenghts: R=349 D=325 D1=303 D2=298 D3=292 D4=287 D5=285 D6=282
- UHF elements spacing: R to D=127, D to D1=54, D1 to D2=123, D2 to D3=148, D3 to D4=173, D4 to D5=193, D5 to D6=207
- The reflectors are mounted 15 mm (VHF) and 25 mm (UHF) from reflector center to the boom edge (thanks to XE1YJS for his correction !- Feb 2, 2002).

REMARKS: All dimensions are in millimeters, all elements are made of aluminum pipe, R=reflector, D=driven, D1 to D6=directors, all spacing between elements is from center to center, elements are mounted **over** the boom (*not through* the boom) and they **are not** isolated to the boom. I used a teflon rod (430 mm long, 100 mm inserted into the boom edge) as arm/hand support...you can use whatever you have -non conductive of course-

I used those aluminum pipe diameters because they were available at home, but I strongly recommend you to use thinner pipes (perhaps rods) to make a not so heavy antenna...your arm will thank you in case you like to have long radio contacts. If you do so, do not forget to re-calculate with the actual elements and boom diameters.

The Gamma Match

Now let's go to the "difficult" part...the matching between coaxial cable and feed point of the driven elements. Since this is a portable antenna to be used very close to the transceiver, I decided to ignore the losses of the normal BELDEN RG58 A/U coax cable because I put just 1200 mm of coax between radio antenna connector and each driven element.

Also I decided to follow the old and problem free matching method known as gamma match. I have always used it with excellent results, and because I do not put any kind of additional capacitors but I use a bare piece of RG8 or RG213 or RG214 as coupling capacitor which is inserted into an aluminum pipe. This pipe has an aluminum band which makes the connection between the sleeve and one arm of the driven element. The bare coax means a piece of coax cable without the external plastic cover and without the shield screen...well, I think it is better to see these pictures which tell you more than a thousand words:



UPDATE!! (Feb.18, 2001): The most frequently asked question from the friends that have duplicated this antenna is related to the gamma match. You asked for it many times, so...if you need a simple drawing please click [here](#) or in the thumbnail:



Of course you can use any other matching method, but in case of the gamma, here is some data that will save you time:

- VHF: gamma aluminum pipe lenght=150 mm, total bare coax lenght=230 mm, bare coax lenght into the alu pipe=68 mm, alu band (making short circuit between gamma "rod" and driven element) placed at 310 mm from center of boom, separation between gamma "rod" and driven arm=30 mm (center to center).
- UHF: gamma aluminum pipe lenght=50 mm, total bare coax lenght=68 mm, bare coax lenght into alu pipe=20 mm, alu band placed at 84 mm from center of boom, separation between gamma "rod" and driven arm=20 mm (center to center).
- Many thanks to Marcin Korona, SP8UFX for his remarks to correct a couple of important UHF gamma dimensions ! (May 15, 2001).

In case you want to do a fine adjustment to the SWR and assuming you have the proper SWR meter, look for minimum inserting or extracting the bare coaxial part and/or moving back and forth the shorting band.

The Reward

Well, after so much effort the good news...if you duplicate the described antenna, I can guarantee that you will get an SWR of less than 1.3:1 in both center frequencies and not more than 2:1 in the band edges.

I could not measure the front gain but it should be close to the theoretical; anyway, just aim your beam to the [AO-27](#), [SO-35](#), [UO-14](#), [FO-20](#), [FO-29](#) or [AO-10](#) and I am sure that you will be satisfied with its performance.

Ok, as you see I did not write anything about the diplexer. It is just because I use two radios. I am going to build a diplexer soon; if it works as expected I will publish here the circuit diagram and its construction details.

I hope you enjoy the construction of this antenna as much as I did...73's de XE1MEX....Alex

