6 Elements

VHF Yagi antenna

By SV1XY

FIG.1 shows a 6 elements VHF Yagi "homebrew" antenna designed with YAGIMAX 3 and made by SV1XY and me with excellent results on local and satellites contacts.(UO-14, AO-27 etc.)

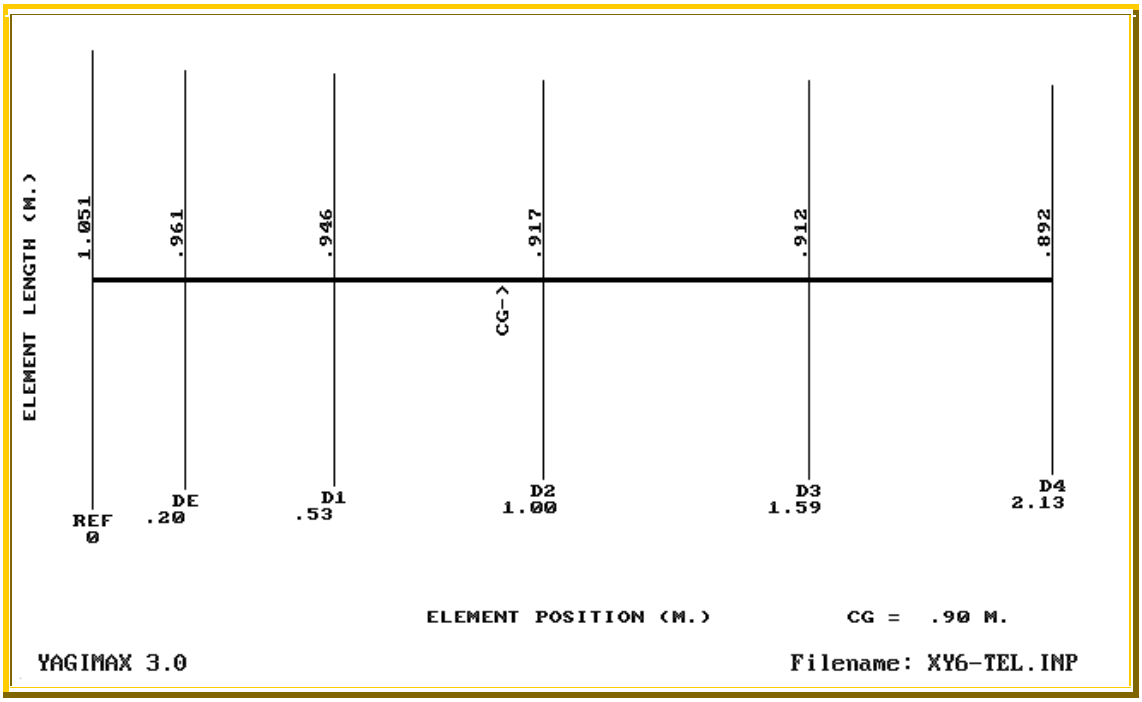

FIG.1

FIG.2 shows a graph for the SWR, GAIN and F/B ratio.

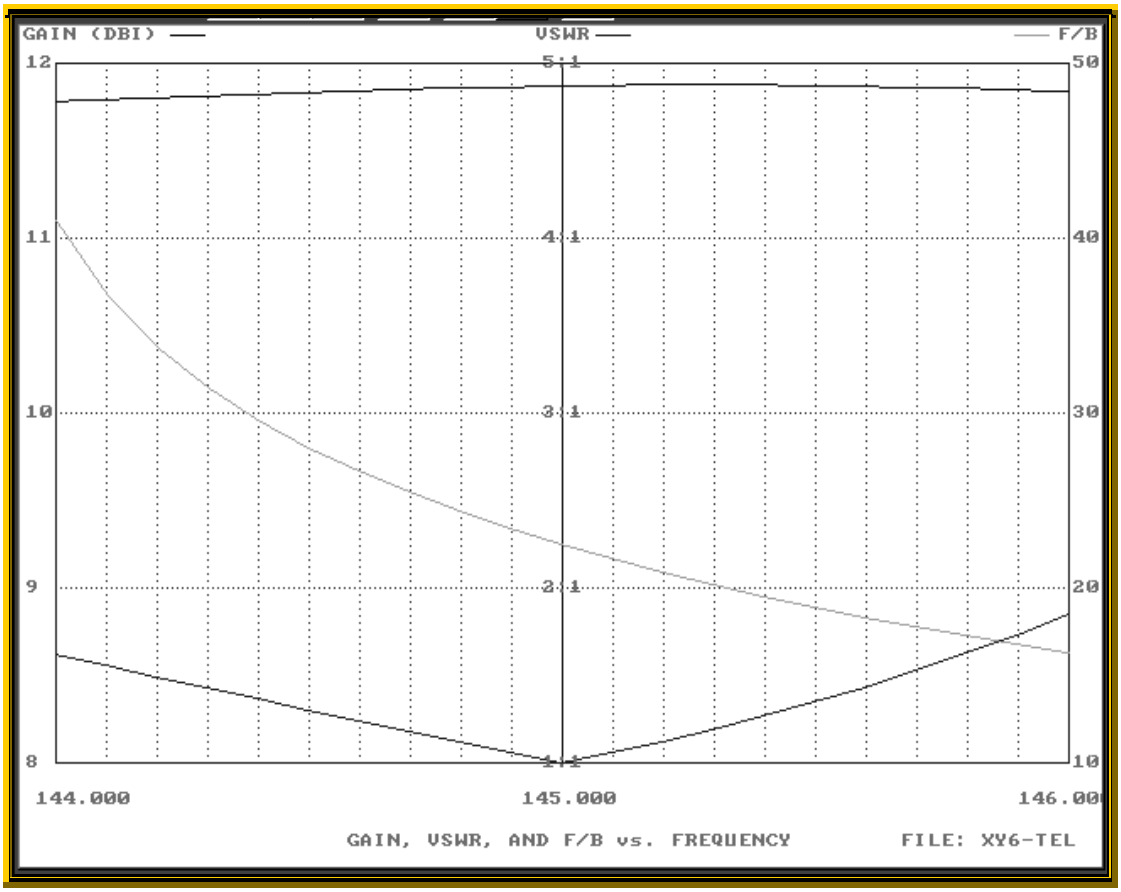

FIG. 2

The maximum forward GAIN is almost 11.9 DBi (abt 9.8 DBd) into 2 m. Band.
With almost 10 DBd gain, we have an **Effective Radiation Power (ERP)** 10 times greater of the tranceiver maximum output (without Coaxial-Loss).
For example, if your VHF-Rig has an output Power of 50 Watts, your ERP will be multiplied 10 times = 500 Watts ! (in the forward GAIN direction)
I think not bad for a 6 Elements small-antenna (2.13 m. Boom) !

FIG.3 below shows a table about Gain, F/B, impedance & SWR
between 144 - 146 MHZ (2 m. Band)

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FREQ (mHz)	GAIN (dBi)	F/B (dB)	IMPEDANCE (ohms)	VSWR
144.000	11.78	40.99	14.45-j13.77	1.62
144.100	11.79	36.82	14.24-j13.20	1.56
144.200	11.80	33.81	14.04-j12.62	1.49
144.300	11.81	31.48	13.83-j12.02	1.43
144.400	11.82	29.60	13.62-j11.41	1.37
144.500	11.83	28.02	13.42-j10.79	1.30
144.600	11.84	26.65	13.22-j10.16	1.24
144.700	11.85	25.45	13.02-j9.51	1.18
144.800	11.86	24.37	12.83-j8.85	1.12
144.900	11.86	23.40	12.65-j8.19	1.06
145.000	11.87	22.50	12.47-j7.50	1.00
145.100	11.87	21.68	12.29-j6.81	1.06
145.200	11.88	20.92	12.13-j6.11	1.12
145.300	11.88	20.21	11.98-j5.40	1.19
145.400	11.88	19.55	11.83-j4.68	1.27
145.500	11.87	18.92	11.69-j3.96	1.35
145.600	11.87	18.33	11.57-j3.22	1.43
145.700	11.86	17.78	11.46-j2.48	1.53
145.800	11.86	17.25	11.35-j1.74	1.63
145.900	11.85	16.75	11.27-j.99	1.73
146.000	11.84	16.28	11.19-j.23	1.85

The Normalized Radiation Resistance at 145.000 mHz is = 17.0 Ohms

FIG. 3

The Radiation Resistance on center frequancy (145,000 MHZ) its 17 Ohms. In practice the antenna needs a "matching system" for a 50 Ohms coaxial cable feeder (H-100, RG-213 or similar).

I have used a "Hairpin" system (FIG. 4), because that is very simple and effective. ***YAGIMAX antenna design program*** including a calculation-tool for the Hairpin's dimension, depending upon "data" of the table above (FIG.3)

The **Drive Element** is an **"Open - Dipole"** (two pieces of about "Lamda/4")
with overall length ***0.961 m.*** (see FIG.1)

FIG.4 shows the Drive-element (Dipole) and the Hairpin construction on the dipole's plastic box. The gap (spacing) between the two screws is **2.2 cm** (dimension B) and the dimension **"A"** is **4.5 cm** for 1:1 SWR (on my antenna).
If you have not the optimum SWR (1:1), you can increase or decrease the "A" dimension a few millimeters, looking for the minimum SWR.

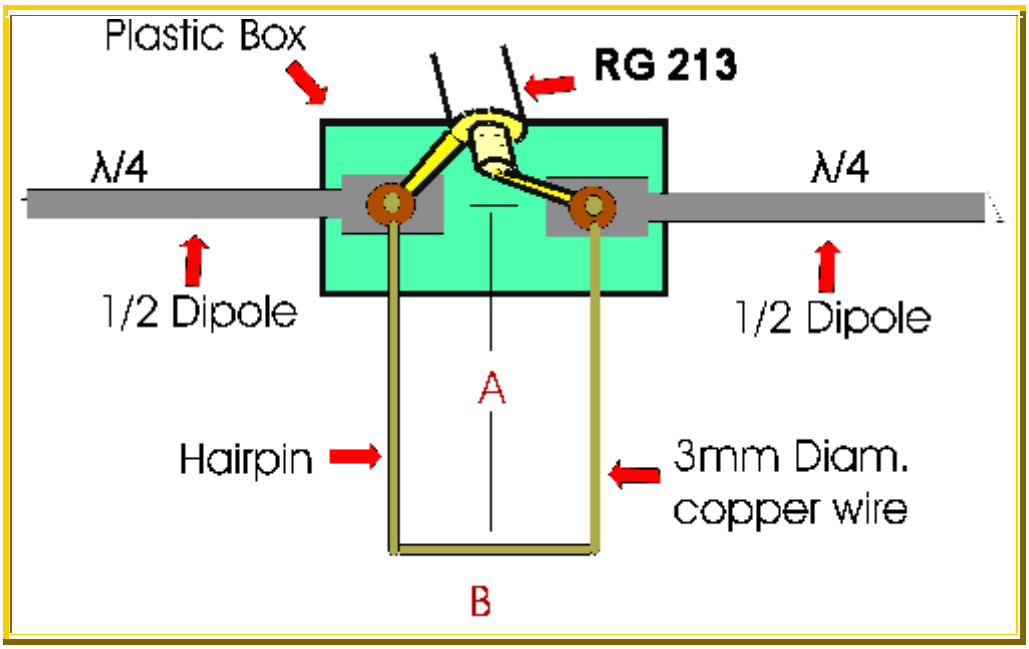

FIG. 4

The antenna has been constructed on a **15 x 15 mm** aluminium boom and I have used for the elements aluminium tubular rods of 8 mm diameter. The plastic box that I have used for the dipole it was from an old TV-antenna.
Keep in mind: this antenna has a sharp SWR curve in order to be achieve the highest gain. You must be careful with elements dimensions !
The maximum acceptable variation is ± 2% !

Finally, the FIG. 5 & 6 shows the polar-plots of antenna

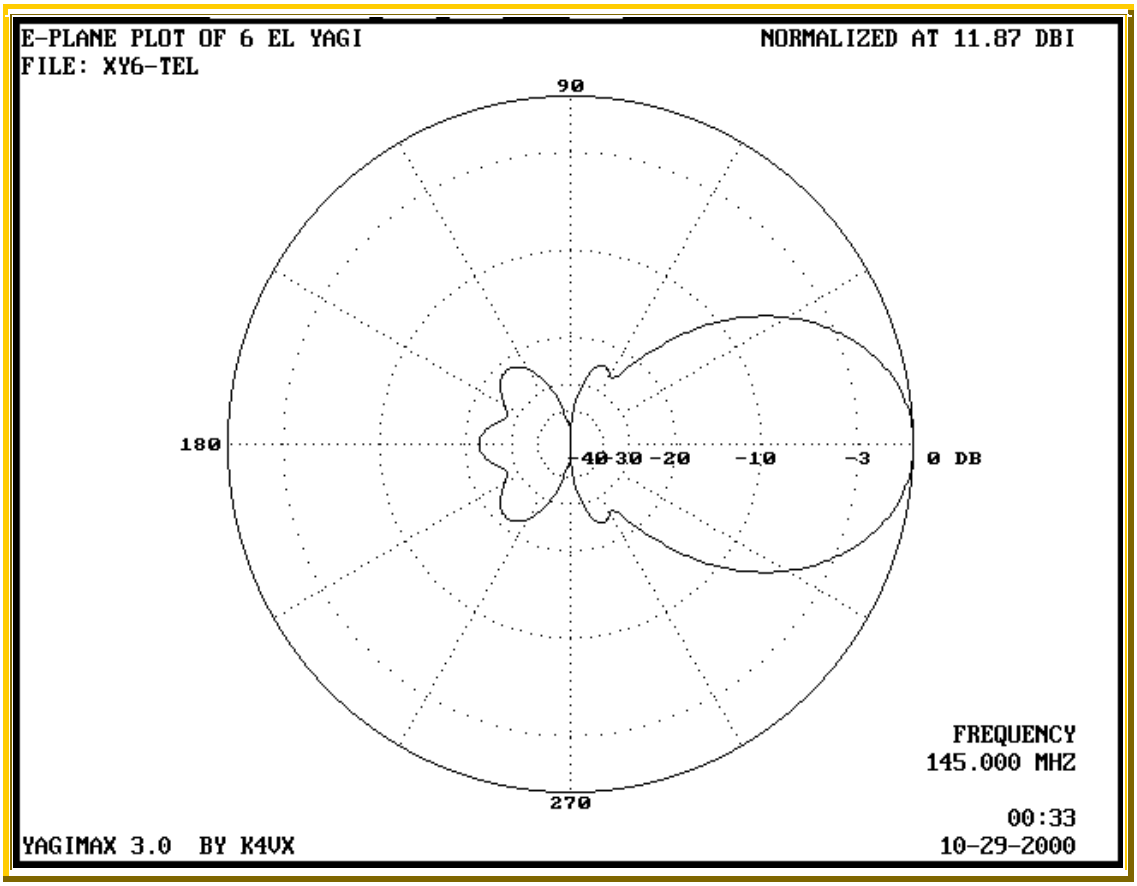

FIG.5

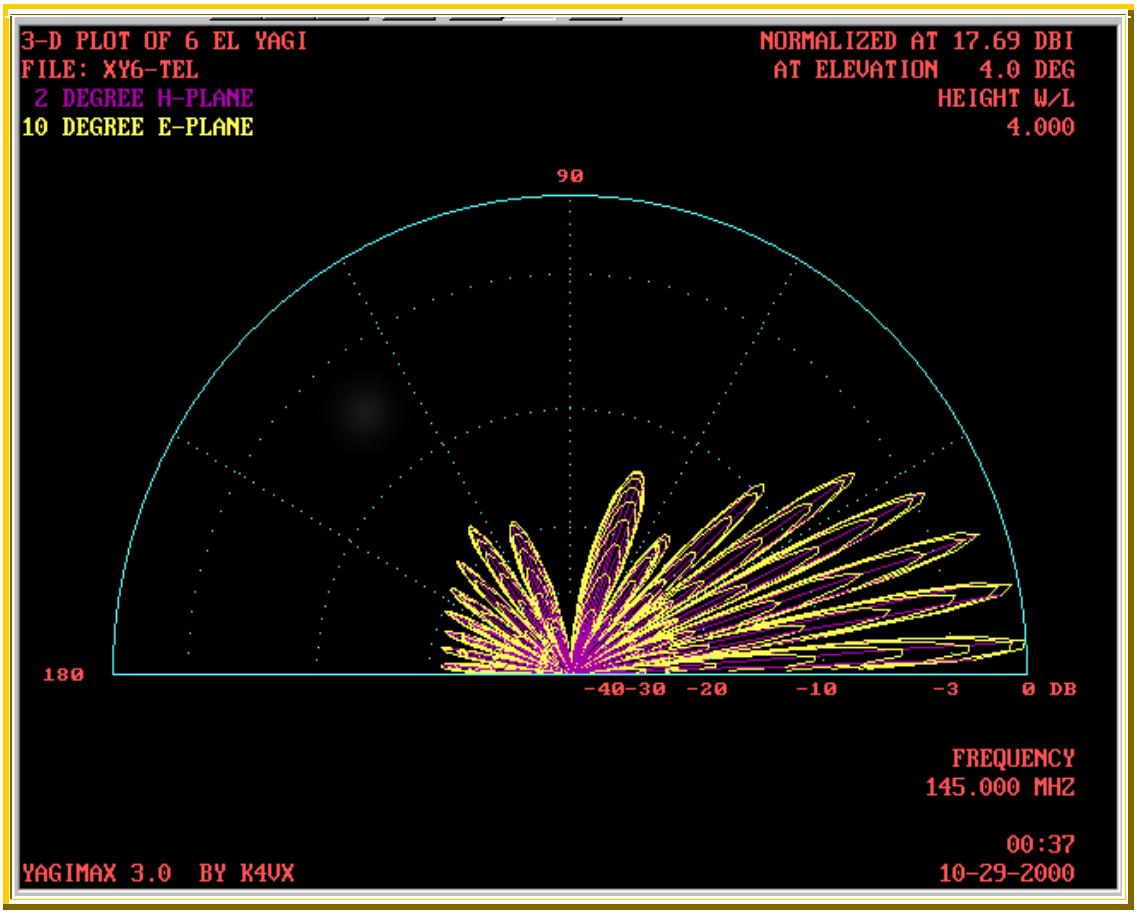

FIG.6

Good luck !
Costas SV1XY - Makis SV1BSX