

The "Dual" company has been producing antennas for more than 30 years.

Our focus is on:

- wide bandwidth,
- designs that work equally well in all weather conditions,
- very low SWR and superior G/T, F/B and F/S ratios across the entire frequency band,
- excellent mechanical properties, and
- uncompromised durability.

We do not use amateurish programs like **EZNEC Pro/4**, **4NEC2**, **EZNEC**, **MMANA AO** or **YO**. We perform the design work using **the latest professional full-3D electromagnetic modelling software**. This enables us to accurately include the influence of the boom, insulators, baluns, feed point, connections, etc

Our designs are optimised using the Particle Swarm algorithm, which is considered one of the best global optimization algorithms. We also use the classic Nelder-Mead Simplex algorithm for fine-tuning. Our optimization runs frequently exceed 1 million evaluations.

We rely on solid physics, not on "clever" tinkering with antenna elements or spacings. By paying the greatest attention to all of the important details, we are able to consistently produce top performance designs.

Our antennas are precision physical instruments, they are real **"Precision Antennas" (PA)**.

PA144-XPOL-18-5B

Electrical Specifications

Frequency Range:	144 - 145 MHZ
Free Space Forward Gain:	13.85 dBi
Front to Back Ratio:	33 dB
3 dB Horizontal Beamwidth:	39.75° (Horizontal polarization)
3 dB Vertical Beamwidth:	43.35° (Horizontal polarization)
G/T for Tsky=290K-Tearth=5400K Hpol	-6.60 dB (Horizontal polarization)
G/T for Tsky=290K-Tearth=5400K Vpol	-6.24 dB (Vertical polarization)
G/T for Tsky=290K-Tearth=5400K RHCP	-6.55 dB
G/T for Tsky=290K-Tearth=5400K LHCP	-6.30 dB
Polarization:	Horizontal, Vertical, RHCP, LHCP with phase shift
Distance Between Dipoles:	520 mm
Degrees:	90°
Isolation Between Antennas:	More than 30 dB
Nominal Input Impedance:	50 Ohms
SWR Across Entire Band:	< 1.2
Maximum Power Input:	1000 W for both antennas
Matching Method:	Direct feed through common mode choke (current balun)
Connectors:	2 x "N"

Maximum Power Input options (by order)

"P" "N" Input connector RG142 Teflon balun cable:	3000 W (PA144-XPOL-18-5BGP)
"E" 7/16 DIN Input connector SM250 Teflon balun cable:	4000 W (PA144-XPOL-18-5BGE)
"EX" 7/16 DIN Input connector RG115 Teflon balun cable:	10000 W (PA144-XPOL-18-5BGEX)

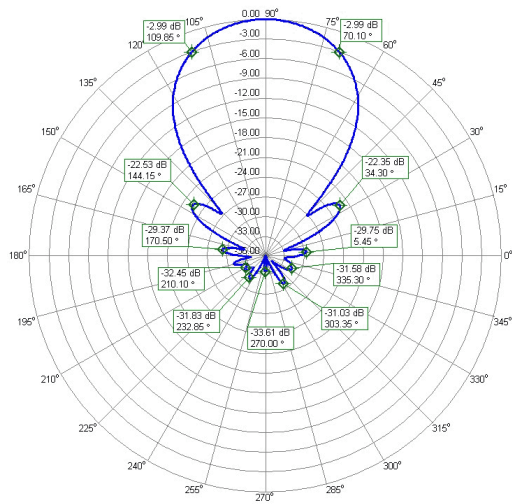
Mechanical Specifications

Number of Elements:	18 (9 + 9)
Element Diameter:	8 mm Aluminum tube.
Dipole Diameter:	8 mm Hard Copper tube plastic coated.
Longest Element:	1040 mm.
Element Mounting Position:	Above the Boom. Slant configuration +-45 deg
Balun and Connectors:	Included
Boom Length:	4.86 m
Single Antenna Length:	4.3 m
Boom Size:	Tapered Boom 40x40 mm, 30x30 mm, 20x20 mm.
Number of Boom Pieces:	4
Guy rope support:	Not necessary. Strong boom.
Mounting Mast Diameter:	43 - 70 mm 1-1/4" - 2-3/4"
Clamp:	M8 Stainless Steel
Survival Wind Speed:	150 km/h
Net Weight:	7 kg
Gross Weight:	9 kg
Transportation Length:	1.5 m

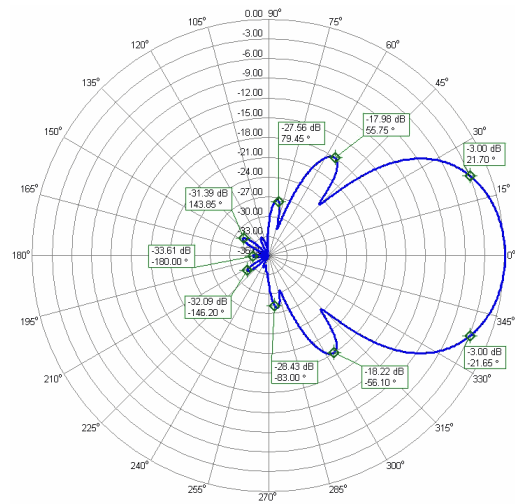


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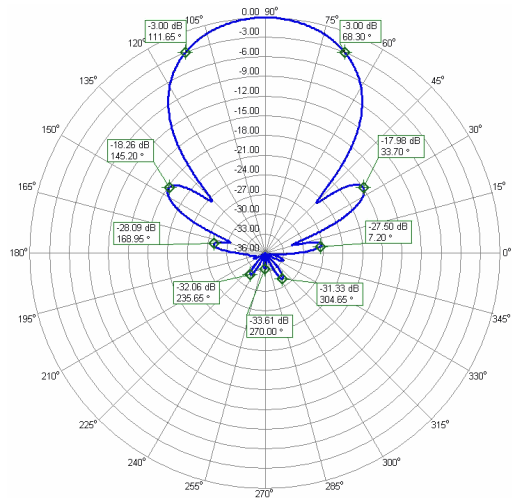
Radiation Patterns for Single Antenna



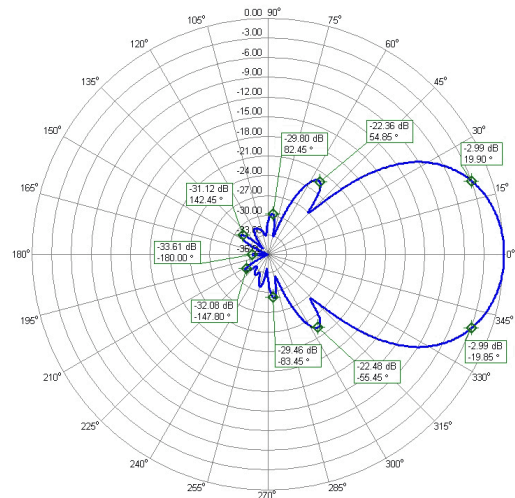
Horizontal Polarization
Azimuth Radiation Pattern



Horizontal Polarization
Elevation Radiation Pattern



Vertical Polarization
Azimuth Radiation Pattern



Vertical Polarization
Elevation Radiation Pattern

Stacking Distance for best G/T, Tsky=290K, Tearth=5400K: 3200mm x 2500mm. Gain 19.65dBi

elevation	pattern	noise temperature	loss	total	G/T
0 deg.	2845.0 K	5.4 K	2797.6 K	-14.95 dB	
5 deg.	1877.0 K	5.4 K	1847.5 K	-13.15 dB	
10 deg.	1052.4 K	5.4 K	1038.2 K	-10.64 dB	
15 deg.	595.6 K	5.4 K	589.9 K	-8.19 dB	
20 deg.	440.0 K	5.4 K	437.2 K	-6.89 dB	
25 deg.	419.7 K	5.4 K	417.3 K	-6.68 dB	
30 deg.	411.8 K	5.4 K	409.6 K	-6.60 dB	
35 deg.	386.6 K	5.4 K	384.8 K	-6.33 dB	
40 deg.	365.1 K	5.4 K	363.7 K	-6.09 dB	
45 deg.	358.1 K	5.4 K	356.8 K	-6.00 dB	
50 deg.	353.2 K	5.4 K	352.0 K	-5.95 dB	
55 deg.	341.0 K	5.4 K	340.0 K	-5.79 dB	
60 deg.	326.6 K	5.4 K	326.0 K	-5.61 dB	
65 deg.	319.7 K	5.4 K	318.2 K	-5.51 dB	
70 deg.	316.9 K	5.4 K	316.4 K	-5.48 dB	
75 deg.	316.4 K	5.4 K	315.9 K	-5.48 dB	
80 deg.	314.8 K	5.4 K	314.4 K	-5.45 dB	
85 deg.	313.0 K	5.4 K	312.6 K	-5.43 dB	
90 deg.	312.3 K	5.4 K	311.9 K	-5.42 dB	

Horizontal Polarization TANT G/T -6.60 dB

elevation	pattern	noise temperature	loss	total	G/T
0 deg.	2845.0 K	6.0 K	2792.0 K	-14.98 dB	
5 deg.	1841.6 K	6.0 K	1809.4 K	-13.10 dB	
10 deg.	1002.4 K	6.0 K	987.6 K	-10.47 dB	
15 deg.	550.2 K	6.0 K	544.8 K	-7.88 dB	
20 deg.	401.4 K	6.0 K	399.1 K	-6.53 dB	
25 deg.	381.7 K	6.0 K	379.8 K	-6.32 dB	
30 deg.	374.8 K	6.0 K	373.0 K	-6.24 dB	
35 deg.	357.1 K	6.0 K	355.7 K	-6.03 dB	
40 deg.	343.7 K	6.0 K	342.6 K	-5.87 dB	
45 deg.	339.0 K	6.0 K	338.0 K	-5.81 dB	
50 deg.	334.6 K	6.0 K	333.7 K	-5.75 dB	
55 deg.	327.6 K	6.0 K	326.8 K	-5.66 dB	
60 deg.	321.8 K	6.0 K	321.1 K	-5.59 dB	
65 deg.	319.7 K	6.0 K	319.0 K	-5.56 dB	
70 deg.	319.3 K	6.0 K	318.7 K	-5.55 dB	
75 deg.	318.4 K	6.0 K	317.9 K	-5.54 dB	
80 deg.	316.7 K	6.0 K	316.2 K	-5.52 dB	
85 deg.	315.0 K	6.0 K	314.4 K	-5.50 dB	
90 deg.	314.2 K	6.0 K	313.7 K	-5.49 dB	

Vertical Polarization TANT G/T -6.24 dB

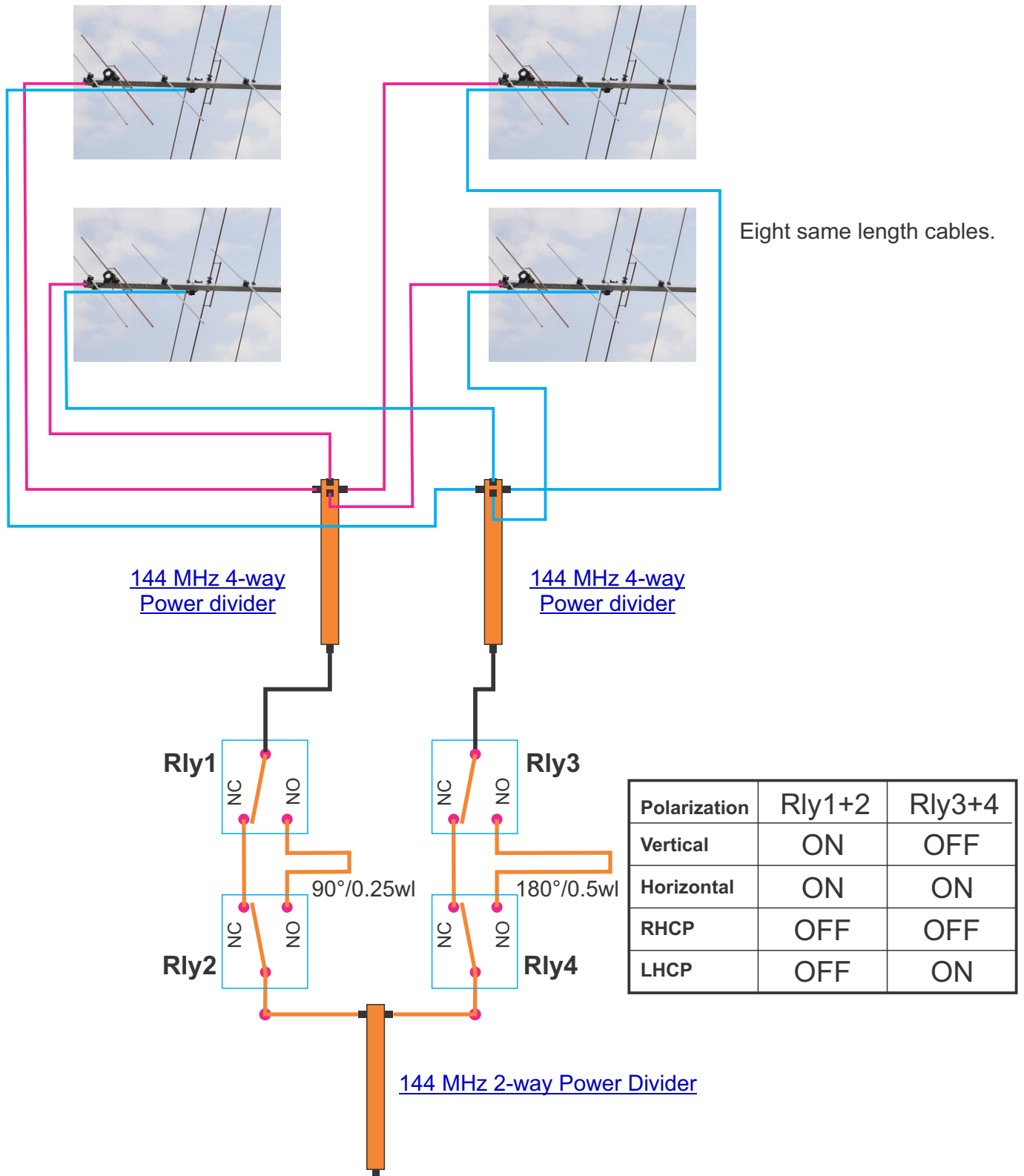


Company Dual. The largest antenna and ham radio equipment manufacturer in Serbia.
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Connection possibilities

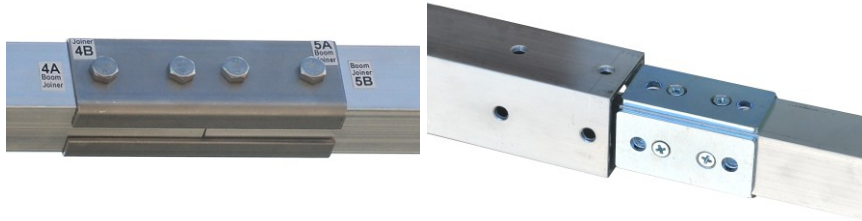
Connecting four XPOL antennas to polarization switch.
Transmit / receive H, V, RHCP, LHCP.



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Assembly instruction

Join the boom.



Not all pictures are related to the particular antenna.



Assemble and attach antenna mounting bracket.

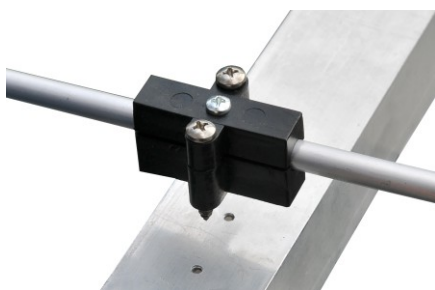


Not all pictures are related to the particular antenna.



Put the boom on the flat surface. Because of length you should tighten screws lightly for the first moment. Then look along the boom to see if any distortion occurs. When you are satisfied tighten firmly. Before tightening all screws, apply thread lock like Loctite 243 or Permatex Threadlocker BLUE.


Attach the elements (number to number).



Not all pictures are related to the particular antenna.

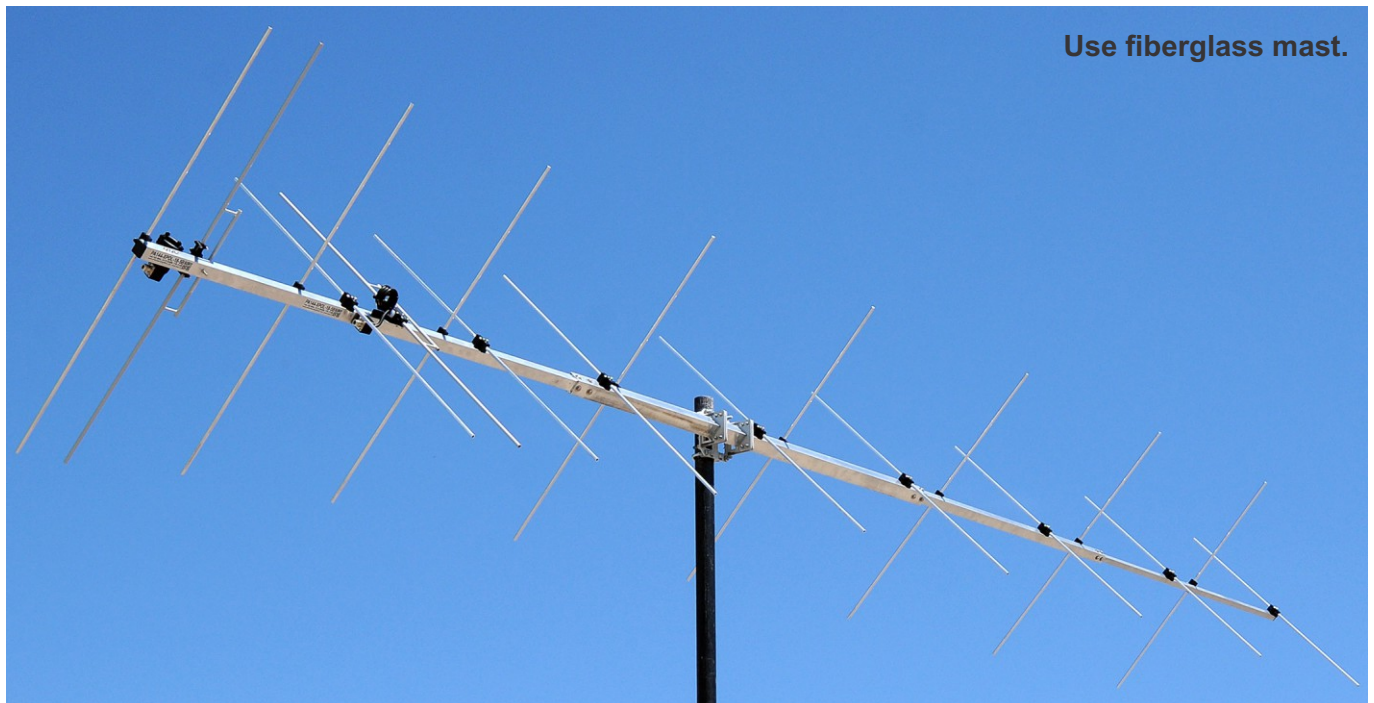
Starting with 1, paying special attention on orientation. Required torque 2.2 Nm. If needed align elements and screw tightly. Elements must stand in one plane. Before tightening all screws, apply thread lock.



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Attach the dipoles and screw connector holder to the boom.



Raise the antenna. Measure SWR. It must be as predicted or very close on all frequencies. And for both antennas.

Low SWR is a sign that you assembled everything correctly. Best DX - EME.



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