



The "Dual" company has been producing antennas for **over 34 years**.

Our focus is on:

- Wide bandwidth - **no tuning antennas**
- Designs that work well in **all weather** conditions
- **Low SWR and superior G/T, F/B and F/S** ratios across the entire band
- Excellent **mechanical properties**
- High durability, built **without compromise**

A Major advance in Amateur Radio antenna design.

All antennas have been calculated using **state of the art full 3D Electromagnetic Simulation Software** including **the influence** of the boom, bracket, baluns and connectors.

The performance of antennas designed using these techniques are **exceptional, far better** than antennas designed using "wire" programs like EZNEC Pro/4 –NEC v5.0, 4NEC2, MMANA or AO. These programs cannot calculate the effect of any metallic or dielectric structures near the antenna elements and therefore must be considered inaccurate.

Designs are optimized using the Particle Swarm algorithm, which is considered **one of the best** antenna optimization algorithms available, followed by a classic Nelder-Mead Simplex algorithm for fine-tuning.

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



PA144-432-29-4.5AP

Electrical Specifications 2 m

Frequency Range:	144 - 146 MHz
Free Space Forward Gain:	13.5 dBi
Front to Back Ratio:	27 dB
3 dB Horizontal Beamwidth:	39.8°
Polarization:	Horizontal
Nominal Input Impedance:	50 Ohms
SWR Across Entire Band:	< 1.2
Maximum Power Input:	1000W
Matching Method:	Voltage Balun
Connector:	"N" (Common connector for both bands)

Mechanical Specifications 2 m

Number of elements:	9
Element Diameter:	8 mm Aluminum tube
Dipole Diameter:	8 mm Hard Copper tube plastic coated. Common dipole.
Longest element:	1030 mm
Element Mounting Position:	Below othe Boom
Balun and Connector:	Included

Electrical Specifications 70 cm

Frequency Range:	432 - 434 MHz
Free Space Forward Gain:	16.9 dBi
Front to Back Ratio:	28 dB
3 dB Horizontal Beamwidth:	21.2°
Polarization:	Horizontal
Nominal Input Impedance:	50 Ohms
SWR Across Entire Band:	< 1.2
Maximum Power Input:	750W
Matching Method:	Voltage Balun
Connector:	"N" (Common connector for both bands)

Mechanical Specifications 70 cm

Number of elements:	20+1
Element Diameter:	4 mm Aluminum rod and 8 mm Aluminum tube
Dipole Diameter:	8 mm Hard Copper tube plastic coated. Common dipole.
Longest element:	350 mm
Element Mounting Position:	Below the Boom
Balun and Connector:	Included

Common Mechanical Specifications

Boom Length:	4.35 m
Boom Size:	Tapered Boom 20x20mm, 30x30mm, 20x20mm
Number of Boom Pieces:	4
Guy rope support:	No , Strong boom.
Mounting Mast Diameter:	43 - 70 mm 1-11/16" - 2-3/4"
Survival Wind Speed:	150 km/h
Wind Load:	0.12m²
Transportation Length:	1.2 m
Net Weight:	4.6 kg
Gross Weight:	5.6 kg



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Horizontal Stacking Distance 2500 mm

Two Antennas Gain on 2 m **16.1 dBi** (+2.6 dB)
Two Antennas Gain on 70 cm **20 dBi** (+3.1 dB)

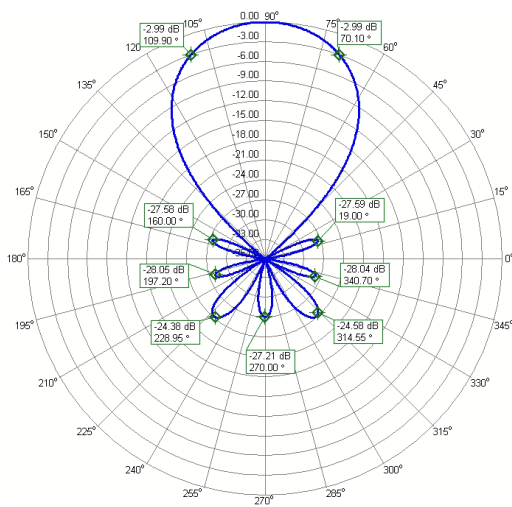
Vertical Stacking Distance 2300 mm

Two Antennas Gain on 2 m **16.1 dBi** (+2.6 dB)
Two Antennas Gain on 70 cm **20 dBi** (+3.1 dB)

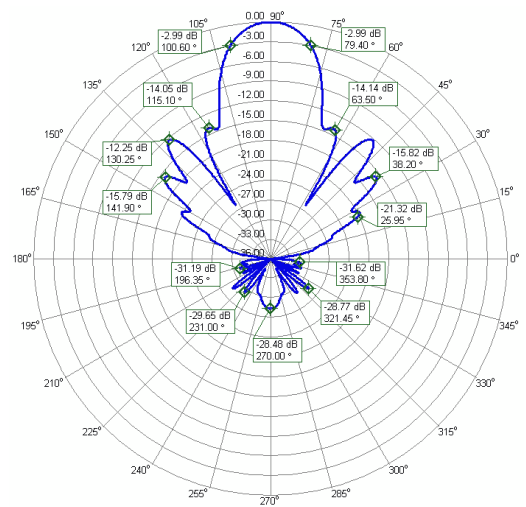
Four Antennas in "H" configuration 2500 x 2300 mm

Gain on 2 m **18.7 dBi** (+5.2 dB)
Gain on 70 cm **23.1 dBi** (+6.2 dB)

Radiation Patterns:



2 m Azimuth Radiation Pattern



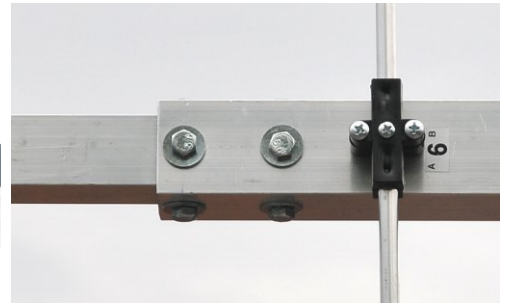
70 cm Azimuth Radiation Pattern

Assembly instruction

Join the boom.



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.



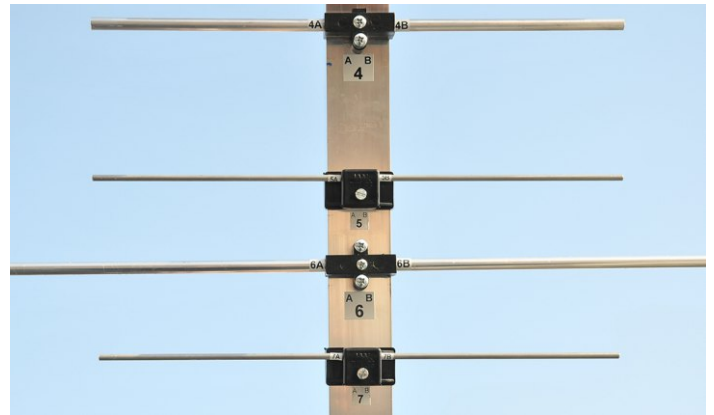
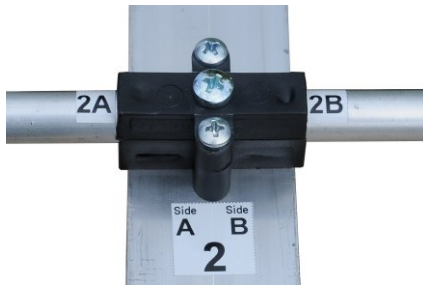
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Attach the elements (number to number).

Starting with 1, paying special attention on orientation.

Not all pictures are related to the particular antenna.



Required torque 2.2 Nm for 8 mm elements and 1.4 Nm for 4 mm elements.
If needed align elements and screw tightly. Elements must stand in one plane.

Attach the dipole

Assemble and attach antenna mounting bracket



Screw connector to connector holder.



Raise the antenna. Measure SWR. It must be as predicted or very close on all frequencies.
Low SWR is a sign that you assembled everything correctly. Best DX.



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