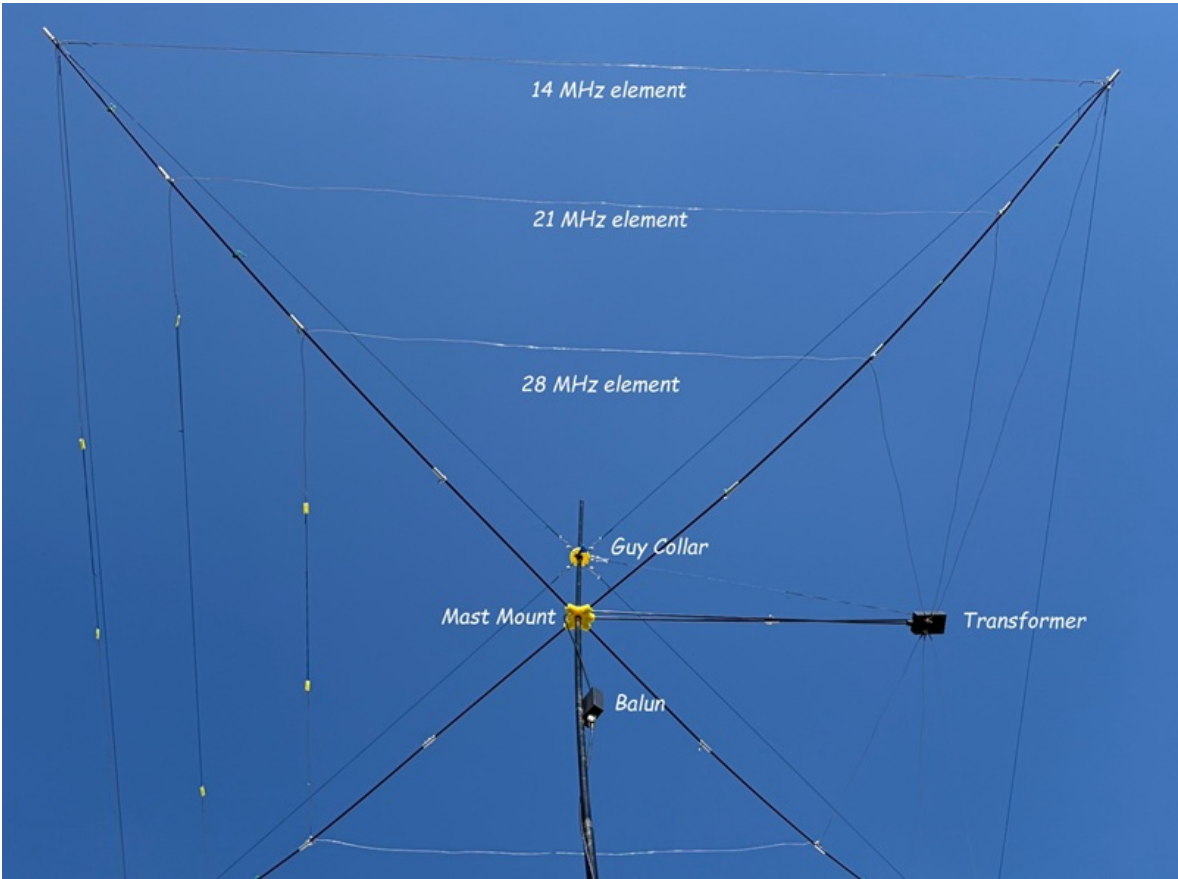


ULTRA LIGHT COBWEB ANTENNA

Multi-Band HF Antenna (20M / 15M / 10M — Optional 17M / 12M)

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Safety Information & Warnings

*NEVER install or adjust antennas near power lines—electricity can arc through the air without direct contact. Maintain a clearance distance of at least **2× the total height** of your mast and antenna from any power lines. Ensure the antenna is elevated out of reach, as touching active wire elements causes severe high-voltage RF burns. Always use fall protection gear when working at heights, and lower or secure the mast during high winds or severe weather.*

Technical Specification

Item	Specification	Notes
Antenna Type	Ultra Light Cobweb Antenna	Ultra Light, omnidirectional square dipole array. Ideal for light telescopic poles.
Frequency Coverage	14 / 21 / 28 MHz	Pre-tuned (14.2, 21.2, 28.2 MHz) and user adjustable.
Optional Frequency Coverage	18 / 24 MHz	Add-on wires available. User installs mounting points and performs tuning.
Power Rating (CW 3:1 duty cycle)	400 W	Field-tested for 30 min with continuous temp. monitoring of the transformer and balun.
Bandwidth (VSWR < 2:1)	14 MHz: 240 kHz 21 MHz: 365 kHz 28 MHz: 365 kHz	Measured via 10m RG58. Installing optional bands reduces 21/28 MHz bandwidth.
Minimum VSWR	≤ 1.3:1 at resonance	
Radiation Pattern	Broad oval, approx. Omnidirectional	Full 360° coverage; no rotator needed.
Max. Gain	20m: 7.1 dBi @ 31deg ; 15m 7 dBi 20deg; 10m 6.6 dBi @ 15deg. elevation angles	NEC2 model at 10 m height, average ground.
Feed Line Type	Single Coaxial 50 Ω	
RF Connector	SO-239 (UHF Female)	
Balun	1:1 Choke Balun (50 Ω), >30 dB CM attenuation	
Transformer	1:4 Impedance Transformer (12.5 Ω to 50 Ω)	
Dimensions	2.6 m x 2.6 m square footprint	
Turning Radius	1.9 m	
Weight	0.9 kg	Ideal for portable setups and telescoping poles.
Mast Compatibility	10 mm to 38 mm OD (dimensional tolerance ±0.3 mm)	3D-printed in weather-resistant PETG and custom-sized to match your specified mast diameter.
Element Wire	22 AWG multi-strand copper with FEP jacket	
Spreaders	Fiberglass rods (6mm) with aluminum sleeves	0.5 m section length.
Wind Load	Low wind profile	Minimalist Mast Mount and slim spreaders. Mast guying is not mandatory in calm weather with Spiderbeam 12m HD mast. Mast Mount has openings for guy ropes.
Transport Length	55 cm	
Materials Used	A2 steel fittings; PTFE coax in Transformer and Balun; fiberglass spreaders; PE cord; ABS enclosures; FEP insulated wire;	

Package Contents

Item	Qty.
Fiberglass Spreader	18
Mast Mount	2
Guy Collar	2
Tension Cord	9
Wire Element (14, 21, 28 MHz) Pre-tuned	3
Wire Element (18, 24 MHz) Not Pre-tuned	2
Transport Cover	1
1:1 Balun	1
Hose Clamp	2
1:4 Transformer	1
Spares (2x Spreader, Cord, Key Rings, Simplex Hooks, zip-ties)	1 Set

Assembly & Installation (approx. 15 min)

1. **Assemble Arms:** Join 18 spreaders into 4 main arms (4 each) and 1 support arm (2 each) for Transformer. Insert into Mast Mount sockets.
2. **Rig Cords:** Run 5 shorter cords from Guy Collar to all arm tips. Run 4 longer cords horizontally between main arm tips to form a square.
3. **Route Wires:** Thread elements through key rings starting from the tip inward (14 MHz at the tip, 21 MHz next, 28 MHz innermost). Attach terminals to 1:4 Transformer posts and adjust sliding knots (see Fig 2) so tension stays on guy cords, not wires.
4. **Mount on Mast:** Slide structure onto mast. Fasten Hose Clamp 47 cm above Mast Mount as a collar stop. (Or pre-mount hardware to mast before assembling).
5. **Connect Coax:** Attach 50 Ω coaxial line to the Balun.

Fine-Tuning Resonant Frequency

The 14, 21, and 28 MHz wire elements are pre-tuned. If nearby structures or ground clearance shift your resonance frequency, adjust as follows:

1. Determine Adjustment Direction:
 - a. Frequency too low: Wire is too long - shorten.
 - b. Frequency too high: Wire is too short- lengthen.
2. Adjust & Spiral Wrap:
 - a. Unwrap the wire ends at the corner insulators.
 - b. Feed or pull equal amounts through the two holes at both ends for symmetry.
 - c. Wrap excess wire back onto itself in a tight spiral (secure with zip-ties for permanent setups).
 - d. Adjust sliding knots so **tension stays on guy cords**, not wires (Fig 2).
 - e. **Do Not Cut Wire:** Spiral-wrapping electrically shortens the element while preserving wire for future adjustments.

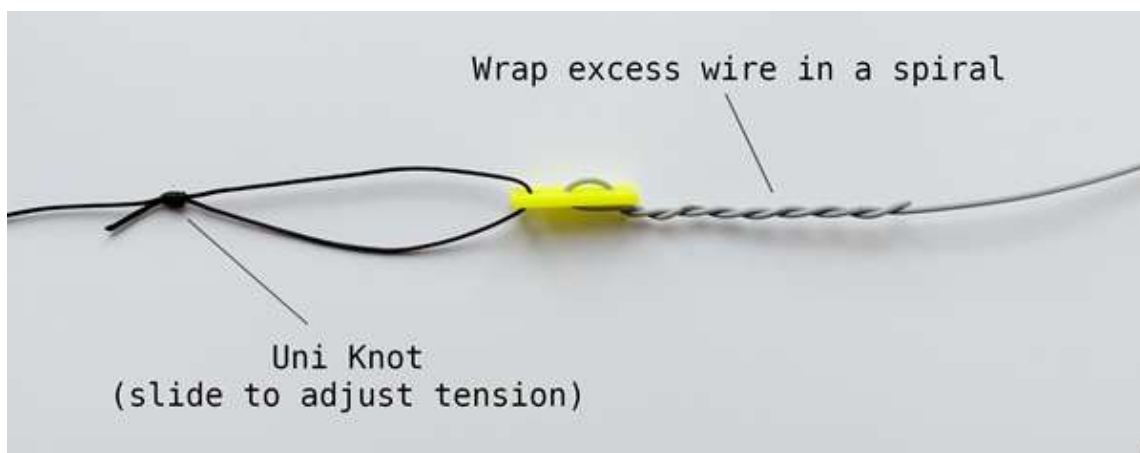


Figure 1

Note: Tuning at a low height is convenient, but raising the antenna to its operational height causes the resonance frequency to move up; for example, moving it from 1.5 m up to 7 m in one environment shifted the resonance upward by 15 kHz on 20 m, 70 kHz on 15 m, and 40 kHz on 10 m.

Troubleshooting Common Issues

High SWR across All Bands

- **Feed line Connection:** Check the coaxial feed line is securely connected to the 1:1 Balun.
- **Terminal Posts:** Ensure the wire element terminal lugs are securely fastened.
- **Enclosure Inspection:** Open the plastic enclosures of both the 1:1 Balun and 1:4 Transformer to inspect the internal wiring and solder joints. Before opening the transformer box, the compression nut must be loosened first.

Resonant Frequency Too Low/High

- **Surrounding Objects / Clearance:** The antenna may be too close to ground level or metal structures.
- **Rain / Wet Conditions:** Rain and moisture on the wire elements increase dielectric loading, which drops the resonant frequency—sometimes by as much as 150 kHz. This is normal physical behavior. Allow wires to dry before making permanent physical length adjustments.

Optional 18/24 MHz Elements

- **5-Band Configuration:** Mount extra elements between existing ones.
 - **Mounting Points:** For 5-band setups, use UV-resistant zip ties to secure the extra wires, placing them at the midpoint between existing elements to create equal 25 cm spacing between all elements (Fig. 3).
 - **Note:** Not recommended for permanent installations, as strong winds can cause wires to tangle on this lightweight structure.
- **3-Band Configuration:** Substitute the optional elements in place of the 21 MHz and 28 MHz elements. Another practical layout during periods of low solar activity is 14, 18 and 21 MHz.
- **Bandwidth Impact:** 5-band mode reduces 21/28 MHz VSWR bandwidth.
- **Tuning Order:** Tune elements in order from lowest to highest frequency.

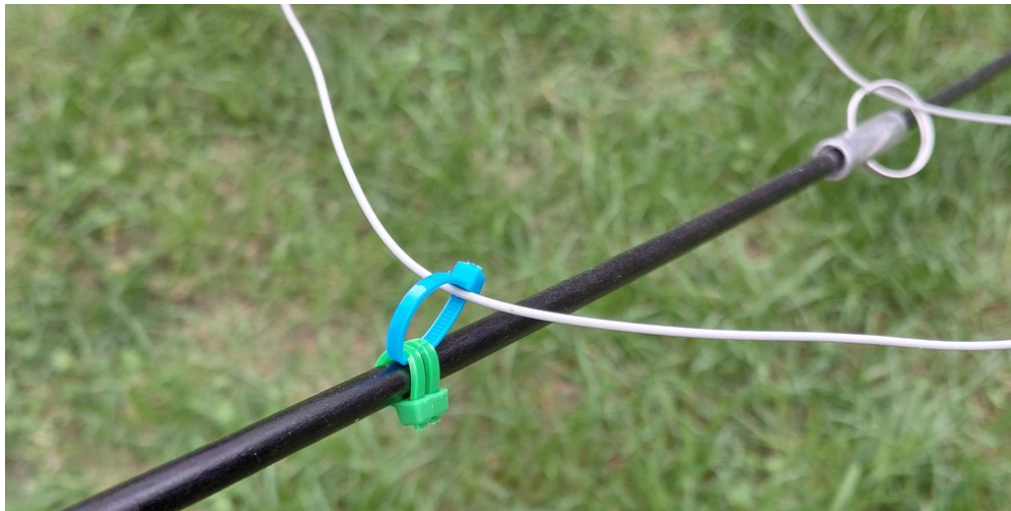


Figure 2