



The Lowdown

630-Meter Antenna for Amateur Radio

Installing and Using the Lowdown 630PD Antenna
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 **The Radio Source**

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INTRODUCTION

The Lowdown 630PD Antenna offers amateur radio operators a convenient yet effective antenna for 630 meters without the requirements of a large yard or tall support structures. The antenna is designed to be installed at ground level above a horizontal radial field consisting of radials 10 to 25 feet in length.

The Lowdown 630PD Antenna is amazingly rugged despite being very compact and lightweight, making it simple to set up, take down, transport and store. The center-loaded, base-fed design and capacitive top hat yield excellent efficiency given its compact size. Typical input powers of 100 to 200 watts over a ground radial system of 32 radials 25 feet in length will produce EIRPs of between 2 to 4 watts, depending on local ground conductivity. At the antenna's maximum rated input power of 250 watts, the EIRP can reach or exceed the 5-watt FCC limit.

INSTALLATION HINTS

The Lowdown 630PD is mounted to a ground support via insulated block clamps that hold the bottom section at two points about 18 to 24 inches apart.

This is most easily accomplished by setting a 4x4 or 6x6 treated wood post into the ground as you would if you were building residential deck leaving about 3 to 4 feet of the post exposed above the ground. 1-1/2-inch insulated block clamps are then secured into the post near the top and at least 24 inches beneath the top clamp to hold the base section of the antenna firmly in a vertical position. Alternately, using a tilt mount will assist when tuning the antenna.

An optional transmission line impedance transformer can be connected to the side of the post with the short output jumper wire connecting the feed point at the base of the antenna to the matching transformer. A copper or aluminum grounding strip circling the mounting post will provide an effective and cost-efficient way to attach the required ground radials.

INSTALLATION PRECAUTIONS

IMPORTANT: Because of its compact size, certain precautions are recommended for safety and operational reasons. There is the potential for high RF voltages on the bottom section of the antenna while transmitting. This could cause painful and potentially injuring effects and RF burns if hands or other body parts come in close enough proximity to draw an arc. We strongly recommend placing a small barrier of some type around the base of the antenna to keep people and wildlife from inadvertent contact with the antenna while you are operating.

The tips of the capacitive loading hat spokes are also a high voltage point on the antenna; so it is important when tuning the antenna's center frequency by adjusting the length of the spokes, to re-install the finial slugs on the ends of each spoke to eliminate corona discharge, as they will also slightly affect the antenna's tuning.



TUNING AND OPERATING WITH THE LOWDOWN 630PD

An antenna or network analyzer is highly recommended for tuning the antenna to resonance. After assembling the antenna, lay the radial field mount of the antenna in its upright position. Determine the point of minimum SWR, which will likely be below the bottom edge of the band. Typical impedance at resonance will be between 20 and 30 ohms resistive and could be even lower depending on the quality of local ground conductivity and the length and density of your radial field.

Tune the antenna to resonance by adjusting the length of the capacitive top hat spoke lengths to resonate the antenna at your desired main operating frequency. As with all electrically short antennas, the resonant bandwidth of the antenna is quite limited due to its relatively high efficiency (High Q factor).

Once the initial resonant point is established, tuning is accomplished by shortening the top hat spokes to raise the resonant frequency. Experience has shown that removing $\frac{1}{2}$ inch from each spoke will shift the resonant frequency upward by about 1 kHz. Due to differences in installation, this number may vary slightly. But using these adjustment intervals is a good rule-of-thumb. As you zero in on your target frequency, fine tune by shortening individual spokes one at a time to avoid overshooting. Once the antenna is tuned to the desired center frequency, check and tighten all hardware and mount the antenna into the block clamps.

As an example, when tuned in our test stand using a 25-foot / 32-radial groundplane, the final top hat spoke length was approximately 50 inches. Once again, this length will vary due to installation differences.

While the antenna may be fed directly with 50-ohm coaxial cable, the lower feed point impedance will present a slight mismatch and SWR of to around 2:1 (10-percent reflected power) at resonance. A transmission-line transformer mounted at the antenna with the proper impedance ratio is recommended to provide a nearly perfect 1:1 impedance match at the resonant frequency. Most transformers sold for amateur bands utilize a ferrite material whose efficiency below 1 MHz is not optimum and prone to overheating. We offer an optional multi-ratio transformer built with core materials optimized for this lower frequency.

TRANSMITTER / TRANSCEIVER / RECEIVER NOTES AND PRECAUTIONS

Most current commercial amateur transceivers do not include transmitting capabilities on the 630-meter band; although many have general coverage receivers that will receive the band. **The MARS / CAP mods may open up the transmitter capability into the 630-meter band for many transceivers but these modified transceivers must be used with great caution.**

The power amplifiers in most amateur transceivers are not designed for operation outside of the amateur bands and have no low-pass filtering to suppress harmonics generated in the power amplifier.



As a result, the transmitter output will not be clean enough to drive the antenna directly or to drive a power amplifier without adding the proper filtering.

Most transceivers will not produce anywhere close to the 100 watts they typically do on the HF bands, as you go lower in frequency; but the majority will have enough output to successfully drive an outboard “brick” amplifier like the K5DNL design that can produce 200 watts of clean output power. Amps like the K5DNL design also provide RX and TX switching and other conveniences. A few transceivers also have spectrally pure low power LF outputs that can drive external amplifiers on the 630-meter band.

A word about receive sensitivity is also in order. General coverage reception below the 160-meter band is typically not the most sensitive in many transceivers with general coverage receive capability. This is somewhat deliberate by the transceiver manufacturers to avoid problems from strong local AM broadcast signals. A few amateur transceivers with general coverage reception have added filtering on the AM broadcast band, only maintaining sensitivity into the 630-meter band and below. If 630-meter receive sensitivity is low, a separate active (amplified) receive antenna or an external preamp might be required for best reception performance when utilizing some commercial transceivers to receive on the 630-meter band.

While we do not recommend specific transceivers or modifications, the general suggestions and information provided here will guide you in equipment selection and preparation.

ANTENNA ASSEMBLY

The images in this section of the manual depict the antenna being assembled with a 3- radial FlexPlane PRO preassembled 10-foot groundplane, portable antenna stand and 1.5-inch M7 block-clamp insulators -- all available as accessories.

Step 1 – Base Pipe Installation

Refer to the Parts Identification Drawing in the Appendix during antenna assembly. Remove the antenna elements from their tubes by using a flat-blade screwdriver and needle-nose pliers to extract the staples in one of the end caps in each tube. Shake the tube length-wise to pop the cap out of the tube. Using the supplied hardware and a 7/16-nut driver or wrench, install the feedline stud at the bottom of the base pipe in the hole located 1-1/2 inch from the bottom of the pipe. Next install the base pipe in the M7 insulator block clamps and terminate your feedline to the feedline stud.



Step 2 – Coil Installation

Insert one end of the coil into the top of the base pipe and secure it using three ¼-20 x 5/8-inch hex screws and star washers found in the hardware kit. Once again use a 7/16-inch nut driver or wrench. Both ends of the coil are identical and may be reversed. It might be necessary to rotate the coil in the base pipe to achieve proper hole alignment between the holes in the base pipe and those in the coil.



Step 3 – Midtip Installation

Install the midtip on top of the coil with 3 additional ¼-20 x 5/8-inch hex head screws and star washers.



Step 4 – Tip Installation

Slide the end of the tip with 4 inches of anodization removed into the top of the midtip until you feel the tip make contact with the shoulder stop inside the midtip. Locate the three ¼-20 set-screws in the hardware kit and install them with an 1/8-inch hex tool in the top of the midtip to secure the tip in place.



Step 5 – Top Hat Finial Installation

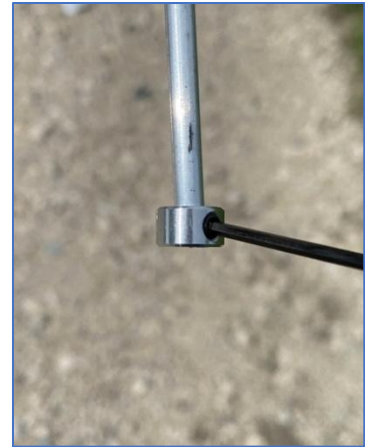
Locate and install the top hat finial on the top of the tip element. Use a 1/8-inch hex tool to secure the finial in place.



Step 6 – Top Hat Spoke Installation

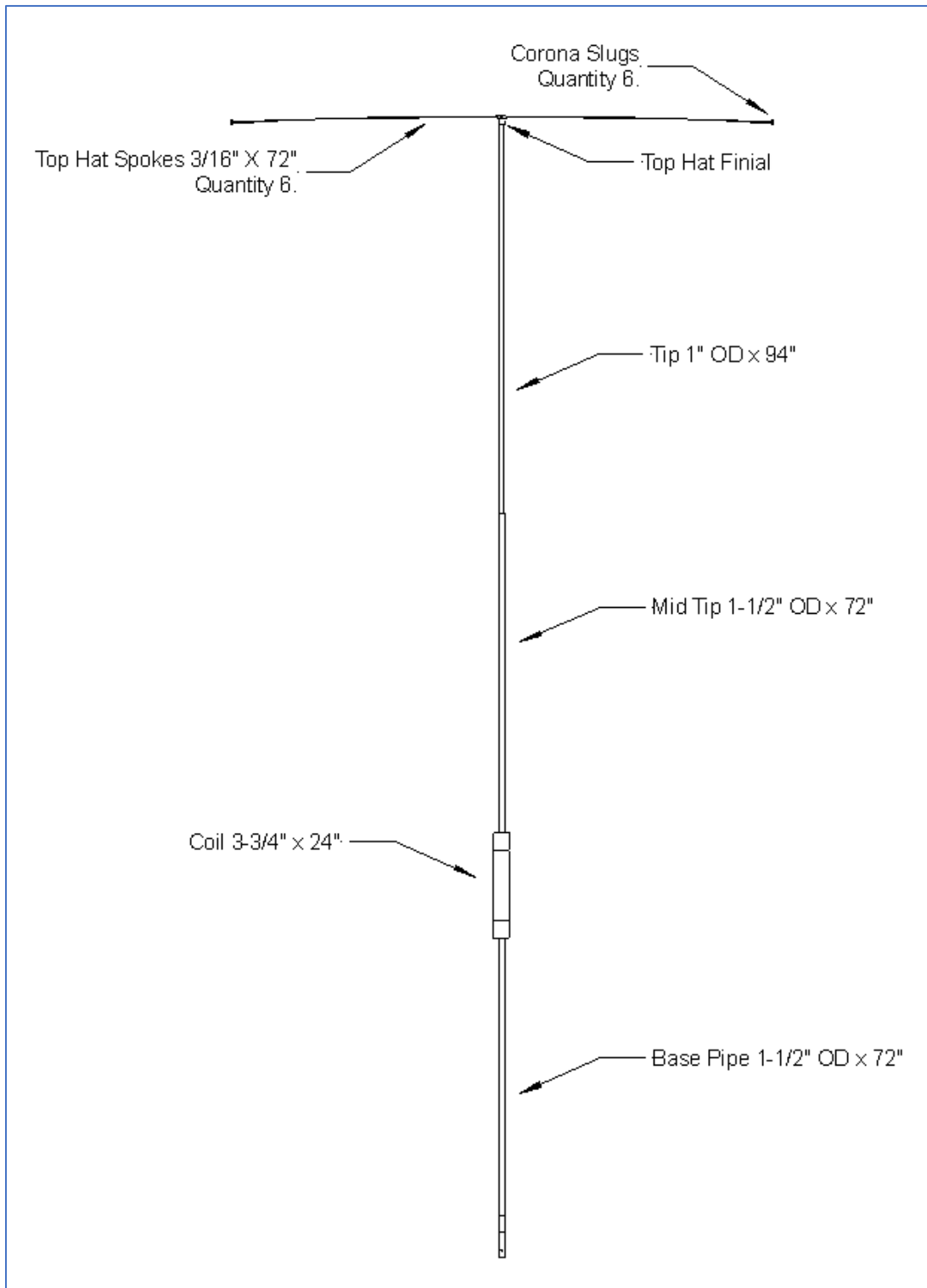
Insert the six top hat spokes into the finial and secure them in place with the 1/4-20 set-screws. Next install the corona slugs flush with the end of each spoke using a 5/64-inch hex tool. Remember that because the slugs influence the resonance of the antenna, they must be removed when trimming the spokes and then reinstalled before taking your next resonance measurement.

Assembly is complete.



APPENDIX

630PD Parts Identification Drawing



Parts List

Antenna Elements

Quantity	Description
1	Base Pipe 1-1/2" OD x 72"
1	630PD Coil
1	Midtip 1-1/2" OD x 72"
1	Tip 1" OD x 94"
1	Top Hat Finial
6	Top Hat Spokes 3/16" x 72"

Antenna Hardware Kit

Quantity	Description
1	Feedline Stud Kit – (1) Pan Head Screw, ¼-20 x 1", (1) Flat Washer ¼", (2) Lock Washer ¼", (2) Nut ¼-20, (1) Star Washer ¼" External Tooth
6	Hex Head Bolt, ¼-20 x 5/8"
6	Star Washer, ¼" External Tooth
3	Set-Screw, ¼-20 x 1/8"
6	Corona Slug
1	Installation Instructions

Available Accessories

Description
THEMATCHBOX Impedance Matching Transformer – MB.22
FlexPlane Preassembled 32-Radial Groundplanes – PRO10 or PRO25
Lowpass Filter for 630 Meters – LP.630.PD
Insulator Mounts with Standoffs (2) – M7B21
Portable Antenna Stand – PSTND26



Specifications

Description
Type: LF base, vertical, whip, omnidirectional.
Feedpoint Impedance: 20-33 ohms with 25'-10' radius groundplanes, respectively.
Matching: Transmission line transformer may be used to match impedance for best efficiency.
Efficiency: up to 2.5 %.
Power rating (approx.): 200-watt carrier.
Frequency coverage: tunable 472 – 479 kHz (630-meter band).
Operating height AGL: 24' nominal.
Assembled length: 21.54'.
Element diameters: base: 1.5"; coil: 3.75"; midtip/tip: 1.5"/1.0".
Capacitive hat: 120" diameter (maximum).
Breakdown: 4 pieces plus 6-element capacitive top hat, longest element 94".
Tuning adjustments: capacitive top hat diameter (spoke length).
Weight: 18.9 lbs.
Material: aluminum (anodized), fiberglass reinforced PVC.
Hardware: stainless steel.
Feed line connector: ¼" screw stud.
Mounting type recommended: 1.5" Insulated, block mounts.
Mounting format: top of mast or pole.
Mounting structure: 4" 4x4 wood post (typical).
Wind surface area: 3.15 square feet.
Wind survivability rating: 140 mph guyed; 100 mph unguyed (48" mount separation).
Bandwidth: 3 kHz (3:1 SWR); 2 kHz (2:1 SWR).

