Screwdriver Antenna Installation

1st Antenna: 20m inverted V

PVC mast stuck in PVC vent pipe

Ends tied off to rain gutter

2nd Antenna: 40m End Fed

PVC mast shared with 20m Inverted V

65' wire + 30' rope

Rope end tied off to small tree at high end of lot



3rd Antenna: 10m Vertical

Homebrew loaner antenna from a local ham Stuck into patio chiminea, tied off to porch roof Vertical Polarization needed for local 10m net



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The original DK-3 Screwdriver Antenna design was created by Don Johnson W6AAQ, author of a series of three books on "HF mobile ring", and was first patented in 1991.



Ref: https://www.amateur-radio-wiki.net/screwdriver-antenna/#:~:text=A%20screwdriver%20antenna%20is%20a,that%20of%20an%20electric%20screwdriver.





Which make & model of Screwdriver antenna ?

Reviews on eham.net are useful, but they tend to be overly positive.









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k0bg.com has excellent info re. Screwdriver antennas, et al..





This site is dedicated to mobile amateur radio operators, old and new alike. Whether you're into HF, or VHF operation, I trust the information presented will increase your enjoyment of our great hobby.

With safety as a byword, there are articles on amplifiers, antennas, bonding, impedance matching, installing hardware, mobile equipment, noise and RFI abatement, wiring, and much more. I do my best to keep these articles up to date, and easy to follow. Any changes are reflected in the date at the beginning of each article.

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After much study, we ordered:

Little Tarheel HP ANTENNA SPECIFICATIONS Lower Mast Size -- 1 1/2" Lower Mast Length -- 16" Whip Length -- 32" Total Length of Antenna in 54 MHz position -- 48" Total Length of Antenna in 7.0 MHz position -- 54" Frequency Coverage Continuous -- 7.0 to 54 MHz Power Rating -- 500 watts P.E.P. SSB 125 watts P.E.P. All other Modes Typical SWR -- 1.5 or less Weight -- 1.9 lbs.



The LTMT 1 mount is made for the Little Tarheel antenna. It's made of 304 stainless steel so it's corrosion resistant and very strong. It comes already assembled with the coax stud. Even the supplied U bolts and nuts are stainless steel. This bracket will bracket up to a 1" industry standard pipe.

TuneMatic Lite is a self-contained, motorized antenna controller that stores and recalls up to 20 presets, based on user input. Antenna position is moved manually or automatically from memory, with extremely repeatable accuracy.



Mast made of 1" PVC electrical conduit, 4 feet long

3 unions, Outer Diameter reduced & beveled with belt sander, Inner Diameter increased with Dremel sander

Lower 3 feet of mast is a smooth fit into kitchen vent pipe

1 union full OD prevents mast from falling into vent pipe



Little Tarheel2 HP

_Anti-rotation spline

LTMT-1 bracket

PVC conduit mast

Shunt matching coil

-SS bolt to attach radials

Ferrite choke on motor cable

RG-8X feedline

= 2 of 4 radials

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#14 THHN stranded wire

Each group of 3 wires is crimped to a 1/4" ring terminal

Crimp was not strong enough to resist tug on radial

Messenger rope was added to prevent tug on ring terminals

Still need messenger ropes for the other 3 radials



Radials

Theory: 6m / 4 = 4.93 ft 10m / 4 = 8.8 ft 12m / 4 = 9.91 ft 15m / 4 = 11.71 ft 17m / 4 = 13.63 ft 20m / 4 = 17.52 ft 30m / 4 = 24.3 ft 40m / 4 = 34.81 fttotal = 125.3 ft X 4 = 501.2 ft

Practice: 20m / 4 = 17.52 ft 30m / 4 = 24.3 ft 40m / 4 = 34.81 ft total = 76.33 ft X 4 = 306.52 ftWorks OK 40m-6m

Did it work?

+ Tunematic Lite moved it up/down & detected stall at top/bottom. Current Limit set to 250 mA.

+ Strong peak in noise level observed on all bands.

- SWR indicated on transceiver was very high. Antenna analyzer was not available during install.

 + After some consultation, using LDG AT-100Pro-II tuner, low SWR was obtained on all bands.
FT8 contacts were completed.
Waterfall showed ~equal: screwdriver vs. 40m end fed.

10 day period 2020-09-23 through 2020-10-01

164 QSO (FT8 + FT4) in 96 grid squares

6m: 3 QSO 10m: 1 QSO 12m: 1 QSO 15m: 1 QSO NEW ZEALAND 17m: 49 QSO including ARGENTINA, BELIZE, BRAZIL, CHILE, CUBA, GUADELOUPE, JAPAN, PUERTO RICO, US VIRGIN ISLANDS 20m: 36 QSO including ARGENTINA, ASIATIC RUSSIA, HAWAII, JAPAN 30m: 18 QSO 40m: 55 QSO including GUAM, JAPAN, MEXICO

More work to be done:

Messenger ropes are needed on all 4 radials, before bad weather arrives.

Shunt matching coil needs to be adjusted, using an antenna analyzer. Perhaps a 50 Ohm match can be obtained.

Ferrite bead & strain relief to be installed on feedline.

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http://www.k0bg.com/common.html

strongly recommends the use of ferrite split-bead chokes, on both the feedline and the motor control cable.

"A multi turn choke will have much better common mode suppression....", i.e. reactance increases by the square of the number of turns.

Chart created by G3TXQ shows that ferrite chokes are more broadband vs. air core chokes.

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Number of unit circles	Enclosing circle diameter	Density	Optimality	Diagram
1	1	1.0000	Trivially optimal.	
2	2	0.5000	Trivially optimal.	
3	$1 + \frac{2}{\sqrt{3}} \approx 2.154$	0.6466	Trivially optimal.	
4	$1+\sqrt{2}$ ≈ 2.414	0.6864	Trivially optimal.	
5	$1 + \sqrt{2\left(1 + \frac{1}{\sqrt{5}}\right)} \approx 2.701$	0.6854	Trivially optimal. Also proved optimal by Graham (1968) ^[2]	
6	3	0.6666	Trivially optimal. Also proved optimal by Graham (1968) ^[2]	
7	3	0.7777	Trivially optimal.	



If it was "Trivially optimal", why was it not proved until 1968 ?

6 turns and 7 turns are the same size.

https://en.wikipedia.org/wiki/Circle_packing_in_a_circle_SLVARC "Screwdriver Antenna" (c) 2020-10-09 AC6SL 16 of 18

Interesting math question: How many turns of coax can pass through a ferrite split-bead?

http://www.k0bg.com/common.html

"...if you're really careful, you can wind 7 turns of RG8X through a 3/4 inch ID bead."

Mix 31 Ferrite Snap-On Beads are available from:

dxengineering.com with ID 0.75" and 1.00"

kf7p.com with ID 0.722" and 1.0"

Large Ferrite Beads are expensive

1 RG-58 0.195"	1 RG-8X 0.242"	1 RG-8 0.405"
2 RG-58 0.390"	2 RG-8X 0.484"	2 RG-8 0.810"
3 RG-58 0.420"	3 RG-8X 0.521"	3 RG-8 0.872"
4 RG-58 0.471"	4 RG-8X 0.584"	4 RG-8 0.978"
5 RG-58 0.527"	5 RG-8X 0.654"	5 RG-8 1.094"
6 RG-58 0.585"	6 RG-8X 0.726"	6 RG-8 1.215"
7 RG-58 0.585"	7 RG-8X 0.726"	7 RG-8 1.215"
8 RG-58 0.644"	8 RG-8X 0.800"	8 RG-8 1.338"
9 RG-58 0.705"	9 RG-8X 0.874"	9 RG-8 1.463"
10 RG-58 0.744"	10 RG-8X 0.923"	10 RG-8 1.544"



Screwdriver Antenna Questions?

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