Six Meter Rover/Mobile Antennas - Legal Environment - Practical Environment - New Antenna Ideas

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Typical Rover - W0ZF

For VHF roving or mobile operation, the antenna used for six meters presents perhaps the greatest challenge. The electrical and physical characteristics of 50 MHz antennas, where a wavelength is about 239 inches, are greatly affected by the legal and practical environments in which vehicles operate.

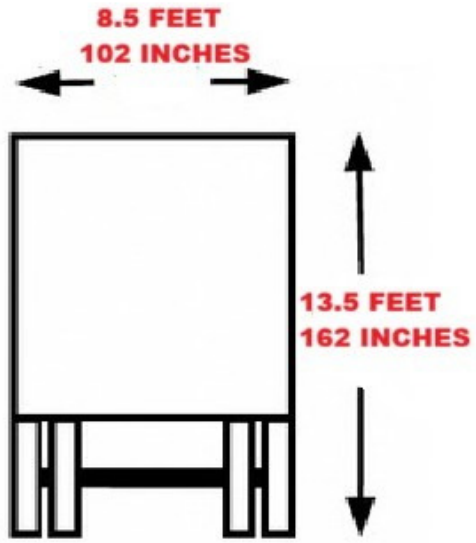
Legal Considerations:

Maximum Height for Vehicles - No Federal Limit. Height Set by States. In most states (Eastern U.S.) maximum height is 13.5 feet (162”)

Maximum width for Vehicles - 102” set by Federal Government

Maximum Single Vehicle Length: 40 feet including load

Projecting Load regulated by states - PA: 3 feet front, 6 feet rear



Maximum width and height (in most states) of vehicle.

Excessive Rear Overhang

Excessive Length

Electrical Considerations:

Wavelength at 50 MHz - 239 inches

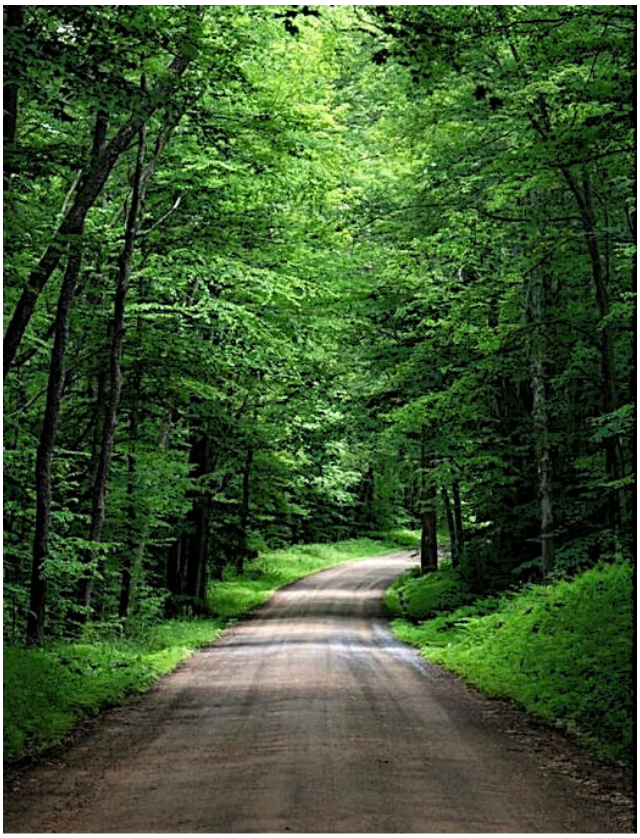
½ WL = 119 ½ “

Element lengths of 50 MHz Yagis **>** legal width of vehicle

Minimum height for operation about 12 feet above ground

Practical Considerations

Although the maximum legal height for a vehicle (including antennas) is 13’6”, not all roads are interstate highways. Roads on which rovers travel and use to get to elevated rover sites may not allow the full height to be utilized.



Road To Fire Tower Site In PA

Low Hanging Trees

Low Hanging Bridge

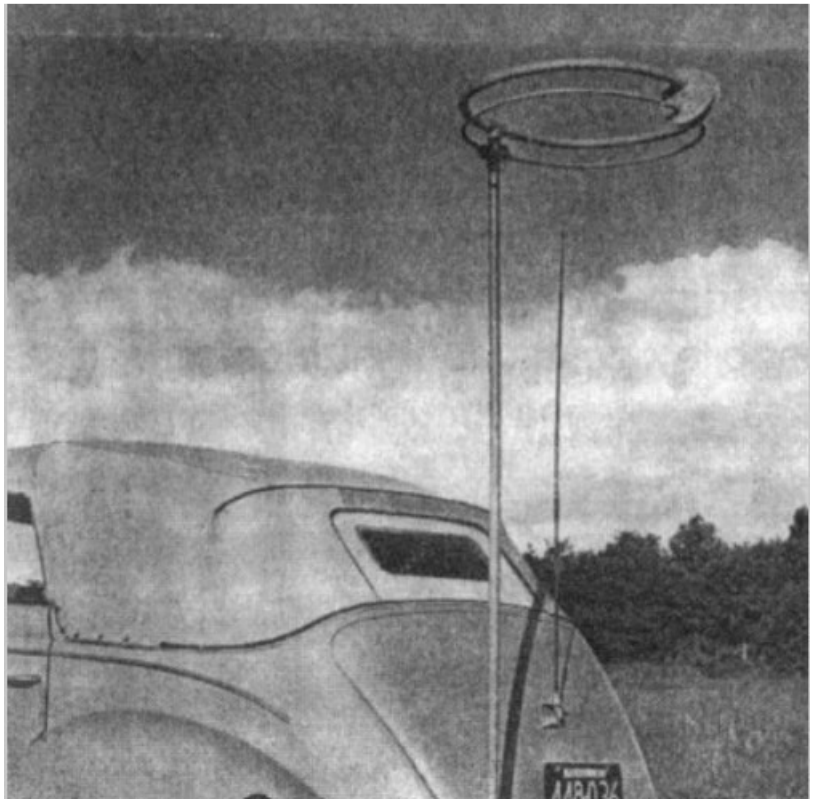
Bridge You Do Not Want To Hit

Antennas

If the rover is an entirely mobile, run and gun operation, all 50MHz antennas are a compromise. If the rover involves stationary hilltop operation the mobile limitations may not apply. Either way, weight and durability should be the biggest considerations. Highway speeds can reach hurricane force winds. For hilltop operation, ease and speed of setup and take down are paramount.

Omni directional Six Meter Antennas

The easiest and simplest rover antenna to use on 50MHz as a rover is a horizontally polarized omni. Most if not all horizontal omni antennas are some form of bent or looped dipole. The circular loop, aka Halo, was the earliest and most common. Circular loops included the Hi-Par Saturn Six and Cushcraft Loop.



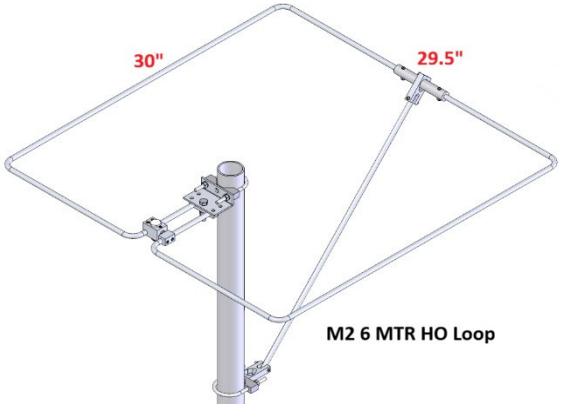
Original Six Meter halo W1MUX

Original Halo Ad - Notice Price

Cushcraft Six Meter Wheel Found by K3TUF At Hamcation 2026

The most common 50MHz horizontal omni antennas today are the triangular loop, e.g., Par Omni OA50, or a square loop, aka Squalo. Examples of square loops include the M^2 HO-Loop, and Cushcraft-MFJ Squalo. Neither is particularly stout.

Par Omni OA50

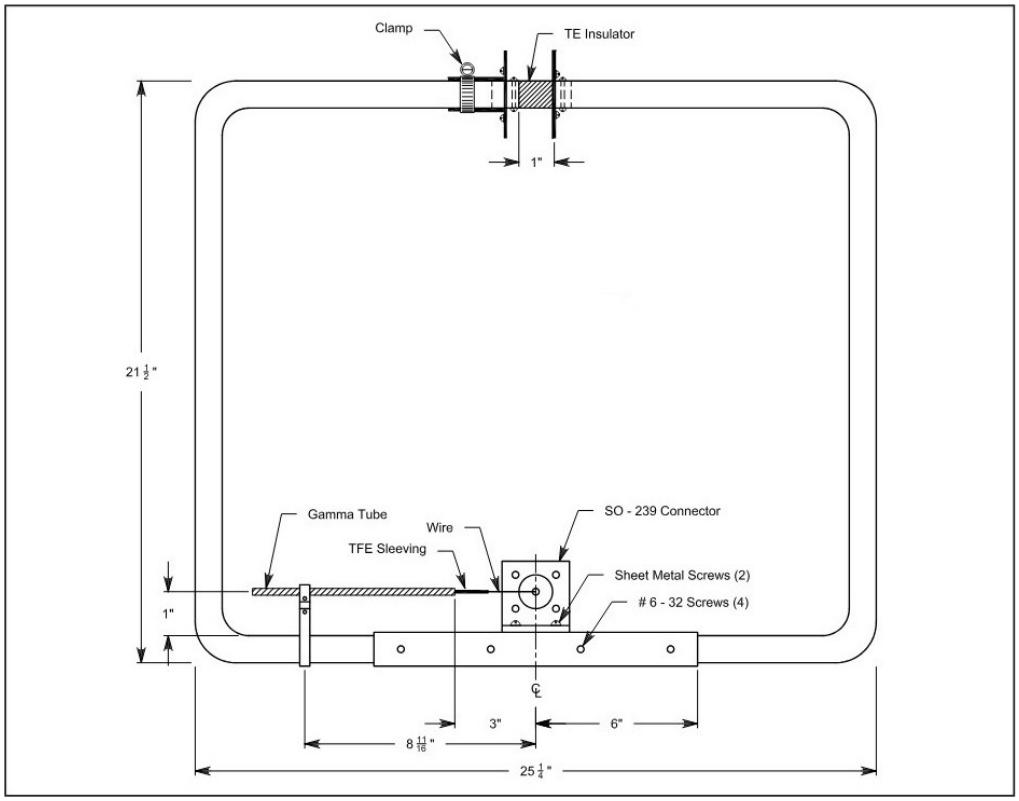


M^2 HO Loop

For those in the mid-Atlantic and Northeast interested in building their own loop, there is an almost endless supply of raw materials, often for free, in post-snow storm parking space reservation chairs. The aluminum lawn chair squalo described in January 2002 *QST* by Dick Stroud W9SR (SK) - Six Meters From Your Easy Chair - is a rugged and inexpensive alternative to commercial antennas

The advantages of an omni directional antenna are that it does not need to be stowed while moving, it requires no setup, and receives and transmits in all directions. The downside of an omni antenna is that it receives and transmits equally poorly in all directions. Gain of an omni-directional antenna is less than a dipole in its favored (broadside) directions. W9SR calculated the gain of his square loop to be about 1.12 dBi (-1 dBd). Unlike higher bands, stacking 50 MHz omni antennas for more gain is impractical for a mobile rover. The usual 5/8 W/L stacking distance is 149".

Raw Material For Six Meter Squalos



W9SR Aluminum Folding Chair Six Meter Loop - January 2002 *QST*

Yagis

Yagis are commonly used by set up rovers. Use of dB yagis on the move is difficult because of element length and inability to be turned. The required length for full size 50MHz yagi elements exceeds 102”; thus, even if the boom is shorter than 102” the yagi must be positioned 90 degrees off the front and back, to be street legal. This often means the 50 MHz antenna is perpendicular to the higher frequency antennas. This necessitates turning the antenna at every stop to align it with other antennas, and inability to rotate while moving. The 102” width maximum width also limits the number of elements, and antenna gain. The most common yagis have gain figures in the 7 to 9 dBi range, as shown on the gain chart below.

Six Meter Rover Antennas with Maximum Boom Length of 102”

Antenna	Boom length (meters)	Gain dBi (-2.1 for dBd)	F/R [1,2]
Loop	NA	1.1	N/A
Moxon [3]	.80	6.1	Not listed
YU7EF EF0603S	1.45	6.93	7.6
Dir Sys & Eng 3 ele	1.71	8.0	Not listed
Cushcraft A50-3S	1.73	7.44	8.8
DK7ZB 3 ele 28 ohm	1.85	7.89	10.5
DK7ZB 3 12.5 ohm	1.85	8.49	13.7
Super Moxon GW3YDX [3]	1.85	8.82	16.6
G0KSC 3 LFA	1.91	8.47	13.6
M² 6M3	2.03	8.56	13.1
K9MU 3 ele	2.18	8.5	Not Listed
NBS 3 ele	2.18	9.2	<10
YU7EF EF0604S	2.33	8.77	14.3
K9MU 4 ele	2.41	9.1	Not Listed
K1BUK Moxy 3 ele[3]	1.82	7.15	31
DK7ZB 3 28 ohm	2.51	8.78	15.4

Notes:

1. Source: https://dg7ybn.de/GT_Tables/GT_download.htm.

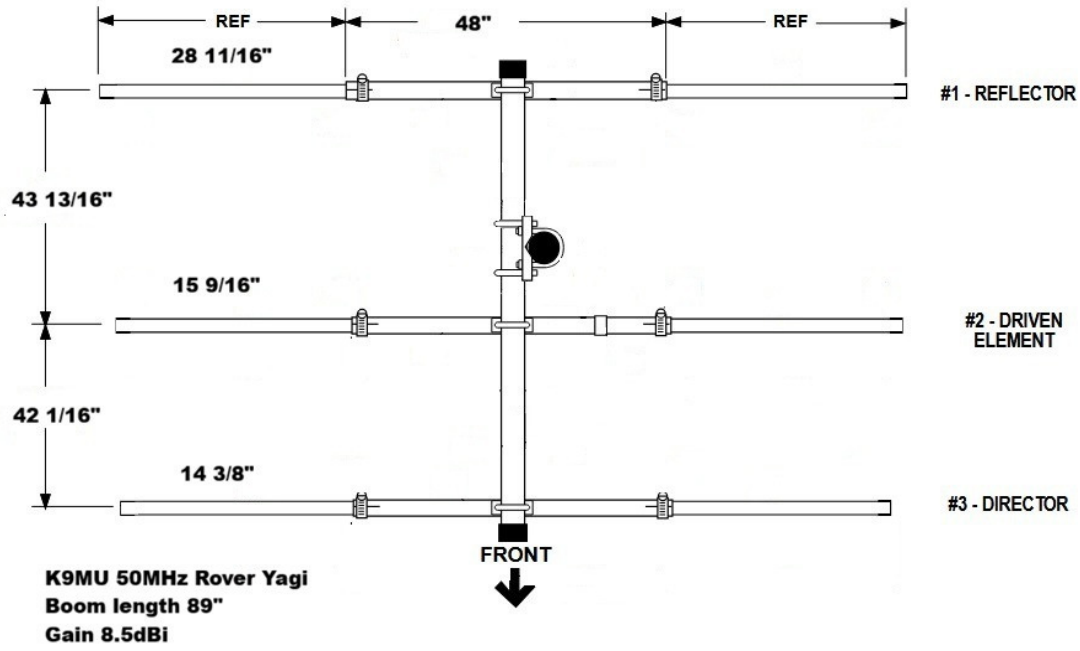
2. F/R in dB over the rear 180 degrees of antenna using either E or H plane.

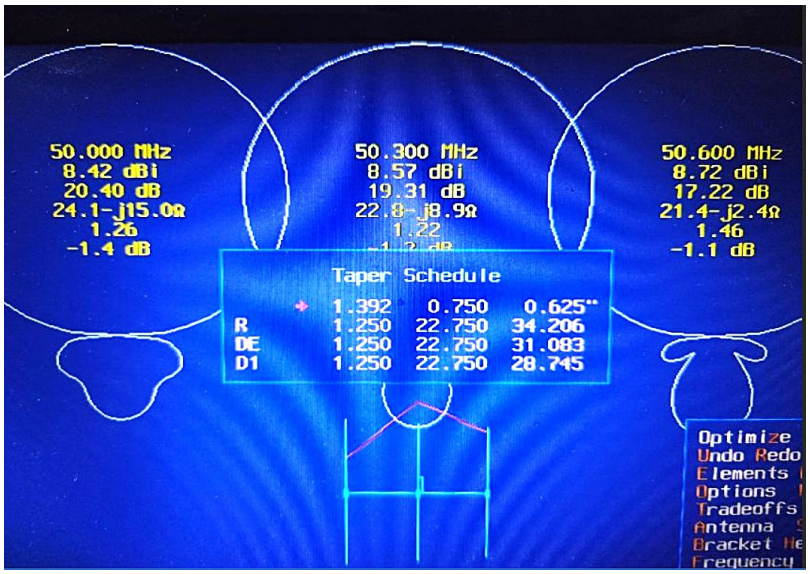
3. Turning Radius of antenna is under 102.”

One outlier yagi is the NBS three element design, which is listed in the NBS Technical Note 688 as 9.2 dBi. The antenna was designed for maximum gain, and the front to back ratio is under 10 dB. That may actually be an asset for a rover station.

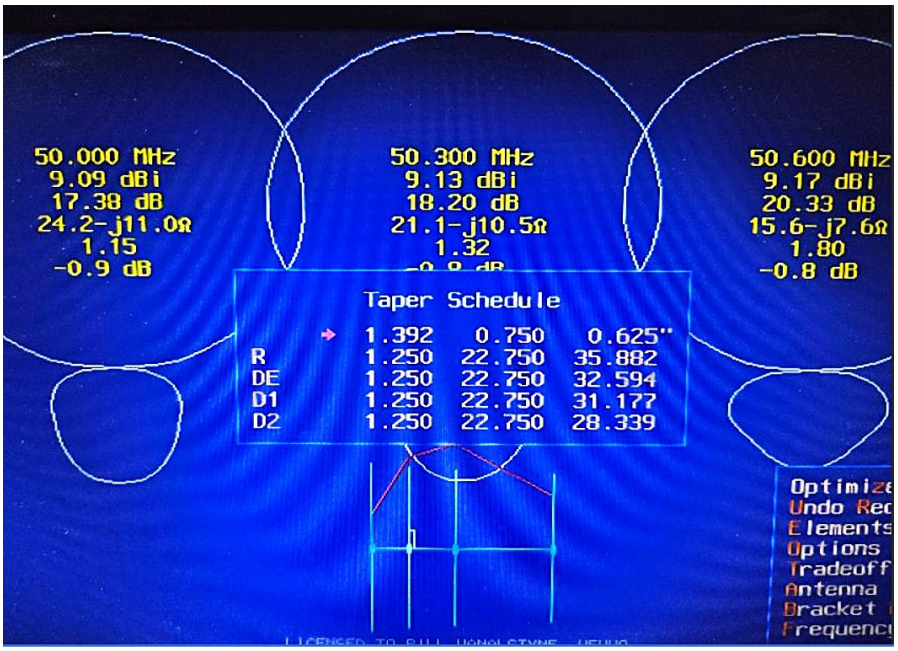
Justin Glasener K9MU, recently ran some YO optimizations of three and four element yagis with boom lengths under 102”. A schematic of the three element and he screenshots of his work are shown below. These designs are at the upper end of the gain range, and have good patterns. The element taper schedule is the same as

Cushcraft A50 elements, so old your old Cushcraft yagis can be recycled. The three element yagi has about 8.5 dBi gain. The four element antenna has about 9.1dbi and 18db F/B with/ good SWR.





K9MU three Element 50 MHz Rover Yagi

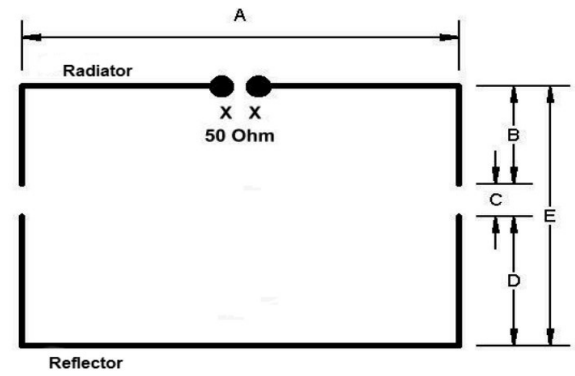


K9MU Four Element Rover Yagi Design

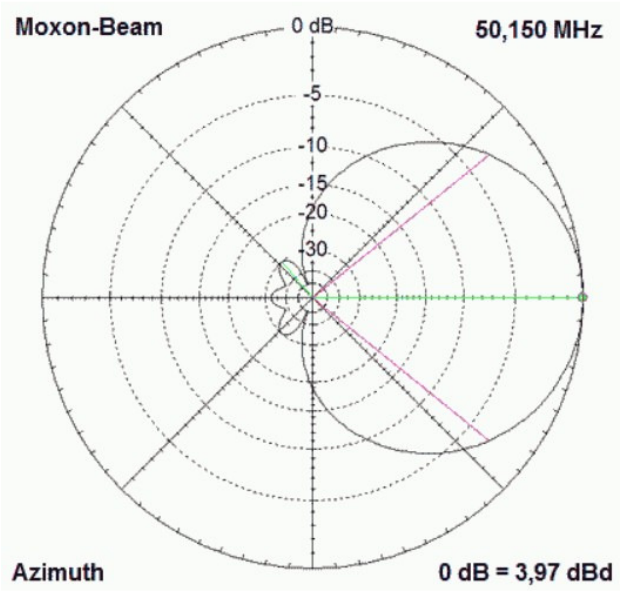
Moxon

For rovers that want a gain antenna with a small foot print and light weight, the Moxon seems to be the most popular. Leslie Moxon G6XN, invented the antenna in the 1950s. A Moxon consists of two elements - a reflector and driven element. It is easy to match to 50 ohm coax and is lightweight. Gain is about 6 dBi, and the front to back ratio

is greater than 25 dB. Its broad front lobe behaves like a high-gain half-omni. Boom length for a six meter Moxon is about 32". Its turning radius is under 102", so it can be rotated while motion. As can be seen below, it is still a large antenna. The only downside to the Moxon is that there is a lot more boom, and presumably gain, available before 102" is reached.



Moxon Configuration



Moxon Pattern Azimuth

There are many designs available with a little internet surfing. Dan Maguire AC6LA has a Moxon design program, MoxGen, available on the net at: https://www.qsl.net/ac6la/. Another Moxon design program can be found at: https://0x9900.com/moxon-antenna-calculator/. Construction of a six meter Moxon was described in April 2004 *QST* by Allen Baker KG4JJH. Commercially available Moxons include the Par Omni SM-50, EAntenna 6MOX (DXEngineering, Wimo) and RF-DXing (India) RFD-MX6. MFJ sold the MFJ-1896.

KE4WMF/R WITH 50 MHz MOXON AT TOP

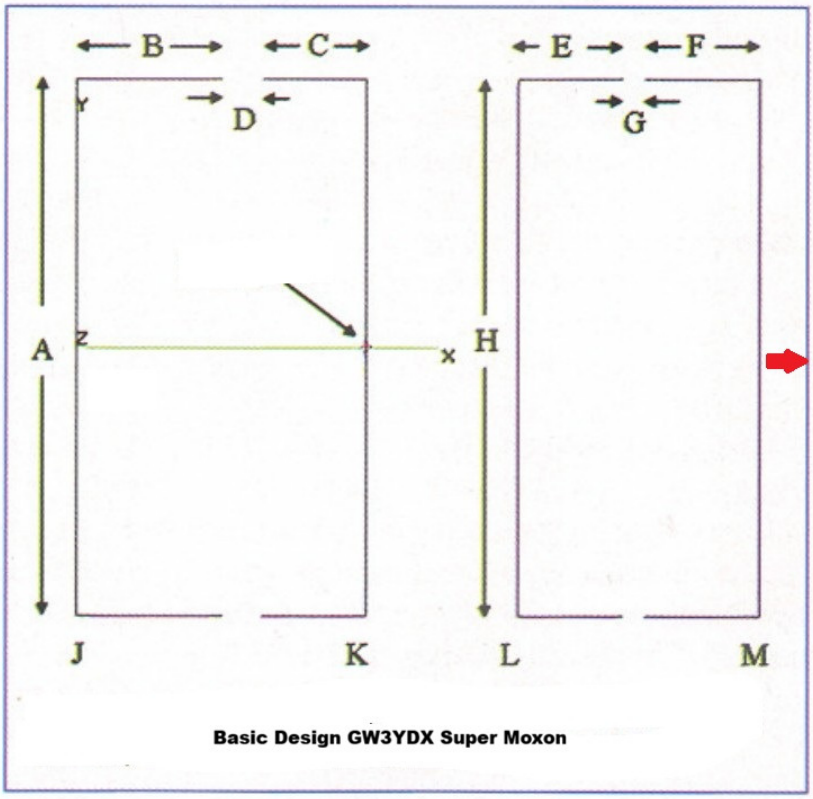
Super Moxon and Moxy - the answers?

While looking for antennas to replace my 50MHz HO-loop in a directional antenna run and gun rover, I looked at the VE7BQH chart. One antenna stood out -"Moxon GW3YDX." It had relatively high gain. Its boom length was well under 102", and probably had a turning radius under 102". A little looking turned up the article describing the antenna.

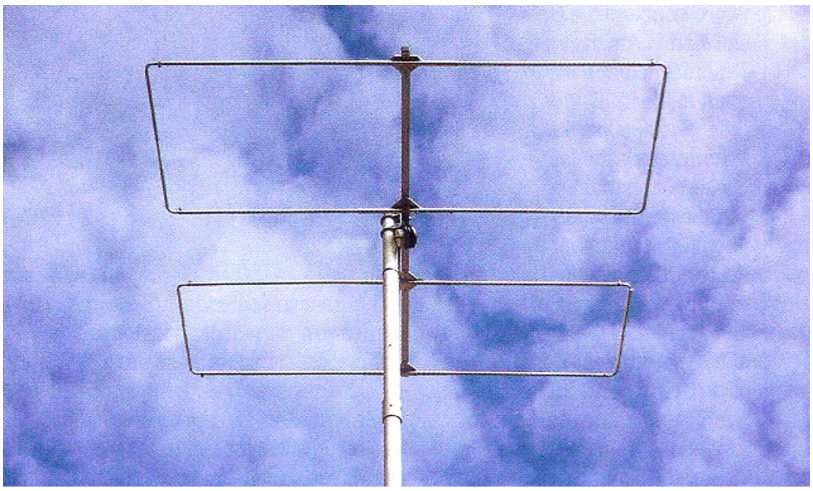
The Super Moxon was developed by Ron Stone, GW3YDX (SK). He described the "The GW3YDX Super Moxon" in July 1010 *RADCOM*. The article can be found at: http://www.zs6wr.co.za/antennas/super%20moxon.pdf.

Ron designed antennas for 6, 4, and 2 meters. The antennas consist of four Moxon (bent) elements on a single boom.

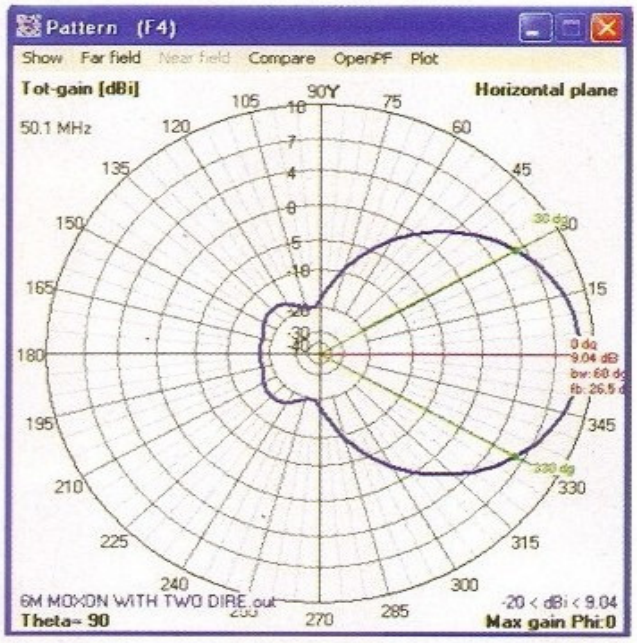
The 50 MHz unit has a boom length of 72", which makes it ideal for rover operation. Its gain is higher than any comparable length yagi. For some time, the antenna was commercially available through Vine Antennas Ltd. Unfortunately, after Ron passed away, the successor company LAM Communications, https://vineantennas.co.uk/, did not pick up the Super Moxon design so it is no longer commercially available.



Basic Design GW3YDX Super Moxon

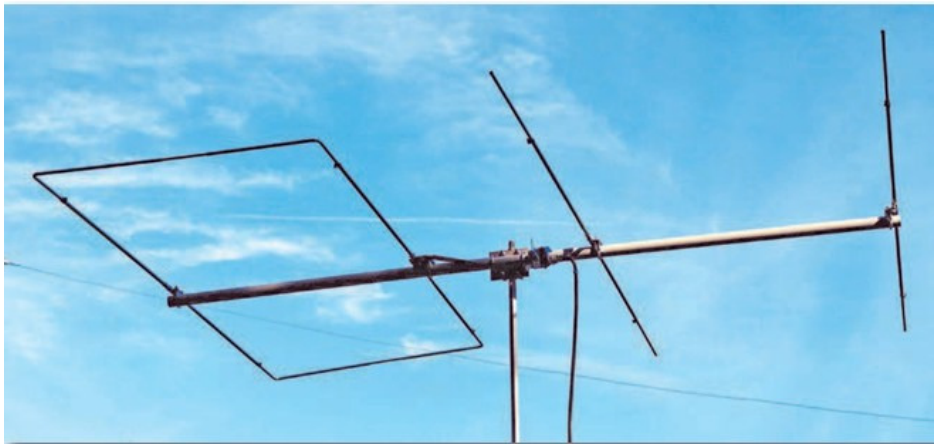


GW3YDX Super Moxon

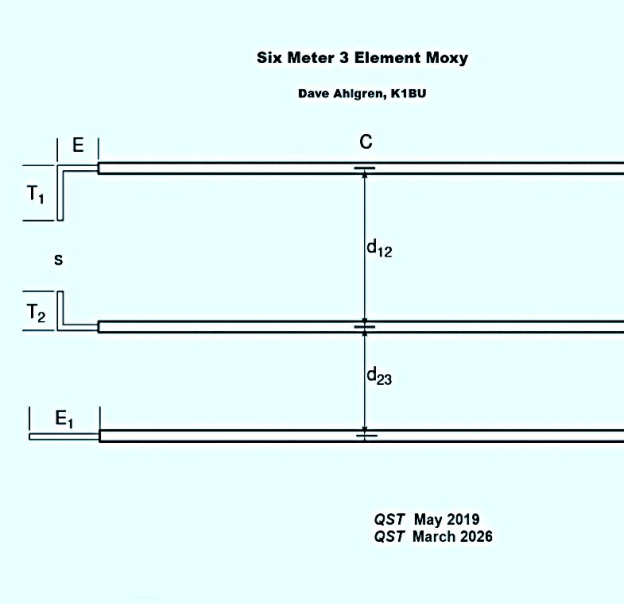


GW3YDX *4NEC2* plot of Super Moxon radiation pattern. Note narrower frontal lobe and improved forward gain with very smooth rear pattern.

As I was researching antennas, March 2026 *QST* arrived. On the cover was an interesting antenna, half yagi, half Moxon - the Moxy. Inside was an article by Dave Ahlgren K1BUK “Optimized Moxy Antennas for the 2-, 6-, and 10-Meter Bands.” Dave described several Moxy antennas for 2, 6 , and 10 meters, with element of 3 to 6 elements. The three element Moxy looked to be an ideal antenna for roving. Its boom length is 72” and the yagi style director is under 102” long. Significantly, the turning radius, is under 102”. Dave’s article referenced an earlier article he wrote which appeared in May 2019 *QST*. The four element Moxy has a boom length of 96”; unfortunately, the first yagi director is 105”

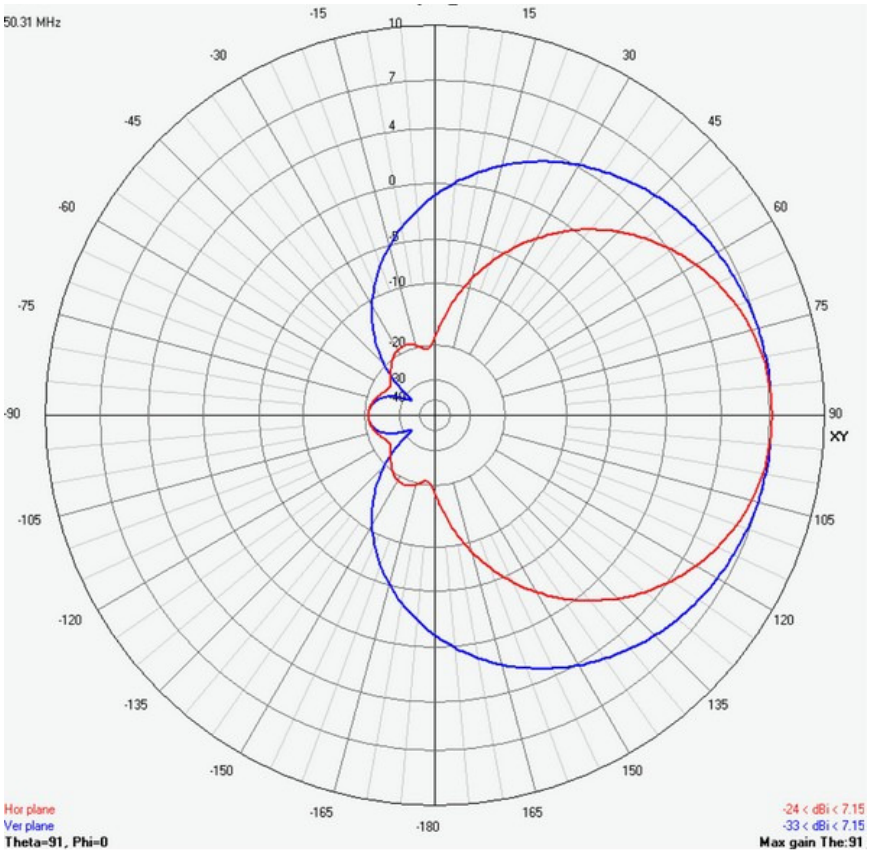


K1BUK Moxy



Dimensions:	
C	72”
E	11”
T_1	13.119”
S	8.9”
T_2	9.979”
E_1	13.141”
D_{12}	31.898”
D_{23}	37.102”

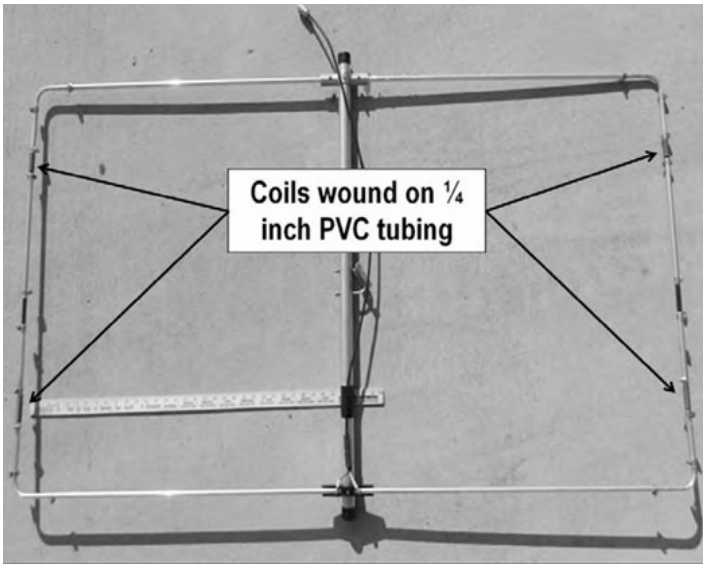
K1BUK 50MHz Three Element Moxy Layout



Three Element Moxy Pattern

Additional Ideas

One other Moxon-derived reduced size six meter antenna I found was described by Jon Platt W0ZQ, in the mentioned in the *48th Proceedings of the Central States VHF Society.Proceedings*. Jon took a MFJ-1896 and put loading coils at the four bent in ends of the elements. By doing so Jon reduced the size of the Moxon from approximately seven feet to five feet. The boom length stayed at 30". Jon did not pursue the past the concept, and more work remains to be done. For anyone interested in pursuing the design, Jon has the EZNEC file and additional information available.



W0ZQ Reduced Size Moxon

73,
Chris Patterson W3CMP