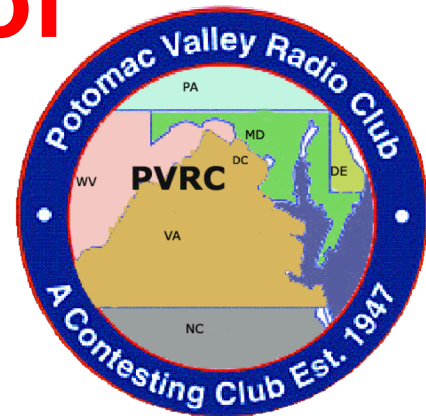
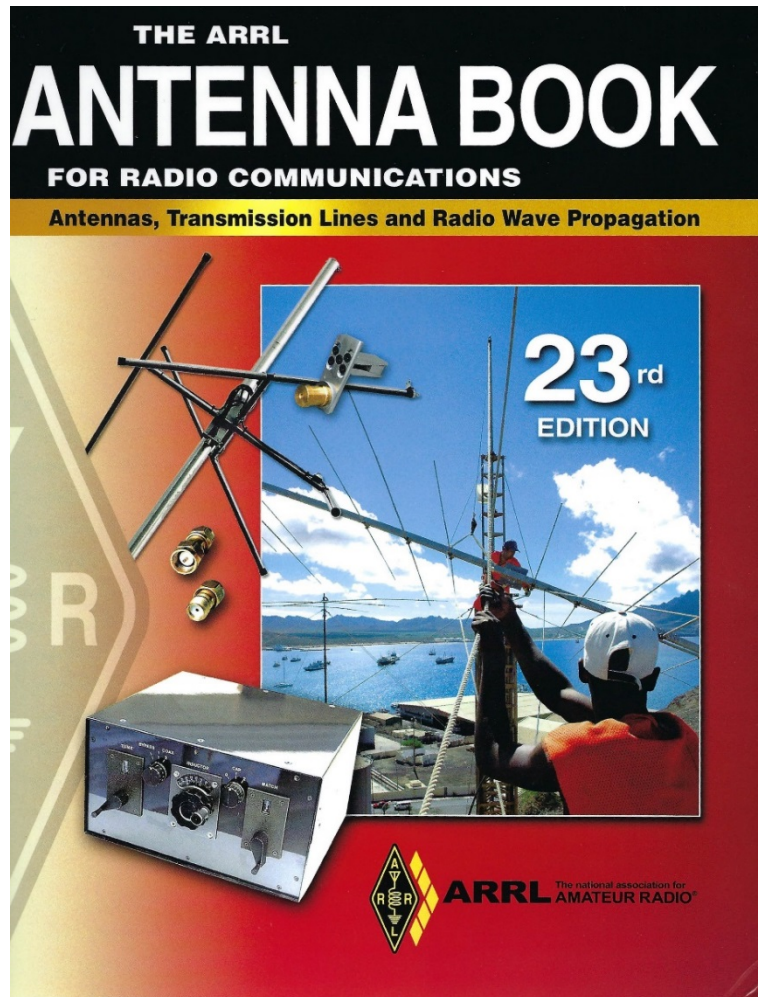
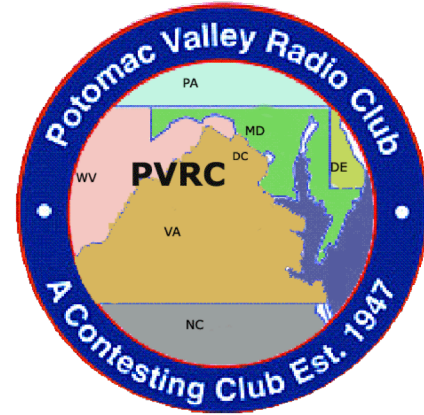


Selection and Construction of High Performance 6 Meter Yagi Antenna Systems



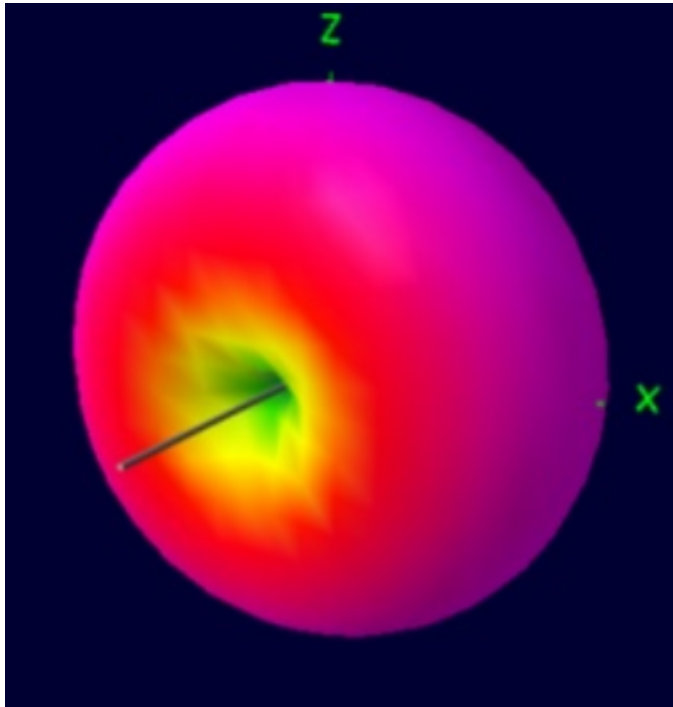
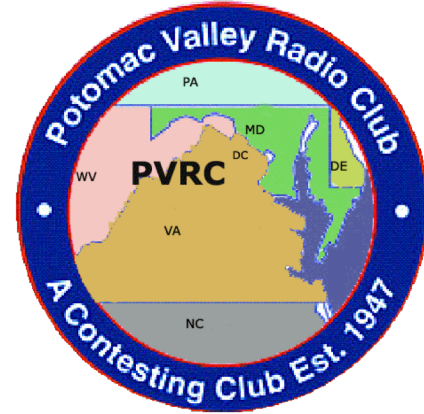
Frank Donovan
W3LPL
donovanf@erols.com

The Most Valuable Investment for any Antenna Builder

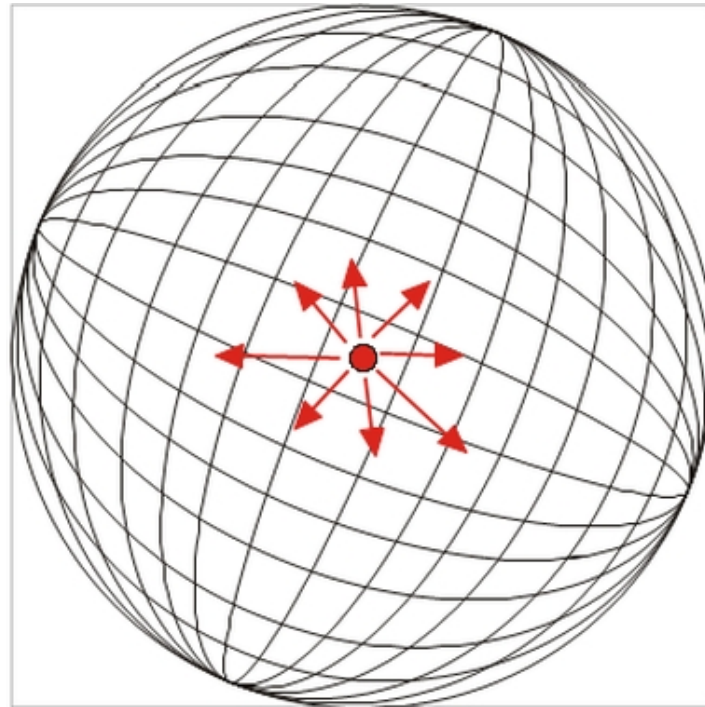


www.arrl.org/shop/ARRL-Antenna-Book-23rd-Softcover-Edition

The Reference Antenna for Antenna Gain in this Presentation is the Half Wavelength Dipole in Free Space



Half Wavelength Dipole

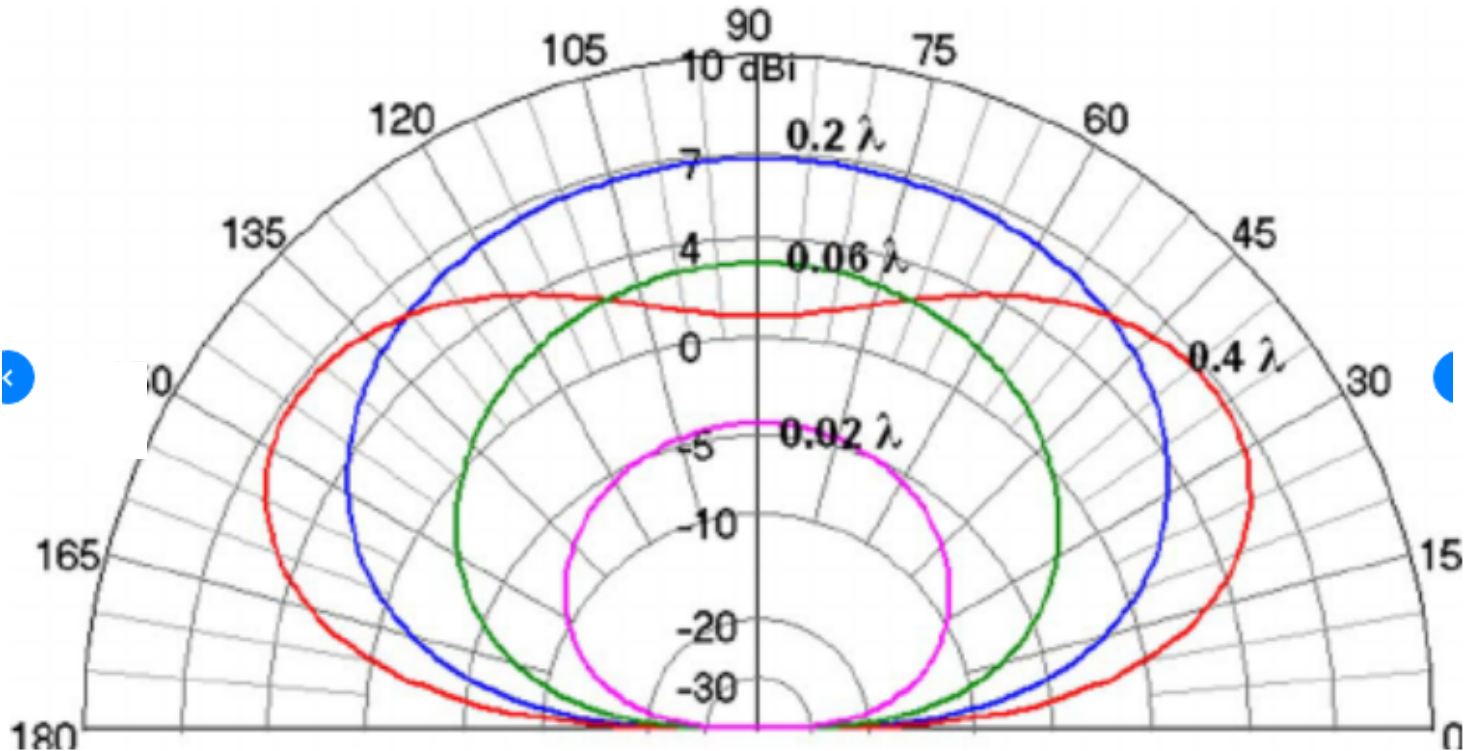
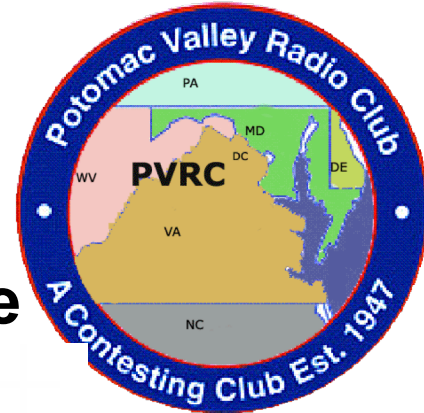


Isotropic Radiator

A half wavelength dipole in free space has 2.15 dB gain over an isotropic radiator

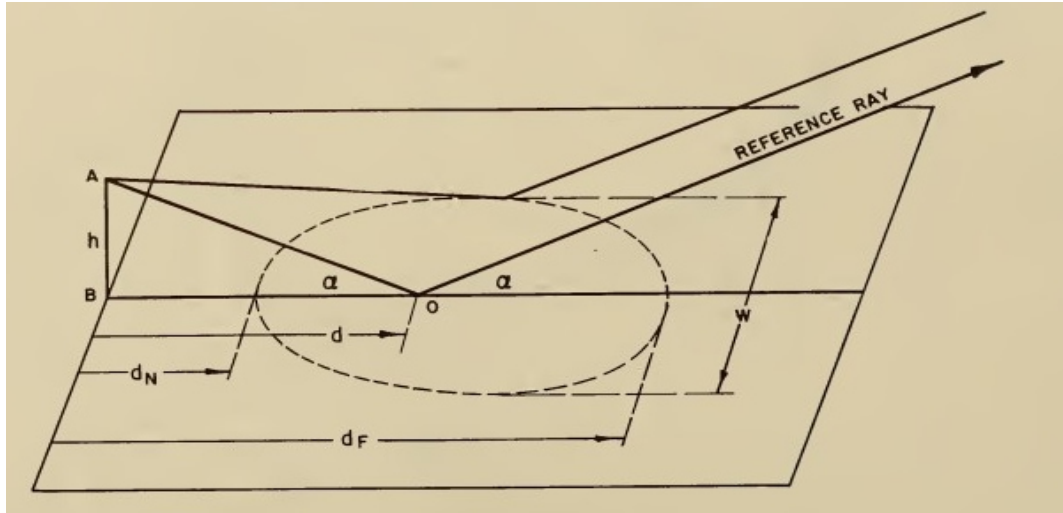
Ground Gain of a Horizontal Half Wave Dipole with Minor Irregularities in the Fresnel Zone

Terrain irregularities: <25% of antenna height
Buildings: <25% of antenna height and obstructing less than 5% of the Fresnel zone



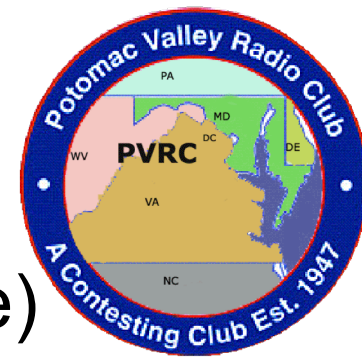
A horizontal half wave dipole at least 0.2 wavelength high with relatively smooth terrain and few tall buildings in the Fresnel zone has 6 dB gain over a horizontal dipole in free space

The Area of the Obstruction-Free Fresnel Zone that can Produce Up to 6 dB of Ground Gain Increases Dramatically with Antenna Height



Elevation angle:	3 deg	5 deg	10 deg
Antenna height:	100 ft	50 ft	25 ft
Tolerable terrain roughness:	25 ft	12 ft	6 ft
Maximum Fresnel zone width:	500 ft	300 ft	150 ft
Near edge of the Fresnel zone:	300 ft	100 ft	25 ft
Geometric reference point:	1800 ft	600 ft	150 ft
Far edge of the Fresnel zone:	3500 ft	1800 ft	1000 ft
Fresnel zone area:	30 acres	10 acres	3 acres

Gain and Front-to-Rear Performance of Short Yagis

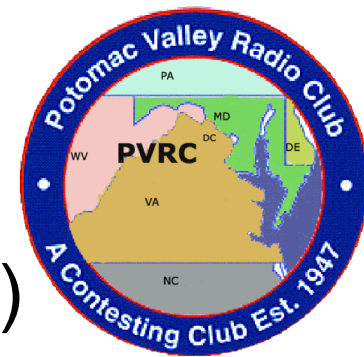


Source: VE7BQH charts (March 2019 issue)

Type	Elements	Gain dBd	Front to Rear Ratio	Boom Length	Cost \$
Directive Sys JX3-50	3	6.0	13 dB	6 feet	120
YU7EF EF0604	4	6.5	15	8	-
EAntenna 50LFA4	4	7.1	21	10	260
Directive Sys JX5-50	5	7.8	17	12	200
EAntenna 50LFA5	5	8.3	21	15	300
G0KSC 5LFA	5	8.9	19	14	225+

www.bigskyspaces.com/w7gj/VE7BQH%20Charts.xls

Gain and Front-to-Rear Performance of Longer Yagis



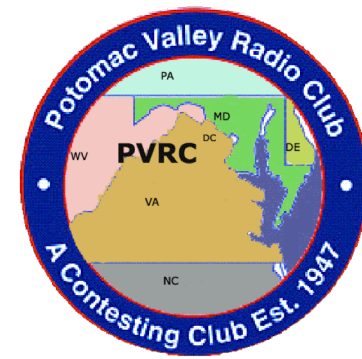
Source: VE7BQH charts (March 2019 issue)

Type	Elements	Gain dBd	Front to Rear Ratio	Boom Length	Cost \$
M2 6M5XHP	6	10.0	18 dB	20 feet	495
G0KSC 6LFA2	6	9.1	30	21	297+
EAntenna 50LFA6	6	9.7	27	23	460
Directive Sys JX7-50	7	10.7	16	29	440
EAntenna 50LFA7	7	10.7	26	31	500
M2 6M7JHV	7	11.0	20	31	525
Innov 8LFA	8	11.8	29	41	785
YU7EF0610	10	12.5	24	52	-

M2inc 6M3 3 Element Yagi on a 7 Foot Boom

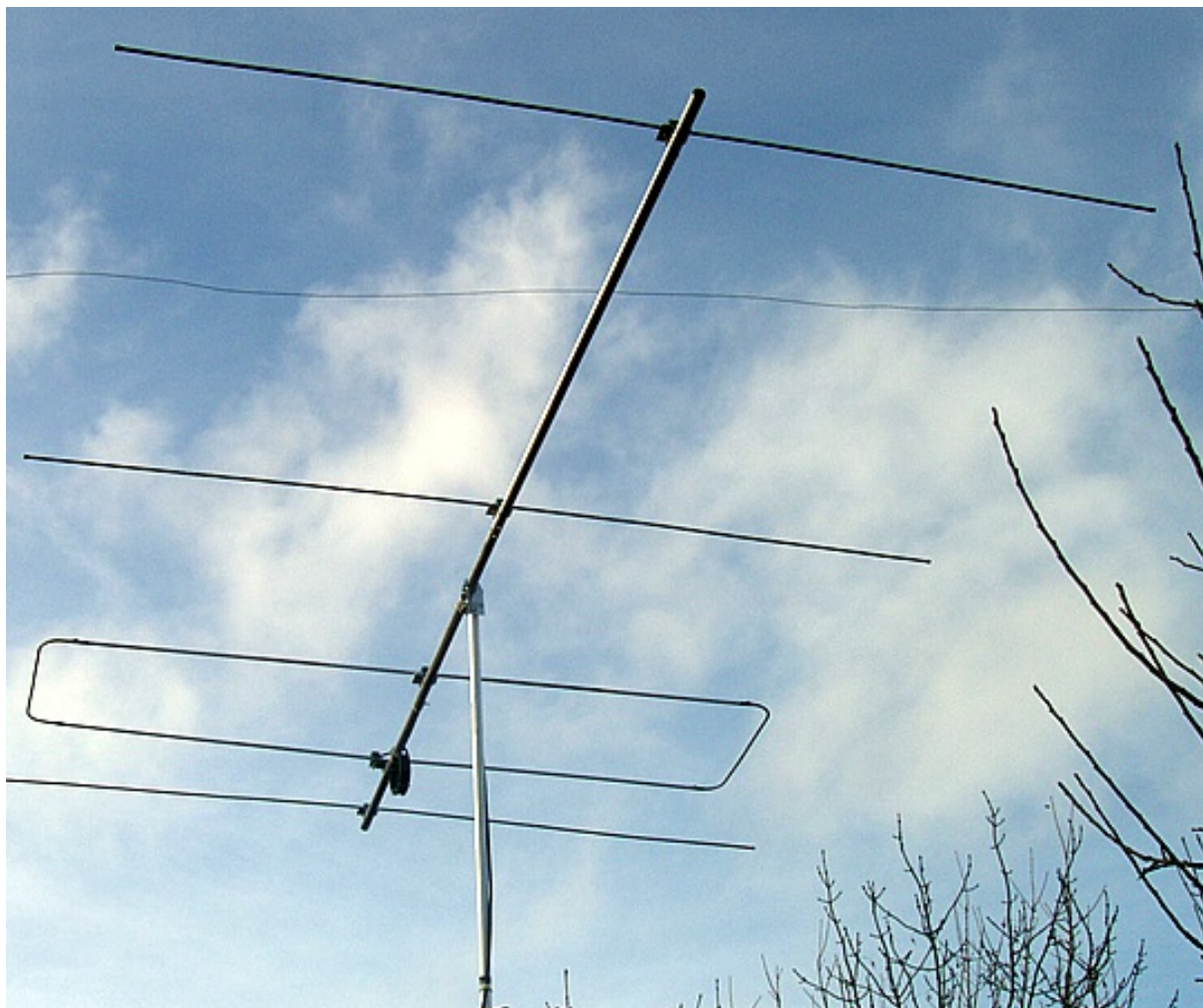
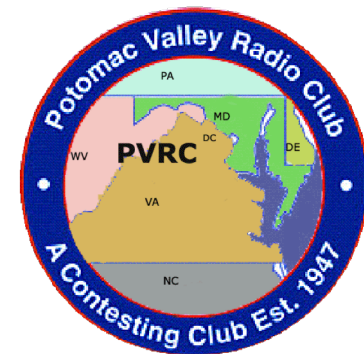


YU7EF EF0606S 4 Element Yagi on an 8 Foot Boom



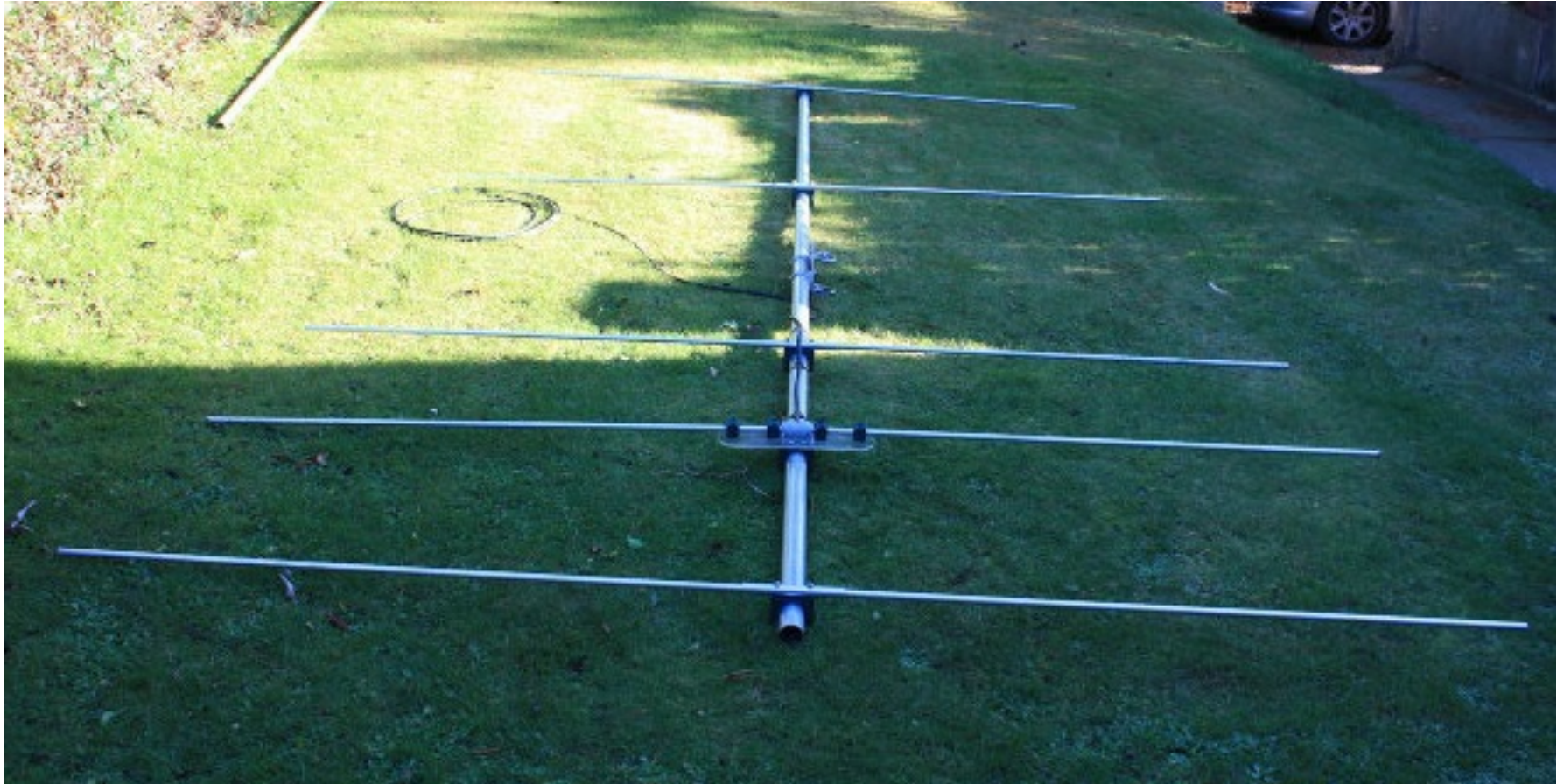
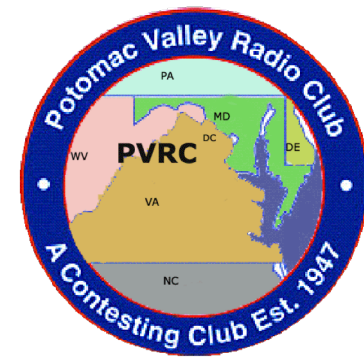
www.yu7ef.com/ef0604s.htm

G0KSC LFA4 4 Element Loop Fed Yagi on a 9 Foot Boom



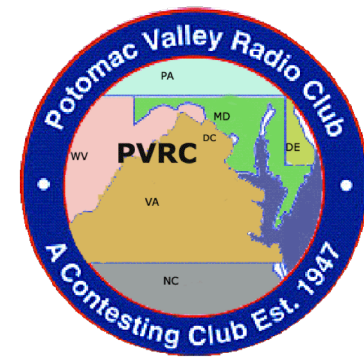
www.g0ksc.co.uk/50mhz-lfa-yagis/4el-35m-boom-lfa.html

G4CQM 6M5N50LY 5 Element Yagi on a 13 Foot Boom



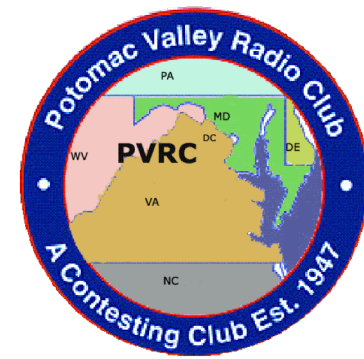
www.thedxshop.com/50mhz-5-element-max-gain-6m5n50ly.html

G0KSC 5 Element Loop Fed Yagi on a 14 Foot Boom



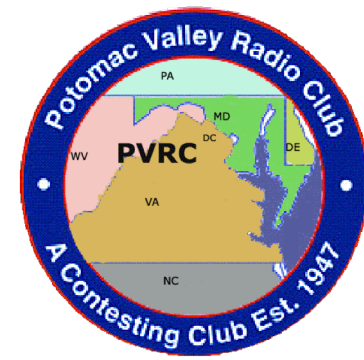
www.g0ksc.co.uk/50mhz-lfa-yagis/5el-44mtr-boom-lfa.html

M2inc 6M5XHP 5 Element Yagi on a 20 Foot Boom



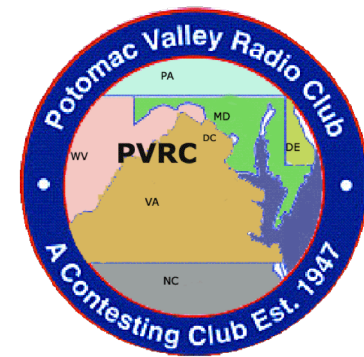
<https://static.dxengineering.com/global/images/instructions/msq-6m5xhp.pdf>

G0KSC LFA6 6 Element Loop Fed Yagi on a 21 Foot Boom



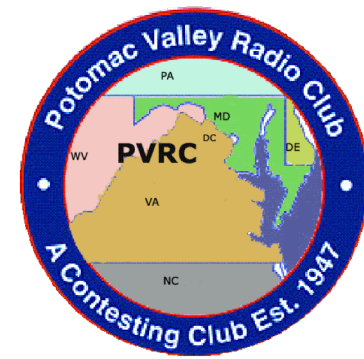
www.g0ksc.co.uk/50mhz-lfa-yagis/6el-64mtr-boom-lfa.html

YU7EF EF0606 6 Element Yagi on a 23 Foot Boom



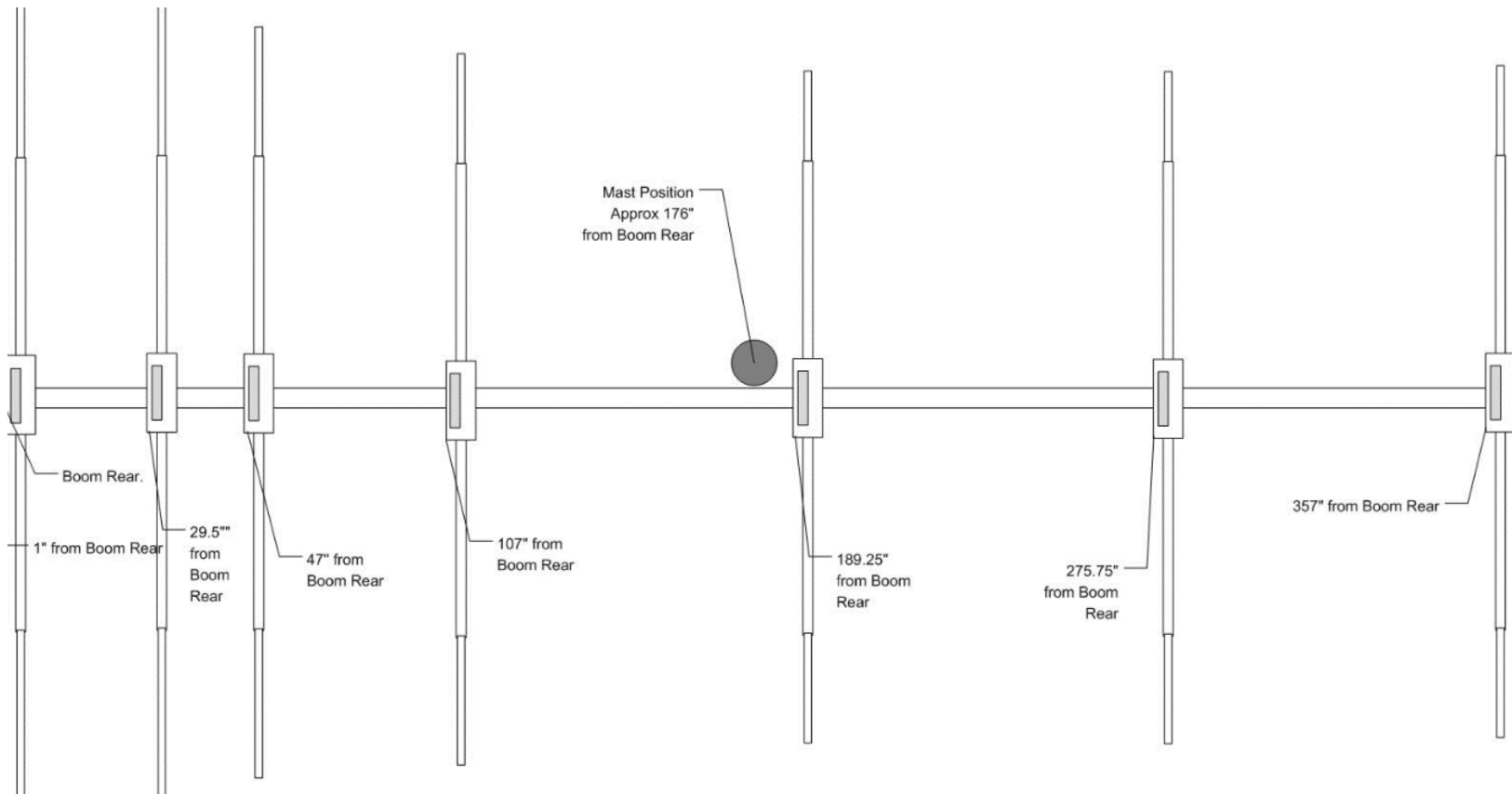
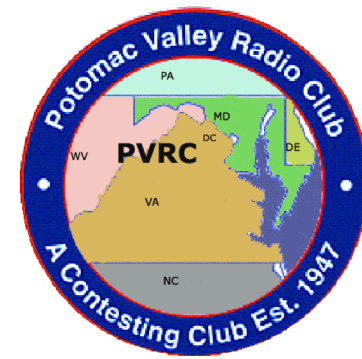
www.yu7ef.com/ef0606.htm

M2 6M7JHV 7 Element Yagi on a 26 Foot Boom



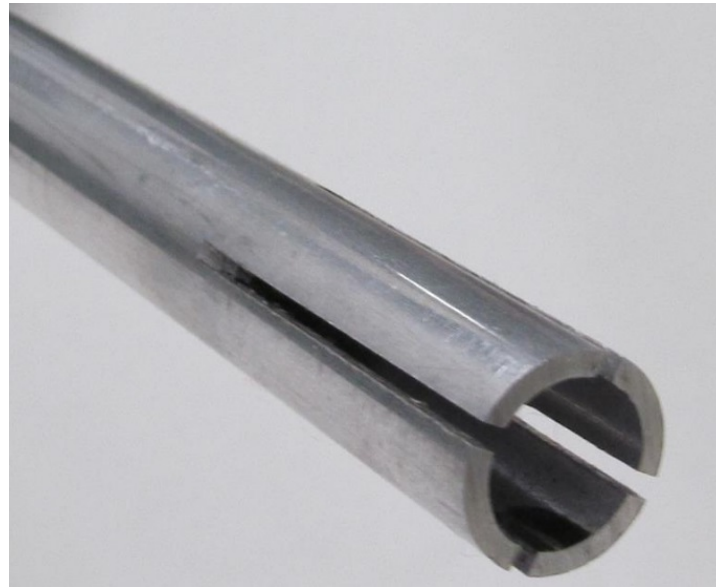
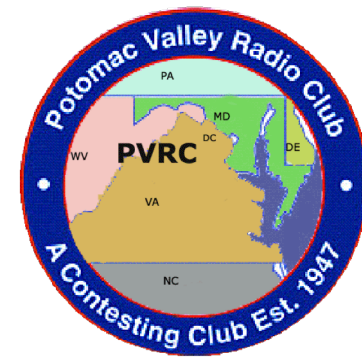
<https://static.dxengineering.com/global/images/instructions/msq-6m7jhv.pdf>

JK Antennas JK67 7 Element Yagi on a 30 Foot Boom



<https://jkantennas.com/jkstore/jk67.html>

Element Construction



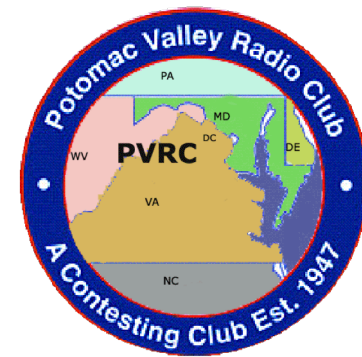
Center of each Yagi element:

6 feet of 0.5" diameter x 0.058" wall aluminum tubing
www.dxengineering.com/parts/dxe-at1205

Tips of each Yagi element:

2 feet of 0.375" diameter x 0.058" wall aluminum tubing
www.dxengineering.com/parts/dxe-at1189

Boom Construction



Two 6 ft x 1.5" x 0.058" wall aluminum tubing for a 12 foot boom
www.dxengineering.com/techsupport/ask/dxe-at1488

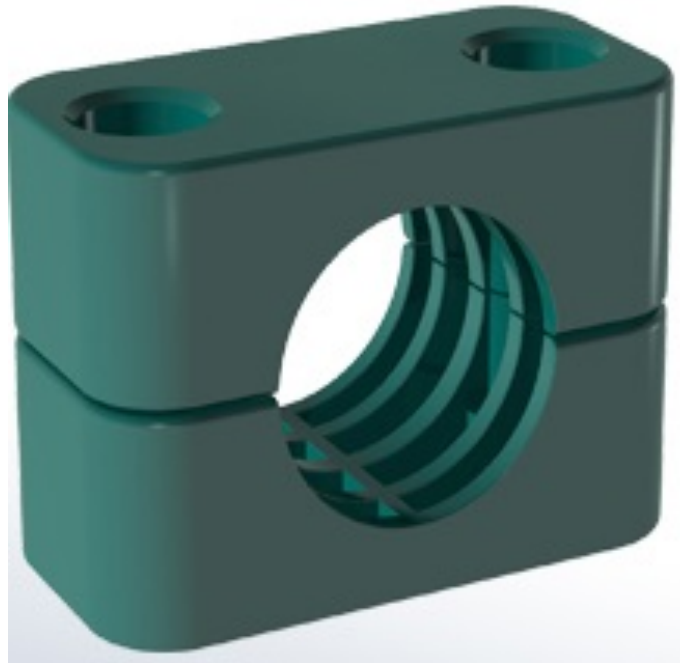
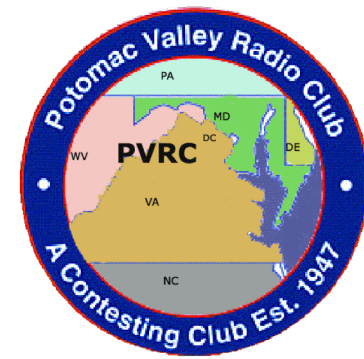
6 ft x 1.5" x 0.120" wall tubing for the center of an 18 foot boom
www.dxengineering.com/techsupport/ask/dxe-at1311

Two 12 ft x 2" x 0.058" wall aluminum tubing for a 24 foot boom
www.metalsdepot.com/aluminum-products/aluminum-round-tube

Square aluminum tubing makes precise element mounting easier
use 1.5 inch tubing for 12 foot boom
use 2.0 inch tubing for 24 foot boom

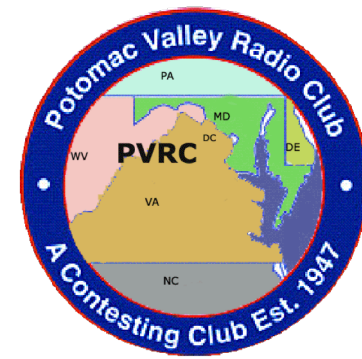
www.metalsdepot.com/aluminum-products/aluminum-square-tube

Stauff Clamps for Mounting Elements on the Boom



www.us.stauff.com

High Quality Coaxial Cable Really Pays Off on 6 Meters

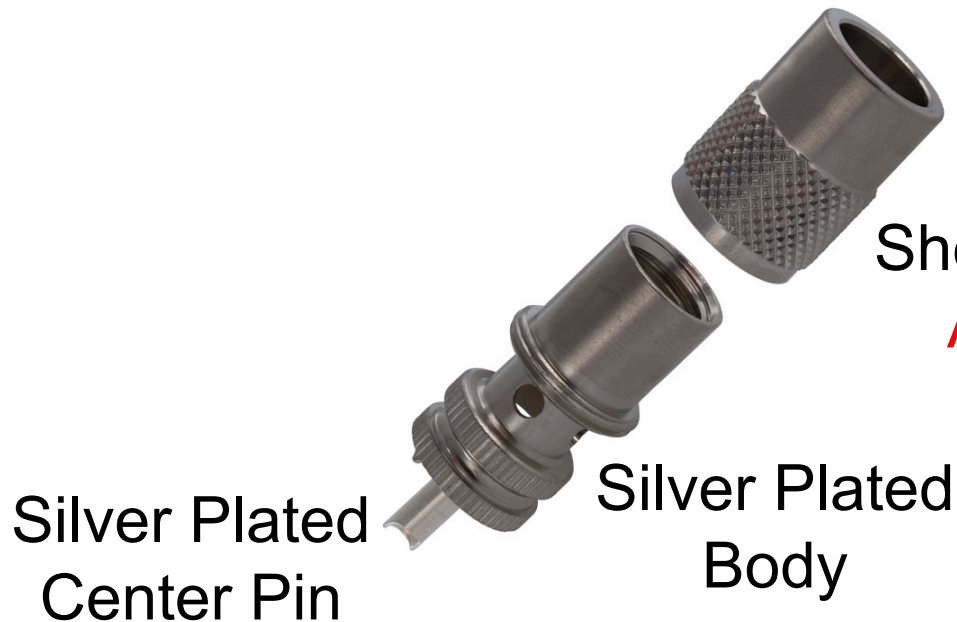
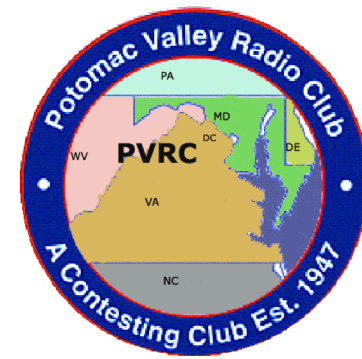


RG-8X 40 feet *per dB*
RG-213 62 feet *per dB*
LDF4-50A 208 feet *per dB*

LDF4-50A has one dB less loss than RG-213
at a cable length of only 85 feet

LDF4-50A has two dB less loss than RG-213
at a cable length of only 170 feet

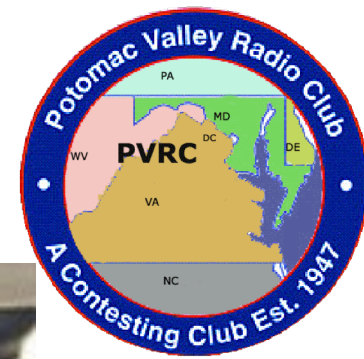
Amphenol 83-1SP PL-259 Connector



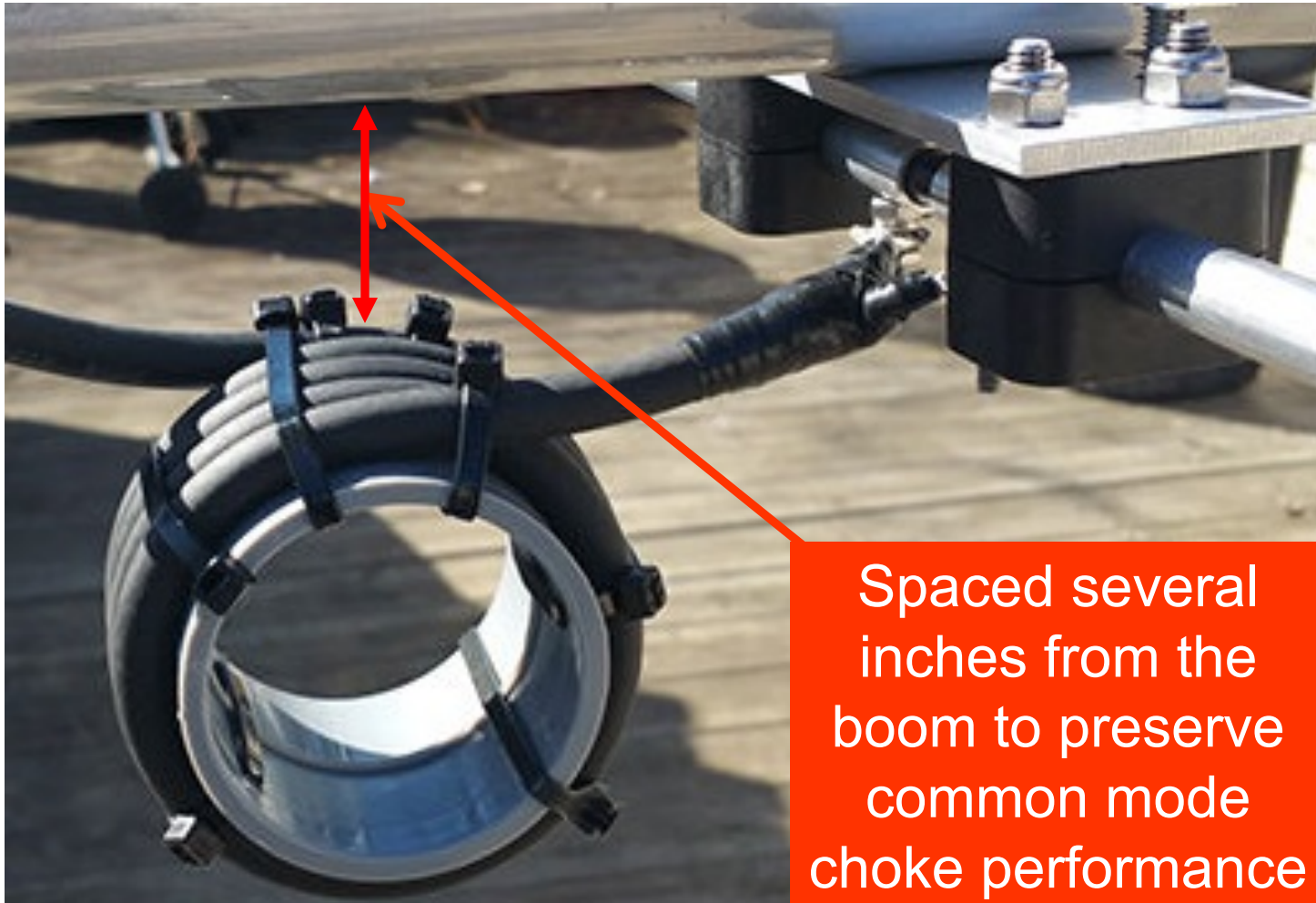
Shell is labeled exactly:
Amphenol 83-1SP

www.dxengineering.com/parts/aml-83-1sp

The Amphenol 83-1SP is an excellent connector for 6 meters



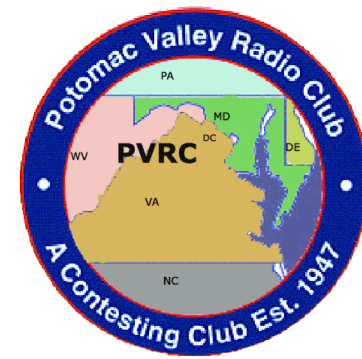
Coiled RG-213 Coaxial Cable Common Mode Choke



Spaced several inches from the boom to preserve common mode choke performance

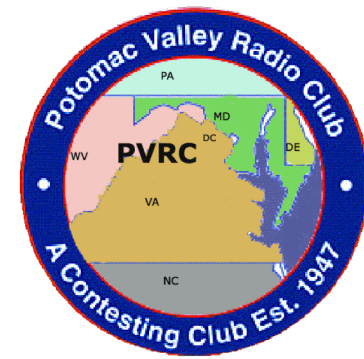
Four turns of RG-213 on a 2.5 inch diameter form

High Performance High Power Ferrite Bead Common Mode Choke



Spaced several inches from the boom to preserve common mode choke performance

Waterproofing the End of your RG-213 Coaxial Cable



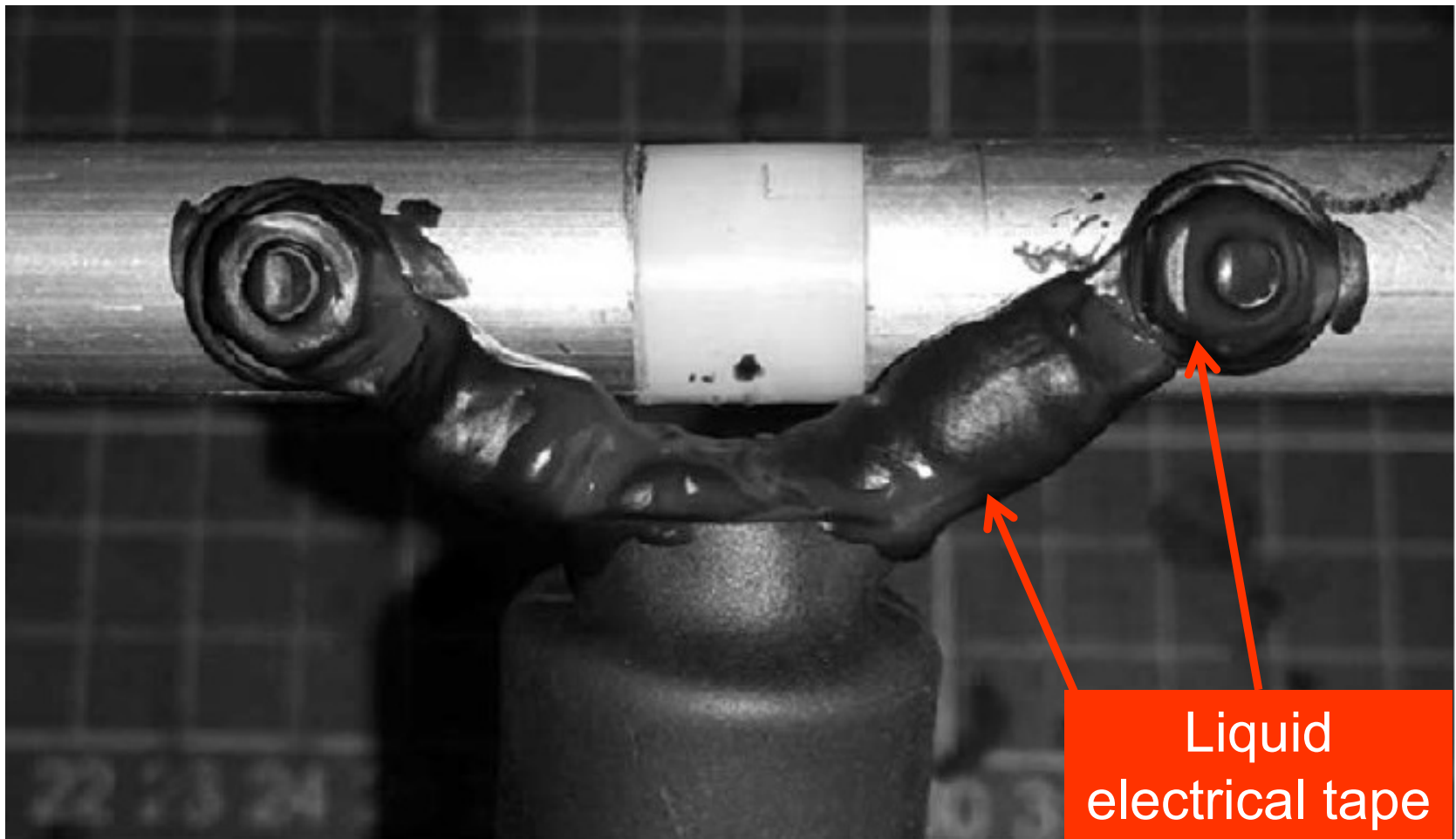
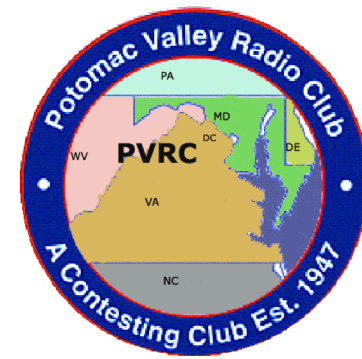
Heavy electrical solder lugs

No exposed coax braid, dielectric or center conductor

Scotch 130C and Scotch 33 waterproofing



Waterproofing the Common Mode Choke Connection to your Driven Element



Liquid
electrical tape

Yagi Driven Element

Waterproof and Shakeproof Connections

