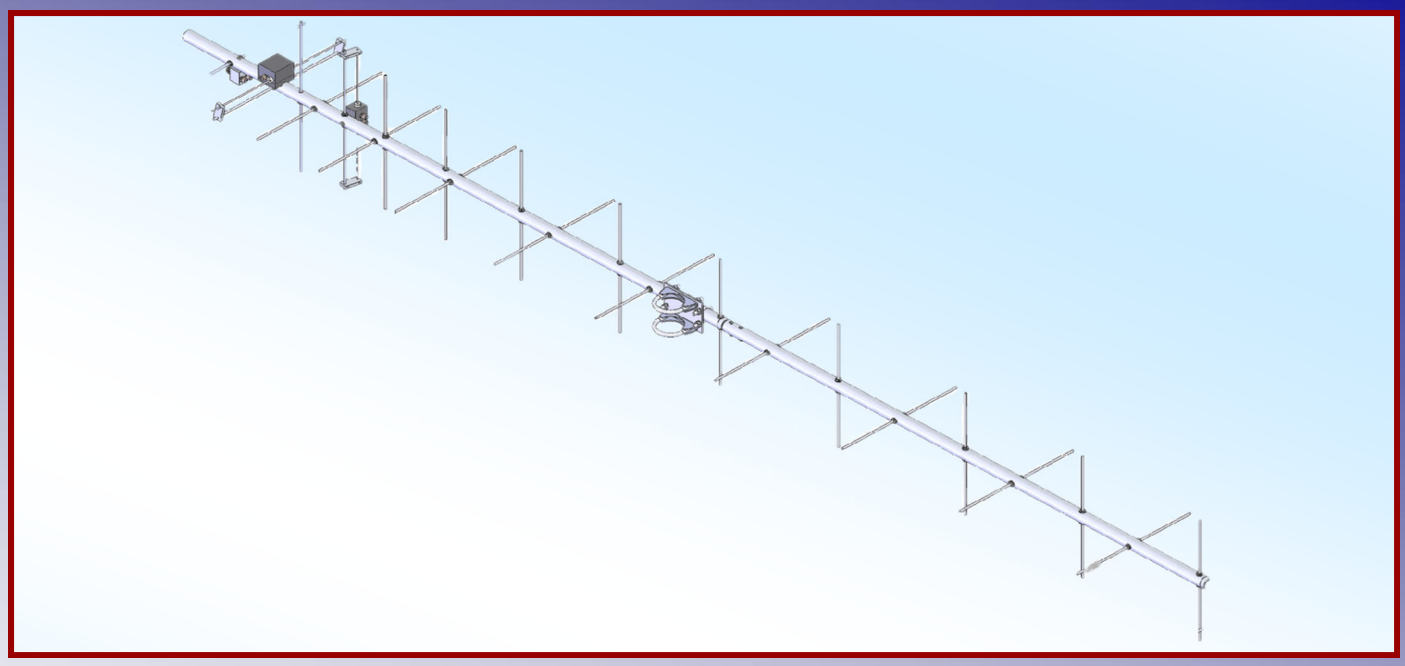
M2 Antenna Systems, Inc.
Model No: 420XP22



SPECIFICATIONS:

Model	420XP22
Frequency Range	400 To 440 MHz
*Gain	14.25 dBic
Front to back	22 dB Typical
Feed type	“T” Match
Feed Impedance.	50 Ohms Unbalanced
Maximum VSWR	1.2:1 Typical
Input Connector	“N” Female
Power Handling	1.5 kW
Boom Length / Dia	84” / 1”
Maximum Element Length	15”
Turning Radius:	Call
Stacking Distance	Call
Mast Size	1-1/2” to 2” Nom.
Wind area / Survival	1.0 Sq. Ft. / 100MPH
Weight / Ship Wt.	7 Lbs. / 9 Lbs.

***Subtract 2.14 from dBi for dBd**

FEATURES:

The 420XP22 is a light, medium performance cross polarized antenna. Optimum match and gain are between 400 & 440 MHz for the satellite band. Computer design techniques help keep spurious side lobes low down for optimum signal to noise ratios. This antenna features the same CNC machined, O-ring and silicone-gel sealed, driven element assemblies common to all M^2 Yagi antennas. This insures years of trouble free performance regardless of weather.

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Rev.00

420XP22 ASSEMBLY MANUAL

TOOLS REQUIRED FOR ASSEMBLY: Screwdriver, 11/32 nut driver or wrench, 7/16” and 1/2” socket or end wrenches, measuring tape.

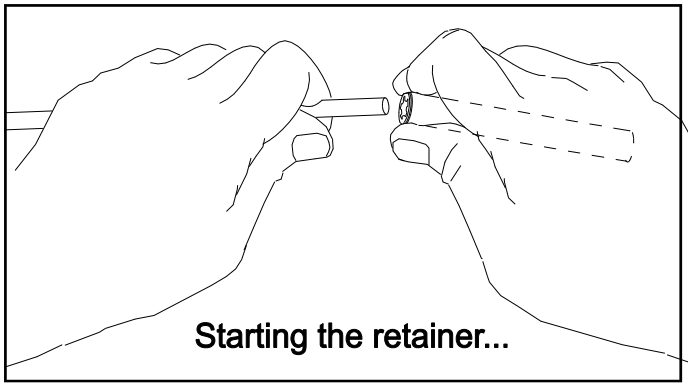
1. Install the horizontal Driven element assembly with “N” connector to the rear of the boom as shown in the DIMENSION SHEET.

ASSEMBLING THE HORIZONTAL ELEMENTS Note: the polyethylene button insulators used in the following steps may be excessively tight on the tube elements. “Cleaning” the hole with a 3/8” drill bit is recommended particularly if assembly is done in cold temperatures.

2. Layout the elements by “H” length and position as shown the DIMENSION SHEET. Start with the reflector (longest) element. Balance it on your finger to find rough center and push on a black button insulator to about 1/2” off center. Push the element through the holes 10.00” from the rear of the boom and install the second button, pressing it up into boom. DO NOT BOTHER CENTERING the element at this time and DO NOT INSTALL the stainless steel shaft retainers yet. It is easier to do it after all the horizontal elements are installed in the boom.

3. Continue with the installation of the DIRECTORS. Note that the Director Elements do not consistently diminish in length from rear to front, so pay close attention to length and position.

4. Now begin centering the elements. Use a tape measure to EQUALIZE, within 1/32”, the amount the element sticking out on each side of the boom. Once you have all the elements centered, sight down the element tips from the rear comparing each side. Correct any obvious misalignments.


Starting the retainer...

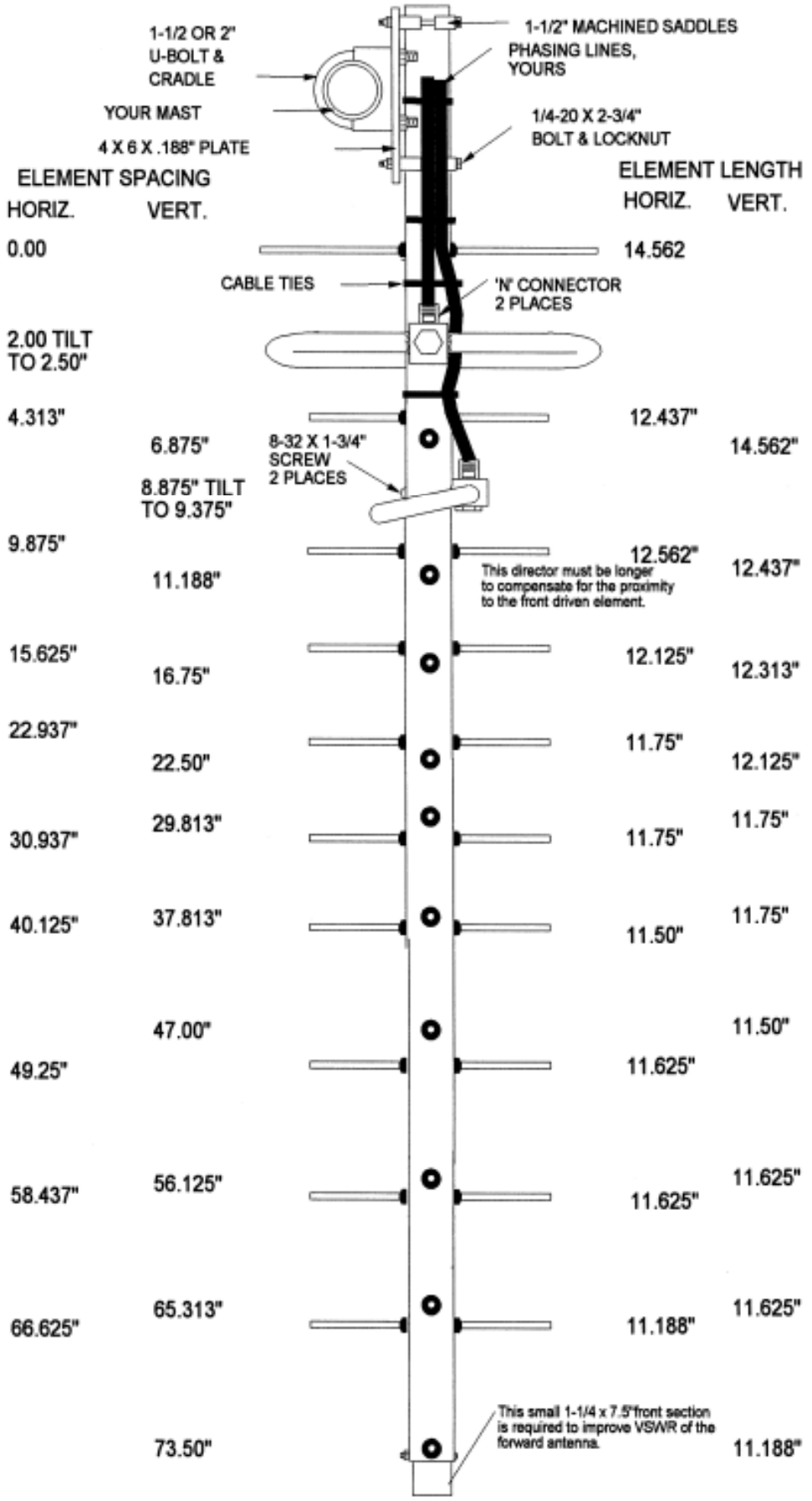
5. Stainless steel SHAFT RETAINERS lock the elements in place. They should always be used for permanent and long term antenna installations. For portable or temporary use, the button insulators are adequate for holding the elements and the retainers may be left off. To install the stainless steel SHAFT RETAINERS, use thumb and forefinger to hold the retainer over the small end of the PUSH TUBE (5/8” x 3” tube, supplied in the kit), internal fingers on retainer dished into tube. HOLD THE ELEMENT FIRMLY TO PREVENT IT FROM SLIDING OFF CENTER and press the retainer onto the element end and continue until retainer butts on insulator button, locking pliers, lightly clamped up against opposite button insulator will help maintain center reference (fi you push the first retainer too far, remove element from boom, push retainer completely off the element and start over). Install another retainer to the opposite side of the element. Continue installing retainers until all elements are secure.

6. Mount the VERTICAL DRIVEN ELEMENT ASSEMBLY to the SIDE of the boom using a single 8-32 x 1-3/4” screw. Orient the assembly with the “N” connector facing to rear as shown on dimension sheet.

ASSEMBLING THE VERTICAL ELEMENTS

7. Repeat steps #2 through #5 to install the Vertical elements, using the Dimension Sheet as your guide to lengths and spacing. Note: The vertical element set is shifted forward on the boom by 1/4 wavelength. This increases isolation between element planes, improving circularity and ease of phasing / matching the two element sets.

420XP22 DIMENSION SHEET



ELEMENT SPACING HORIZ.	ELEMENT SPACING VERT.	ELEMENT LENGTH HORIZ.	ELEMENT LENGTH VERT.
0.00		14.562	
2.00 TILT TO 2.50"			
4.313"	6.875"	12.437"	14.562"
8.875" TILT TO 9.375"			
9.875"	11.188"	12.562"	12.437"
15.625"	16.75"	12.125"	12.313"
22.937"	22.50"	11.75"	12.125"
30.937"	29.813"	11.75"	11.75"
40.125"	37.813"	11.50"	11.75"
49.25"	47.00"	11.625"	11.50"
58.437"	56.125"	11.625"	11.625"
66.625"	65.313"	11.188"	11.625"
73.50"			11.188"

INCH TO MM
.062 = 1.57
.125 = 3.15
.188 = 4.78
.250 = 6.35
.313 = 7.95
.375 = 9.53
.437 = 11.1
.500 = 12.7
.562 = 14.3
.625 = 15.9
.688 = 17.5
.750 = 19.0
.813 = 20.6
.875 = 22.2
.937 = 23.8
1.00 = 25.4
1.50 = 38.1
2.00 = 50.8

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420XP22 ASSEMBLY MANUAL

8. **INSTALLATION OF THE VERTICAL DRIVEN ELEMENT BLOCK DETERMINES THE CIRCULARITY OF THIS ANTENNA.** THE ORIENTATION OF THE BLOCK FOR RHC-RIGHT HAND CIRCULARITY, IS SHOWN ON THE DIMENSION SHEET ASSUMING EQUAL LENGTH PHASING LINES ARE USED. CIRUCLARITY CAN BE REVERSED BY MOVING ONE OF THE DRIVEN ELEMENT BLOCKS OT THE OPPOSITE SIDE OF THE BOOM OR INSERTING A HALF WAVE MORE PHASING LINE TO ONE SIDE. Viewed from the rear of the boom (rearmost Reflector HORIZONTAL), the VERTICAL Driven Element Blocks mounts to the RIGHT hand side of the boom with “F” connector oriented to the REAR. Secure with 8-32 x 1-3/4” screw.

9. **NOTE: THE M2 CP OPTIONS KIT** REQUIRES ONE (1) 1/4 WAVE PHASING LINE AND ONE (1) 3/4 WAVE PHASING LINE OT REACH THE JUNCTION BLOCK MOUNTED JUST BEHIND THE REAR REFLECTOR ELEMENT. THIS REQUIRES THAT THE REAR DRIVEN ELEMENT BE MOUNTED ON THE OPPOSITE SIDE OF THE BOOM TO MAINTAIN RIGHT HAND CIRCULARITY.

10. Use good quality coax and “N” connector for your PHASING LINES. (see Insulation Tips). Secure coax near connector on each DRIVEN ELEMENT block, to provide stress relief. Route the coax lines to the rear of antenna keeping them tight against the antenna boom to minimize coupling back the antenna elements.

11. The BOOM TO MAST PLATE is mounted at the rear of the boom. Use the 1-1/2” or 2” U-bolts and cradles provided to mount the BOOM TO MAST plate to the mast. Use the 1-1/2” machined saddles and 1/4-20 x 2 3/4 bolts and lock nuts provided to mount antennas to the plates.

INSTALLATION TIPS

12. A circular polarized antenna creates fields in all planes or polarities. Performance **DETERIORATES SIGNIFICANTLY** if it is mounted on a metal (conductive) mast or crossboom. Unless the metal boom is behind the rear most reflector element. For center mounted antennas a mast or crossboom of any NON-CONDUCTIVE material can be used. Fiberglass is the prime choice for its strength and weather resistance. The feedline which is metallic must still exit the rear of the antenna to prevent performance degradation. Mount the antenna so that element tips are at least 12” from any conductive material (mast, tower, feedline, etc.).

13. Try to keep the cable run to under 100 ft. to prevent excessive signal loss.
    Recommended feedlines, in order of preference.
    Andrews or Celwave 1/2” hardline
    Times Microwave LMR-400 or Belden 8214

14. To maintain proper phasing when stacking two or more antennas, mount each with the same orientation of Driven Element Blocks. DO NOT MOUNT IN MIRROR IMAGE. Contact the manufacturer for optimum stacking distance between antennas. For more detailed stacking information contact M2.

420XP22 PARTS & HARDWARE

420XP22 PARTS LIST

DESCRIPTION	QTY
BOOM SECTION, 1 X .058 X 84” W/SLEEVE	1
ELEMENTS, 3/16 ROD X Dimension Sheet	22
D.E. BLOCK ASSEMBLY	2
JUNCTION BLOCK (SADE0065)	1
BALUN, RG-6 1/2λ	2
MATCHING / PHASING CABLE, 3/4λ	1
MATCHING / PHASING CABLE, 1/4λ	1
BOOM TO MAST PLATE, .125 X 4” X 6”	1
U-BOLT AND CRADLE, 2"	2
U-BOLT AND CRADLE, 1-1/2”	2
ASSEMBLY MANUAL	1

IN HARDWARE BAG:

SHORTING BAR	4
BUTTON INSULATORS	40
KEEPER, SS	40
NUT, 5/16-18 SS	4
LOCKWASHER, 5/16 SS	4
NUT, 1/4-20 SS	4
LOCKWASHER, 1/4 SS	4
SCREW, 8-32 X 1-1/4 SS	2
LOCKNUT, 8-32 SS	4
SET SCREW, 8-32 X 1/4 SS	8
CABLE TIE, NYLON	4
ALLEN HEAD WRENCH	1
PUSH TUBE, 3/8 X 3”	1

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