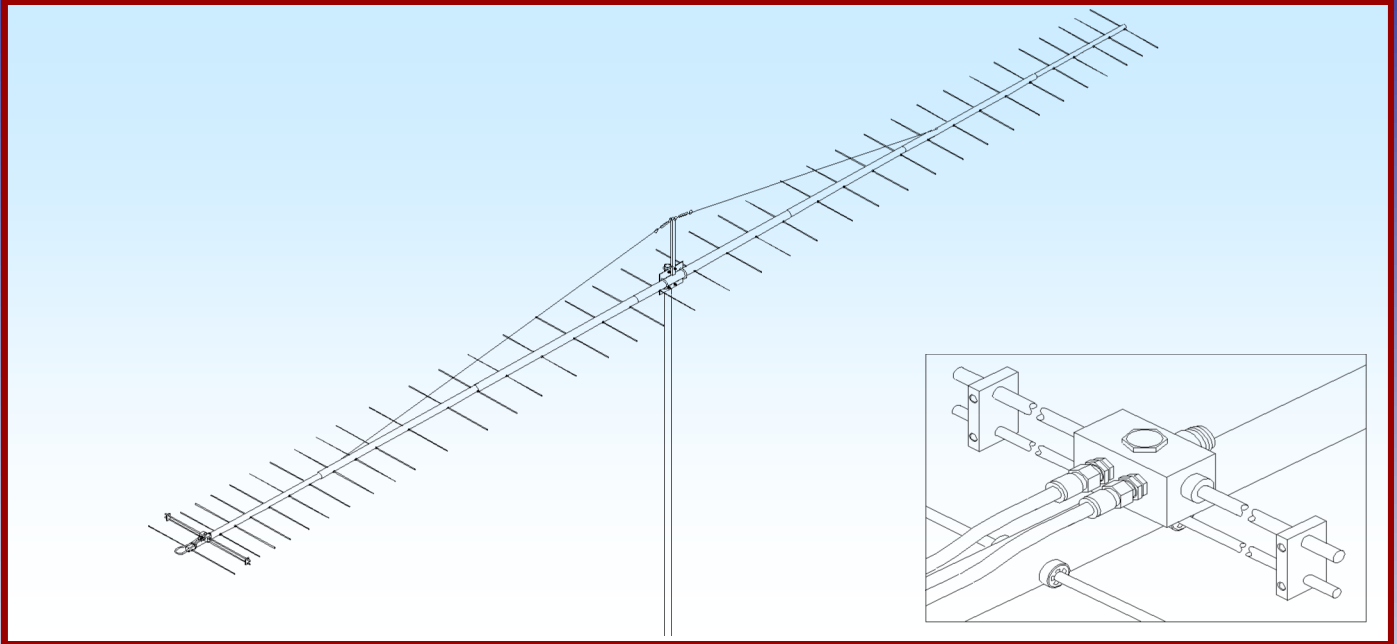




# M2 Antenna Systems, Inc.

## Model No: 432-13WL



### SPECIFICATIONS:

Model .....	432-13WL	Power Handling .....	1 kW
Frequency Range.....	430 To 436 MHz	Boom Length / Dia.....	364" / 1", 1-1/4" & 1-1/2"
*Gain .....	20.50 dBi	Maximum Element Length.....	13-5/8"
Front to back .....	22 dB Typical	Turning Radius:.....	188"
Beamwidth .....	E=16° H=18°	Stacking Distance.....	82" High & 82" Wide
Feed type .....	Folded Dipole	Mast Size .....	1-1/2" to 2" Nom.
Feed Impedance.....	50 Ohms Unbalanced	Wind area / Survival .....	2.5 Sq. Ft. / 100 MPH
Maximum VSWR.....	1.2.:1 Typical	Weight / Ship Wt.....	12 Lbs. / 14 Lbs.
Input Connector.....	"N" Female		

**\*Subtract 2.14 from dBi for dBd**

### FEATURES:

While the 432-13WL produces over 23 dBd gain in a four Yagi array, its also an excellent stand alone antenna. And, for the serious amateur it would make a sensational 16 Yagi 432 array.

The driven element is a modified and adjustable folded dipole. Its heart is a unique machined aluminum Driven Element Module. All three connectors on the module are threaded in and feature 'O' ring seals. Internal connections are encapsulated in a space age silicone gel with nearly 4 times the dielectric strength of air. Each parasitic element is a solid 3/16" rod, mounted through the boom on a UV stabilized, black polyethylene button insulator and locked in place with stainless steel shaft retainers. The 432-13WL has been designed for outstanding performance and long term electrical and mechanical integrity.

# 432-13WLA ASSEMBLY MANUAL

Tools handy for assembly process: screwdriver, 11/32" spin-tite or socket, 7/16" and 1/2" end wrenches / sockets, measuring tape.

1. Start by laying out the boom sections using the DIMENSION sheet as a guide. Use 8-32 X 1-1/4" screws and locknuts to join 1" to 3/4" sections, 8-32 X 1-1/2 hardware to join 1" to 1-1/4" sections, and 8-32 x 1-3/4" hardware for 1-1/4" to 1-1/2" sections. Notes for boom section orientation:  
1-1/2" section swaged both ends: end with 1st hole at 6-7/8" is to rear.  
1-1/2" section swaged one end: assemble to rear.  
1-1/4" section with 1st hole at 4" from swaged end: assemble to rear.  
1-1/4" section with 1st hole at 11-1/16" from swaged end: assemble to front  
1" straight section: assemble to rear.  
1" section swaged one end: assemble to front.  
3/4" section: assemble to front.
2. Lay out the elements by length and position as shown the DIMENSION sheet. Start with the reflector (13-3/8") element and push on a black button insulator to about 1/2" from center. Insert the element through the holes 1/2" from the rear of the boom and install the second button, snugging it up into boom. DO NOT BOTHER WITH ACCURATELY CENTERING the element at this time and DO NOT INSTALL the stainless steel internal locking SHAFT RETAINERS yet. This is easier to do after all the elements are installed in the boom.
3. Install the 3/16" x 13-5/8" rod DRIVEN ELEMENT as you did the reflector. Then 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 center the elements. Use a tape measure to EQUALIZE the element length on each side of the boom. Once you have all the elements centered, sight down the element tips from the rear comparing each side. Look for any obvious discrepancies and correct if found.
5. NOTE: The SHAFT RETAINERS should always be used for permanent and long term antenna installations. For portable or temporary use, or whenever it is anticipated that the antenna will be disassembled within a short time, the retainers may be left off. The button insulators, alone, hold the elements quite securely.  
The SHAFT RETAINERS are installed on both sides of each element rod, butted on the button insulators. To start the retainers, use thumb and index finger to hold one over end of the 3/8 x 3" push tube, retainer dished into tube. Hold the element firmly and start the retainer onto the rod by applying pressure with the push tube. Push the retainer until up tight against the button insulator (Locking pliers, **lightly** clamped up against opposite button insulator will help maintain center reference and keep you from pushing the first retainer too far). Repeat for the opposite side. Continue installing retainers until all elements are locked in place.
6. Mount the DRIVEN ELEMENT BLOCK to the boom using a single 8-32 X 1-1/4" screw. Orient the block with feed connector facing to center and balun connectors facing to rear.
7. Attach balun and tighten the connectors **gently** using a 7/16" end wrench. Form the balun close to the boom and secure to boom with a nylon cable tie. Tie should be snug but not crushing or kinking the coax.
8. Install the 8-32 x 1/4" set screws (internal Allen head - tool supplied) into the SHORTING BARS. Slide the bars onto the 3/16" rod driven element tips and 1/8" Driven Element Block Rods. Position the Shorting Bars as specified on the Dimension Sheet, or adjust for best match at your favorite frequency. Align the bars and rods with each other and tighten the setscrews.
9. The boom to mast plate is normally mounted at the balance point. Since the feed line represents significant weight it is best to have it (or a temporary equivalent) attached and fastened along the boom with cable ties before balancing the boom and mounting the plate. 1-1/2" U-bolts and the stainless nuts and lock washers provided. DO NOT OVER TIGHTEN. 2" U-bolts are provided for mounting the antenna to your mast.

# 432-13WLA ASSEMBLY MANUAL

10. Refer to Hardware Drawing. Attach the square 18" RISER TUBE to the boom-to-mast plate using two 8-32 x 1-1/4" screws and locknuts. The large holes at the top of the riser are slightly off-center and should be oriented away from the boom-to-mast plate side and closer to the centerline of the boom.
11. Install eyebolts into booms. Secure with flat washer and lock nuts.
12. Install the two turnbuckles into the top of the riser with open ends of the hooks "UP". Adjust threads until just one or two show inside turnbuckle body. Adjust the boom with supports until the middle is 1-1/2" to 2" LOWER than the ends. Attach one end of the Dacron cord to the rear U clip by taking two wraps through the "U" and finishing with two half-hitches or a square knot. Adjust to leave 2" to 4" of cord after knots. Attach the other end of the cord to the front clip in the same way. Equalize excess cord at the riser tube and cut. Take rear cord end and make two wraps through rear turnbuckle eye, then pull line taut and knot as above. Repeat for front cord and turnbuckle, balancing tension.
13. Now support antenna at the boom-to-mast plate. This tensions the cord and helps the knots to take a set. If possible, let this process extend overnight. Then adjust turnbuckles so boom ends bow up slightly (and equally). A few days on the mast should leave the boom straight. Cut excess lengths from cord, leaving 2" to 4". To prevent fraying melt ends with heat or flame and tape back to main line.

## 10. INSTALLATION AND STACKING INFORMATION

**FOR HORIZONTAL POLARIZATION**, the antenna may be mounted to a metallic vertical mast or a horizontal NON-METALLIC cross boom (fiberglass tubing or equivalent). If mounted to a horizontal cross boom, route the feedline forward to the boom-to-mast plate, loop down, and bring back to cross boom at least 6" beyond element tips. Antenna pairs are typically stacked one above the other in horizontal polarity. Refer to Specifications Sheet for stacking distances and see Stacking Reminders, below.

**FOR VERTICAL POLARIZATION**, the antenna may be mounted to a NON METALLIC VERTICAL MAST (fiberglass tubing or equivalent) or a horizontal metallic cross boom. If mounted to a vertical mast, route the feed line forward to the boom-to-mast plate, then loop out at a right angles to the boom, and bring down to the mast at least 6 inches BELOW THE ELEMENT TIPS. Antenna pairs are typically stacked side by side on a horizontal cross boom. Refer to Specifications Sheet for stacking distances and see Stacking Reminders, below.

**A.** To protect your investment in this high performance antenna, always use high quality coax and connectors. Old, corroded, or poor quality materials are common sources of serious performance losses.

**B.** If possible, test the antenna, connectors and feedline BEFORE installing to your mast or tower. At 6 feet or more the antenna will exhibit VSWR *similar* to higher mounting heights. Set antenna on a ladder or temporary mast. Check for continuity and that match is close to "spec" across the rated bandwidth.

### **C. STACKING REMINDERS:**

1. All driven element blocks MUST be oriented to the same side of boom. **Do not** mirror image the antennas; this puts them 180 degrees out of phase!
2. All boom-to-mast plates MUST be mounted at the same point on the boom.
3. Feed / phasing lines MUST be of equal electrical length or multiples of 1 wavelength in order to maintain equal phasing in the array. Improper phasing can severely deteriorate performance.

If you are unsure about stacking multiple antennas, please call **M<sup>2</sup>** and let us help you DO IT RIGHT!

**DESCRIPTION**

**QTY**

# 432-13WLA DIMENSION SHEET

## ELEMENT SPACING

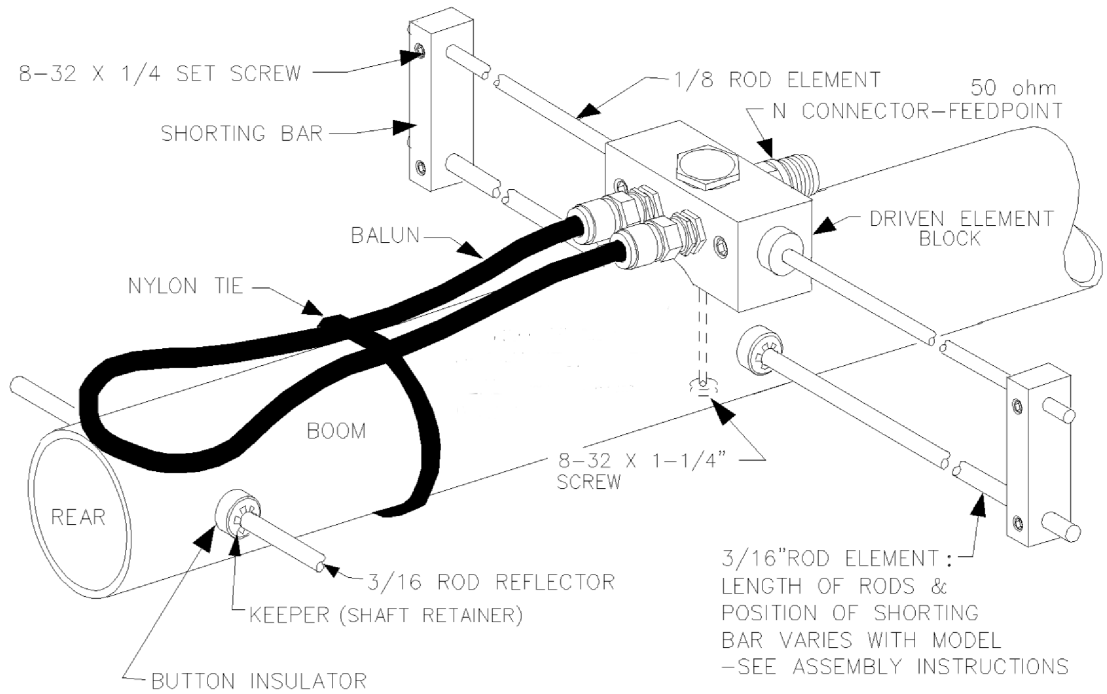
## ELEMENT LENGTH

0.5		13.375	
5.25		13.625	
8.125		12.75	
12.688		12.25	
18.562		12.0	
25.375		11.937	
32.937		11.875	
41.125		11.625	
49.875		11.625	
59.0		EYEBOLT	11.688
68.5			11.562
78.437			11.375
88.625			11.375
99.125			11.437
109.375			11.375
120.875			11.188
131.875			11.188
142.875			11.188
153.875			11.188
164.875			11.125
175.875			11.0
186.937			10.875
197.937			10.875
208.937			10.937
219.937			10.937
230.937			10.875
241.937			10.688
252.937			10.562
263.937		EYEBOLT	10.75
274.937			10.75
286.50			10.688
297.0			10.5
308.0			9.937
319.0			10.375
330.0		10.813	
341.0		10.875	
352.0		11.0	
363.0		11.5	

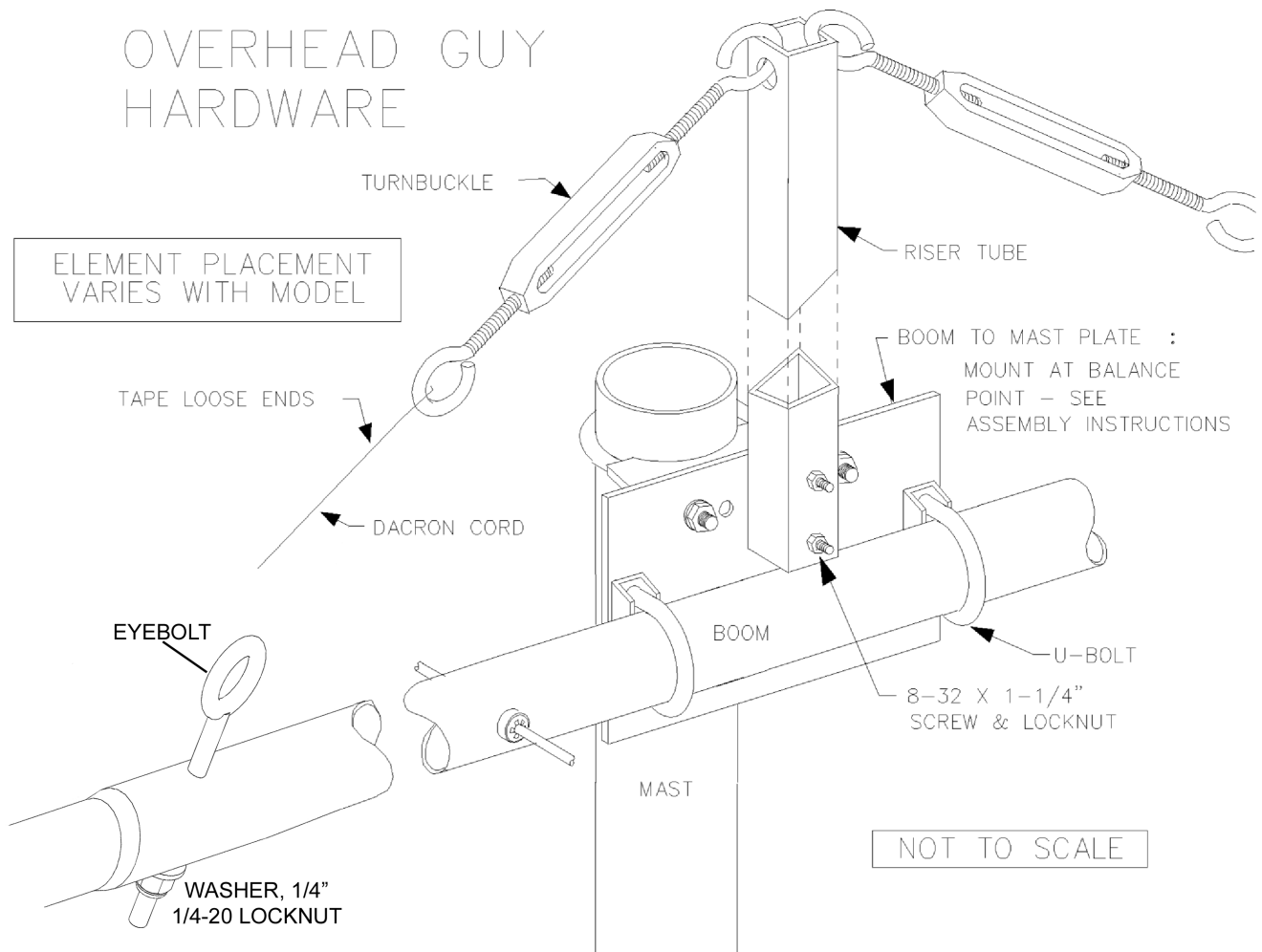
FRONT

DECIMAL TO FRACTION CONVERSION	
.062	= 1/16"
.125	= 1/8"
.188	= 3/16"
.250	= 1/4"
.313	= 5/16"
.375	= 3/8"
.437	= 7/16"
.50	= 1/2"
.562	= 9/16"
.625	= 5/8"
.688	= 11/16"
.75	= 3/4"
.813	= 13/16"
.875	= 7/8"
.937	= 15/16"
1.0	= 1"

# 432-13WLA ASSEMBLY DETAILS



## OVERHEAD GUY HARDWARE



# 432-13WLA PARTS & HARDWARE

BOOM SECTION, 1-1/2 X .058 X 60" SBE .....	1
BOOM SECTION, 1-1/2 X .058 X 60" SOE.....	1
BOOM SECTION, 1-1/4 X .058 X 60" SOE.....	2
BOOM SECTION, 1 X .058 X 57" SOE.....	1
BOOM SECTION, 1 X .058 X 58" STR .....	1
BOOM SECTION, 3/4 X .049 X 27" STR .....	1
ELEMENTS, 3/16 ROD x Dimension Sheet.....	38
DRIVEN ELEMENT BLOCK .....	1
BALUN, RG-6 1/2 WAVE .....	1
BOOM-TO-MAST PLATE, .188 X 6" X 4" .....	1
U-BOLT AND CRADLE, 2".....	2
U-BOLT AND CRADLE, 1-1/2" .....	2
RISER TUBE, 3/4 SQ X 18".....	1
DACRON CORD, 3/32 X 25' .....	1
ASSEMBLY MANUAL.....	1

## IN HARDWARE BAG:

EYEBOLTS, 1/4" .....	2
TURNBUCKLE, 1/4" ALUM BODY.....	2
SHORTING BAR.....	2
BUTTON INSULATORS .....	76
SHAFT RETAINER, SS .....	80
NUT, 5/16-18 SS.....	8
LOCK WASHER, 5/16 SS.....	8
WASHER, 1/4", SS .....	2
LOCK NUT, 1/4-20", SS.....	2
SETSCREW, 8-32 X 1/4, SS .....	4
SCREW, 8-32 X 1-1/4 SS .....	5
SCREW, 8-32 X 1-1/2 SS .....	4
SCREW, 8-32 X 1-3/4 SS .....	6
LOCKNUT, 8-32 SS.....	14
CABLE TIE, NYLON .....	6
ALLEN HEAD WRENCH, 5/64" .....	1
PUSH TUBE, 3/8 X 3".....	1

CAREFULLY MANUFACTURED BY:

## **M<sup>2</sup> ANTENNA SYSTEMS, INC.**

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