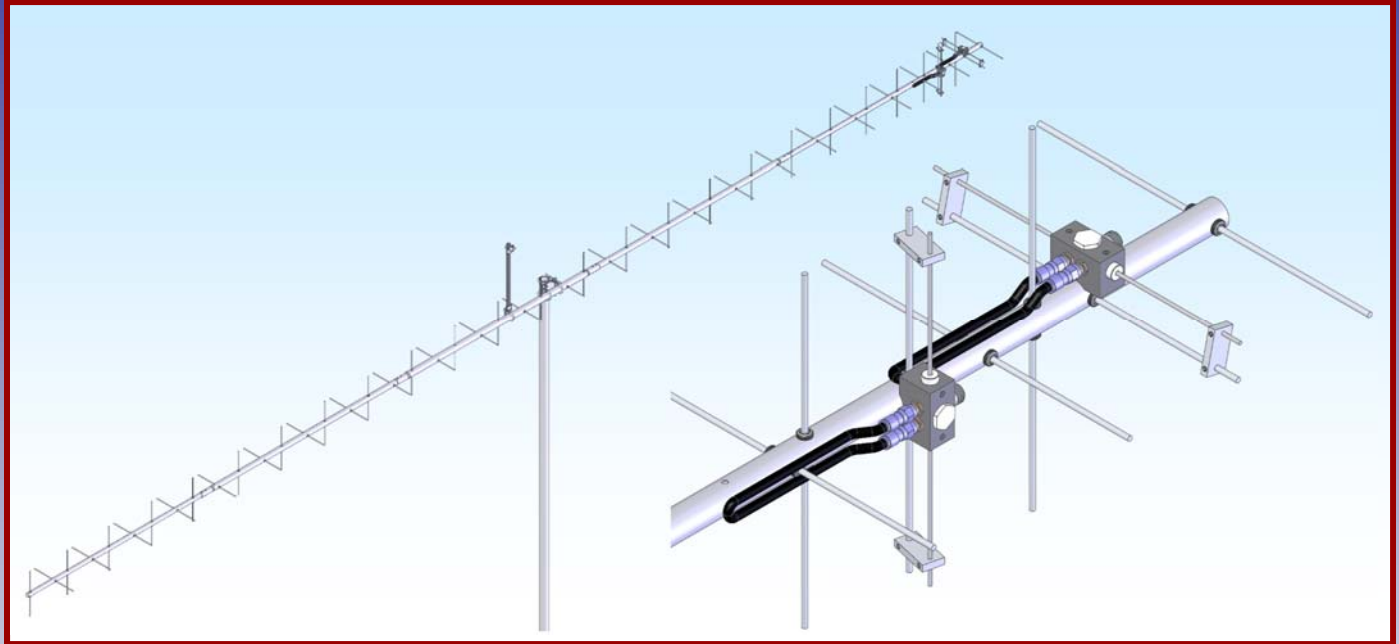




# M2 Antenna Systems, Inc. Model No: 432XP50



## SPECIFICATIONS:

Model .....	432XP50	Input Connector .....	"N" Female
Frequency Range.....	430 To 434 MHz	Power Handling .....	1300 W
*Gain .....	20.0 dBi	Boom Length / Dia.....	23' 4" / 1-1/2" To 1"
Front to back .....	22 dB Typical	Maximum Element Length.....	13-7/16"
Cross pol. isolation.....	>20 db Typical	Turning Radius: .....	12 ft
Beamwidth .....	19°	Stacking Distance.....	80" High & 80" Wide
Feed type .....	Folded Dipole	Mast Size.....	1-1/2" to 2" Nom.
Feed Impedance. ....	50 Ohms Unbalanced	Wind area / Survival .....	2.4 Sq. Ft. / 100 MPH
Maximum VSWR.....	1.5:1	Weight / Ship Wt.....	9.5 Lbs. / 11 Lbs.

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

## FEATURES:

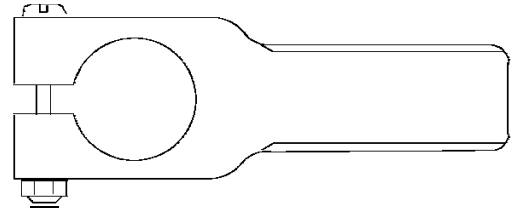
The 432XP50 has been specifically designed for EME and long haul tropo-scatter use. The dual polarity flexibility is particularly valuable for EME where the long waits for Faraday polarity rotation are eliminated. Having polarity flexibility for long haul tropo paths is very useful as well. This flexibility handles polarity shift due to hills, mountains and buildings, not to mention working mobiles and modest stations with verticals. Gain and F/B are excellent. The extremely clean pattern maximizes forward gain and F/B. The pattern is important in order to match the antenna's noise temperature with modern low-noise preamps. Using the 432XP50 in an array of two or four antennas is a very small, manageable package that can make moonbounce (EME) contacts even with very modest stations like Dxpeditions!

The driven elements are CNC machined aluminum, O-ring sealed connectors to assure low maintenance and long-term peak performance. Internal connections are embedded in a space-age silicone gel that seals out moisture and improves power handling. The 3/16" 6061-T6 rod elements are centered in the boom to minimize polarity interaction. Insulators are UV stabilized and locked in place with stainless retainers. The central boom section is 1-1/2" dia., tapering, front and rear, through 1-1/4" sections to 1" ends. A non conductive vertical mast and Dacron cord supports the boom., M2 can supply all the parts for arrays of any size. M2 makes the best switching preamps using the latest device technology. See web site for more details.

# 432XP50 ASSEMBLY MANUAL

**TOOL REQUIRED FOR ASSEMBLY:** Screwdriver, 11/32 nut driver or wrench, 7/16" and 1/2" end wrenches, pliers, measuring tape.

**NOTE: WE RECOMMEND COMPLETELY ASSEMBLING ONE BOOM SECTION AT A TIME WITH BOTH HORIZONTAL AND VERTICAL ELEMENTS. CENTER THE ELEMENTS AND INSTALL THE RETAINERS (KEEPERS) ON ONE SIDE OF THE ELEMENT ONLY. BEFORE STARTING THE NEXT BOOM SECTION, USE A TAPE MEASURE TO QUICKLY IDENTIFY EACH BOOM SECTION BY ITS' DIAMETER AND ELEMENT HOLE POSITION. MARK EACH SECTION WITH A FELT MARKER.**



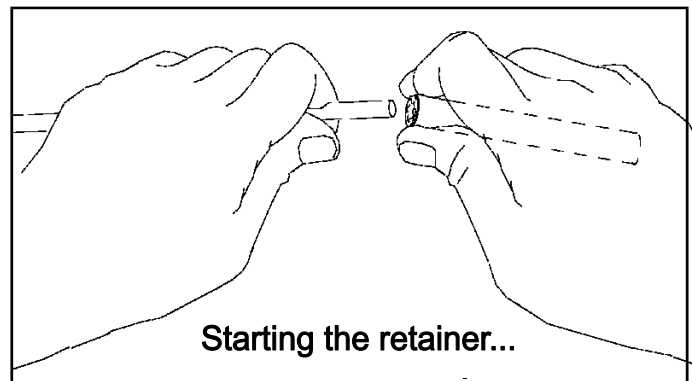
1. Locate boom section #1 and the horizontal and vertical elements that mount in that section..

2. Reserved for future use.

3. Separate the elements by length into two sets, "H" (rear) and "V" (forward). The offset between the two element sets is 1/4 wave length. **Follow the BOOM #1 DIMENSION SHEET lengths carefully because H and V SETS ARE NOT IDENTICAL.** Begin with the reflector (longest) element. Balance it across your finger to find rough center and push on a black button insulator to about 1/2" off center. Insert the element through the holes 1/2" from the rear of the boom and install the second button, pressing it up into boom. **DO NOT BOTHER TO ACCURATELY CENTER** the elements at this time and **DO NOT INSTALL** the stainless steel shaft retainers. This is easier to do after ALL the horizontal elements are installed in this boom section..

4. Install the 3/16" 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.**

5. Now begin centering the horizontal elements. Use a tape measure to EQUALIZE the length of rod showing on each side of the boom. Once you have all the elements centered, sight down the element tips from the rear comparing each side for obvious errors. Correct as needed. Chamfer the inside edges of the PUSH TUBE (3/8" x 3" tube, supplied in the kit) to allow the retainer fingers to flex into the tube during installation. Use thumb and forefinger to hold the retainer over the end of the Push Tube with the 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 continue until retainer butts on insulator button. Locking pliers, **lightly** clamped up against opposite button insulator will help maintain center reference (if you push the first retainer too far, remove element from boom, push the retainer completely off the element and start over).



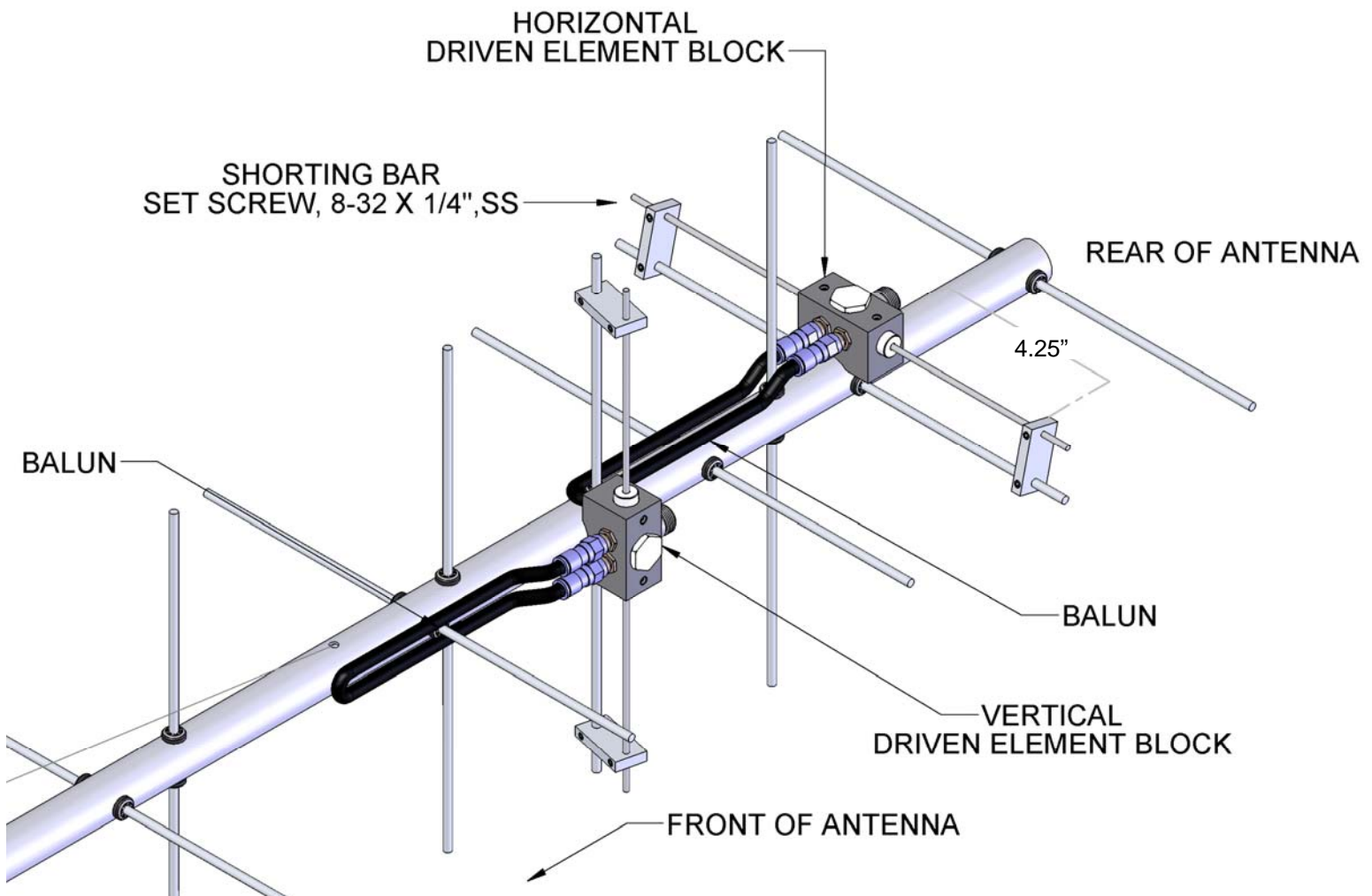
Only install the retainers on one side of each element until you have tested your antenna. This will save having to cut off any retainers if you make a mistake.

**NOTE:** The SHAFT RETAINERS (used in securing the elements) should always be used for permanent and long term antenna installations. For portable or temporary use, the retainers may be left off. The button insulators, normally a tight fit, should hold the elements quite securely. If the button

# 432XP50 ASSEMBLY MANUAL

insulators are a bit loose, you can crimp them slightly with pliers (not required when using the shaft retainers).  
**Use a thin coat of Penetrox on all metal to metal contacts (except for the coax connectors) and on all stainless hardware to minimize the chance of freezing/galling.**

6. Mount the **HORIZONTAL DRIVEN ELEMENT BLOCK / ROD ASSEMBLY** to the **TOP** of the boom using a single 8-32 x 1-1/4" screw. Orient the block with the two balun connectors facing to the front. 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" driven element rods and the 1/8" Driven Element Block Rods. Position the Shorting Bars as specified on the **DIMENSION SHEET**. The given dimension is between the outer face of the driven element block and the inner face of the shorting bar. Hold the bar so both rods are parallel with each other and tighten the set screws.
7. **ASSEMBLING THE VERTICAL ELEMENTS:** Repeat steps #2 through #5 for the Vertical (forward) elements, using the **BOOM #1 DIMENSION SHEETS** as your guide for lengths and spacing.
8. **INSTALLATION OF THE VERTICAL DRIVEN ELEMENT BLOCK:** Refer to the **DIMENSION SHEET** for block orientation and balun direction. **NOTE: IF THIS ANTENNA IS PART OF AN ARRAY OR TWO OR MORE ANTENNAS, all driven element blocks in the final array must be mounted in the same position – such as all horizontal driven element blocks up with balun to the front and all vertical blocks on the same side with the balun going forward.** Install the shorting bars as specified on the **DIMENSION SHEET**. (FOR MORE DETAILS, PLEASE SEE PICTURE BELOW).



# 432XP50 ASSEMBLY MANUAL

9. Attach the baluns to the Driven Element Blocks connectors as shown on the drawing. Tighten the connectors **gently** using a 7/16" end wrench. A lot of torque is unnecessary. The baluns may loop around the element. This is normal. Form the balun coax close to the boom and secure gently with nylon cable ties.
10. Continue mounting and securing the elements in boom sections #2, #3, #4 and #5.
11. Now assemble the boom sections and securing them with the hardware noted on the BOOM DIMENSION DRAWINGS.
12. The boom to mast plate is normally mounted at center of mass (REFER TO BOOM #3 DIMENSION SHEET). If building an array, the boom to mast plate on each antenna should be mounted at the identical location. When used in an array, the rear 'T' brace, coax, and power dividers add considerable weight to the rear of the antenna.

## **BOOM SUPPORT GUY SYSTEM (REFER TO THE BOOM SUPORT DRAWING FOR MOST DETAILS)**

13. Position the riser assembly in front of the boom to mast plate near the balance point. (not critical). Next connect each end of the Mastrant cord to the eyebolts. Use at least 3 half hitches to secure the cord.
14. Install a 1/4-20 stainless nut on the "EYE" end of each turnbuckle by unscrewing the EYE end and running the nut on all the way up to the end of the threads. Once the turnbuckles are finally adjusted and set to level the boom, tighten these nuts securely to the turnbuckle bodies. This prevents the turnbuckles from loosening and is much easier than safety wiring the turnbuckles. HINT: Now is the time to grease the turnbuckle threads lightly with WHITE GREASE so the turnbuckles will remain easily adjustable for long periods.
15. Hook the turnbuckles to the plate and adjust so the threads just show inside the body of the turnbuckle on both ends. Cut the cord so an equal amount of cord remains to tie to the eyes in each turnbuckle. LEVEL THE BOOM or elevate the ends slightly. Then pull each cord tight through the turnbuckle eye and secure with at least 3 half hitches. Route any excess cord back down the tensioned cords and tape securely.
16. Adjust the turnbuckles until the boom is straight or bowed up slightly to allow for cord stretch ( very little ). Final adjustments can be made with the turnbuckles at any time. Don't forget to retighten the jam nuts after each adjustment.

NOTE: THE MALE 'N' CABLE CONNECTOR AT THE FRONT DRIVEN ELEMENT MUST BE EITHER A CRIMP TYPE OR A VERY SHORT MANUAL ASSEMBLY CONNECTOR. WARM THE COAX AND FORM THE COAX TO THE SIDE AND AROUND THE HORIZONTAL DIRECTOR. A LONG MANUAL ASSEMBLY 'N' MALE CONNECTOR WILL NOT FIT HERE. THE COAX JACKET AND/OR HEAT SHRINK (WEATHERPROOFING) **WILL TOUCH THE ELEMENT. THIS IS ACCEPTABLE.**

Use top quality coax and "N" connectors for your phasing / matching lines. M<sup>2</sup> can make LMR-400 matched phasing lines for your system as an option. For phased arrays, the driven elements must be correctly oriented. In homebrew arrays, phasing/ matching lines should exit from the boom rear, and parallel to, the forward reflector and at right angles to, and slightly forward of, the rear-most driven element. Another alternative is to have both lines exit at the rear of the boom. ***Do not route lines forward to boom-to-mast plate as exiting antenna, in any plane, here will adversely affect pattern.***

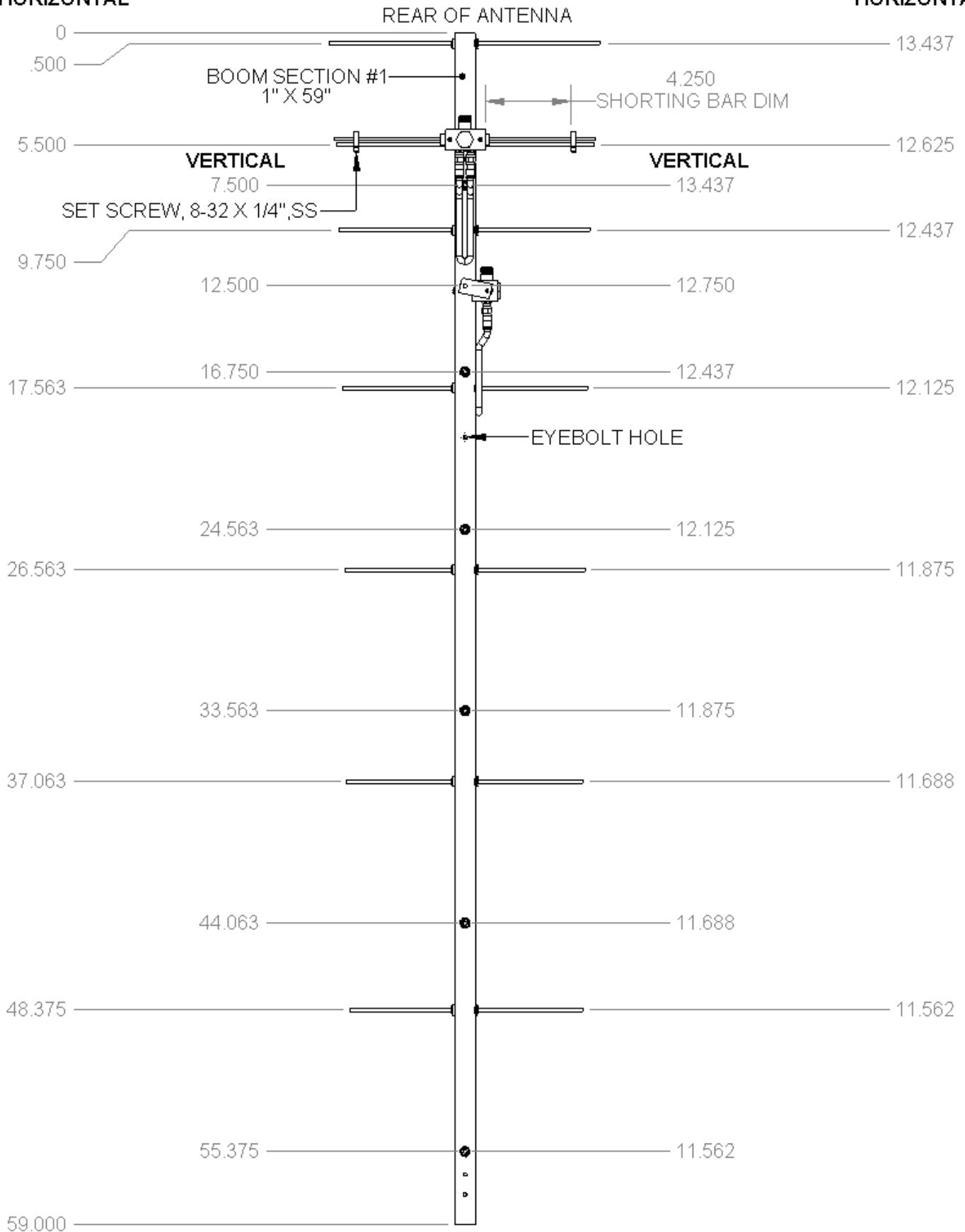
## **HINTS AND KINKS:**

DUAL POLARITY AND CP ANTENNAS create a field in all planes or polarities. **Gain, f/b and SWR DETERIORATES SIGNIFICANTLY** if they are mounted to a metal (conductive) mast / cross boom or if the feedline exits the boom anywhere but at the rear. A 2" mast of any NON-CONDUCTIVE material can be used. Fiberglass is the prime choice for its strength and weather resistance. Array hardware that does not intersect or intrude on the element planes may be of conductive material; for instance, the main cross boom in a 4- or 8-bay array. The general rule is to keep any elements that are in the same plane as a support boom at least 1/2 wavelength between the tips of the elements and the metallic end of the support boom. (40" for 144 and 12" for 432 MHz).

# 432XP50 DIMENSION SHEET

ELEMENT SPACING  
HORIZONTAL

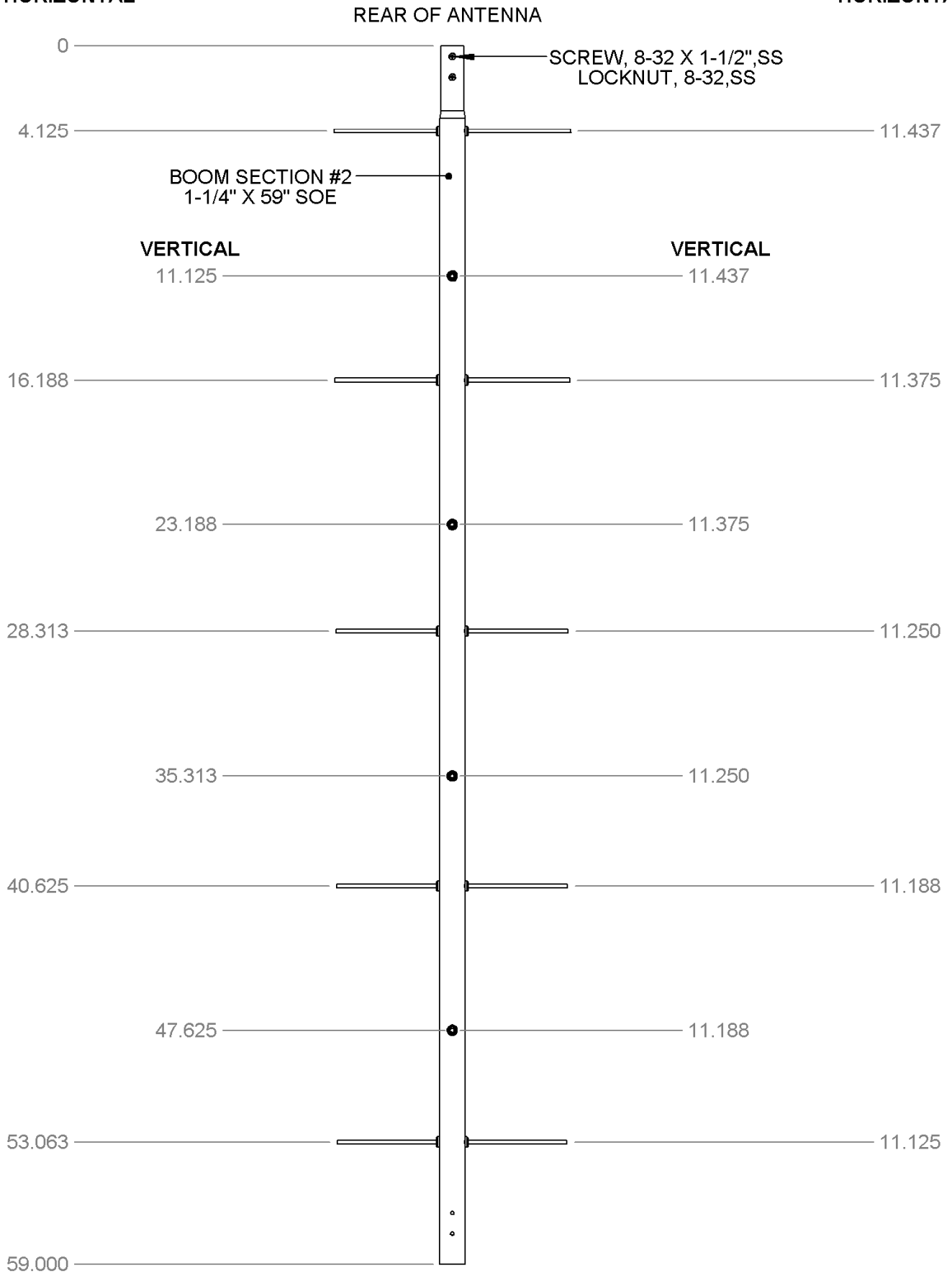
ELEMENT LENGTH  
HORIZONTAL



# 432XP50 DIMENSION SHEET

ELEMENT SPACING  
HORIZONTAL

ELEMENT LENGTH  
HORIZONTAL

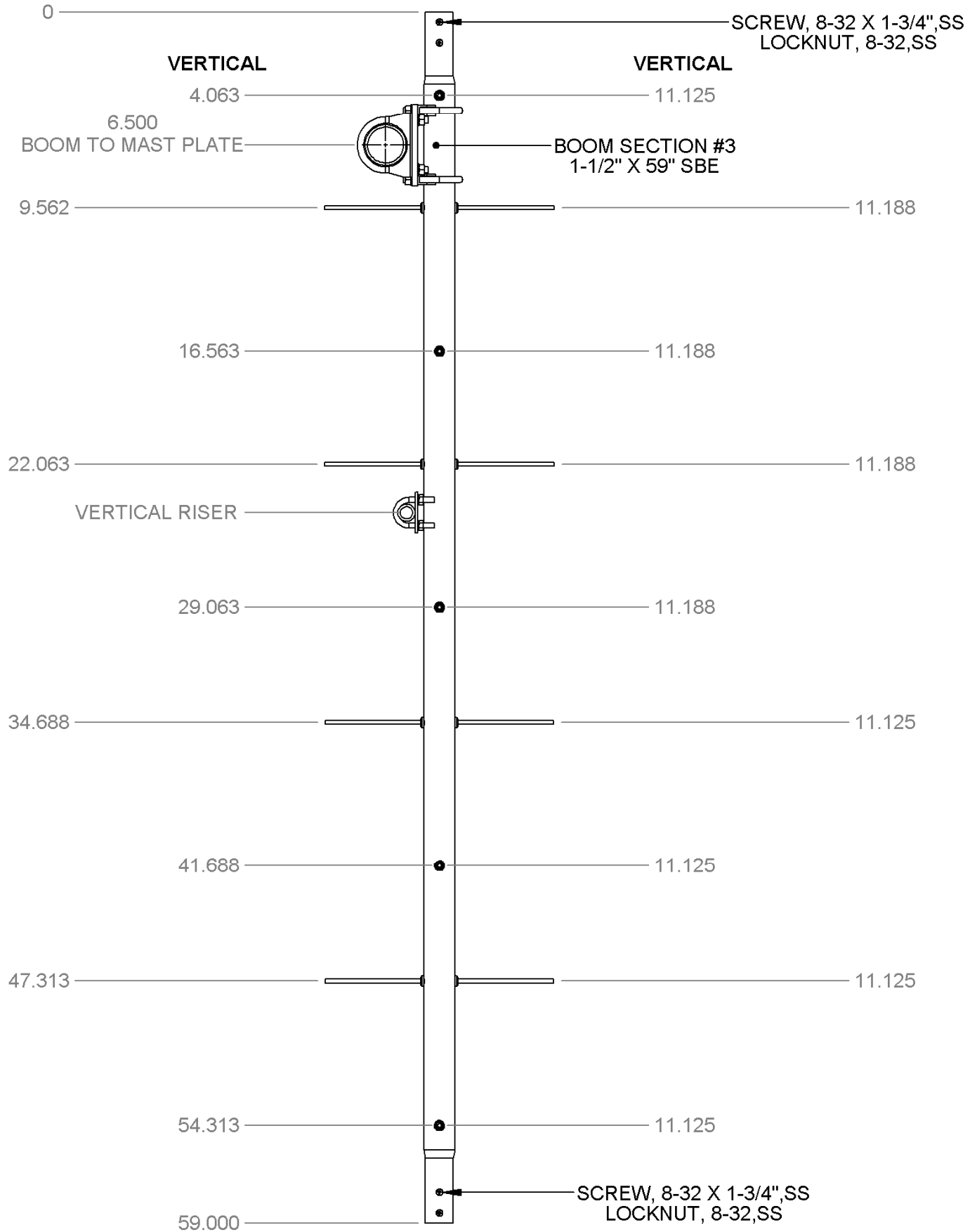


# 432XP50 DIMENSION SHEET

ELEMENT SPACING  
HORIZONTAL

REAR OF ANTENNA

ELEMENT LENGTH  
HORIZONTAL

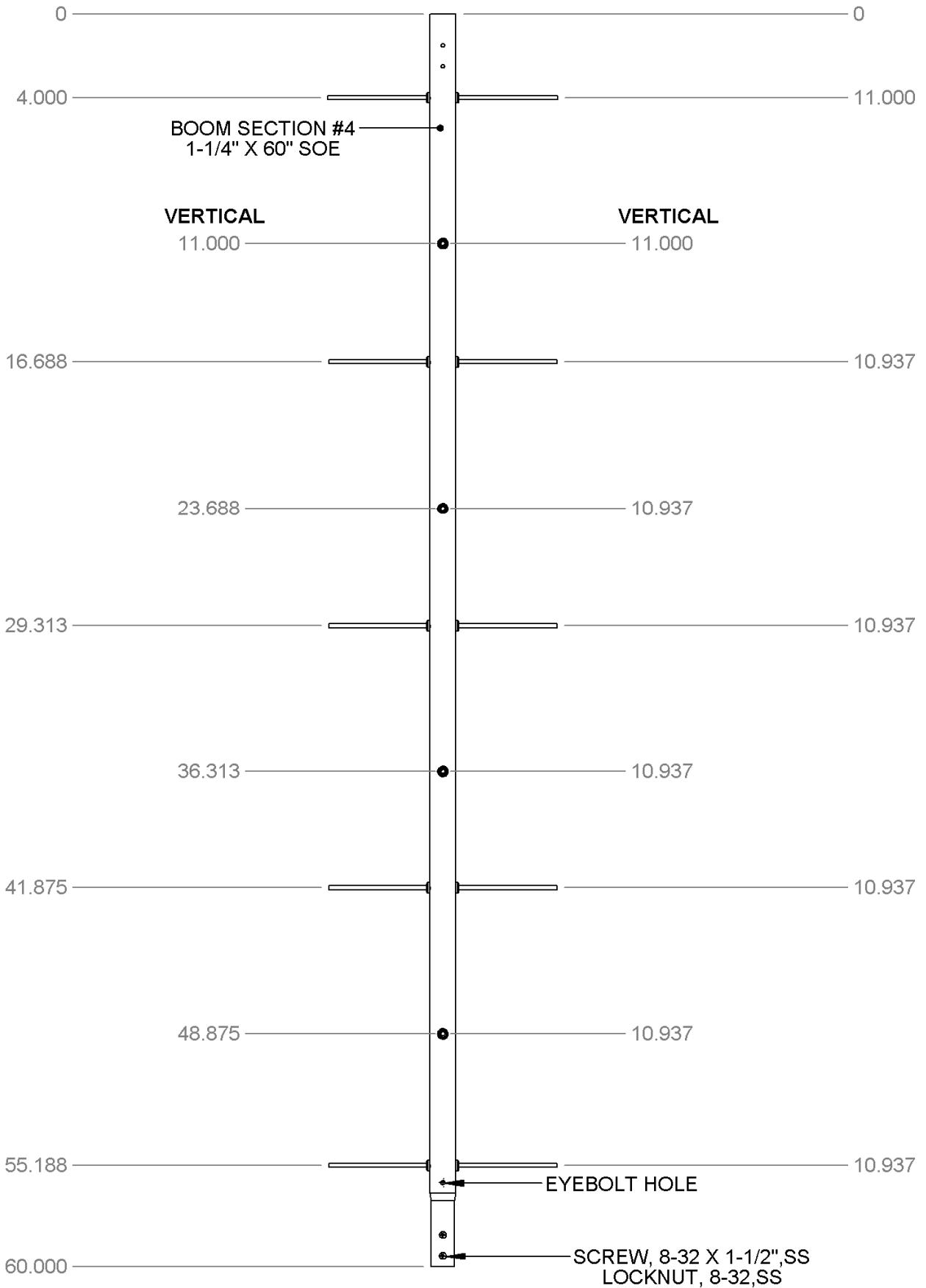


# 432XP50 DIMENSION SHEET

ELEMENT SPACING  
HORIZONTAL

REAR OF ANTENNA

ELEMENT LENGTH  
HORIZONTAL



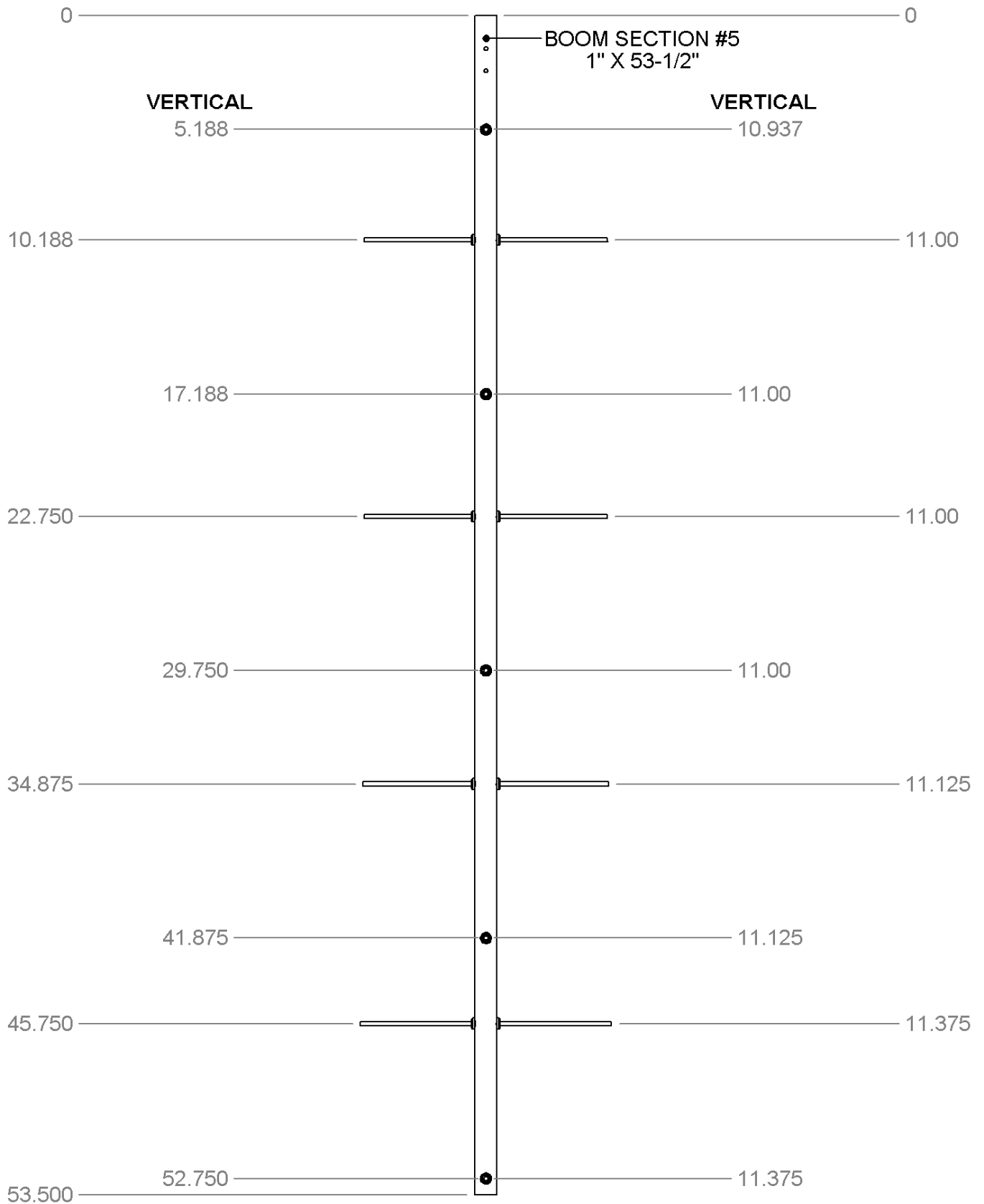


# 432XP50 DIMENSION SHEET

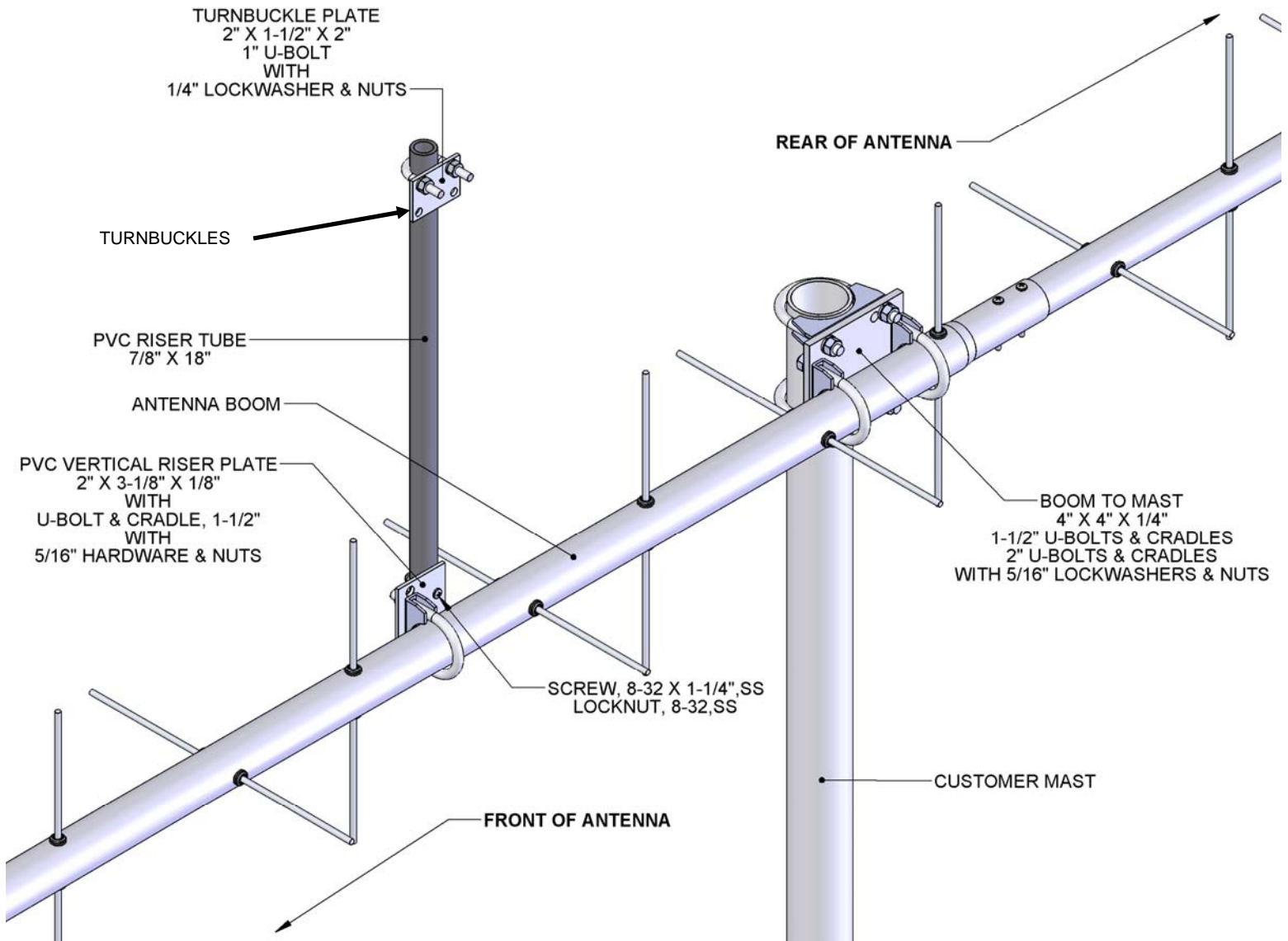
ELEMENT SPACING  
HORIZONTAL

REAR OF ANTENNA

ELEMENT LENGTH  
HORIZONTAL



# ANTENNA BOOM SUPPORT DETAILS



# 432XP50 PARTS & HARDWARE

DESCRIPTION .....	QTY
BOOM SECTION # 1, 1" X 0.058 X 59" .....	1
BOOM SECTION # 2, 1-1/4" X 0.058 X 59" SOE .....	1
BOOM SECTION # 3, 1-1/2" X 0.058 X 59" SBE .....	1
BOOM SECTION # 4, 1-1/4" X 0.058 X 60" SOE .....	1
BOOM SECTION # 5, 1" X 0.058 X 53-1/2" .....	1
ELEMENTS, 3/16 ROD x DIM SHEET .....	50
DRIVEN ELEMENT BLOCK ASSEMBLY .....	2
PVC VERTICAL RISER TUBE, 7/8" X 18" .....	1
BALUN FOR D.E. ASSEMBLY, (RG-6) .....	2
SHORTING BAR, 1/4" X 3/4" (M2ASB0080).....	4
BOOM TO MAST PLATE, 4" X 4" X 1/4" (M2APT0024) .....	1
TURNBUCKLE PLATE, 1/8" X 1-1/2" X 2" .....	1
VERTICAL RISER PLATE, 1/8" X 2" X 3-1/8"(M2APT0067) .....	1
TURNBUCKLE, 1/4" X 5-1/4" .....	2
U-BOLT & CRADLE, 2" .....	2
U-BOLT & CRADLE, 1-1/2" .....	3
U-BOLT, 1" .....	1
MASTRANT, 1/8" X 21' .....	1
ZIP TIE, (MEDIUM) .....	6
PENETROX / ZINC PASTE CUP .....	1
ASSEMBLY MANUAL .....	1

## HARDWARE:

BUTTON INSULATORS.....	102
SHAFT RETAINER, SS.....	102
EYEBOLT, 1/4-20 X 3", ZINC W/NUT .....	2
LOCKWASHER, 5/16,SS .....	10
NUT, 5/16-18,SS .....	10
LOCKWASHER, 1/4,SS .....	4
NUT, 1/4-20,SS .....	6
SCREW, 8-32 X 1-3/4, SS.....	4
SCREW, 8-32 X 1-1/2, SS.....	4
SCREW, 8-32 X 1-1/4, SS.....	4
SETSCREW, 8-32 X 1/4, SS.....	8
LOCKNUT, 8-32, SS .....	10
ALLEN HEAD WRENCH, 5/64" .....	1
PUSH TUBE, 3/8 X 3" .....	1

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