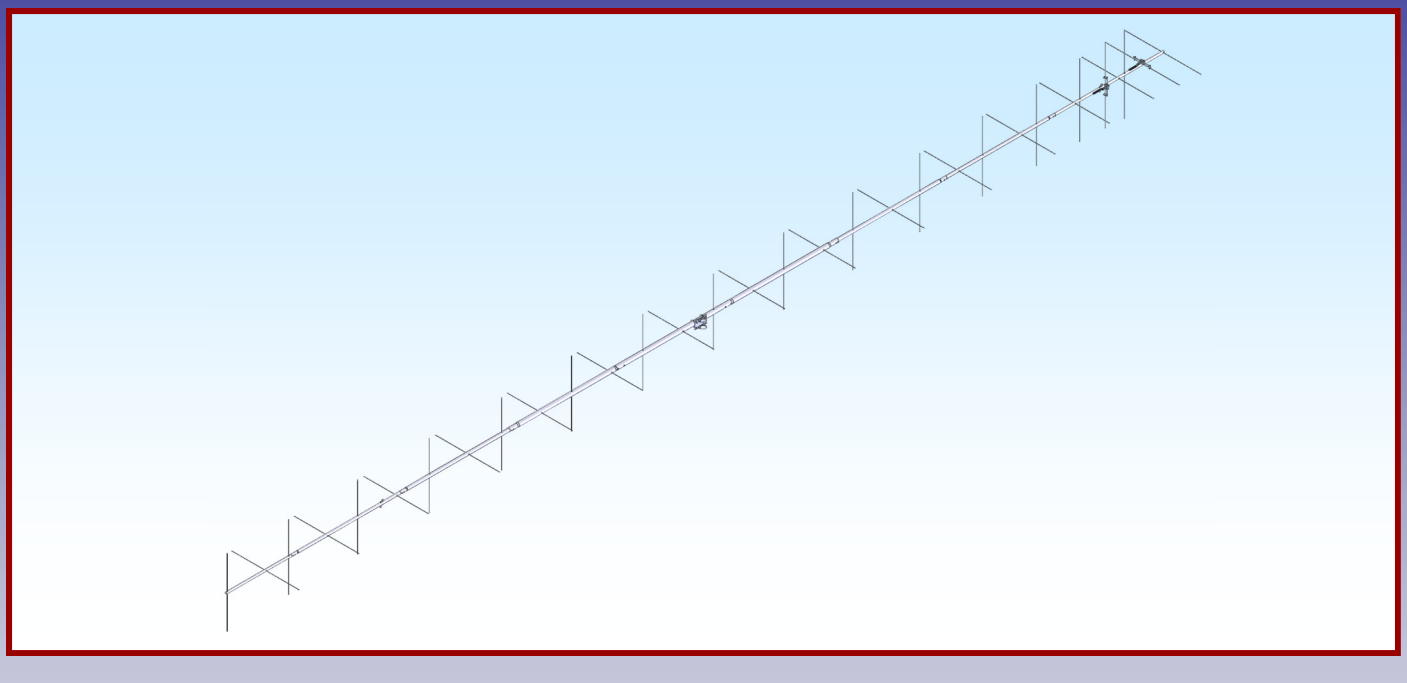
M2 Antenna Systems, Inc.
Model No: 145XP32



SPECIFICATIONS:

Model	145XP32
Frequency Range	144 To 146 MHz
*Gain, (FS) / 4 spaced 178”	17.5 dBi / 23 dBi
G/T for 4 ants	-0.11
Front to back	24 dB Typical
Beamwidth	24°
Feed type	T-Match
Feed Impedance.	50 Ohms Unbalanced
Maximum VSWR	1.7:1 Max

Input Connector	“N” Female
Polarity	Vertical and Horizontal
Power Handling	1.5 kW
Boom Length / Dia	40’ 10” / 2” down to 1”
Turning Radius:	20’ 7”Single
Stacking Distance	180”
Mast Size	2” Nom.
Wind area / Survival	4.2 Sq. Ft. / 100 MPH
Weight / Ship Wt.	24 Lbs. / 26 Lbs.

***Subtract 2.14 from dBi for dBd / FS = Free Space**

FEATURES:

This is the latest in a series of dual polarity Yagis. This antenna stretches the practical limit of 2 meter array boom length and squeezes almost 22 dBd from a quad array. The very good G/T is a result of low side and back lobes The design has been optimized for stacking (see patterns). Simple, one relay switching provides either Horizontal or Vertical polarity and this simple system is never more than 3 dB from optimum. Using more complex switching schemes can provide Horizontal, Vertical, Right Orthogonal, and Left Orthogonal and Right and Left hand circular that can keep you within a few 10ths of a dB of the peak signal you are seeking. Signal losses from special polarity and Faraday rotation virtually disappear. EME reliability approaches 100%. M^{2}'s new 145XP32 antennas, power dividers and phasing lines (using Times' new light-weight, low-loss LMR400 and/or LMR600 cable) coupled with ‘T’ brace kits and fiberglass H-frame packages, provide the building blocks for a whole new generation of high performance arrays.

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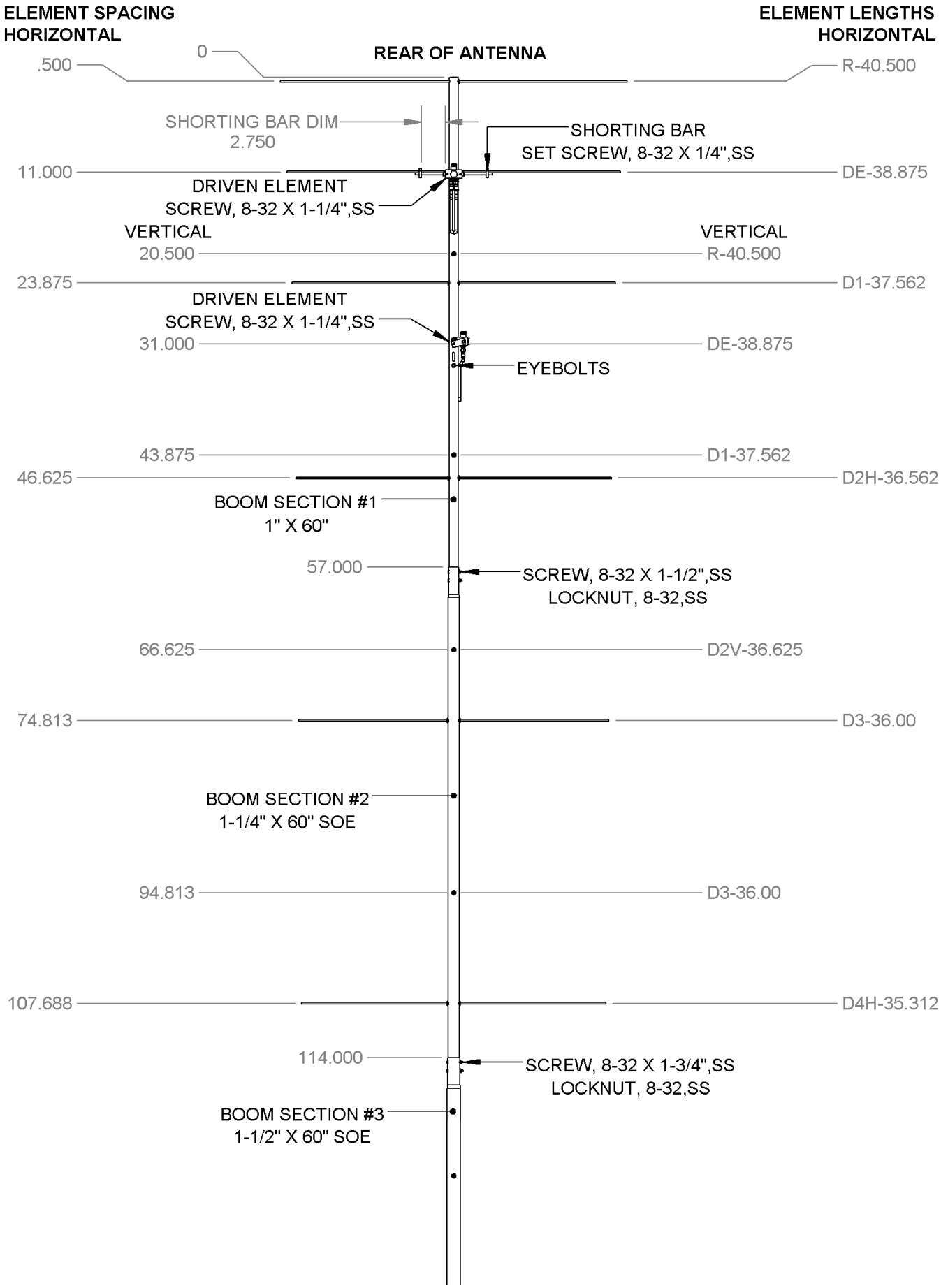
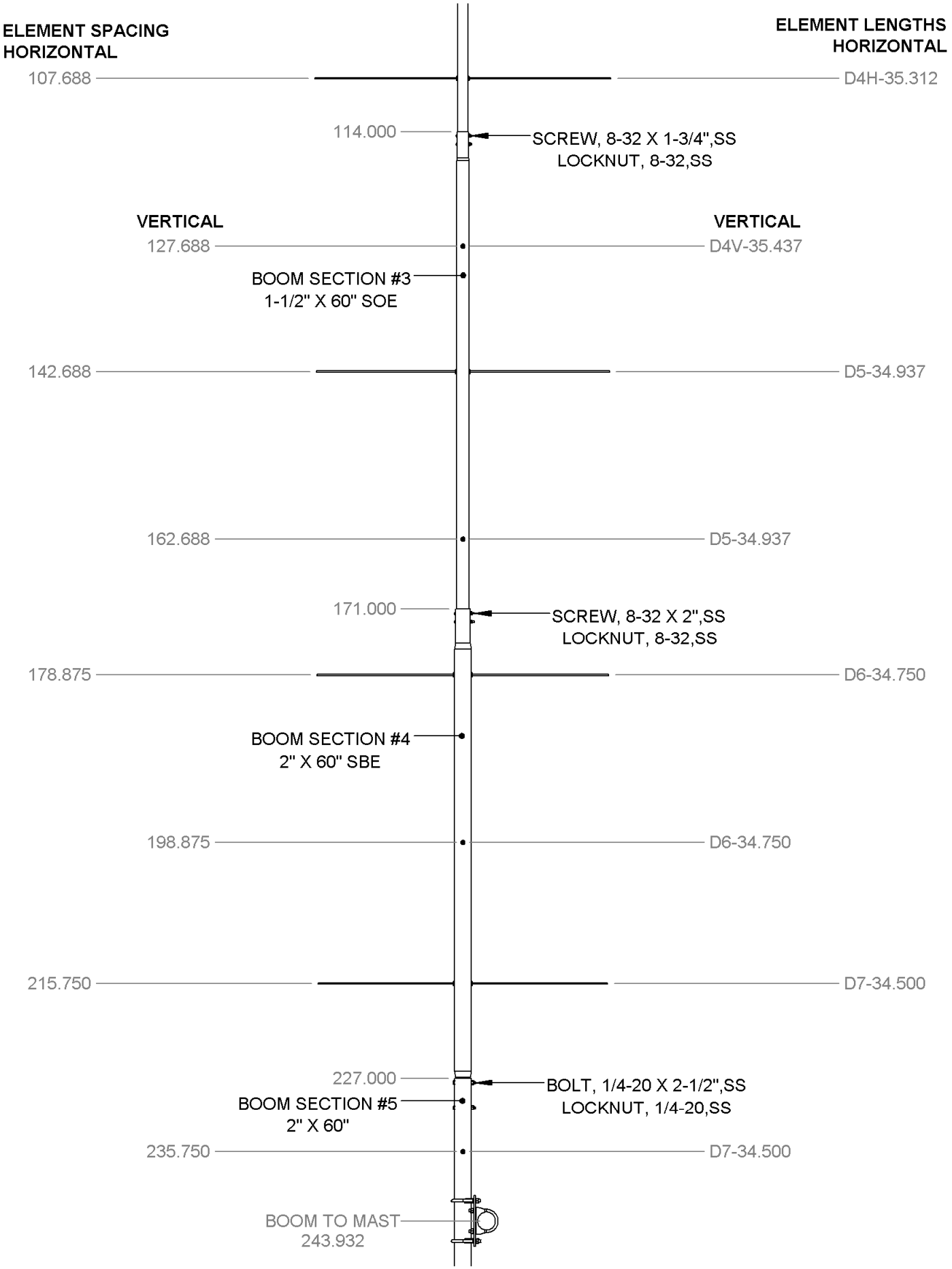
09/1/15
Rev.00

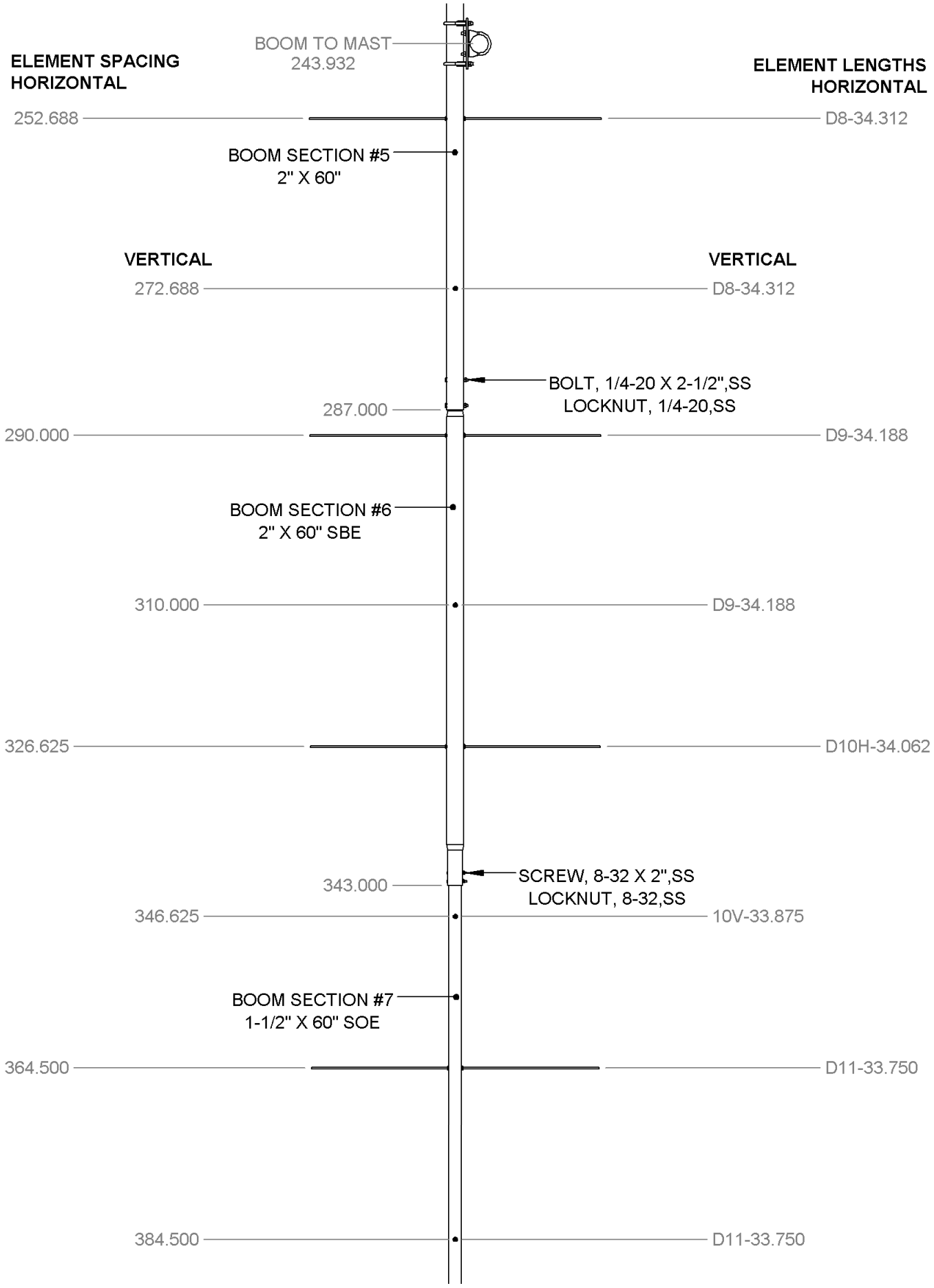
145XP32 DIMENSION SHEET #1



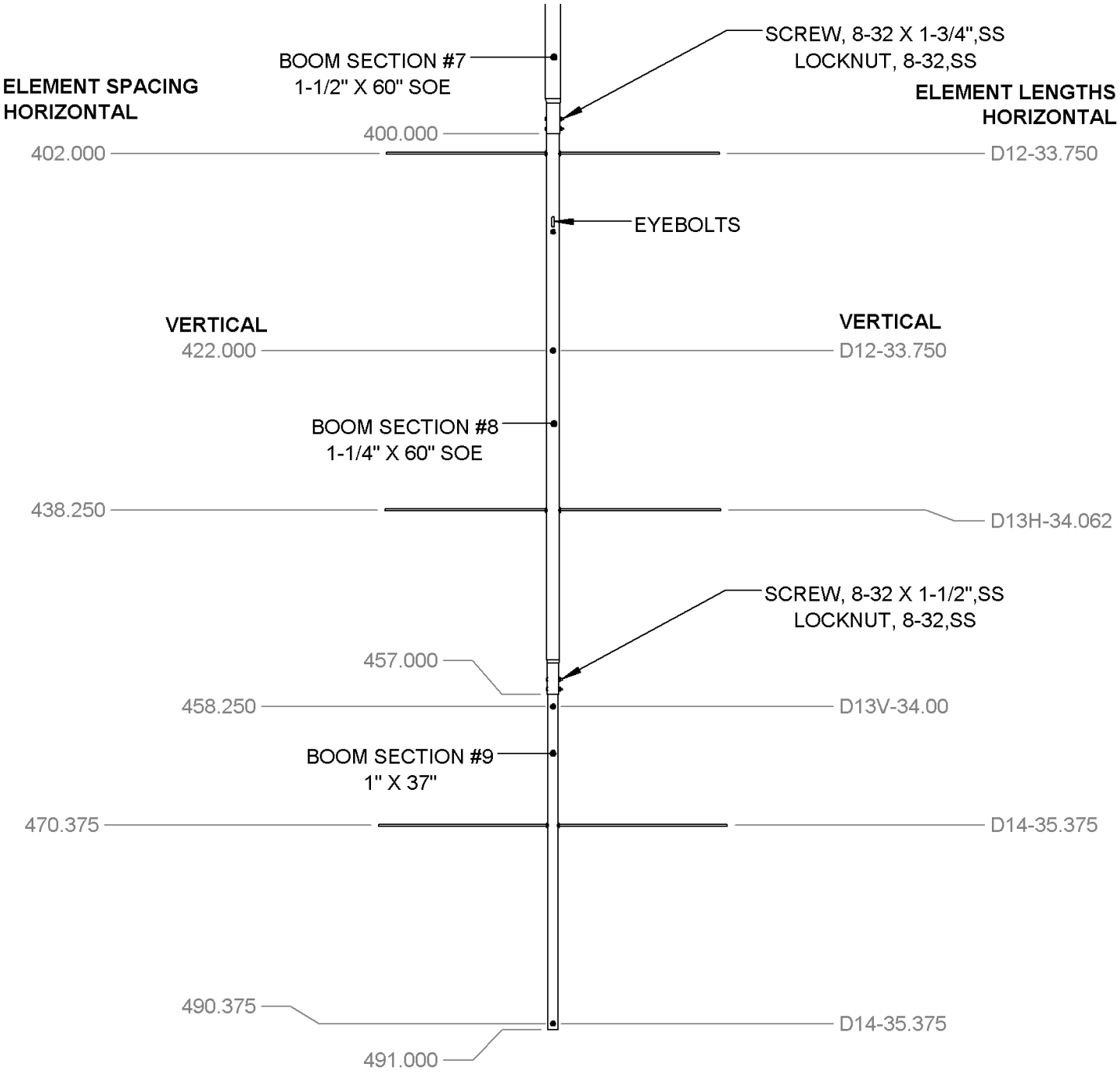
145XP32 DIMENSION SHEET #2



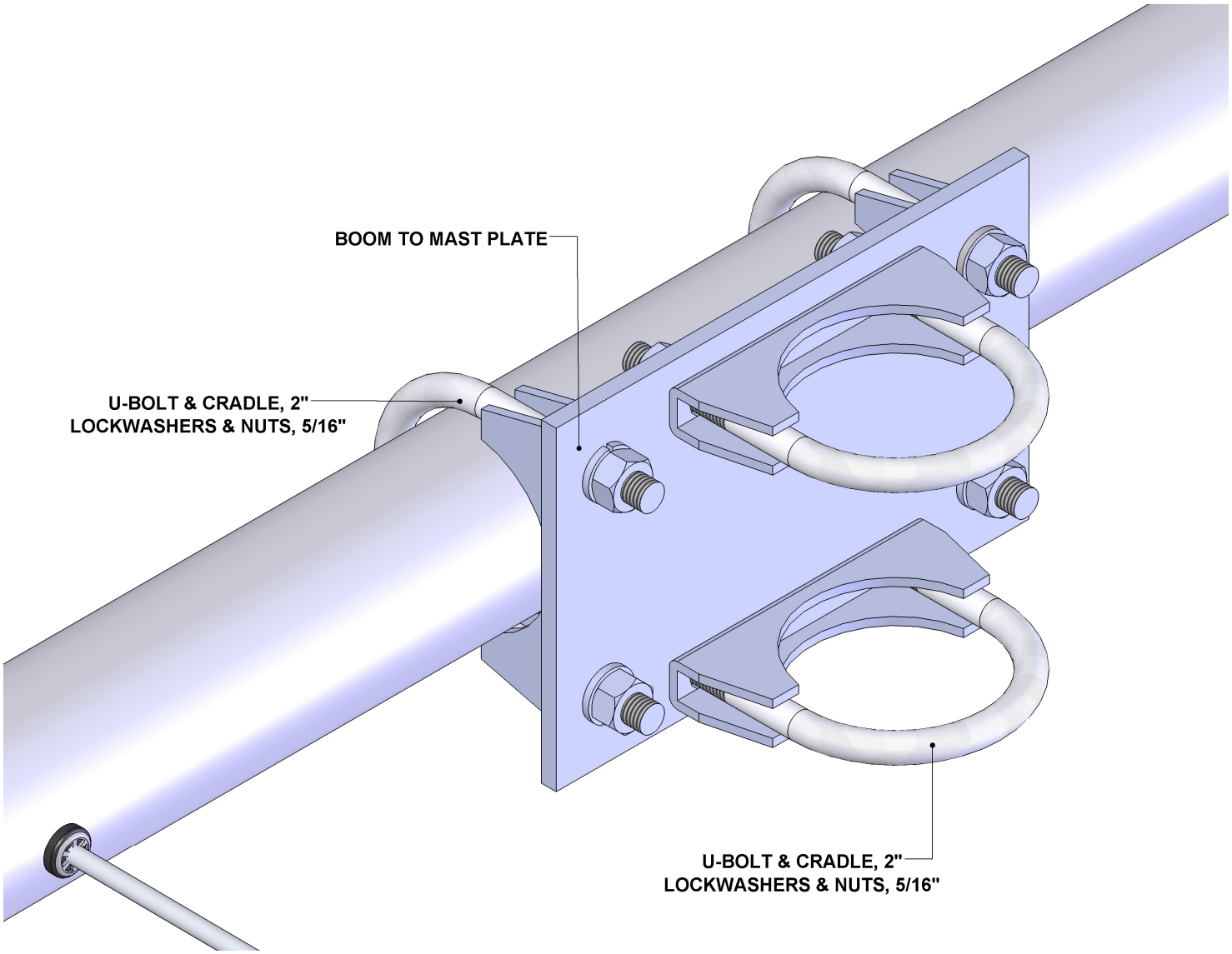
145XP32 DIMENSION SHEET #3



145XP32 DIMENSION SHEET #4



BOOM TO MAST PLATE DETAIL

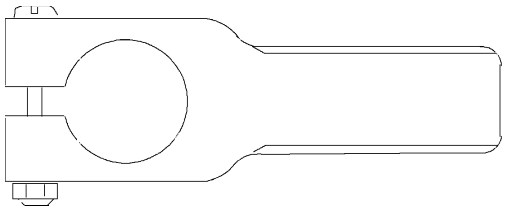


145XP32 ASSEMBLY MANUAL

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

1. Start by laying out the boom sections, noting hole positions and matching to the DIMENSION SHEET. The inner 2" sections couple with 1/4-20 x 2-1/2 bolts and locknuts Use 8-32 x 1-1/2" screws and locknuts to join 1" to 1-1/4" sections, 1-3/4" hardware for 1-1/4" to 1-1/2" sections, 2" hardware for 2" to 1-1/2" sections.

2. If you are also using the M^2 XP H-frame Kit, open that kit and find one of the 'T' brace clamps shown at right. Loosely install an 8-32 x 1-1/2" screw and locknut into the clamp fingers. Then slide the clamp on the rear boom section (1") and position (between holes for horizontal driven element and vertical reflector). Do not tighten clamp at this time.



3. Separate elements by length into two sets, "H" (rear) and "V" (forward). Offset between the two element sets is 1/4 wavelength. **Follow the DIMENSION SHEET lengths carefully because SETS ARE NOT IDENTICAL.** Lay out the "H" element set by length and position as shown on the DIMENSION SHEET. 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.

INSTALLATION TIP FROM MIKE: Because of tolerance in rod diameter, use pliers or equivalent to deform the hole in both button insulators until the rod fits through each tight. This will help hold the elements firmly in place and make it easier to hold the element on center during KEEPER installation.

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 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 the boom.

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 elements. Use a tape measure to EQUALIZE the length of rod showing on each side of the boom within 1/16 inch. 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.

6. **INSTALLING THE SHAFT RETAINERS:** Deburr or 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 fore finger 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 and 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 it completely off the element, and start over). Install another retainer to the opposite side of the element. Continue installing retainers until all elements are locked in place.
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, or whenever it is anticipated that the antenna will be disassembled within a short time, the retainers may be left off. The button insulators, normally a tight fit, hold the elements quite securely.

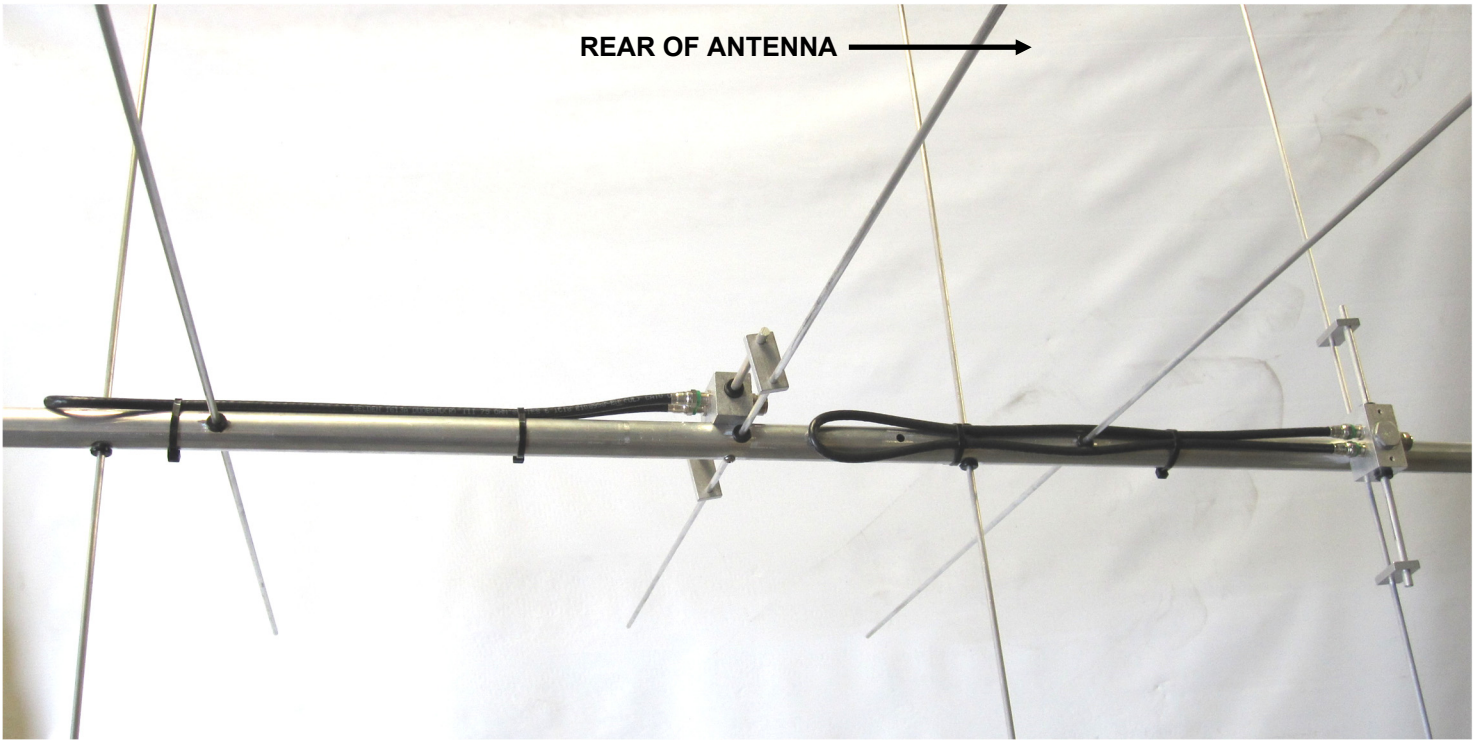
7. Mount the **HORIZONTAL** DRIVEN ELEMENT BLOCK / ROD ASSEMBLY to the **TOP** of the boom using a single 8-32 x 1-1/4" screw. Orient the block with the two Balun connectors facing to front. Install the 8-32 x 1/4" set screws (internal Allen head – tool supplied) into the SHORTING BARS. Slide the bars onto the 3/16" driven element rods and the 1/4" 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. Align the bars with each other and tighten the set screws.

8. **ASSEMBLING THE VERTICAL ELEMENTS:** Repeat steps #2 through #5 for the Vertical (forward) elements, using the DIMENSION SHEET as your guide to lengths and spacing.

9. **INSTALLATION OF THE *VERTICAL* DRIVEN ELEMENT BLOCK:** Refer to the DIMENSION SHEET for block orientation and Balun direction. 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.

10. Attach Baluns to the Driven Element Blocks connectors as shown on the drawing. Coil rear Balun once to keep length on boom. Tighten the connectors ***gently*** using a 7/16" end wrench. A lot of torque is unnecessary. The Vertical Balun may loop around a horizontal element. This is normal. Form Balun coax close to the boom and secure with nylon cable ties. Ties should be snug, but not crushing or kinking the coax.

11. Use top quality coax and "N" connector for your phasing / matching lines. If using with the M^2 XP H-frame Kit, secure coax near feed connectors on driven element blocks, to provide stress relief, route to 'T' brace clamp, and down 'T' brace tube to power divider. Secure at regular intervals. Refer to H-Frame manual drawings for more important details on orientation of antennas: Driven elements must be correctly phased. In homebrew arrays, phasing / matching lines should at least exit from the boom behind, and parallel to, the forward reflector and at right angles 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.***



145XP32 ASSEKBLY MANUAL

12. See Dimension sheet for boom to mast plate mount location. The 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. When used with an M^2 XP H-frame Kit, vertical elements are aligned with the boom to mast plate. Secure plate with two 2" U-bolts and the stainless nuts and lock washers provided. DO NOT OVER TIGHTEN. 2" U-bolts and stainless hardware are provided for mounting the antenna to a NON-CONDUCTIVE mast or cross boom.

BOOM SUPPORT GUY SYSTEM

13. To prepare the guys, First attach a temporary 2" x 24" or longer mast section to the boom to mast plate. Install a 2" U-bolt into the 2" X 2" x 4" ANGLE TURNBUCKLE PLATE and slide the U-bolt over the temproary mast in the boom-to-mast plate. Secure the Ubolt assembly at about 18" above the boom with a couple of 5/16" nuts. The turnbuckles should be extended until just a thread or two shows inside the body of the turnbuckle. Then hook into the horizontal holes in the "L" plate. Install Cable Eyes on each turnbuckle loop.

14. Install the two EYEBOLTS into the holes in the front 1-1/4 and rear 1" boom sections. Install cable eyes in each eyebolt.

15. Uncoil PHILLISTRAN CORD. String two cable clips on the cord and then pass the cord through the eye in the front eyebolt and back through the two clips. Three inches of cord folded back is all that is needed for the two clips. Tighten the cable clips or U-clamps on the cord. Repeat this step for the rear eyebolt. Don't cut the cord yet.

16. At this point the boom should be laying on flat ground or level surface. Equalize the excess Phillistran cord length at turnbuckle plate and cut. String 2 cable clips on the cord and thread it through rear turnbuckle eye and back through the two cable clips. Pull out the slack and tighten the cable clips. Repeat for front cord section. Trim excess length, if any beyond the clips or tape the excess to main line. In large array systems under supports may be needed. (Repeat steps 13-15) for underside supports.

17. All cords should now be fairly taut and the boom, when lifted should be fairly straight. Final tensioning can be done now or at the time of final installation on the H frame or mast. Remove the temporary 2" mast section. During final installation, secure the turnbuckle plate to the fiberglass mast, raise, and tighten the U-bolt when the boom is straight. Finer adjustments can be made with the turnbuckles at any time. BE SURE TO: Safety wire the turnbuckles to maintain settings and prevent unwinding.

18. The 145XP32 ANTENNA creates a field in all planes or polarities. PERFORMANCE DETERIORATES SIGNIFICANTLY if it is 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 or the center 5-6 feet of the vertical support masts.

19. Orientation of multiple antennas in an array is critical to optimum performance. See the attached array harnessing, spacing, and hardware arrangement drawings. Also see assembly information supplied with the M^2 XP H-frame Kit.

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145XP32 PARTS & HARDWARE

DESCRIPTION	QTY
#1 BOOM SECTION, 1 X .058 X 60.0” STR	1
#2 BOOM SECTION, 1-1/4 X .058 X 60” SOE	1
#3 BOOM SECTION, 1-1/2 X .058 X 60” SOE	1
#4 BOOM SECTION, 2.0 X .065 X 60" SBE	1
#5 BOOM SECTION, 2.0 X .065 X 60” STR.	1
#6 BOOM SECTION, 2.0 X .065 X 60 SBE	1
#7 BOOM SECTION, 1-1/2 X .058 X 60” SOE	1
#8 BOOM SECTION, 1-1/4 X .058 X 60” SOE	1
#9 BOOM SECTION, 1 X .058 X 37.0” STR	1
ELEMENTS, 3/16 ROD X Dimension Sheet	32
DRIVEN ELEMENT BLOCK ASSEMBLY	2
BALUN, RG-6 1/2 WAVE	2
BOOM-TO-MAST PLATE, .188 X 6 X 4” (M2APT0021)	1
TURNBUCKLE PLATE, 3/16 X 2 X 4 (M2APT0101)	2
U-BOLT AND CRADLE, 2"	6
U-BOLT AND CRADLE, 1-1/2"	2
PHILLISTRAN HPTG, 1200 X 37’	2
ASSEMBLY MANUAL	1

IN HARDWARE BAG:

TURNBUCKLES, 5/16”	4
1/8” CABLE CLIPS	16
SMALL CABLE EYES 1/8”	8
EYEBOLT, 1/4 X 3”	4
SHORTING BAR (M2ASB0090)	4
BUTTON INSULATORS	64
KEEPER, SS	64
NUT, 5/16-18 SS	16
LOCKWASHER, 5/16 SS	16
BOLT, 1/4-20 X 2-1/2”, SS	4
NUT, LOCKING ,1/4-20, SS	4
SCREW, 8-32 X 2” SS	4
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	2
LOCKNUT, 8-32 SS	12
SET SCREW, 8-32 X 1/4 SS	8
CABLE TIE, NYLON	6
ALLEN HEAD WRENCH	1
PUSH TUBE, 3/8 X 3”	1

STR = STRAIGHT TUBE
SOE = SWAGED ONE END
SBE = SWAGED BOTH ENDS

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