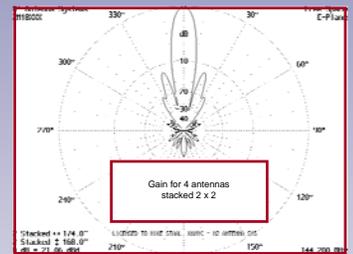
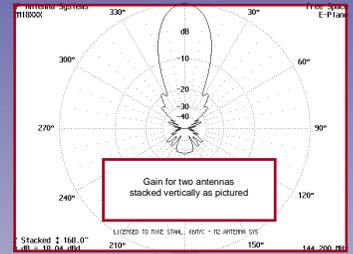
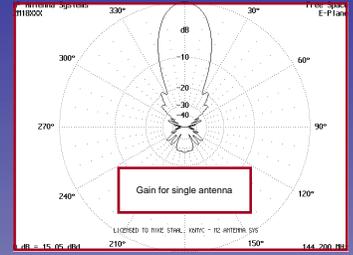
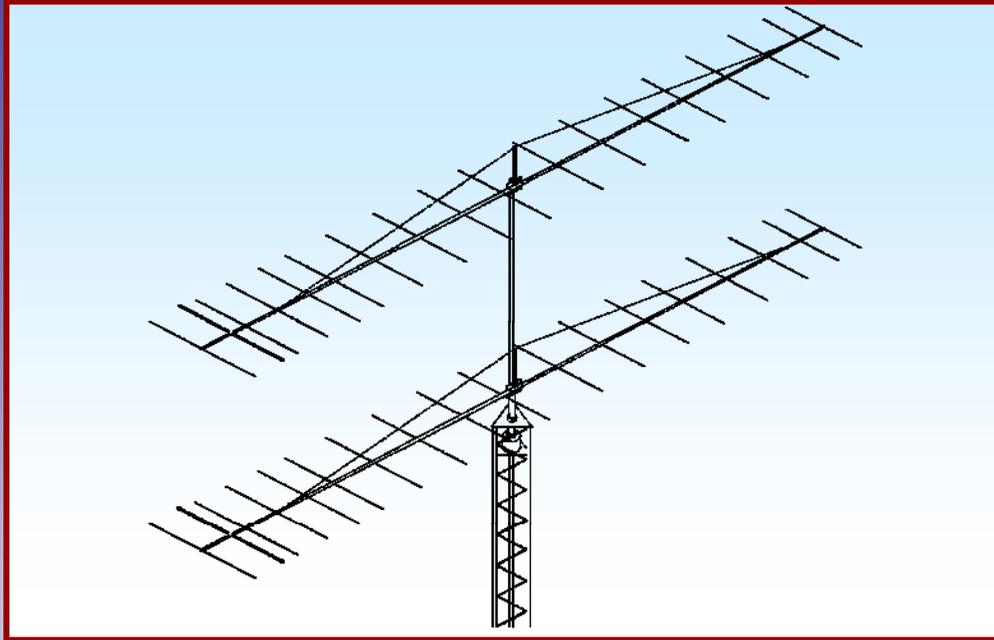




# M2 Antenna Systems, Inc.

## Model No: 2M18XXX



### SPECIFICATIONS:

Model .....	2M18XXX	Power Handling .....	1.5 kW
Frequency Range.....	144 To 146 MHz	Boom Length / Dia.....	36.5' / 1-1/2" to 3/4"
*Gain for 1 / 2 / 4 .....	17.14 / 20.14 / 23.14 dBi	Maximum Element Length.....	41"
Front to back .....	26 dB Typical	Turning Radius: .....	19' 6"
Beamwidth .....	E=26° H=28°	Stacking Distance.....	14' High & 14.5' Wide
Feed type .....	"T" Match	Mast Size.....	2" Nom.
Feed Impedance. ....	50 Ohms Unbalanced	Wind area / Survival .....	2.9 Sq. Ft. / ?? MPH
Maximum VSWR.....	1.2:1	Weight / Ship Wt.....	14 Lbs. / 16 Lbs.
Input Connector.....	"N" Female		

\*Subtract 2.14 from dBi for dBd

### FEATURES:

The 2M18XXX has been extensively used by many moon bouncers and other weak signal enthusiasts for the last eight years. The clean, sharp pattern yields a very good G/T (gain/temperature in K) which, in everyday language, means you **hear more signal and less noise**. It is ideal as a single antenna or in stacked arrays of 2 or more antennas, yielding a **full 6 dB** of stacking gain for four antennas! Mechanically, the boom is strong in the middle and tapered in 1/4" steps to reduce weight and wind area. M<sup>2</sup> has integrated the computer optimized design with the unique driven element module. The aluminum CNC machined housing features "O" ring seals on all three connectors and internal connections are potted in silicon gel than enhances the power handling capability. That is important to those who feel life is too short for QRP (Low power)! All hardware is stainless except the U-bolts. By all standards the "18XXX" is a true thoroughbred among VHF antennas!

# 2M18XXX ASSEMBLY MANUAL

**TOOL REQUIRED: Flat blade screwdriver, 11/32 nut driver or socket, 7/16 and 1/2 end wrenches and / or 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 3/4" to 1" sections; 1-1/2" screws for 1" to 1-1/4" sections; 1-3/4" screws for 1-1/4" to 1-1/2" and 1-1/2" to 1-1/2" sections.

Assemble the three 1-1/2" sections first. The center 1-1/2" section, swaged on both ends, has an element hole 13-1/4" from the "rear" end. Find the 1-1/2" section with 5/16" element hole 17-1/16" from swaged end. Assemble this section to "rear" swage of center section. Assemble remaining 1-1/2" section to "front" of center section. The 1-1/4" section with 3 element holes is assembled to the rear; 2 hole section to front. The straight 1" section is the rear of the boom; the swaged section is to the front. The 3/4" section is the front of the boom.

To make assembly easier, support the completed boom about waist high on bucks, tables, etc. Or, drive a 1-1/2" to 2" pipe into the ground and temporarily attach boom using boom to mast plate and U-bolts at balance point.

2. Lay out the elements by length and position as shown the DIMENSION sheet. Start with the reflector (40-7/8") element. **NOTE: Buttons and rods vary a few thousandths of an inch in diameter from run to run. If buttons are loose on the rods, squeeze each button slightly before pushing it onto the rod. This will help hold the element on center during keeper installation.** Balance across finger to find center 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 "KEEPERS" yet. This is easier to do after all the elements are installed in the boom.
3. Install the 3/16" X 41" 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 begin centering 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. Begin installing the stainless "keepers." Use thumb and index finger to hold a keeper over end of the 3/8 x 3" push tube (keeper dished into tube). **NOTE: Add keeper finger relief by chamfering the inner end of the tube where you place the keeper.** Hold the element firmly and start the keeper onto the rod by applying pressure with the push tube. Push the keeper 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 keeper too far). Repeat for the opposite side. Continue installing keepers until all elements are locked in place.
6. Mount the DRIVEN ELEMENT BLOCK ASSEMBLY to the top of the boom using a single 8-32 X 1-1/4" screw. Orient the block with feed connector facing forward and balun connectors facing to rear.
7. Attach balun connectors to the Block and tighten **gently** using a 7/16" end wrench. Form the balun close to the boom and secure with a nylon cable tie. Tie should be snug but not crushing or kinking the coax.

# 2M18XXX ASSEMBLY MANUAL

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 the 1/4" Driven Element Block Rods. Position the Shorting Bars as per the DIMENSION SHEET. Then align the bars and rods with each other and tighten the setscrews.
9. 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 and closer to the centerline of the boom.
10. The boom to mast plate is normally mounted at the balance point, about 15' 10" from rear of boom. Since the feed line represents significant weight it is best to have it attached and fastened along the boom with cable ties before final mounting the plate. Use two 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.
11. Install a small "U" shaped rod into the top side of the rear 1" boom section and the front 1-1/4" boom section. Secure with keepers.
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 4" to 6" 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.

THIS COMPLETES THE ANTENNA ASSEMBLY.

## INSTALLATION AND STACKING INFORMATION

**A. Never mount the antenna with a metallic mast or cross boom in the element plane: pattern and performance will deteriorate.** FOR HORIZONTAL POLARIZATION, the antenna may be mounted to a metallic vertical mast or a horizontal NON-METALLIC / NON-CONDUCTIVE cross boom . 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. ***H plane stacking distance is 13 to 14.5 ft.*** See Stacking Reminders, below.

**B.** To optimize the performance from this high quality antenna, always use high quality coax and connectors, as old, corroded, or poor quality materials are common sources of SERIOUS performance losses.

**C.** 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 the match is close to the rated specifications. It should be 1.5:1 or better from 144 to 146 MHz. Remember, the 2M18XXX is tailored for the lower half of two meters where horizontal polarity and Single Side Band (SSB) / CW are the common modes.

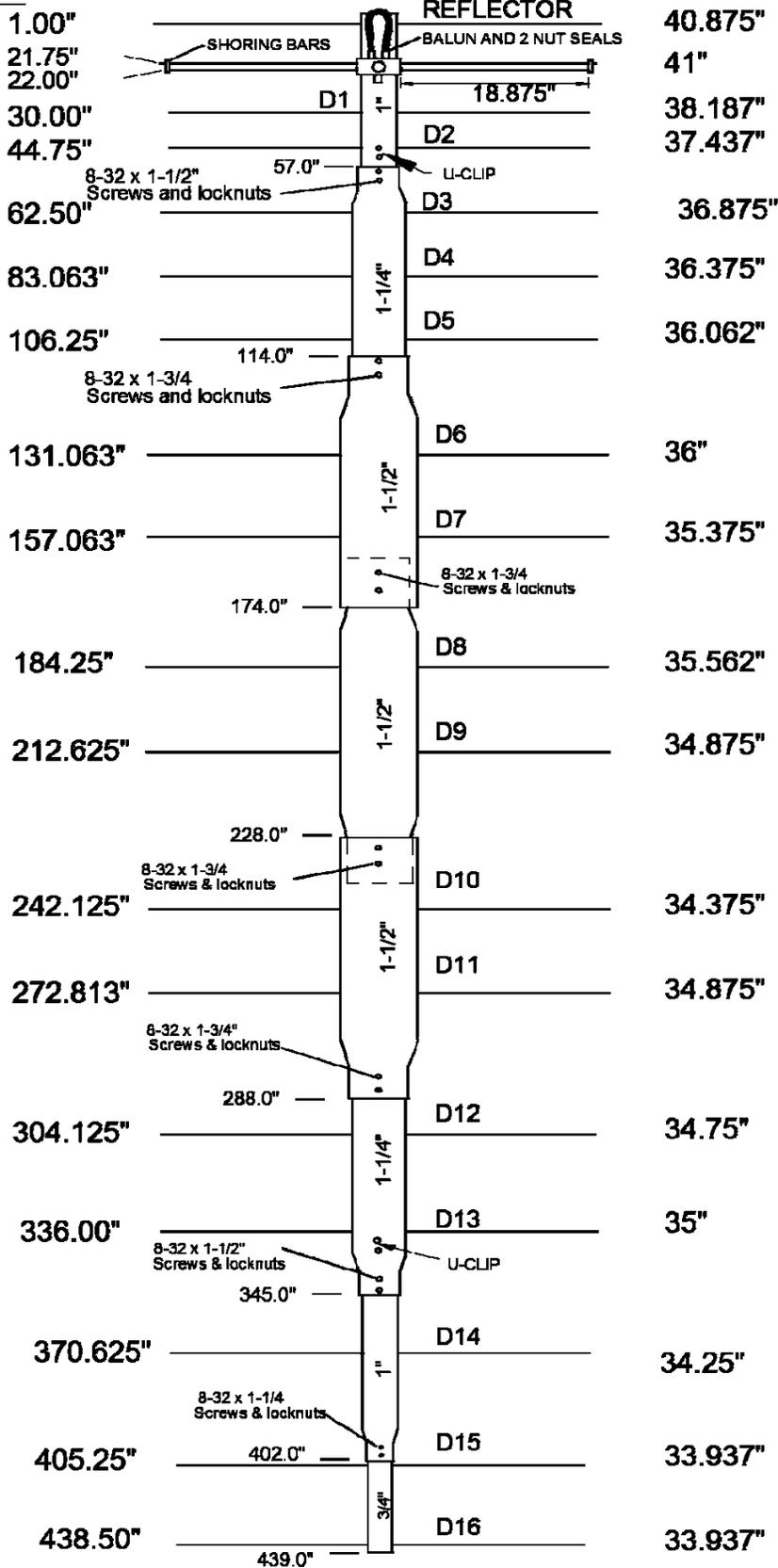
### **C. STACKING REMINDERS:**

1. All driven element blocks **MUST** be oriented to the same side of boom.
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.

# 2M18XXX DIMENSION SHEET

**ELEMENT  
SPACING**

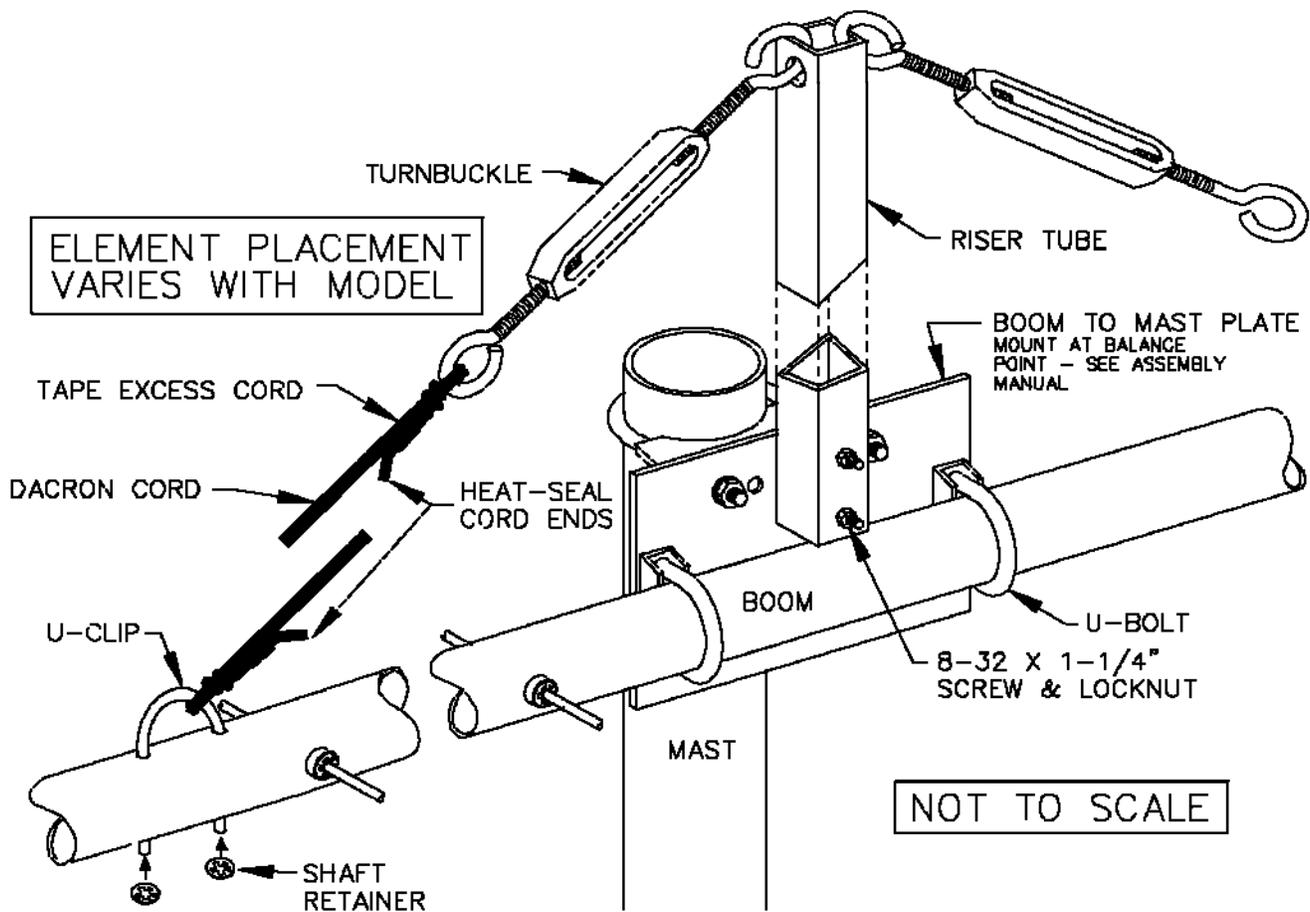
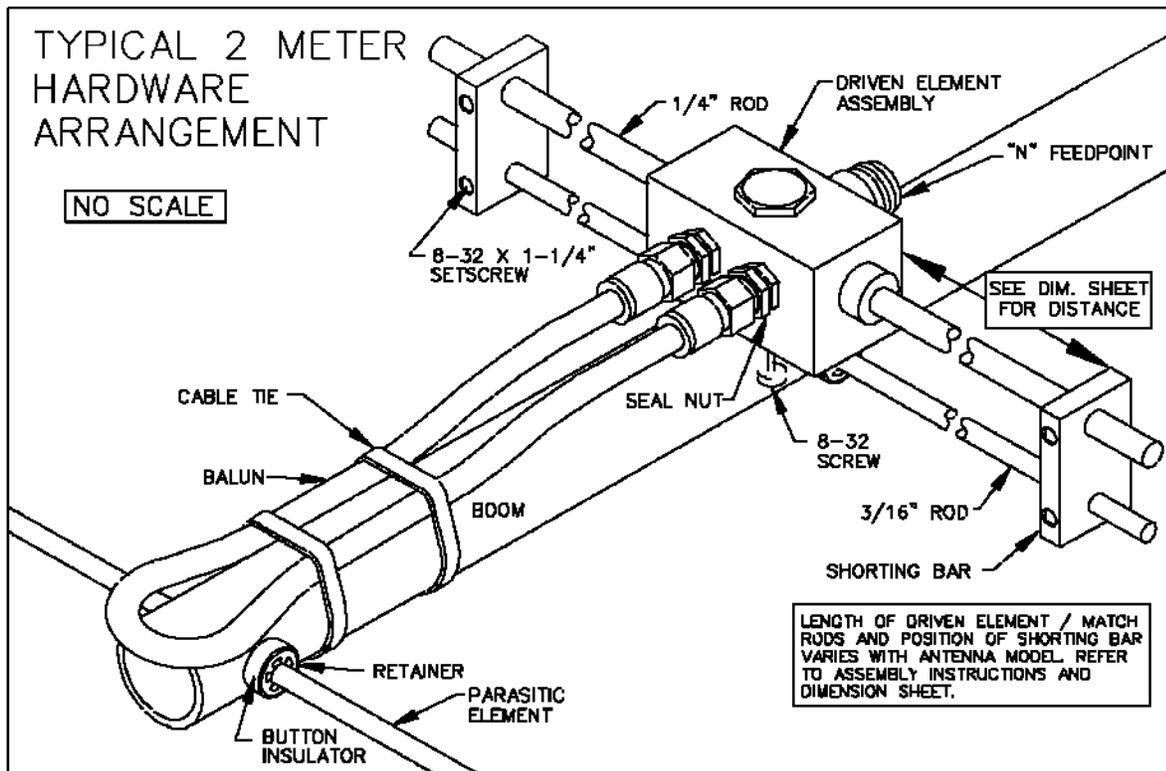
**ELEMENT  
LENGTH**



**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"

# 2M18XXX ASSEMBLY DETAILS



# 2M18XXX PARTS & HARDWARE

DESCRIPTION	QTY
BOOM SECTION, 1-1/2 X .058 X 60" SOE .....	2
BOOM SECTION, 1-1/2 X .058 X 60" SBE .....	1
BOOM SECTION, 1-1/4 X .058 X 60" SOE .....	1
BOOM SECTION, 1-1/4 X .058 X 60" SOE .....	1
BOOM SECTION, 1 X .058 X 60" SOE .....	1
BOOM SECTION, 1 X .058 X 60" STR .....	1
BOOM SECTION, 3/4 X .049 X 40" STR .....	1
ELEMENTS, 3/16 ROD x Dimension Sheet .....	18
DRIVEN ELEMENT BLOCK ASSEMBLY .....	1
BALUN, RG-6 1/2 WAVE .....	1
BOOM-TO-MAST PLATE, .188 X 6 X 4" .....	1
VERTICAL RISER, 3/4 X 18" .....	1
DACRON CORD, 3/32" X 28 .....	1
ASSEMBLY MANUAL .....	1
<b>HARDWARE BAG #1</b>	
U-BOLT AND CRADLE, 2' .....	2
U-BOLT AND CRADLE, 1-1/2" .....	2
<b>HARDWARE BAG #2</b>	
TURNBUCKLES, 1/4 X 4" HOOK & EYE .....	2
SHORTING BAR .....	2
EYEBOLT, 1/4" .....	2
BUTTON INSULATORS .....	36
KEEPER, SS .....	40
NUT, 5/16-18 SS .....	8
LOCK WASHER, 5/16 SS .....	8
LOCKNUTS, 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 .....	8
LOCKNUT, 8-32 SS .....	16
CABLE TIE, NYLON .....	5
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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