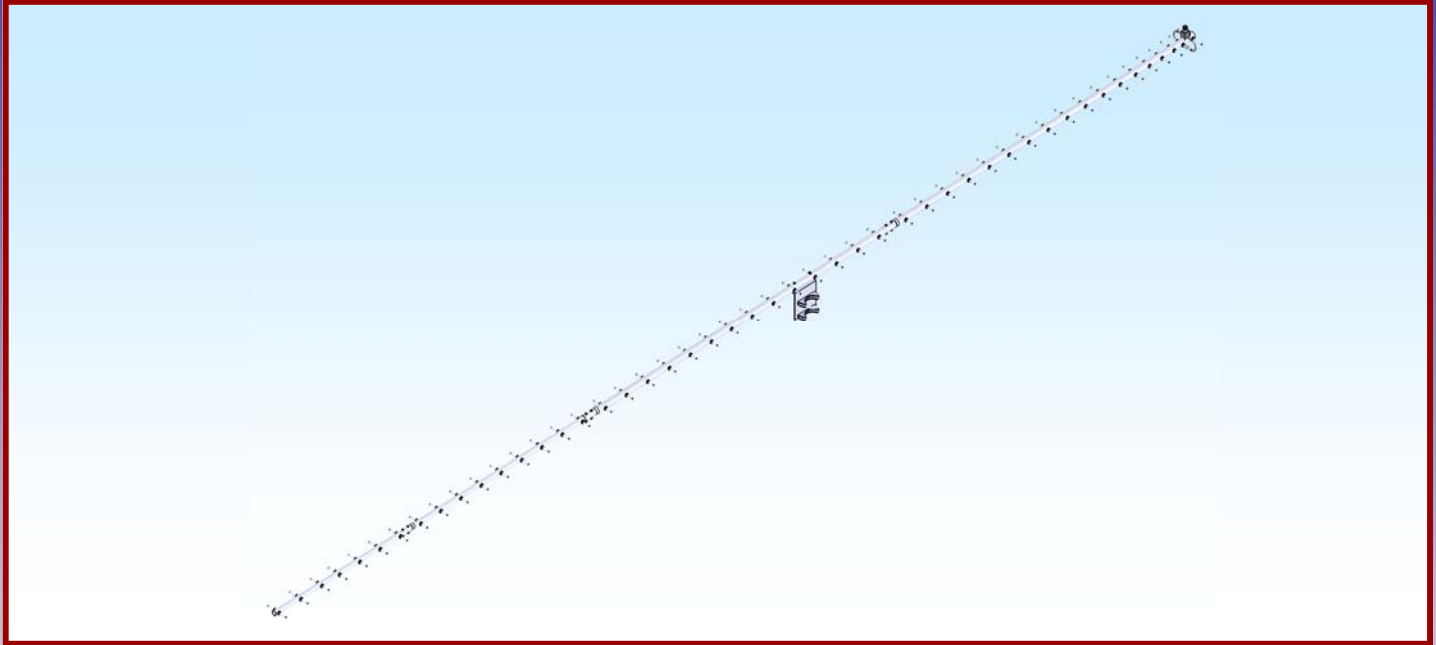




# M2 Antenna Systems, Inc. Model No: 23CM49



## SPECIFICATIONS:

Model .....	23CM49 "the 49er"	Power Handling .....	1 kW
Frequency Range.....	1250 To 1300 MHz	Boom Length / Dia.....	14.4' / 1" & 1" & 3/4"
*Gain .....	22.5 dBi	Maximum Element Length.....	4.437"
Front to back .....	25 dB Typical	Turning Radius: .....	90"
Beamwidth .....	E=14° H=14°	Stacking Distance.....	35" High & 35" Wide
Feed type .....	Folded Dipole	Mast Size.....	1-1/2" to 2" Nom.
Feed Impedance. ....	50 Ohms Unbalanced	Wind area / Survival .....	0.85 Sq. Ft. / 100 MPH
Maximum VSWR.....	1.2:1 Typical	Weight / Ship Wt.....	3.5 Lbs. / 5 Lbs.
Input Connector.....	"N" Female		

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

## FEATURES:

The 23CM49 is designed and optimized at 1296 for terrestrial and EME use. Gain in the satellite band (1269-1270) is only down by about 0.5 dB so it is still a killer! Stacking 2 or 4 at just 35" apart is a very manageable package with eye popping 25 and 28 dB gain!. 1" diameter rear and center boom sections stiffen the boom so no added support is required . The folded dipole driven element also contains the balun. This eliminates connectors and cable and as always with M2 driven elements, the whole assembly is sealed. When other designs will have succumbed to wind and weather, the 100 MPH-rated 23CM49 will be as good as new and still performing to 'spec'!

The '23CM49' is an outstanding performer for "hill-topping" or base station applications. Gain is relatively flat across the band so no matter your application, weak signal EME or tropo-scatter, ATV, FM repeater use, or future OSCAR applications, you will find the 23CM49 to be an outstanding performer. The directivity, gain and the clean pattern will astound you. Phasing cables, power dividers and stacking kits are available for building a super-gain system.

# 23CM49 ASSEMBLY MANUAL

**TOOLS RQD:** Phillip #2 screw driver, 11/32" nut driver or equiv. 7/16" and 1/2" end wrench or socket.

**1. PREPARE THE ELEMENTS FOR MOUNTING AS FOLLOWS: (THE MOST IMPORTANT STEP)**

Sort out the 3/16" rod elements by length, setting the ends up against a straight edge. Then cut an 8" strip of masking tape or equivalent. Fold each end under about 1" and stick the tape to your bench top with the sticky side up. Place the longest element (reflector) at one end of the tape. Place the next longest element (director D1) next to the reflector element. **Note that the director elements DO NOT consistently diminish in length from rear to front. BE ALERT FOR VARIATIONS!**

As you continue this procedure you must refer to the DIMENSION SHEET for the next element length. Elements vary in 1/16" increments so it can be measured by any common tape measure or the measurement stick. Use Dimension sheets to determine the correct placement of the elements on the sticky tape. Continue until all the elements are in the correct order for sequential insertion into the boom.

**2. INSTALLATION OF ELEMENTS:** Assemble each boom section with elements as shown on the dimension sheets. HINT: SQUEEZE THE BUTTON INSULATOR SLIGHTLY WITH PLIERS TO IMPROVE THE TEMPORARY HOLDING OF THE ELEMENTS.

Starting with REFLECTOR (longest element), push on a black button insulator and insert the element through the holes. Install the second button, pushing it on and into boom. DO NOT BOTHER WITH ACCURATELY CENTERING the element at this time. Next, install D1 and so on. DO NOT INSTALL the stainless steel SHAFT RETAINERS yet. This is easier to do after all the elements are installed in the boom.

**3. Install the remaining DIRECTOR elements on other boom sections. (SEE DIMENSION SHEETS).**

**4. CENTERING THE ELEMENTS.**

Now begin centering the elements. Use a tape measure to EQUALIZE the amount the element sticking out on each side of the boom. Accuracy of 1/32" is adequate. 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. Note: centering of D1 is very critical to match.

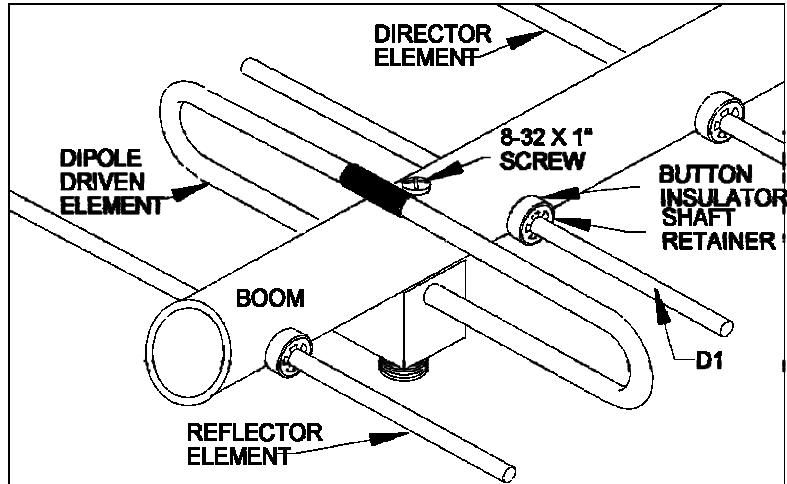
NOTE: The SHAFT RETAINERS, used for securing the elements, should always be used for permanent and long term antenna installations. For portable or temporary use, or whenever it is anticipated that the antenna will be disassembled within a short time, ONE retainers may be left off. The button insulators, normally a tight fit, hold the elements quite securely.

**5. Begin installing the stainless shaft retainers. Use thumb and index finger to hold a Shaft Retainer over end of the 3/8" x 3" push tube (Shaft Retainer dished into tube). Hold the element firmly and start the keeper onto the rod by applying pressure with the push tube. Push the Shaft Retainer until up tight against the button insulator. 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 retainer completely off the element, and start over. After the first retainer is on, install another retainer to the opposite side. Continue installing Shaft Retainers until all elements are locked in place.**

**6. REFERENCE THE 'DIMENSION SHEET**

Assemble the boom complete boom with installed elements as shown on the dimension sheets. Add the BOOM TO MAST 'L' BRACKET at the SMALL HOLES in the center 1" boom section. Secure with 8-32 x 1-1/2" screws and locknuts.

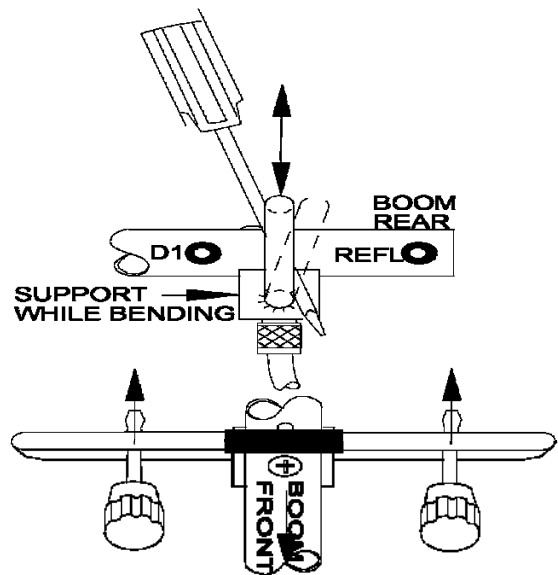
# 23CM49 ASSEMBLY MANUAL



7. Slide the FOLDED DIPOLE DRIVEN ELEMENT ASSEMBLY over the rear of the boom and mount at the front hole about 1-3/4" from the rear of the boom (the rear hole is used in situations during phasing where a 180 deg. phase shift can be used like mirror image mounting). Orient with the feed connector down and the access cap to the rear. Secure the block with an 8-32 x 1" screw and lock washer.

COMMENT: The dipole is fabricated with the dipole straight up so the mounting screw can be inserted and tightened and for best match. If you have good VSWR measurement equipment, using this tipping function to optimize the match at the frequency of choice. A good match (well under 1.5:1) will occur from 1250 to 1300 mHz. Place the screwdriver as shown and in about the middle of each element half to make the bend, making small bends and checking VSWR as you go is recommended

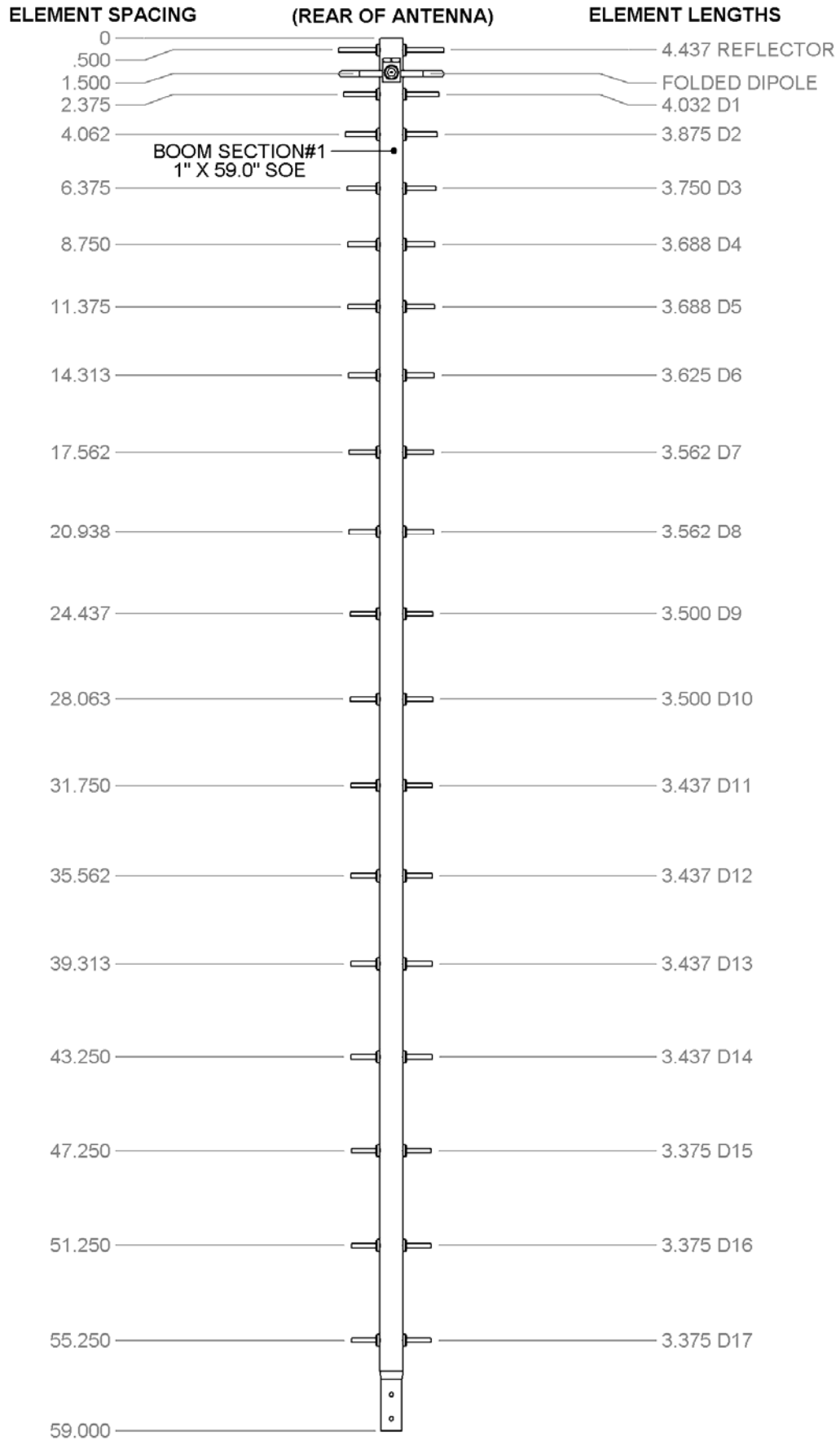
(see the sketch). Looking from the rear, the LEFT SIDE OF THE DIPOLE IS *NORMALLY* A SOLID 1/4" ROD and is quite stiff. The other half of the dipole is soft aluminum tubing and bends quite easily. Alternate back and forth until the dipole slants forward or back to achieve the desired VSWR



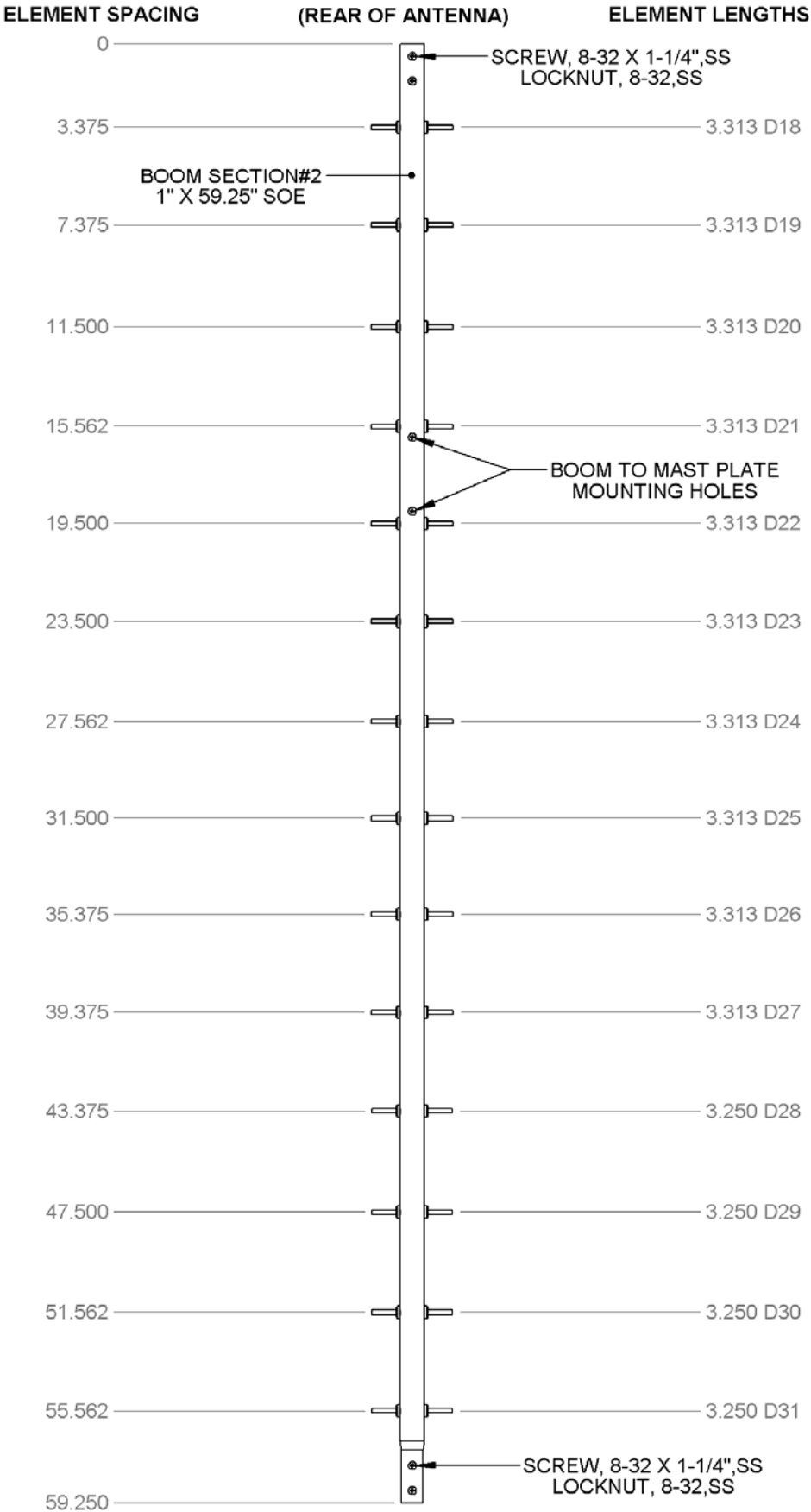
8. Attach the feedline and route forward to the boom to mast bracket. Secure at regular intervals with cable ties. U-bolts, (2") are supplied for attaching bracket to end of mast. Keep mast as far from boom as the U-bolts allow. Do not allow the mast to pass up through the element plane as it WILL CAUSE GREAT PERFORMANCE DEGRADATION.
9. GENERAL COMMENTS. It is always a good idea to check out the antenna with a little RF prior to installing it in some inaccessible location. DO NOT use any PL-259 fittings or adapters at these frequencies. Very small problems in coax and in connectors can cause MAJOR VSWR problems. Even a loose connector will affect the VSWR noticeably.

Be sure to use good quality feedline. We recommend Times LMR-400 or larger coax. For long runs of 50 feet or more, 7/8" hard line is highly recommended. For higher gain, these antennas can be stacked. Stacking one above the other WILL NOT narrow the azimuth beamwidth which is already narrow. M<sup>2</sup> can supply phasing lines and power dividers and structures for your stacking requirements. We can also supply technical information to make sure you optimize your system.

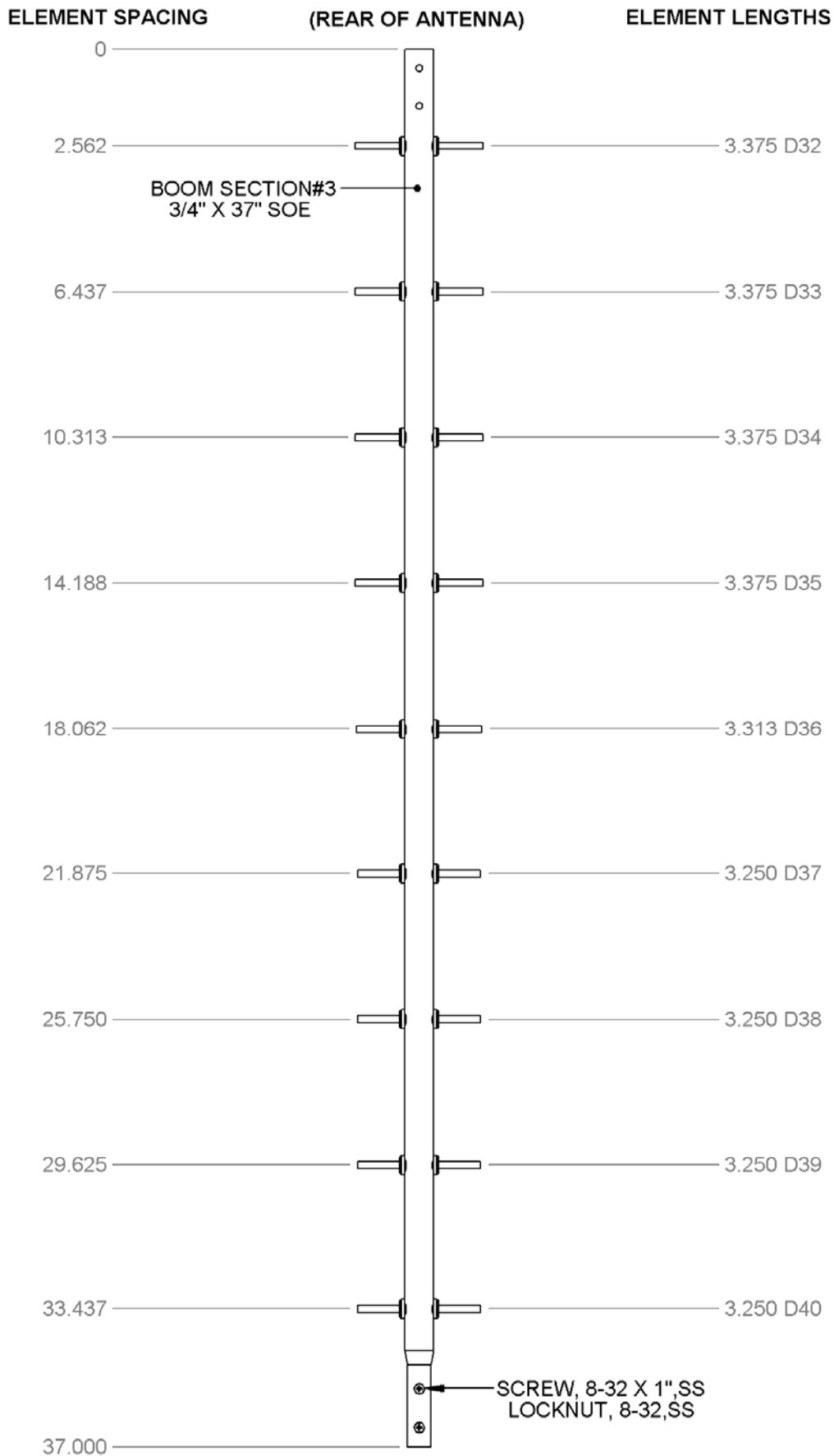
# 23CM49 DIMENSION SHEET



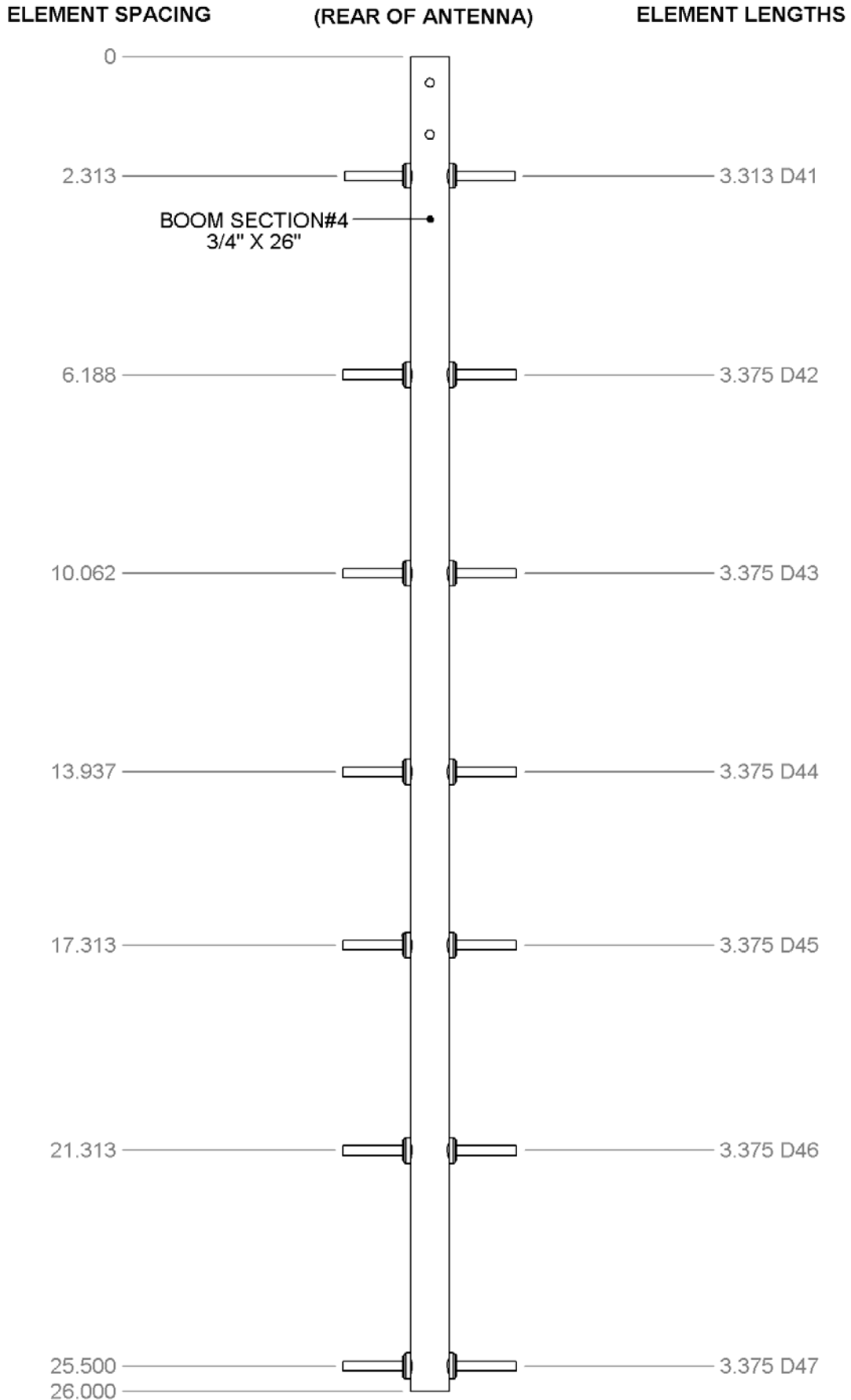
# 23CM49 DIMENSION SHEET



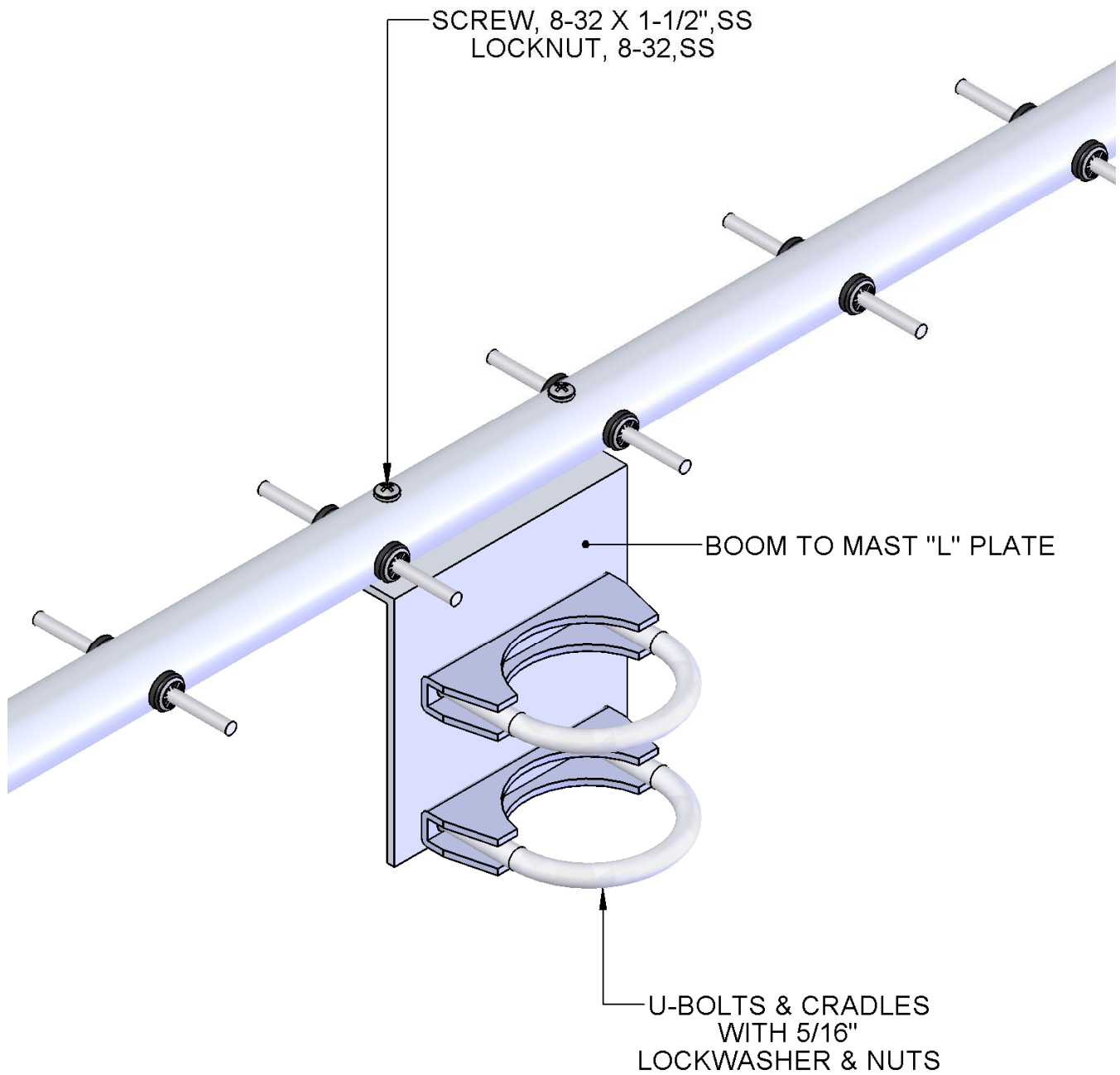
# 23CM49 DIMENSION SHEET



# 23CM49 DIMENSION SHEET



# 23CM49 BOOM TO MAST DETAIL





# 23CM49 PARTS & HARDWARE

DESCRIPTION	QTY
BOOM SECTION #1, 1" X 0.058 X 59" SOE.....	1
BOOM SECTION #2, 1" X 0.058 X 59.25" SOE.....	1
BOOM SECTION #3, 3/4" X 0.049 X 37" SOE.....	1
BOOM SECTION #4, 3/4" X 0.049 X 26". .....	1
ELEMENTS, 3/16" X SEE DIM. SHEET .....	48
FOLDED DIPOLE ASSEMBLY (SADEA23CM) .....	1
BTM 'L' PLATE, 0.125 X 4" X 4" (M2APT0062) .....	1
U-BOLT, 2" & CRADLE .....	2
ASSEMBLY MANUAL .....	1

HARDWARE BAG	QTY
NUT, 5/16-18, SS .....	4
LOCKWASHER, 5/16", SS .....	4
SCREW, 8-32 X 1-1/2", SS .....	2
SCREW, 8-32 X 1-1/4", SS .....	5
SCREW, 8-32 X 1", SS.....	2
LOCKNUT, 8-32, SS .....	8
SHAFT RETAINER, 3/16",SS.....	98
BUTTON INSULATOR, 3/16", BLACK .....	98
PUSH TUBE, 3/8" X 3" (FOR KEEPER INSTALLATION) ....	1

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

4402 N.SELLAND AVE.

FRESNO, CA 93722

559-432-8873 FAX: 432-3059

[www.m2inc.com](http://www.m2inc.com) Email: [sales@m2inc.com](mailto:sales@m2inc.com)