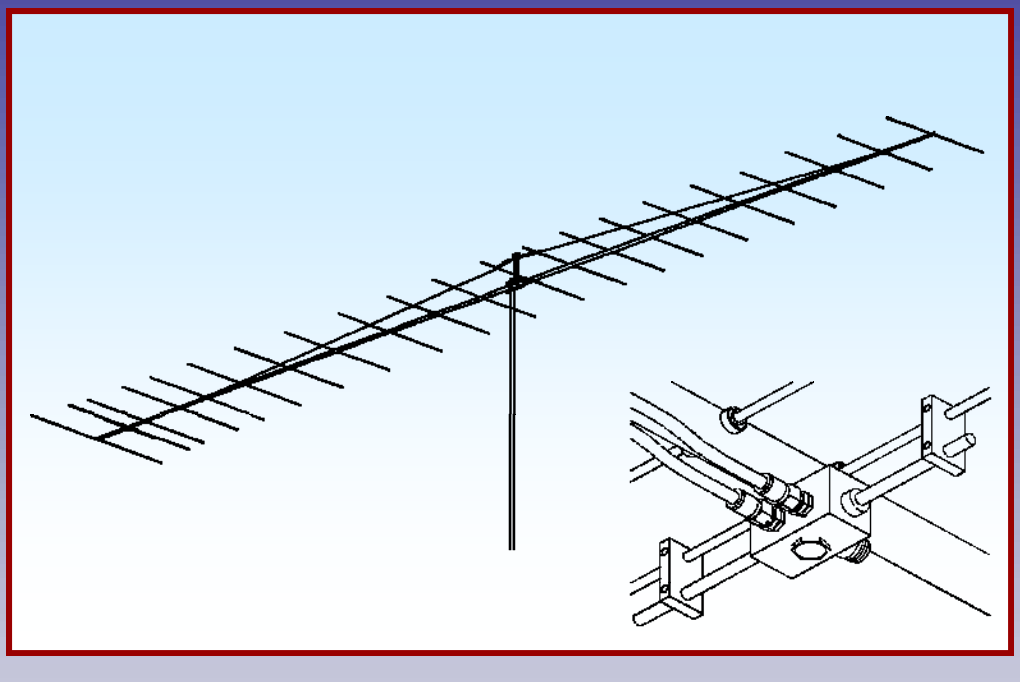
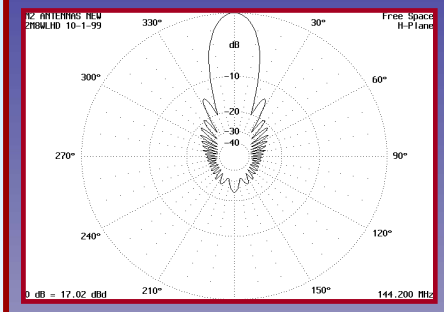
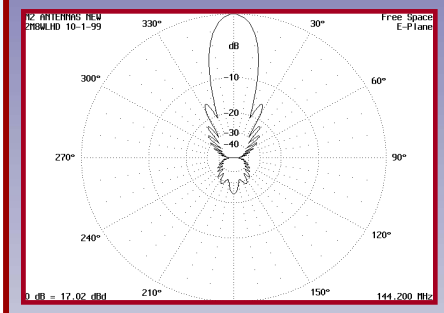
M2 Antenna Systems, Inc.
Model No: 2M8WL







SPECIFICATIONS:

Model	2M8WL
Frequency Range	144 To 144.6 MHz
*Gain	18.5 dBi
Front to back	26 dB Typical
Beamwidth	E=20° H=21°
Feed type	"T" Match
Feed Impedance.	50 Ohms Unbalanced
Maximum VSWR	1.5:1
Input Connector	"N" Female

Power Handling	2.5 kW
Boom Length / Dia	55' / 2-1/2" To 1-1/2"
Maximum Element Length	21-3/16"
Turning Radius:	29'
Stacking Distance	17' High & 17' Wide
Mast Size	1-1/2" to 2" Nom.
Wind area / Survival	5.5 Sq. Ft. / 100 MPH
Weight / Ship Wt.	50 Lbs. / 59 Lbs.

***Subtract 2.14 from dBi for dBd**

FEATURES:

The 2M8WL provides the user with not just improvements in gain and front to back ratio but also features a robust boom design, making the antenna capable of handling winds over 100 MPH. The 2M8WLHD features the same highly reliable, CNC machined, driven element components used on our other VHF and UHF yagis. The boom tapers from 2.5" in the 23 foot middle section to 1.5" at the rear and front. It is top guyed with dacron cord. A single 2M8WL provides the gain requirement to make EME contacts with even small 4 yagi stations. It passes the echo test by producing its own audible echoes even when pointed up with no ground gain! Obviously it is dynamite on Tropo! There's absolutely nothing else like it.

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5/8/09
Rev.00

M² 2M8WLHD Assembly Manual 1-11-00

TOOLS REQUIRED: Screwdriver, 11/32 wrench, socket or spintite, a 7/16" and 1/2" wrench or socket, tape measure. Please review these instructions and the 2M8WLHD DIMENSION SHEET before assembly.

1. BOOM ASSEMBLY

Refer to the 2M8WLHD DIMENSION SHEET as a guide. Note the FRONT and REAR locations of the antenna and that it is pictured looking from underneath. Prior to beginning the assembly of the boom find a LONG level surface to work on. Start by laying out the boom sections. Use 1/4-20 x 2" bolts and locknuts to join 1-1/2" to 2" sections; 2-1/2" bolts for 2" to 2" sections and 2" to 2-1/2" sections; 3" bolts for 2-1/2" to 2-1/2" sections. You will notice that several of the boom sections are the same length. The following notes will help you determine which-one-goes-where:

1-1/2" sections: The rear section has 4 through holes for the elements and one through hole perpendicular to the others. Orient this section piece with the cross bolt holes facing towards the front.
2 x 48" sections: The rear section has the 5/16" element through hole closer to its swaged end.
2 x 95" sections: Both the front and rear sections have 11/32" holes for the eyebolts. The rear section has a through hole for an element closer to its unswaged end.
2-1/2 x 95" SOE: The front section has a through hole for an element closer to its unswaged end.
2-1/2 x 95" SBE: The rear end has a through hole closer to a swaged end.

After assembly, double check boom sections against ELEMENT SPACING figures on Dimension Sheet.

2. BOOM TO MAST PLATE

At this time it may be convenient to add the boom to mast plate. The 6 x 8 x 1/4" plate mounts approximately 24" from the front element hole on the center most section of the boom. Use two 2-1/2 inch U-bolts and cradles and the 5/16" stainless steel lockwashers and nuts. TEMPORARILY position the plate under the boom. This way the boom can be laid across a bench or bucks and the plate will keep the boom from rotating while installing the elements.

3. ELEMENT ASSEMBLY

Lay out the elements by length and position as shown the DIMENSION sheet. Start with the reflector (longest) element. 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. ***Note that the Director Elements do not consistently diminish in length from rear to front, so pay close attention to length and position.*** We have enclosed a 1:1 scaled dimension chart to help sort out the 21 elements.

Now begin centering the elements. Use a tape measure to EQUALIZE 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.

4. ELEMENT KEEPER INSTALLATION

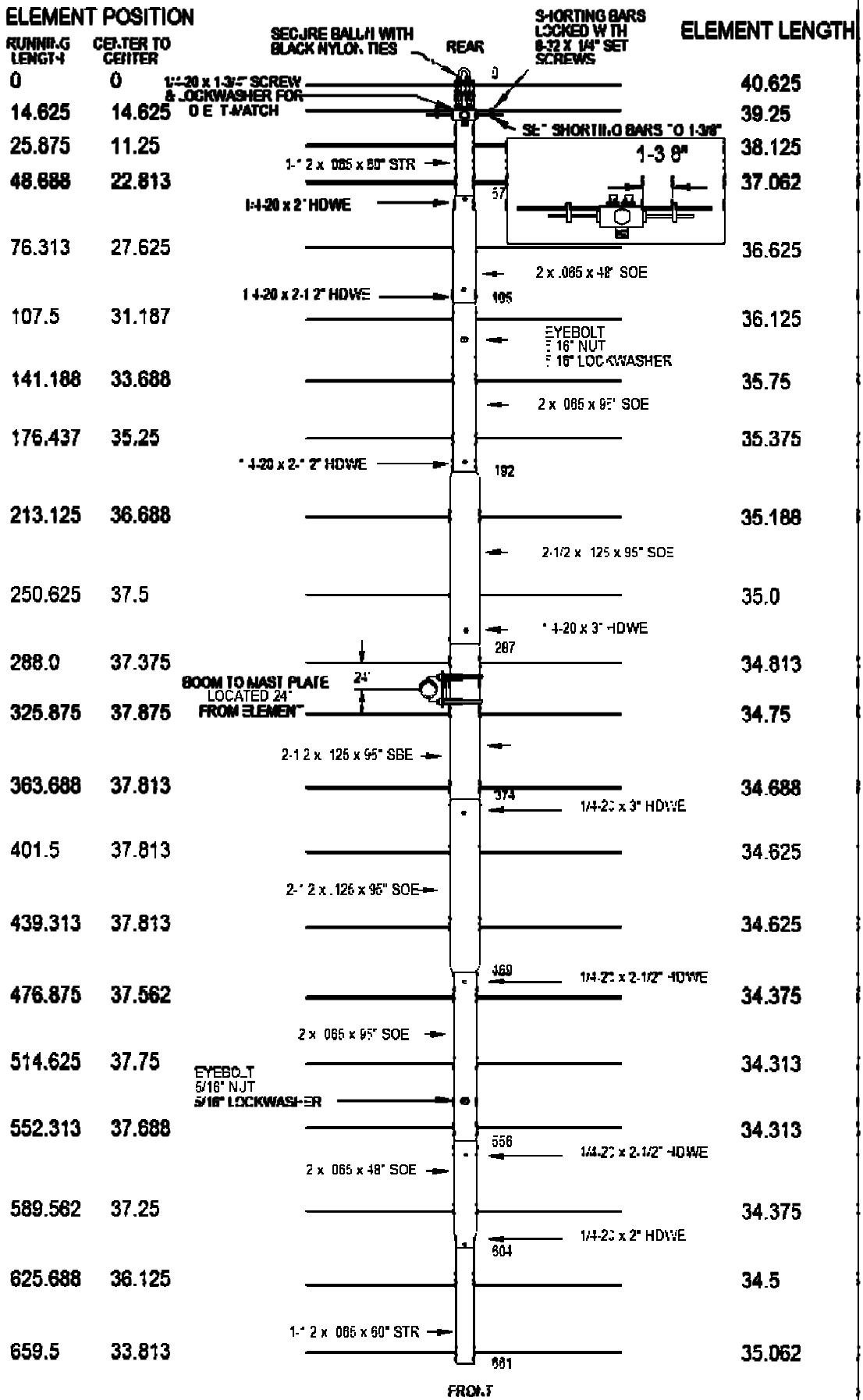
Begin installing the stainless "keepers." Use thumb and index finger to hold a keeper over end of the 3/8 x 3" push tube (keeper dished into tube). Hold the element firmly and start the keeper onto the rod by applying pressure with the push tube. Push the keeper until up tight against the button insulator (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.

5. DRIVEN ELEMENT INSTALLATION

Mount the DRIVEN ELEMENT "T" MATCH ASSEMBLY to the BOTTOM of the boom using a single 1/4-20 x 1-3/4" bolt and lockwasher. Orient the block with feed connector facing to center and balun connectors facing to rear.

2M8WLHD DIMENSION SHEET

ELEMENT POSITION RUNNING LENGTH	ELEMENT POSITION CENTER TO CENTER	ELEMENT LENGTH
0	0	40.625
14.625	14.625	39.25
25.875	11.25	38.125
48.688	22.813	37.062
76.313	27.625	36.625
107.5	31.187	36.125
141.188	33.688	35.75
176.437	35.25	35.375
213.125	36.688	35.188
250.625	37.5	35.0
288.0	37.375	34.813
325.875	37.875	34.75
363.688	37.813	34.688
401.5	37.813	34.625
439.313	37.813	34.625
476.875	37.562	34.375
514.625	37.75	34.313
552.313	37.688	34.313
589.562	37.25	34.375
625.688	36.125	34.5
659.5	33.813	35.062



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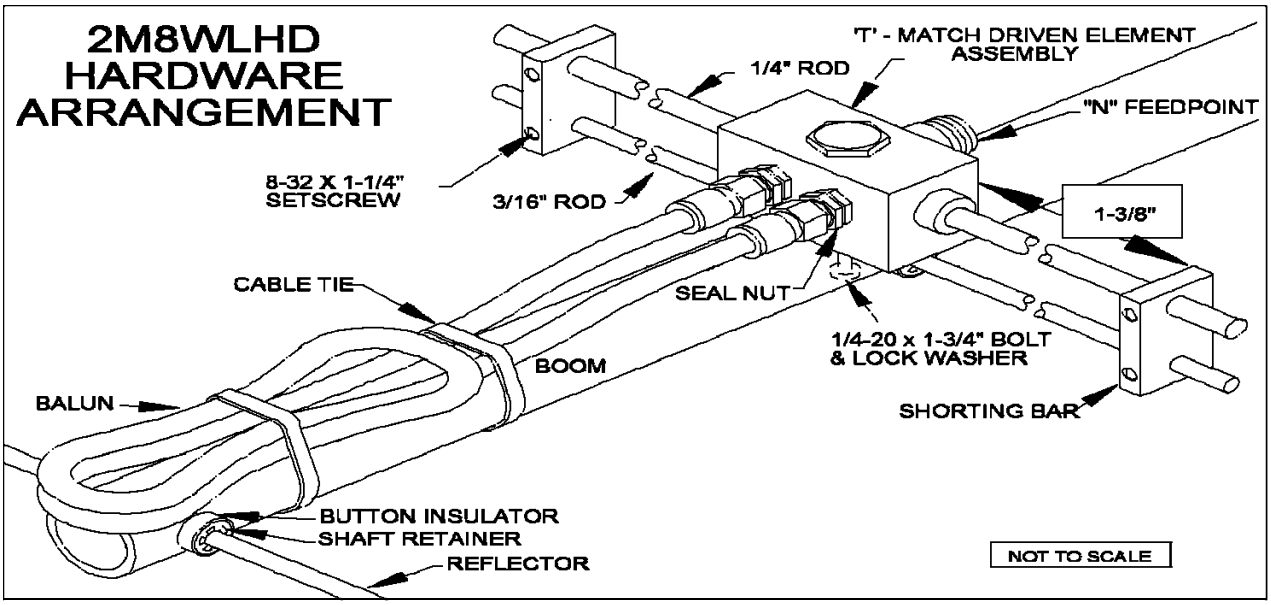
6. BALUN INSTALLATION

Before installing the balun, thread a 3/8" SEAL NUT all the way onto both connectors, with the black Neoprene face of the nuts facing out. Attach balun to the Block and tighten the connectors ***gently*** using a



7/16" end wrench. Once the connectors are tight, back the Seal Nuts out and finger-tighten firmly up against the face of the connectors (or tighten ***gently*** with 1/2" end wrench). A lot of torque is unnecessary. 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.

7. SHORTING BAR INSTALLATION

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 tips mounted through the boom and then onto the 1/4" rod of the "T" match assembly. Position the Shorting Bars at **1-3/8"** from the outer edge of the "T" match block to the inner edge of the Shorting Bar. See Dimension Sheet. NO SWR ADJUSTMENT should be necessary for a nearly perfect match at 144.2 MHz but adjusting these bars should allow you some optimization if you care to place the minimum SWR somewhere within your antenna's specified operating bandwidth. Align the bars and rods with each other and tighten the setscrews.

8. BOOM TO MAST PLATE AND CENTER OF ROTATION

If you followed step 2 earlier, re-orient the BOOM TO MAST PLATE perpendicular to the elements and relocate along the boom at or near the physical balance point of the antenna, which should be about 24" from the first element on the front side of the center most boom section. You can also determine this location simply by picking the antenna up. Re-tighten the boom to mast plate to the boom. 2" U-bolts are supplied for attaching the plate to your mast.

9. INSTALLATION OF EYEBOLTS

See the Dimension Sheet for the eyebolt hole locations. Install the two 5/16 x 4 " EYEBOLTS in the boom. Use 5/16 stainless nuts and lockwashers to secure.

10. OVERHEAD GUY SYSTEM

Unscrew the turnbuckle eyes / hooks until only a thread or two shows inside the turnbuckle body. Install the two turnbuckles into the two bottom U-bolt holes (closest to the boom). Uncoil DACRON ROPE. Secure one end to the rear eyebolt, taking two turns through the eyebolt, then adding three TIGHT half-hitches. Pull hard on cord to set the knots. Repeat for the front eyebolt. Cut excess lengths from cord, leaving 2" to 4". To prevent fraying melt ends with heat or flame and tape back to main line. Equalize cord length at turnbuckle plate and cut. Put two turns trough rear turnbuckle eye, pull slack out of rope, and add three TIGHT half-hitches. Repeat for front cord section. Seal and tape cord ends. Both cords should now be fairly taut and parallel with boom.

Supplied with this kit is a vertical support tube (VERTICAL RISER). You have the option to attach the

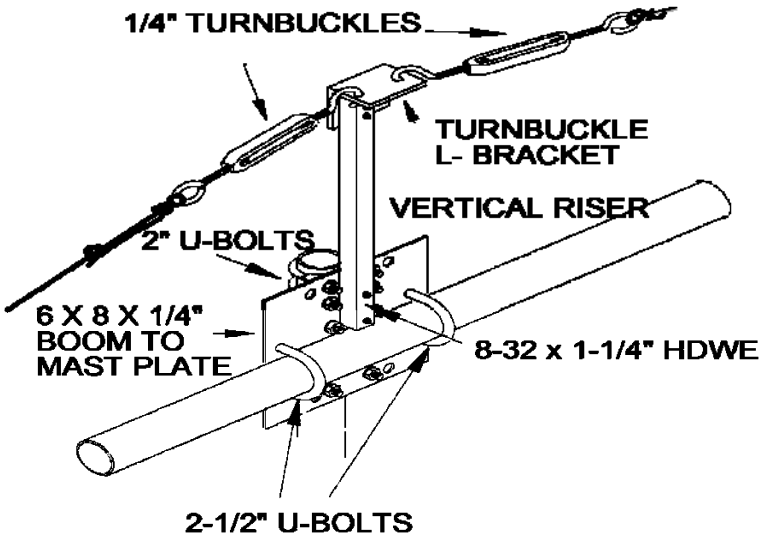
TURNBUCKLE L-BRACKET to the VERTICAL RISER **OR** to your mast. The Riser will enable you to install the antenna at the very top of your mast, should you require it. It also allows the boom to be straight in two dimensions. **MAKE SURE THAT YOU HAVE DETERMINED THAT TOP MAST MOUNTING IS SAFE FOR YOUR SYSTEM**.

A). MAST MOUNTED OPTION

Disconnect the two turnbuckles from the boom to mast plate and install into the two holes on the L-bracket. Install the a 2" U-bolt into the L-bracket and lift the Bracket up until the boom bows up slightly. This is approximately how high the Bracket will need to be mounted on the mast when the antenna is installed. During the final installation on the tower / mast, secure the Turnbuckle L-bracket at the appropriate height with the 2" U-bolt. Then lean or pull on the cords to increase the tension and tighten the knots.

B). VERTICAL RISER OPTION

Install the Vertical Riser as shown in the figure on the next page. Make sure the bottom 8-32 x 1-1/4" screws are oriented as shown with the locknuts on the boom side. Insert the remaining two 8-32 x 1-1/4" screws into the Bracket and install the Bracket onto the Riser. Secure the assembly with the 8-32 locknuts. Now temporarily lift the front and rear ends of the boom about 2' above the ground (use small chairs, boxes, or get a couple of friends to help), disconnect the two turnbuckles from the boom to mast plate, and install them into the two holes onto the L-bracket. This should straighten the boom.



For both options, if possible, let guy system take a set overnight. Then adjust turnbuckles so boom ends bow up slightly (and equally). A few days on the mast should leave the boom straight.

11. ANTENNA INSTALLATION AND STACKING INFORMATION

A. Never mount the antenna with a metallic mast or crossboom 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 crossboom. If mounted to a horizontal crossboom, route the feedline forward to the boom-to-mast plate, loop down, and bring back to crossboom at least 6" beyond element tips. Antenna pairs are typically stacked one above the other in horizontal polarity. See Stacking Reminders, below.

If you plan on stacking this antenna above / below other nonresonant antennas maintain at least **5'** of separation distance.

For best noise reduction on terrestrial use stack this antenna **18.5'** in either plane. Stack this antenna **20'** in either plane for moon bounce applications. An array of 4 (stacked 2 x 2) antennas should yield about **23dBd**

of gain.

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 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. Remember, the 2M8WLHD is tailored for the lower half of two meters where horizontal polarity and sideband / CW are the common modes.

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.

CAREFULLY MANUFACTURED BY:

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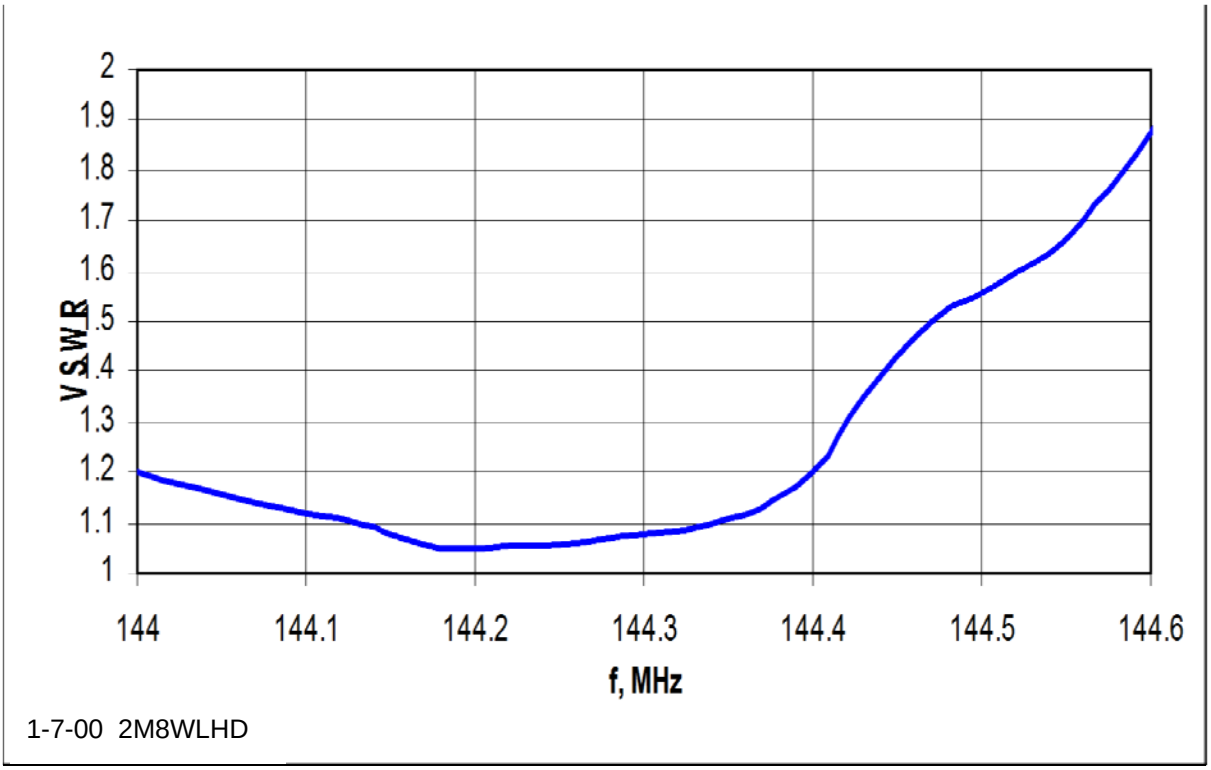

1-7-00 2M8WLHD

2M8WLHD
PARTS LIST

1-10-00
REV. 7-11-00

DESCRIPTION	QTY
BOOM SECTION, 2.5 x .125 x 95” SBE	1
BOOM SECTION, 2.5 x .125 x 95” SOE	2
BOOM SECTION, 2 x .065 x 95” SOE	2
BOOM SECTION, 2 x .065 x 48” SOE	2
BOOM SECTION, 1-1/2 x .065 x 60” SOE	2
ELEMENTS, 3/16 ROD x Dimension Sheet	21
DRIVEN ELEMENT “T” MATCH ASSEMBLY	1
BALUN, RG-6 1/2 WAVE	1
BOOM-TO-MAST PLATE, 6 x 8 x 1/4”	1
VERTICAL RISER, 3/4 X 24”	1
TURNBUCKLE EXT. BRKT	1
U-BOLT AND CRADLE, 2”	5
U-BOLT AND CRADLE, 2-1/2”	2
DACRON CORD, 5/16” X 48’	1
ASSEMBLY MANUAL	1

IN HARDWARE BAG:

SHORTING BAR, 1/4 x 3/4 x 1-3/4	2
EYEBOLTS, 5/16 x 4”	2
TURNBUCKLES, 1/4”	2
BUTTON INSULATORS	48
KEEPER, 3/16 SS	48
BOLT, 1/4-20 x 1-3/4”	1
BOLT, 1/4-20 x 2”	4
BOLT, 1/4-20 x 2-1/2”	8
BOLT, 1/4-20 x 3”	4
SCREW, 8-32 x 1-1/4”	4
NUT, 5/16-18 SS	14
LOCKWASHER, 5/16 SS	14
LOCKWASHER, 1/4-20 SS	1
LOCKNUT, 1/4-20 SS	16
LOCKNUT, 8/32 SS	4
SETSCREW, 8-32 X 1/4, SS	4
CABLE TIE, LARGE, NYLON	6
SEAL NUTS, 3/8-32	2
ALLEN HEAD WRENCH, 5/64”	1
PUSH TUBE, 3/8 X 3”	1

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