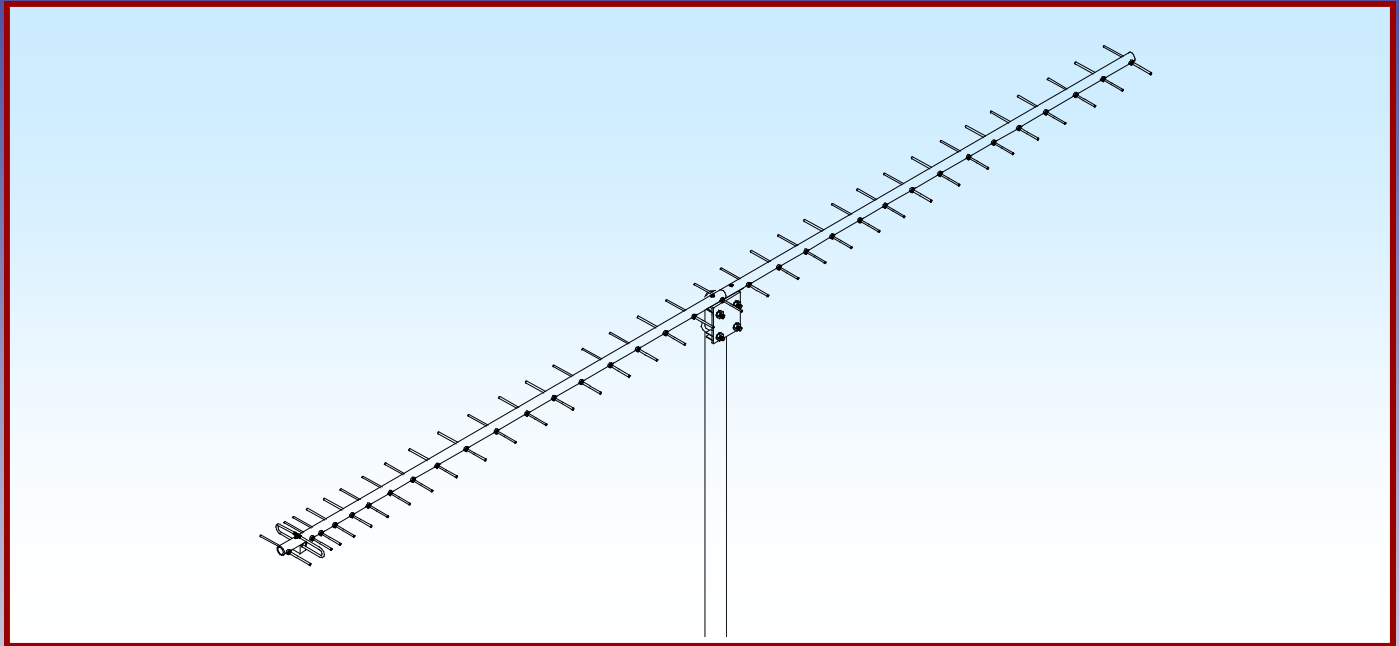




M2 Antenna Systems, Inc.

Model No: 23CM35



SPECIFICATIONS:

Model	23CM35	Power Handling.....	1 kW
Frequency Range	1250 To 1300 MHz	Boom Length / Dia	10' / 3/4"; 1" & 3/4"
*Gain	20.94 dBi	Maximum Element Length	4.75"
Front to back.....	25 dB Typical	Turning Radius:.....	60"
Beamwidth	E=17° H=18°	Stacking Distance	29" High & 29" Wide
Feed type.....	Folded Dipole	Mast Size	1-1/2" to 2" Nom.
Feed Impedance.....	50 Ohms Unbalanced	Wind area / Survival.....	0.6 Sq. Ft. / 100 MPH
Maximum VSWR	1.2:1 Typical	Weight / Ship Wt.	2.5 Lbs. / 3 Lbs.
Input Connector	"N" Female		

***Subtract 2.14 from dBi for dBd**

FEATURES:

The original 23CM35 has recently been re-designed and optimized for 1269 (satellite) and 1296 (terrestrial and EME) use. A 1" diameter center boom section has been added to strengthen and stiffen the boom and make the shipping box smaller, saving costs. The driven element has been modified to make matching easier and hold more securely. Perfect balance is achieved with balun 'inside' the folded dipole itself. 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 23CM35A will be as good as new and still performing to 'spec'!

The '23CM35' 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 troposcatter, ATV, FM repeater use, or future OSCAR applications, you will find the 23CM35A 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.

23CM35 PARTS & HARDWARE

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

1. Assemble the boom as shown. NOTE: the CENTER 1" boom section has two small holes 15.75 and 18.75" from one end. This is the rear end and connects to the 3/4" x 39" REAR boom section. DO NOT REVERSE THE CENTER SECTION AS MOUNTING AND PERFORMANCE WILL BE AFFECTED. Secure these two section using 2 8-32 x 1-1/4" screws and locknuts. Next, insert the FRONT BOOM section and secure with two more 8-32 x 1-1/4" screws and locknuts. Add the BOOM TO MAST 'L' BRACKET at the SMALL HOLES in the center boom section. Secure with 8-32 x 1-1/2" screws and locknuts.

2. 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 can be measured by any common tape measure of measurement stick. Use as required 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.

3. INSTALLATION OF ELEMENTS: HINT: SQUEEZE THE BUTTON INSULATOR SLIGHTLY WITH PLIERS TO IMPROVE THE TEMPORARY HOLDING OF THE ELEMENTS.

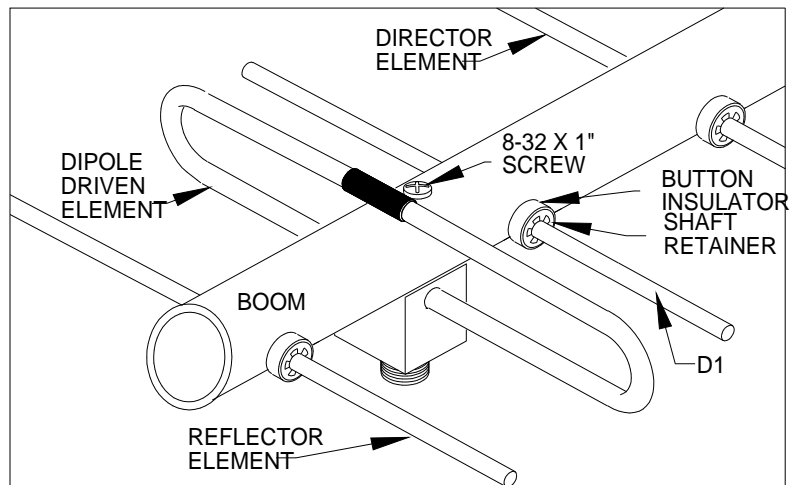
Starting with REFLECTOR (longest element), push on a black button insulator and insert the element through the holes 2-1/2" from the rear of the boom. Install the second button, pushing it on and into boom. DO NOT BOTHER WITH ACCURATELY CENTERING the element at this time. Next, install D1 and so on. DO NOT INSTALL the stainless steel SHAFT RETAINERS yet. This is easier to do after all the elements are installed in the boom.

4. Install the remaining DIRECTOR elements, as you did the REFLECTOR and D1.

5. 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.



6. Begin installing the stainless shaft retainers. Use thumb and index finger

23CM35 PARTS & HARDWARE

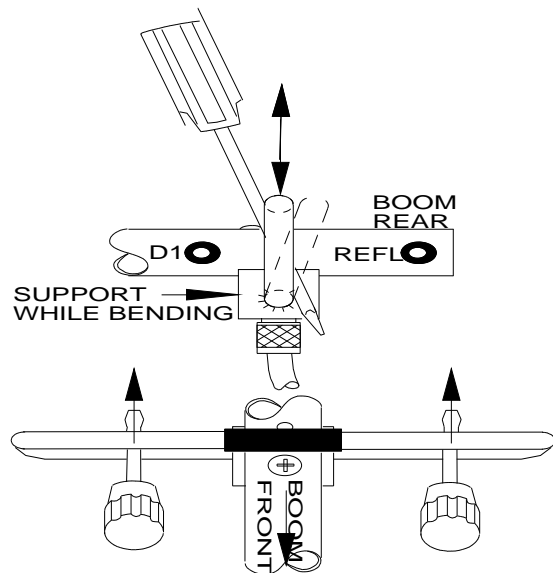
to hold a Shaft Retainer over end of the 3/8" x 3" push tube (Shaft Retainer dished into tube). Hold the element firmly and start the keeper onto the rod by applying pressure with the push tube. Push the Shaft Retainer until up tight against the button insulator. Locking pliers, *lightly* clamped up 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.

- 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

- Attach the feedline and route forward to the boom to mast bracket. Secure at regular intervals with cable ties. 1-1/2" and 2" U-bolts 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.

- 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.



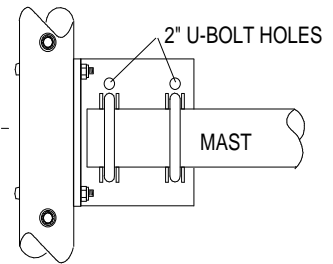
Be sure to use good quality feedline. We recommend Times LMR-400 or larger coax. For long runs of 50 feet or more, 7/8" hard line is highly recommended. For higher gain, these antennas can be stacked. Stacking one above the other WILL NOT narrow the azimuth beamwidth which is already narrow. M² can supply phasing lines and power dividers and structures for your stacking requirements. We can also supply technical information to make sure you optimize your system.

23CM35 DIMENSION SHEET

BOOM REAR

0.0		
0.500		4.688 REFLECTOR
1.500		DRIVEN ELEMENT
2.437		4.063
4.062		4.000
6.313		3.813
8.750		3.813
11.375		3.75
14.437		3.688
17.688		3.75
20.937		3.688
24.437		3.625
28.125		3.562
31.875		3.562
35.688		3.625
39.437		3.562
43.375		3.562
47.375		3.50
51.375		3.50
55.375		3.50
59.50		3.50
63.562		3.50
67.688		3.437
71.75		3.437
75.75		3.375
79.75		3.437
83.813		3.437
87.75		3.50
91.625		3.50
95.625		3.437
99.625		3.437
103.75		3.437
107.875		3.375
111.875		3.375
115.875		3.375
119.75		3.50

(MTG SCREW @ 1.75)
FOR SINGLE ANTENNA
SYSTEMS. SEE TEXT FOR
MIRROR IMAGE STACKING
AND PHASING.



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"
.750 = 3/4"
.813 = 13/16"
.875 = 7/8"
.937 = 15/16"
1.00 = 1"

23CM35 PARTS & HARDWARE

DESCRIPTION	QTY
BOOM SECTION #1, 3/4" X /049 X 39" STR ALUM	1
BOOM SECTION #2, 1" X /058 X 47" STR ALUM	1
BOOM SECTION #3, 3/4" X /049 X 40.25" STR ALUM	1
ELEMENTS, 3/16" X SEE DIM. SHEET	34
DRIVEN ELEMENT ASSEMBLY	1
BOOM TO MAST 'L' PLATE, .125 X 4" X 4"	1
U-BOLT, 1 1/2" & CRADLE	2
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	4
LOCKNUT, 8-32, SS	6
SCREW, 8-32 X 1", SS	1
LOCKWASHER, 8-32, SS	1
SHAFT RETAINER, 3/16" SS	68
BUTTON INSULATOR, POLY	68
PUSH TUBE, SHAFT RETAINER	1

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