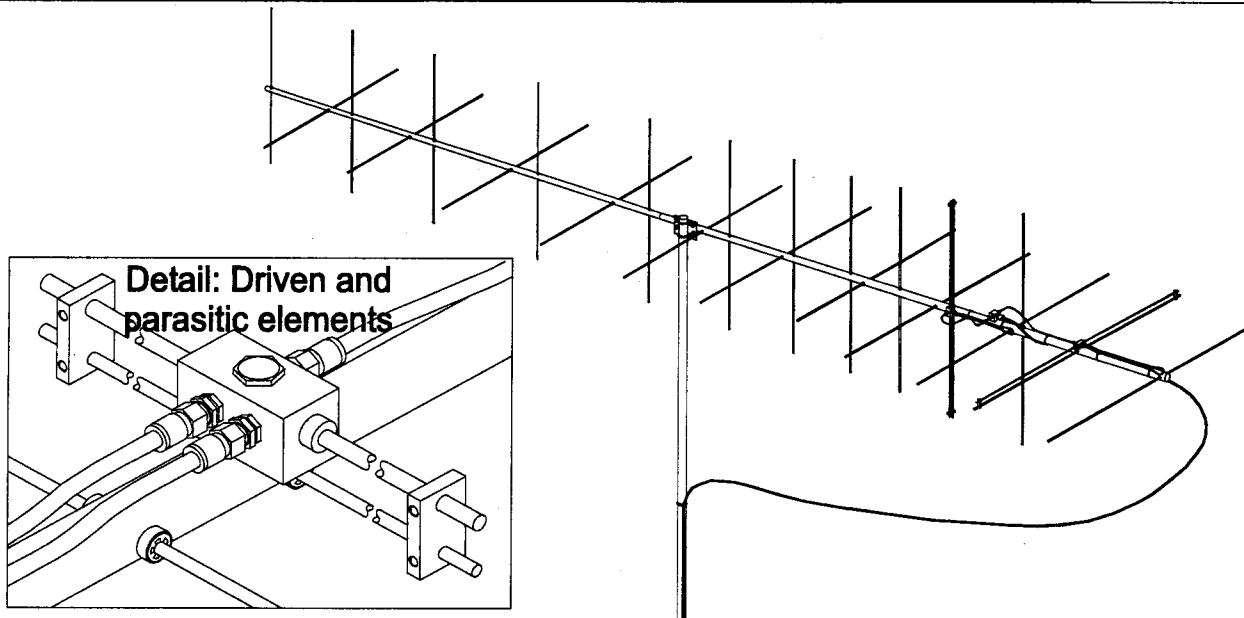


M² 2MCP22 Circular Polarized Antenna

Rev.11-21-03



SPECIFICATIONS

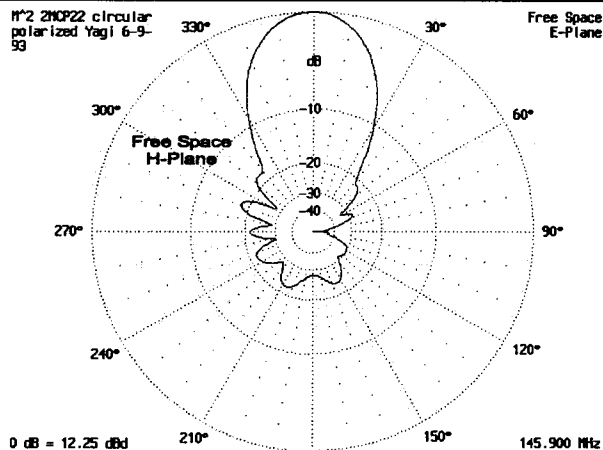
Model Number	2MCP22
Frequency Range	144 TO 148 MHz
Gain @ 145.9 MHz	12.25 dBdc
Beamwidth	38 degrees
Polarity	Circular RHC OR LHC
Front To Back	25 dB Typical
VSWR	1.4: Max
Feed Impedance	50 Ohms Unbal.
Connector	'N' Female
Power Handling	1.5 KW
Stacking Distance	9.5 to 10 feet
Turning radius	10 ft.
Boom Length	18' 7"
Boom Diameter	1-1/2, Tapering to 1"
Elements / type	22 / 3/16" Alum Rod
Wind Area	2.5 sq. ft.
Weight/ ShipWt.	12.5 lbs 14 lbs UPS

FEATURES

This cross polarized Yagi was computer designed for the serious OSCAR user. The average side and back lobes power have been reduced by approximately 10 dB over any previous design, enhancing signal to noise ratio and putting all your power where it will do the most good. The 2MCP22 is ideal for general use over the ENTIRE two meter band from FM to SSB and CW DX. Arrays of two or more will even permit moonbounce contacts using the old reliable passive repeater in the sky.

The unique Driven Element Modules are CNC machined and feature O-ring sealed connectors. Internal connections are encapsulated in a space age silicone gel with nearly 4 times the dielectric strength of air. The 2MCP22 is our finest circular polarized antenna. We are confident you will be impressed with the 2MCP22 from the moment you open the box until you've worked DXCC and beyond!

Optional items include HDFG fiberglass crossboom kit compatible with Yaesu 5400 and 5600 series az-el rotators, power dividers 2M2PORT and 2M4PORT, phasing lines VHF-50-2MCP22(2) or (4), 'H' frames, OR-2800 azimuth and MT-1000 and MT-3000 elevation rotators / positioners.





2MCP22 Assembly Manual

6-2-94
Rev.

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. Use 8-32 X 1-1/2" screws and locknuts to join 1" to 1-1/4" sections; 1-3/4" screws for 1-1/4" to 1-1/2" sections.

2. Separate elements by length into two identical sets, "H" and "V." Position the "H" element set along the boom by "H" length and position as shown the DIMENSION sheet. Start with the reflector (longest) element. Balance it on your finger to find rough center and push on a black button insulator to about 1/2" off center. Push 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 CENTERING** the element at this time and **DO NOT INSTALL** the stainless steel shaft retainers yet. It is easier to do after all the horizontal elements are installed in the boom.

3. 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.**

4. Now begin centering the elements. Use a tape measure to EQUALIZE the amount the element sticking out 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 retainers. Use thumb and index finger to hold a retainer over end of the 3/8 x 3" push tube (retainer dished into tube). Hold the element firmly and start the retainer onto the rod by applying pressure with the push tube. Push the retainer 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 retainer too far). Repeat for the opposite side. Continue installing retainers until all elements are locked in place.

6. 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 rear. Install the 8-32 x 1/4" set screws (internal Allen head - tool supplied) into the SHORTING BARS. Slide the bars onto the Driven Element Block Rods and the driven element rods. Position the Shorting Bars at the ends of the 3/16" rod that passes through the boom. Align the bars with each other and tighten the set screws.

7. Mount the "T" JUNCTION BLOCK on the top of the boom to holes about 9" to the rear of the vertical driven element block. Orient "N" feed connector to the rear. Secure with 8-32 x 1-1/4 screw.

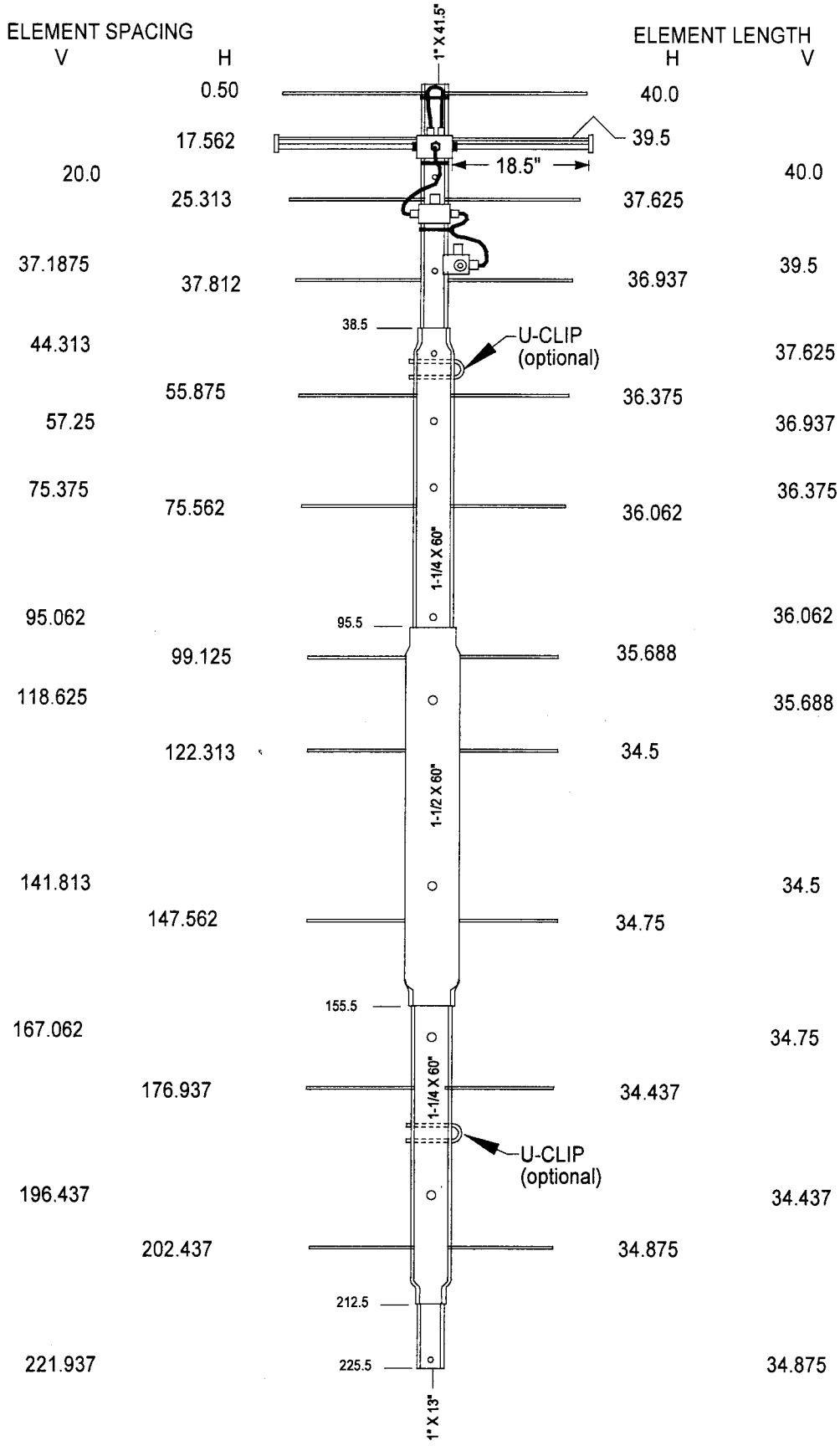
8. ASSEMBLING THE VERTICAL ELEMENTS

Repeat steps #2 through #5 for the Vertical elements, using the Dimension Sheet as your guide to lengths and spacing.

9. INSTALLATION OF THE VERTICAL DRIVEN ELEMENT BLOCK DETERMINES THE CIRCULARITY OF THIS ANTENNA. THE ORIENTATION OF THE BLOCK FOR RHC - RIGHT HAND CIRCULARITY, IS SHOWN ON THE DIMENSION SHEET AND DRAWING.

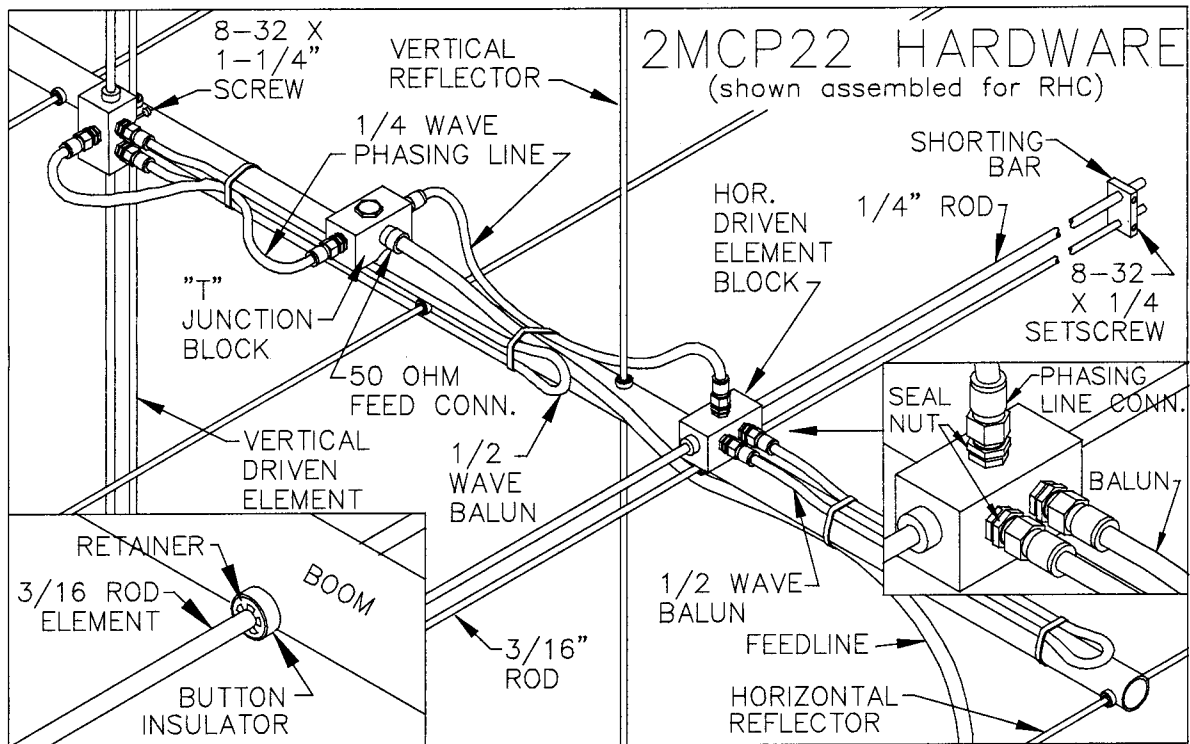
Viewed from the rear of the boom (rearmost Reflector HORIZONTAL), the VERTICAL Driven Element Block mounts to the LEFT hand side of the boom with the two Balun connectors oriented to the REAR. Secure with 8-32 x 1-1/4" screw. Install the Shorting Bars as in step #7.

2MCP22 DIMENSIONS

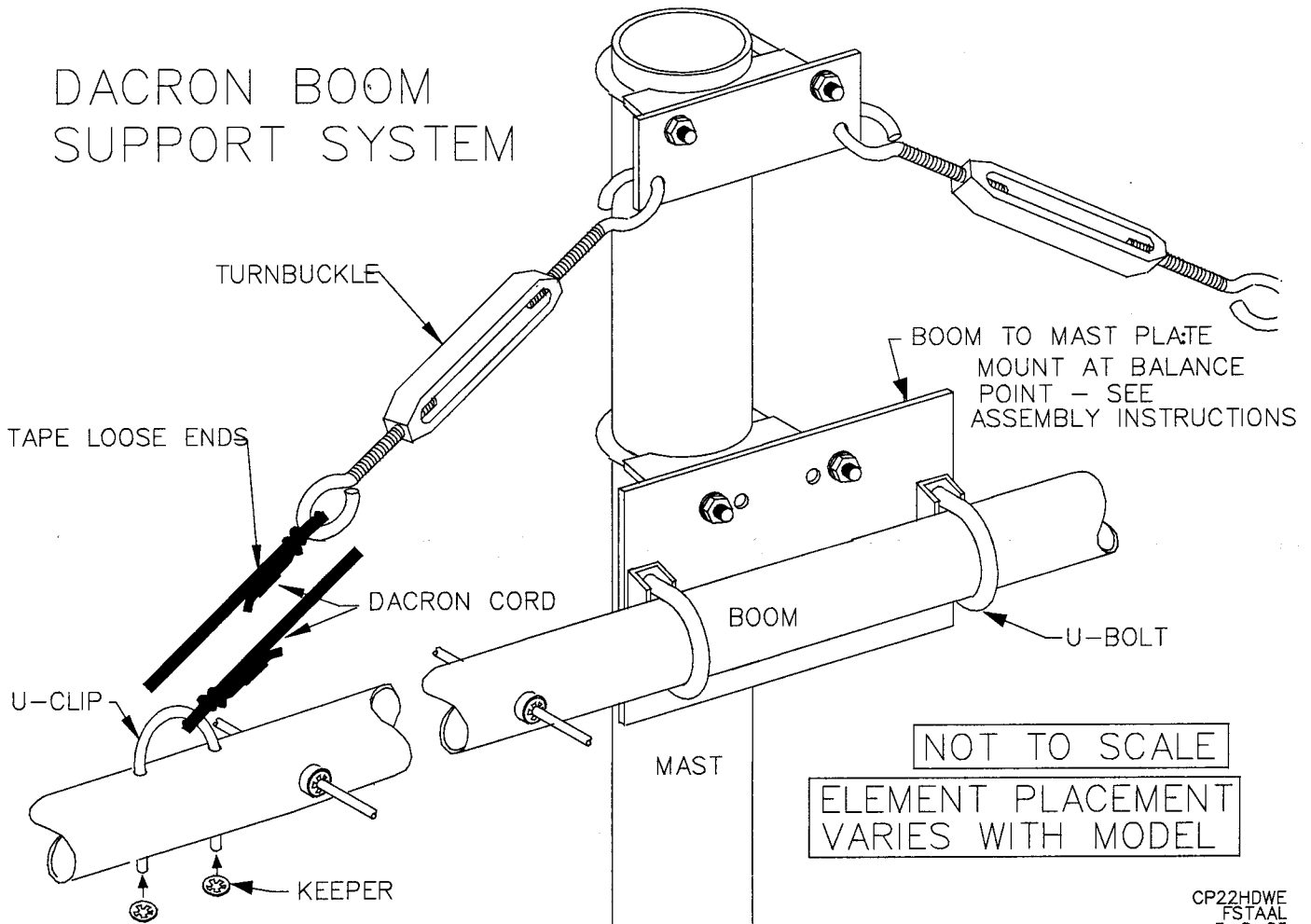


DECIMAL TO FRACTION CONVERSION

- .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"



DACRON BOOM SUPPORT SYSTEM



10. Before installing the Baluns and Matching / Phasing Harness, thread 3/8" SEAL NUTS fully onto all connectors, with the black Neoprene face of the nuts facing out. Attach Baluns and Phasing lines to the Driven Element Blocks and Junction Block as shown on the Dwg. 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. Depending on model and polarity, the Vertical balun may loop around another element. This is normal. Form balun and phasing line coax close to the boom and secure with nylon cable ties. Ties should be snug but not crushing or kinking the coax.

11. Use good quality coax and "N" connector for your feedline. Secure feed coax near connector on Junction Block, to provide stress relief, route to rear of boom and secure again. Allow coax to hang in a loop between the rear end of the boom and the reattachment point (at least 12" beyond element tips) on the mast or crossboom. **Do not route feedline to boom- to- mast plate as exiting antenna here will adversely affect circular field.**

12. The boom to mast plate is normally mounted to the boom at, **or near**, the physical balance point, and **only** to the 1-1/2" boom section. Use two 1-1/2" 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 your NON-CONDUCTIVE 2" mast or crossboom. Since the feed line represents significant weight it is best to have it attached and fastened to the boom with cable ties before final mounting of the plate. Element alignment is your choice. Elements oriented at 45 degrees works well for bringing the feedline off with minimal interference to the pattern or VSWR.

13. IF YOU WILL BE USING THE ANTENNA FOR TERRESTRIAL USE ONLY, you may want to consider installing the overhead Dacron cord boom support system (supplied). FOR SATELLITE USE most users don't find it necessary and prefer to "keep the antenna simple". A slight droop in the boom may be noted but it will not effect the antenna performance.

14. To add the support, install a 2" U-bolt into the 1-1/2" x 4" TURNBUCKLE PLATE and attach the turnbuckles. Temporarily install the turnbuckle U-bolt studs into the top set of U-bolt holes in the boom to mast plate and loosely secure with a couple of 5/16" nuts. This "locks" the alignment of the turnbuckle plate to the boom to mast position. Install the two U-clips into the boom and secure with retainers. Rotate boom so clips are vertical.

15. Now attach one end of the BLACK DACRON SUPPORT CORD to the front U-clip. Two turns of cord and a square knot is adequate. Heat-seal the left over end and tape back to the main line. Route the cord back to the rear clip and knot the same. Even-up excess cord at the turnbuckle plate and cut. The turnbuckles should be extended until just a thread or two shows inside the body of the turnbuckle. Attach cord ends to the turnbuckles as on the U-clips. When completed, the two lines should be tight, the turnbuckles laying flat out just over the boom. After the antenna is installed to a mast, the turnbuckle plate is attached and slid up about one foot until the boom is straight. Use the turnbuckles to balance and fine tune the support. After final adjustments, safety-wire the turnbuckles to maintain settings.

15. The 2M22CP is a circular polarized antenna and creates a field in all planes or polarities. PERFORMANCE DETERIORATES SIGNIFICANTLY if it is mounted on a metal (conductive) mast / crossboom or if the feedline exits the boom anywhere but at the rear. A 2" mast or crossboom of any NON-CONDUCTIVE material can be used. Fiberglass is the prime choice for its strength and weather resistance (1/4" wall x 2" O.D. Fiberglass tube is available from M²). Mount the 2M14CP so that element tips are at least 12" from any conductive material (mast, tower, feedline, etc.).

THIS COMPLETES THE ANTENNA ASSEMBLY.

2MCP22 PARTS LIST

DESCRIPTION	QTY
#1 BOOM SECTION, 1 X .058 X 41.5"	1
#2 BOOM SECTION, 1-1/4 X .058 X 60" SOE	1
#3 BOOM SECTION, 1-1/2 X .058 X 60"	1
#4 BOOM SECTION, 1-1/4 X .058 X 60" SOE	1
#5 BOOM SECTION, 1 X .058 X 13"	1
ELEMENTS, 3/16 ROD x Dimension Sheet	22
DRIVEN ELEMENT BLOCK ASSEMBLY	2
JUNCTION BLOCK.....	1
BALUN, RG-6 1/2 WAVE.....	2
MATCHING / PHASING CABLE, 1/4 WAVE	2
BOOM-TO-MAST PLATE, .188 X 6 X 4"	1
TURNBUCKLE PLATE, 2 X 4.....	1
U-BOLT AND CRADLE, 2'	2
U-BOLT AND CRADLE, 1-1/2"	2
DACRON ROPE, 3/32 X 16' 8"	1
ASSEMBLY MANUAL.....	1

IN HARDWARE BAG:

TURNBUCKLES, 1/4"	2
U-CLIPS, 3/16" ROD.....	2
SHORTING BAR.....	4
BUTTON INSULATORS	44
KEEPER, SS.....	48
NUT, 5/16-18 SS.....	10
LOCKWASHER, 5/16 SS.....	10
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	3
LOCKNUT, 8-32 SS.....	8
SET SCREW, 8-32 X 1/4 SS	8
CABLE TIE, NYLON	5
SEAL NUTS	8
ALLEN HEAD WRENCH	1
PUSH TUBE, 3/8 X 3".....	1

CAREFULLY MANUFACTURED BY:

M² ENTERPRISES

4402 N. Selland Ave.

FRESNO, CA 93722

(559) 432-8873 FAX (559) 432-3059