

M2 Antenna Systems, Inc. Model No: 2MXP20



SPECIFICATIONS:

.2MXP20
.144 To 146 MHz
.15.3 dBi
.25 dB Typical
.E=30° H=34°
."T" Match
.50 Ohms Unbalanced
.1.5:1
."N" Female

Power Handling	2.5 kW
Boom Length / Dia	21' 7" / 1-1/2" To 1"
Maximum Element Length	40-1/2"
Turning Radius:	146"
Stacking Distance	11' 6" High & 12" Wide
Mast Size	1-1/2" to 2" Nom.
Wind Area / Survival	1.9 Sq. Ft. / 100 MPH
Weight / Ship Wt	8 Lbs. / 12 Lbs.

*Subtract 2.14 from dBi for dBd

FEATURES:

This dual polarized yagi was computer designed for the **serious** Moonbouncer. The very good G/T is a result of low side and back lobes and the design has been optimized for stacking. This antenna is **remarkable** in that the **stacking gain** for four antennas **exceeds 6 dB**. Even using a single Horizontal/Vertical relay, you have a moonbounce package that can outperform larger, linear arrays. Additional relay switching provides 4 different types of signals. Losses from special polarity and Faraday rotation virtually disappear. EME reliability approaches 100%. M²'s new 2MXP20 antennas, power dividers and phasing lines (using Times' new light-weight, low-loss LMR400 and/or LMR600 cable) coupled with 'T' brace kits, fiberglass H-frame packages, OR2800P Azimuth Rotator, and our New MT-1000 Elevation Motor provide the building blocks for a whole new generation of high performance EME arrays.

2MXP20 ASSEMBLY MANUAL

- 1. Start by laying out the boom sections using the DIMENSION sheet as a guide. Use 8-32 screws and locknuts to join sections. Sections are swaged to fit each other.
- 2. Lay out the elements by length and position as shown the DIMENSION sheet. Start with the HORIZONTAL reflector (longest) element and push on a black button insulator to about 1/2" from 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 WITH ACCURATELY CENTERING the element at this time and DO NOT INSTALL the stainless steel SHAFT RETAINERS yet. This 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 HORIZONTAL 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. **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, the retainers may be left off. The button insulators, normally a tight fit, hold the elements quite securely. Begin installing the

2MXP20 ASSEMBLY MANUAL

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 and keep you from pushing the first Shaft Retainer too far). Repeat for the opposite side. Continue installing Shaft Retainers until all The HORIZONTAL elements are locked in place. NOW repeat steps 2-5 for the VERTICAL elements.

- 6. Mount the DRIVEN ELEMENT T-MATCH BLOCKS per the position on the DIMENSION SHEET using a single 8-32 X 1-1/4" screw for each. Orient the HORIZONTAL block with feed connector facing to center the VERTICAL block with the feed connector facing the rear. VERTICAL block orientation may be reversed if you wish LEFT HAND CIRCULAR.
- 7. Before installing the baluns, thread a 3/8" SEAL NUT all the way onto each connector, with the black Neoprene side out. Now coil the rear or HORIZONTAL balun so it will not extend beyond the reflector when installed. 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. Squeeze the balun coil across the middle until it is close to the boom and secure to boom with a nylon cable tie. Tie should be snug but not crushing or kinking the coax.
- 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 then onto the Driven Element Block Rods. Position the Shorting Bars as specified on the DIMENSION SHEET: the distance given is between the outer edge of the Driven Element Block and the inner edge of the Shorting Bar. Align the bars and rods with each other and tighten the setscrews.
- 9. The boom to mast plate is normally mounted at 116" from rear of boom. This should be the perfect position when using the M² "T" BRACE KIT. Use two 1-12" U-bolts and the stainless nuts and lock washers provided. DO NOT OVER TIGHTEN. 2" and 1-1/2" U-bolts are provided for mounting the antenna to your 2" or 1-1/2" mast.

THIS COMPLETES THE ANTENNA ASSEMBLY.

MOUNTING AND STACKING INFORMATION

Stacking distance is BEST at 144" to 152". Be sure all antennas are oriented so the HORIZONTAL and VERTICAL driven element blocks are on the SAME SIDE of the boom and NOT MIRROR IMAGE to each other. Holes in rear 1 inch boom section are provided for the "T" brace kit mounting. Route the phasing lines onto the vertical legs of the "T" brace kit and then forward to the main "H" frame cross boom. To minimize phasing line length, cutting across the corners is fine and will not cause pattern degradation. M² can provide low loss LMR400 or LMR600 phase lines and 4 port power dividers.

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2MXP20 DIMENSION SHEET



2MXP20 (FM 145-148) DIMENSION SHEET



2MXP20 PARTS & HARDWARE

DESCRIPTION	QTY
BOOM, 1.0 X .058 X 51" ALUM. TUBE	1
BOOM, 1.0 X .058 X 45.5" ALUM. TUBE	1
BOOM, 1-1/4 X .058 X 60 SOE, ALUM	2
BOOM, 1-1/2 X .058 X 60 SBE ALUM	1
BOOM TO MAST PLATE, 3/16 X 4 X 6"	1
TURN BUCKLE PLATE, 1/8 X 2 X 4" (M2APT0102)	1
'T' MATCH BLOCK ASSEMBLY	2
BALUN CABLE RG-6U, HALF WAVE	2
DACRON, 3/32" X 20 FT	1
ELEMENT, 3/16 X SEE DIMENSION SHEET	20
ASSEMBLY MANUAL	1

HARDWARE BAG #1

U-BOLT AND	CRADLE,	2"	
U-BOLT AND	CRADLE,	1-1/2"	

HARDWARE BAG #2

BUTTON INSULATOR, 3/16" POLY	40
KEEPER, 3/16" SS	44
TURNBUCKLE, 1/4"	2
NUT, 5/16-18 SS	10
LOCKNUT, 1/4-20, SS	2
LOCKWASHER, 5/16" SPLIT RING SS	10
SCREW, 8-32 X 1-3/4" SS, PHILLIPS	4
SCREW, 8-32 X 1-1/2" SS, PHILLIPS	4
SCREW, 8-32 X 1-1/4" SS, PHILLIPS	2
SET SCREW, 8-32 X 1/4" SS	8
LOCKNUT, 8-32 SS	8
SHORTING BLOCK	4
EYEBOLT, 1/4-20 X 2-1/2"	2
NYLON TIE, (MEDIUM)	4
ALLEN WRENCH, 5/64"	1
PUSH TUBE, 3/8" X 3" ALUM	1

<u>OPTIONAL</u>

2MXP20 FM KIT

ELEMENT, 3/16 X SEE DIMENSION SHEET	10
KEEPER, 3/16" SS	

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