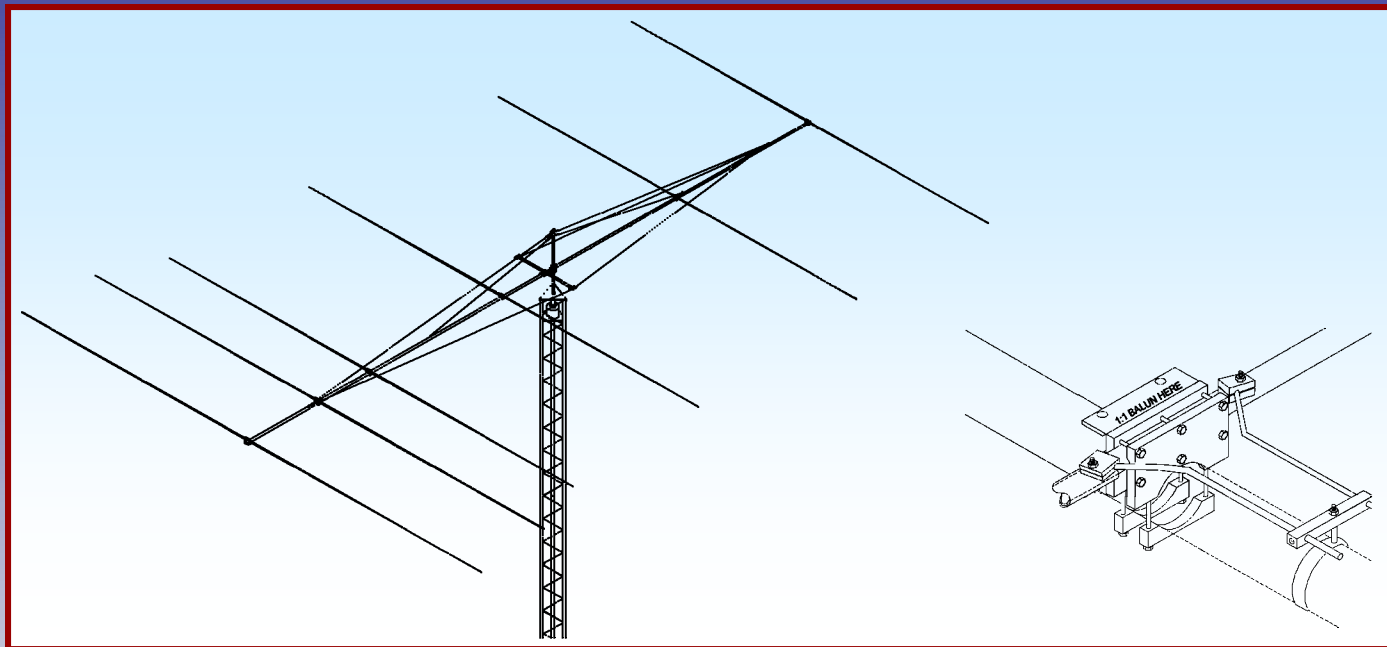




M2 Antenna Systems, Inc.

Model No: 20M6



SPECIFICATIONS:

Model	20M6	Power Handling	3 Kw, Higher avl.
Frequency Range	14.0 – 14.350 MHz	Boom Length / Dia	59' / 3.0 x .125 Wall
*Gain, (FS) / Over gnd	11.14dBi / 16.6dBi @70'	Element Length / Dia.	36.5' / 1 1/4" – 1/2"
Front to back	25 dB Typical	Turning Radius:	40'
Beamwidth	E=46° / H=60°	Stacking Distance	65' -70'
Feed type	Hair pin match	Mast Size	2" to 3 " Nom.
Feed Impedance	50 Ohms Unbalanced	Wind area / Survival	15 Sq. Ft. / 100 MPH
Maximum VSWR	1.2:1	Weight / Ship Wt.	165 Lbs. / 191 Lbs.
Input Connector	SO-239, Others avl.		

***Subtract 2.14 from dBi for dBd / FS = Free Space**

FEATURES:

The 20M6 is a medium spaced, high performance, **full band coverage** 6 element Yagi, computer optimized to squeeze the last drop of performance from this boom length. The design provides virtually flat gain, exceptional front to back and excellent VSWR never exceeding 2:1 at the upper band edge. Large, sleeved elements and boom provide the 100 mph wind survival factor. Construction includes machined boom to element mounting plates and a rugged, efficient hairpin match. Predrilled holes for the stainless bolts and locknuts will keep you on the top of the pileup for years to come in spite of Mother Nature! The 20M6 is our "top of the line" 20 meter Yagi. A 125 mph version of this design is also available in our "Survivor Series".

20M6 ASSEMBLY MANUAL

TOOLS REQUIRED: screw driver, 11/32" spintite or socket, 7/16", 1/2", and 9/16" socket and / or end wrenches. A small container of Noalox, Penetrox (or equivalent) conductive, anti-oxidant zinc paste has been supplied. Apply a small amount at all aluminum to aluminum and other electrical joints.

1. Begin by assembling the 1" and 3/4" elements as shown on the DIMENSION DRAWING. Use 8-32 x 1-1/4" screws and locknuts at the joint to hold the 3/4" section. Tighten securely. Assemble all 12 1" to 3/4" sections. Next, pair up the equal length 1/2 inch tubes. Install each pair into the 3/4 sections. Secure with 5/8" compression clamps (See compression clamp and tip assembly detail sheet). You can insert these tips later depending on your space limitations.

2. Locate a 1-1/8 x 72" section. Slide a 1-1/4 x 60" section halfway over it, match up the drilled holes and secure with a 1/4-20x1-1/2" bolt and locknut. Repeat for the other end of the 1-1/8" section. Assemble two element clamp plates over the center of this section (1-1/4 butts at center of plates). Use the 1/4-20 x 2-1/2" bolts and locknuts to pull the element clamps together. Tighten bolts a little at a time to ensure plates are kept parallel and pressure is even. Repeat this procedure for the other four parasitic elements.

3. DRIVEN ELEMENT: Locate the two 1-1/8" x 36" sleeves and insert them into the last 1-1/4 x 60 inch sections. Next slip the two round polyethylene disk insulators over the 1" x 24" fiberglass center insulator rod to about 1-1/2" inside the two holes in the rod.

Slip each half element over the fiberglass rod. Align the holes and temporarily hold in place with two 1/4-20 x 2-1/4 bolts and locknuts. Finger tighten only at this time. Assemble the last two element clamp sets over the center insulator as in step #2 but add the the "L" bracket for balun mounting using the top three bolts to secure it. center the assembly in the clamps and tighten evenly with 1/4-20 x 2-1/2" bolts straight up or down.

4. See BOOM ASSEMBLY drawing. The boom is symmetrical, so inner and outer sections are identical. Check the machined surfaces of the 144" splice section for deep scratches or dents. File off any rough spots.

Lubricate splice lightly with oil and slide halfway into one of the swaged inner boom sections. Add two 1/4-20 x 3-1/2" bolts, and locknuts but do not tighten. Now slide remaining inner section onto the splice. Add the hardware and **tighten all four bolts**. Add a straight section to each end of the center assembly, align holes and secure with 1/4-20 x 3-1/2" hardware.

5. Install the two INNER eyebolts into the boom, just in from swaged joint, and tighten the nuts.

6. Place the boom on bucks or equivalent to get it to a convenient working height (eyebolts UP). Refer to the DIMENSION SHEET and using a tape measure and a marking pen or piece of tape, mark the ELEMENT LOCATIONS on the boom.

7. At the REFLECTOR element location, mount a center element assembly on the boom (rear plate about 1/2" from boom end). Add a SADDLE CLAMP under each ELEMENT CLAMP PLATE and secure with 4 1/4-20 x 2-3/4" bolts. Align the element at right angle to the EYEBOLTS and finger tighten bolts. Rotate boom back and forth a little to make sure saddles and plates are square with boom and not cocked. Tighten evenly. Omit the driven element and mount the rest of the elements at their proper location. Exact spacing can be done later once final assembly is completed.

20M6 ASSEMBLY MANUAL

8. DRIVEN ELEMENT, Place the element on the boom at the proper spacing from the Reflector and add the bottom saddle clamps, align with the reflector and tighten. Add the two Hairpin (beta) tube clamp blocks on the 1/4-20 x 2-1/4" bolts inserted from the underside of each element butt replace the locknuts and finger tighten again. Mount the 3-30 MHz 1:1 balun on the balun "L" bracket using the 2-1/2" U-bolt and saddle. The balun connector should face away from the Reflector. DO NOT OVER TIGHTEN THE SADDLE CLAMP NUTS AS DAMAGE TO THE BALUN MAY OCCUR. Now, attach the balun leads loosely to the studs at each element butt and fingertighten the nuts again. The Hairpin (beta match) tubes will be installed later.

9. Next, attach the 1", 3/4" and 1/2" tip element assemblies to the 1-1/4" element sections matching 1/2" tip lengths (if installed) to correct element position (see Dimension Sheet). Check that 7/8" O.D. insert is in place at butt of 1" elements. Use 8-32 x 1-1/2" screws and locknuts and tighten securely.

10. HAIRPIN MATCH ASSEMBLY: Locate the 3-1/2 stainless band clamp and insert a 1-1/4-20 x 2" bolt through the hole from the inside. Add the 3/8 x 1" spacer and then add the 5" long shorting bar. Secure with a locknut. Using the DIMENSION SHEET, place the clamp around the boom at the proper distance in front of the Driven element. Insert the straight ends of the 3/8" x 44" hairpin tubes into the shorting bar. Then feed the angled end of the tubes between the clamp blocks at the butt of each driven element half. Align the tubes and tighten the clamp halves securely. Insert the 1/4-20 x 1/4" set screws into the ends of the shorting bar, adjust as required to the correct position and tighten the set screws. Tighten the band clamp around the boom to insure a good ground. Attach feedline section at this time, if possible. Use the large cable ties to secure the balun and the main feedline to the boom up to near the boom to mast plate position.

11. Determine the BALANCE POINT of the assembled antenna (approximately 320" from the reflector). Mount the 8" x 8" BOOM TO MAST PLATE there using two 3 inch U-bolts, stainless steel lock washers and nuts. Add two of the four HEAVY DUTY 2 inch mast U-bolts and install a short (6' or so) temporary mast in order to pre-rig the boom support cables. Use the lighter 2 inch U-bolt to attach one of the turnbuckle / plate assemblies to the temporary mast. Then slide it right down to the boom to mast plate. Extend the turnbuckle eyebolts so just one thread shows inside the body.

12. Support boom so that it is straight or droops just slightly at the ends. Attach one end of the 32' 5/16" DACRON CORD to an inner eyebolt using 3 half hitches. Pull them as tight as possible and tape the leftover end back to the main line using black electrical tape. Tie other end of cord at the other inner eyebolt.

13. Equalize cord length at turnbuckle plate and cut. Put two turns of the rear cord through rear turnbuckle eye, pull tight, and add three TIGHT half-hitches. Repeat for front cord section. Cut any leftover cord at 10". Seal loose ends with heat or flame and tape to main lines. At this point the cord should be stretched tight nearly PARALLEL with the boom.

Now raise the turnbuckle plate assembly up the temporary mast until the boom begins to lift at the eyebolts. Pull firmly at the middle of each support lines to help the knots take a good set. If possible leave the lines under tension overnight. Readjust plate height as needed. Final tensioning with turnbuckles can be done at the time of installation. Remember to safety-wire turnbuckles to maintain adjustments.

20M6 ASSEMBLY MANUAL

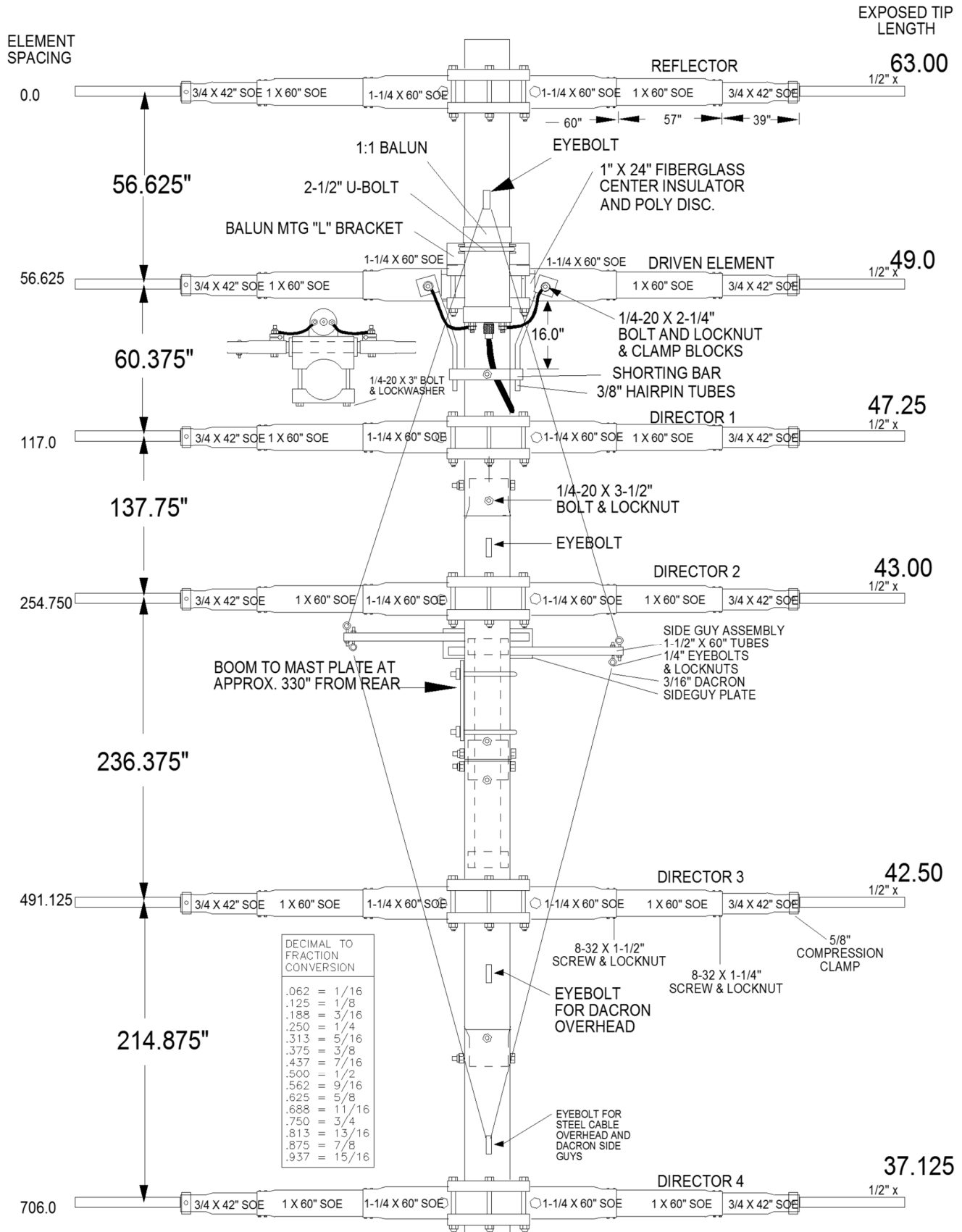
14. Install the 3/8" eyebolts attached to the ends of the 1/8" aircraft cables into the outer boom eyebolt holes. Note: The longer cable assembly (27-6') goes forward, the shorter (about 23') to the rear. Install the remaining turnbuckle / plate assembly about 5-6' above the boom to mast plate. Unscrew turnbuckle eyebolts until just one thread shows inside body. Install a cable eye into each turnbuckle eye,. Pull aircraft cable through turnbuckle eye, apply tension and install two cable clips to secure cable. Repeat for other cable, balancing tension, so temporary mast remains square with boom.

16. Attach the sideguy plate to underside of boom as shown in the diagrams provided. Secure with 3" U-Bolts. Insert a pair of eyebolts into opposite sides of each 1-1/2" x 60" sideguy tube. Mount the tubes to the sideguy plate with 1-1/2" U-bolts. Position tubes so about 3' extends beyond plate (tubes are extended farther after ropes are installed). Use sections of the 120' length of 3/16" Dacron rope to tie between the sideguy eyebolts and the **outer** boom eyebolts. Balance tension when tying off so boom remains straight. Then loosen the 1-1/2" U-bolts and slide each sideguy tube out until the lines are fairly taut. Great tension is not required: the side guys are provided to damp out and limit major boom flex, not to lock boom into a rigid structure. Adjust the tension on both sides so that the boom is straight. Side guy tubes may be temporarily removed and taped to boom if it seems likely they will interfere during antenna installation.

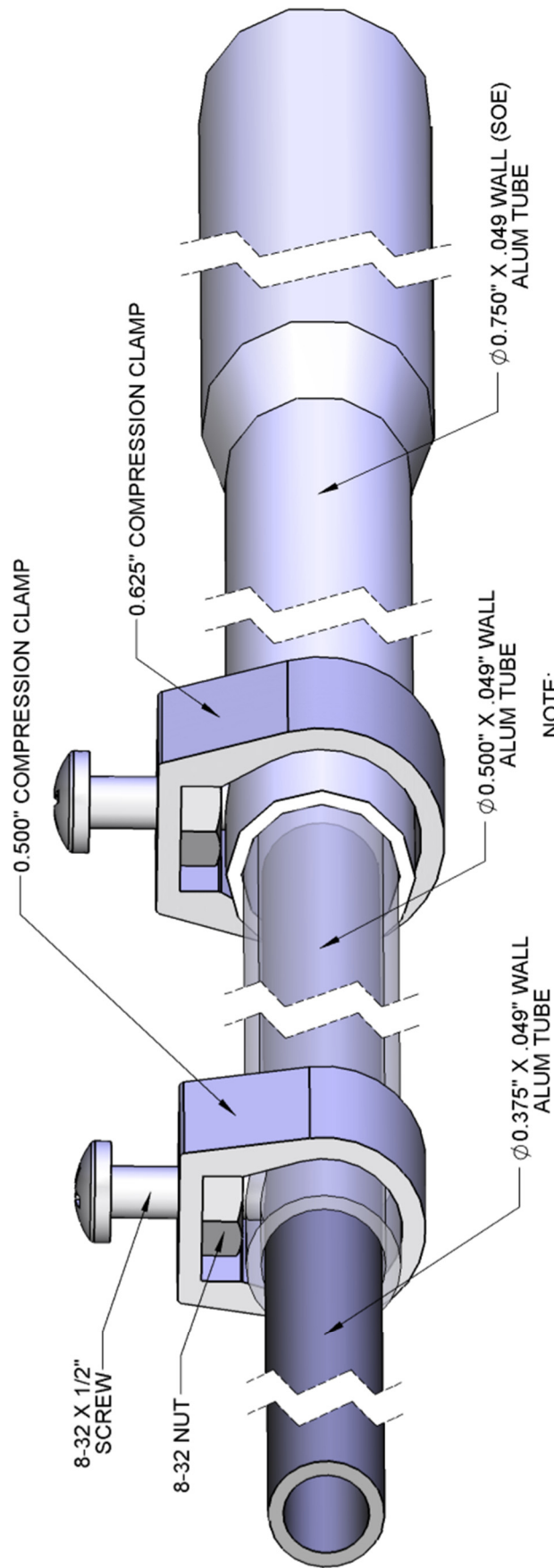
CAREFULLY DESIGNED AND MANUFACTURED BY:

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20M6 DIMENSION SHEET



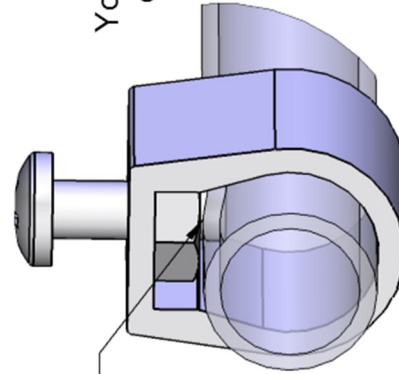
GENERIC COMPRESSION CLAMP DETAIL



NOTE:
TUBES SHOWN TRANSPARENT
TO SHOW MORE DETAIL

NOTE:

Generic layout to show
how compression clamps work.
Your antenna may have one or the other
or may even have both compression
clamp sizes.



NOTE: INSIDE TUBE NOT SHOWN FOR CLARITY

20M6 PARTS & HARDWARE

DESCRIPTION	QTY.
Boom sections, 3" x .125 x 15' swaged alum. tube	2
Boom sections, 3" x .125 x 15' straight alum. tube	2
Boom splice, 2-1/2 x 120" bushed to 2-3/4"	1
Side Guy Tube, 1.5x.058x60"	2
Boom to mast plate, 8 x 8 x .250" (M2APT0070)	1
Side Guy Plate, 6x8x.188" (M2APT0088)	1
1-1/4 x .058 x 60" alum. tube, SOE NON D.E.	10
1-1/4 x .058 x 60" alum. tube, SOE drilled for D.E.	2
1-1/8" x .058 x 72" center sleeve	5
1-1/8 x .058 x 36", center sleeve	2
1 x .058 x 60" alum. tube SOE, w. 7/8 x 15" sleeve.....	12
1" x 24", Fiberglass rod (M2AFG0037)	1
3/4 x .049 x 42" alum. tube SOE	12
1/2 x .049 alum. tube. x SEE CHART	12
Hairpin tubes, 3/8 x 44", bent	2
Balun, 3-30, 1:1 standard SO-239 conn.	1
Balun L bracket, 1 x 1 x 6" alum (M2APT00160)	1
Element clamp Block, 3 X 6 X 1/2" (M2AEC0040)	12
Machined cradle, 3" LD, 1 x 4 x 1/2" (M2AMC0136).	12
"Turnbuckle plate, 2 x 5 x 3/16" (M2APT0113)	2
Wire Rope, 1/8" x 330" with 3/8" eyebolt	1
Wire Rope, 1/8" x 275" with 3/8" eyebolt	1
Dacron Rope, Black 5/16 x 32 ft.	1
Dacron Rope, Black, 3/16"x120 ft.	1
Turnbuckle, 3/8"	4
Eyebolt, 3/8 x 6" for 5/16" Dacron guy	2
Eyebolt, 1/4 x 4"	4
Cable ties, large	5
U-bolt & cradle, 3"	4
U-bolt & cradle, 2-1/2"	1
U-bolt & cradle, 2" HD	4
U-bolt & cradle, 1-1/2"	4
U-bolt & cradle, 2"	2
Cable clips, 1/8"	4
Cable eyes, 1/8"	2
Compression clamp, 5/8" (M2AMC0145)	12
Zinc paste	1
Assembly Manual	1
HAIRPIN PARTS BAG	
Hairpin shorting bar. 1/2 x 1/2 x 5.0 (M2ASB0262)	1
Hairpin spacer, 3/8 x 1" tube.....	1
Hairpin clamp block, 1/4" X 1" X 1-1/4" (M2AMC0261)	4
Polydisc insulator, 1" (M2ADI0030)	2
Set screw, 1/4-20 x 1/4"	2
Band clamp, modified, 2-1/2-23-1/2"	1
Bolt, 1/4-20 x 2" ss	1
Nut, locking 1/4-20, ss	1
Allen wrench, 1/8"	1
IN HARDWARE BAGS	
Bolt, 1/4-20 x 3-1/2"ss.....	8
Bolt, 1/4-20 x 2-3/4"ss.....	24
Bolt, 1/4-20 x 2-1/2"ss.....	36
Bolt, 1/4-20 x 2-1/4"ss.....	2
Bolt, 1/4-20 x 1-1/2" ss.....	10
Lockwasher 1/4" split ring ss	4
Nut, 1/4-20 locking ss	56
Nut, 5/16-18 ss.....	14
Lockwasher, 5/16 ss	14
Nut, 3/8-16 ss.....	20
Lockwasher, 3/8 split ring ss.....	20
Screw, 8-32 x 1-1/2"ss.....	24
Screw, 8-32 x 1-1/4" ss.....	24
Screw, 8-32 x 1/2"ss.....	12
Nut, 8-32 locking, ss	48
Nut, 8-32, ss.....	12

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