12425

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LWA60X1K
6/86

40M-3A METER MONOBANDER

ASSEMBLY TEXT

Revised June 19, 1985

40M-3A METER MONOBANDER

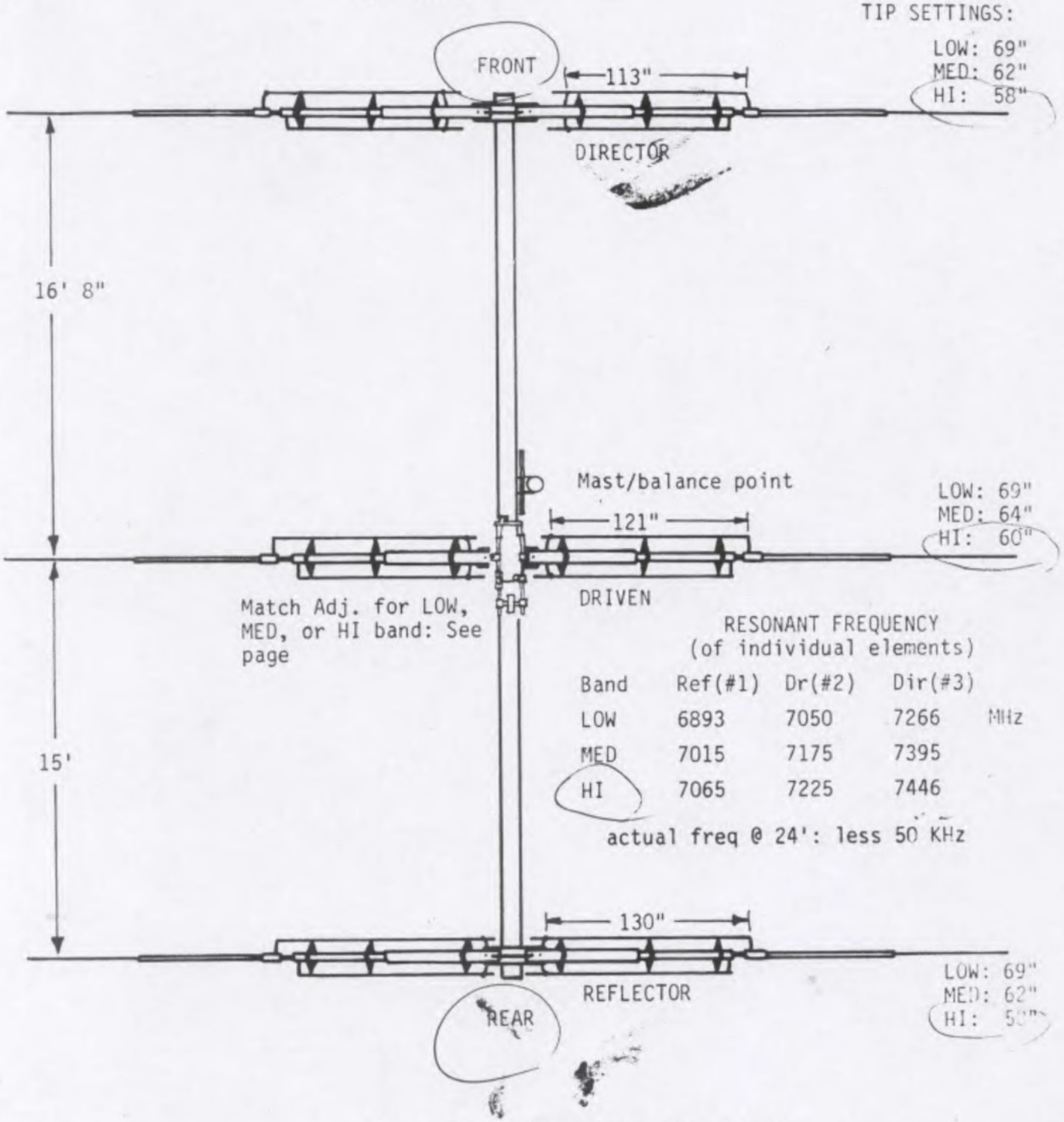
The 40M-3A is KLM's carefully designed effort to produce a modest-sized 40 meter monobander with superior performance and bandwidth. The assembly manual offers three tuning options for achieving optimum performance over your favorite part of the band. Extensive R&D and post-production field testing reveals the 40M-3A as a highly successful design - one we're sure you will find very rewarding and enjoyable to work with. Thus, the 40M-3A joins the ranks of KLM's other great amateur products.

SPECIFICATIONS

Frequency of Operation: 7.0-7.3 MHz
Bandwidth: 200 kHz @ 1.5:1 VSWR
F/B: 30 dB
Feed Impedance: 50 ohms, unbalanced
Element Length: 46' maximum
Boom Length/Diameter: 32'/3" O.D. x .065 wall
Weight: 70 lbs.
Windload: 10 sq. ft.
Mast Size: 2" O.D.

DIMENSION SHEET

KLM 40M-3



RESONANT FREQUENCY
(of individual elements)

Band	Ref(#1)	Dr(#2)	Dir(#3)	
LOW	6893	7050	7266	MHz
MED	7015	7175	7395	
HI	7065	7225	7446	

actual freq @ 24': less 50 KHz

For typical VSWR curves see page 14

H.F. ANTENNA ASSEMBLY GUIDE: 40M-3A

BEFORE YOU BEGIN...

1. Select an assembly area large enough to comfortably accommodate overall antenna dimensions. A shallow box is handy for holding and sorting the smaller hardware, as is a marking pen for identifying components.

2. Some simple tools are required: A tape measure, screwdriver, a set of spintites, and socket or end wrenches. Common nut sizes are:

8-32 Hdwe = 11/32"	5/16-18 Hdwe = 1/2"
10-32 Hdwe = 3/8"	3/8-16 Hdwe = 9/16"
1/4-20 Hdwe = 7/16"	

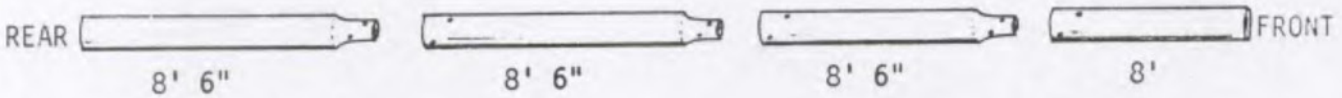
To avoid damage to antenna components, be aware that most hardware need only be moderately hand-tightened with screwdriver or spintite to be secure. When using tools with mechanical leverage such as socket or end wrenches, care must be taken not to over-torque nuts and damage components.

3. Thoroughly unpack shipping box and check components and hardware against the Parts List. If there is a difference, look for a "Factory Update/Change" sheet accompanying the assembly instructions prior to contacting KLM.

4. For easiest and fastest assembly, take a few moments before starting to familiarize yourself with the assembly guide and the antenna components.

3" O.D. BOOM ASSEMBLY

1. Lay out the boom sections on the ground as shown in the sketch below:

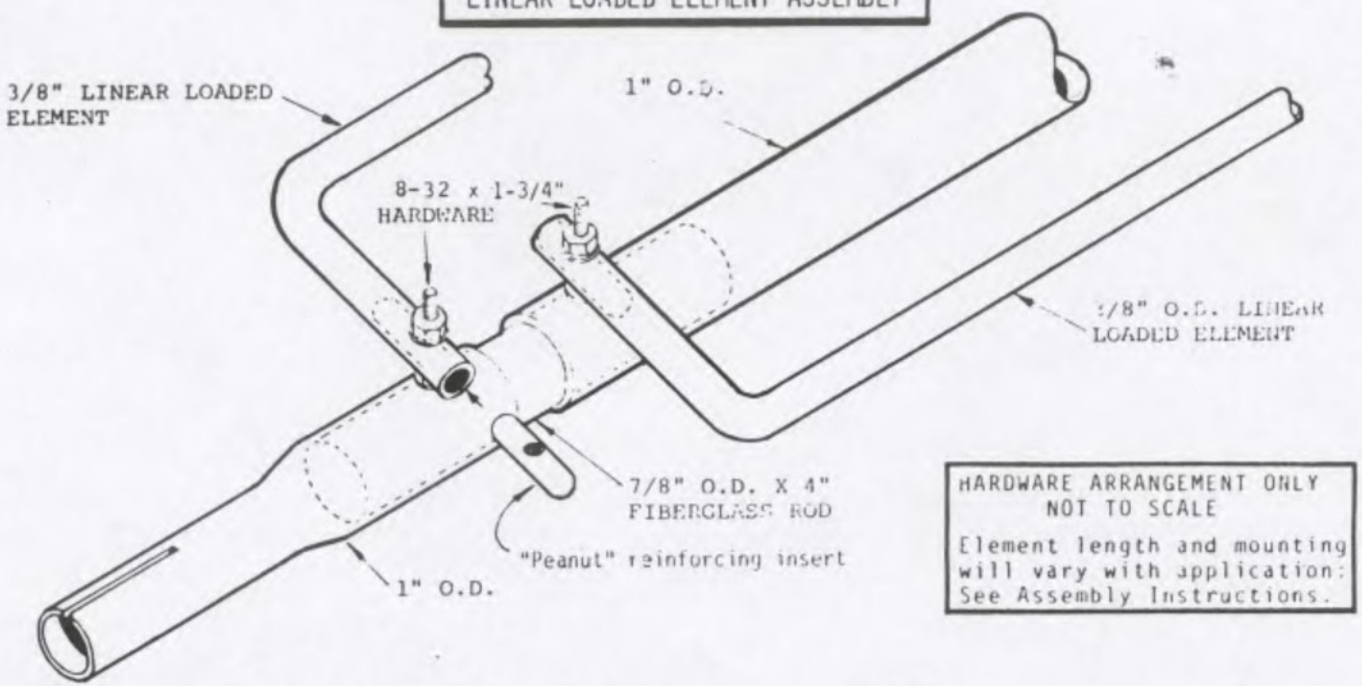


2. To assemble the boom sections, insert the swaged (necked-down) end into the appropriate straight end and align the bolt holes. Each boom joint is cross-bolted with two 1/4" - 20 x 3-1/2" bolts, lockwashers, ad nuts. Torque nuts up to 10 ft/lbs.

3. Slide a 3" I.D. cast aluminum ring clamp about 4 feet onto each end of the boom and loosely install the 3/8" - 16 x 2" bolts, lockwashers, and nuts.

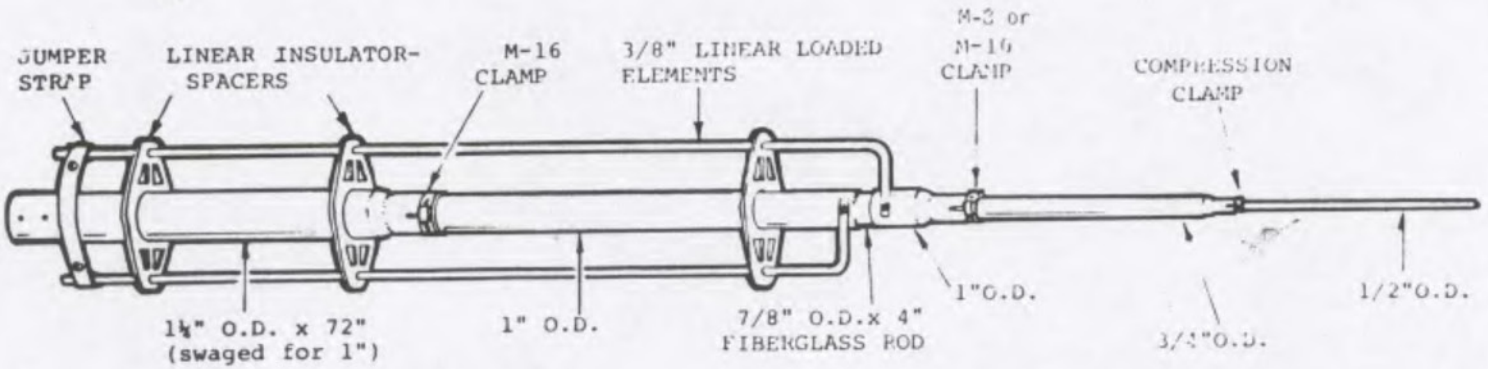
ASSEMBLY PICTORIAL

LINEAR LOADED ELEMENT ASSEMBLY



HARDWARE ARRANGEMENT ONLY
NOT TO SCALE

Element length and mounting will vary with application: See Assembly Instructions.



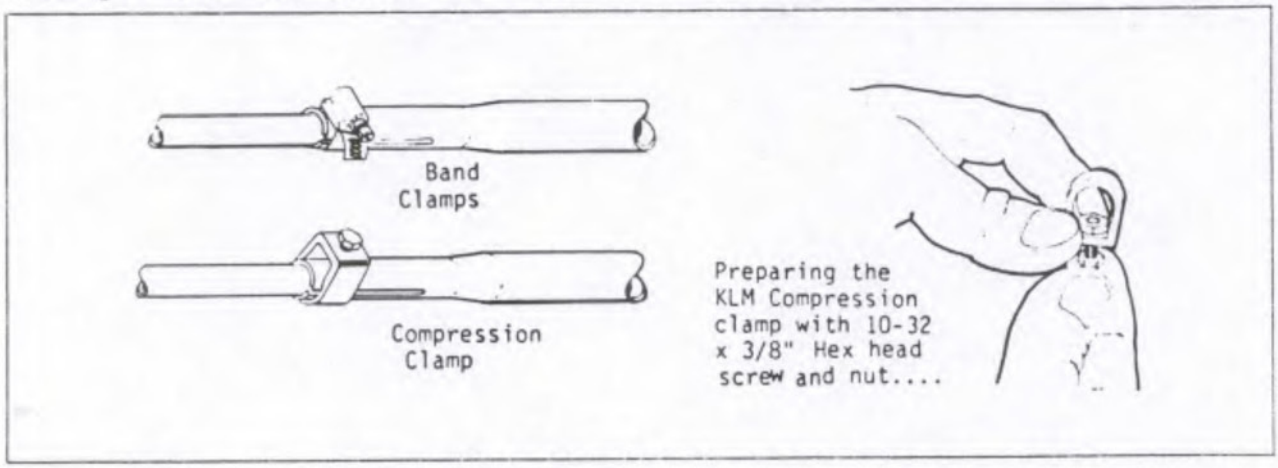
H.F. LINEAR LOADED ELEMENT CONSTRUCTION (refer to Assembly Pictorial)

1. Assembly of Element Halves - General Notes

The 1-1/4" swaged and 1" O.D. stright sections are overlapped 3". The 3/4" O.,D. x 72" swaged also overlaps the 1" O.D. x 6" swaged section by 3". This procedure applies to all elements. Overlap of the 1/2" tip sections will vary slightly because the overall element half length is the critical electrical dimension and the tip section is adjusted as necessary to achieve it.

The smaller inside section of each telescoping joint is always coated lightly with a conductive zinc paste before assembly to promote good long lasting electrical connections.

Each telescoping section is secured with a specified band or compression clamp located 1/16" back from slit end of larger tubing. See the sketch below.



Assembly of Element #1 (Reflector)

1. Insert 7/8" O.D. x 4" fiberglass rod into 1" x 67" tubing until holes align. Secure with a 8-32 x 1-3/4" screw, lockwasher, and nut. Screws are extra long to provide studs for subsequent mounting of 3/8" O.D. linear elements.

2. Add short 1" O.D. x 6" tubing section to other end of fiberglass rod and secure as in #1 above.

Assembly of Element #1 (Reflector) - cont'd
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3. Lay the 11' linear elements (3/8" O.D.) on opposite sides of the 1" tubing, angled ends by the studs. Insert a peanut-shaped reinforcing insert into each angled end, aligning holes; then place them on studs. Secure with 8-32 nuts and lockwashers.

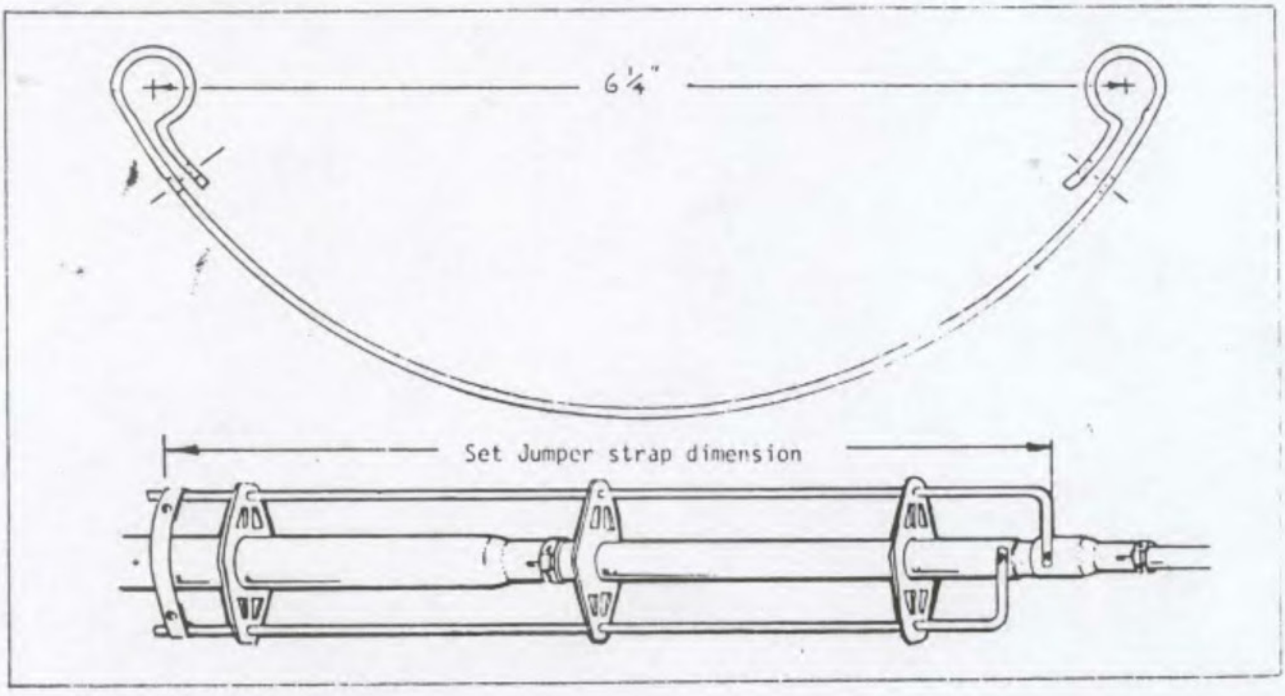
4. Slide a diamond-shaped linear insulator with 1" central hole onto the butt ends of the 3/8" linear elements. Work up and onto the 1" tubing until the insulator is about 14" - 16" from the fiberglass section. Slide on another insulator until it is about 4" onto the butt end of the 1" tubing.*

5. Slide the swaged end of the 1-1/4" O.D. x 72" section 3" onto the butt end of the 1" tubing and secure with an M-16 clamp.

6. Slide a diamond-shaped linear insulator with 1-1/4" central hole onto the 1-1/4" butt and locate about 12" onto the 3/8" linear elements."*

7. Bend one of the 1/2" x 8-1/2" linear loading jumper straps into the arc shown in the profile below. Slide onto the butt ends of the 3/8" linear loading sections and set to 130" (measure with tape from "L" bend on outermost linear loading section to outside of jumper strap - strap itself is inside the measurement). Secure with 8-32 x 1/2" screws, nuts, and lockwashers. See sketch below.

*For extended insulator life in high winds, a loose fit on the 3/8" O.D. tubing is recommended. Maintain insulator position with band of black electrician's tape around main element on either side of insulator.



*8. Slide a 3/4" O.D. x 72" section into the swaged end of the 1" tubing and secure with an M-8 or M-10 clamp. (If you are working in a limited assembly area, install the 3/4" and 1/2" tubing later.

9. Add a 5/8" compression clamp to the swaged end of the 3/4" tubing and insert a 1/2" O.D. x 72" section until the correct amount is showing to optimize your 40M-3A to the low, mid, or upper band. Use the dimensions given in the chart following this section.

10. Half of the reflector element is now complete. Repeat Steps #1 through #9 for the other half. Make it a mirror image of the first reflector. Keep in mind that tip tubing dimension on this half must match that of the original.

11. Steps #1 through #10 are repeated for the remaining elements. Dimensions for the linear-loading sections, linear jumper straps, and tip sections will vary with each element and according to the section of the band you are optimizing for. Use the chart below to select correct tubing and set strap and tip dimensions (given for all three elements). Remember to use paste for all electrical junctions (overlaps, straps, studs, etc.). Pair up element halves as they are completed to avoid mix-ups.

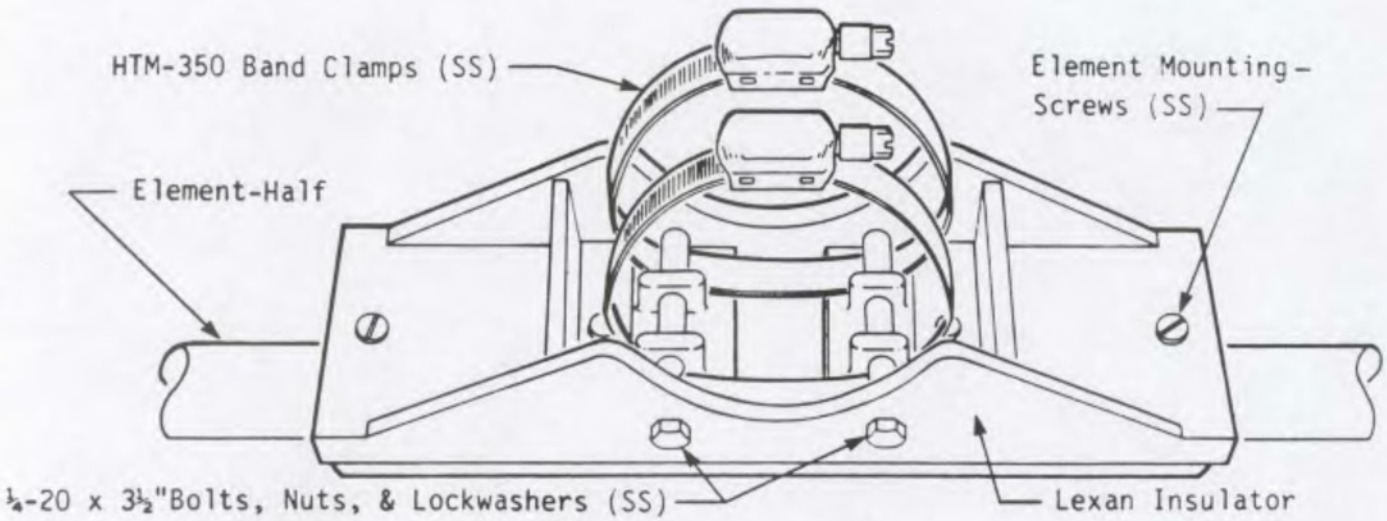
(SELECT ONE ROW ONLY)

Element# (Phone)	Lgth: 3/8" Linear Loaded Elements(2)	Set Jumper Strap:	½" Tip Showing: Low	Mid	Upper
#1 REFLECTOR	11' (132")	130" (10'10")	69"	62"	58"
#2 DRIVEN	10'3" (123")	121" (1'1")	69"	64"	60"
#3 DIRECTOR	9'7" (115"	113" (9'5")	69"	62"	58"

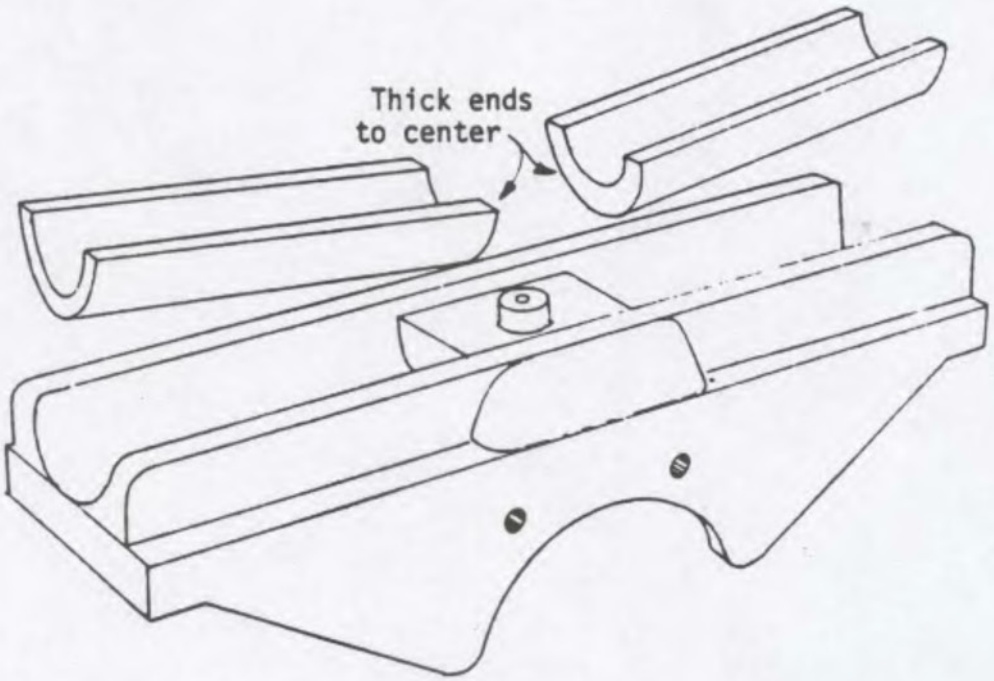
NOTE: Tip dimensions are designed to produce a flat response (@ 1.2:1 VSWR and better) across approximately 130 kHz in the part of band designated, at the height of 45 feet or more.

2. Preparing the Insulator

a. The large HTM-350 band clamps are bolted into the underside of the Lexan insulators with 1/4" - 20 x 3-1/2" bolts, lockwashers, and nuts (stainless steel) as shown in the following drawing. Install in all the insulators.



b. The KLM Lexan insulator has been designed to accommodate up to 1-1/2" O.D. elements. Antennas using smaller O.D. elements are supplied with half-round reduction sections. These are placed in the two element channels on the top of the insulator with the thicker ends toward center as shown in the drawing below. Prepare all insulators.

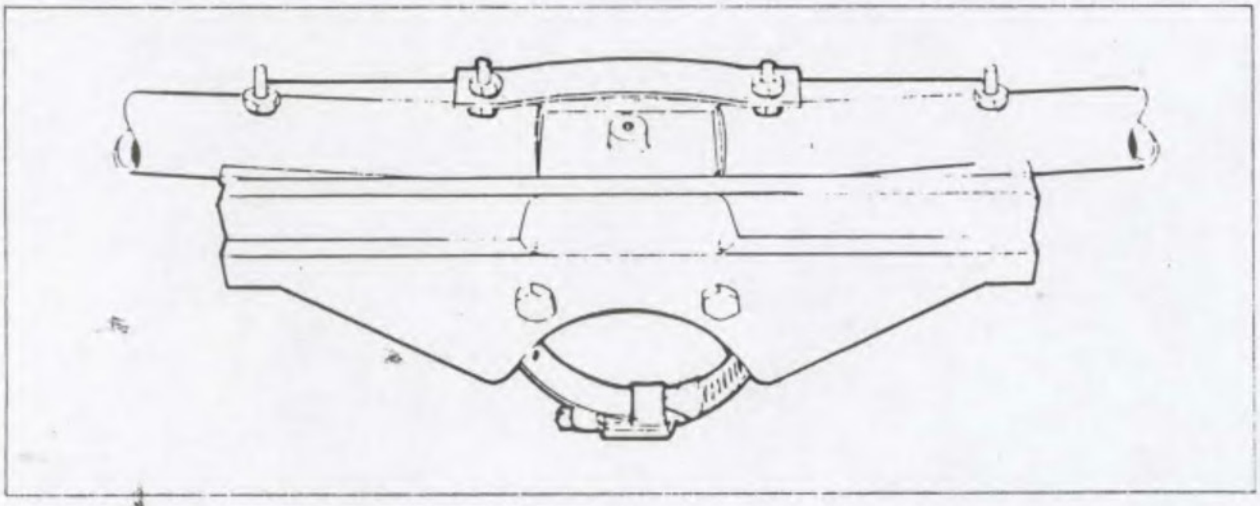


3. Mounting the Element Halves

a. Take each pair of element halves, in sequence, and attach them to insulators. Check that reinforcing inserts in element half butts are flush and mounting holes are aligned. Lay the element half butt into the insulator channel. Insert 10-32 x 2-1/2" screws from bottom of insulator and secure above element butt with 10-32 nuts and lockwashers. Holes in element half butt will align one way only (drilled slightly off square to compensate for element "lift" designed into insulator). If screws are not an easy fit, rotate about half butt 180 degrees and repeat.

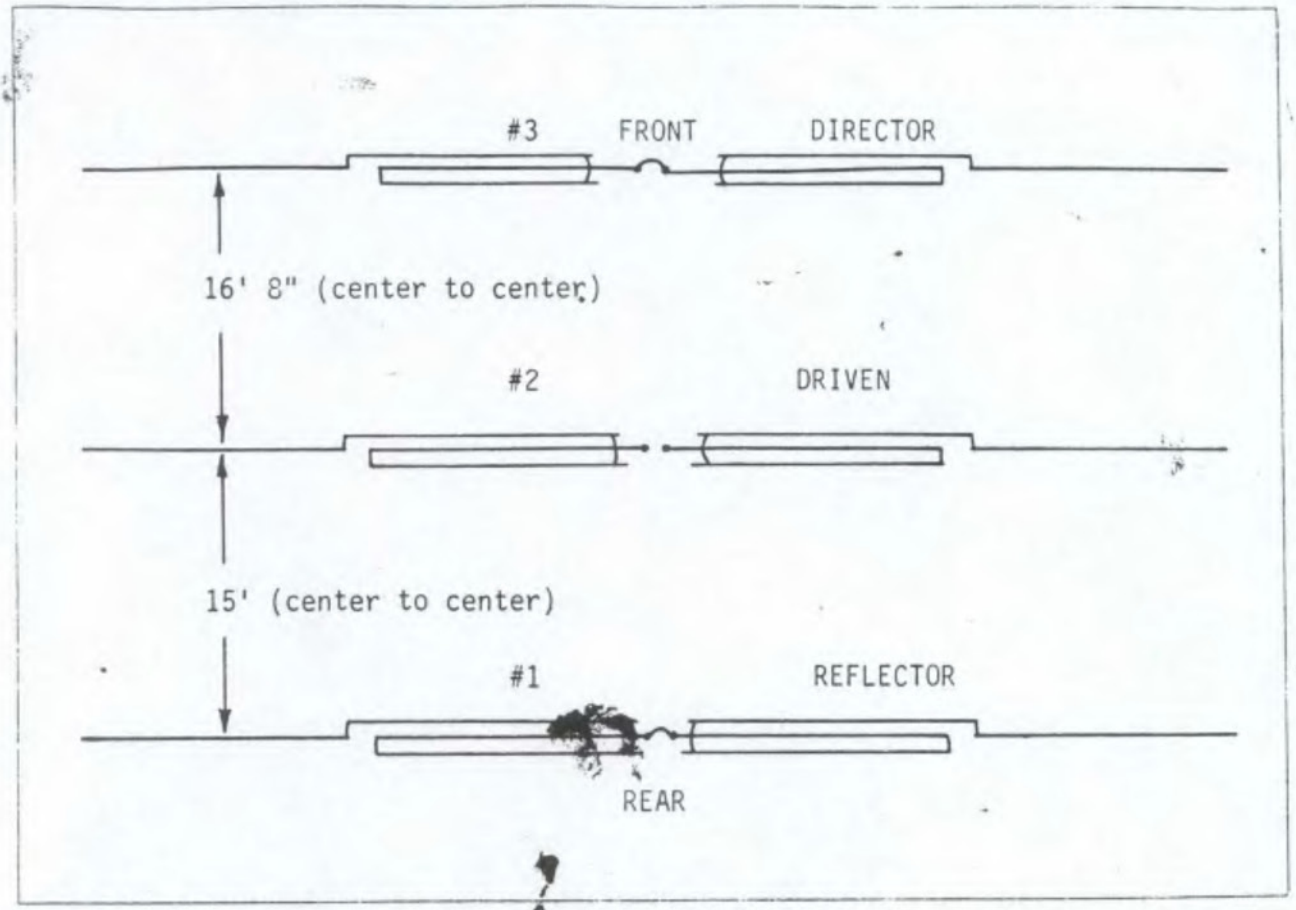
b. Assemble all element halves to insulators and set each completed element aside, in order.

c. The reflector and director elements (#1 and #3) each require a 1/2" x 3-3/4" jumper strap between element halves. Bow the strap slightly, as needed, to fit the two innermost element mounting screw studs and secure with additional lockwashers and nuts. See sketch below.



Mounting the Element to the Boom

1. Roll the boom until assembly bolts are 45 degrees from vertical with bolt heads "up." Center element #1 at two inches from the rear of the boom (about 1/2" of boom should extend beyond insulator) and securely tighten the HTM-350 clamp. Install the remainder of elements on the boom according to the dimensions on the drawing below. Align each element to element #1, with the help of another person if possible, by sighting down boom from rear end. When each element is aligned and properly spaced, tighten the clamp.



BALUN/MATCH SECTION INSTALLATION

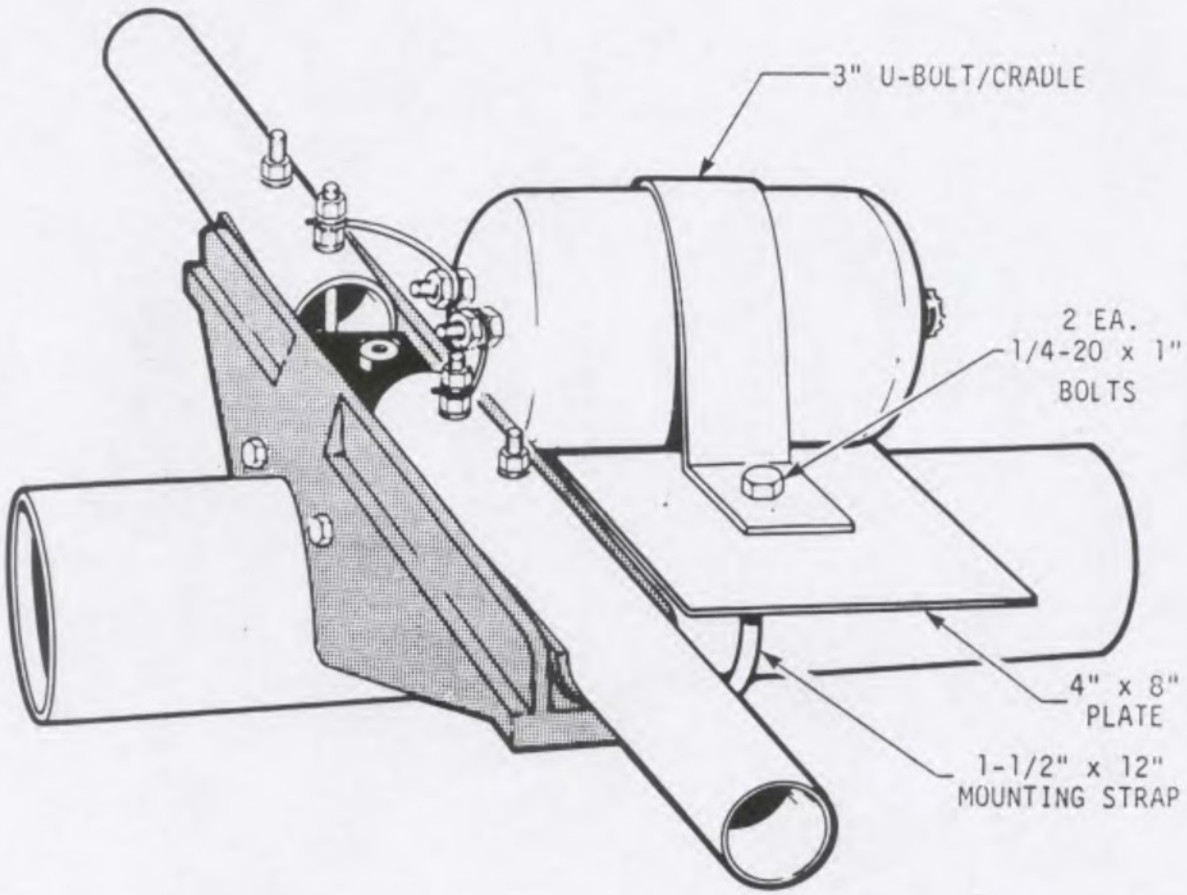
Mount the balun as shown in the Balun Mounting Detail drawing. The balun should be as close as possible to the driven element. Make the connections to the driven element using short lengths of solid copper wire provided.

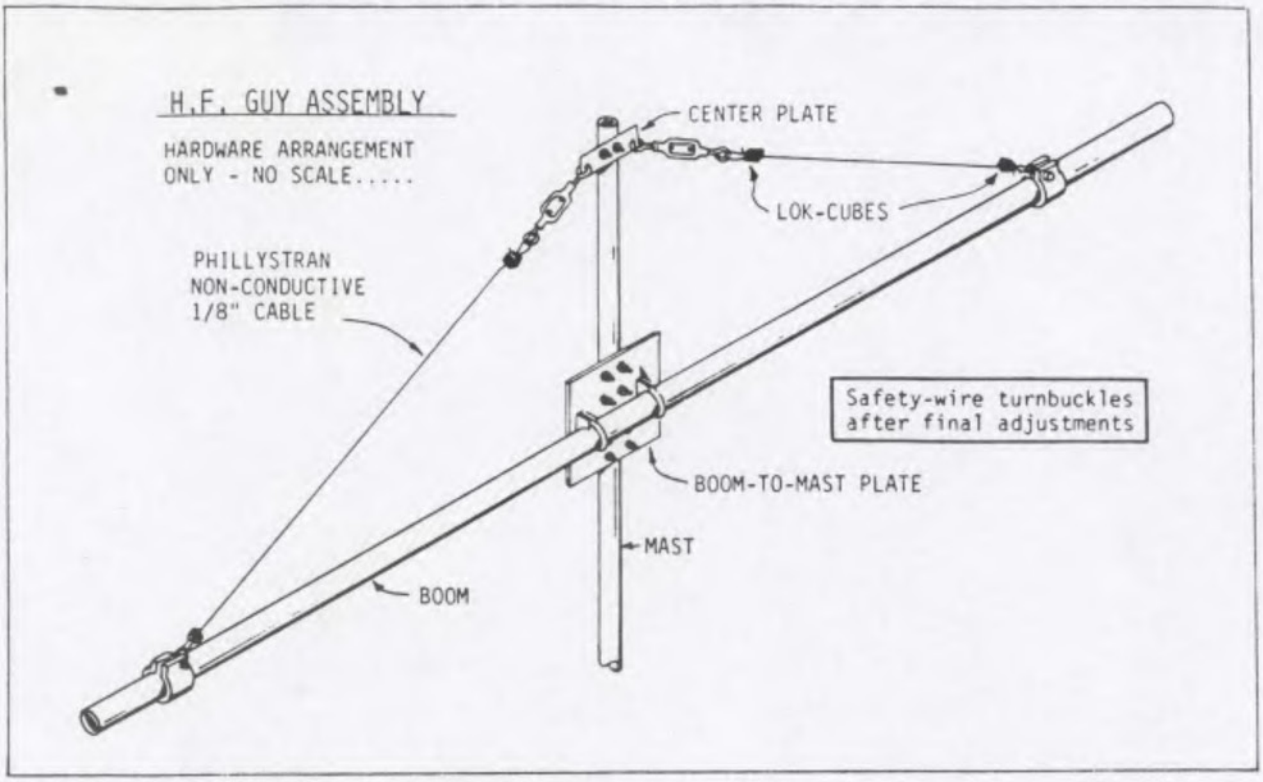
Attach the coax matching section to the balun. Lay the coax along the boom and fasten in place using good quality plastic tape or strap-fasteners. The surplus should be coiled and fastened to the mast or boom. It is important that this cable be mounted in such a way that it is not subjected to mechanical stress; i.e., twisting or flexing. Any turn or drip loops should be formed in the main feedline. Fasten the connectors between feedline and match-section securely to the boom or mast.

BOOM-TO-MAST PLATE AND GUY ASSEMBLY

The antenna is attached to the mast via a 8" x 9 x 3/16" plate located at the physical balance point. The boom is supported front and rear by a adjustable overhead guy harness. The cables, made of super-strong Phillystran (TM), are non-conductive to prevent any possible interaction with other nearby antennas. The cables tie to cast aluminum ring clamps near each end of the boom and to a pair of turnbuckles mounted on the mast above the antenna.

40M-2/40M-3
BALUN MOUNTING DETAIL





BOOM-TO-MAST PLATE AND GUY ASSEMBLY - cont'd

1. Center the boom-to-mast plate at the physical balance point of the antenna with the feedline attached. Loosely secure with two 3" U-bolts.

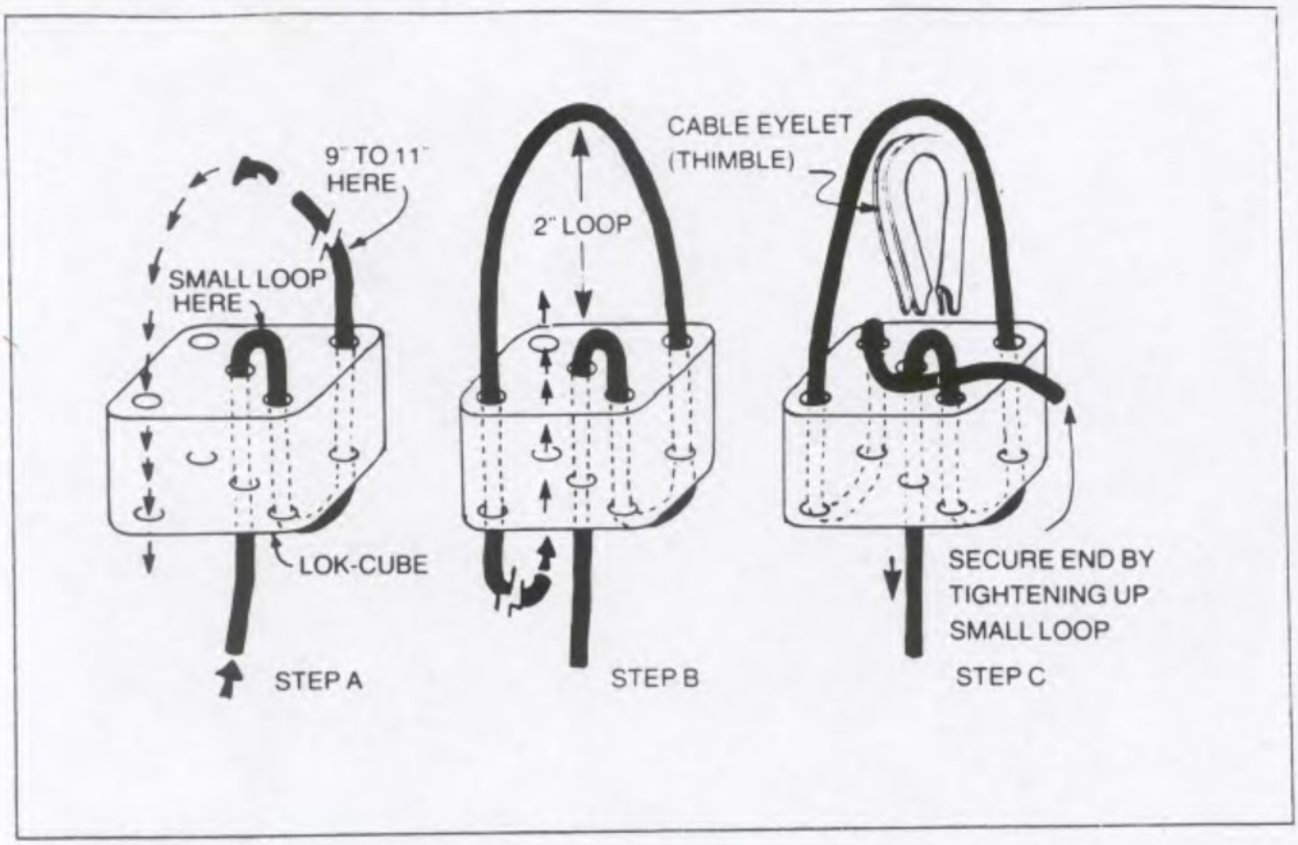
2. Mount a temporary 3 or 4 foot mast (not supplied) to the mounting plate, the mainlength extending above the boom. Secure with two 2" U-bolts.

3. Using the temporary mast as a guide, sight down the boom from either end and rotate mounting plate until mast is perpendicular to the elements. Then tighten the 3" U-bolts.

4. Adjust the turnbuckles on the harness center plate until no threads show on the inside. Attach the center plate to the boom side of the mast about 3 to 4 feet up the mast. Secure with 2" U-bolt.

5. Place supports under the boom at regular intervals so that it lays as straight as possible. This will aid in rigging an accurate and balanced guy harness.

6. Prepare one end of each cable with a 2" loop using the KLM Lok-cubes as shown in the sketch below:



7. Place a cable eyelet (thimble) into each loop and snug up cables onto eyelets. Then install loop/eyelet into splits in each ring clamp. Secure with 3/8" - 16 x 2" bolts, lockwashers, and nuts.

8. Prepare the other end of each cable with Lok-cubes as far as Step A only. Pull each cable taut and adjust Lok-cubes until they are about 2" to 3" from the turnbuckle eyebolts. Then thread the cable ends through the eyebolt and around the eyelets. Complete rigging as shown in Steps B and C, snugging up cables on the eyelets. Balance tension on mast so it is not pulled to front or rear, but remains vertical.

9. Make further rough boom straightening adjustments by moving the ring clamps on the boom. When finished, disconnect harness center plate and remove temporary mast. Secure loose cables to boom so they do not interfere during installation.

10. After the antenna is installed on permanant mast, reattach center plate with 2" U-bolt, raising or lowering as needed to keep boom straight. The guy rigging usually stretches very slightly as it takes its "set" and you may want to compensate for that, particularly if the antenna is not easily accessible. Otherwise, minor straightening and tension balancing adjustments are accomplished with the two turnbuckles. Block eyebolts during adjustment so cables are not twisted. When finished, safety wire the turnbuckles so they cannot unwind.

COMPLETING THE ANTENNA

1. If possible, allow the antenna to sit assembled overnight. The hardware will temperature cycle and various nuts and bolts may require further tightening. Check all nuts, bolts, clamps, etc., and make sure they are all tight and secure. This is a very easy operation on the ground, and very difficult once the antenna has been installed.

2. If you live in an area of severe weather, or if it is likely the antenna elements will snag on trees, guy wires, etc. during installation, it is recommended that the elements be additionally secured in the following manner: drill a #36 pilot hole into the boom through the existing hole in each HTM-350 band clamp. Then install #6 x 3/8" sheet metal screws (supplied).

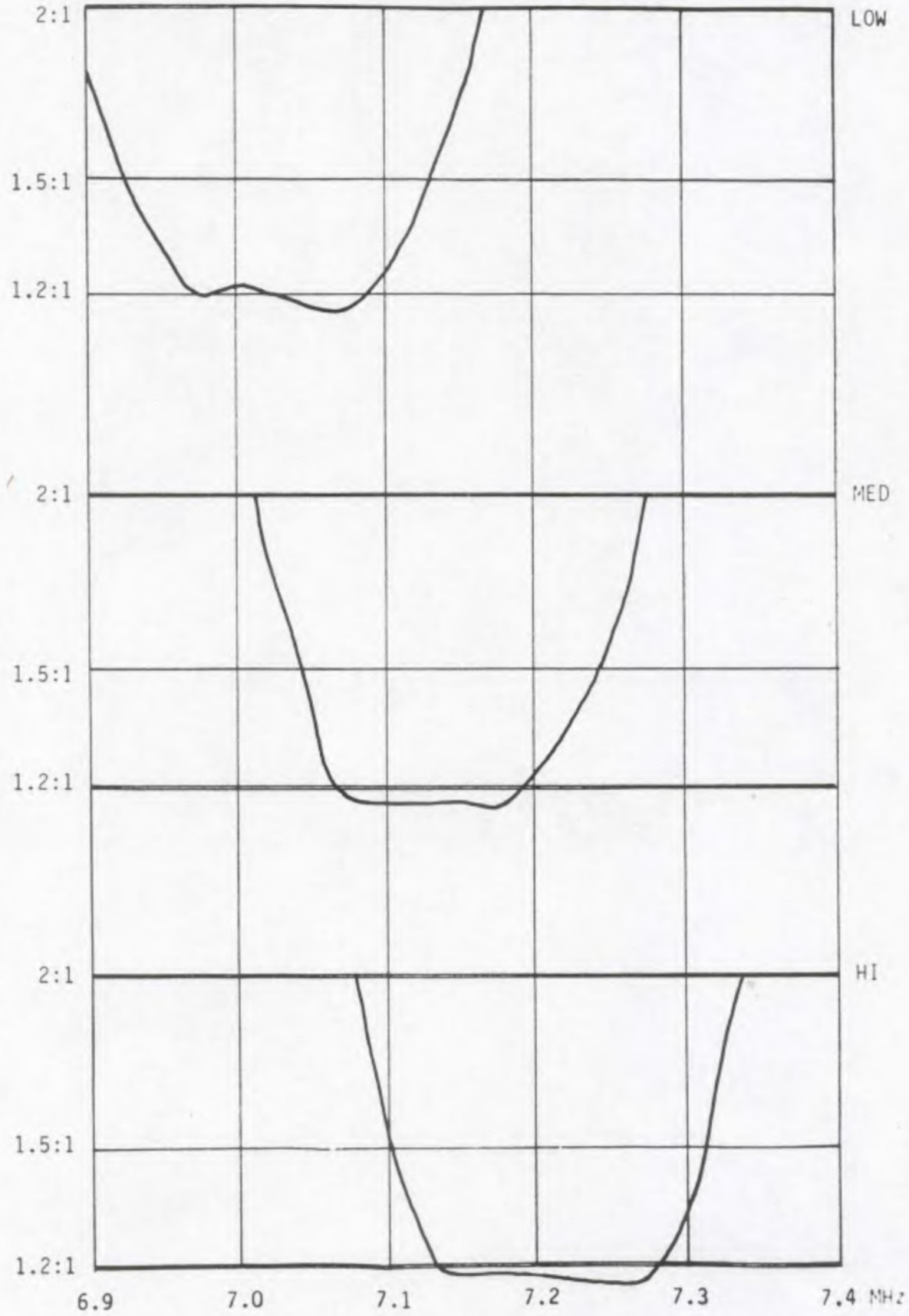
3. Plastic plugs are supplied for the boom ends. They keep out birds and reduce wind noise. Cut or drill a small drain hole in each near the bottom edge before installing.

4. Connect 50 ohm coax to the match section and route back under boom to the mounting plate. Tape or strap every 3 to 4 feet. To avoid problems, use only quality coax of known 50 ohm impedance (such as Times FM-8, Belden 8214, RG 213, RG 214, etc.).

5. The antenna's boom-to-mast plate is drilled for a 2" O.D. mast. Install with four 2" U-bolts.

CAUTION: The 40M-3A can be operated in any part of the band, but when VSWR exceeds 2:1, the maximum power handling capability is reduced by 6 dB (ex. 2000W PEP to 500W PEP, or 250 watts out). Running full power at 2:1 VSWR may cause damage to the antenna.

TYPICAL VSWR CURVES FOR 7.2-3 TUNED TO LOW, MED, AND HI BAND



40M-3A PARTS LIST

PART DESCRIPTION	KLM PART NUMBER	QUANTITY
Swaged Boom, 3" O.D. x 8'6"	69095	3
Straight Boom, 3" O.D. x 8'	69109	1
Insert, 7/8" x 34"	69501	6
Swaged Element, 1-1/4" O.D. x 72"	69071	6
Straight Tubing, 1" O.D. x 67"	69061	6
Swaged Element, 3/4" O.D. x 72"	69062	6
Straight Element, 1/2" O.D. x 72"	69063	6
Linear Elements with "L" Bend, 3/8" O.D. x 9' 7"	69074	4
Linear Elements with "L" Bend, 3/8" O.D. x 10'3"	69073	4
Linear Elements with "L" Bend, 3/8" O.D. x 11'	69072	4
Boom-to-Mast Plate, 1/4" x 8" x 9"	69704	1
Coaxial Match Section		1
Coax Balun, 1:1	97302	1
Balun Mounting Plate, 4" x 8"	69702	1
Balun Strap, 1-1/2" x 12"	28636	1
Box of Hardware including:		
Insulator Inserts, 1-1/2" to 1-1/4"	66141	6
Linear Insulators, 1" hole	66136	12
Linear Insulators, 1-1/4" hole	66107	6
"C" Straps, 1/2" x 8-1/2"	28626	6
Clamps, M-10	28488	6
Clamps, M-16	28477	6
Clamps, HTM-350	28487	6
Compression Clamps, 5/8"	28489	7
Fiberglass Rod, 7/8" O.D. x 4"	69504	6
Aluminum Tubing, 1" O.D. x 6"	69064	6
Boom Caps, 3"	66131	2
U-Bolts and Cradles, 3"	24410	2
H.F. Insulators, 1-1/2" x 3"	66139	2
Conductive Paste, 1 oz.	16001	1
Cast Boom Clamps, 3"	28482	2
U-Bolts and Cradles, 2"	28402	5
Plate with 2 Turnbuckles, 3-3/16" x 3-3/16"	69701	1
Phillystran Cable, 1/8" x 14"	60025	2
Assembly Manual	84010	1
Hardware Bag #1		
Screws, 6-32 x 2"	28009	2
Nuts, 6-32	28201	2
Lockwashers, #6	28351	2

PARTS LIST - cont'd

PART DESCRIPTION	KLM PART NUMBER	QUANTITY
Hardware Bag #1 - cont'd		
Sheet Metal Screws, #6 x 3/8"	28000	4
Screws, 8-32 x 1/2"	28011	13
Screws, 8-32 x 1-3/4"	28016	12
Nuts, 8-32	28202	38
Lockwashers, #8	28352	38
Jumper Straps, 1/2" x 3-3/4"	69010	2
Peanut Inserts	66106	12
Hardware Bag #2		
Screws, 10-32 x 2-1/2"	28025	12
Screws, Hex Head, 10-32 x 3/8"	28021	16
Nuts, 10-32	28203	36
Lockwashers, #10	28353	36
Flatwashers, #10	28303	2
Hardware Bag #3		
Bolts, 3/8" - 16 x 2"	28545	2
Nuts, 3/8" - 16	28205	6
Lockwashers, 3/8"	28355	6
Bolts, 1/4" - 20 x 1"	28533	7
Bolts, 1/4" - 20 x 3-1/2"	28526	12
Nuts, 1/4" - 20	28204	12
Lockwashers, 1/4"	28354	12
Nuts, 5/16" - 18	28206	10
Lockwashers, 5/16"	28356	10
Hardware Bag #4		
Lok-Cubes	66128	4
Thimbles, 1/8"	28707	2
Large Nylon Straps	66119	12