

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.

15M6

12847

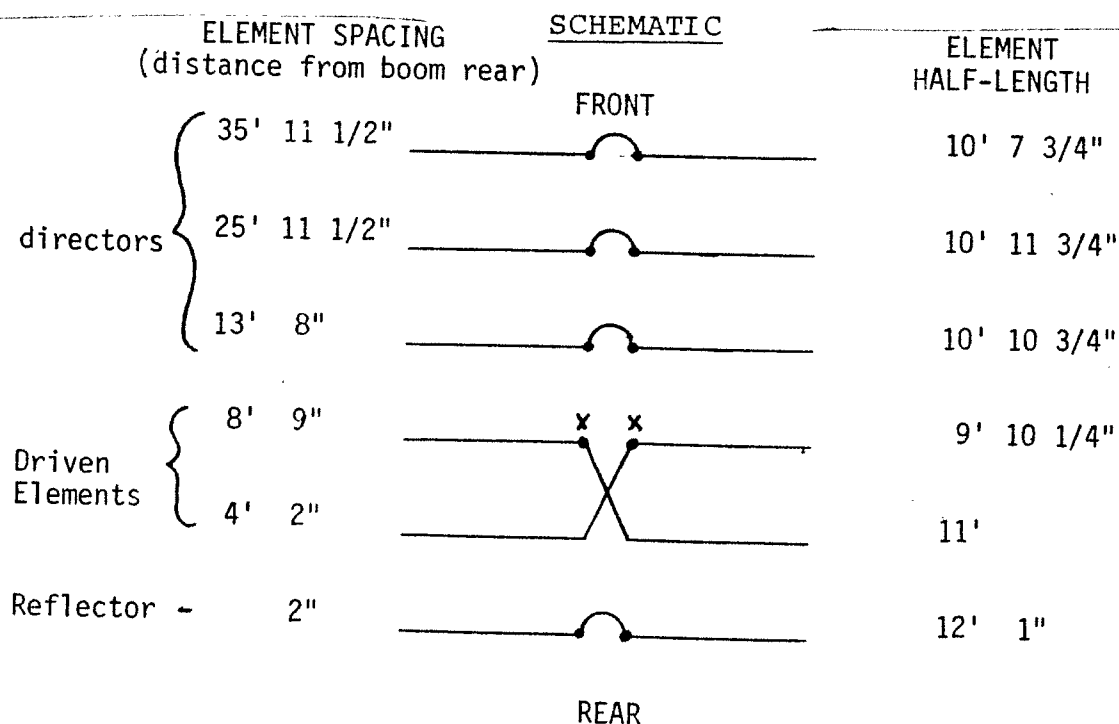
MIRAGE/KLM'S 15 METER "BIG STICKER" IS DESIGNED TO TAKE ADVANTAGE OF THE OFTEN OUTSTANDING DX POTENTIAL OF THE BAND. IT OFFERS MAXIMUM GAIN AND F/B, F/S RATIOS TO PULL IN THOSE RARE WEAK SIGNALS EVEN WHEN THE BAND IS MARGINAL. THE DUAL-DRIVEN, BOOM INSULATED ELEMENTS DELIVER CONSTANT HIGH GAIN AND LOW VSWR ACROSS THE WHOLE BAND. NO RETURNING IS NECESSARY.

THE ELECTRICAL HARDWARE IS STAINLESS STEEL, THE INSULATORS ARE LEXAN. BOTH BOOM AND ELEMENTS ARE MADE OF STRONG, WEATHER RESISTANT 6063-T832 ALUMINUM ALLOY.

FOR GOOD PERFORMANCE, MOUNT THE ANTENNA AT LEAST HALF-WAVELENGTH ABOVE GROUND (ONE WAVELENGTH OR MORE IS EVEN BETTER). THE MIRAGE/KLM 3-60-4:1 BALUN IS INCLUDED WITH THE ANTENNA FOR OPTIMUM TROUBLE-FREE SERVICE.

SPECIFICATIONS

FREQ. OF OPERATION:	21 - 21.5 MHz	FEED IMP.:	200 ohm BALANCED
NO. OF ELEMENTS:	SIX (6)	BALUN:	3-60-4:1 5KW
MAX. ELE. LENGTH:	25'	WIND AREA:	8.5 SQ. FEET
GAIN IN dBd:	10.5	TURN RADIUS:	20 FEET
VSWR:	BETTER THAN 1.5:1	BOOM LENGTH/DIA:	36'/3"O.D.
FRONT-TO-BACK:	30 dB	MAST SIZE:	2"O.D. STANDARD
WEIGHT:	60 LBS.		



XX = Feedpoints, 200 ohm balanced.

Please note: Modification of this antenna may upset gain, VSWR, or bandwidth specifications and is not recommended. For technical assistance in achieving specialized performance characteristics, contact KLM's Antenna Division.

MIRAGE /KLM

COMMUNICATIONS EQUIPMENT, INC.

15M6

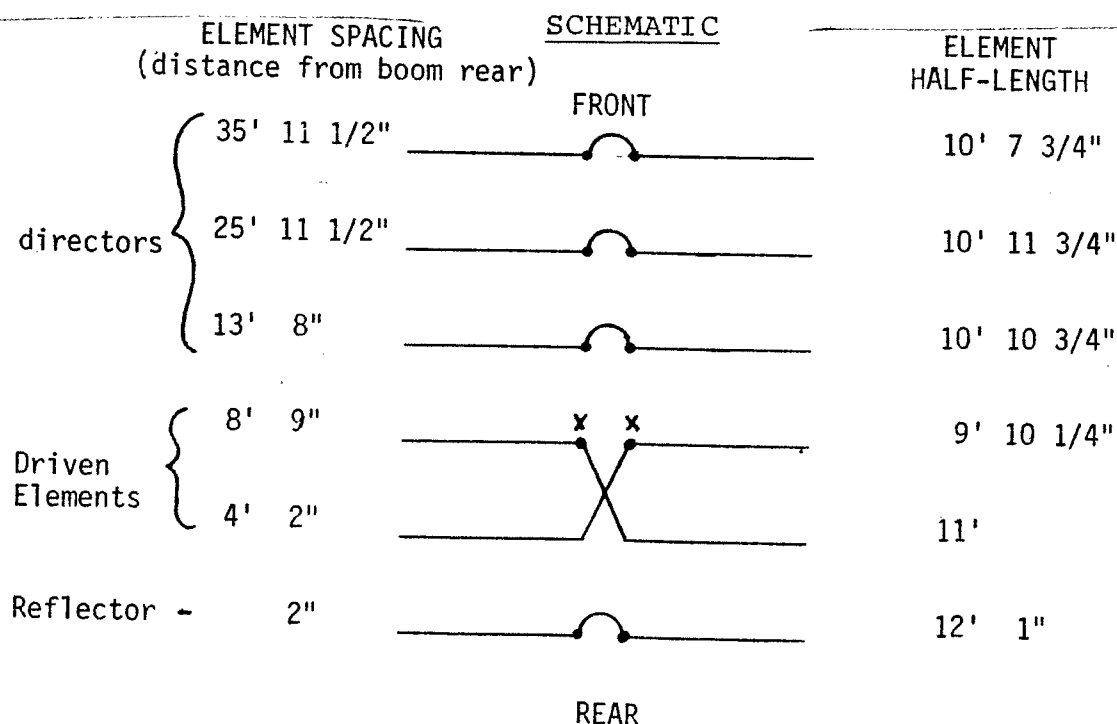
MIRAGE/KLM'S 15 METER "BIG STICKER" IS DESIGNED TO TAKE ADVANTAGE OF THE OFTEN OUTSTANDING DX POTENTIAL OF THE BAND. IT OFFERS MAXIMUM GAIN AND F/B, F/S RATIOS TO PULL IN THOSE RARE WEAK SIGNALS EVEN WHEN THE BAND IS MARGINAL. THE DUAL-DRIVEN, BOOM INSULATED ELEMENTS DELIVER CONSTANT HIGH GAIN AND LOW VSWR ACROSS THE WHOLE BAND. NO RETURNING IS NECESSARY.

THE ELECTRICAL HARDWARE IS STAINLESS STEEL, THE INSULATORS ARE LEXAN. BOTH BOOM AND ELEMENTS ARE MADE OF STRONG, WEATHER RESISTANT 6063-T832 ALUMINUM ALLOY.

FOR GOOD PERFORMANCE, MOUNT THE ANTENNA AT LEAST HALF-WAVELENGTH ABOVE GROUND (ONE WAVELENGTH OR MORE IS EVEN BETTER). THE MIRAGE/KLM 3-60-4:1 BALUN IS INCLUDED WITH THE ANTENNA FOR OPTIMUM TROUBLE-FREE SERVICE.

SPECIFICATIONS

FREQ. OF OPERATION:	21 - 21.5 MHz	FEED IMP.:	200 ohm BALANCED
NO. OF ELEMENTS:	SIX (6)	BALUN:	3-60-4:1 5KW
MAX. ELE. LENGTH:	25'	WIND AREA:	8.5 SQ. FEET
GAIN IN dBd:	10.5	TURN RADIUS:	20 FEET
VSWR:	BETTER THAN 1.5:1	BOOM LENGTH/DIA:	36'/3"O.D.
FRONT-TO-BACK:	30 dB	MAST SIZE:	2"O.D. STANDARD
WEIGHT:	60 LBS.		



XX = Feedpoints, 200 ohm balanced.

Please note: Modification of this antenna may upset gain, VSWR, or bandwidth specifications and is not recommended. For technical assistance in achieving specialized performance characteristics, contact KLM's Antenna Division.

H.F. ANTENNA ASSEMBLY GUIDE:

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, and a set of spin-tite, and socket or end wrenches. Common nut sizes are:

3/8" 10-32 Hdwe
7/16" 1/2-20 Hdwe

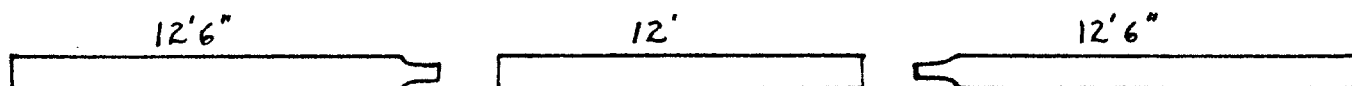
1/2" 5/16-18 Hdwe
9/16 3/8-16 Hdwe

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.

BOOM ASSEMBLY

1. Lay out 3" O.D. boom sections on the ground as shown in the sketch below:



2. To assemble, insert the swaged (necked down) end of the boom sections into the appropriate straight boom section and align the bolt holes. Each joint is cross-bolted with two 1/2-20 x 3 1/2" bolts, lockwashers, and nuts. Torque nuts up to 10 ft./lbs.
3. Place the assembled boom on two sawhorses or boxes about 1/3 the length from each end. Slide a 3" I.D. cast-aluminum ring clamp onto each end. Position roughly 3 ft from the rear and 5 ft from the front. If clamps do not slide easily spread them open slightly with two nuts inside split on a 5/16" or 3/8" bolt.

H.F. ELEMENT CONSTRUCTION:

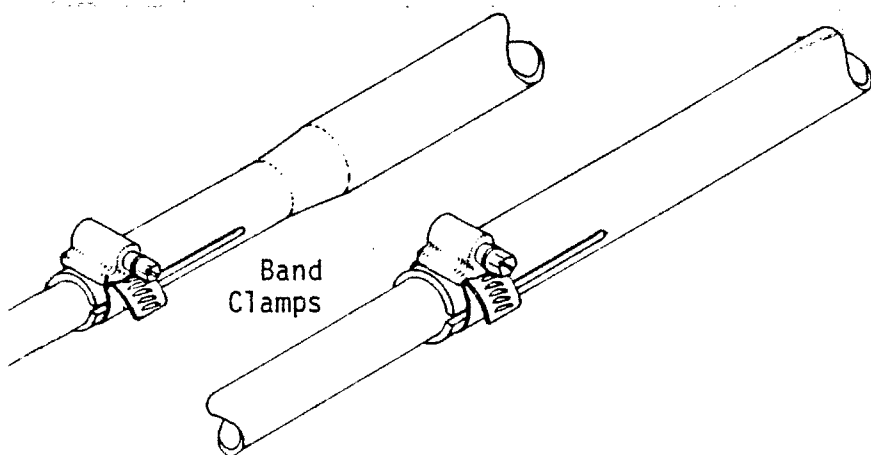
Each complete antenna element is composed of two halves of telescoping aluminum tubing secured in the middle by a Lexan insulator. Reflector/director element halves are electrically joined by a short jumper strap. The driven elements are interconnected by phasing straps and the front driven element provides the feedpoints, via an appropriate balun, for the antenna.

1. Assembly of Element Halves

Inner tubing sections on each element half are telescoped (or overlapped) three inches. Overlap of the tip sections will vary slightly because the over-all 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 to promote good long lasting electrical connections.

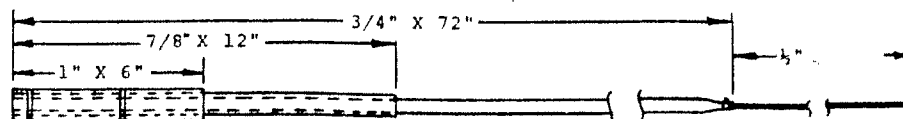
Each telescoping section is secured with a specified band or compression clamp located 6" back from slit end of larger tubing. See the sketch below.



The chart below lists the tubing lengths supplied for each element half, the proper band clamp for each overlap, and the correct element half length (adjust the tip section!). Remember to use paste at each overlap and securely tighten clamps. Pair up element halves as they are completed and set aside to avoid mixups.

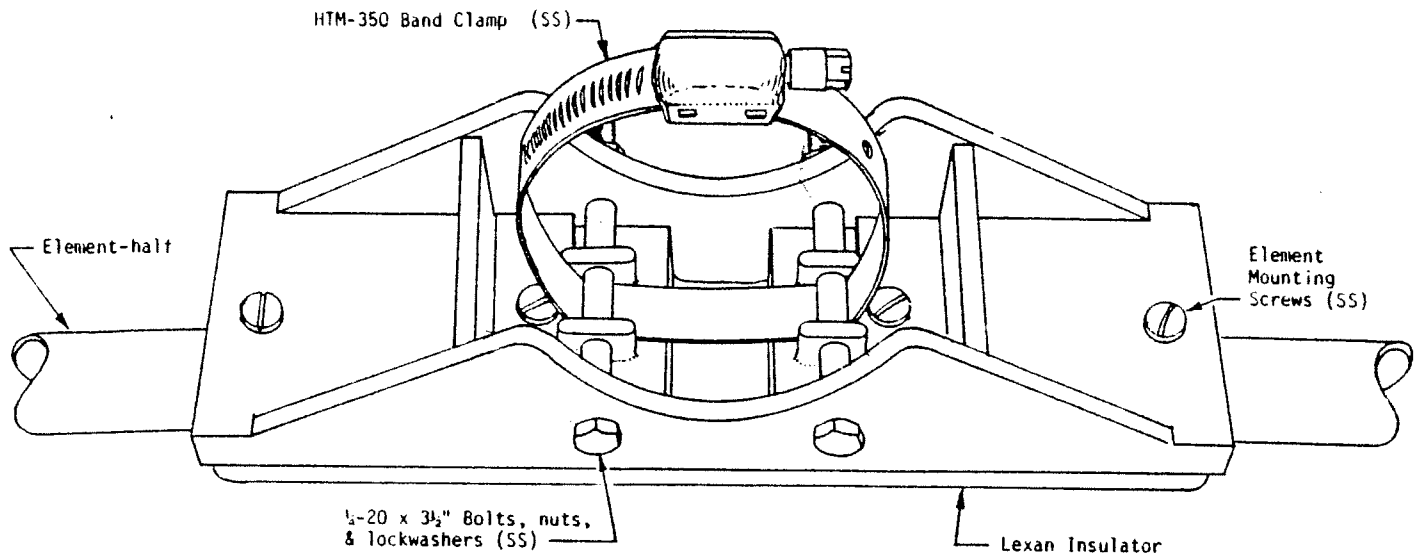
ELEMENT NUMBER		3/4" O.D. SUPPLIED	CLAMP	1/2" O.D. SUPPLIED	ELEMENT HALF-LENGTH
#1	Reflector	6'	M-6	6' 4"	12' 1"
#2	Rear Driven	6'	"	5' 4"	11'
#3	Front Driven	6'	"	5' 4"	9' 10 1/4"
#4	Director	6'	"	5' 4"	10' 10 3/4"
#5	Director	6'	"	5' 4"	10' 11 3/4"
#6	Director	6'	"	5' 4"	10' 7 3/4"

Note: 3/4" O.D. Tubing is reinforced at butt with 7/8" O.D. x 12" and 1" O.D. x 6" sleeves as shown in sketch of typical element half below:

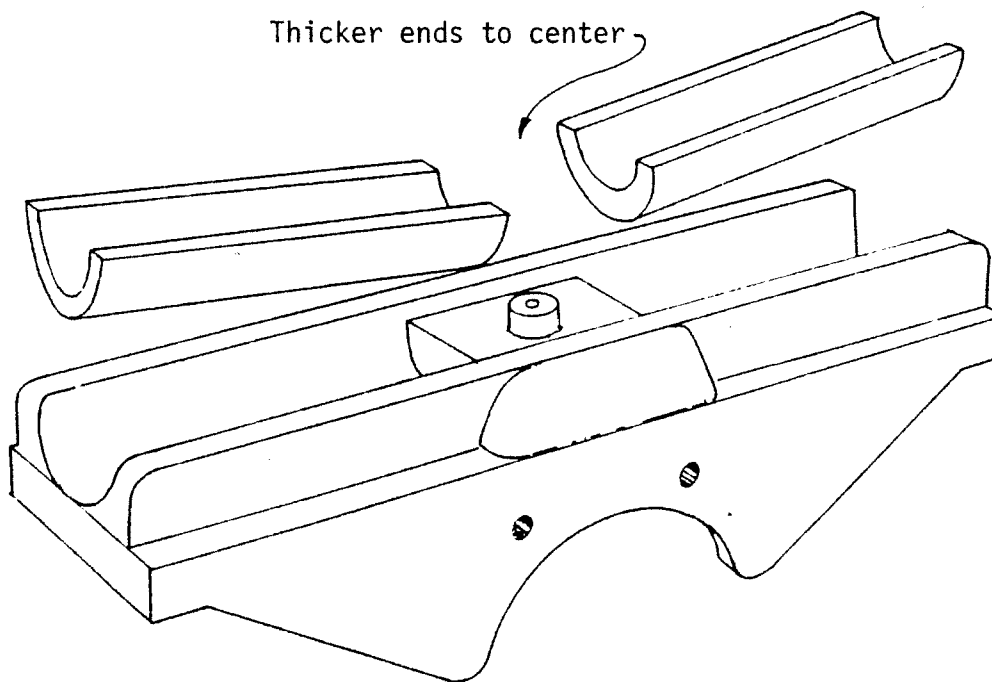


2. Preparing the Insulator

A. The large HTM-350 band clamps are bolted into the underside of the Lexan insulator with $\frac{1}{2}$ -20 x $3\frac{1}{2}$ " bolts, lockwashers, and nuts (stainless steel) as shown in the drawing below. Install in all the insulators.



B. The KLM Lexan insulator has been designed to accommodate up to $1\frac{1}{2}$ " 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.

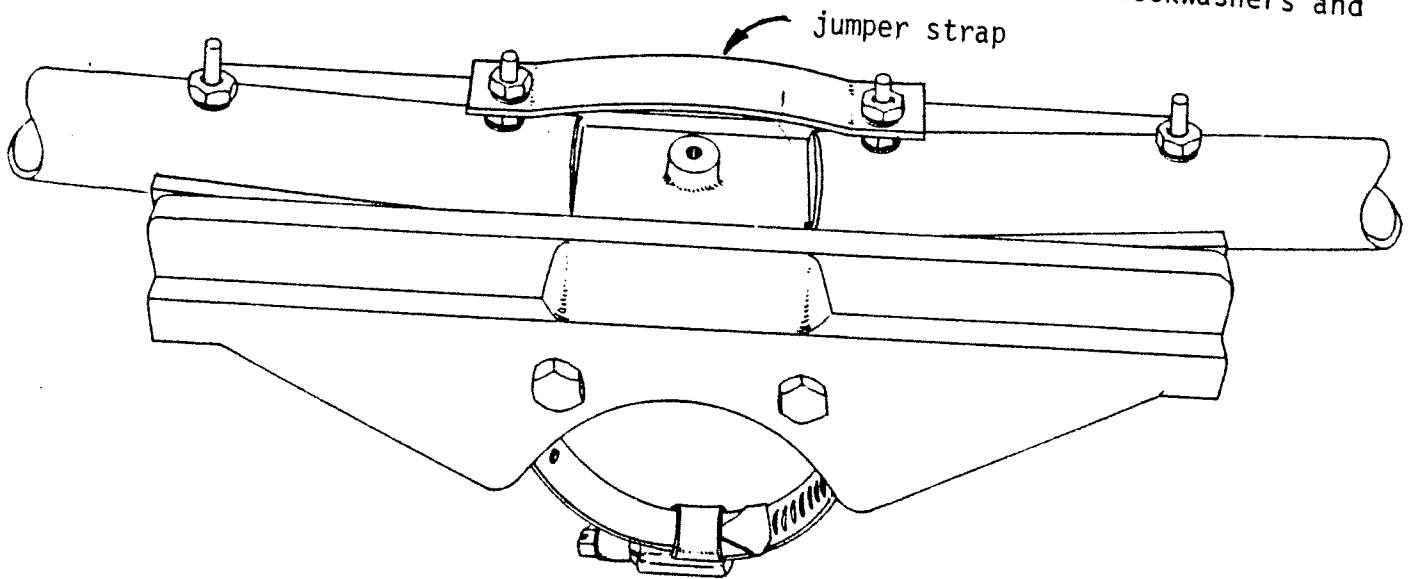


3. Mounting the Element Halves

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 $2\frac{1}{2}$ " screws from bottom of insulator and secure above element butt with 10-32 nuts and lockwash. 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 element half 180 degrees and repeat.

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

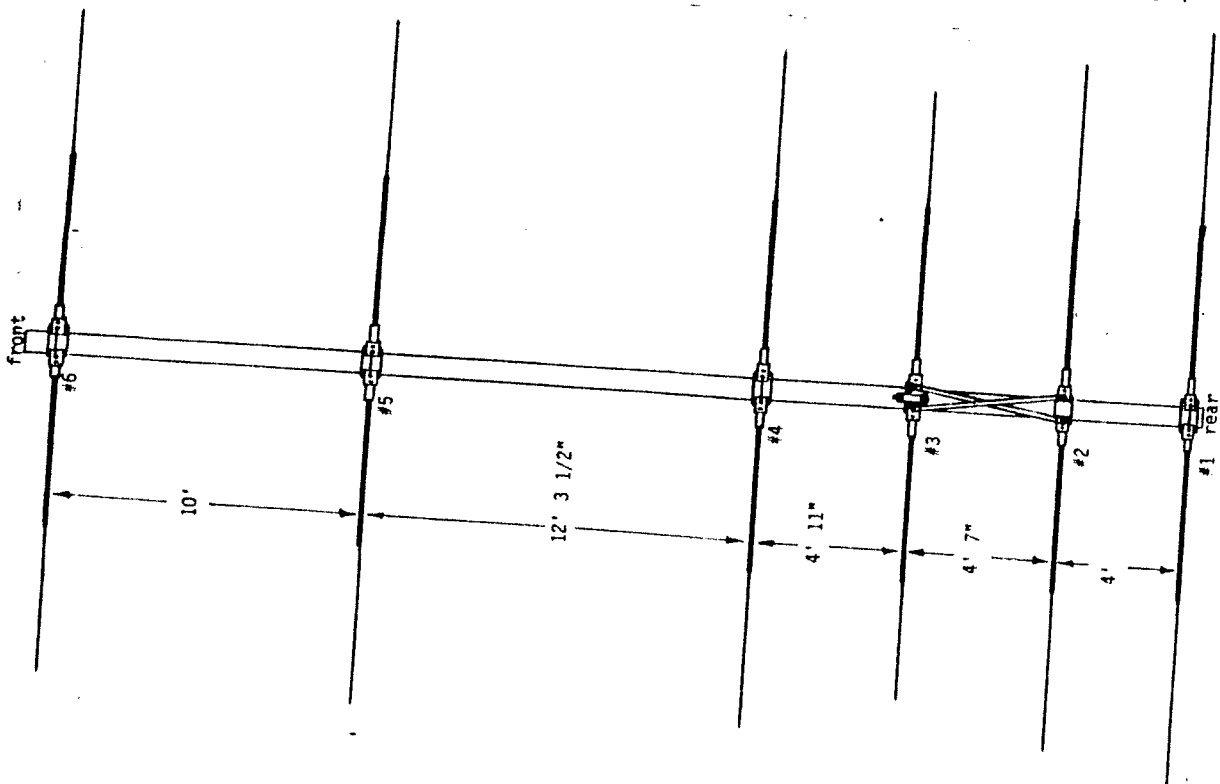
C. The reflector and director elements (#1, 4, 5, and 6) each require a $\frac{1}{2}$ " x $3\frac{7}{8}$ " jumper strap between element halves. Bow the strap slightly, as needed, to fit the two inner most element mounting screw studs and secure with additional lockwashers and nuts. See sketch below.



4. Mounting the Element to the Boom

A. Roll the boom until assembly bolts are 45° from vertical with bolt heads "up." Center element #1 at two inches from the rear of the boom (about $\frac{1}{2}$ " of boom should extend beyond insulator) and securely tighten the HTM-350 clamp. Install the remainder of the 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.

B. Leave the front driven element (#3) clamp loose to allow for fitting phasing traps in Step 5.



5. Driven Element Connections

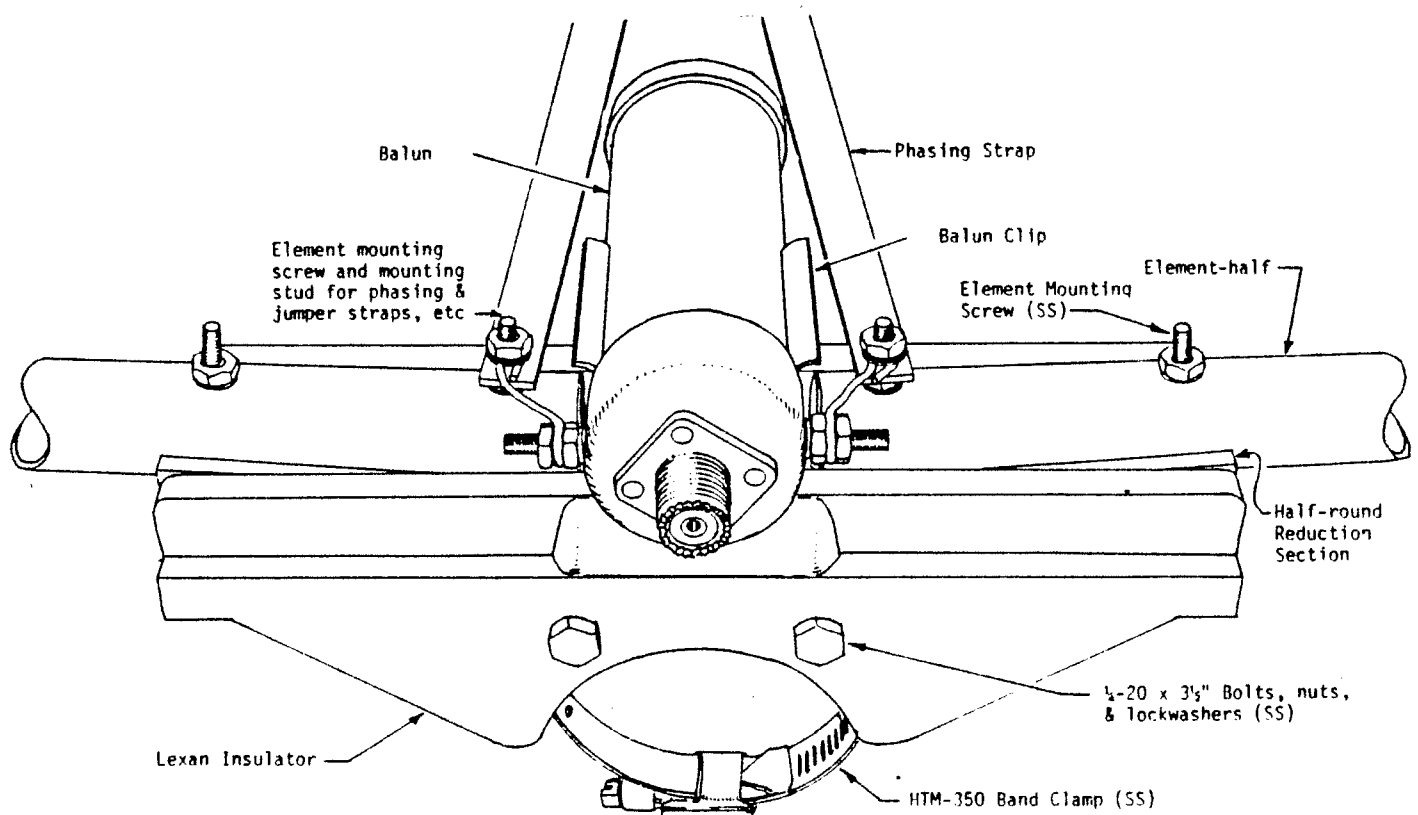
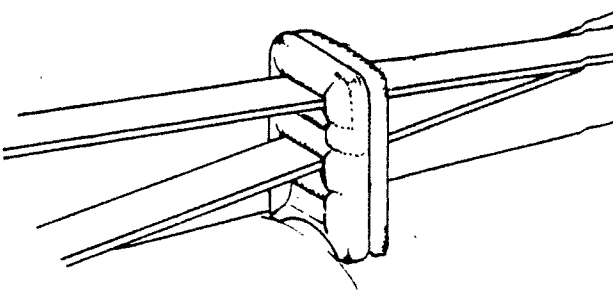
A. Driven elements are linked by a crossed pair of $\frac{1}{2}$ " x $5\frac{1}{4}$ " phasing straps. Slide the straps through two standoffs until centered. See the sketch at right.

B. Support boom so area between driven element is as straight as possible. Paste strap ends and mount on innermost screw studs on element #2. Secure with 10-32 lockwashers and nuts. Run straps, crossed, to the studs on element #3.

C. Attach balun clip to top center of element #3 with a #6 x $\frac{3}{8}$ " sheet metal screw. Place balun in clip, connector pointing to boom center. Keep balun terminals as close as possible to feedpoints but a minimum of $\frac{3}{8}$ " from balun clip.

Paste balun leads and place over phasing straps. Secure with #10-32 flatwasher lockwashers, and nuts.

See sketch below for correct assembly of hardware.

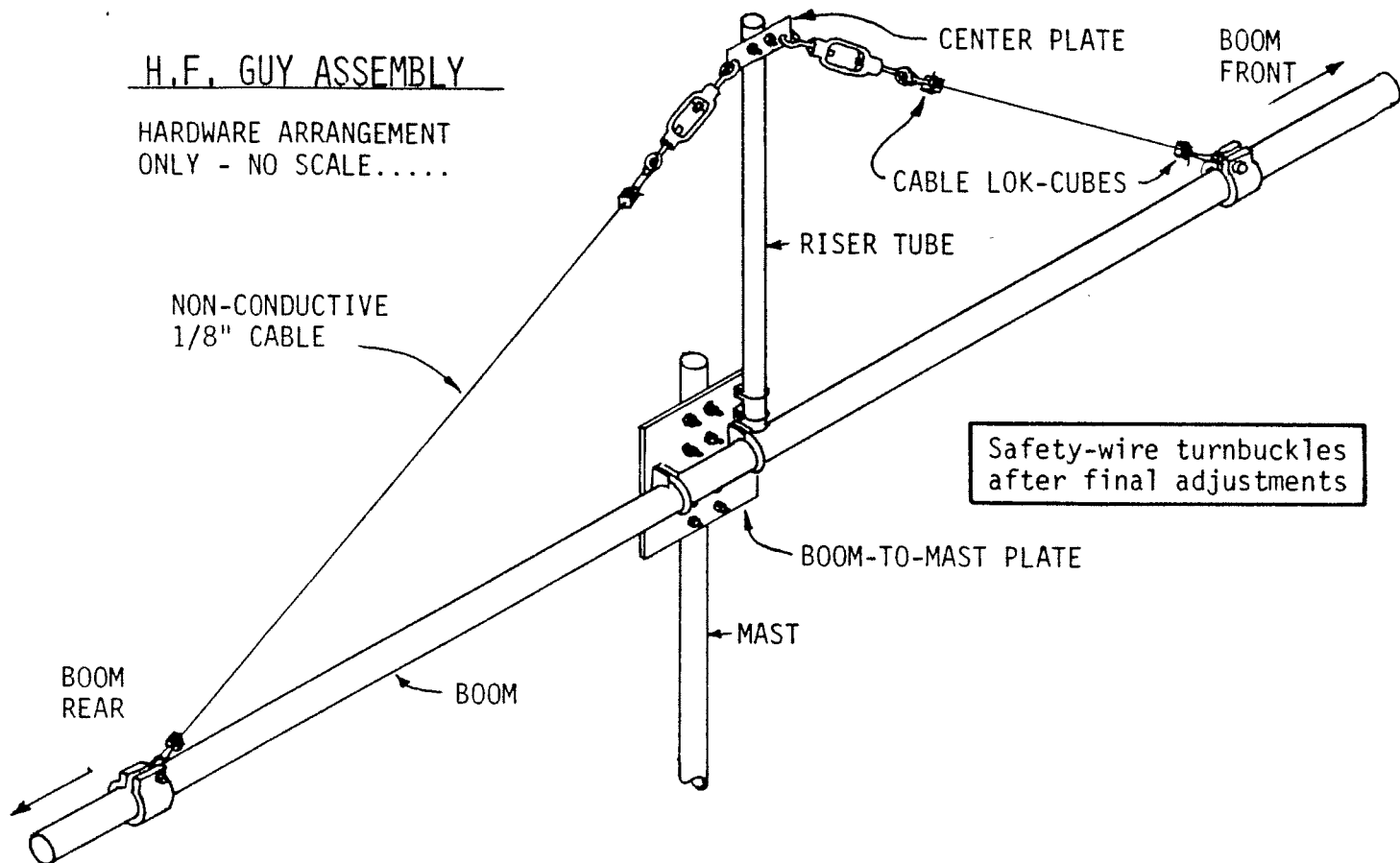


D. Take up any slack in phasing straps by tapping element #3 away from #2. When straps are taut, align element #3 with the rest and tighten clamp.

E. Referring to the Dimension Sheet (P.2), recheck all elements for correct half lengths and spacing.

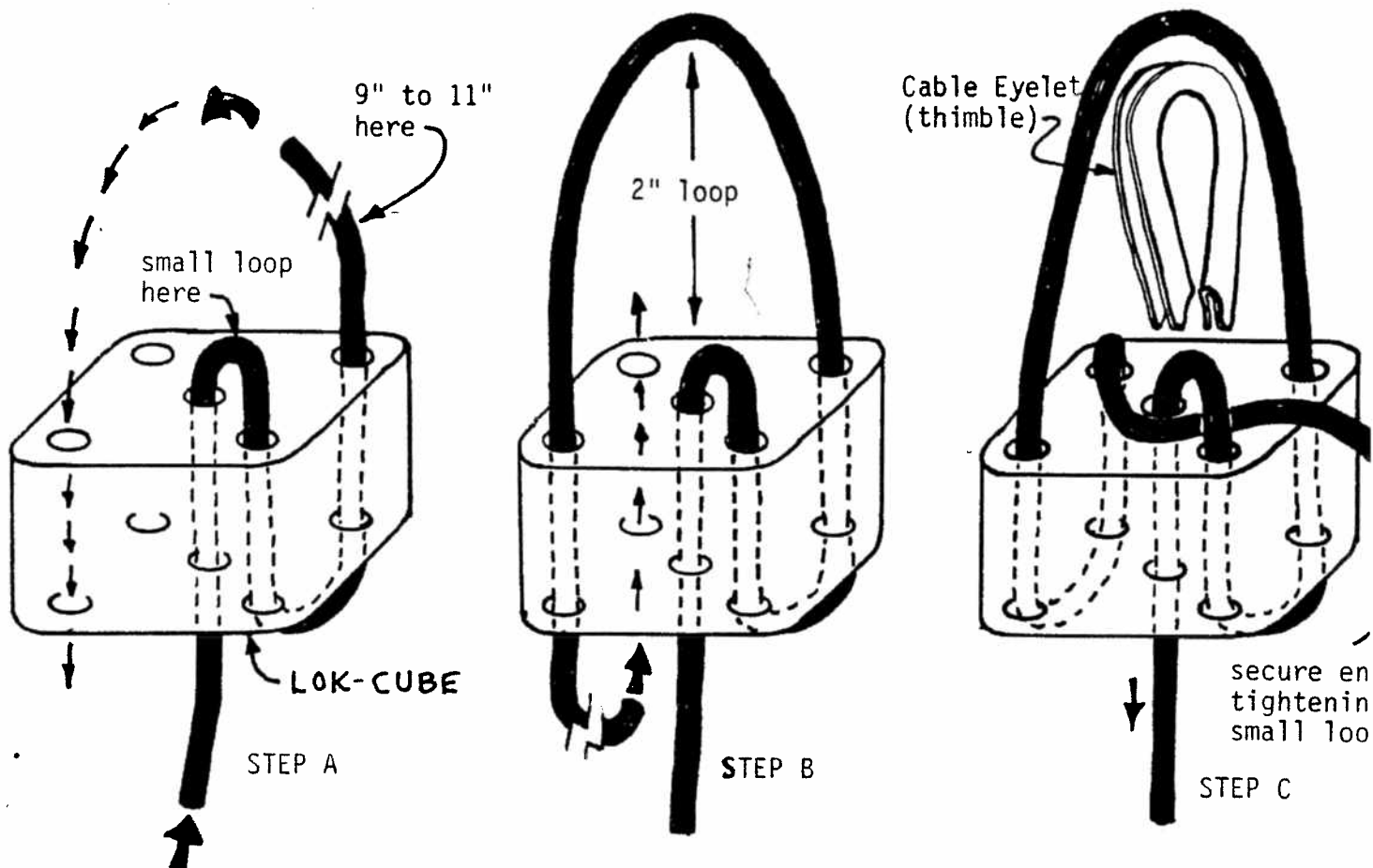
H.F. ANTENNAS: BOOM-TO-MAST MOUNTING PLATE AND OVERHEAD GUY ASSEMBLY

The antenna is attached to the mast via a 12" x 12" plate located at the physical balance point. The boom is supported front and rear by an adjustable guy harness. The cables 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 turnbuckles mounted on the 48" riser tube (see the sketch below).



1. Center the boom to mast plate at the physical balance point of the antenna with the feedline attached
Lightly secure with two 3" U-bolts. Set of holes in corner of plate are for the riser tube and should be "up" and forward of mast.
2. Attach the 2"O.D. x 48" riser tube to the boom to mast plate with the bottom just slightly above the boom. Secure with two 2" U-bolts.
3. Using the riser as a guide, sight along the beam from one end and have someone rotate the boom-to-mast plate until the riser is perpendicular to the elements. Tighten the 3" U-bolts until the boom just begins to deform.
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 riser about 2" or 3" from the top.
5. Rigging the guy harness is easier if the boom is more or less straight. If possible, support the boom at regular intervals.

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 until 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 permanent 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 it's "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 small pilot hole into the boom through the existing hole in the HTM 350 clamp band and screw in a #6 x 3/8" sheet metal screw. Repeat for all elements (screws are 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 balun 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, Columbia 1198, 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. Maintain 8 to 9 feet of spacing from lower frequency antennas.

15M-6 PARTS LIST

KLM PART NO.	QTY	SIZE	PART DESCRIPTION
T3000	2	3" O.D. X .065 X 12' 6"	SWAGED BOOM
T3000	1	3" O.D. X .065 X 12'	STRAIGHT BOOM
T2000	1	2" O.D. X 48"	RISER TUBE
T0340	12	3/4" O.D. X 72"	SWAGED (WITH 1" O.D. X 7/8" O.D. X 12" SLEEVES
T1000 & T0780			
T0120	2	1/2" O.D. X 76"	ELEMENT
T0120	10	1/2" O.D. 64"	ELEMENT
S 0120	2	1/2" O.D. 56 1/4"	PHASING STRAPS
H1200	2	1/8" X 16' 7"	PHILLYSTRAN CABLE
PA204	1	2" x 4"	TURNBUCKLE PLATE ASSY.
P1112	1	11 1/2" x 11 1/2" x 1/2"	BOOM-TO-MAST PLATE
	1	BOX OF HARDWARE INCLUDING:	
28200	12	M-6	COMPRESSION CLAMPS
66135	12	1" TO 1-1/2"	INSULATOR INSERTS
66139	6	1-1/2" TO 3"	INSULATORS
28482	2	3"	CAST RING CLAMPS
28487	6	HTM-350	CLAMPS
28410	2	3"	U-BOLTS & CRADLES
28402	7	2"	U-BOLTS & CRADLES
66133	2	3"	BOOM CAPS
16001	1	1 OZ. CUP	CONDUCTIVE PASTE
B3641	1	3-60 4:1	BALUN & CLIP
M4021	1	11 PAGE	ASSEMBLY MANUAL
<u>BAG #1</u>			
28526	16	1/4-20 X 3-1/2"	BOLTS
28204	16	1/4-20	NUTS
28354	16	1/4	LOCKWASHERS
28545	2	3/8-16 X 2"	BOLTS
28205	6	3/8-16	NUTS
28355	6	3/8	LOCKWASHERS
28206	14	5/16-18	NUTS
28356	14	5/16"	LOCKWASHERS
28000	8	#6 X 3/8"	SHEET METAL SCREWS
<u>BAG #2</u>			
28025	24	10-32 X 2-1/2"	SCREWS
28203	38	10-32	NUTS
28353	38	#10	LOCKWASHERS
28303	2	#10	FLATWASHERS
<u>BAG #3</u>			
S0120	4	1/2" X 3-3/4"	JUMPER STAPS
66105	2	1" x 1 1/2"	PHASING STRAP SPACERS
66128	4	1/8" HOLES	LOCK CUBES
28707	4	1/8" EYE	THIMBLES

10/21/86
TOF

MIRAGE/KLM

COMMUNICATIONS EQUIPMENT

P.O. BOX 1000

MORGAN HILL, CA 95037

WARRANTY CARD

PLEASE RETURN WITHIN 10 DAYS AFTER DATE OF PURCHASE

MODEL # 15m-6 SERIAL # 13370

NAME: _____

ADDRESS: _____

CITY: _____ STATE _____ ZIP _____

DEALER: _____

CITY: _____

DATE PURCHASED: _____