

INSTRUCTION MANUAL

ORDER NO. 388

**THUNDERBIRD
three element, ham antenna**

PN 801235

Description:

The Hy-Gain TH3-Mk3 is a three-element tri-band designed for operation on 10, 15, and 20 meters. Multi-banding is accomplished through the use of Hy-Gain's all new Hy-Q traps. The antenna is designed to fit a 1 1/2" (41 mm) O.D. mast and can be rotated with a heavy duty TV rotator.

Electrical

Input impedance	50 ohms
Gain	8 dB minimum
Front-to-back ratio	-25 dB
Maximum power input	1 kw AM
VSWR (at resonance)	less than 1.5:1
Lightning protection	DC ground

Mechanical

Boom length	14 ft. (426.7 cm)
Boom diameter	2 in. (51 mm)
Longest element	27 ft. (823.7 cm)
Maximum wind survival	75 mph (120.67 kmp/h)
Net weight	36 lbs. (16.3 kg)
Accepts mast	1 1/2" to 2 1/2" O.D. (32 mm-64mm)
Wind surface area	4.03 sq ft. (0.374 m ²)
Wind load 80 mph	103.7 lbs. (47.0 kg)

FOR OUR OVERSEAS CUSTOMERS: The United States uses English units of measurement. Please see the last page of this manual for assistance in identifying the hardware and components supplied with this product.

The antenna site should be free of large buildings, metal objects, or powerlines.

WARNING

When installing your system, take extreme care to avoid any contact with overhead powerlines. Failure to exercise this care could result in serious or fatal injury.

There are two methods of installing the TH3-Mk3 at the top of your tower.

Method 1 — Completely assemble the antenna on the ground then hoist it into position using a block and tackle as shown in Figure 1.

Method 2 — Assemble the antenna on the ground in halves, then hoist each half up the tower and assemble in the boom-to-mast bracket on the tower as shown in Figure 2.

All tubing supplied with the TH3-Mk3 telescopes together. Make all measurements as accurately as possible using the given dimensions to gain optimum results from your antenna.

WARNING
 When installing your system, take extreme care to avoid any contact with overhead powerlines. Failure to exercise this care could result in serious or fatal injury.

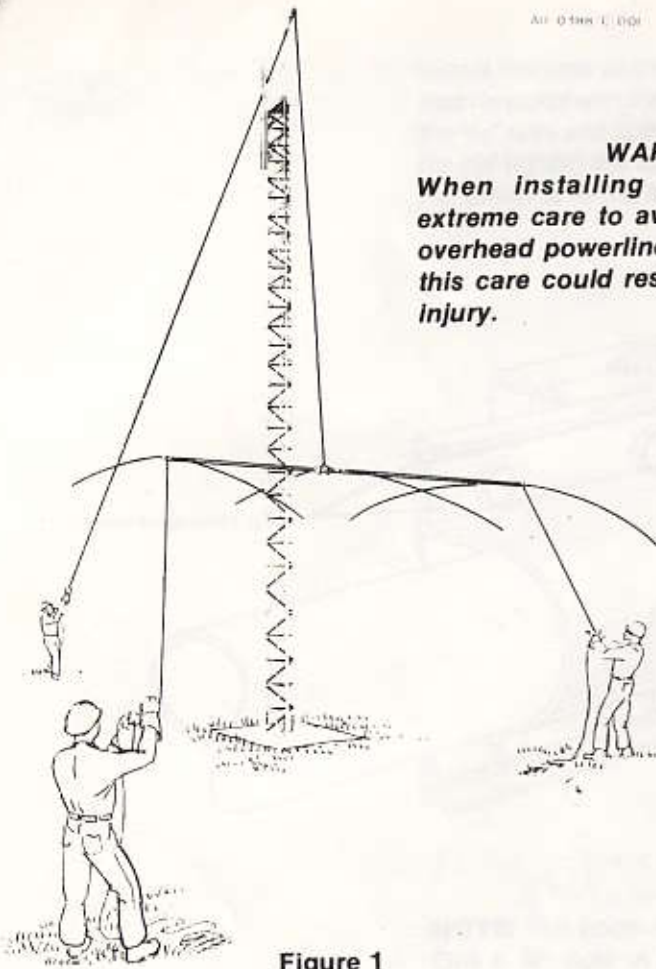


Figure 1

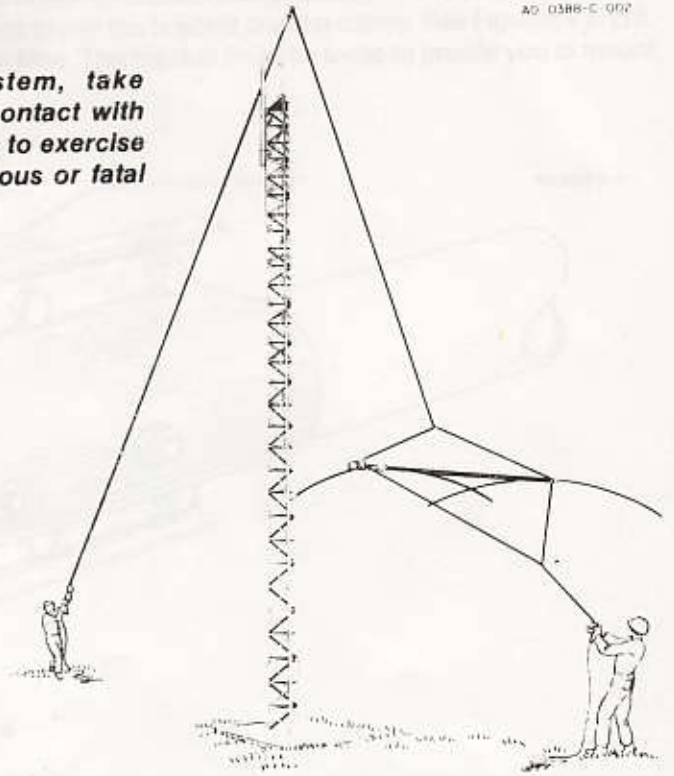


Figure 2

CAUTION

When unpacking your antenna, check the inside of all tubing for parts (clamps, insulators, smaller tubing, etc.). To conserve space, these smaller articles are sometimes put inside larger pieces.

Assembly of the Boom

Select the boom-to-bracket clamp parts (items 2 and 3). Loosely assemble them on the drilled ends of the two boom sections (item 8) using the 1/4"-20 x 3/4" bolts and the 1/4" nuts and internal lockwashers. Secure the boom to the bracket using the two 5/16"-18 x 2 3/4" screws, nuts, and lockwashers provided. See Figure 3.

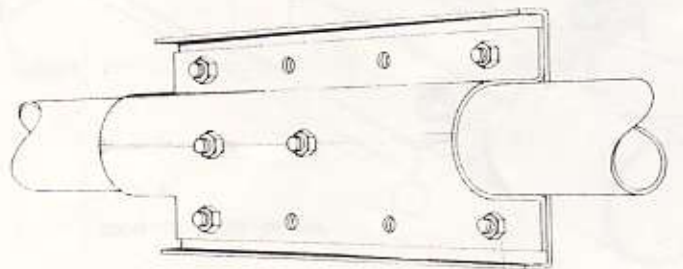


Figure 3

Select the cast aluminum boom-to-mast bracket (item 1). Align the boom-to-mast bracket with the holes in the boom-to-bracket clamp. Use the $\frac{5}{16}$ "-18 x 5" screws and the $\frac{5}{16}$ " nuts and split lockwashers to join the bracket and the clamp. See Figures 4 and 5. Do not tighten the screws at this time. The bracket must be loose to enable you to mount the antenna to the mast.

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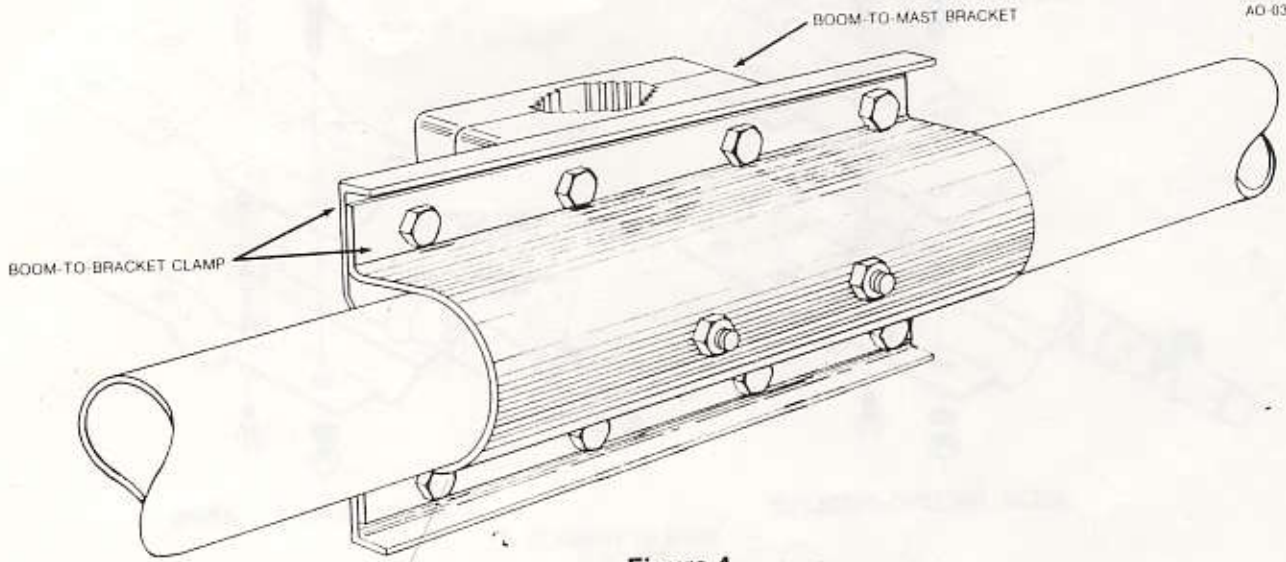


Figure 4

$\phi 6,5 \text{ m } L = 20 \text{ mm}$
(X4) + rondelles fines

NOTE: The boom-to-mast bracket (item 1) has a hole in it for connecting it to the mast. Drill a $\frac{3}{8}$ " hole in the mast to correspond to the hole in the bracket before raising the antenna.

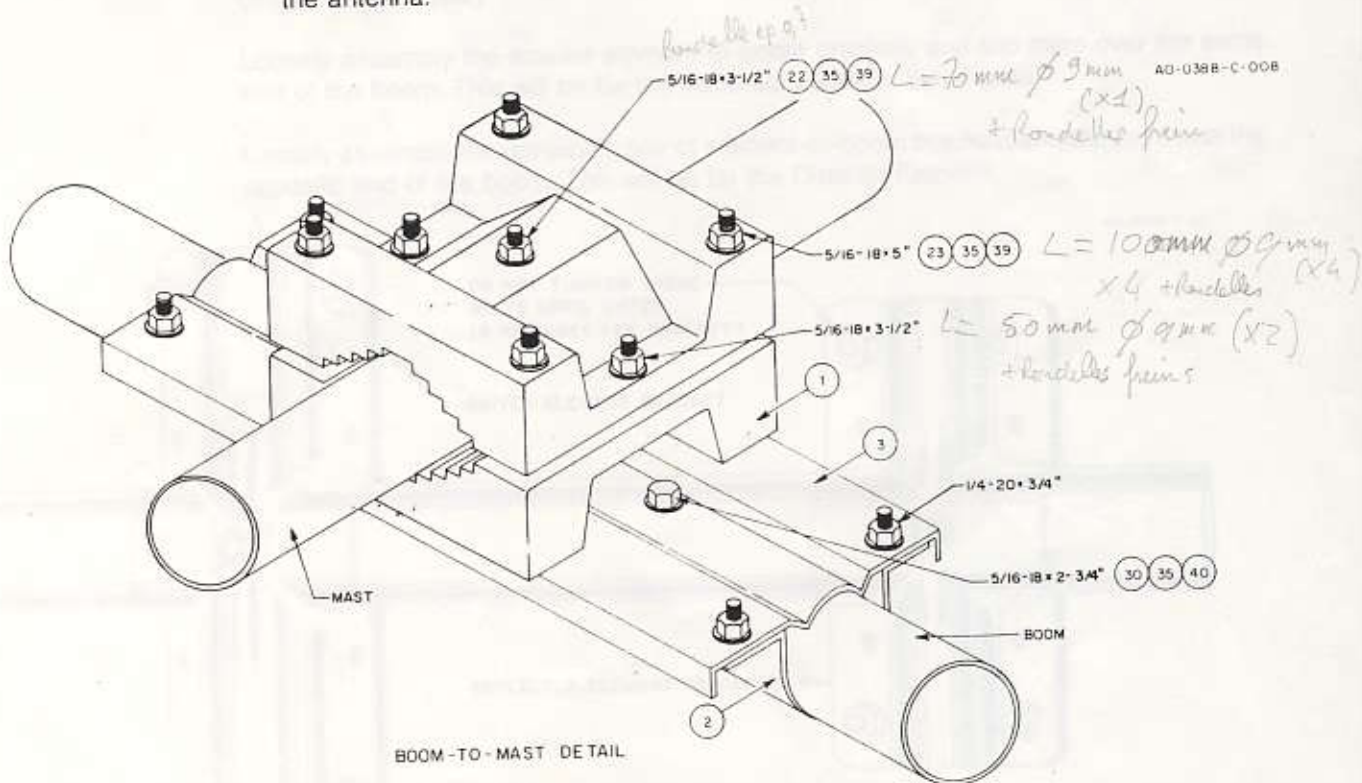


Figure 5

+ capuchon Tube $\phi 2$ pouces

**Element-to-Boom
Brackets**

Select the element-to-boom brackets and insert the 1/4"-20 x 3/8" anchor screws and 1/4" nuts as shown in Figure 6.

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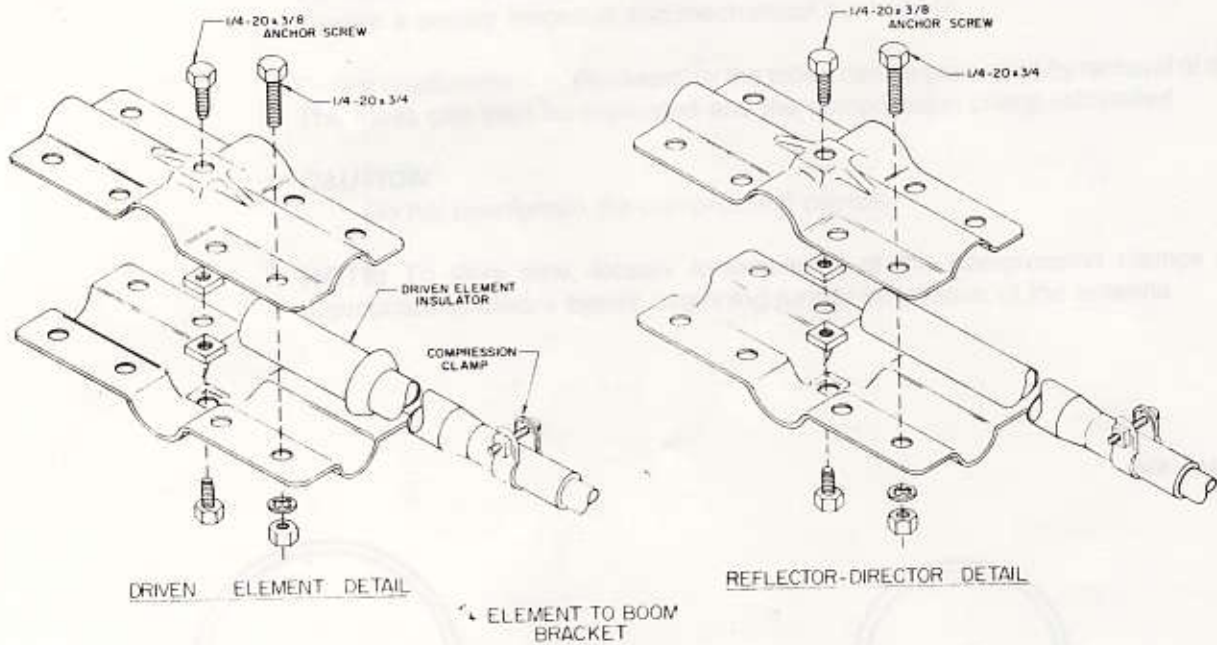


Figure 6

Loosely assemble the larger element-to-boom brackets and place them over one end of the boom. Slide them toward the boom-to-mast bracket. This will be the bracket for the Driven Element (DE).

Loosely assemble the smaller element-to-boom brackets and slip them over the same end of the boom. This will be for the Reflector element. See Figure 7.

Loosely assemble the remaining pair of element-to-boom brackets and slip them over the opposite end of the boom. This will be for the Director Element.

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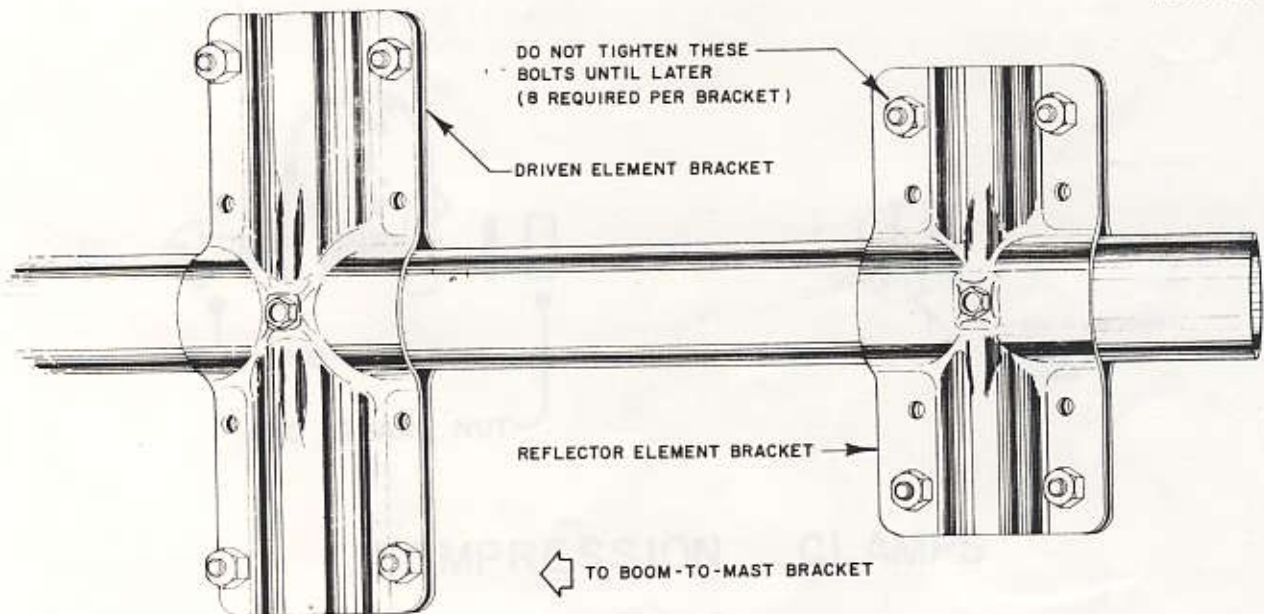


Figure 7

Compression Clamps

Use the compression clamps in the following manner: Take care when measuring the tubing lengths for your mode of transmission. Place the clamp near the end of the tube with the joint even with the slot. Tighten the clamp until the inner tube cannot be turned in the outer tube. One-half to three-quarters further turn on the compression screw will provide a secure electrical and mechanical connection.

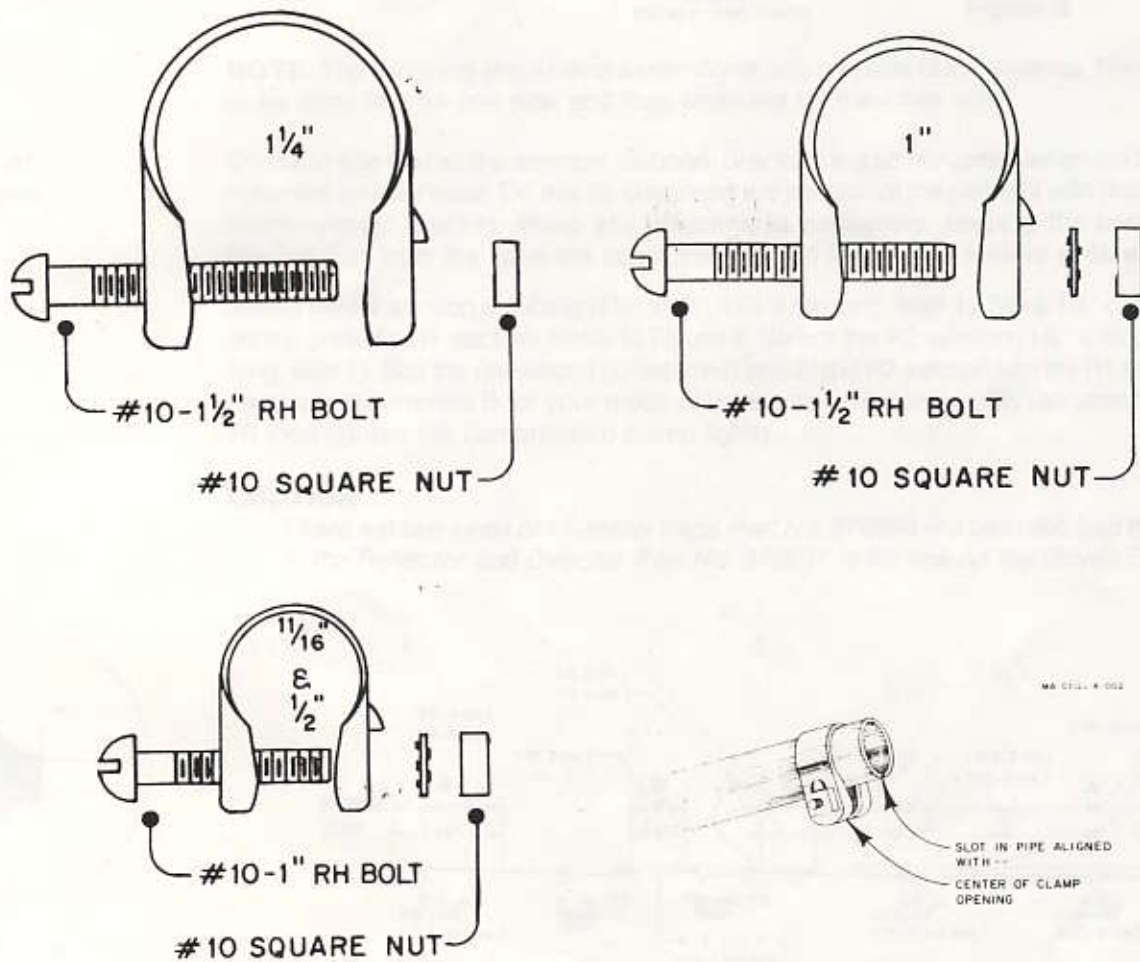
During readjustment or disassembly the tubes can be separated by removal of the clamp. The tubes can then be separated and the compression clamp reinstalled.

CAUTION

Do not overtighten the compression clamps.

NOTE: To save time, loosely assemble all of the compression clamps and their appropriate hardware before beginning further installation of the antenna.

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COMPRESSION CLAMPS

Figure 8

Transmission Modes

Determine which mode of transmission you will use — either phone or continuous wave (CW). Dimensions for both are shown, but only one mode must be used throughout the assembly of the antenna. Trying to use phone dimensions on one band and CW dimensions on another band will give less than optimum results on both. The typical VSWR charts shown in Figure 9 will help you to decide which mode is best for your use.

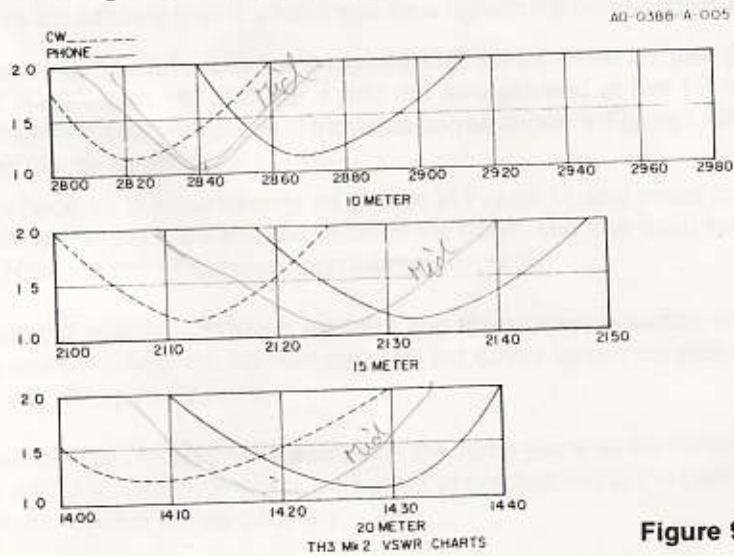


Figure 9

NOTE: The following steps cover assembly of only one side of the antenna. They will have to be done first for one side and then repeated for the other side.

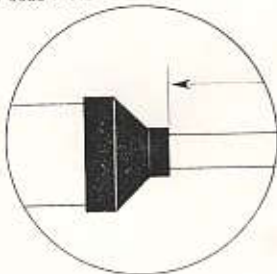
Check to see that all the element-to-boom brackets will lie horizontal when the antenna is mounted on your mast. Do this by observing the position of the element with respect to the boom-to-mast bracket. Make any adjustments necessary, keeping the center of the bracket $2\frac{1}{8}$ " from the tip of the boom then tighten the anchor screws securely.

Select the R1 section of tubing ($1\frac{1}{4}$ " x 48", 121.9 cm long, item 4). Slip a $1\frac{1}{4}$ " compression clamp onto the R1 section. Refer to Figure 8. Select the R2 section ($1\frac{1}{8}$ " x 48", 121.7 cm long, item 7). Slip the unswaged (untapered) end of the R2 section into the R1 section and measure dimensions B for your mode of transmission (phone or CW) as shown in Figure 10 then tighten the compression clamp lightly.

CAUTION

There are two kinds of 15-meter traps. Part No. 878694 is a parasitic trap that is used in the Reflector and Director. Part No. 878637 is for use on the Driven Element.

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Dimensions Measured as Shown

Detail

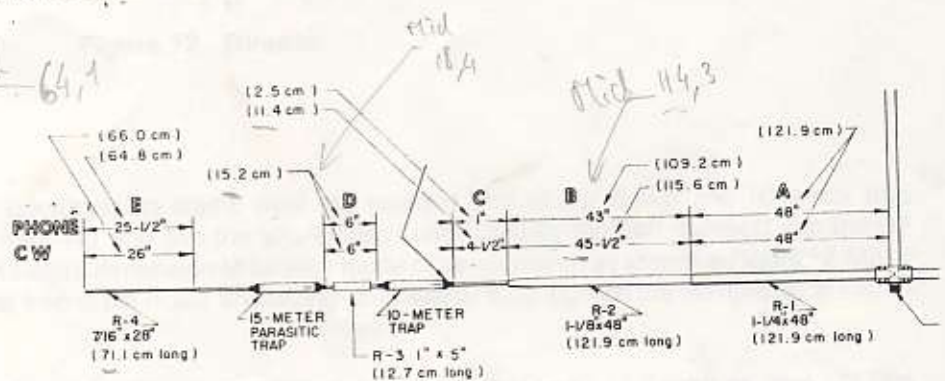


Figure 10 Reflector

NOTE: Install all traps with drain holes on bottom and make sure the part number end is toward the boom.

Slip two 1" compression clamps over the DE3 section (1" x 6", 15.2 cm long, item 12). Now slip the DE3 section over the 10-meter trap then slip the shorted end of the 15-meter Driven Element trap (878637, item 14) into the DE3 section. Make certain the shorted end of the trap (identified by part number) slipped into the DE3 section. Measure dimension 1 for your mode of transmission as shown in Figure 11, keeping the DE3 section approximately equidistant from the two traps. Now tighten the compression clamps lightly.

Slip a 1/2" compression clamp over the swaged end of the 15-meter DE trap. Select the DE4 section (7/16" x 28", item 11) and slip it into the swaged end of the 15-meter DE trap. Measure dimension J for your mode of transmission as shown in Figure 11 then tighten the compression clamp lightly.

Carefully recheck all measurements as shown in Figure 11 and make certain that the shorted ends of the traps are pointed towards the boom and trap drain holes are facing downward. Now tighten all compression clamps securely.

Slip the insulated end of the driven element into the bracket assembled on the boom. Tighten the screws to hold the element securely but *do not tighten the anchor screw (item 25) at this time*. Refer to Figure 6.

Check to see that the Driven Element will lie in the same plane as the Reflector and make certain it is still 72 3/4" (184.8 cm) from the center of one bracket to the center of the other. Now tighten the anchor screw securely.

Select the D1 section of tubing (1 1/4" x 48", 121.9 cm long, item 4). Slip a 1 1/4" compression clamp over the D1 section. Select the D2 section (1 1/8" x 38", 96.5 cm long, item 9). Slip the unswaged end of D2 into the D1 section and measure dimension L for your mode of transmission as shown in Figure 12. Now tighten the compression clamp lightly.

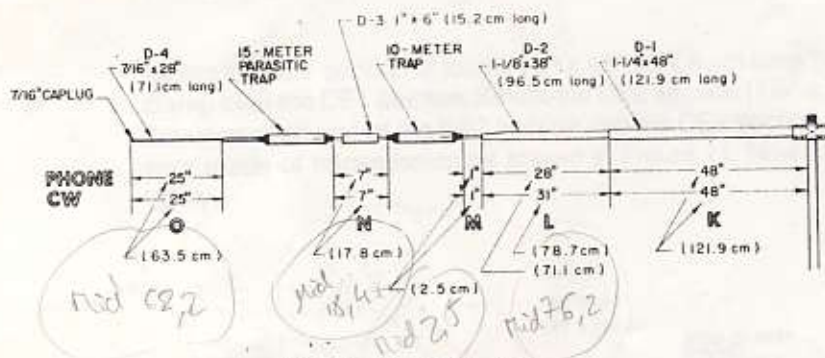


Figure 12. Director:

Slip a 1" compression clamp over the swaged end of D1. Select the 10-meter trap (878749, item 16) and slip the shorted end (identified by the part number) into the D2 section. Measure dimension M for your mode of transmission as shown in Figure 12. Make certain the trap drain holes are facing downward, then tighten the compression clamp lightly.

Slip two 1" compression clamps over the D2 section (1" x 6", 15.2 cm long, item 12). Slip the D3 section over the 10-meter trap, then slip the shorted end of the 15-meter parasitic trap (878694, item 15), into the D3 section. Make certain the shorted end of the trap (identified by the part number) is inserted into the D3 section. Measure dimension N for your mode of transmission as shown in Figure 12, keeping D3 approximately equidistant from the two traps. Now tighten the compression clamps lightly.

Slip a 1" compression clamp onto the swaged end of the R2 section. Select the 10-meter trap (item 16), and slip the shorted end into the R2 section. The shorted end can be identified by the part number marking, near the plastic insulator. Measure dimension C for your mode of transmission as shown in Figure 10. Make certain the drain holes in the traps are facing downward.

CAUTION

Be sure you install the traps correctly. They will not operate properly unless the shorted end is facing towards the boom.

Slip two 1" compression clamps onto the R3 section (1" x 5", 12.7 cm long, item 13). Now slip the R3 section over the 10-meter trap and slip the shorted end of the 15-meter parasitic trap (item 15), into the R3 section. Make certain the shorted end of the trap (identified by the part number) is inserted into the R3 section. Measure dimension D for your mode of transmission as shown in Figure 10, keeping R3 section approximately equidistant from the two traps. Make certain the drain holes in the trap are facing downward. Now tighten all compression clamps lightly.

Slip a 1/2" compression clamp over the swaged end of the 15-meter trap. Select the R4 section (1/8" x 28", item 11) and slip it into the 15-meter trap. Measure dimension E for your mode of transmission as shown in Figure 10, then tighten the compression clamp lightly.

Carefully recheck all measurements and make certain the shorted end of all traps are pointed towards the boom. Now tighten all compression clamps as explained earlier. Remember not to overtighten them. Make sure all drain holes are facing down.

Slip the Reflector element into the bracket assembled in the boom. Tighten the screws to hold the R1 section securely but *do not tighten the anchor screw (item 25) at this time.*

Assembly of the Driven Element

Select the DE1 section of tubing (1/4" x 48", 121.9 cm long, item 4). Slip a 1 1/4" compression clamp over the DE1 section. Select the DE2 section (1 1/4" x 38", 96.5 cm long, item 9). Slip the unswaged end of the DE2 section into the DE1 section and measure dimension G for your mode of transmission as shown in Figure 11. Now tighten the compression clamp lightly.

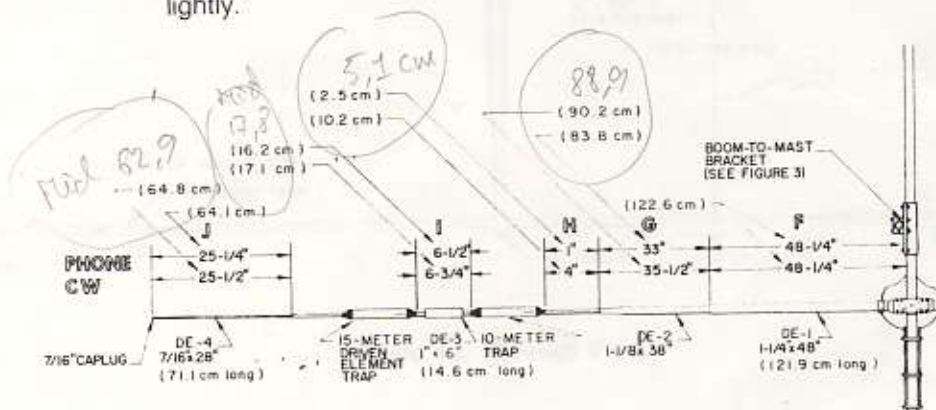


Figure 11. Driven Element

Slip a 1" compression clamp over the swaged end of the DE2 section. Select the 10-meter trap (878649, item 16) and slip the shorted end (identified by the part number) into the DE2 section. Measure dimension H for your mode of transmission as shown in Figure 11. Make certain the drain holes in the trap are facing downward. Now tighten the compression clamp lightly.

Slip a $\frac{1}{2}$ " compression clamp over the swaged end of the 15-meter trap.

Select the D4 section ($\frac{7}{16}$ " x 28", 71.1 cm long, item 11) and slip it into the swaged end of the 15-meter trap. Measure dimension O for your mode of transmission as shown in Figure 12 and then tighten the compression clamp lightly.

Insert the Director Element into the bracket assembled on the boom. Tighten the screws to hold the element securely but *do not tighten the anchor screws* (item 25) at this time.

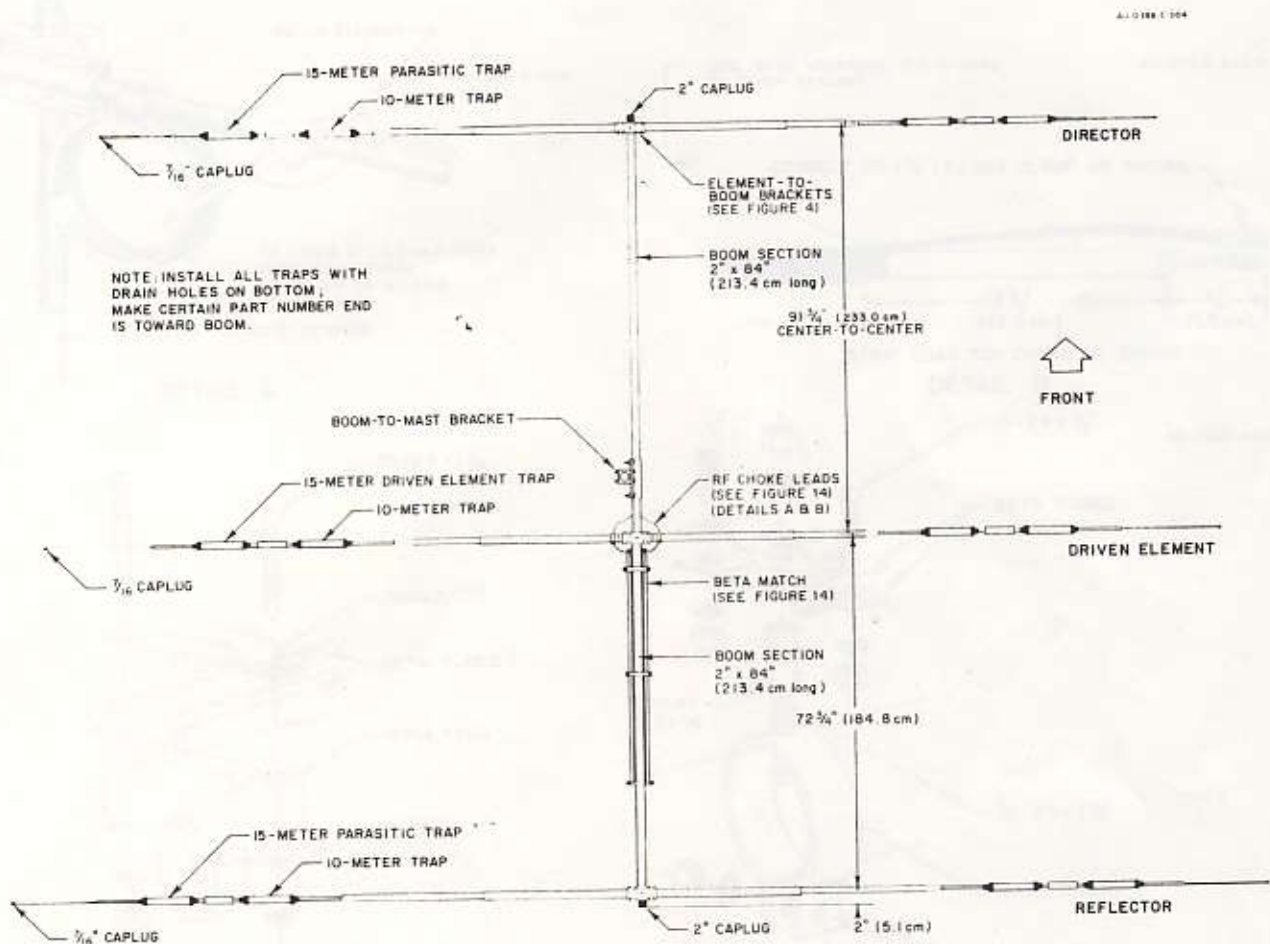


Figure 13. Overall View

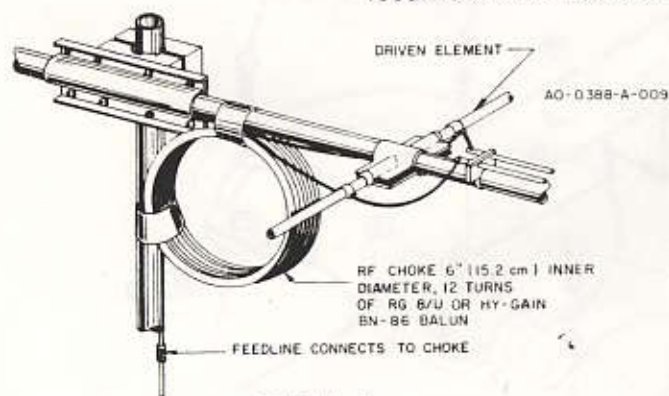
Carefully recheck all measurements as shown in Figure 13. The driven element should measure 72 $\frac{3}{4}$ " (184.8 cm) from the center of the reflector element-to-boom bracket to the center of the driven element-to-boom bracket as shown in Figure 13. The director should measure 91 $\frac{3}{4}$ " (233.0 cm) from the center of the driven element-to-boom bracket to the center of the director-to-boom bracket. Make certain that the shorted ends of the trap are pointed towards the boom and the trap drain holes are facing downward. Now tighten all compression clamps and anchor screws securely.

Installation of the Beta Match

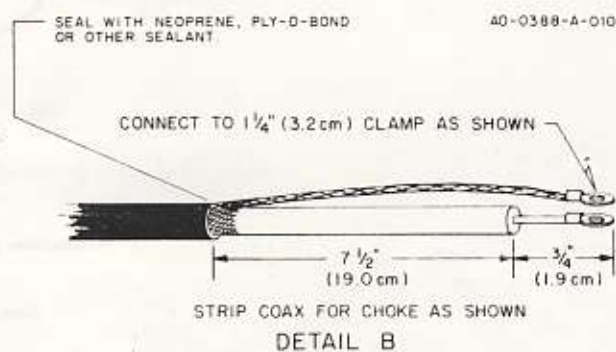
Select the beta match tubes ($\frac{3}{4}$ " x 46", 116.8 cm long, item 10) and the beta support insulators and clamps as shown in Figure 14 and Detail C & D. Assemble the beta match tubes in the boom as shown in Figure 14 and Detail C & D.

Select the beta match shorting clamps and the shorting strap and assemble as shown in Figure 14 and Detail D. Notice that the #10-24 x $1\frac{1}{2}$ " screw attaching the shorting clamps to the strap has a sleeve slipped over it. This allows you to install the shorting clamps without putting undue strain on the beta match tubes.

Install the pigtail assemblies (item 55) on the beta match tubes using the two #10 screws (item 32) and lockwashers (item 42). Slip the $\frac{1}{4}$ " tubing clamps on the Driven Element near the insulator. Loosely attach the pigtails to the tubing clamps using the $\frac{1}{4}$ "-20 x $1\frac{1}{2}$ " screws as shown in Figure 14. Do **NOT** tighten the connection at this time. The coaxial feedline will connect to this point in a later step.

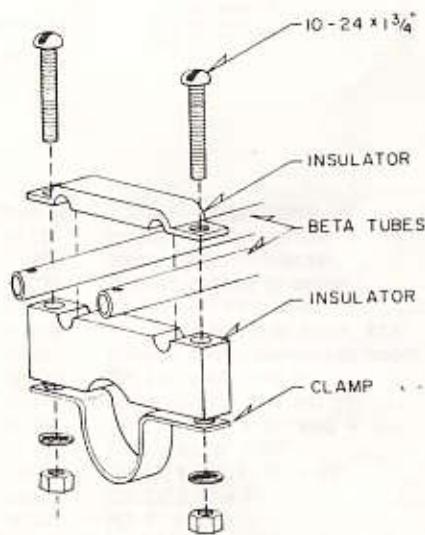


DETAIL A



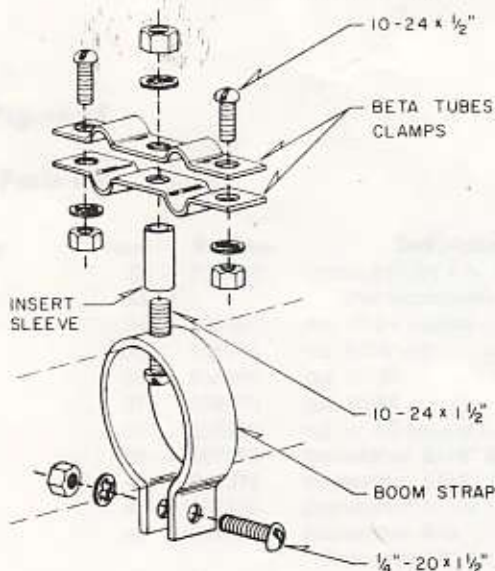
DETAIL B

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DETAIL C

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DETAIL D

Final Assembly

Place a $\frac{1}{16}$ " caplug on each element tip and a 2" caplug on each end of the boom.

Install a Hy-Gain balun Model BN-86, available at your local Hy-Gain dealer. The BN-86 will allow the TH3-Mk3 to operate with a greater efficiency than is possible with a "home-made" choke.

If you wish, you may wind yourself an RF choke. The choke consists of 12 turns of RG-8/u coaxial feedline with 6" (15.2 cm) diameter. Strip one end of the choke as shown in Figure 14 and Detail B and connect to the tubing clamps on the Driven Element. Tape the choke securely to the boom and weatherproof the connection to the Driven Element using Pli-O-Bond, Neoprene or some similar substance.

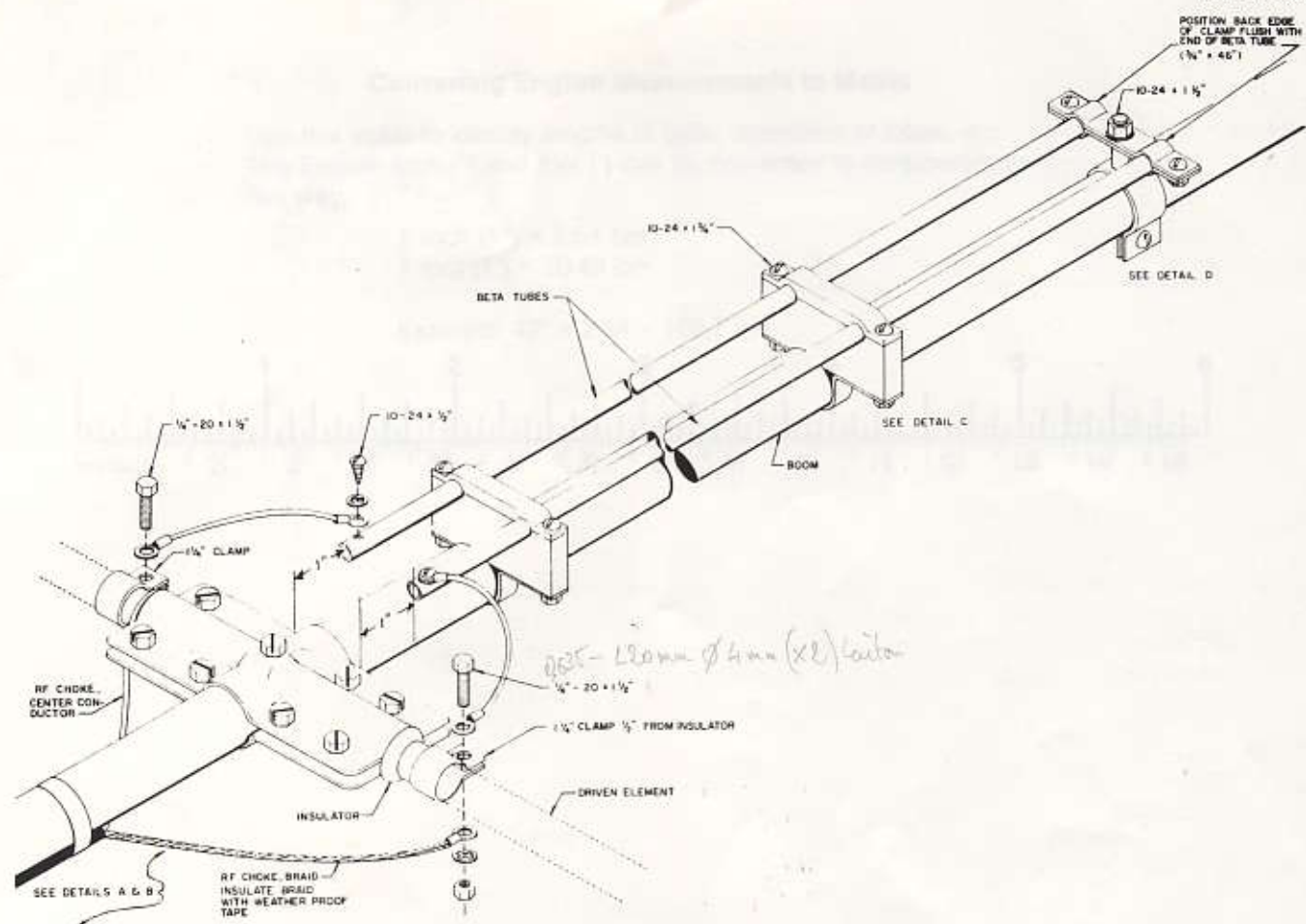


Figure 14

Parts List

Item	Part No.	Description	Qty	Item	Part No.	Description	Qty
1	102734	bracket, cast aluminum	2	32	516470	screw, #10-24 x 1/2" type A	2
2	172732	clamp, boom-to-bracket	1	33		(not applicable)	
3	172735	bracket, casting-to-boom	1	34	555362	nut, 10-24 square	30
4	190900	R1, DE1, D1, 1 1/2" x 48"	6	35	556945	nut, 5/16"-18	9
5	165919	bracket, element-to-boom, #13	4	36	556960	nut, 1/2"-20	33
6	165920	bracket, driven element-to-boom, #14	2	37	556970	nut, 10-24	9
7	190300	R2, 1 1/2" x 48" swg 3/8"	2	38	558685	nut, 1/2"-20 square	6
8	178411	boom section, 2" x 84"	2	39	567080	lockwasher, 5/16" split	7
9	190307	DE2, D2, 1 1/2" x 38" swg 3/8"	4	40	567075	lockwasher, 5/16" int.	2
10	171142	beta rods, 3/4" x 46"	2	41	567110	lockwasher, 1/4" int.	56
11	178558	D4, DE4, R4, 7/16" x 28"	6	42	567125	lockwasher, #10	10
12	190606	D3, DE3, 1" x 6"	4			Parts Pack B 879231	
13	190607	R3, 1" x 5"	2	43	380284	compression clamp, 1/2"	6
14	878637	trap, 15-meter Driven Element	2	44	380286	compression clamp, 1"	18
15	878694	trap, 15-meter parasitic	4	45	380287	compression clamp, 1 1/4"	6
16	878749	trap, 10-meter	6	46	168695	tubing clamp, 1 1/4"	2
17	879222	Parts Pack A	1	47	171077	beta shorting strap, 2" ID	1
18	879231	Parts Pack B	1	48	171162	beta shorting strap, 3/4"	2
19	872089	Parts Pack C	1	49	177888	beta support clamp	2
		Parts Pack A 879222				Parts Pack C (872089)	
20	171131	beta match shorting sleeves	1	50	455625	caplug, 2"	2
21	506455	#10-24 x 1" round head screw	6	51	455644	caplug, 7/16"	6
22	501541	screw, 5/16"-18 x 3 1/2" hex head	3	52	465595	insulator, beta tube	2
23	501543	screw, 5/16"-18 x 5"	4	53	465600	insulator, beta support	2
24	506325	screw, 1/2"-20 x 3/4"	28	54	465833	insulator, DE to boom	2
25	505540	screw, 1/2"-20 x 1/2"	6	55	878561	pigtail assembly	2
26	506335	screw, 1/2"-20 x 1 1/2"	3				
27	506440	screw, #10-24 x 1 1/4"	4				
28	506445	screw, #10-24 x 1 1/2"	25				
29	506485	screw, #10-24 x 1/2"	2				
30	506741	screw, 5/16"-18 x 2 3/4"	2				
31		(not applicable)					

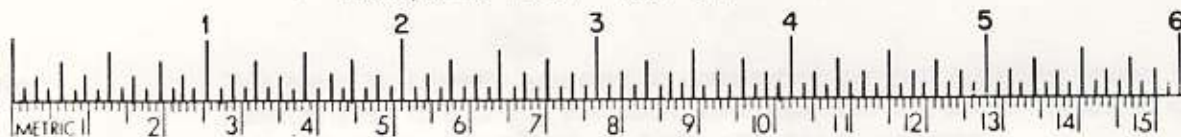
Converting English Measurements to Metric

Use this scale to identify lengths of bolts, diameters of tubes, etc.
The English inch (") and foot (') can be converted to centimeters in this way.

$$1 \text{ inch (1")} = 2.54 \text{ cm}$$

$$1 \text{ foot (1')} = 30.48 \text{ cm}$$

$$\text{Example: } 42" \times 2.54 = 106.7 \text{ cm}$$



LIMITED WARRANTY FOR ANTENNAS AND ANTENNA ACCESSORIES

Hy-Gain Electronics/division of TELEX COMMUNICATIONS, INC. ("Hy-Gain") warrants for a period of 90 days from the date of purchase by the original consumer all products manufactured by it to be free, under normal use and service, from defects in materials and workmanship and to promptly without charge repair or replace the product, at our option, when it is returned with proof of purchase to our Hy-Gain Warranty Service Center postage prepaid during this 90-day period and our examination of the product discloses the defect to be the fault of our manufacture.

All claims of defect or shortage should be sent postage prepaid to:

Hy-Gain Warranty Service Center, Dept. 623
Hy-Gain Electronics
division of TELEX COMMUNICATIONS, INC.
8601 N.E. Highway 6
Lincoln, Nebraska 68505 USA/phone: (402) 467-5321

This warranty shall not apply to any product which has been repaired or altered in any manner by anyone other than our Hy-Gain Warranty service Center, or products which have been the subject of misuse, negligence, accident, or which have been connected, installed, used, or otherwise adjusted other than in accordance with written instructions furnished by Hy-Gain.

The above 90-day warranty period shall not be extended beyond its original term with respect to any part or parts repaired or replaced by Hy-Gain. No person, including any dealer, agent, distributor, or representative of Hy-Gain, is authorized to assume for Hy-Gain any obligation or liability other than is expressly stated herein.

HY-GAIN DOES NOT ASSUME ANY LIABILITY FOR INCIDENTAL, SPECIAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER AND IN ANY EVENT, OUR LIABILITY SHALL IN NO CASE EXCEED THE ORIGINAL PURCHASE PRICE OF THE PRODUCT.

IMPLIED WARRANTIES INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS ARE EXPRESSLY LIMITED IN DURATION TO THE NINETY-DAY WARRANTY PERIOD SPECIFIED ABOVE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. Some states do not allow limitations on how long an implied warranty lasts so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.