TH3-MK3

INSTRUCTION MANUAL
MODEL TH3-Mk3
(388)
"THUNDERBIRD"

Printed in USA

PN 804697

INTRODUCTION

Hy-Gain's Model TH3-Mk3 Thunderbird is the ultimate in a 3 element tri-bander for operation on 10, 15, 20 meters. It delivers at least 8 db gain on all three bands and has maximum front-to-back ratio. The TH3-Mk3 utilizes Hy-Gain's exclusive Beta Match system for a perfect 52 ohm input impedance on all bands giving you an SWR of less than 1.2:1.

This new Thunderbird is equipped with Hy-Gain's all new Hy-Q traps. Threse traps have undergone exhaustive environmental testing at Hallicrafters Reliability Evaluation Laboratory and passed all tests with flying colors. The TH3-Mk3 also uses hardware that is iridite treated to Military Specifications for maximum corrosion resistance. The large diameter boom and all elements are constructed of heavy gauge seamless aluminum tubing. Built for years of trouble-free service this is absolutely the finist 3 element tri-bander on the market today.

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SECTION 1
GENERAL INFORMATION

GENERAL:

The Hy-Gain Model TH3-Mk3 is a 3 element tri-bander 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 5/8" OD mast and can be rotated with a heavy duty TV rotator.

SPECIFICATIONS:

Electrical:

Input Impedance	52 ohms
Gain	8 db min.
Front-to-Back Ratio	20-25 db
Maximum Power Input	1 KW AM
VSWR (at Resonance)	1.2:1
Lightning Protection	DC Ground

Mechanical:

Boom Length	14 ft.
Boom Diameter	2 in.
Longest Element	26 ft.
Maximum Wind Survival	80 mph
Net Weight	36 lbs.
Accepts Mast	1 5/8" OD
Wind Surface Area	3.4 sq. ft.
Wind Load (80 mph)	85 lbs.

SECTION 2
ASSEMBLY AND INSTALLATION

PREPARATION FOR ASSEMBLY:

Before leaping headlong into the assembly of this antenna, take a moment to read this paragraph. The TH3-Mk3 is a fairly large antenna and requires some consideration as to how you are going to get it to the top of your tower. To help you with this problem we have furnished you with three methods and it is best that you consider which you are going to use now, as it will determine how you put the antenna together.

Method 1 - Completely assemble the antenna on the ground then hoist it into position using a block and tackle as shown in Figure No. 1.

Method 2 - The guy wire method (Figure No. 2) is a simple inexpensive way of installing the antenna. Guy the antenna as shown in the illustration and pull it into position. This method requires that you make two boom cradles as shown in the detailed drawing.

Method 3 - The last method is to 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.

All tubing supplied with the TH3-Mk3 is designed to telescope together. Make all measurements as accurate as possible using the dimensions given in this manual. If this is done you will gain optimum results from your antenna.

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 brackets, cast aluminum, the clamp, boom-to-bracket, and the Bracket, casting-to-boom and the two boom sections (2 x 84"). Slip the drilled end of each boom section into the boom-to-mast bracket and

line up the holes. Secure the boom to the bracket using the two 5/16-18 x 2 1/2" screws, nuts and lockwashers provided. DO NOT tighten the screws at this time. The bracket must be loose to enable you to mount the antenna to the mast.

NOTE

The Boom-to-Mast bracket has a hole drilled in it for connecting to the mast. Before the antenna has been completely assembled and attached to the mast, drill a 3/8" hole in the mast corresponding to the hole in the bracket.

ASSEMBLY OF THE REFLECTOR ELEMENT:

LOOSELY assemble a set of element-to-boom brackets on one end of the boom as shown in Figures 5 and 6. Do not forget the 1/4-20 x 1/2" taper point anchor screws with their associated square nuts as shown in Figure 6. Position the bracket 2 1/2" from the tip of the boom to the center of the bracket. This will be the Reflector end of the boom.

NOTE

The following steps will be in a singular form and they will have to be done first for one side and then repeated for the other side.

Select the R1 section of tubing (1 1/4 x 48", Item 4). Slip the R1 section into the bracket assembled on the boom. Tighten the screws to hold the R1 section securely but DO NOT TIGHTEN THE ANCHOR SCREWS (Item 33) AT THIS TIME.

Check to see that the Reflector element will lie in a plane horizontal to the earth 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 1/2" from the tip of the boom then tighten the anchor screws SECURELY.

CAUTION

THE COMPRESSION CLAMPS FURNISHED ARE A UNIVERSAL DEVICE AND MUST BE APPLIED AS BELOW. DO NOT OVERTIGHTEN. CARE SHOULD BE USED WHEN MEASURING THE TUBING LENGTHS. THE COMPRESSION CLAMPS WILL INDENT BOTH TUBES MAKING READJUSTMENT DIFFICULT. THE CLAMP IS PLACED NEAR THE END OF THE TUBE, WITH THE SCREW 180 DEGREES FROM THE SLOT. IT SHOULD BE TIGHTENED UNTIL THE INNER TUBE CANNOT BE TURNED WITHIN THE OUTER TUBE. ONE HALF TO THREE QUARTER FURTHER TURN OF THE COMPRESSION SCREW BEYOND THIS POINT WILL PROVIDE A SECURE ELECTRICAL AND MECHANICAL CONNECTION.
WHEN READJUSTMENT OR DISASSEMBLY BECOMES NECESSARY THE TUBES CAN BE SEPARATED BY REMOVAL OF THE CLAMP. IF THE SCREW HAS BEEN OVERTIGHTENED, IT WILL BE NECESSARY TO FIRST DRILL OUT THE INDENT WITH A SHARP 1/4" DRILL BIT. THE TUBES CAN THEN BE SEPARATED AND THE COMPRESSION CLAMP REINSTALLED.

Assemble a 1 1/4" compression clamp and slip it onto the R1 section. Refer to Figure 7. Select the R2 section (1 1/8 x 48", Item 7). Slip the unswaged (untapered) end of the R2 section into the R1 section and measure dimension B for your mode of transmission (phone or CW) as shown in Figure 5, then tighten the compression clasp LIGHTLY.

NOTE

Determine at this time which mode of transmission you wish to favor, either phone or CW. The illustrations show dimensions for both but you must use only one mode throughout the assembly of this antenna. If you should attempt to use phone dimension on one band and CW dimension on another band the antenna will not give optimum results. The typical VSWR chart shown in Figure 9 will help you decide which mode is best for your particular application.

Assemble a 1" compression clamp and slip it onto the swaged end of the R2 section. Select the 10 meter trap (878749, Item 16) and slip the SHORTED end into the R2 section. Measure dimension C for your mode of transmission as shown in Figure 5. Make certain the drain holes in the traps are facing downward.

CAUTION

THE TRAPS WILL NOT OPERATE PROPERLY UNLESS THE SHORTED END IS FACING TOWARDS THE BOOM. THE SHORTED END CAN BE IDENTIFIED BY THE PART NUMBER MARKING, NEAR THE PLASTIC INSULATOR. THE END ON WHICH THE PART NUMBER IS MARKED IS THE SHORTED END. SEE FIGURE 5.

Assemble two 1" compression clamps and slip them onto the R3 section (1 x 5", Item 13). Now slip the R3 section over the 10 meter trap then slip the SHORTED end of the 15 meter parasitic trap (878694, 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 5, keeping the R3 section approximately equidistant from the two traps. Make certain the drain holes in the trap are facing downward. Now tighten the compression clamps LIGHTLY.

CAUTION

THERE ARE TWO STYLES OF 15 METER TRAPS. PART NO. 878694 IS A PARASITIC TRAP AND IS USED ON THE REFLECTOR AND DIRECTOR. PART NO. 878637 IS FOR USE ON THE DRIVEN ELEMENT.

Assemble a 11/16" compression clamp and slip it over the swaged end of the 15 meter trap. Select the R4 section (7/16 x 28", Item 11) and slip it into the 15 meter trap. Measure dimension E for your mode of transmission as shown in Figure 5, 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 until snug. Do not compress tubing too much or elements cannot be telescoped if you want to change settings later.

ASSEMBLY OF THE DRIVEN ELEMENT:

Select the larger set of element-to-boom brackets (Item 6) and LOOSELY assemble on the boom 72 3/4" from the center of the Reflector element-to-boom bracket to the center of the Driven Element-to-Boom bracket as shown in Figure 5. Do not forget the taper point anchor screws as shown in Figure 6.

Select the DE1 section of tubing (1 1/4 x 48", Item 4) and the element insulators (Item 55) from the parts package. Slip the insulator over the DE1 section then slip the insulated end of DE1 into the bracket assembled on the boom. Tighten the screws to hold the element securely but DO NOT TIGHTEN THE ANCHOR SCREWS (ITEM 33) 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" from the center of one bracket to the center of the other. Now tighten the anchor screws SECURELY.

Assemble a 1 1/4" compression clamp and slip it over the DE1 section. Select the DE2 section (1 1/8 x 38", 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 5. Now tighten the compression clamp LIGHTLY.

Assemble a 1" compression clamp and slip it over the swaged end of the DE2 section. Select the 10 meter trap (878749, 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 5. Make certain drain holes in trap are facing downward. Now tighten the compression clamp LIGHTLY.

Assemble two 1" compression clamps and slip then over the DE3 section (1 x 6", 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 the part number) is slipped into the DE3 section. Measure dimension 1 for your mode of transmission as shown in Figure 5, keeping the DE3 section approximately equidistant from the two traps. Now tighten the compression clamps LIGHTLY.

Assemble a 11/16" compression clamp and slip it 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 5 then tighten the compression clamp LIGHTLY.

Carefully recheck all measurements as shown in Figure 5 and make certain that the shorted ends of the traps are pointed towards the boom and the trap drain holes are facing downward. Now tighten all compression clamps SECURELY.

INSTALLATION OF THE BETA MATCH:

Select the Beta Match tubes (3/4 x 46", Item 10) and the Beta support insulators and clamps as shown in Figure 8. Assemble the Beta Match tubes on the boom as shown in Figures 5 and 8.

Select the Beta Match shorting clamps and the shorting strap and assemble as shown in Figure 8. Notice that the 10-24 x 1 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 56) on the Beta Match tubes using the two No. 10 metal screws (Item 32) and lockwashers (Item 42). Slip the 1 1/4" tubing clamps on the Driven Element near the insulator. LOOSELY attach the pigtails to the tubing clamps using the 1/4-20 x 1 1/2" screws as shown in Figure 8. DO NOT tighten the connection at this time. The coaxial feedline will connect to this point in a later step.

ASSEMBLY OF THE DIRECTOR ELEMENT:

Select the remaining set of element brackets (Item 5) and loosely assemble on the boom 91 3/4" from the center of the Driven Element-to-Boom bracket to the center of the Director Element-to-Boom bracket. Refer to Figures 5 and 6. Do not forget the taper point anchor screws as shown in Figure 6.

Select the D1 section of tubing (1 1/4 x 48", Item 4). Insert the D1 section into the bracket assembled on the boom. Tighten the screws to hold the element securely but DO NOT TIGHTEN THE ANCHOR SCREWS (ITEM 33) AT THIS TIME.

Carefully recheck the 91 3/4" measurement from the

center of the Driven Element bracket to the center of the Director element bracket. Make certain that the Director element lies in the same plane as the other elements then tighten the anchor screws SECURELY.

Assemble a 1 1/4" compression clamp and slip it over the D1 section. Select the D2 section (1 1/8 x 38", 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 5. Now tighten the compression clamp LIGHTLY.

Assemble a 1" compression clamp and slip it over the swaged end of D2. 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 5. Make certain the trap drain holes are facing downward then tighten the compression clamp LIGHTLY.

Assemble two 1" compression clamps and slip them over the D3 section (1 x 6", Item 12). Now 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 part number) is inserted into the D3 section. Measure dimension N for your mode of transmission as shown in Figure 5, keeping D3 approximately equidistant from the two traps. Now tighten the compression clamps LIGHTLY.

Assemble a 11/16" compression clamp and slip it over the swaged end of the 15 meter trap.

Select the D4 section (7/16 x 28", 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 5 and then tighten the compression clamp LIGHTLY.

Carefully recheck all measurements as shown in Figure 5 and make certain that the shorted ends of the traps are pointed towards the boom and the trap drain holes are facing downward. Now tighten all compression clamps SECURELY.

FINAL ASSEMBLY:

Place a 7/16" caplug on each element tip and a 2" caplug on each end of the boom.

Wind yourself an RF choke using RG-8/U coaxial feedline as shown in Figure 8. The choke must consist of 12 turns with a 6" diameter. Strip one end of the choke as shown in Figure 8 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. The choke is necessary to keep unbalanced currents from flowing down the coax and decreasing the efficiency of the antenna.

NOTE

In place of the RF choke it is recommended that you obtain a Hy-Gain balun Model BN-86 available at your local Hy-Gain dealer. The BN-86 will allow the Th-3 Mk3 to operate with an efficiency far greater than is possible with a "home-made" choke.

Your TH3-Mk3 is now ready to be installed on your 1 5/8" OD mast. Use one of the two methods explained in the beginning of this section. When the completed antenna is mounted be certain to pin the bracket to the mast as explained in paragraph 2-2 then tape the coaxial feedline to the mast every 6 inches using waterproof tape.

For lightning protection and to insure noise-free reception, ground the base of your tower using a 1/2" x 8' ground rod driven into the ground as close to the base of the tower as possible. Attach the tower to the ground rod using No. 8 or larger copper or aluminum wire. For a total protection of your equipment from lightning it is recommended that you obtain a Hy-Gain Model LA-1 Lightning Arrestor.

THIS COMPLETES YOUR INSTALLATION OF THE TH3Mk3. HAPPY DXING.

SECTION 3
PARTS LIST

Item	Description	Part No.	Qty.
1	Cast Aluminum Bracket	102734	2
2	Clamp, Boom to Bracket	172732	1
3	Bracket, Casting to Boom	172735	1
4	R1, DE1, D1, 1 1/4 x 48"	190900	6
5	Element-to-Boom Bracket #13	165919	4
6	Driven Element-to-Boom Bracket #14	165920	2
7	R2, 1 1/8 x 48" Swg 7/8"	190300	2
8	Boom Section, 2 x 84"	178411	2
9	DE2, D2, 1 1/8 x 38" Swg 7/8"	190307	4
10	Beta Rods, 3/4 x 46"	171142	2
11	D4, DE4, R4, 7/16 x 28"	178558	6
12	D3, DE3, 1 x 6"	190606	4
13	R3, 1 x 5"	190607	2
14	Trap, 15 meter Driven Element	878637	2
15	Trap, 15 meter parasitic	878694	4
16	Trap, 10 meter	878749	6
17	Parts Pack A	873876	1
18	Parts Pack B	872090	1
19	Parts Pack C	872089	1
	Parts Pack A (873876)		
20	Beta Match Shorting Sleeves	171131	1
21	Screw, 10-24 x 1" Flat Head	501093	4
22	Screw, 5/16-18 x 3 1/2 HH	501541	3
23	Screw, 5/16-18 x 5"	501543	4
24	Screw, 1/4-20 x 3/4"	506325	28
25	Screw, 1/4-20 x 3/8"	541441	24
26	Screw, 1/4-20 x 1 1/2"	506335	3
27	Screw, 10-24 x 1 3/4"	506440	4
28	Screw, 10-24 x 1 1/2"	506445	1
29	Screw, 10-24 x 1/2"	506485	8

Item	Description	Part No.	Qty.
30	Screw, 5/16-18 x 2 [illegible] "½"	506741	2
31	Screw, 1/4-20 x 2 3/4"	509543	1
32	Screw, 10-24 x 1/2" Type A	516470	2
33	Screw, 1/4-20 x 1/2" Taper Point	548684	6
34	Nut, 10-24 Square	555362	6
35	Nut, 5/16-18" Hex	556945	9
36	Nut, 1/4-20	556960	33
37	Nut, 10-24	556970	9
38	Nut, 1/4-20 Square	558685	30
39	Lockwasher, 5/16" Split	566664	[illegible]6
40	Lockwasher, 5/16" Int.	567075	[illegible]3
41	Lockwasher, 1/4" Int.	567110	33
42	Lockwasher #10	567125	16
	Parts Pack B (872090)		
43	Clamp, Compression, 11/16"	165763	6
44	Clamp, Compression, 1 1/4"	168680	6
45	Clamp, Compression, 1"	168682	18
46	Clamp, Tubing, 1 1/4"	168695	2
47	Clamp, Beta Shorting, 2" ID	171077	1
48	Clamp, Beta Shorting	171162	2
49	Clamp, Beta Support	177888	2
	Parts Pack C (872089)		
50	Caplug 2"	455625	2
51	Caplug, 7/16"	455644	6
52	Insulator, Beta Tube	465595	2
53	Insulator, Beta Support	465600	2
54	Insulator, DE to Boom	465833	2
55	Pigtail Assembly	878561	2

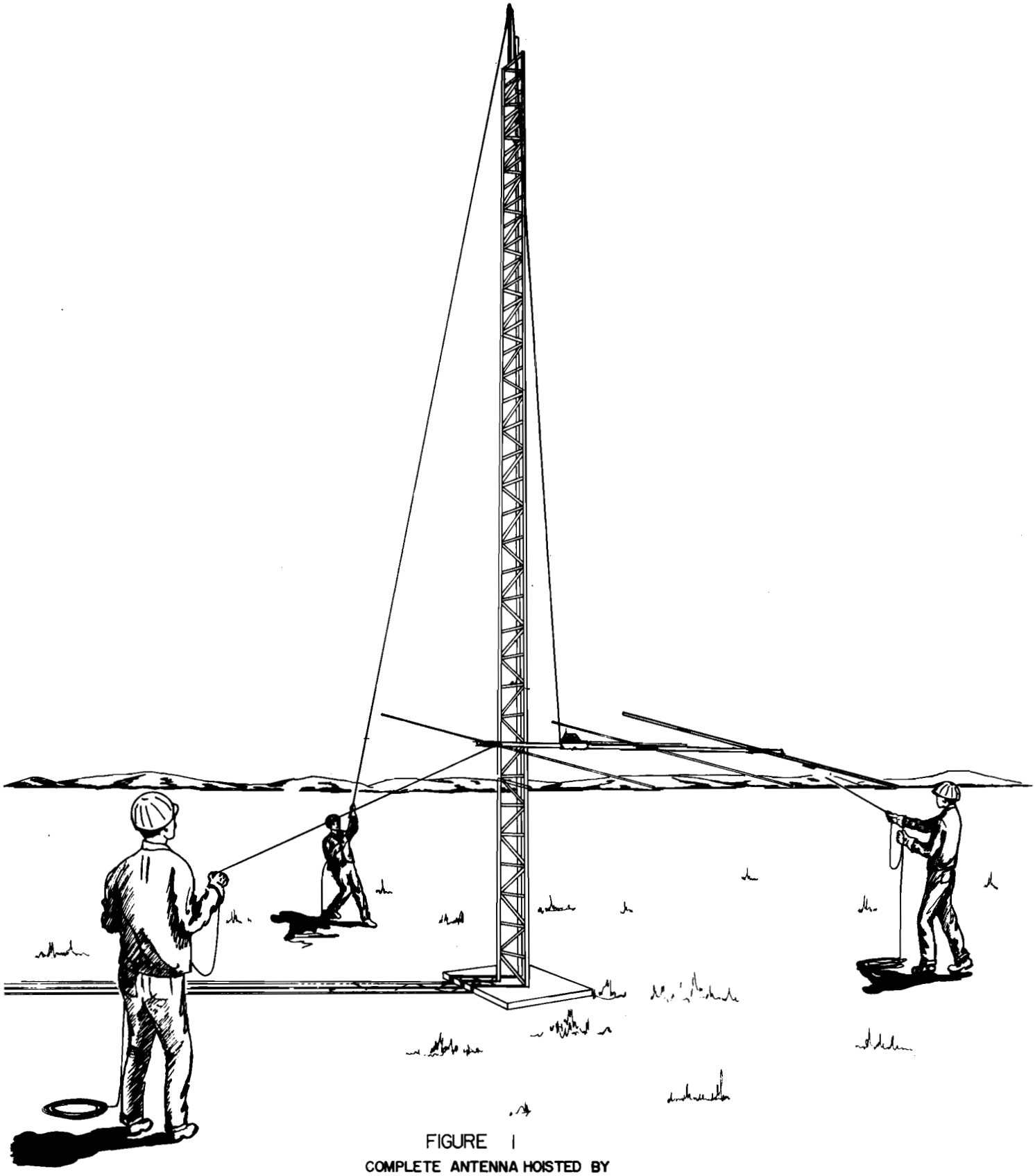


FIGURE 1

COMPLETE ANTENNA HOISTED BY CABLE OR ROPE

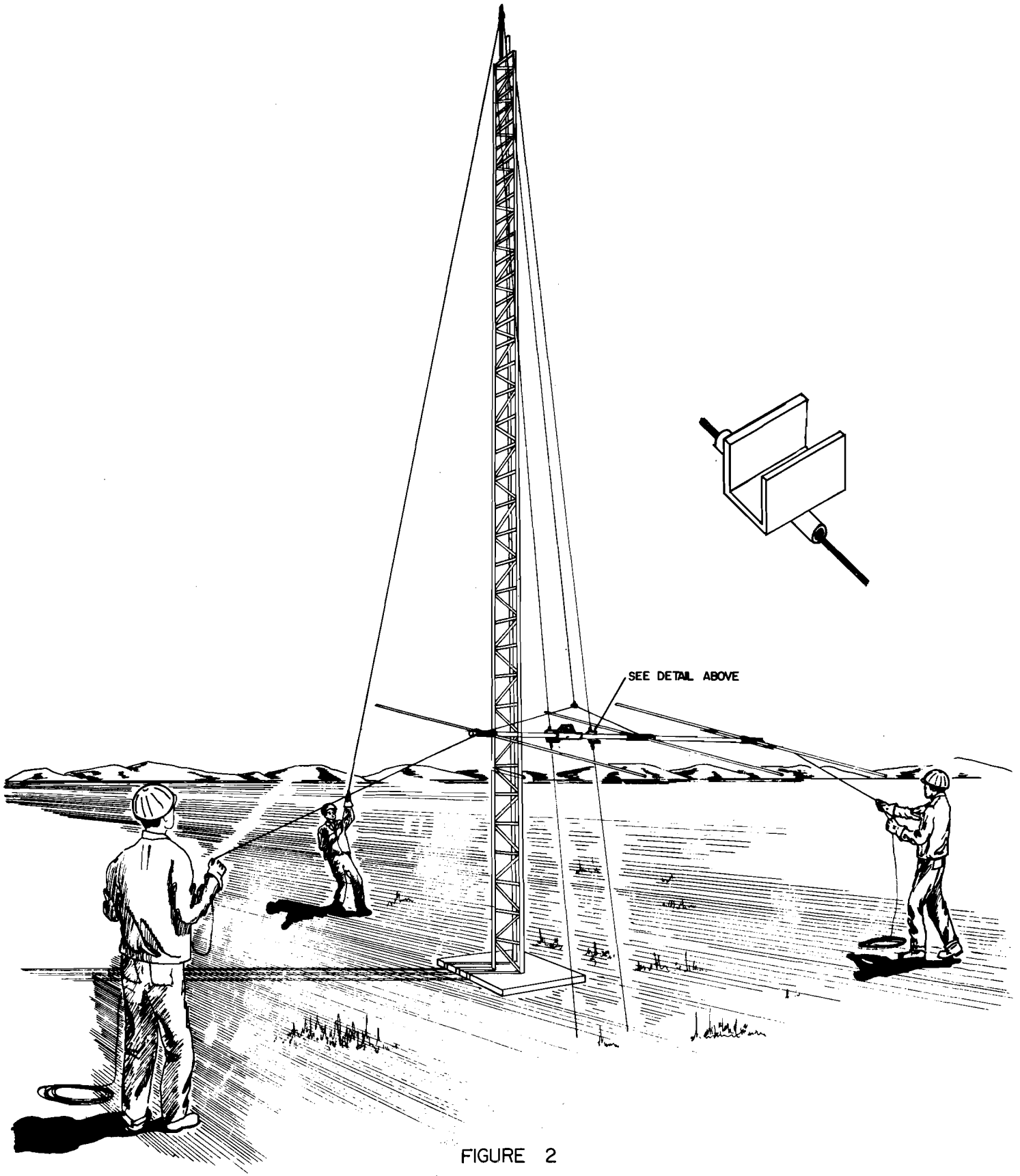


FIGURE 2

COMPLETE ANTENNA USING
GUYING FOR ERECTION

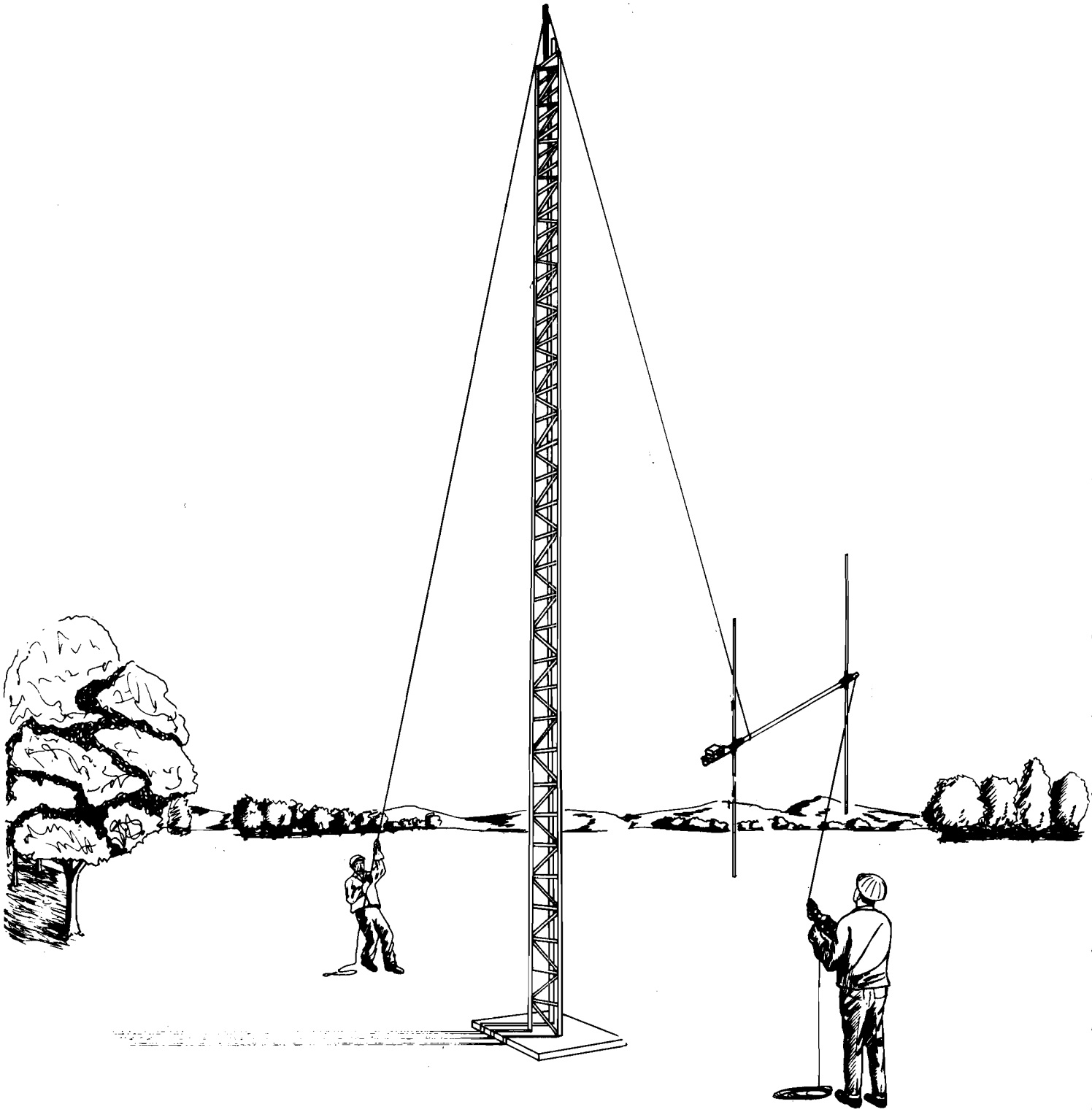


FIGURE 3

ANTENNA SECTION BEING
ERECTED ON TOWER

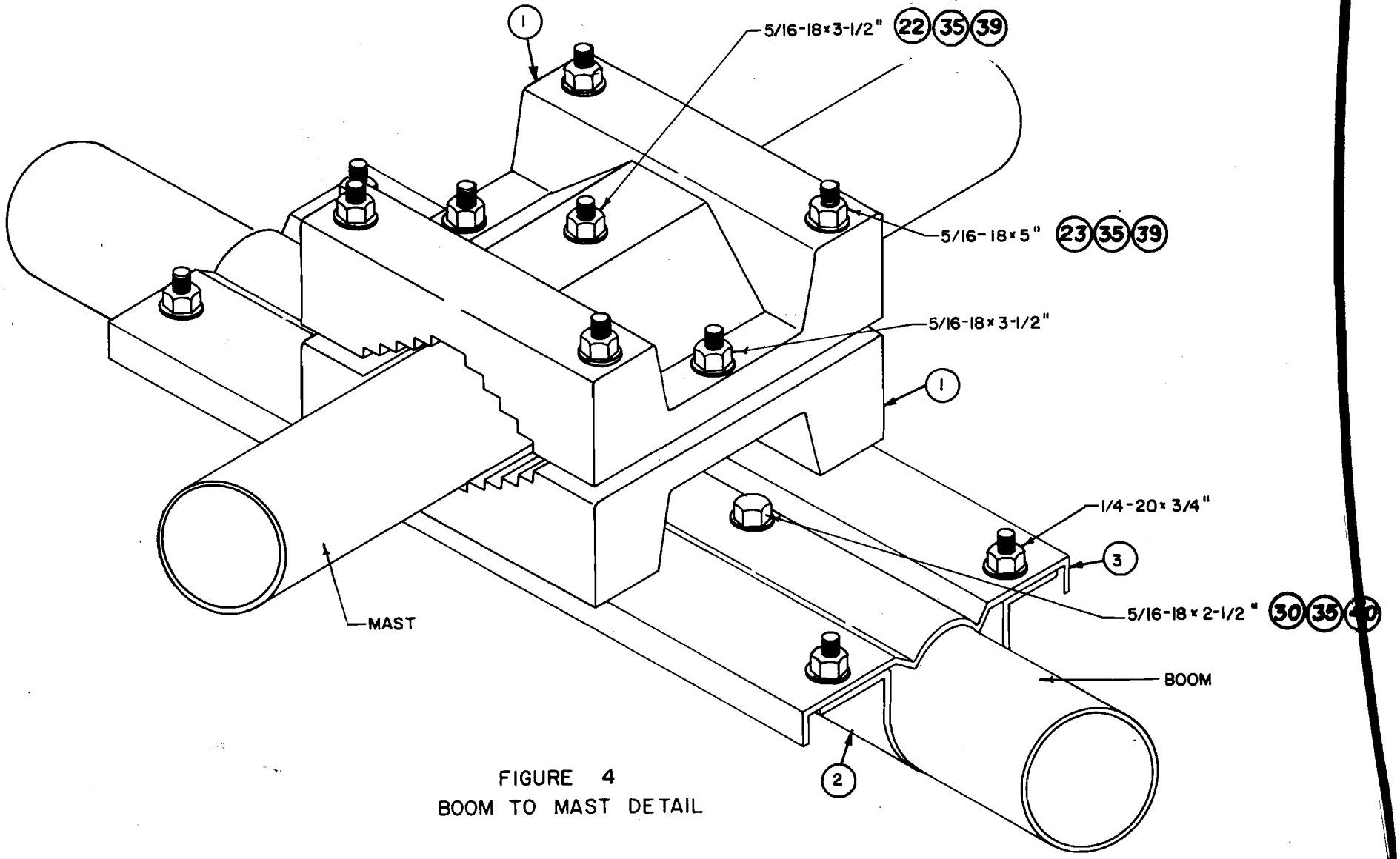
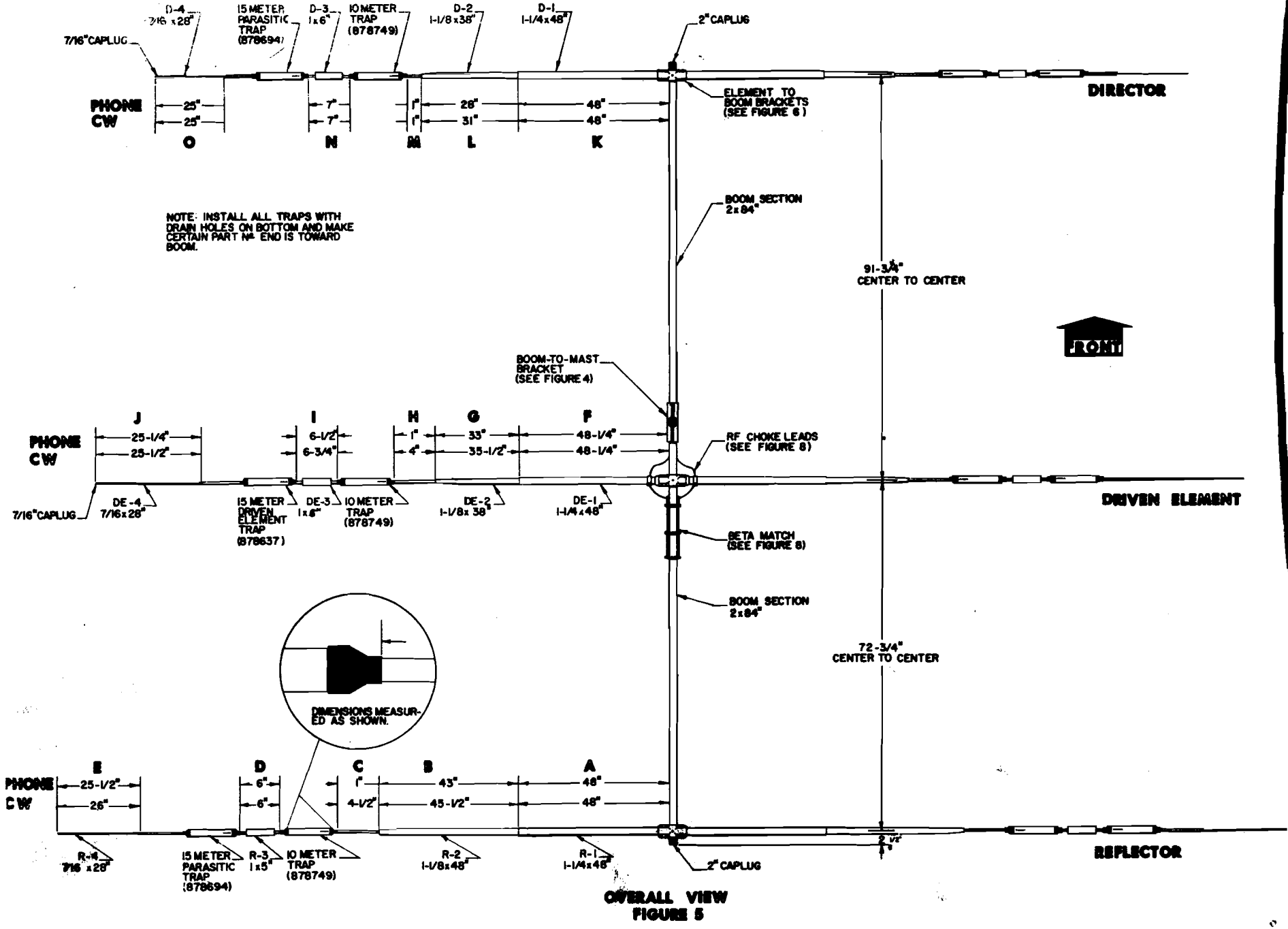
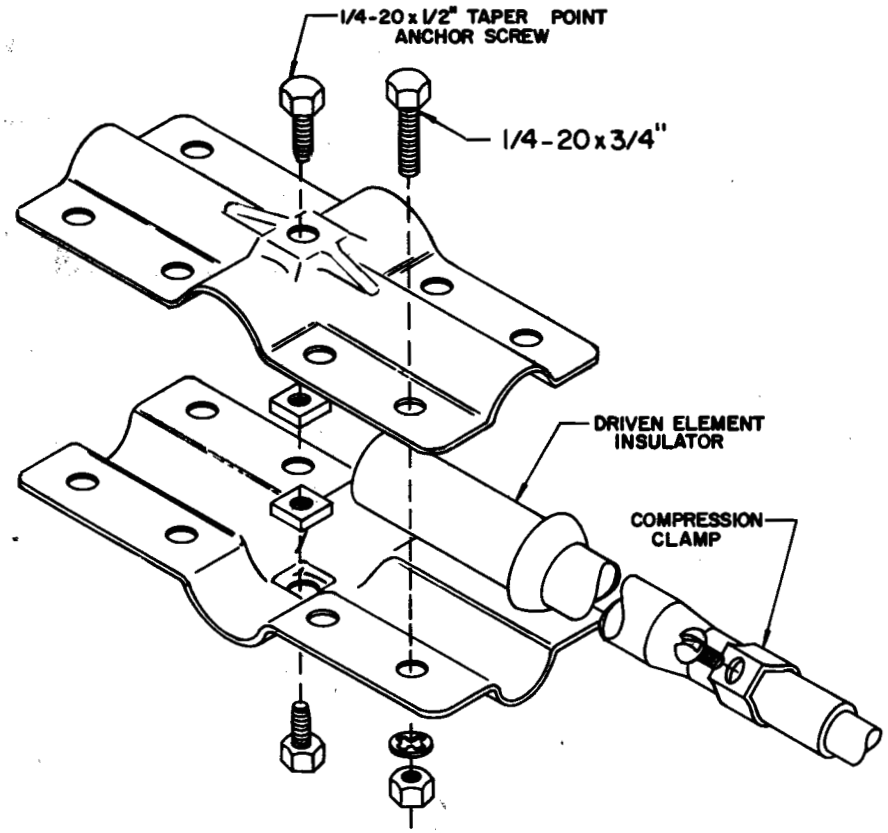


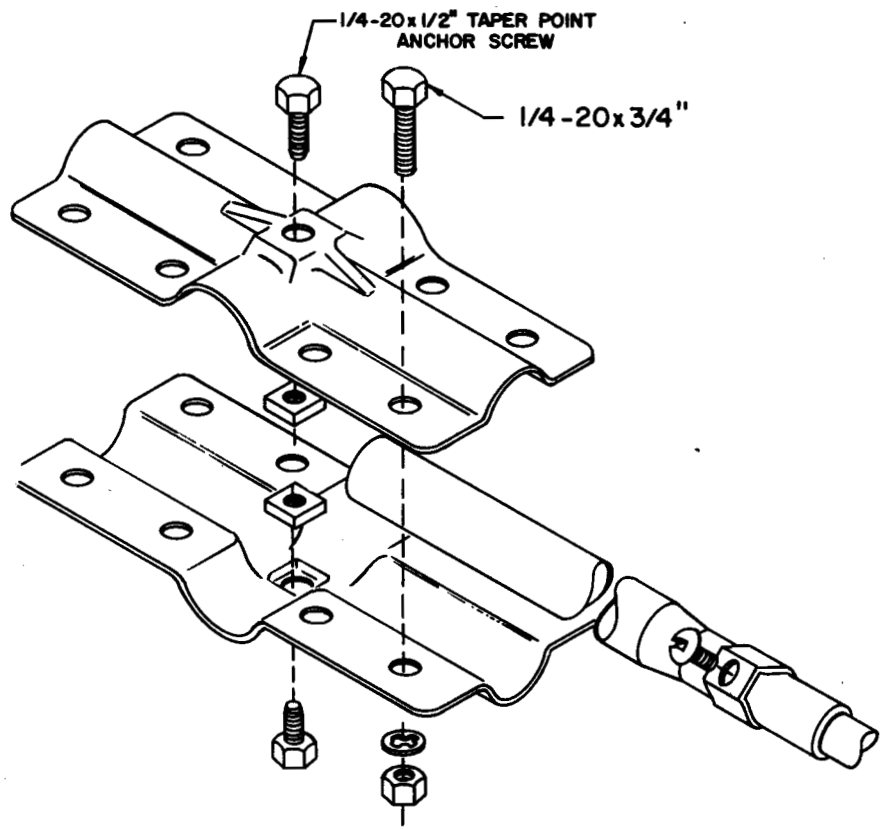
FIGURE 4
BOOM TO MAST DETAIL



OVERALL VIEW
FIGURE 5

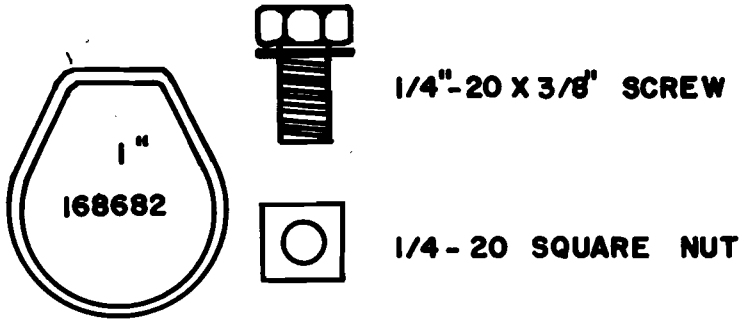


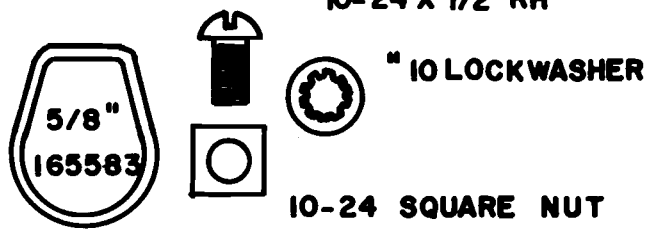
DRIVEN ELEMENT DETAIL

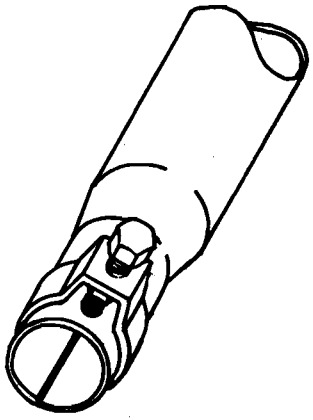


REFLECTOR-DIRECTOR DETAIL

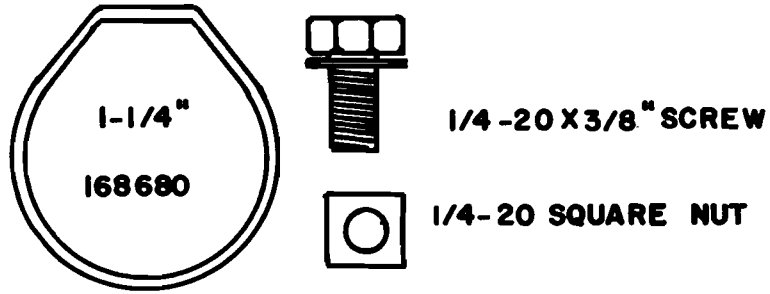
ELEMENT TO BOOM
BRACKET
FIGURE 6







PLACE COMPRESSION CLAMP ON THE END OF THE TUBING WITH THE SCREW SCREW HEAD 180° FROM THE SLOT IN THE TUBING.



COMPRESION CLAMPS

FIGURE 7

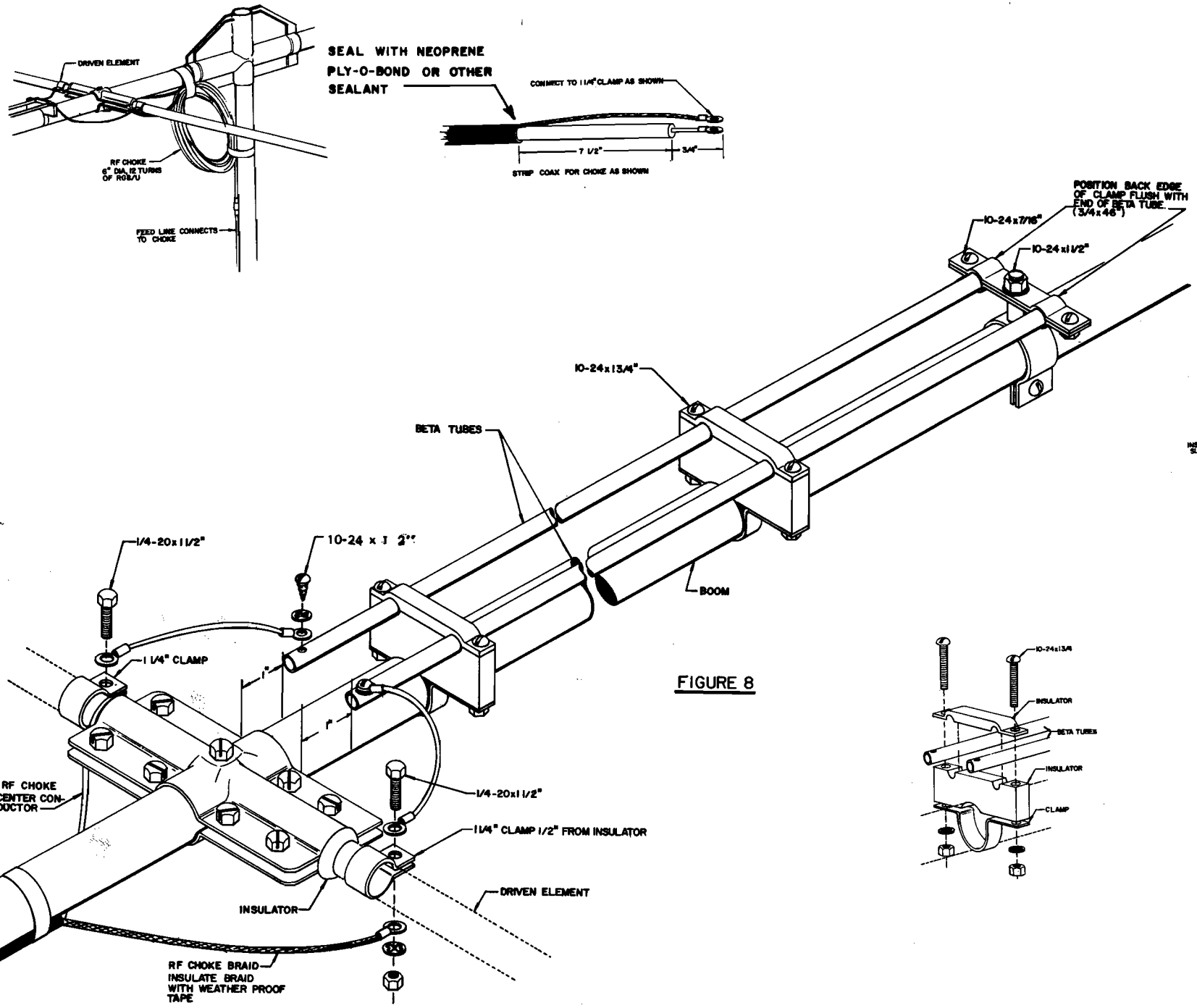
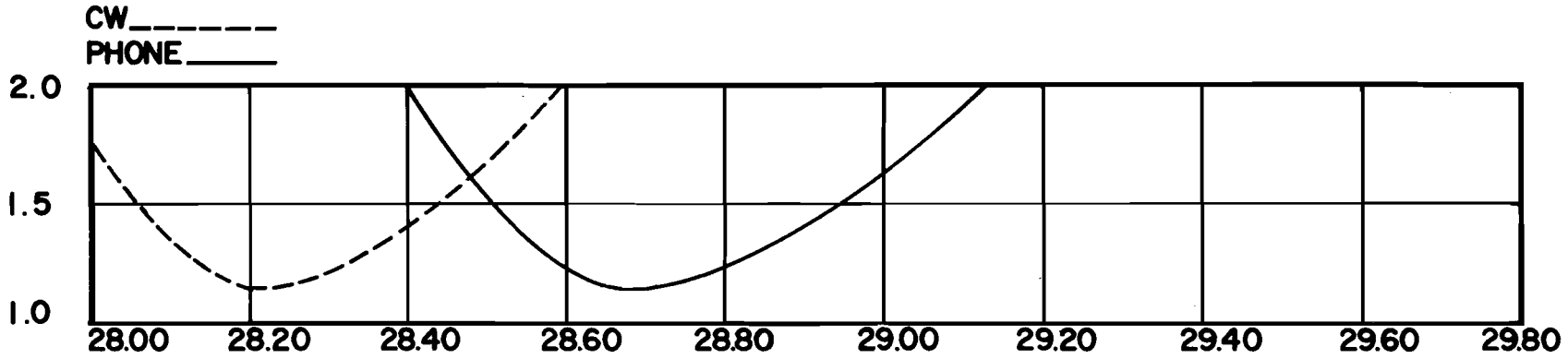
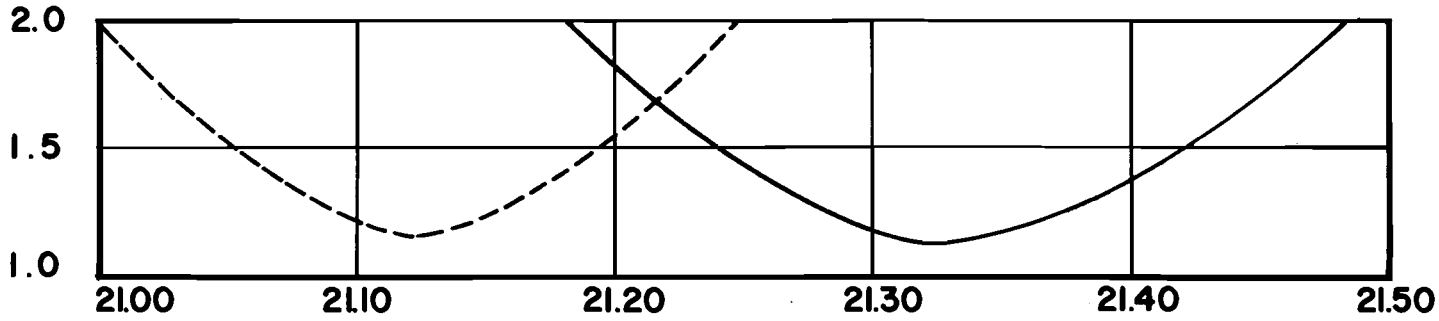

DRIVEN ELEMENT
RF CHOKE 6" DIA, 12 TURNS OF RG8/U
FEED LINE CONNECTS TO CHOKE
SEAL WITH NEOPRENE PLY-O-BOND OR OTHER SEALANT
CONNECT TO 1 1/4" CLAMP AS SHOWN
7 1/2"
3/4"
STRIP COAX FOR CHOKE AS SHOWN
POSITION BACK EDGE OF CLAMP FLUSH WITH END OF BETA TUBE. (3/4x48")
10-24 x 7/16"
10-24 x 1 1/2"
10-24 x 13/4"
BETA TUBES
BOOM
1/4-20 x 1 1/2"
10-24 x 1 1/2"
1 1/4" CLAMP
RF CHOKE CENTER CONDUCTOR
1/4-20 x 1 1/2"
1 1/4" CLAMP 1/2" FROM INSULATOR
INSULATOR
DRIVEN ELEMENT
RF CHOKE BRAID
INSULATE BRAID WITH WEATHER PROOF TAPE
10-24 x 1 1/2"
BETA TUBES CLAMPS
INSERT SLEEVE
10-24 x 1 1/2
BOOM STRAP
1/4-20 x 1 1/2
10-24 x 1 3/4
INSULATOR
BETA TUBES
INSULATOR
CLAMP

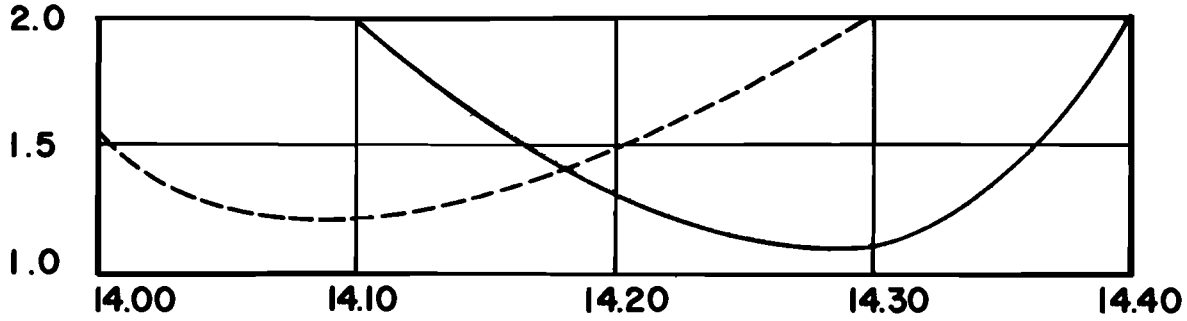
FIGURE 8



10 METER



15 METER



20 METER

TH3 Mk2 VSWR CHARTS
FIGURE 9