

INSTRUCTION MANUAL

MODEL SDB-10

**HY-GAIN ELECTRONICS CORPORATION
N E Hwy 6 at Stevens Creek
Lincoln, Nebraska 68501
Telephone 434-6331 Area Code 402**

Printed in USA

**Series Date 5/20/68
PN 805589**

TABLE OF CONTENTS

Section

Page

1

General Information

General	1
Description and Purpose	1
Leading Particulars	1
Capabilities and Limitations	1
Equipment Supplied	1

2

Installation

General	2
Installation	2
Cross Support Boom Assembly	2
Antenna Boom Assembly	2
Reflector Assembly	3
Driven Element and Beta Match Assembly	3
Director Assembly	3
Phasing Harness Installation	4
Antenna Mounting	4
Lightning Protection	5

3

Operating Instructions

Not-Applicable

4

Principles of Operation

General	5
---------	---

5

Maintenance

General	5
Periodic Maintenance	5
VSWR	5

6

Parts List

General	6
Explanation	6

LIST OF ILLUSTRATIONS

	<i>Figure</i>
Overall View	1
Cross Support Assembly	2
Antenna Bay Assembly	3
Element-To-Boom Brackets	4
Phasing Line Installation	5
Compression Clamps	6
VSWR Chart	7
Roof-Top Tower Installation	8
Roof-Top Mast Installation	9

WARRANTY

Hy-Gain Electronics Corporation guarantees for a period of 90 days from date of purchase, each new product manufactured to be free from defects in workmanship and/or materials. Any part or accessory shall be replaced free of charge providing the defect is in our opinion due to faulty workmanship and/or material and not caused by tampering, abuse, normal wear or poor installation. No further guarantee or warranty is implied and in accepting delivery the purchaser assumes full responsibility for proper installation and service arrangements.

This warranty is valid only if the Owner's Warranty Card has been filled out by the purchaser and mailed to Hy-Gain at time of original purchase.

Hy-Gain Electronics Corporation reserves the right to make changes in current production models without being obligated to incorporate such changes in earlier production models

SECTION 1

GENERAL INFORMATION

General This manual contains installation instructions, logistical information, maintenance procedures, and principles of operation for the Hy-Gain Model SDB-10 antenna.

Description and Purpose The Hy-Gain Model SDB-10 is a twin driven antenna system consisting of two 5 element beams stacked and fed with a phasing harness to obtain maximum gain and directivity.

Maximum mechanical and electrical reliability is obtained through the use of seamless taper-swaged aluminum elements. A triangular tension cross boom support is employed for additional strength and reliability. The elements are attached to the booms with iridite treated hardware and bright dip galvanized brackets.

Due to superb designing and the use of high quality materials, one setting will cover the entire CB frequency range with minimum VSWR. If the antenna is assembled properly and care is taken when adjusting elements lengths, optimum results from the antenna system will be realized.

The input impedance to the antenna is 52 ohms. For minimum transmission line losses and long cable runs of over 50', it is strongly recommended that RG-8/U coaxial cable be used as a feedline. The desired performance designed into the Model SDB-10 will thus be obtained. The phasing harnesses provide a perfectly balanced input. Since coaxial cable is unbalanced, either a Hy-Gain CB Balun, Model BN-27A, or a substitute RF choke, constructed from the feedline as shown in Figures 1 and 5, must be used. The balun will produce much greater efficiency than is possible with a "home-made" choke. The BN-27A is available at the local Hy-Gain dealer.

NOTE

FOR MAXIMUM POWER TRANSFER, FEEDLINE LENGTHS MUST BE ONE OF THE FOLLOWING:

RG-58/U or
RG-68/U 36'-48'-60'-72'-84'-96'-108'

ADD ONE FOOT TO EACH DIMENSION IF EITHER RG-58/AU OR RG-8/AU ARE USED.

THESE DIMENSIONS ARE MEASURED EITHER FROM FEEDPOINT INSULATOR INCLUDING LENGTH OF RF CHOKE OR FROM INPUT OF BN-27A DEPENDING UPON WHICH IS USED.

Signals transmitted or received with the MAXIMUM efficiency possible can be expected because the Duo-Beam is the most powerful antenna ever developed for Citizens Band radio communications. This superior performance is obtained in two ways: through increased directivity and increased gain.

Leading Particulars Table 1-1 lists logistical data for the Hy-Gain Model SDB-10.

Physical Characteristics of Antenna

Boom Length.....	20'
Cross Boom Length.....	24'
Longest Element.....	18' 9 3/4"
Boom Diameters (Tapers).....	2"
Cross Boom Diameter.....	2"
Element Diameter (Tapers).....	7/8" to 7/16"
Turning Radius.....	15' 6"
Mast Bracket Accommodates.....	1 1/4" to 2 1/2"
Maximum Wind Survival.....	100 MPH
Net Weight.....	63 lbs.
Surface Area.....	9.01 sq. ft.
Wind Load.....	.80 MPH 231.0 100 MPH 361.0

TABLE 1-1
Leading Particulars

Capabilities and Limitations Table 1-2 lists the capabilities and limitations of the Hy-Gain Model SDB-10

Gain.....	14 db.
Power Multiplication Factor.....	25
Front-to-Back Ratio.....	26 db.
SWR at Resonance.....	Less than 1.4:1
Coaxial Feedline.....	52 ohm

TABLE 1-2
Capabilities and Limitations

Equipment Supplied The Model SDB-10 is supplied complete and corresponds to the enclosed drawings. Refer to Section 6, PARTS LIST, for a complete breakdown of parts.

SECTION 2

INSTALLATION

General This section contains information necessary for assembly and installation of the Model SDB-10.

CAUTION

PROPER RESULTS CAN BE OBTAINED ONLY IF THE STEP BY STEP PROCEDURES OUTLINED IN THIS CHAPTER ARE FOLLOWED. SPECIAL NOTES AND PRECAUTIONARY MEASURES INDICATED MUST BE ADHERED TO.

Installation The close proximity of trees, power lines, or any metallic objects can seriously deteriorate the performance of any antenna. For best results, it is recommended that the antenna be mounted at least 20' away from any existing structures. The recommended installation is shown in Figure 8. If the tower requires guy wires, strain insulators must be used at 3' intervals. An alternate mounting method is shown in Figure 9. The mast material used must be of 1 5/8" heavy walled material. Plumbers pipe, 1 1/4" I.D. x 1 5/8" O.D. is the recommended mast material. The unique heavy duty mounting bracket allows you to mount the antenna at any point on the mast with any amount of mast extending up past the bracket. Mount the antenna a maximum of 1 foot above the rotator and guy the mast leaving a minimum of 2' clearance between the guys and the lower tip of the antenna elements. Use three guy wires equally spaced and broken up every 3' with strain insulators.

Cross Support Boom Assembly

Select the cast aluminum brackets, casting to boom bracket and bracket to boom clamp. Attach the flat-head screw to the boom to bracket clamp. This screw will be used for attaching the feed point insulator in a later step.

Assemble the boom to mast bracket loosely. Refer to Figure 2.

Select the two cross support center sections and slip the unswaged ends into the assembled boom-to-mast bracket. Do not tighten the screws at this time.

Select the two cross supports and assemblies and install as shown in Figure 2. Fasten securely.

Install a cross support cable clamp and strap on each end of the cross support boom approximately 7' 6" from the center of the boom-to-mast bracket. Refer to Figure 2.

Select the 20' cable and cut it into two 10' lengths. Install the cable on the cross support using a thimble and two cable clamps as shown in Figure 2. Install a turnbuckle on the free end of each cable. Adjust the cable to obtain a dimension of approximately 8' from the cross support cable clamp to the free end of the fully extended turnbuckle. Tighten the cable clamps securely and clip off all excess cable.

Antenna Boom Assembly

NOTE

FOR CLARITY, ASSEMBLY INSTRUCTIONS FOR ONE ANTENNA BAY WILL BE DISCUSSED. ASSEMBLE BOTH BAYS IN THE SAME MANNER. AFTER THE TWO ANTENNA BAYS ARE ASSEMBLED THEY WILL BE MOUNTED ON THE CROSS SUPPORT BOOM AND THE PHASING HARNESS INSTALLED THIS KEEPS THE ANTENNA IN THREE MAJOR GROUPS: THE CROSS SUPPORT BOOM AND THE TWO ANTENNA BAYS THIS ALLOWS ASSEMBLY OF THE ANTENNA AT SOME CONVENIENT LOCATION THE ANTENNA CAN THEN BE TAKEN TO THE INSTALLATION SITE AND COMPLETELY ASSEMBLED PRIOR TO HOISTING INTO POSITION.

Select two boom-to-mast brackets and loosely assemble. Refer to Figure 3.

Select the center antenna boom sections and insert the drilled end of each into the previously assembled boom-to-mast bracket. Refer to Figure 2. Do not tighten screws at this time.

NOTE

REFER TO FIGURE 3 FOR PLACEMENT OF REFLECTOR, DRIVEN ELEMENT AND DIRECTORS.

Attach the end boom sections to the boom sections attached to the boom to mast brackets as shown in Figure 3. Place a 2" caplug on each end of the boom.

Reflector Assembly

Loosely assemble a set of number 4 element-to-boom brackets on the Reflector end (short end) of the antenna boom. Refer to Figures 3 and 4.

Insert the unswaged end of the Reflector first section into the element-to-boom bracket. Tighten the screws to hold the element in place but DO NOT tighten the taper point anchor screws at this time.

Adjust the element until the bracket is 6" from the end of boom. Insure the element will lie in a vertical plane when the antenna bay is installed on the cross support boom and tighten the taper point anchor screws securely.

Place a 3/4" compression clamp over the swaged portion of the 7/8" tubing.

NOTE

FIGURE 6 SHOWS THE COMPRESSION CLAMPS AND ASSOCIATED HARDWARE.

Select the Reflector second section and insert the unswaged end into the 7/8" tube. Adjust the 5/8" tube until a dimension of 24" (measured from the edge of the 7/8" tubing to the end of the 5/8" tubing) is reached. Refer to Figure 3. Tighten the compression clamp securely.

Slip a 1/2" compression clamp over the 5/8" tubing.

Select the Reflector end section and insert into the 5/8" tubing. Adjust the 7/16" tube until a dimension of 55 13/16" (measured from the edge of the 7/8" tubing to the end of 7/16" tubing) is reached. Tighten the compression clamp securely.

NOTE

The compression clamps used in this antenna are a universal device and are used in many varied applications, depending upon the application, the screw head may or may not contact the lockwasher or clamp body. Do not over tighten the clamps in an attempt to contact the clamp body with the screw head. To do so may result in clamp failure or tube failure caused by puncture.

Place a 7/16" caplug without hole on the element that will point skyward when the antenna is in position and a 7/16" caplug with hole on the other element end.

Driven Element and Beta Match Assembly

Loosely assemble a set of number 13 element-to-boom brackets on the boom 69 1/8" from the Reflector bracket. Refer to Figures 3 and 4.

Select the Driven Element first sections and a set of insulators. Slip the insulator over the unswaged end of the tubing and insert the insulated end of the tube into the bracket. Tighten the screws holding the element securely but DO NOT tighten the taper point anchor screws at this time.

Carefully recheck the 69 1/8" measurement from the center of the Reflector bracket to the center of the Driven Element bracket and make certain the Driven Element lies in the same plane as the Reflector. Tighten the taper point screws securely.

Slip a 3/4" compression clamp over the 7/8" tube.

Select the Driven Element second section and insert the unswaged end into the 7/8" tube. Adjust the 5/8" tube until a dimension of 24" (measured from edge of 7/8" tubing to end of 5/8" tubing) is reached. Tighten the compression clamp securely.

Slip a 1/2" compression clamp over the 5/8" tubing,

Select the Driven Element end section and insert into the 5/8" tube. Adjust the 7/16" tube until a dimension of 104 3/8" from center of boom to tip is reached (as shown in Figure 3).

Assemble the Beta Match as shown in Figure 3. Adjust the Beta Clamp to measure 9 1/4" from the center of the Beta Clamp. Tighten all screws securely.

Director Assembly

Loosely assemble a set of number 4 element-to-boom brackets on the boom 57 3/4" from the Driven Element brackets. Refer to Figures 3 and 4.

Select the Driven Element #1 first section and insert the tubing into the bracket. Tighten the screws holding the element securely but DO NOT tighten the taper point anchor screws.

Carefully recheck the 57 3/4" measurement from the center of the Driven Element bracket to the center of Director #1 bracket and make certain Director #1 lies in the same plane as the Driven Element. Tighten the taper point anchor screws securely.

Slip a 3/4" compression clamp over the 7/8" tube.

Select the Director #1 second section and insert the unswaged end into the 7/8" tube. Adjust the 5/8" tube until a dimension of 24" (measured from edge of 7/8" tubing to end of 5/8" tubing) is reached. Tighten the compression clamp securely.

Slip a 1/2" compression clamp over the 5/8" tubing.

Select the Director #1 end section and insert into the 5/8" tubing. Adjust the 7/16" tube until a dimension of 49 5/16 (measured from edge of 5/8" tubing to end of 7/16" tubing) is reached. Tighten the compression clamp securely.

Loosely assemble a set of number 4 element-to-boom brackets on the boom 54" from the Director #1 brackets. Refer to Figures 3 and 4.

Assemble the element sections in the same manner as Director #1 but use the following dimensions.

Director #2 second section - 24"
Director #2 end section - 52 3/16"

Loosely assemble a set of number 4 element-to-boom brackets on the boom 59 1/4" from the Director #2 brackets. Refer to Figures 3 and 4.

Assemble the element sections in the same manner as Director #1 but use the following dimensions.

Director #3 second section - 24"
Director #3 end section - 53 11/16"

Phasing Harness Installation

Support the antenna cross support boom approximately 10' off the ground using a step ladder or some similar support.

CAUTION

DO NOT ALLOW THE ANTENNA TO REST ON THE ELEMENTS. THE ELEMENTS ARE NOT DESIGNED TO SUPPORT THE WEIGHT OF THE ANTENNA.

Install an antenna bay on each end of cross support boom. Make certain each antenna is in the same plane.

Install a 1 5/8" caplug on each end of the cross support boom.

Install the three hole phasing line insulator on the center boom-to-mast bracket as shown in Figure 5.

Install the phasing harness assemblies between the center boom-to-mast bracket and the Driven Element as shown in Figure 5. Connect the solder lug with the larger hole to the Driven Element bracket using the taper point anchor screw. Connect the other end of the phasing harness to the feedpoint insulator.

NOTE

INSURE THE TOP DRIVEN ELEMENT IS CONNECTED TO THE TOP PHASING LINE CENTER CONDUCTOR. ATTACH THE OTHER END OF THE TOP PHASING LINE CENTER CONDUCTOR TO THE UPPER HOLE IN THE

FEEDPOINT INSULATOR. ATTACH THE CENTER CONDUCTOR OF THE BOTTOM PHASING LINE TO THE BOTTOM DRIVEN ELEMENT AND THE LOWER HOLE IN THE FEEDPOINT INSULATOR. INSTALL BOTH PHASING LINES IN THIS MANNER. REFER TO FIGURE 5.

Tape the phasing lines to the boom with weather proof tape, leaving enough slack to compensate for antenna movement.

Mount the CB Balun, BN-27A, 1 1/2" below the bottom terminal on feedpoint insulator. Attach one terminal to the top terminal of feedpoint insulator and the other terminal to the bottom terminal of the feedpoint insulator. Refer to Figure in Balun instruction sheet at the front of the manual.

If an RF choke is used proceed as follows:

Wind an RF choke and attach it to the feedpoint insulator as shown in Figure 5. Attach the center conductor of the RF choke to the top screw of the feedpoint insulator. Attach the braid of the RF choke to the bottom screw of the feedpoint insulator. The other end of the RF choke attaches to the transceiver.

Securely tape all exposed portions of the coaxial braid to prevent it from shorting out on the antenna. Weather proof all coaxial connections with neoprene or some similar substance.

Antenna Mounting

Figures 8 and 9 show typical methods of installation. If the installation requires guy wires, break them up every 3' with strain insulators. Leave enough distance between the guy wires and the elements to allow rotation.

Mount the antenna on a 1 5/8" mast. Allow approximately 3' of the mast to extend above the boom-to-mast bracket.

Install the 1 5/8" I.D. boom support clamps 3' above the boom-to-mast bracket.

With the turnbuckles fully extended, attach the turnbuckles to the boom support clamp using the links provided as shown in Figure 2.

Adjust the turnbuckles as necessary to support the antenna with no droop. If necessary, the boom support clamps can be moved to insure proper support. Tighten all screws securely.

Drill a hole in the mast to correspond with the remaining hole in the boom-to-mast bracket. Secure the bracket to the mast using a 5/16-18 x 3 1/2" screw.

Securely tape the RF choke if used, to the boom-to-mast bracket and to the mast. Leave enough slack in the feedline to allow 360 degrees of antenna rotation.

Lightning Protection

To insure proper lightning protection and noise free operation, the antenna supporting structure must be properly grounded. Drive a 1/2" x 8' copper clad steel ground rod into the ground as close as possible to the antenna supporting structure.

Attach the ground rod to the supporting structure with

#8 or larger copper or aluminum wire.

For complete lightning protection, it is recommended that the user obtain a Hy-Gain Lightning Arrestor, Model LA-1. The LA-1 is available at the local Hy-Gain dealer.

SECTION 3

OPERATING INSTRUCTIONS

NOT-APPLICABLE

SECTION 4

PRINCIPLES OF OPERATION

The Model SDB-10 consists of two antenna bays, each with a Reflector, Driven Element, and three Directors. The antenna bays are optimum spaced and fed with a preassembled phasing harness. This enables the sig-

nals from the antennas to reinforce each other. The result is a tremendous gain in effective radiated power and maximum front-to-back ratio.

SECTION 5

MAINTENANCE

General Very little maintenance and upkeep is required with the Model SDB-10. However, periodic inspection and maintenance as required will lengthen the "life" of the Model SDB-10 as well as improve its frequency.

Periodic Maintenance Immediately following any severe weather inspect the antenna for any adverse effects. Pay particular attention to all mechanical and electrical connections. Inspect the antenna at least quarterly and perform the following maintenance if necessary.

Check all nuts and bolts for required tightness.
Clean the insulators on the Driven Elements.
Check the coax connectors for tightness and proper weather-proofing.

Check the finish of the antenna brackets and apply paint if necessary.

Inspect each solder lug on the phasing harnesses for proper electrical connections.

VSWR Any noticeable change in VSWR can be attributed to loose connections, corroded connections, damaged element, Beta match or Balun, or coax breakdown and is a requisite for inspection of the system.

SECTION 6

PARTS LIST

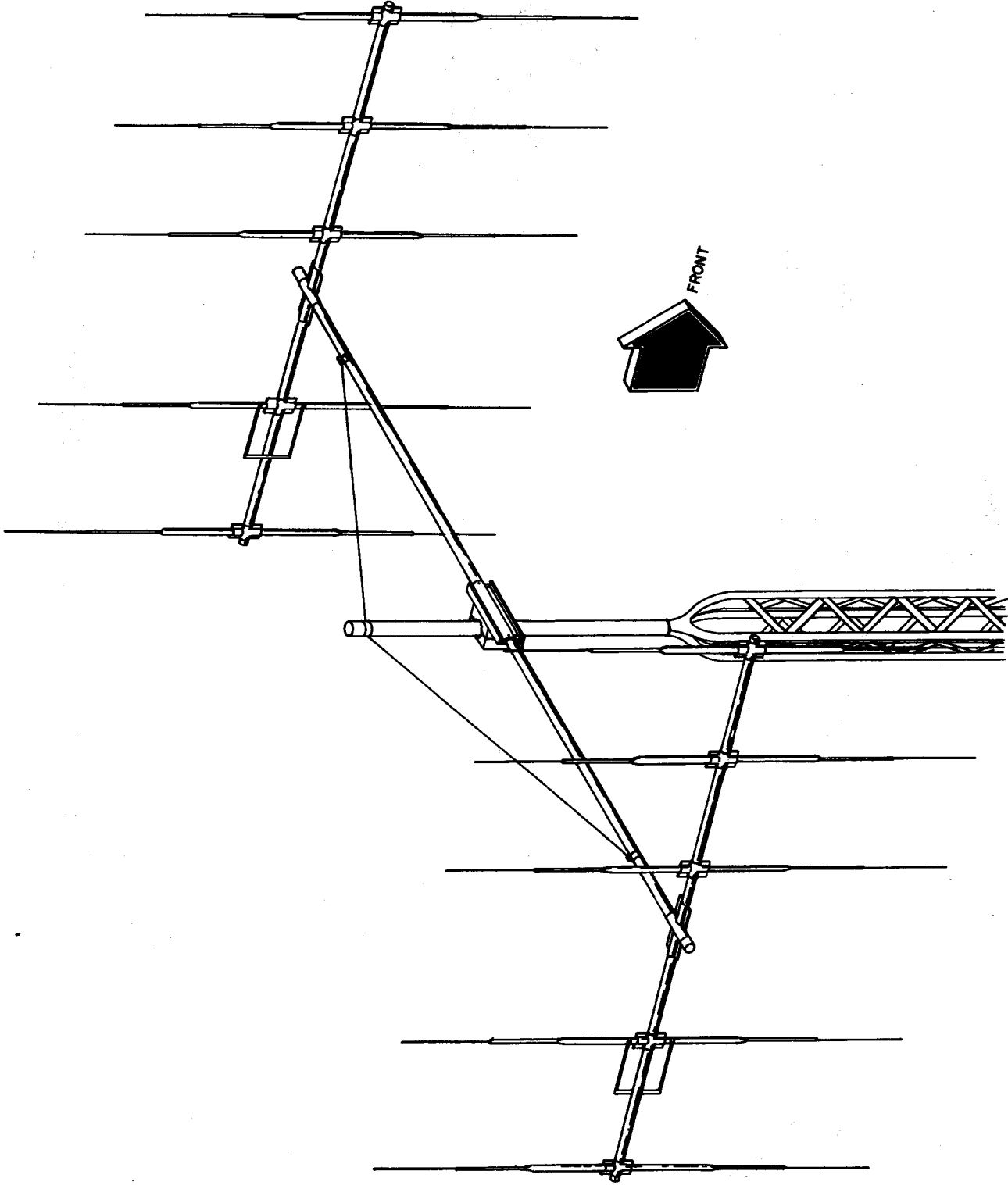
General This section contains a complete parts list for the Hy-Gain Model SDB-10.

identification of parts when unpacking the equipment or for ordering replacement parts.

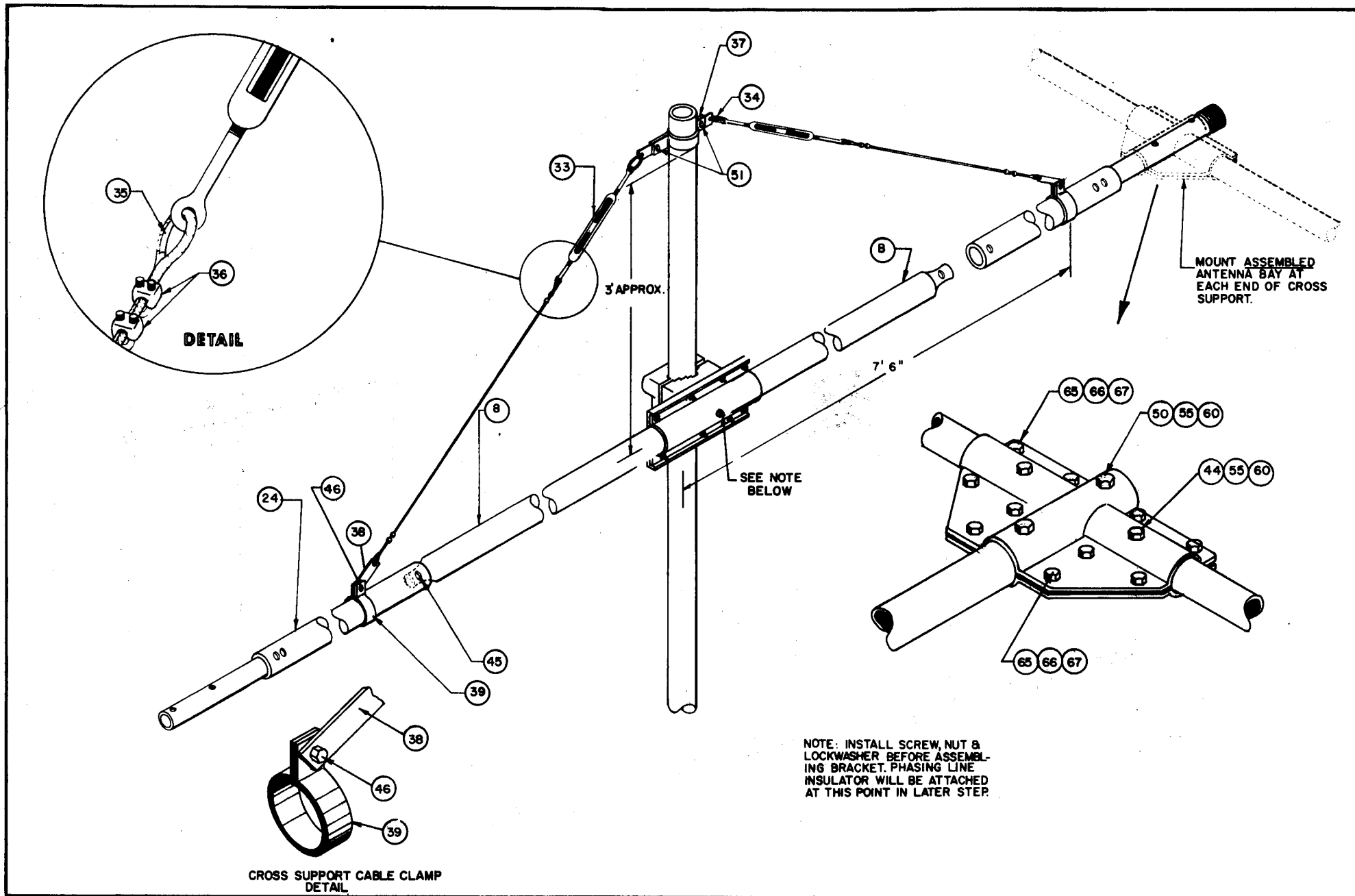
Explanation This information may be used either for

Parts List

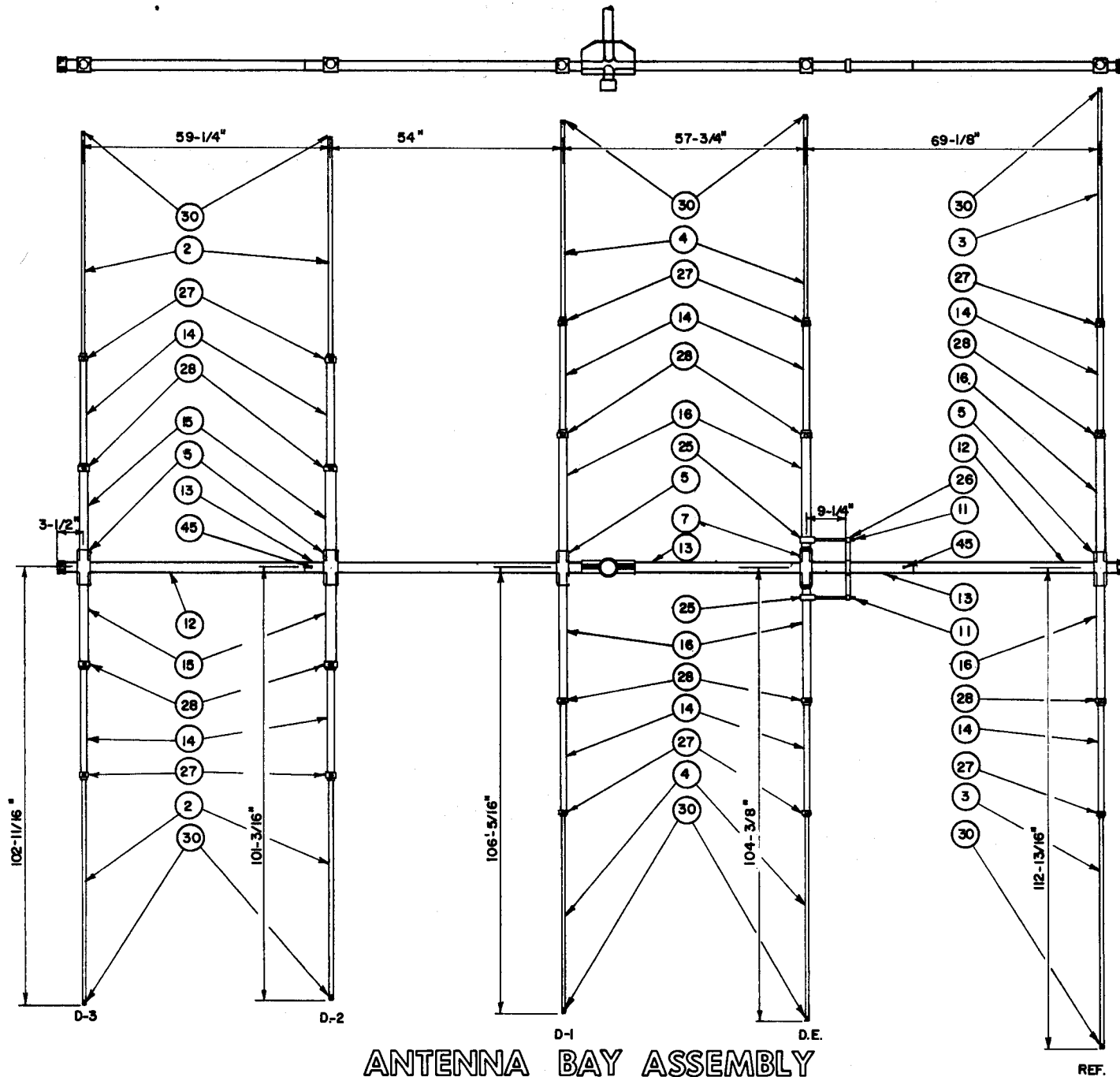
Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1	102734	Bracket, Cast Aluminum	2	38	381253	Cross Support Strap	2
2	112000	Tubing, 7/16 x 56"	8	39	388861	Cross Support Cable Clamp	2
3	112127	Tubing, 7/16 x 60	4		873864	Parts Pack "C" contains the following:	
4	114781	Tubing, 7/16 x 52"	8				
5	163764	Bracket, Element-to-Boom #4	16	40	501093	Screw, 10-24 x 1" Flat Head	1
6	164645	Bracket, Boom to Mast	4	41	501541	Screw, 5/16-18 x 3 1/2" Hex Head	3
7	165919	Bracket, Element-to-Boom #13	4	42	501543	Screw, 5/16-18 x 5" Hex Head	4
8	171566	Tubing, 2 x 61 3/4"	2	43	505671	Screw, 10-24 x 5/16" Round Head	20
9	172732	Clamp, Boom to Bracket	1				
10	172735	Bracket, Casting to Boom	1				
11	172813	Beta Rod, 1/4 x 9 1/4"	4	44	506235	Screw, 5/16-18 x 3" Hex Head	4
12	172817	Tubing, 2 x 51" Drilled	4	45	506290	Screw, 1/4-20 x 2 1/2" Round Head	6
13	175661	Inner Boom 2 x 75"	4				
14	190006	Tubing, 5/8 x 26" Swg. 7/16"	20	46	506389	Screw, 1/4-20 x 1" Hex Head	2
15	190204	Tubing, 7/8 x 24" Swg. 5/8"	8	47	506455	Screw, 10-24 x 1" Round Head	2
16	190207	Tubing, 7/8 x 32" "	12	48	506460	Screw, 10-24 x 3/4" Round Head	12
17	463767	Insulator, Driven Element	4	49	506520	Screw, 10-24 x 3/8" Round Head	20
18	691081	Cable, Boom support, 20 Ft.	1	50	509173	Screw, 5/16-18 x 2 1/2" Hex Head	4
19	872448	Parts Pack "B"	1				
20	872480	Phasing Harness Assembly	2	51	509320	Screw, 3/8-16 x 1" Hex Head	2
21	873863	Parts Pack "D"	1	52	509543	Screw, 1/4-20 x 2 3/4" Hex Head	2
22	873864	Parts Pack "C"	1				
23	873879	Parts Pack "A"	1	53	548684	Screw, 1/4-20 x 1/2" Taper Point	20
24	873913	Cross Support End Assembly	2				
	873879	Parts Pack "A" contains the following:		54	555362	Nut, 10-24 Square	40
25	163312	Clamp, 7/8"	4	55	556945	Nut, 5/16-18 Hex	15
26	163371	Beta Clamp	4	56	556970	Nut, 10-24 Hex	24
27	165123	Compression Clamp, 1/2"	20	57	558137	Nut, 3/8-16 Hex	2
28	165361	Compression Clamp, 3/4"	20	58	558685	Nut, 1/4-20 Square	20
29	451185	Caplug, 1 5/8"	2	59	566664	Lockwasher, 5/16" Split	6
30	455644	Caplug, 7/16"	10	60	567075	Lockwasher, 5/16" Internal	12
31	465410	Phasing Harness Insulator	1	61	567085	Washer, 5/16" Flat	4
32	475639	Caplug, 7/16" w/hole	10	62	567095	Lockwasher, 3/8" Internal	2
68	455625	Caplug, 2"	4	63	567125	Lockwasher, #10 Internal	43
	872448	Parts Pack "B" contains the following:		64	567130	Washer, #10 Flat	3
33	351243	Turnbuckle, 7/32 x 2" Eye & Eye	2		873863	Parts Pack "D" contains the following:	
34	351244	Chain Link, 3/16" Open End	2	65	506325	Screw, 1/4-20 x 3/4" Hex Head	104
35	351700	Thimble, 5/32"	4	66	556960	Nut, 1/4-20 Hex	116
36	359929	Clip, 1/8" Wire	8	67	567110	Lockwasher, 1/4" Internal	116
37	381100	Mast Guy Strap	2				



OVERALL VIEW
MODEL SDB 10
FIGURE 1



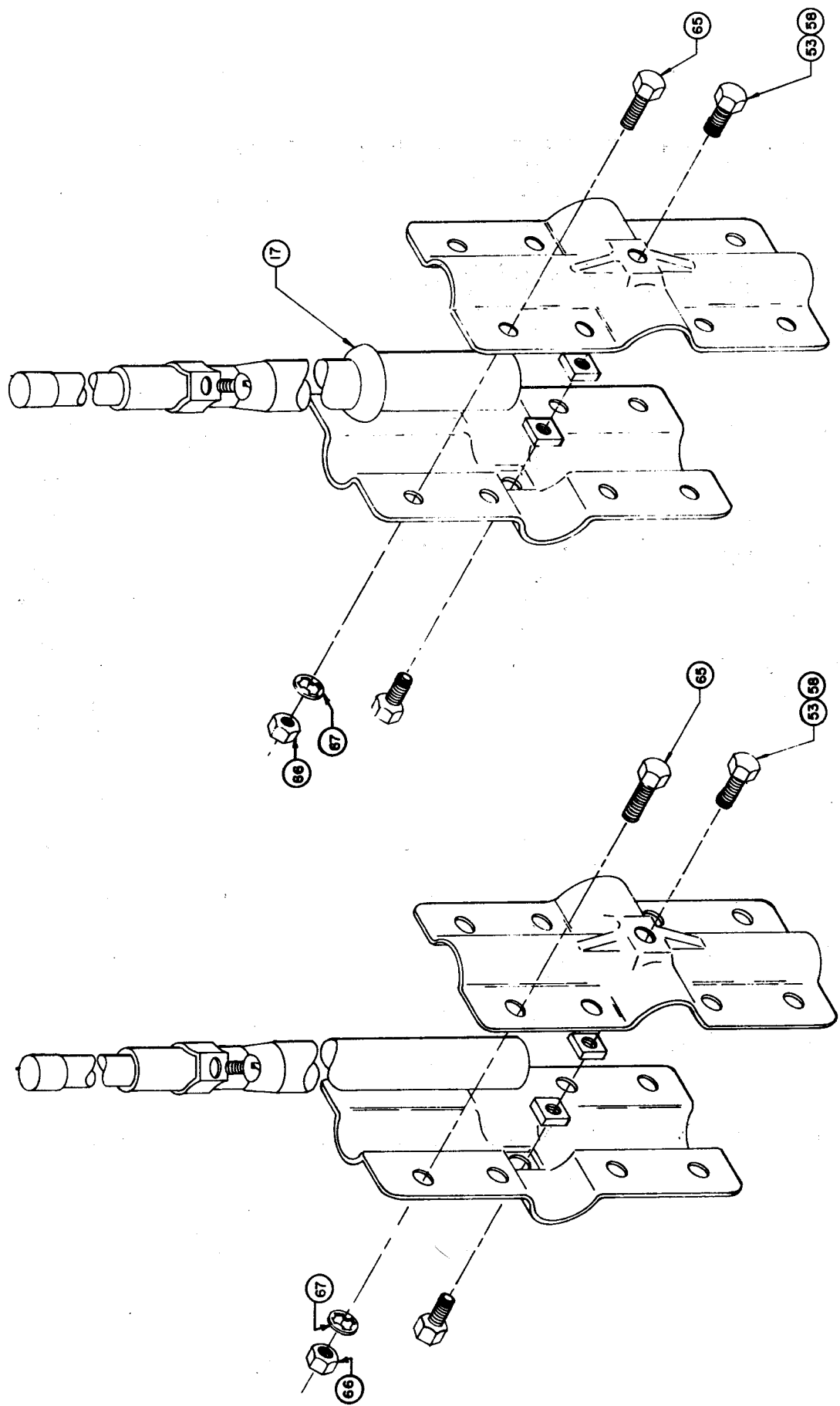
CROSS SUPPORT ASSEMBLY
FIGURE 2



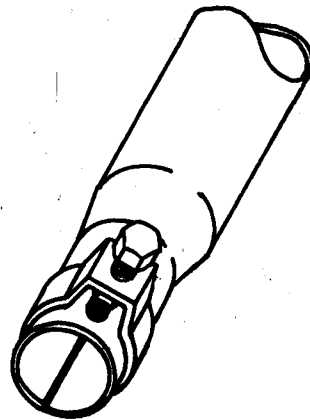
ANTENNA BAY ASSEMBLY
 FIGURE 3

DRIVEN ELEMENT USE 7

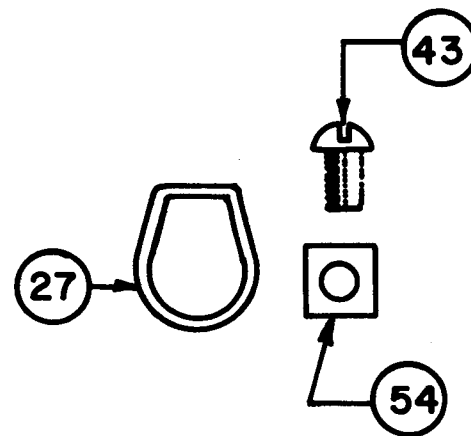
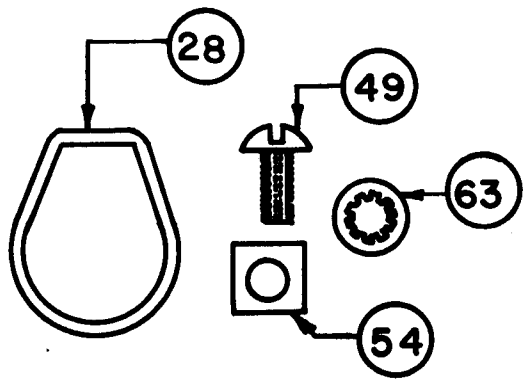
PARASITIC ELEMENT USE 6



ELEMENT TO BOOM
BRACKETS
FIGURE - 4

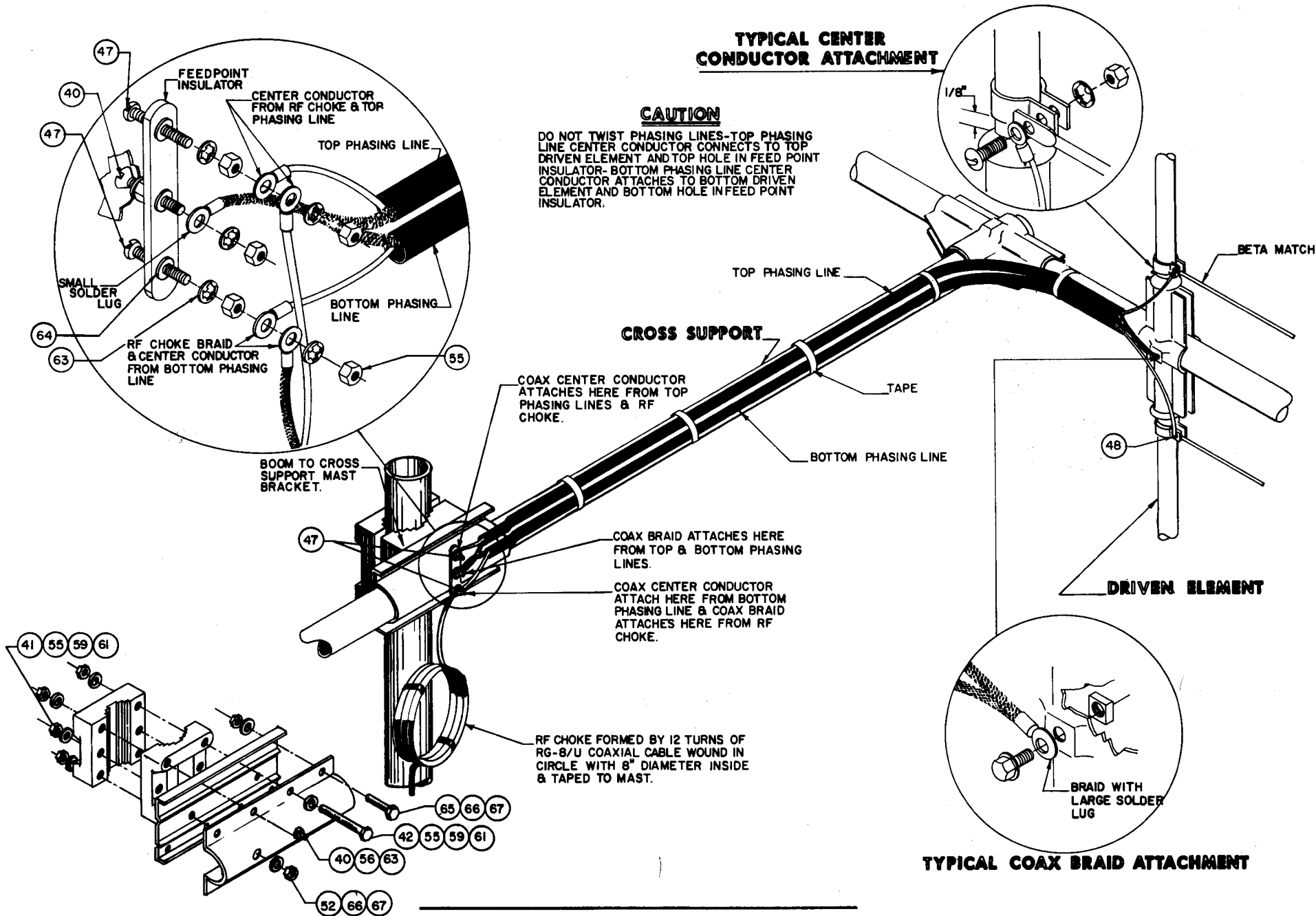


PLACE COMPRESSION CLAMP ON
THE END OF THE TUBING WITH THE
SCREW HEAD 180° FROM THE
SLOT IN THE TUBING.



COMPRESSION CLAMPS

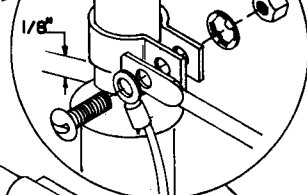
FIGURE 6



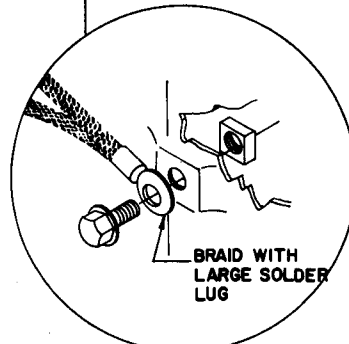
TYPICAL CENTER CONDUCTOR ATTACHMENT

CAUTION

DO NOT TWIST PHASING LINES-TOP PHASING LINE CENTER CONDUCTOR CONNECTS TO TOP DRIVEN ELEMENT AND TOP HOLE IN FEED POINT INSULATOR-BOTTOM PHASING LINE CENTER CONDUCTOR ATTACHES TO BOTTOM DRIVEN ELEMENT AND BOTTOM HOLE IN FEED POINT INSULATOR.



DRIVEN ELEMENT

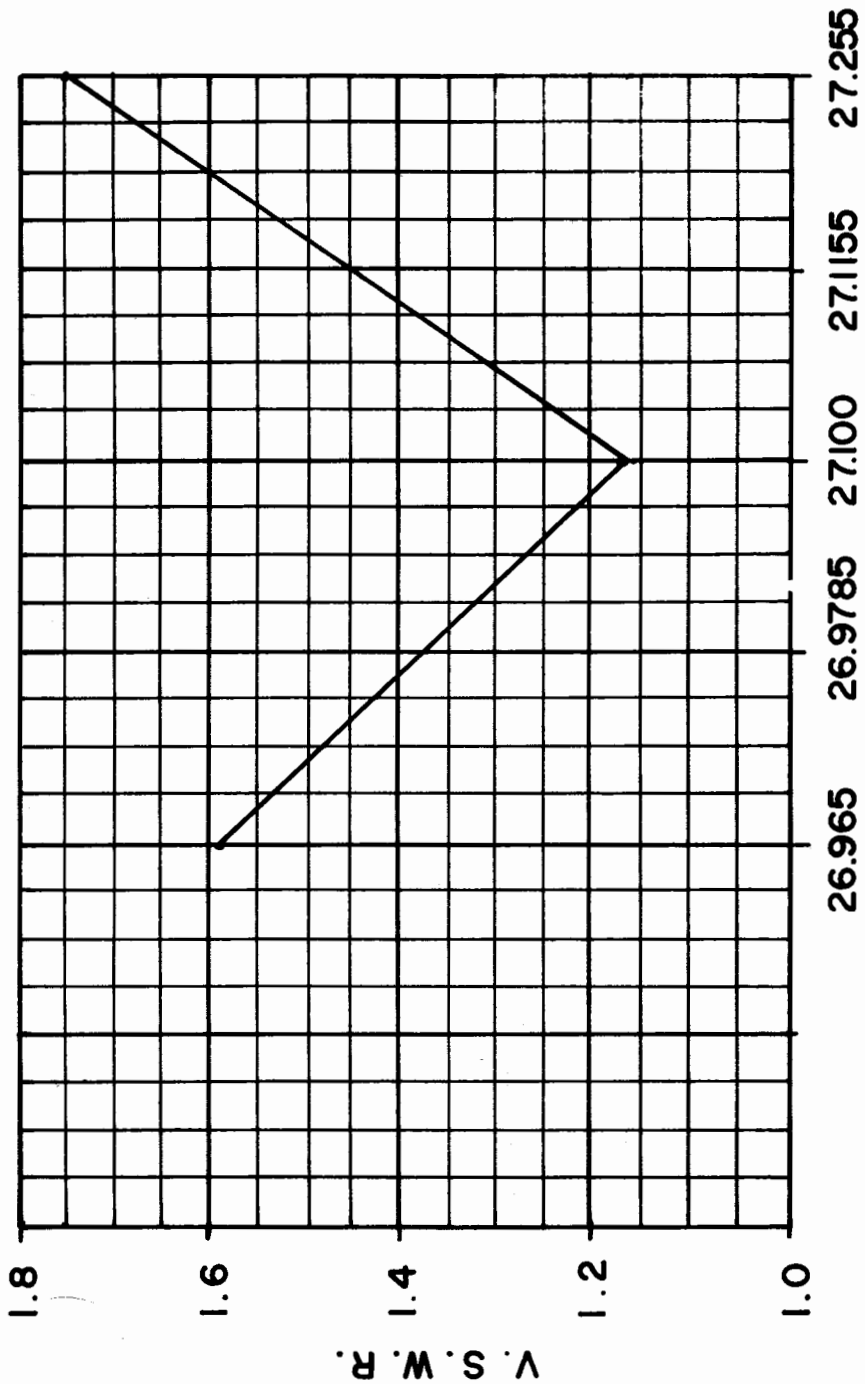


TYPICAL COAX BRAID ATTACHMENT

BOOM TO MAST BRACKET DETAIL

PHASING LINE INSTALLATION

FIGURE 5



FREQUENCY

VSWR CHART
FIGURE 7

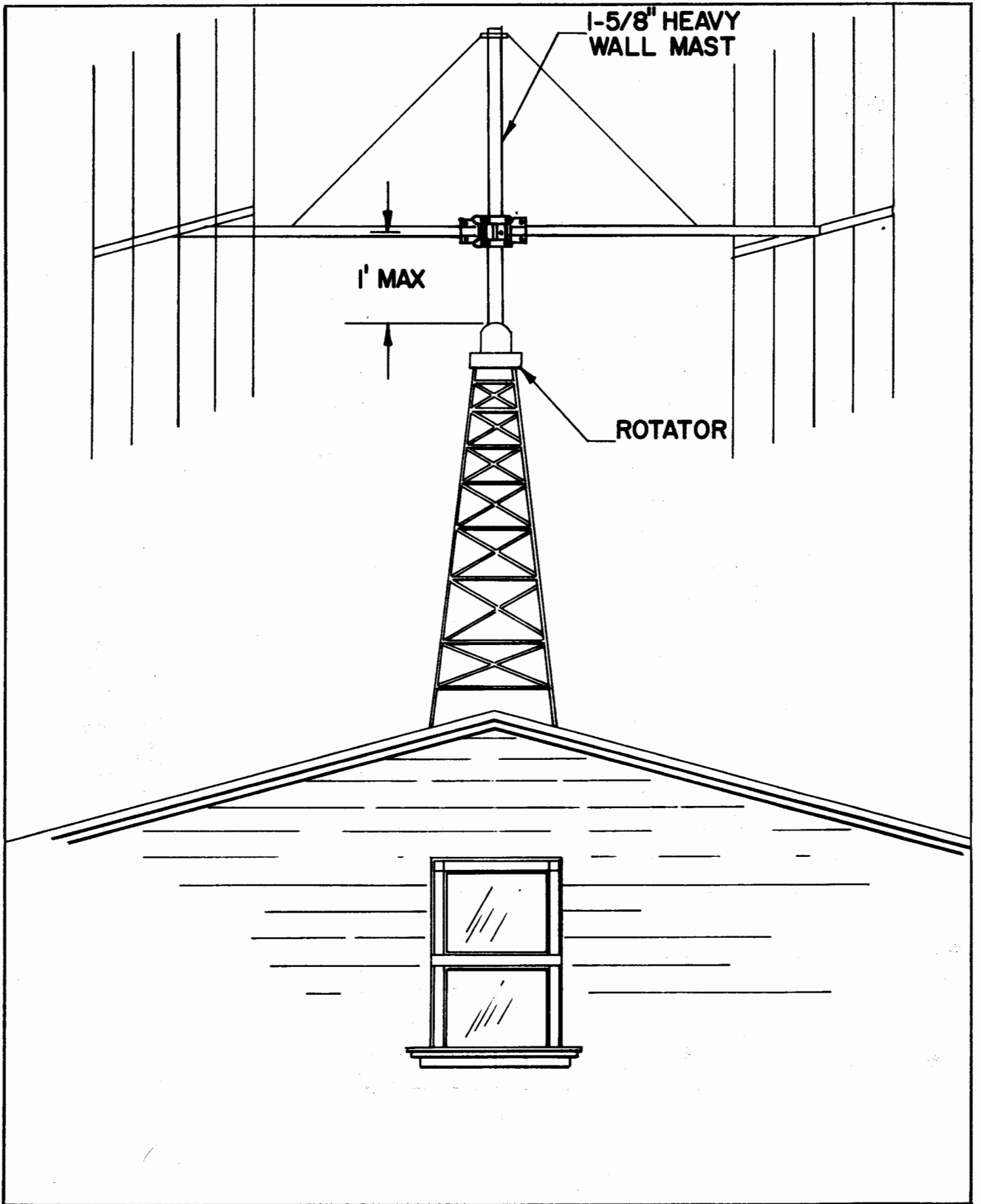


FIGURE 8
ROOF-TOP TOWER
INSTALLATION

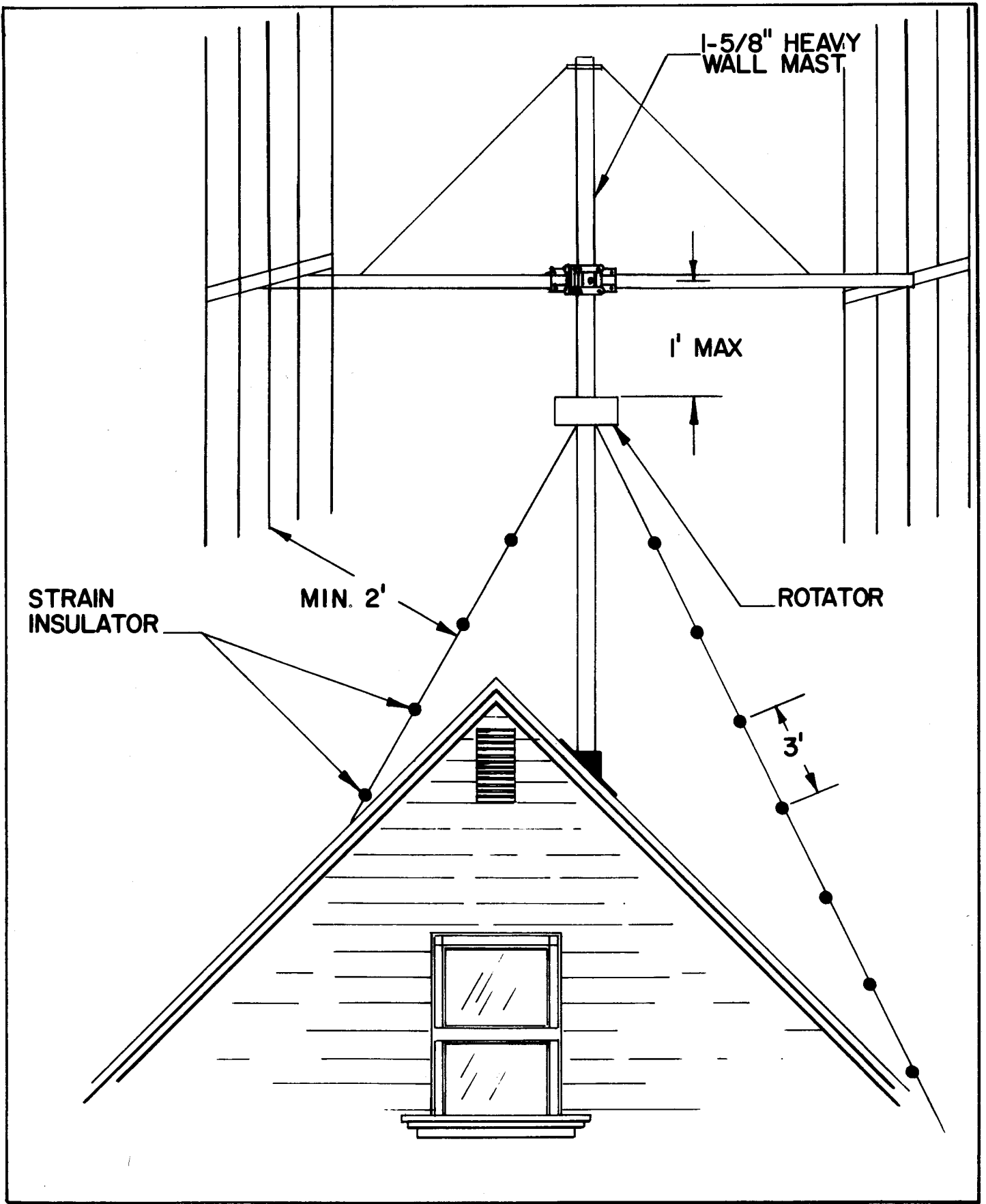


FIGURE 9
ROOF-TOP MAST
INSTALLATION