

# INSTRUCTION MANUAL

Model EXP-14  
Broadband Tribander 10, 15,  
20 Meter

*Hy-gain*

308 Industrial Park  
Starkville, MS 39759 USA Ph: (662)  
323-9538 FAX: (662) 323-6351

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# CHAPTER 1

## General Description

The Hy-Gain Explorer 14 is a very unique 4-element, three band beam antenna designed for broadband, high performance, high efficiency operation on the Amateur 10, 15, and 20 meter bands. The boom length of 14 feet 11/2 inches (4.17 m) and a longest element of 31 feet 6 inches (9.6 m) combine for a modest 17 foot 3 inch turning radius, small enough for most city lots. Broadbanding is accomplished through the use of a monoband reflector on 10 meters, a duoband reflector on 15 and 20 meters and a very unique driven element system called the Para-Sleeve

Stainless steel hardware and clamps are used on all electrical and mechanical connections. Hy-Gain's 50 ohm BN-86 balun and new Beta Multi-Match are supplied. Add-on kits for a 30 or 40 meter driven element are available as option QK-710. The antenna is designed to fit masts from 2" to 2 1/2" in diameter and can be rotated with Hy-Gain's CD-4511 or Ham IV rotators.

## Driven Element

The Explorer 14 utilizes a new concept in driven element design, called the Para-Sleeve System (Patent No. 4,604,628). Basically, the design consists of an open-sleeve dipole that has been optimized for maximum bandwidth and directivity within a Yagi-Uda configuration of parasitic elements. The open-sleeve dipole has evolved from the coaxial sleeve dipole; however, it is much easier to tune and exhibits less wind loading. The ParaSleeve System consists of a trapped driven element for 15 and 20 meters, electrically connected to the balun and Beta-Match; and a set of two parallel sleeve elements for 10 meters.

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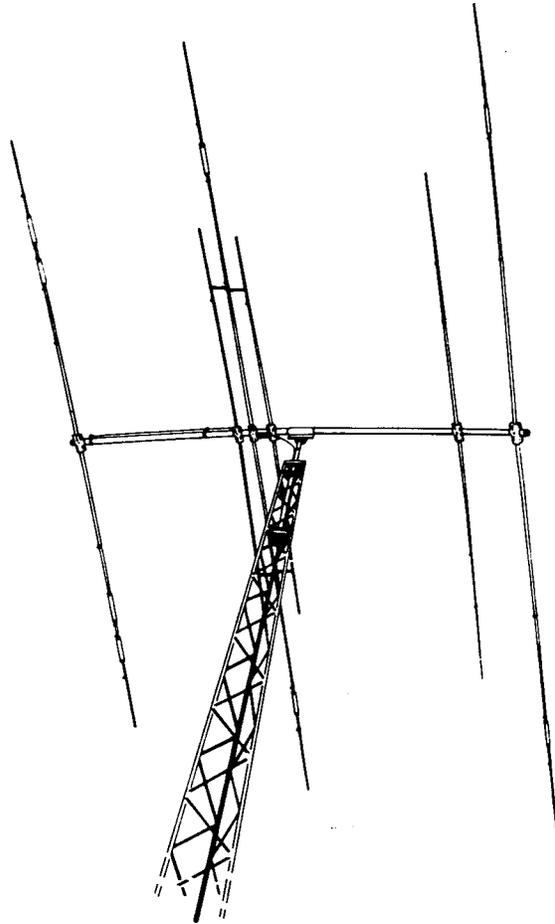


Figure 1  
Overall View

This driven element system allows half element lengths of 0.209 wavelength on 20 meters, 0.242 wavelengths on 15 meters and 0.241 wavelength on 10 meters.

\* For more information on the open-sleeve dipole, see H.E. King and J.L. Wong, "An Experimental Study of a Balun-Fed Open-Sleeve Dipole in Front of a Metallic Reflector", IEEE Trans. Antennas Propagation, Vol. AP-20,201-204, March 1972. Also see: Roger Cox, "The Open-Sleeve Antenna", CQ Magazine, Vol. 39,

## SPECIFICATIONS

### *Electrical*

Frequencies of Operation:	<u>20M</u>	<u>15M</u>	<u>10M</u>
Under 2:1 VSWR (MHz)	14.0-14.35	21.0-21.45	28.0-29.7
Under 1.5:1 VSWR (MHz)	14.17-14.33	21.22-21.45	28.55-29.55
Front-to-Back Ratio (dB): Maximum	27	27	21
Average Half-Power Beamwidth (deg)	65	66	67
Maximum Gain (dBi) (average gain for 3 bands = 8.1 dBi)	7.5	8.0	8.8
Maximum Power	----- Maximum Legal -----		
Lightning Protection	----- DC Ground -----		

### *Mechanical*

Boom Length.....	14' 1 1/2" (4.3 m)
Boom Diameter .....	2 inches (51 mm)
Longest Element.....	31' 6" (9.6 m)
Longest Driven Element .....	20M - .209 wavelength
(one-half total length)	15M - .242 wavelength
	10M - .241 wavelength
Turning Radius.....	17'3" (5.3 m)
Accepts Mast .....	2" to 2 1/2" O.D. (51 mm to 63.5 mm)
Net Weight .....	45 lbs. (20.4 kg)
Maximum Wind Survival .....	100 mph (161 kmph)
Wind Surface Area .....	7.5 sq. ft. (.69 sq. m)
Wind Load at 80 mph .....	192 lbs. (87.1 kg)
Hardware .....	All stainless steel
Suitable Rotors .....	Hy-Gain CD-45II, Ham IV
Shipping Weight.....	50 lbs. (22.7 kg)

# CHAPTER 6

## Preparation For Assembly

**FOR OUR OVERSEAS CUSTOMERS:** If you use the Metric System, see American-to-Metric Conversion Table in the rear of this manual. The United States uses American units of weights and measures.

Choose a large, clear area to assemble the EX14. The area must be at least 14' x 32' (4.3 m x 9.7 m). You may wish to use sawhorses or chairs to support the boom during assembly. An alternate method involves driving a 5' (1.5 m) length of mast material into the ground and attaching the boom and boom-to-mast bracket to this mast temporarily during assembly. This permits eye level installation of parts and allows easy alignment of elements after assembly. If you assemble this antenna over a grassy area, precautions should be taken so that hardware is not accidentally lost during assembly. A concrete

**Tools:** The following tools are required for easy assembly of the EX-14:

Type Tool	Qty
Tape Measure, 12 foot.....	1
Adjustable Wrench, 8 inch.....	2
Nut Driver, 7/16 inch.....	1
Nut Driver, 3/8 inch.....	1
Nut Driver, 5/16 inch.....	1
Standard Hand Pliers.....	1

When unpacking your antenna, check inside of all tubing parts (traps, smaller tubing, etc.). To conserve space, these smaller articles are sometimes put inside larger pieces. Check all parts against the Parts List to make sure no parts are missing. The hardware supplied with this antenna is bagged by thread size for

All tubing supplied with the EX-14 telescopes together. Make all measurements to the given dimensions, plus or minus, no more than 1/8 inch!

The assembly of this antenna will be easier if you read this manual completely through at least three (3) times before beginning assembly. Allow at least 5 hours for assembly. Double and triple check ALL dimensions

NOTE: An extra Figure 12 has been inserted in this manual for use when assembling the antenna.

## Option QK-710

The Hy-Gain Model QK-710 is an optional kit that will allow you to add 30 or 40 meter operation to your Explorer 14 antenna. The kit supplies all the necessary hardware and instructions to add an extension onto the Para-Sleeve driven element for either 30 or 40

If you anticipate adding this kit to your Explorer 14, you may make the following adjustments before adding the QK 710.

- Disassemble the Para-Sleeve spacers from the sleeve elements (FS-1 and RS-1). See Figure 14. An extension to the spacers will be added.

Increase the distance between the central driven element and both sleeve elements from 6" to 7". This will reduce the distance to the director and 10 meter reflector by 1" each. See Figure 12.

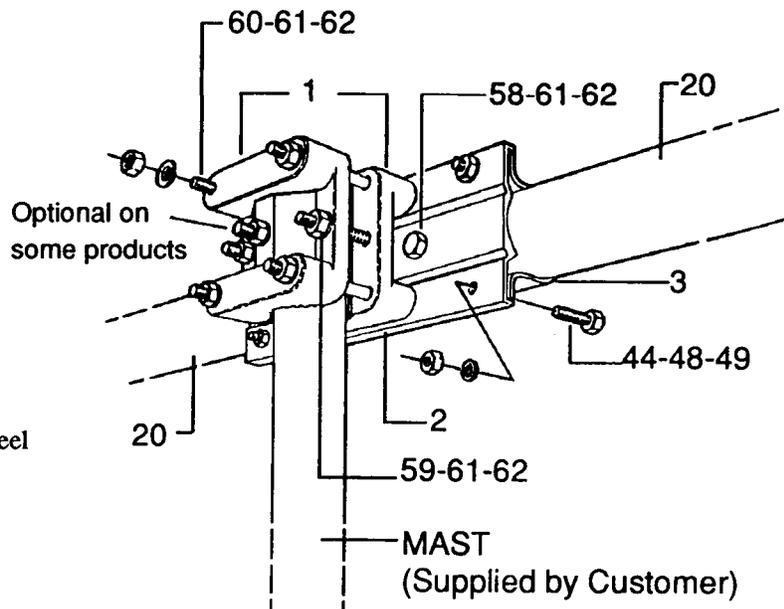
Increase the length of the DE-2 from 36 1/2" to 37 1/2".

Slide the 15 meter DE trap all the way into the DE-2.

Adjust FS-2 to 48" and RS-2 to

Remove DE-3 and the 1/2" element tubing clamps from the center driven element. Save the compression clamps.

Item No.	Description
1	Bracket, Cast aluminum
2	Bracket, Casting-to-Boom
3	Clamp, Boom-to-Bracket
20	Tube, aluminum, 2" x 83 3/4"
44	Bolt, hex head, 1/4" - 20 x 3/4", stainless steel
48	Lockwasher, internal, 1/4", stainless steel
49	Nut, hex, 1/4"-20, stainless steel
58	Bolt, hex head, 5/16" - 18 x 2 3/4", stainless steel
59	Bolt, hex head, 5/16" - 18 x 3", stainless steel
60	Bolt, hex head, 5/16" - 18 x 5", stainless steel
61	Lockwasher, split, 5/16", stainless steel
62	Nut, hex, 5/16" - 18, stainless steel



**Figure 2**  
**Boom-To-Mast Bracket**

### Assembly of the Boom-to-mast Brackets and Boom

Select the boom-to-bracket clamp parts (Item Nos. 2 and 3). Loosely assemble them on the boom ends (Item No. 20), as shown in Figure 2. Line up the holes on both brackets and both boom ends. Secure the two brackets together with four (4) 1/4"-20 x 3/4" bolts, lockwashers and nuts. Secure the brackets to the boom ends using the 5/16"-18 x 2 3/4" bolts, lockwashers and nuts. Tighten these six (6) bolts securely.

Assemble the two cast aluminum brackets (Items No. 1) on the mast at the desired height above your tower. Secure the two brackets together using the two (2) 5/16"-18 x 3" bolts, lockwashers and nuts. You may wish to drill a hole through your mast so that a 5/16"-18 x 3 1/2" bolt may be inserted through the cast brackets and the mast and tightened. This bolt will prevent the antenna from twisting on the mast in high winds. See Figure 2. The four (4) 5-inch bolts will be installed when the antenna is installed on the mast.

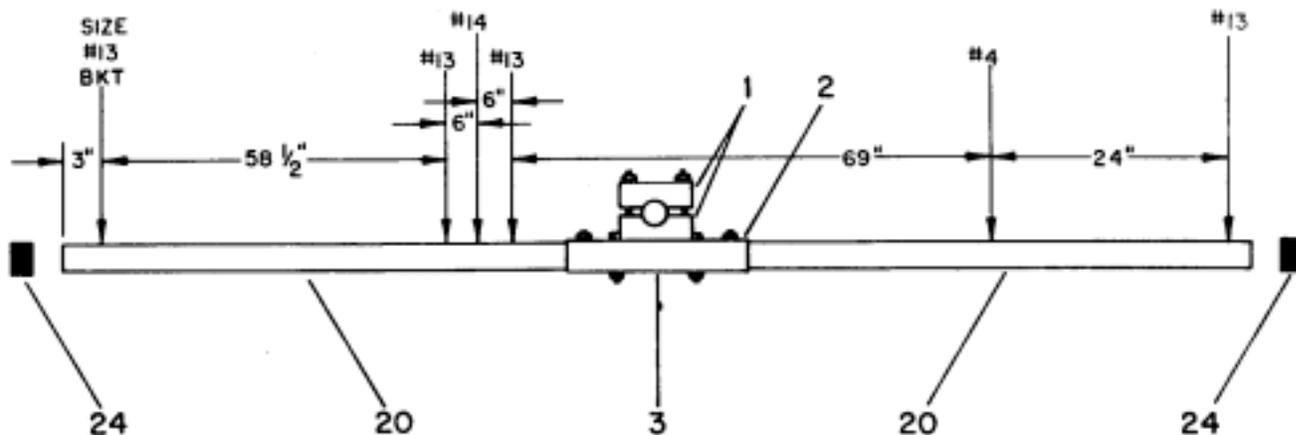
### Element-to-boom Brackets

To save time, loosely assemble all of the element-to-boom brackets and their appropriate hardware before beginning further installation of the antenna. See Figure 4. The different size brackets can be identified by a number stamped into the surface of each bracket half DO NOT tighten the bolts until instructed to do so.

NOTE: Bracket size #14 is used on the center driven element. Bracket size #13 is used on the driven element sleeves and on the director and 15/20 reflector. Each size number is stamped into the surface of each bracket.

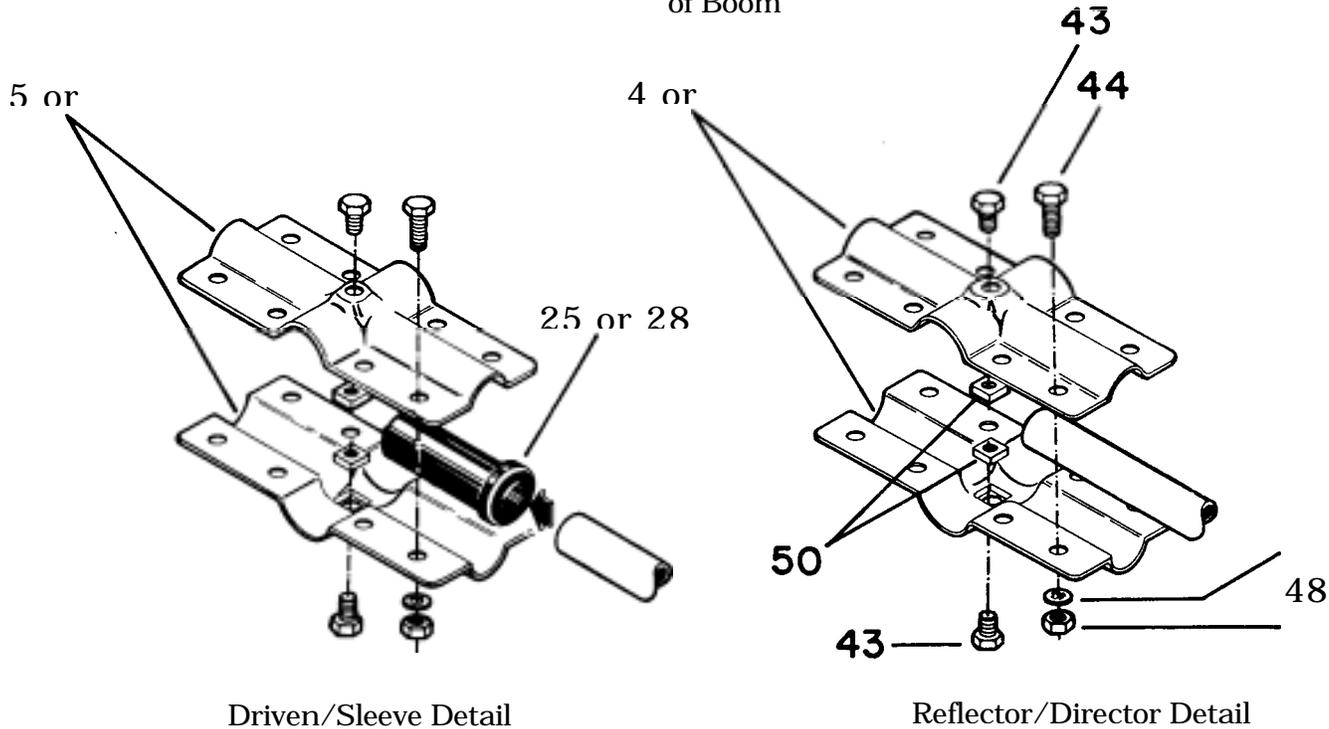
At this time, slide each element-to-boom bracket over a boom end and position all of the brackets close to their final attachment points. See Figure 3 and Figure 12.

Hand-tighten the hardware on each element-to-boom bracket to prevent losing small parts, and to prevent bracket movement on the boom.



Ite No.	Description	Item No.	Description
1	Bracket, Cast Aluminum	20	Tube, aluminum, 2"x 83
2	Bracket, Casting-to-Boom	24	Caplug, 2", black
3	Clamp, Boom-to-Bracket		

Figure 3 Assembly of Boom



NOTE: The #4, #13 and #14 brackets use the same size bolts, lockwashers and nuts - in identical locations.

Item No.	Description	Item No.	Description
4	Bracket, Element-to-Boom, #4	43	Bolt, hex head, 1/4"-20 x 3/8", stainless
5	Bracket, Element-to-Boom, #13	44	Bolt, hex head, 1/4"-20 x 3/4", stainless
6	Bracket, Element-to-Boom, #14	48	Lockwasher, internal, 1/4", stainless steel
25	Insulator, Front & Rear Sleeves, 5/8" I.D.	49	Nut, hex, 1/4"-20, stainless steel
28	Insulator, Driven Element, 1 1/4" I.D.	50	Nut, square, 1/4"-20, stainless steel

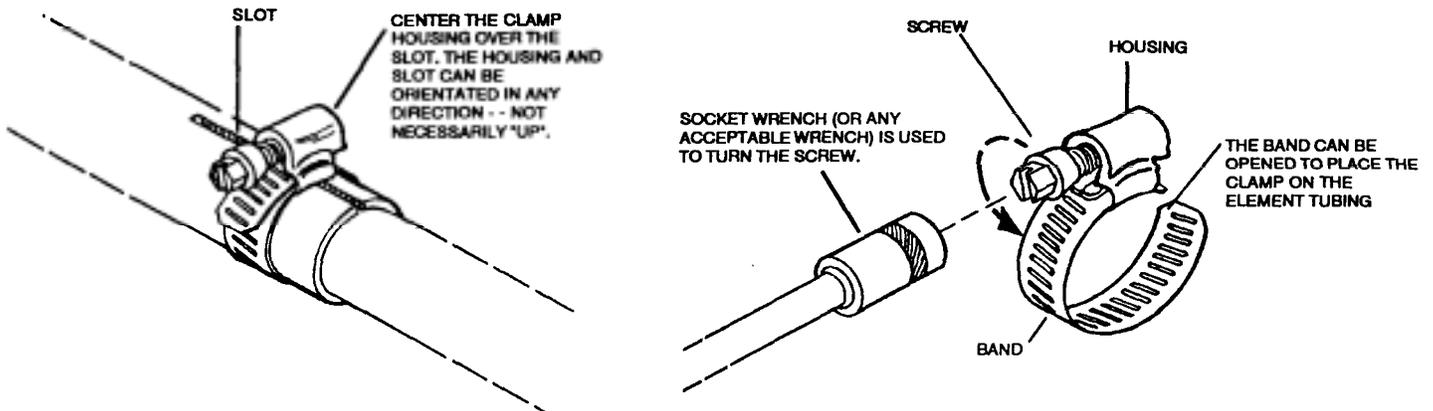
Figure 4  
Element-To-Boom Brackets

## Installation of Tubing Clamps

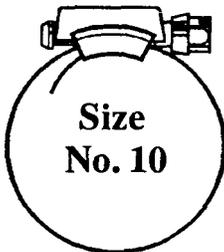
Select the proper size tubing clamp as shown in the chart. When installing the clamps, place the clamp near the tube end with the top of the clamp over the slot in the tube as shown in Figure 5.

After adjustment of the tubing length, tighten the clamp with a 5/16 inch nut driver, socket, or open end wrench until the tubing will not twist or telescope. DO NOT overtighten.

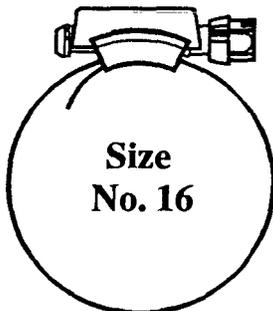
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Part No.	Description	Fits Tubing Sizes
358756	Clamp, Size #6 all stainless steel 5/16" hex head screw	1/2 and 3/4"



Part No.	Description	Fits Tubing Sizes
358757	Clamp, Size #10 all stainless steel 5/16 hex head screw	1"



Part No.	Description	Fits Tubing Sizes
358758	Clamp, Size #16 all stainless steel 5/16 hex head screw	1 1/4"

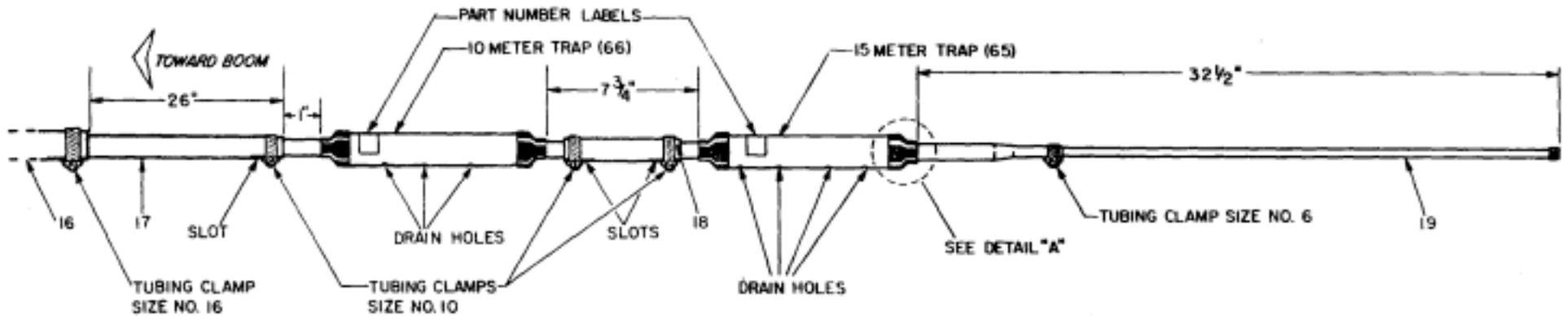
## **Element Assembly**

**Because of the broadband nature of the EX-14, it is supplied with only one setting for use on all modes on all of the 20, 15, and 10 meter bands. If assembled and installed correctly, the VSWR should be below 2:1 on any frequency on these bands.**

**The following steps will be in singular form. Do each element assembly step, first for one side of the boom and then for the other side. The dimensions shown in Figure 12 are in American units on the right side and Metric on the left side.**

**The elements may be assembled indoors, perhaps in the garage or basement work area, especially if the weather is cold, wet or windy outside. Take your time, and recheck all element dimensions. The elements should be attached to the boom outside, at a location near your tower.**

**After each element is assembled to the boom, tighten the eight (8) 1/4"-20 x 3/4" bolts. After all elements are assembled, make sure that they all lie in a horizontal plane at 90 degrees to the mast, then securely tighten the two (2) anchor bolts on each element.**



### 10-15-20 Meter Director Element

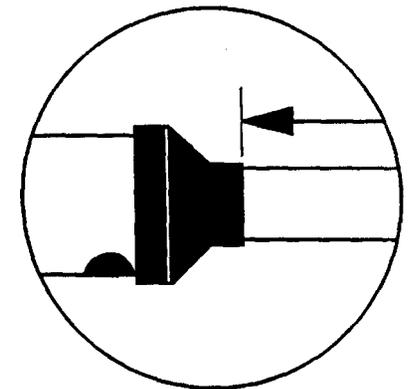
Assemble the 10-15-20 meter director as shown in Figure 6 and 12. Use trap part numbers 878749 and 878694 and install with the tubing slots and trap drain holes facing the ground and the labeled trap ends toward the boom. Use Figure 6 and Detail "A" as guides. Tighten all element tubing clamps

NOTE: Make sure that all trap caps are firmly seated while measuring dimensions.

#### Item

#### No. Description

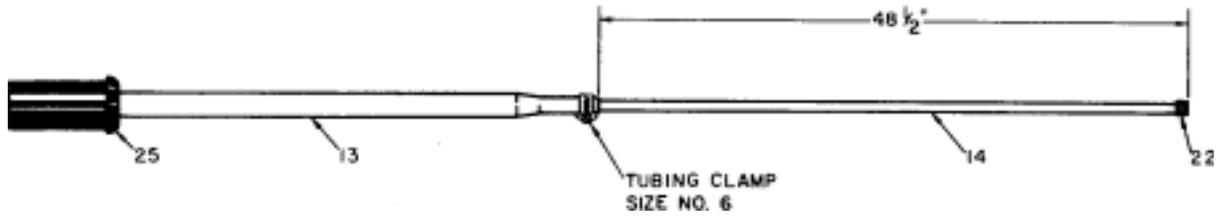
- 16 Tube, aluminum, 1 1/4" x 48", D1
- 17 Tube, aluminum, 1 1/8" x 30", swaged, D2



Dimensions Measured as

Detail A Trap Detail -  
Measuring Point

Figure 6 10-15-20 Meter  
Director Element



**Front Sleeve Element**

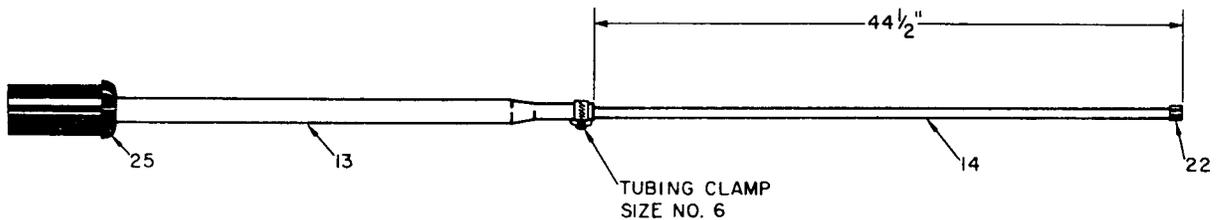
Select the FS-1 section (5/8" x 48") and a small driven element insulator (Item No. 25). Slip the insulator on the unslotted end of the FS-1 section, completely.

Item No.	Description
13	
14	Tube, aluminum, 5/8" x 48", swaged, RS-1, FS-
22	1 Tube, aluminum, 7/16" x 53"
25	Caplug, 7/16", black

Install a #6 tubing clamp on the slotted end of the FS-1 section and insert one end of the FS-2 section (7/16" x 53") to the dimension shown in Figure 7. Tighten the tubing clamp securely and recheck the FS-2 dimension.

**Figure 7**

**Front Sleeve Element**



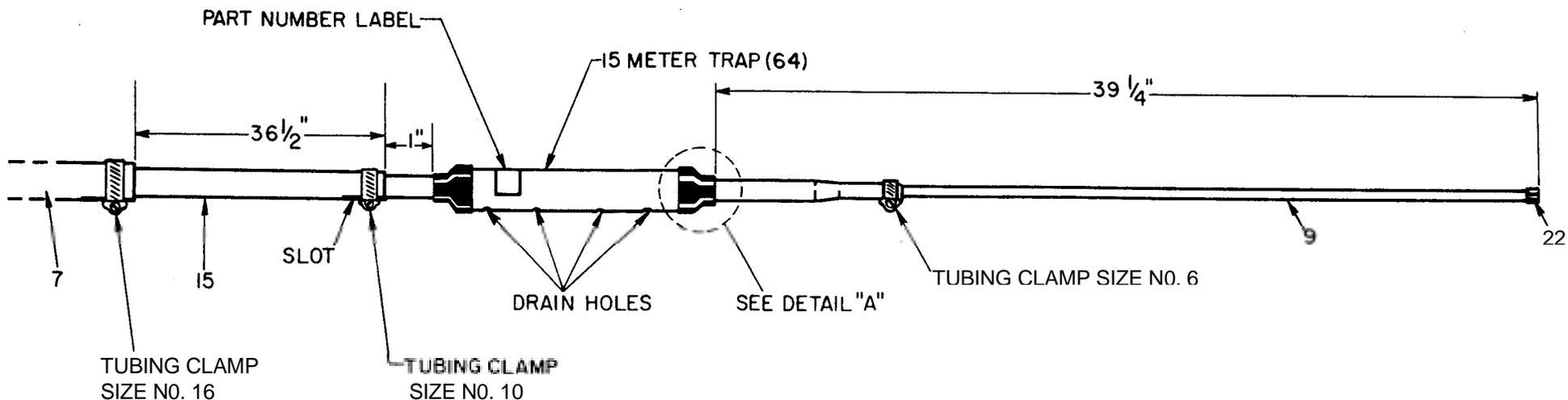
**Rear Sleeve Element**

Select the RS-1 section (5/8" x 48") and a small driven element insulator (Item No. 25). Slip the insulator on the unslotted end of the RS-1 section, completely.

Item No.	Description
13	
14	Tube, aluminum, 5/8" x 48", swaged, RS-1, FS-
22	1 Tube, aluminum, 7/16" x 53"
25	Caplug, 7/16", black

Assemble the remainder of the Rear Sleeve Element using a #6 tubing clamp and the RS-2 section (7/16" x 53"). Set it to the dimension shown in Figure 8. Tighten the tubing clamp securely and recheck the RS-2 dimension.

**Figure 8 Rear Sleeve Element**



**Center Driven Element**

N  
00

Select the DE-1 section (1 1/4" x 83") and a large driven element insulator (see Figure 4). Slip the insulator on the unslotted end of the DE-1 section, completely.

Install a #16 tubing clamp onto the slotted end of the DE-1 and insert the unslotted end of the DE-2 (1 1/8" x 42") to the dimension shown in Figure 9. Tighten the tubing clamp securely and recheck the DE-2 dimension.

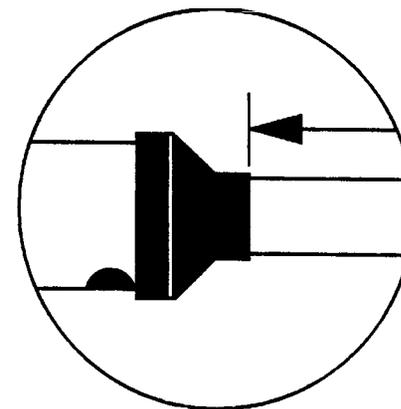
Assemble the remainder of the center driven element in the same manner using dimensions from Figure 9. Use 15 meter trap Part Number 878637 in this assembly.

**Item**

**No. Description**

7 Tube Assembly, aluminum, 1 1/4" x 83", R1, DE-1

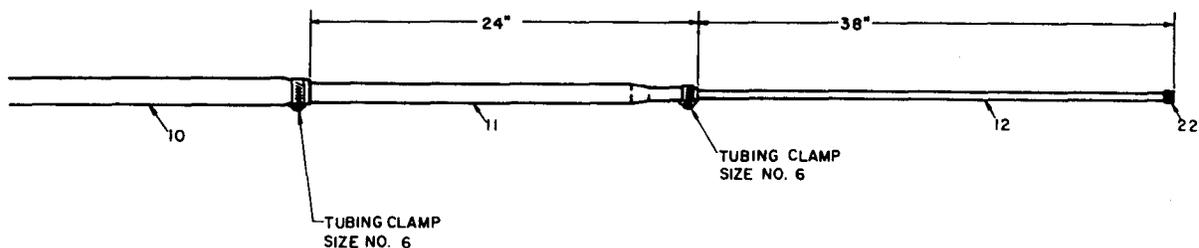
NOTE: ON ALL TRAPS MAKE SURE ALL DRAIN HOLES ARE FACING THE GROUND, ALL LABELED ENDS ARE TOWARDS THE BOOM AND ALL INSULATORS AND TRAP CAPS ARE FIRMLY SEATED. ALSO ON ALL TUBING ATTACHED TO TRAPS, MAKE SURE ALL SLOTS ARE FACING THE GROUND AND THE SMALL DRAIN HOLES ARE ALIGNED WITH THE SLOTS.



Dimensions Measured as

**Detail A Trap Detail -  
Measuring Point**

**Figure  
Center Driven**



### 10-Meter Reflector

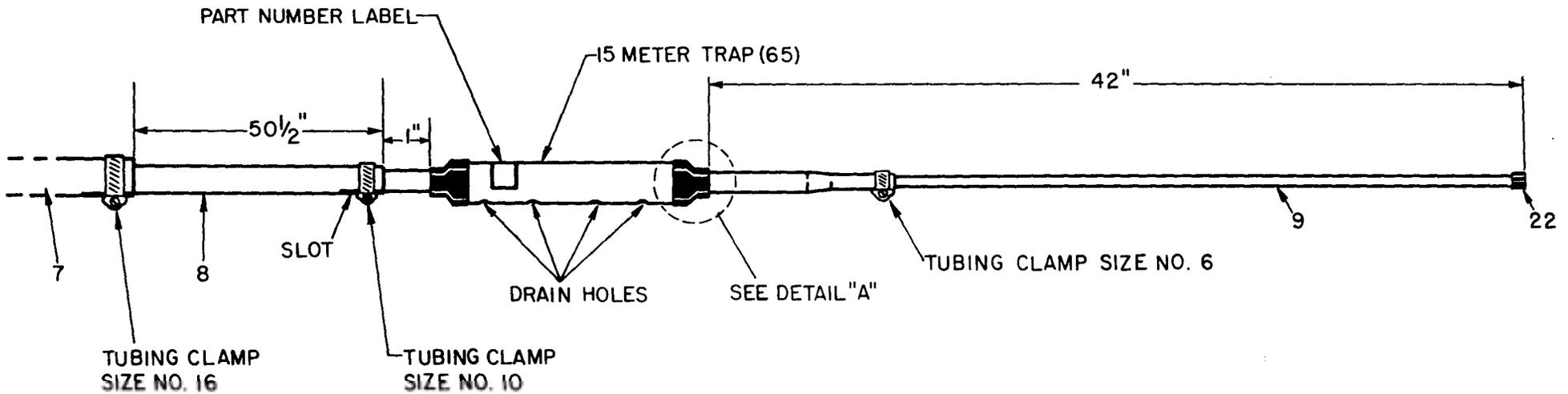
Assemble the 10-meter reflector as shown in Figure 10, using #6 tubing clamps. Tighten all element tubing clamps with the slots facing the ground and recheck all dimensions.

### Item

### No. Description

10	Tube, aluminum, 7/8" x 55", swaged, R2-
1	
11	Tube, aluminum, 5/8" x 26", swaged, R2-
2	
12	Tube, aluminum, 7/16" x 42 3/4", R2-3
22	Caplug, 7/16", black

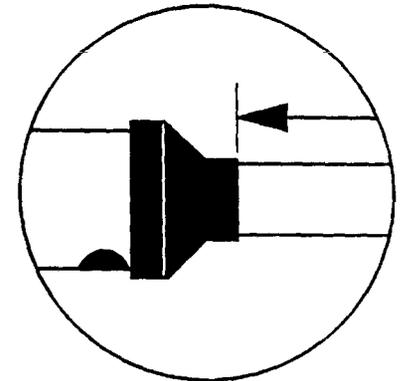
Figure 10 10 Meter  
Reflector Element



**N 15-20 Meter Reflector**

Assemble the 15-20 meter reflector, as shown in Figure 11, using # 16, # 10 and # 6 tubing clamps. Use trap Part Number 878694 and install with tubing slots and trap drain holes facing the ground and the labeled trap end toward the boom. Use Figure 11 and Detail "A" as guides. Tighten all element tubing clamps and recheck all dimensions.

Item No.	Description
7 8	
9 22	Tube Assembly, aluminum, 1 1/4" x 83", R1, DE-
65	1 Tube, aluminum, 1 1/8" x 54", swaged, R2 Tube, aluminum, 7/16" x 37", R3, DE-3 Caplug, 7/16", black



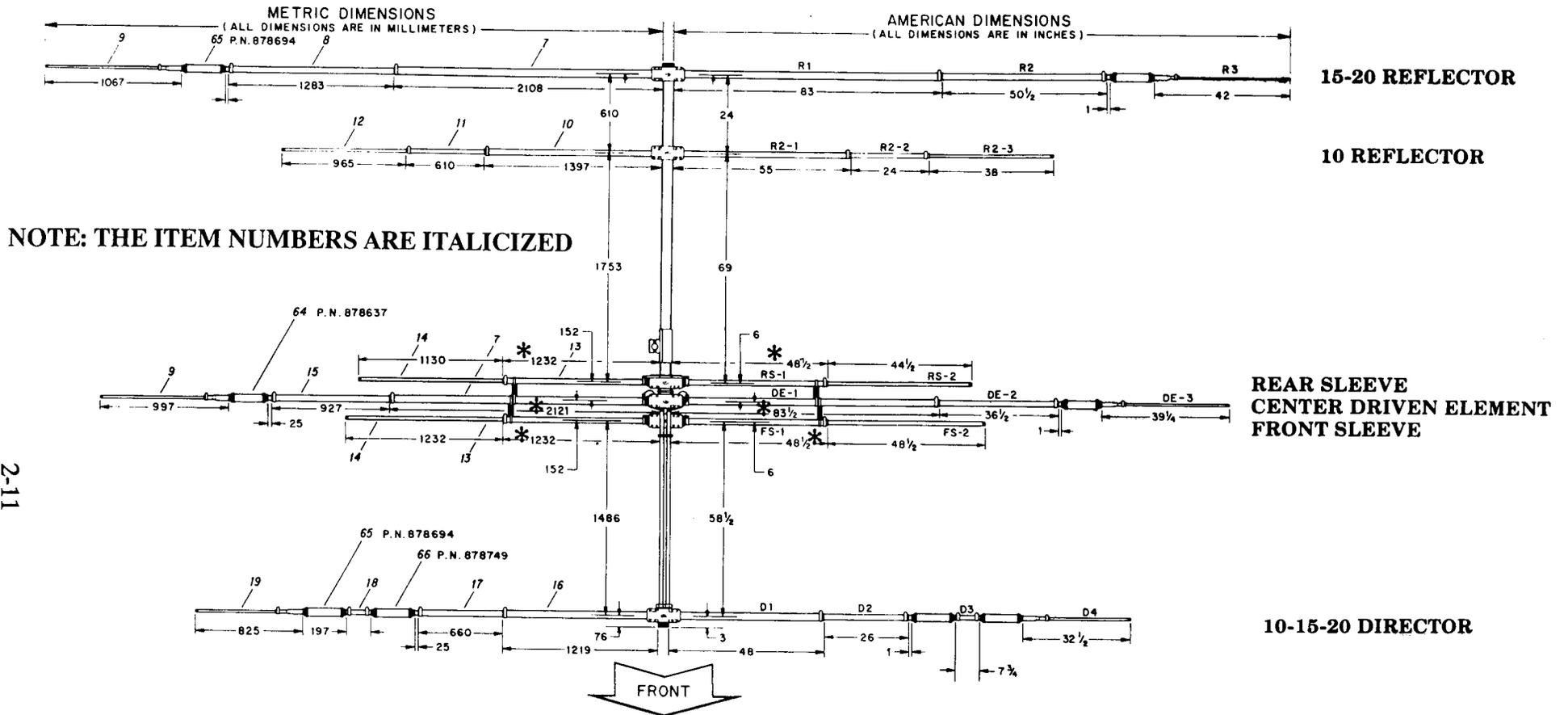
Dimensions Measured as

Detail A Trap Detail - Measuring Point

**Element Alignment**

After **all elements** have been installed, align all elements in the horizontal plane at 90 from the mast. Also, recheck all dimensions between element centers as shown in Figure 12. Securely tighten each set of eight (8) 1/4"-20 x 3/4" bolts on every element-to-boom bracket, then tighten both anchor bolts on each bracket. See Figure 4. The anchor bolts should be tightened flush to the aluminum bracket.

Figure 11 15-20 Meter Reflector Element



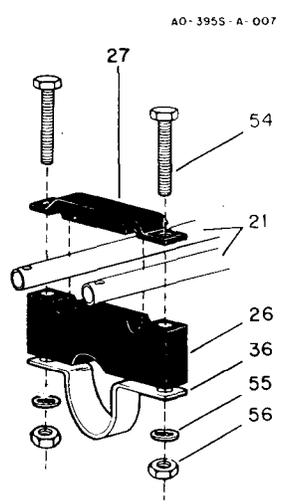
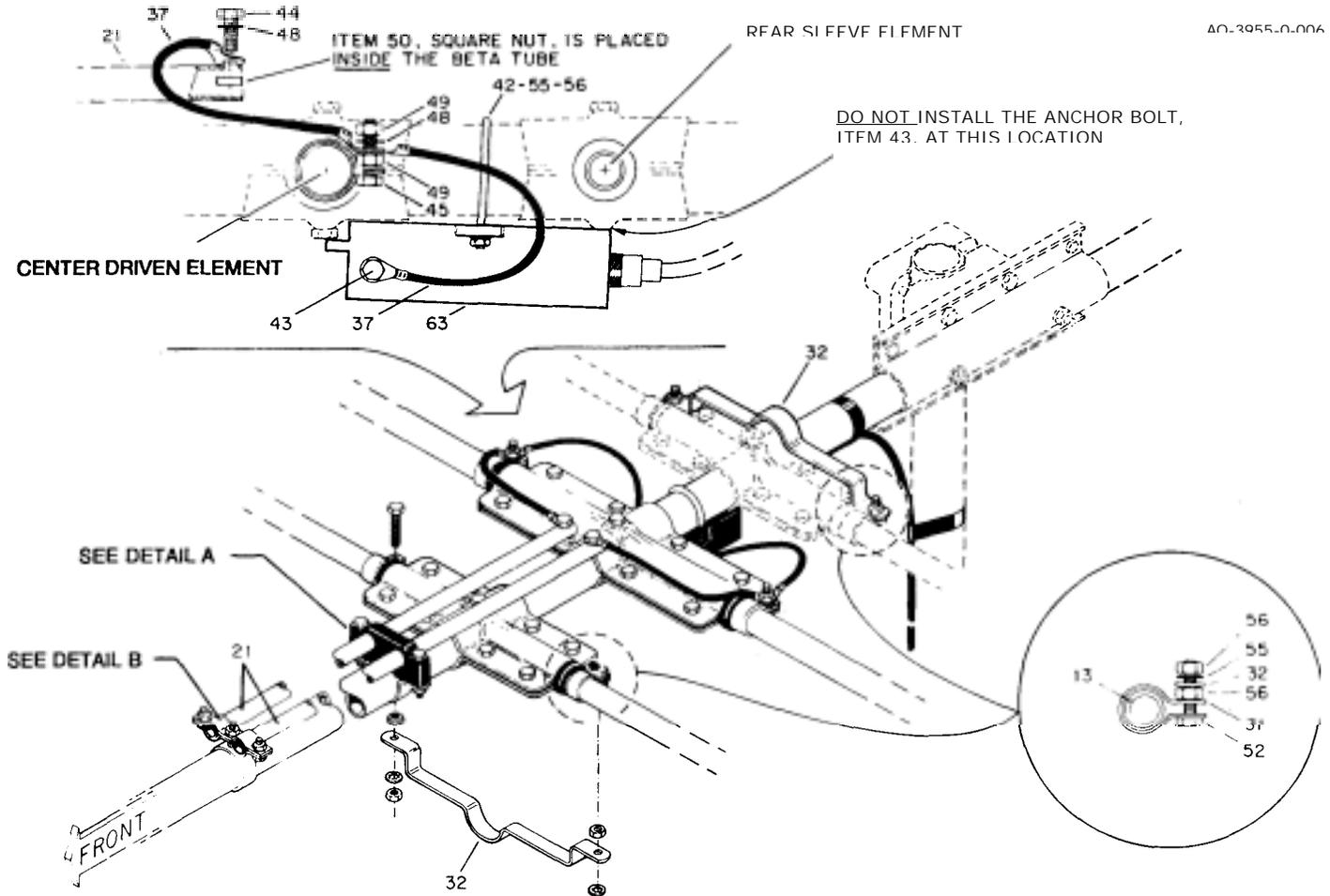
NOTE: THE ITEM NUMBERS ARE ITALICIZED

2-11

Item No.	Designator	Description	Item No.	Designator	Description
7	R1, DE-1	1 1/4" x 83"	15	DE-2	1 1/8" x 42"
8	R2	1 1/8" x 54"	16	D1	1 1/4" x 48"
9	R3, DE-3	7/16" x 37"	17	D2	1 1/8" x 30"
10	R2-1	7/8" x 55"	18	D3	1" x 6"
11	R2-2	5/8" x 26"	19	D4	7/16" x 28"
12	R2-3	7/16" x 42 3/4"	64	15M DE Trap	15M DE Trap
13	RS-1, FS-1	5/8" x 48"	65	15M Trap	15 M Trap
14	RS-2, FS-2	7/16" x 53"	66	10M Trap	10 M Trap

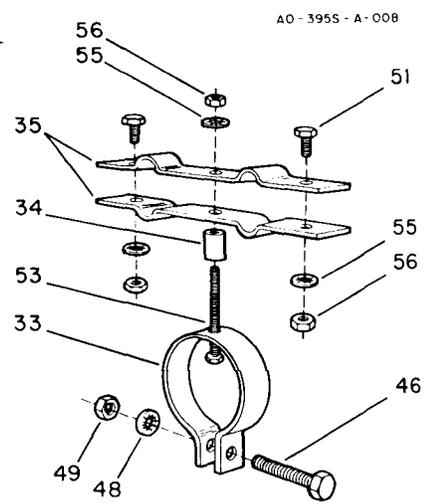
\*NOTE: THESE MEASUREMENTS ARE LONGER THAN THE MEASUREMENTS OF THE TUBE ITSELF DUE TO THE DEPTH OF THE BOOM-TO-DRIVEN ELEMENT INSULATORS.

Figure 12  
Element Assembly and Antenna Dimensions



**Detail A**  
Beta Support Clamps  
and Insulator Assembly

Item No.	Description
13	Tube, aluminum, 5/8" x 48", swaged, RS-1, FS-1
21	Tube, aluminum 3/4" x 60"
26	Insulator, Beta Support (Bottom)
27	Insulator, Beta Support (Top)
31	Clamp, Tubing, 5/8"
32	Strap, Boom Jumper
33	Strap, Boom-to-Beta
34	Sleeve, Beta Shorting
35	Strap, Beta Shorting, 3/8" radius
36	Clamp, Beta Support
37	"Pigtail" Wire, 7"
42	U-Bolt, #10-24 x 2 1/2" x 2 3/4"
43	Bolt, hex head, 1/4"-20 x 3/8", stainless steel
44	Bolt, hex head, 1/4"-20 x 3/4", stainless steel
45	Bolt, hex head, 1/4"-20 x 1 1/4", stainless steel
46	Bolt, hex head, 1/4"-20 x 1 1/2", stainless steel
48	Lockwasher, internal, 1/4", stainless steel
49	Nut, hex, 1/4"-20, stainless steel
50	Nut, square, 1/4"-20, stainless steel
51	Bolt, hex head, #10-24 x 5/8", stainless steel
52	Bolt, hex head, #10-24 x 1", stainless steel
53	Bolt, hex head, #10-24 x 1 1/2", stainless steel
54	Bolt, hex head, #10-24 x 2", stainless steel
55	Lockwasher, internal, #10, stainless steel
56	Nut, hex, #10-24, stainless steel
63	Balun, BN-86



**Detail B**  
Beta Shorting Clamp Assembly

**Figure 13**  
Para-Sleeve Driven Element Connections

## **Final Assembly Para-sleeve Driven Element System**

Select the two (2) 1 1/4" aluminum tubing clamps, four (4) 5/8" aluminum tubing clamps, two (2) 1/4"-20 x 1 1/4" bolts, two (2) 1/4"-20 hex nuts, six (6) 1/4" lockwashers, four (4) #10-24 x 1" bolts, and four (4) # 10-24 hex nuts. Assemble the two (2) 1 1/4" tubing clamps onto the center driven element and the four (4) 5/8" tubing clamps onto the sleeve elements as shown in Figure 13. Tighten these clamps

Select the two (2) boom jumper straps, four (4) # 10 lockwashers and four (4) # 10 hex nuts. Assemble these straps to the sleeve elements as shown in Figure 13. The front boom jumper strap is installed below the boom, and the rear boom jumper strap is installed above the boom. **DO NOT** allow these straps to short out against the boom. Tighten the hardware

Select the BN-86, 50 ohm balun, U-bolt, four (4) 7" pigtail wires and associated hardware and assemble as shown in Figure 13. Tighten all hardware securely. The balun should slope down towards the rear end, when installed, so that water may drain out during rain showers.

## **Beta Match Assembly -**

**NOTE:** The Beta Match Assembly is not used in the 40-meter conversion of the Explorer 14, therefore, it need not be assembled if you plan to add 40-meter operation. Also, the two pigtail wires going to the Beta Match need not be installed for 40 meters.

Select the two (2) beta match tubes (3/4" x 60"), beta support clamp, beta support insulator, beta top insulator, and associated hardware and clamps, as shown in Figure 13 and Details "A" and "B". Assemble as shown in Figure 13 and Details "A" and "B".

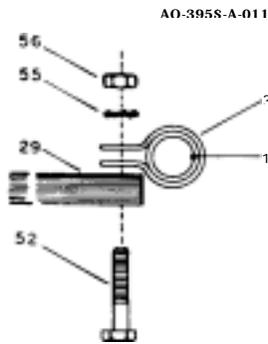
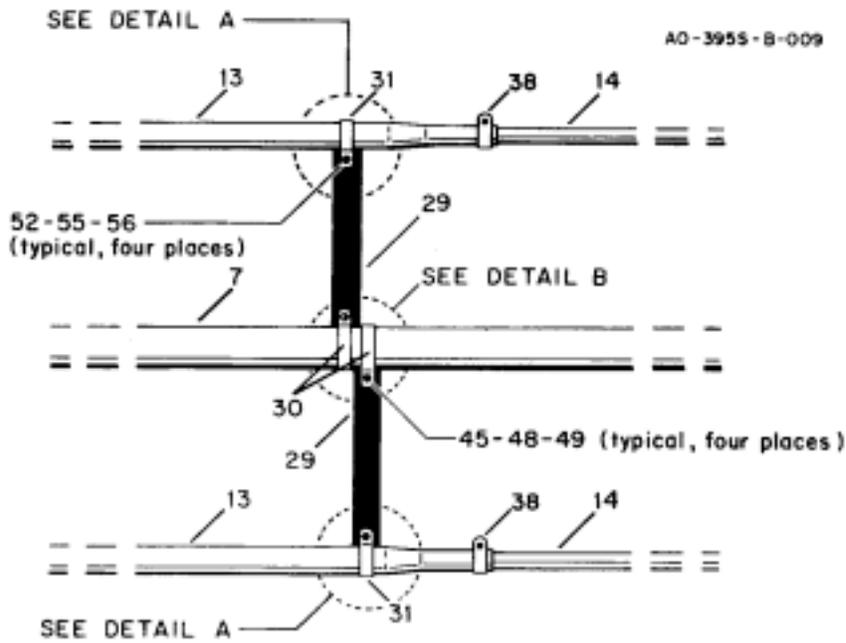
The shorting clamp should be flush with the ends of the beta match tubes. The opposite ends of the beta tubes should be even with the front edge of the center driven element-to-boom bracket. Tighten all hardware securely.

Do not allow the pigtail wires to touch either the boom or the element-to-boom bracket.

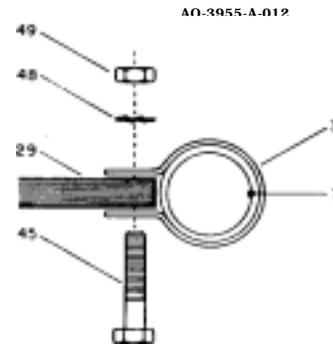
## **Para-sleeve Spacer Assembly**

Select the remaining four (4) 1 1/4" aluminum tubing clamps, four (4) 5/8" aluminum tubing clamps, four (4) sleeve spacer insulators, four (4) 1/4"-20 x 1 1/4" bolts, four (4) 1/4" lockwashers, four (4) 1/4"-20 hex nuts, four (4) #10-24 x 1" bolts, four (4) #10 lockwashers, and four (4) #10-24 hex nuts and assemble as shown in Figure 14. The sleeve spacers should be installed near the ends of the FS-1 and RS-1 sections. Tighten all bolts securely.

**NOTE:** If the QK-710 option is used, do not attach the spacers to the sleeve elements until the extension is added.



**Detail A 5/8" Clamp on  
Open-Sleeve Spacer  
Insulator**



**Detail B 1 1/4" Clamp on  
Open-Sleeve Spacer  
Insulator**

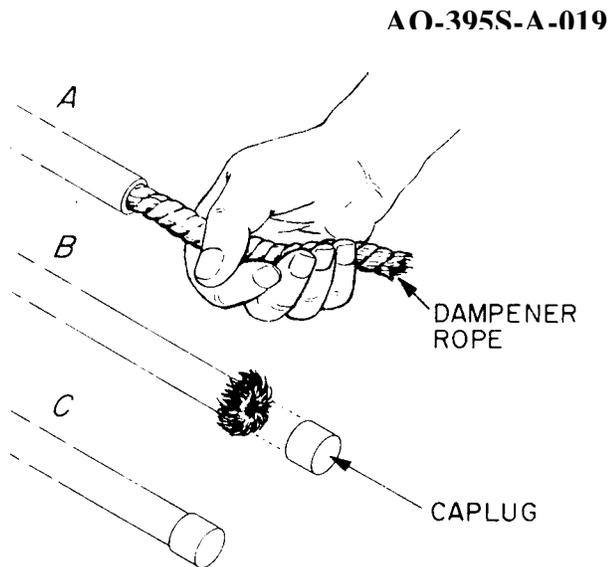
Item No.	Description
7	Tube Assembly, aluminum, 1 1/4" x 83", R1, DE-1
13	Tube, aluminum, swaged, 5/8" x 48", RS-1, FS-1
14	Tube, aluminum, 7/16" x 53", RS-2, FS-2
29	Insulator, Open-Sleeve Spacer

Item No.	Description
45	Bolt, hex head, 1/4"-20 x 1 1/4", stainless steel
48	Lockwasher, internal, 1/4", stainless steel
49	Nut, hex, 1/4"-20, stainless steel

**Figure 14 Para-Sleeve  
Spacer Detail**

## Final Assembly Rope Dampening

Select the dampener rope and cut it into two equal lengths of six feet each. Slip a rope into the end of each 10 meter reflector element. With about a 1/2" of rope extending from the element end, separate the fibers and fold them back over the element end. Refer to Figure 15. Now slip a 7/16" caplug over the element and rope. The rope inside the element will dampen vibrations caused by low wind speeds. Place a 7/16" caplug on each end of the trapped elements. Select the 2" caplugs and place one on each boom end. Check all element spacings and dimensions and tighten all of the bolts before continuing.



**Figure 15 Rope Dampening**

## Final Assembly Checklist

1. - Check the distance between elements, 58 1/2", 6", 6", 69" and 24". (Distances will be 57 1/2", 7", 7", 68" and 24" if option QK-710 is used.)
2. - Check the exposed element lengths against the dimensions shown in Figure 12. Check both sides of each element. Ensure that the trap caps are firmly seated. (Note differences if option QK-
3. - Check the tightness of each element tubing clamp. You should not be able to turn an element that is securely clamped within a larger element.
4. - Check to ensure all elements lie in the same plane and will be perpendicular (at 90°) to the mast when installed.
5. -Ensure that all trap drain holes and all tubing slots will be facing the ground when installed.
- 6.-Securely tighten all bolts used in the element-to-boom brackets.
7. -Securely tighten all bolts used in the parasleeve and beta tube assemblies.

## CHAPTER

### Installation

#### IMPORTANT

*The Explorer 14 is a moderately large antenna and requires some consideration as to how you are going to get it to the top of the tower. Thoroughly read this section before beginning to install your antenna.*

#### Installation on a Crank-Up Tower

Crank the tower down completely or as low as it will go, and block all sections from moving by using a 2" x 4" piece of wood or a solid iron bar for heavier towers. The block should be inserted through the lattice structure before the tower is completely down, then the tower can be cranked down until the block takes the weight off the winch.

Use a ladder to reach the top of the tower. **NEVER CLIMB THE LATTICE STRUCTURE OF ANY CRANK-UP TOWER!** Attach the mast to the tower and rotator. (The cast aluminum boom-to-mast brackets should be installed on the mast as shown in Figure 2. See Chapter 2.) Attach a gin pole to the tower to assist in lifting the Explorer 14.

Attach the lifting rope to the balance point of the antenna. Be careful not to damage the rear sleeve assembly next to the boom-to-mast clamp. The lifting rope should be fed through the gin pole or other pulley arrangement attached to the tower. The other end should be at ground level, available to the ground crew for lifting. Guide ropes may be loosely looped over the boom ends and used by the ground crew to guide the antenna away from the tower and ladder. Each guide rope's two loose ends should be held by the ground crew, so that the guide rope can be retrieved. Always use a nonconductive type of rope if working near power lines.

#### Attaching the Antenna to the Mast

When the antenna reaches the mast bracket, the four (4) 5" bolts should be inserted through the holes in the mast brackets and secured using 5/16"-18 lockwashers and nuts. Tighten all bolts securely. You may wish to use a deep well socket set to tighten these bolts.

#### Other Types Of Towers

When installing the Explorer 14 on a guyed tower, you may wish to use a different guide system. If you have insulators on your guy wires, you will need to keep the antenna away from the guy wires as well as the tower. You may wish to use two ropes attached together at the top of the tower and attached to the ground about 15 feet apart. These two ropes can then be used to slide the antenna on as it is also being lefted. The two ropes will need to be far enough from the tower base to allow some sag and still support the antenna away from the guy wires.

#### WARNING

Installation of this product near power lines is dangerous. For your safety, follow the instructions.

#### Lightning Protection

For proper lightning protection, you must ground your antenna supporting structure. Grounding will ensure noise-free operation and low SWR. A proper ground consists of a 1/2" x 8" copper clad steel ground rod driven into the ground approximately 12" away from the concrete tower base. Connect the tower to the ground rod using #8 copper wire and commercial noncorrosive ground clamps.

**Attachment of Feedline**

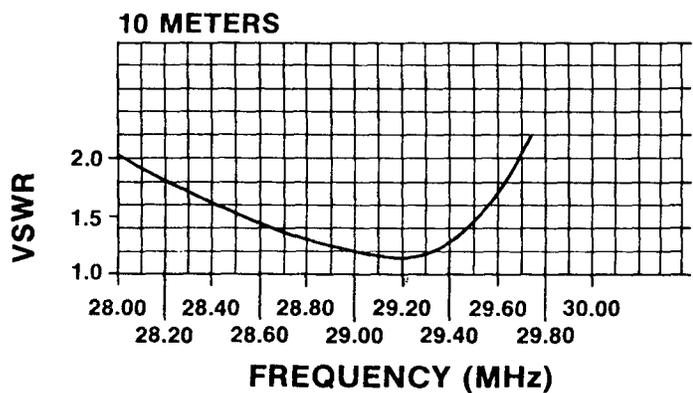
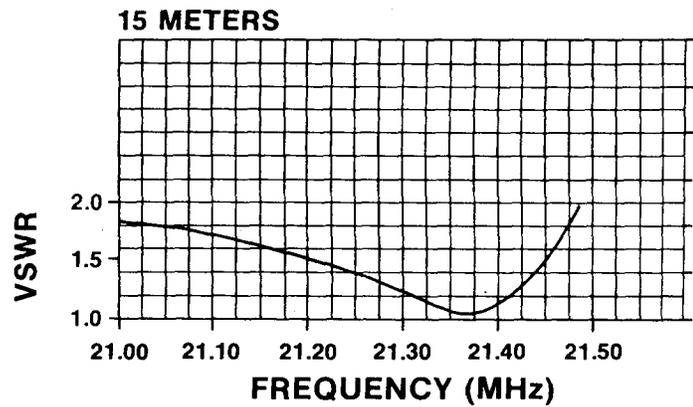
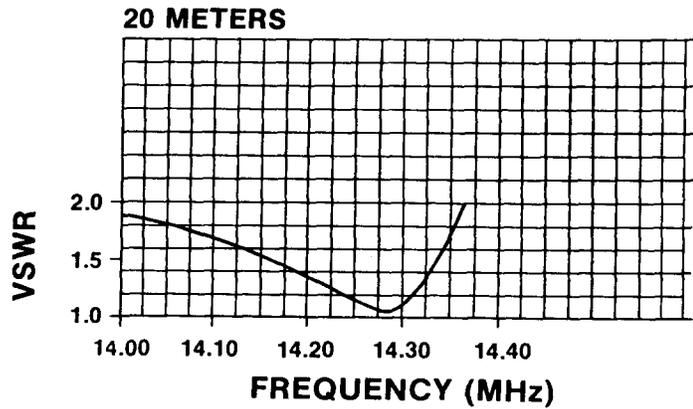
Use a good quality 50 ohm coaxial transmission line such as Times Wire and Cable RG-213/u or Belden 8214 (foam) or Belden 8237, 8267 or 9251 (solid). Take extra care when soldering connectors to foam dielectric coaxial cable. Weatherproof all connectors which will be exposed to rain or ice, with Coax-Seal® or another similar substance. There is no need to make the feedline any multiple of wavelengths long.

Attach the transmission line to the BN-86 balun and tighten the connector securely. Tape the coax to the boom and mast to ensure good strain relief.

**VSWR Curves**

These VSWR curves are typical for this antenna mounted 70 feet above the ground, horizontally polarized. Similar curves can be expected for this antenna mounted between 30 and 100 feet above the ground. **DO NOT TRY TO TUNE THIS ANTENNA FOR LOW VSWR AT GROUND LEVEL.** Higher VSWR can be expected if mounted at less than 30 feet or above a roof or large metallic structure. Forty (40) and eighty (80) meter wire dipoles should be kept at least 6 feet below this antenna.

Guy wires should be broken up into nonresonant lengths (less than 12 foot lengths) and insulated from the tower if mounted within 10 feet of the top of the tower.



**Figure 16  
VSWR Charts**

# CHAPTER 4

## Operatio

Connect the other end of your transmission line to a good quality SWR meter or ThruLine® wattmeter and then to your radio. While using lower power (less than 200 watts output), check the VSWR across each band from 14.0 to 29.7 MHz. Record this information for future reference. See Attachment 1 on the last page of this manual. Check the VSWR periodically to ensure proper operation.

The front-to-back ratio may be checked by using a steady carrier transmitted by a local station (at least a half mile away). The front-to-back ratio may be affected by the proximity of metallic structures or guy wires less than 10 feet below the antenna.

This completes your installation of the Explorer 14. Happy DX'ing!

## Maintenanc

The Explorer 14 antenna is designed to be relatively maintenance free. All hardware, except for seven (7) long bolts used in the boom-to-mast bracket, are made of passivated stainless steel. The seven (7) long bolts are plated with a thick layer of cadmium with a protective coating of clear chromate. The internal tooth-type lockwashers used in this antenna are made of a slightly magnetic grade of stainless steel. The element tubing clamps are made of all stainless steel. All other metallic parts are aluminum. All insulators are made of either black polyethylene or black Cylolac®.

Hy-Gain now recommends genuine Penetrox-A® from Burndy Corporation for use as an anti-electrolytic compound within element assemblies. This prevents aluminum oxide from forming on the aluminum surface, thereby maintaining high electrical conductivity between element sections, especially in coastal environments. No other type of conductive paste should be used. Penetrox-A® may be obtained from any electrical supply store.

A light amount of clear lacquer or an acrylic spray may be used to coat the exterior surface of the element assemblies if heavy oxidation is likely to occur. Do not use any coating on trap assemblies. Heavy oxidation of aluminum may occur if the antenna is installed within 5 miles of salt water.

When storing this antenna (or if awaiting installation), care should be taken not to damage any trap assembly or allow any dirt or insects to enter any trap assembly. Do not leave the elements in a grassy area, as wet grass will stain the aluminum.

## Optional

If you use a 1500 watt continuous duty power amplifier or if you use RTTY at 1500 watts on this antenna, the BN-86 balun should be replaced with a suitable high power balun or RF choke. Hy-Gain makes a new high-power current-type balun rated at 2000 watts continuous, Model /BN-4000B for beams.

# CHAPTER 5

## Troubleshooting

If you encounter problems with the operation of your Explorer 14, follow these steps to isolate the cause.

Usually you can isolate problems that occur in either your antenna or feedline/feedpoint.

If you experience high VSWR on all bands, your problem is probably in the feedline or balun. If you experience high VSWR on some bands but not all bands, look for problems in the antenna element lengths or traps or nearby resonant structures.

SYMPTOM	POSSIBLE CAUSES
Consistently high VSWR on all bands.	<p>Balun damaged by lightning or excessive power.</p> <p>Shorted coaxial connector.</p> <p>Water inside of balun or transmission line.</p>
High VSWR dependent upon direction of beam.	<p>Resonant guy wires too close to antenna.</p> <p>Metallic structures or wiring too close to antenna.</p>
Intermittent high VSWR not dependent on weather or power level or direction of beam or band selection.	<p>Loose connection on feed system, matching system or transmission line.</p>
High VSWR after rainshowers or with high humidity.	<p>Trap(s) installed with drain holes up instead of down.</p> <p>Water inside of coax or connector.</p> <p>DE-2 tubing section installed with slot up instead of down.</p> <p>Balun installed incorrectly (tipped down on front end).</p>
High VSWR with High power, Low VSWR with Low power.	<p>Balun damaged or defective.</p>
Low VSWR, but only near band edge(s).	<p>Loose coaxial connection on transmission line.</p>
High VSWR on only one or two bands.	<p>Trap(s) damaged or defective.</p> <p>Resonant guy wires or nearby metallic structure.</p> <p>Another HF antenna too close.</p> <p>Antenna not assembled correctly.</p>

## CHAPTER 25

### Service

If you are unable to resolve technical problems, you should contact the Telex/Hy-Gain Customer Service Department in Minneapolis, Minnesota.

You should fully research your problem by going through the Troubleshooting Guides in Chapter 5 before you contact the Customer Service Department. You should also record your VSWR across all three bands before calling.

You should retain your sales receipt or other proof of purchase for antennas that are still under warranty. (See separate sheet for Telex Warranty.)

All requests, inquiries or warranty claims should be made to:

Amateur Department Telex  
Communications, Inc. 9600 Aldrich  
Avenue South Minneapolis, MN 55420  
Phone: (612) 884-4051 or (612) 887-5528

For ordering replacement parts,

Telex/Hy-Gain

Telex Communications, Inc.  
8601 East Cornhusker  
Highway P.O. Box 5579  
Lincoln, NE 68505-5579

### PARTS LIST

Item No.	Part No.	Description	Qty
1	102734	Bracket, cast aluminum.....	2
2	172735	Bracket, casting-to-boom.....	1
3	172732	Clamp, boom-to-bracket.....	1
4	163764	Bracket, element-to-boom, #4 .....	2
5	165919	Bracket, element-to-boom, #13 .....	8
6	165920	Bracket, element-to-boom, #14 .....	2
7	871098	Tube Assembly, aluminum, 1 1/4" x 83", R1, DE-1 .....	4
8	190314	Tube, aluminum, 1 1/8", x 54", swaged, R2 .....	2
9	171153	Tube, aluminum, 7/16" x 37", R3, DE-3 .....	4
10	190206	Tube, aluminum, 7/8" x 55", swaged, R2-1.....	2
11	190006	Tube, aluminum, 5/8" x 26", swaged, R2-2.....	2
12	175512	Tube, aluminum, 7/16" x 42 3/4", R2-3 .....	2
13	190000	Tube, aluminum, 5/8" x 48", swaged, RS-1, FS-1 .....	4
14	172928	Tube, aluminum, 7/16" x 53" .....	4
15	190309	Tube, aluminum, 1 1/8" x 42", swaged, DE-2.....	2
16	190900	Tube, aluminum, 1 1/4" x 48", D1.....	2
17	190313	Tube, aluminum, 1 1/8" x 30", swaged, D2.....	2
18	190606	Tube, aluminum, 1" x 6", D3 .....	2
19	178558	Tube, aluminum, 7/16" x 28", D4.....	2
20	178411	Tube, aluminum, 2" x 83 3/4", drilled, (boom tube) .....	2
21	170482	Tube, aluminum, 3/4" x 60", (beta tube) .....	2
28	465833	Insulator, 1 1/4" I.D., dirven element .....	2

## PARTS LIST (continued)

Item

No.	Part No. Qty	Description	
22	455644	Caplug, 7/16", black .....	12
23		(NOT USED)	
24	455625	Caplug, 2", black.....	2
25	461057	Insulator, 5/8", I.D., front and rear sleeves.....	4
26	465595	Insulator, beta support (bottom) .....	1
27	465600	Insulator, beta support (top) .....	1
29	470486	Insulator, open-sleeve spacer .....	4
	872222	Parts Pack, 395S, Straps .....	1
30	168695	Clamp, tubing, 1 1/4 "	
31	171329	Clamp, tubing, 5/8.....	8
32	170483	Strap, boom jumper.....	2
33	171077	Strap, boom-to-beta, 2" I.D. ....	1
34	171131	Sleeve, beta shorting.....	1
35	171162	Strap, beta shorting, 3/8" radius .....	2
36	177888	Clamp, beta support .....	1
37	871508	"Pigtail" wire, 7" .....	4
	878682	Parts Pack, 395S, Clamps.....	1
38	358756	Clamp, tubing #6, stainless steel .....	14
39	358757	Clamp, tubinyg #10, stainless steel .....	10
40		(NOT USED)	
41	358758	Clamp, tubing #16, stainless steel.....	6
-42	541363	U-bolt, # 10-24 x 2 1/2" x 2 3/4" .....	1
	872224-1	Parts Pack, 395S, 1/4" Hardware.....	1
43	500156	Bolt, 1/4"-20 x 3/8", hex head, stainless steel .....	14
44	505266	Bolt, 1/4"-20 x 3/4", hex head, stainless steel .....	56
45	506518	Bolt, 1/4"-20 x 1 1/4", hex head, stainless steel .....	6
46	504098	Bolt, 1/4"-20 x 1 1/2", hex head, stainless steel .....	2
47	505763	Bolt, 1/4"-20 x 1 3/4", hex head, stainless steel .....	2
48	562961	Lockwasher, internal, 1/4", stainless steel .....	72
49	554099	Nut, hex, 1/4"-20, stainless steel .....	64
50	551367	Nut, square, 1/4"-20, sstainless steel .....	14
	872225-1	Parts Pack, 395S, #10 and 5/16" Hardware.....	1
51	500160	Bolt, # 10-24 x 5/8", hex head, stainless steel .....	4
52	504069	Bolt, #10-24 x 1", hex head, stainless steel .....	10
53	500159	Bolt, # 10-24 x 1 1/2", hex head, stainless steel .....	2
54	500157	Bolt, #10-24 x 2", hex head, stainless steel.....	2
55	565697	Lockwasher, internal, #10, stainless steel.....	28
56	554071	Nut, # 10-24, hex, stainless steel .....	24
57	555792	Nut, #10-24, square, stainless steel.....	2
58	506968	Bolt, 5/16"-18 x 2 3/4", hex head, stainless steel.....	2

# PARTS LIST

Item No.	Part No.	Description	Qty
59	500392	Bolt, 5/16"-18 x 3", hex head, stainless steel .....	2
60	500349	Bolt, 5/16"-18 x 5", hex head, stainless steel .....	4
61	564792	Lockwasher, split, 5/16", stainless steel.....	13
62	555747	Nut, 5/16"-18, hex, stainless steel .....	9
63	873424	Balun, BN-86 .....	1
64	878637	Trap, 15M, driven element.....	2
65	878694	Trap, 15M .....	4
66	878749	Trap, 10M .....	2
67	850050	Coax-Seal ©.....	1
68	691138	Rope, 12 ft., black poly .....	1

## Converting American Measurements To Metric

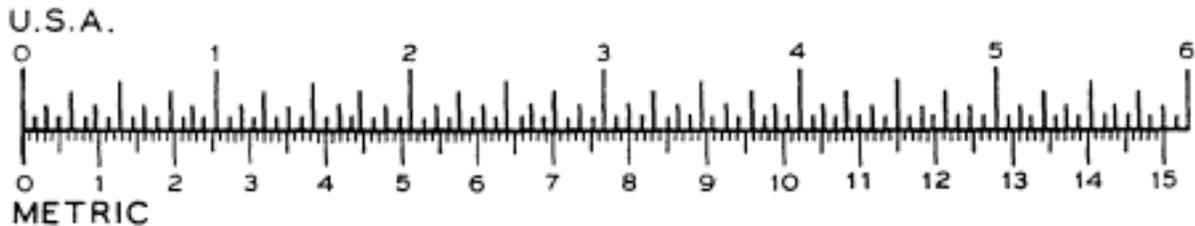
Use this scale to identify lengths of bolts, diameters of tubes, etc. The American inch (1 ") and foot (1') can be converted to centimeters in

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

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

Example:

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



# VSWR RECORD

Type of VSWR Meter \_\_\_\_\_

Frequency	Date _____	Date _____	Date _____
	VSWR	VSWR	VSWR
14.00	_____	_____	_____
14.10	_____	_____	_____
14.20	_____	_____	_____
14.30	_____	_____	_____
14.35	_____	_____	_____
21.00	_____	_____	_____
21.10	_____	_____	_____
21.20	_____	_____	_____
21.30	_____	_____	_____
21.40	_____	_____	_____
21.45	_____	_____	_____
28.00	_____	_____	_____
29.25	_____	_____	_____
29.50	_____	_____	_____
28.75	_____	_____	_____
29.00	_____	_____	_____
29.25	_____	_____	_____
29.50	_____	_____	_____
29.70	_____	_____	_____

Height of Antenna: \_\_\_\_\_

Typed of antennas or guy wires  
also attached to same tower: \_\_\_\_\_  
\_\_\_\_\_

NOTES

**Please record the following information for your records.**

**Date of Purchase:** \_\_\_\_\_

**Purchased From:** \_\_\_\_\_

**Price Paid:** \_\_\_\_\_

**Please retain your copy of the Bill-of-Sale for warranty claims.**

## *hy-gains* LIMITED WARRANTY

*by gain* Warrants to the original owner of this product, if manufactured by *by gain* and purchased from an authorized dealer or directly from *by gain* to be free from defects in material and workmanship for a period of 12 months for rotator products and 24 months for antenna products from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof-of-purchase to *by gain* at the time of warranty service. *hygain* shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. *hygain* agrees to repair or replace at *hygain's* option without charge to the original owner any defective product under warranty, provided the product is returned postage prepaid to *hygain* with a personal check, cashiers check, or money order for \$8.00 covering postage and handling.
3. Under no circumstances is *hygain* liable for consequential damages to person or property by the use of any *hygain* products.
4. Out-of-warranty Service: *hygain will* repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
5. This warranty is given in lieu of any other warranty expressed or implied.
6. *hygain* reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
7. All *hygain* products to be serviced in-warranty or out-of-warranty should be addressed to *hygain*, 308 Industrial Park Road, Starkville, Mississippi 39759, USA and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.
8. This warranty gives you specific rights, and you may also have other rights which vary from state to state.