

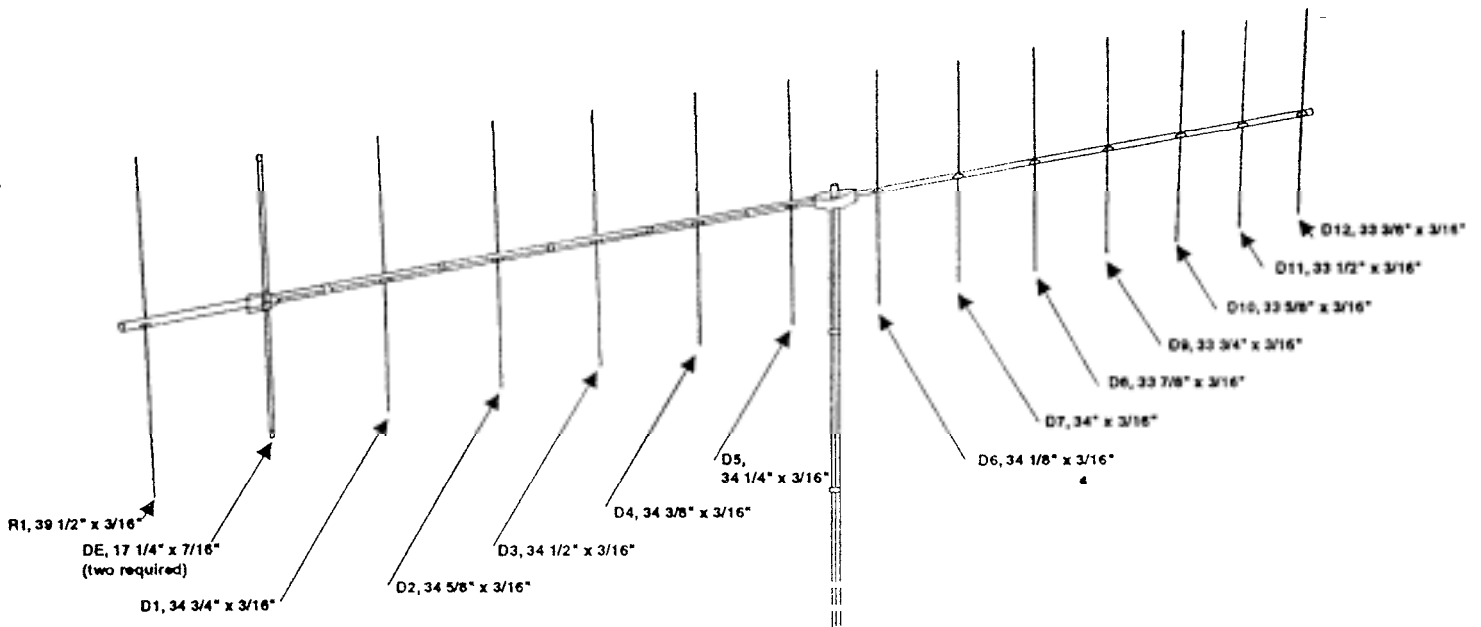


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# VB-214FM

14 Elements 2-Meter Beam

# INSTRUCTION MANUAL



**Figure 1**  
**Overall View**

### GENERAL DESCRIPTION

This antenna is a 14-element, closed-spaced, two meter beam. It features high forward gain associated with a narrow beam width. It has an excellent front-to-back ratio and is especially suited for DX contacts where maximum gain and a narrow beam width is required.

The 214FM antenna now features stainless steel hardware for all electrical and most mechanical connections, and a boom-to-mast bracket that will fit mast diameters up to 2 1/16 inches.

## SPECIFICATIONS

### *Mechanical*

Boom Length.....	15'6" (4.72 m)
Longest Element .....	39 1/2" (1003 mm)
Turning Radius (maximum) .....	95" (2.41 m)
Wind Survival .....	80 mph (129 kmph)
Mast Diameter.....	15/8" to 2 1/16" O.D. (41 mm to 52 mm)
Boom Diameter.....	1 1/4" O.D. (32 mm)
Wind Area .....	1.65 sq. ft. (vertical), 1.28 sq. ft. (horizontal)
Net Weight .....	5.5 pounds (2.5 kg)

### *Electrical*

Gain .....	15.2 dBi (13.0 dBd)
Front-to-Back Ratio .....	20 dB
Maximum SWR.....	2:1
Band Width . . . . .	4 MHz
Maximum Power.....	250 watts continuous, 500 watts <a href="#">P.E.P.</a>
<a href="#">Impedance</a> .....	50 ohms (with balun)
Half-Power Beam Width .....	35° (vertical, horizontal polarization)
Broadside Stacking Distance .....	12" max., 6'10" min.

## INSTALLATION

This antenna fits a 2" O.D. mast. A 2" O.D. galvanized pipe is recommended for a sturdy mast.

Mount the antenna in the clear. Surrounding objects - particularly power lines and other objects of considerable mass or length - are detrimental to the performance of the antenna.

### WARNING

Do not allow any part of the antenna to touch power line. This could cause severe burns or fatal injuries.

When mounting the 214FM with an HF beam antenna on the same mast, the 214FM should be on top. If the 214FM is to be vertically polarized, separation of the two antennas should be at least 2 feet. If the 214FM is to be horizontally polarized, separation should be at least 6 feet.

The mast, if metallic, should never be run completely through the plane of the elements. A vertically polarized 214FM may be mounted at the top of a metallic mast as shown in Figure 1. Horizontally polarized mounting will not be affected by the mast.

The antenna can be mounted either vertically or horizontally for FM or SSB/CW operation respectively. Circular polarization can be obtained by using two yagis. For information about which polarization to use, consult local Amateurs who use the frequencies you desire.

## STEP-BY-STEP ASSEMBLY

Remove the parts from the carton and check them against the Parts List and the illustrations.

Select the boom-to-mast backup plate (Item No. 6), the boom-to-mast clamp (Item No. 5) and the four (4) 1/4"-20 x 3/4" bolts, 1/4" lockwashers and nuts (Item Nos. 32, 33 & 34).

Place the boom-to-mast clamp on the boom as shown in Figure 2. The front and rear boom sections should meet in the middle of the boom-to-mast clamp. Use the 1/4"-20 x 3/4" bolts in the outside holes. Leave the inside holes for the two (2) U-bolts, which will be used later for mounting the mast. Select either the vertical or horizontal mounting position. Adjust the boom accordingly before tightening the bolts securely.

Select 3/16" x 39 1/2" R1 aluminum rod (Item No. 7). Use a pencil to place a mark at the center of the rod (19 3/4" from either end). Place two more marks 5/8" from each side of the center mark.

NOTE: Clamps shown in vertically-polarized mounting configuration.

Place a #10-24 x 1 1/2" eyebolt (Item No. 27) into the RI slot as shown in Figure 3. Slide the RI through the holes and the eyebolt until the outer two marks on the RI are visible on each side of the boom. Slip on an aluminum half washer (Item No. 23), a lockwasher (Item No. 30) and a #10 nut (Item No. 31). Tighten it just enough to hold the rod securely. **DO NOT OVERTIGHTEN** You should not be able to twist or move the element if tightened enough.

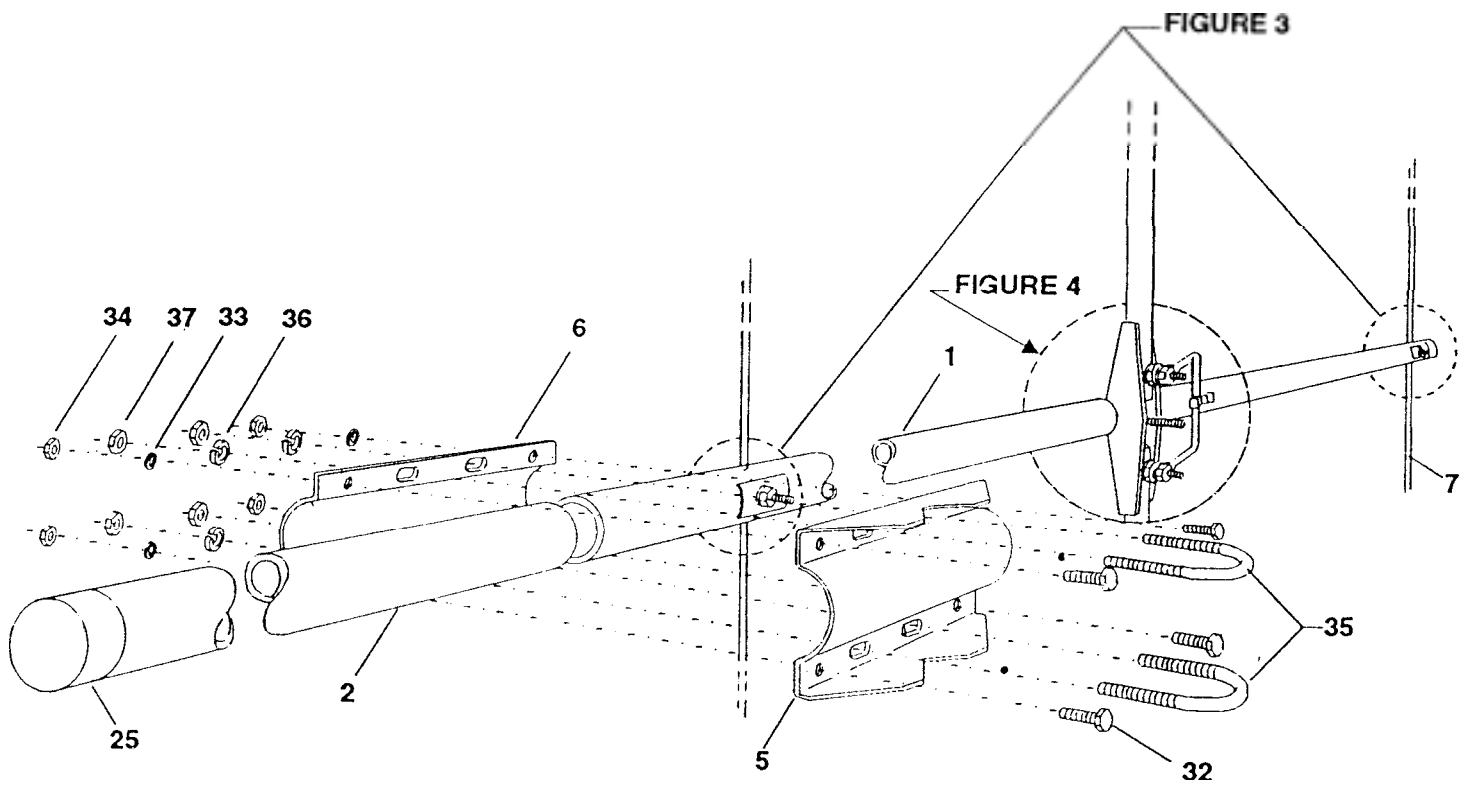


Figure 2  
Boom-to-Mast Clamp Assembly

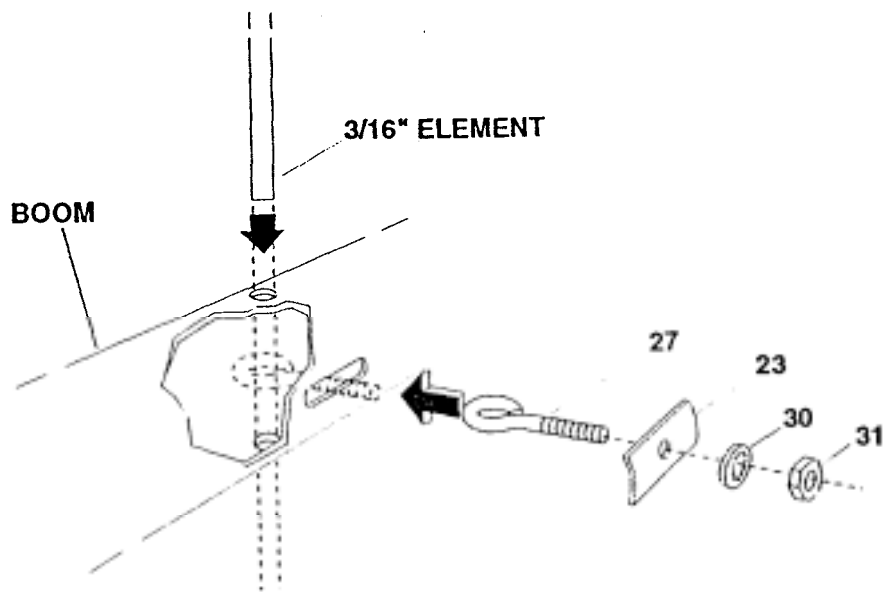


Figure 3  
Element Assembly

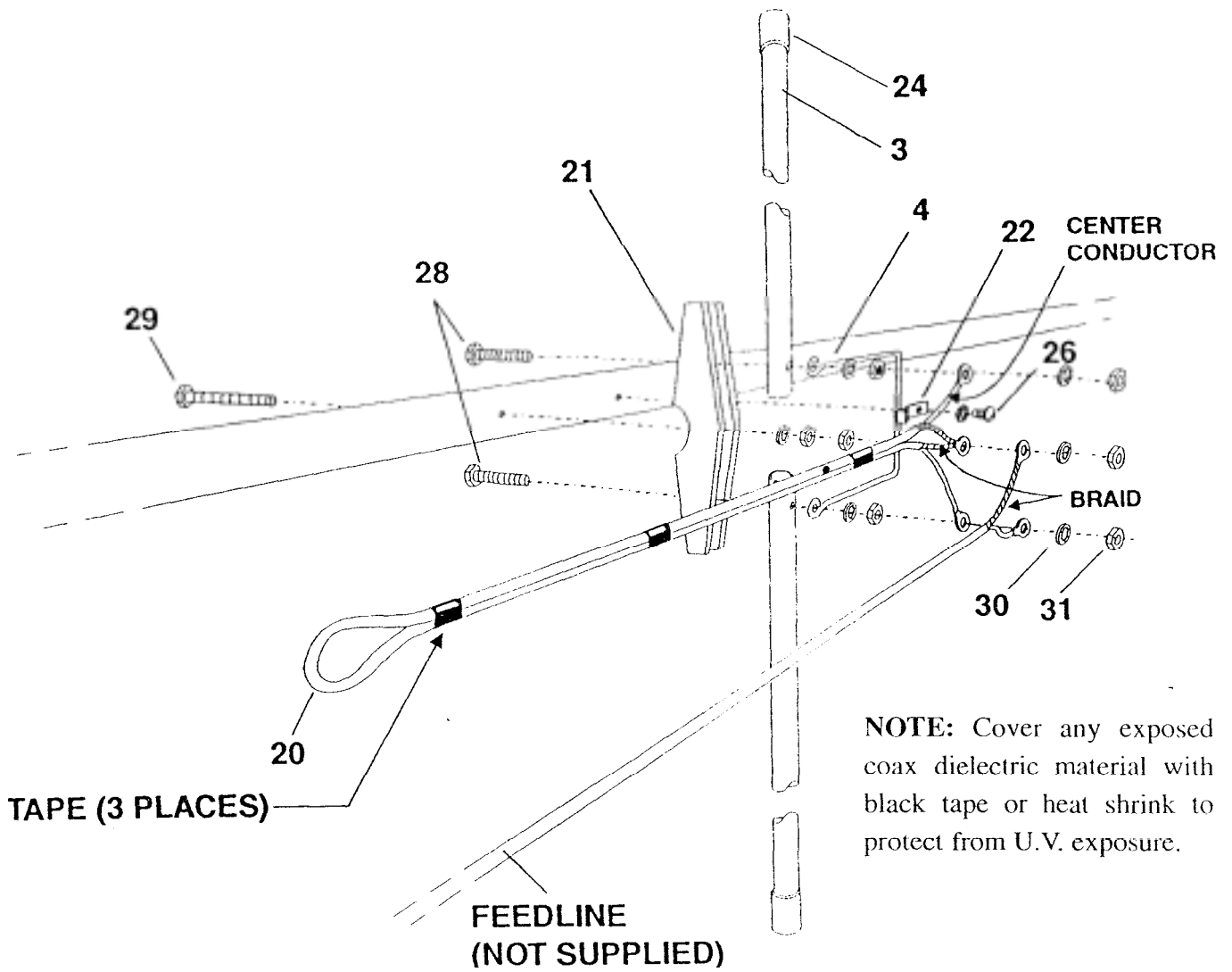


Figure 4  
Driven element assembly

Select the element-to-boom insulator (Item No. 21), two sections of the 7/16" x 17 1/4" Driven element (DE) (Item No. 3) and the beta rod (Item No. 4). See Figure 4.

Use the #10-24 x 2 1/2" bolt (Item No. 29) to fasten the element-to-boom insulator to the boom. Refer to Figure 4. Use a lockwasher and 2 nuts to secure.

Use the two (2) #10-24 x 1 1/2" bolts (Item No. 28) to assemble the Driven Element as shown in Figure 4. Pay particular attention to the connections of the beta rod, balun and feedline. The beta rods will bend slightly as the screw (item 26) is tightened.

Use the #10 x 3/8" screw (Item No. 26) to fasten the beta rod shorting clip (Item No. 22) over the beta rod as shown in Figure 4.

Waterproof the coax connection with Coax-Seal® or some similar substance. Install capplugs on the ends of the boom and the Driven Element.

Coax-Seal is a registered trademark of Universal Electronics Inc.

Select the rods from the table below. Mark the center point on each rod, then make two more marks 5/8" on either side of the center mark. Secure the elements to the boom as shown in Figure 3. Be sure they are oriented as shown. When all elements are installed, loosen the boom-to-mast clamp then twist the front boom to align the elements, then retighten the boom-to-mast clamps.

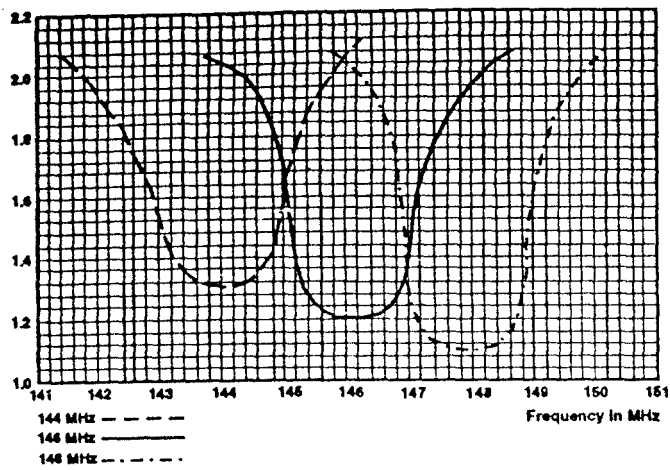
Slip the two U-bolts (Item No. 35) into the boom-to-mast bracket and fasten it to the mast securely. Use black electrical tape or black tie-wraps to secure the coax feedline and balun to the boom and to the mast. Be sure to insulate any connections from the boom or the mast. This completes the assembly procedures.

## TUNING

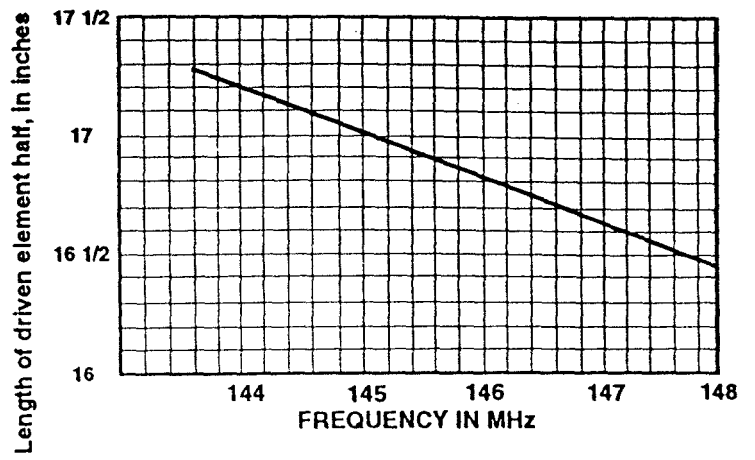
Driven Element: SWR can be lowered to less than 1.2:1 at a desired frequency by carefully trimming the driven element. Keep the element symmetrical by cutting the same amount from each side. Typical SWR curves and a cutting chart are shown in Figure 6. Each installation is slightly different, so cut the driven element for the lower SWR at your particular location. Measure the SWR as close to the antenna as you can for accurate results. The SWR should be measured with the mast at right angles to the elements.

Element Description	Length	Item No.
D1	34 3/4" (883 mm)	8
D2 <sup>1</sup>	34 5/8" (879 mm)	9
D3	34 1/2" (876 mm)	10
D4	34 3/8" (873 mm)	11
D5	34 1/4" (870 mm)	12
D6	34 1/8" (867 mm)	13
D7	34" (864 mm)	14
D8	33 7/8" (860 mm)	15
D9	33 3/4" (857 mm)	16
D 10	33 5/8" (854 mm)	17
<u>D11</u>	33 1/2" (851 mm)	18
D 12	33 3/8" (848 mm)	19

Element Table



VSWR for Horizontal Polarization Only



Driven Element Cutting Chart

Figure 6  
 VSWR and Cutting Chart

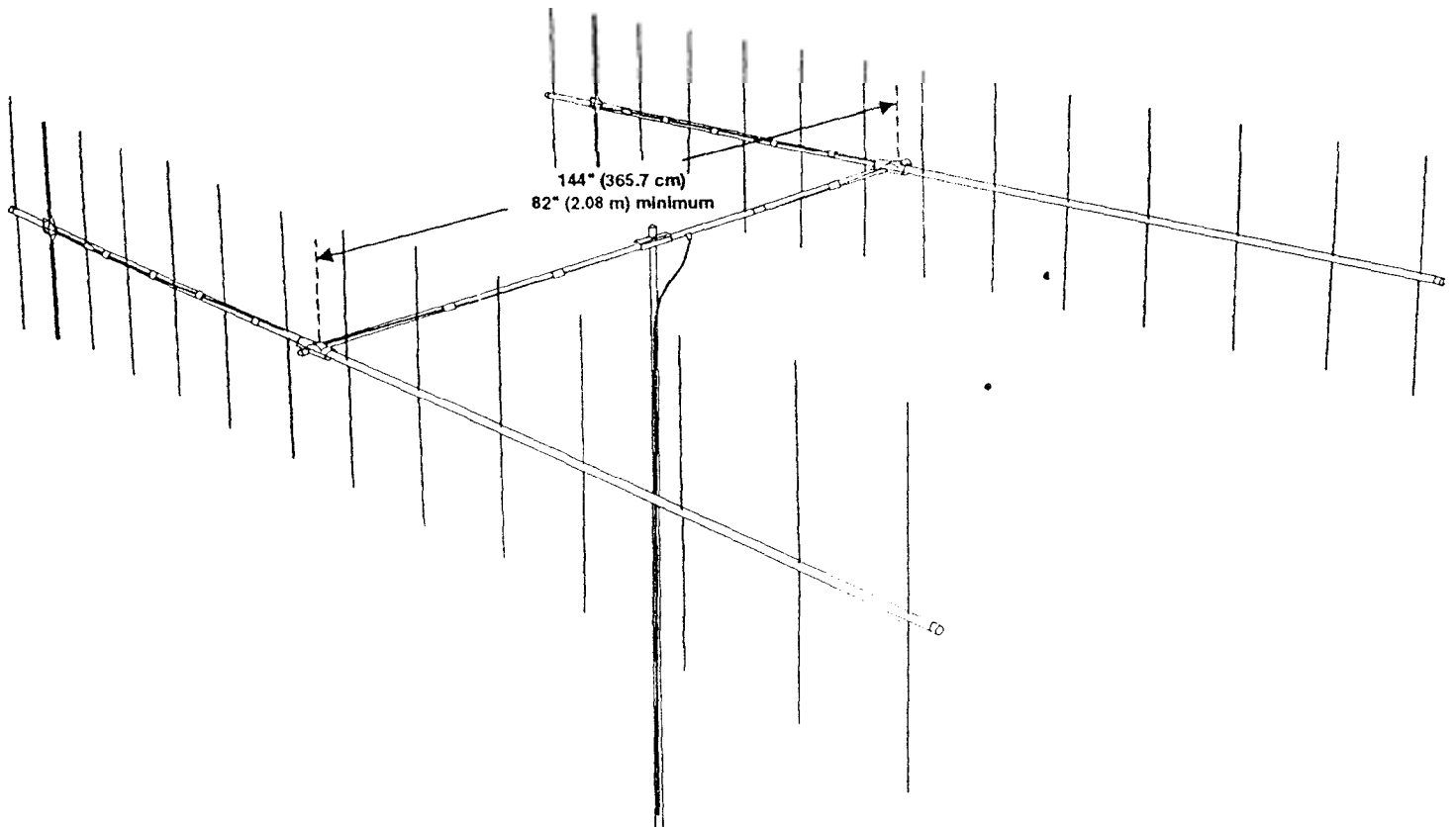


Figure 7  
 Vertically Polarized Broadside Stacking Configuration for FM Operation

## STACKING

This antenna can be easily stacked for approximately 3 dB more gain each time the number of yagi is doubled. Refer to Figures 7 and 8 for stacking and phasing harness cutting information.

The two phasing lines coming from the two antennas to the "T" connector can be any odd multiple of one-quarter wavelength in the 75-ohm transmission line. See Figure 8.

NOTE: When phasing two antennas, the Driven Element halves that are connected directly to the phasing lines should be on the same side of the array (either top or bottom).

For detailed information on stacking more than two yagis, please consult any current Amateur Handbook.

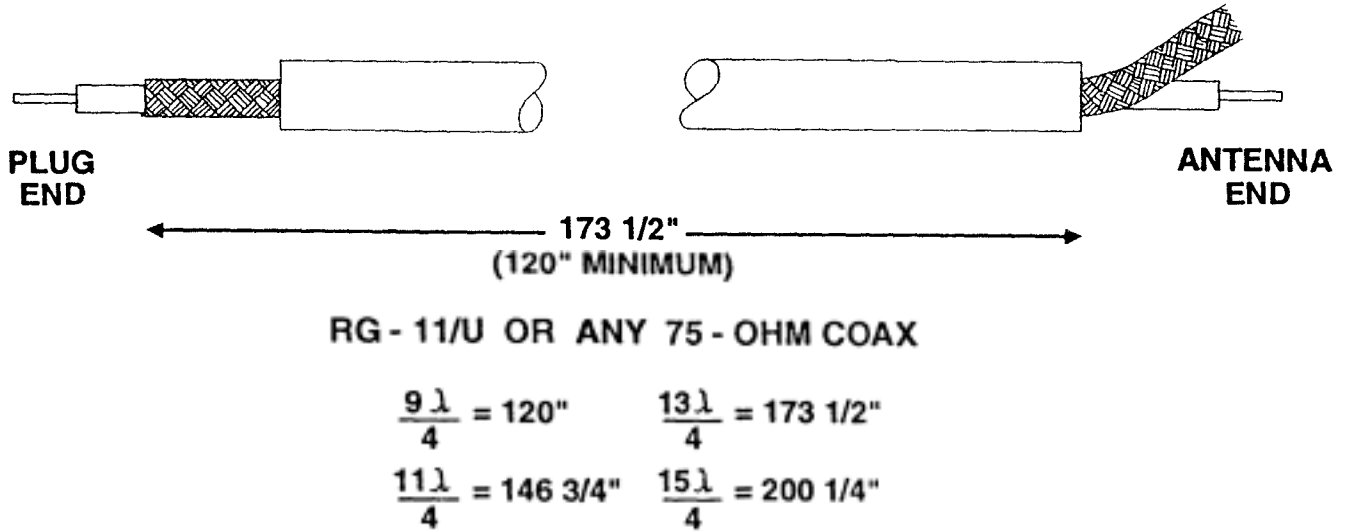


Figure 8  
Coaxial Cable Length for Phasing

**FOR OUR OVERSEAS CUSTOMERS:** The United States uses American units of measurement. Please see the information below for assistance in identifying the hardware and components supplied with the product.

### CONVERTING AMERICAN MEASUREMENTS TO METRIC

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

1 inch (1") = 2.54 cm

1 foot (1') = 30.48 cm

Example: 42" x 2.54 = 106.7 cm



## PARTS LIST

Item	Part No.	Description	Qty
1	170390	Boom, Rear, 1 1/4" x 93" (has extra hole for Beta Match) .....	1
2	170387	Boom, Front, 1 1/4" x 93.....	1
3	175157	Driven Element. 7/16" x 17 1/4.....	2
4	170389	Beta Rod, 2 1/2".....	1
5	385142-1	Clamp, Boom-to-Mast .....	1
6	385144-1	Backup Plate, boom-to-Mast.....	1
7	160037	Rod, R1, aluminum, 3/16" x 39 1/2.....	1
8	160024	Rod, D1, aluminum, 3/16" x 34 3/4.....	1
9	160025	Rod, D2, aluminum, 3/16" x 34 5/8.....	1
10	160026	Rod, D3, aluminum, 3/16" x 34 1/2.....	1
11	160027	Rod, D4, aluminum, 3/16" x 34 3/8".....	1
12	160028	Rod, D5, aluminum, 3/16" x 34 1/4.....	1
13	160029	Rod, D6, aluminum, 3/16" x 34 1/8.....	1
14	160030	Rod, D7, aluminum, 3/16" x 34.....	1
15	160031	Rod, D8, aluminum, 3/16" x 33 7/8.....	1
16	160032	Rod, D9, aluminum, 3/16" x 33 3/4.....	1
17	160033	Rod, D10, aluminum, 3/16" x 33 5/8.....	1
18	160034	Rod, D11, aluminum, 3/16" x 33 1/2.....	1
19	160035	Rod, D12, aluminum, 3/16" x 33 3/8.....	1
20	871704	Balun Assembly .....	1
21	465420	Insulator (Driven Element-to-Boom).....	1
	872072-1	Parts Pack 214S-1, Stainless Steel.....	1
22	163266	Beta Clip .....	1
23	170376	Half Washer, aluminum.....	13
24	475639	Caplug, 7/16", with hole, black.....	2
25	455630	Caplug, 1 1/4", black .....	2
26	510670	Screw, pan head, #10 x 3/8", Type A .....	1
27	540065	Eyebolt, 5/16" #10-24 x 1 1/2.....	13
28	500159	Bolt, hex head, #10-24 x 1 1/2.....	2
29	500164	Bolt, hex head, #10-24 x 2 1/2" .....	1
30	565697	Lockwasher, internal, #10.....	21
31	554071	Nut, Hex, #10-24 .....	20
32	505266	Bolt, hex head, 1/4"-20 x 3/4.....	4
33	562961	Lockwasher, internal, 1/4.....	5
34	554099	Nut, hex, 1/4"-20 .....	4
35	540067	U-bolt, 5/16"-18 x 3 5/8.....	2
36	564792	Lockwasher, split, 5/16.....	4
37	555747	Nut, hex, 5/16"-18 .....	4

## **hy-gain**® LIMITED WARRANTY

**Hy-Gain** Warrants to the original owner of this product, if manufactured by **Hy-Gain** and purchased from an authorized dealer or directly from **Hy-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 **Hy-Gain** at the time of warranty service. **Hy-Gain** 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. **Hy-Gain** agrees to repair or replace at **Hy-Gain's** option without charge to the original owner any defective product under warranty, provided the product is returned postage prepaid to **Hy-Gain** with a personal check, cashiers check, or money order for \$8.00 covering postage and handling.
3. Under no circumstances is **Hy-Gain** liable for consequential damages to person or property by the use of any **Hy-Gain** products.
4. Out-of-warranty Service: **Hy-Gain** 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. **Hy-Gain** 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 **Hy-Gain** products to be serviced in-warranty or out-of-warranty should be addressed to **hy-gain, 308 Industrial Park Road, 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.