

hygain antenna parts (402)465-7022



88070

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for notes
RPL-2

INSTRUCTION MANUAL



ORDER NO. 205S-1

Model 205B-S
5-Element, 2-Meter Beam

PN 801313-2

General Description

This antenna is a 5 element, 2 meter beam optimum spaced on a 75" boom. It features high forward gain and an excellent front-to-back ratio. The antenna is end mounted giving it the advantage of no mast decoupling and a broad frequency response. This antenna now uses stainless steel hardware in most locations except for the U-bolts. Also, this antenna now features a NEW boom-to-mast bracket that fits up to a mast diameter of 2 1/16 inches.

Specifications

Mechanical

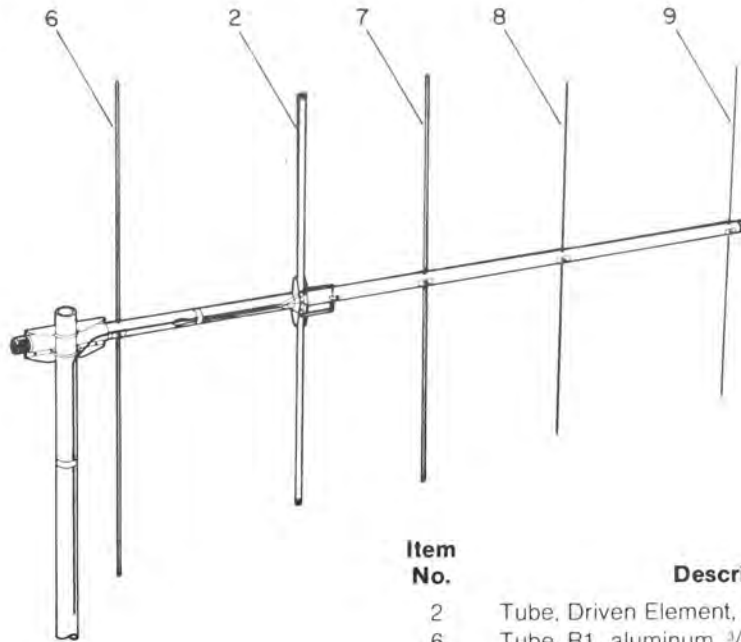
Boom Length	75" (1905 mm)
Longest Element	39 5/8" (1006 mm)
Net Weight	2.9 lbs. (1.3 kg)
Turning Radius (Max.)	73" (1854 mm)
Wind Survival	80 mph (129 kmph)
Mast Diameter	1 5/8" to 2 1/16" O.D. (41 mm to 52 mm)
Boom Diameter	1 1/4" O.D. (32 mm)
Wind Area	0.585 sq. ft. (.054 m ²) (horizontal) 0.740 sq. ft. (.0688 m ²) (vertical)

Electrical

Gain (Average)	11.3 dBi (9 dBd)
Front-to-Back Ratio	20 dB
Maximum SWR	2:1
Band Width	4 MHz
Maximum Power	250 Watts continuous, 500 Watts P.E.P.
Impedance	50 ohms (with balun)
Half-Power Beam Width	60° (vertical polarization) 45° (horizontal polarization)
Stacking Distance	82" (2083 mm) minimum

SWR and Feedline

The 205S-1 antenna has an input impedance of 200 ohms. The supplied balun matches the input to 50 ohms. If you are using transmission line with a characteristic impedance other than 50 ohms or 200 ohms, a matching device must be made. Refer to any current Amateur Handbook for information on constructing a matching service.



Item No.	Description
2	Tube, Driven Element, aluminum, $\frac{7}{16}$ " x $17\frac{1}{4}$ "
6	Tube, R1, aluminum, $\frac{3}{16}$ " x $39\frac{5}{8}$ "
7	Tube, D1, aluminum, $\frac{7}{16}$ " x $36\frac{7}{8}$ "
8	Tube, D2, aluminum, $\frac{3}{16}$ " x $35\frac{3}{4}$ "
9	Tube, D3, aluminum, $\frac{1}{16}$ " x $35\frac{3}{8}$ "

AO-0205-B-004

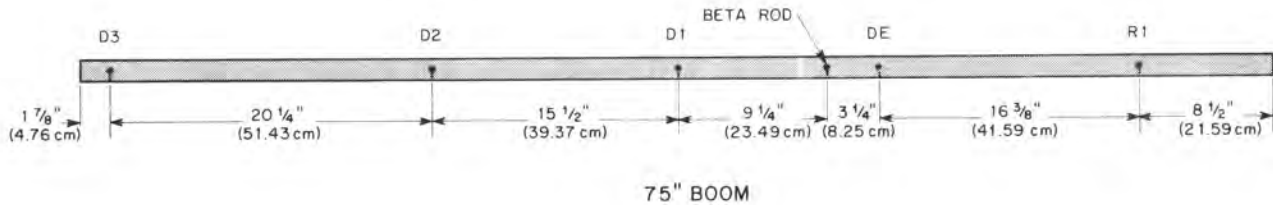


Figure 1
Overall View and Boom Detail

Tuning

NOTE: The Driven and Parasitic Elements are adjusted independently in the following manner:

Parasitic Elements: This antenna is pretuned for maximum gain and best radiation pattern at 146 MHz. This setting will give optimum performance over the entire 144-148 MHz band.

If you wish to optimize the antenna for a frequency higher than 146 MHz, cut $\frac{1}{4}$ " off of the total element lengths for each MHz higher than 146.

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 are shown in Figure 2A, and a cutting chart is shown in Figure 2B. 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.

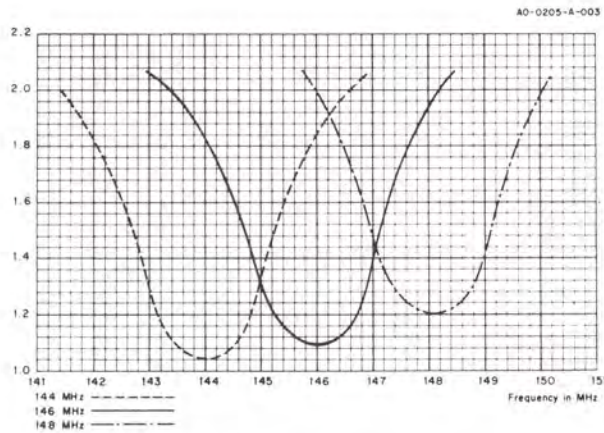


Figure 2A
VSWR for Both Vertical
and Horizontal Polarization

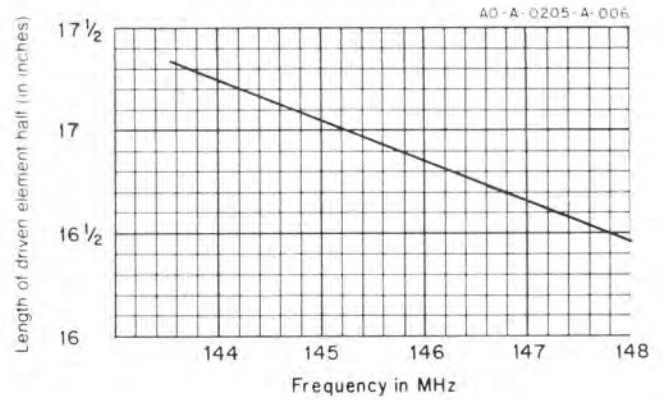


Figure 2B
Driven Element Cutting Chart

Stacking

This antenna can be easily stacked for approximately 3 dB more gain each time the number of yagi is doubled. Refer to Figure 3 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 1/4 wavelength in the 75 ohm transmission line. See Figure 4.

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.

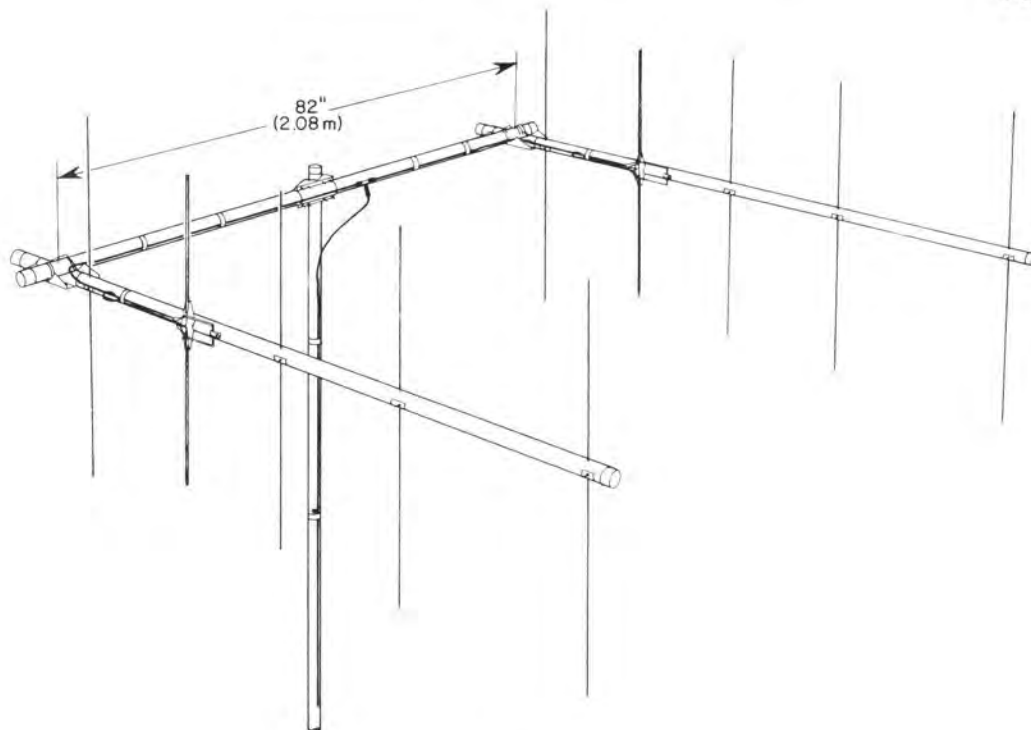


Figure 3
Stacking Two (2) Antennas

The feedline impedance is for 50 ohms (RG-213/U). For detailed information on stacking more than two yagis, please consult a current Amateur Handbook.

NOTE: The boom-to-mast bracket may be placed between the Driven Element and D1 when stacking two antennas.

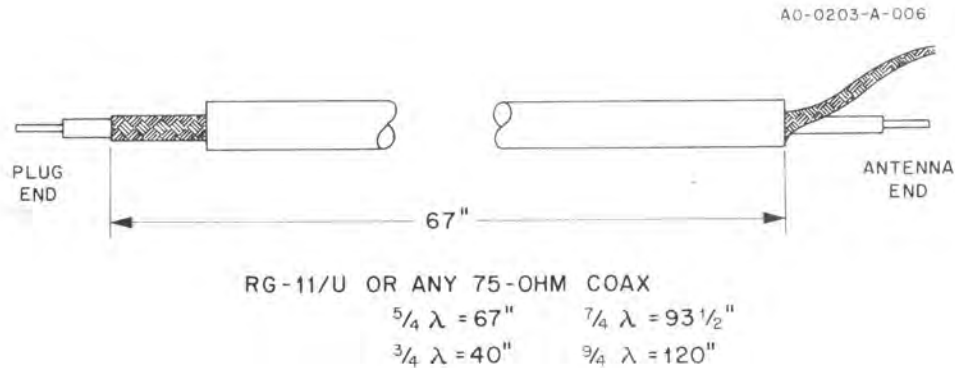


Figure 4
Phasing Line Cutting Dimensions

Installation

This antenna fits a 2" mast. A 2" O.D. 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 lines. This could cause severe burns or fatal injuries.

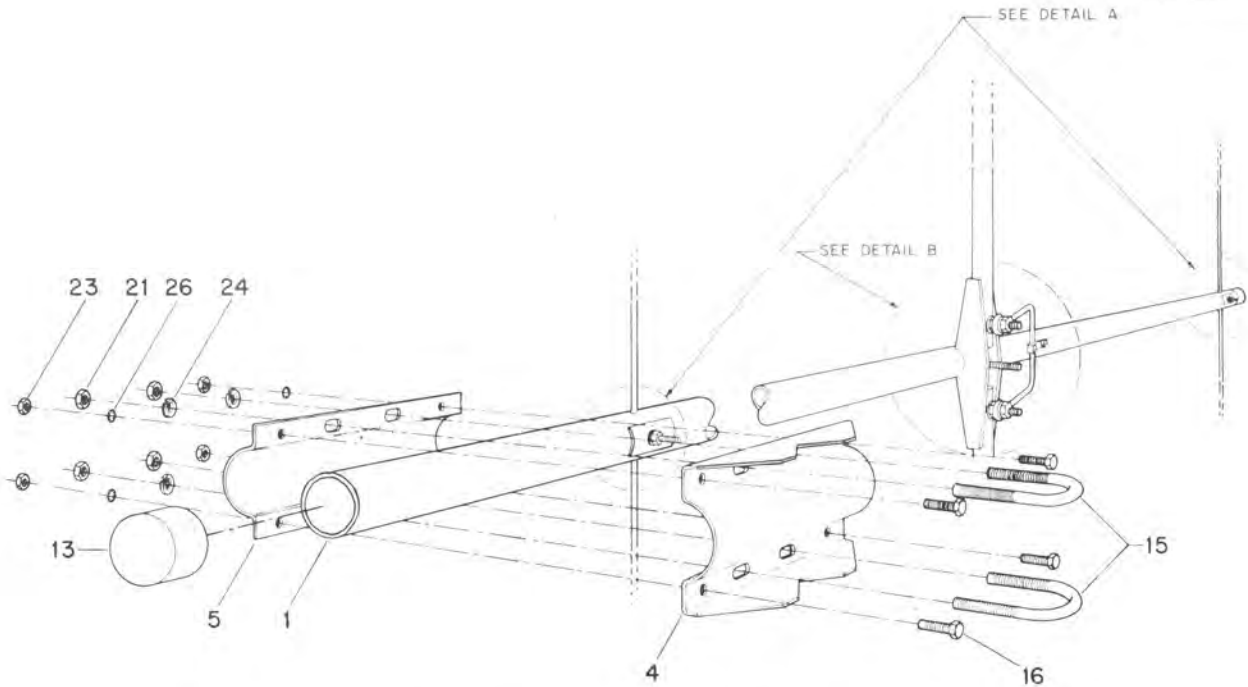
When mounting two dissimilar antennas on the same mast, be sure they are separated by at least six feet—eight to ten feet is even better.

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

Step-by-Step Assembly

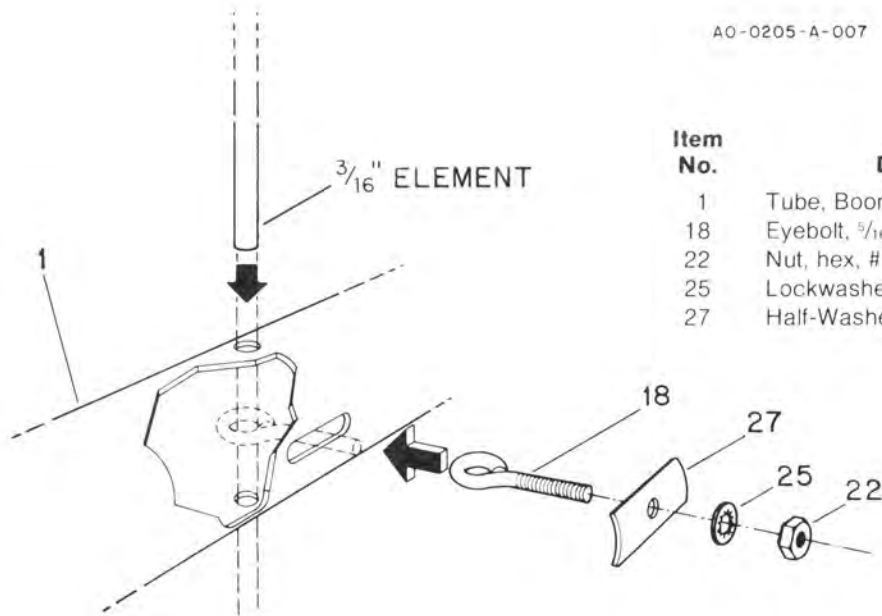
Remove the parts from the carton and check them against the parts list and the illustrations.

Select the boom-to-mast backup plate (Item No. 5), the boom-to-mast clamp (Item No. 4) and the four (4) $\frac{1}{4}''$ -20 x $\frac{3}{4}''$ bolts, lockwashers and nuts (Item Nos. 16, 26 & 23).



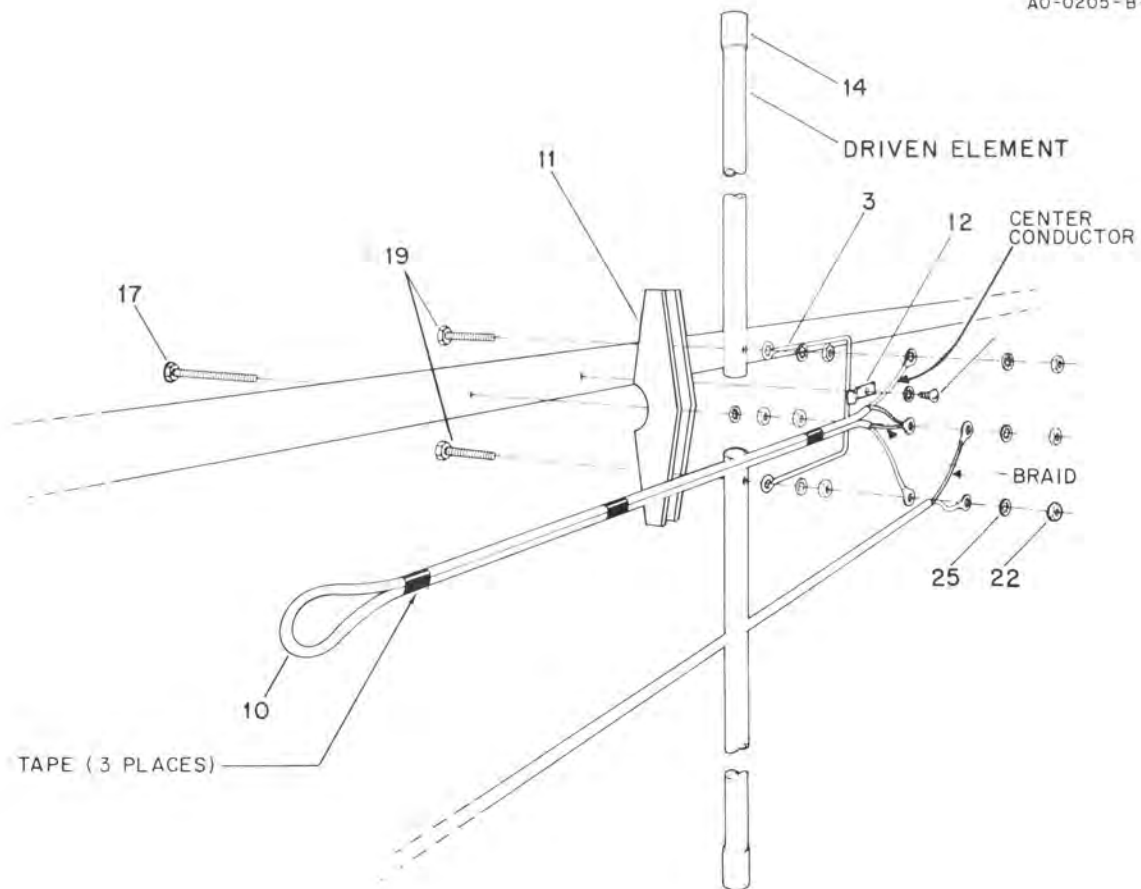
Item No.	Description	Item No.	Description
1	Tube, Boom, aluminum, 1 1/4" x 75"	16	Bolt, hex head, 1/4"-20 x 3/4"
4	Clamp, Boom-to-Mast	21	Nut, hex, 5/16"-18
5	Backup Plate, Boom-to-Mast	23	Nut, hex, 1/4"-20
13	Caplug, 1 1/4"	24	Lockwasher, split, 5/16"
15	U-Bolt, 5/16"-18 x 3 5/8"	26	Lockwasher, internal, 1/4"

**Figure 5
Boom-to-Mast Clamp Assembly**



Item No.	Description
1	Tube, Boom, aluminum, 1 1/4" x 75"
18	Eyebolt, 5/16", #10-24 x 1 1/8"
22	Nut, hex, #10-24
25	Lockwasher, internal, #10
27	Half-Washer, aluminum

**Figure 5 — DETAIL A
Parasitic Element Attachment**



Item No.	Description	Item No.	Description
3	Beta Rod, 3"	17	Bolt, hex head, #10-24 x 2 1/2"
10	Balun Assembly	19	Bolt, hex head, #10-24 x 1 1/2"
11	Insulator (Driven Element-to-Boom)	22	Nut, hex, #10-24
12	Beta Clip	25	Lockwasher, internal, #10
14	Caplug, 1/16"		

Figure 5 — DETAIL B
Driven Element, Beta Match and Balun Assembly

Place the boom-to-mast clamp on the boom as shown in Figure 5. Use the 1/4"-20 x 3/4" bolts in the outside holes. Leave the inside holes for the two 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 the 3/16" x 39 5/8" R1 tube (Item No. 6), use pencil to place a mark at the center of the rod (19 13/16" from either end) and place two more marks 5/8" from each side of the center mark.

Place a #10-24 x 1 1/2" eyebolt (Item No. 18) into the R1 slot as shown in Figure 5, Detail A. Slide the R1 through the holes and the eyebolt until the outer two marks on the R1 are visible on each side of the boom. Slip on an aluminum half washer, a lockwasher and a #10 nut (Item Nos. 27, 25 & 22). Tighten it just enough to hold the rod securely. **Do not over tighten.**

Select the element-to-boom insulator (Item No. 11), two sections of the Driven Element ($7/16"$ x $17/4"$) tubing (Item No. 2) and beta rod (Item No. 3).

NOTE: If 50 ohm coaxial cable is used to feed the antenna, select the supplied balun at this time.

Use the #10-24 x $2\frac{1}{2}"$ bolt (Item No. 17) to fasten the element-to-boom insulator to the boom. Refer to Figure 5, Detail B.

Use the two (2) #10-24 x $1\frac{1}{4}"$ bolts (Item No. 19) to assemble the Driven Element as shown in Figure 5, Detail B. Pay particular attention to the connections of the beta rod, balun and feedline.

Waterproof the connection with neoprene, Krylon® or some similar substance.

Install caplugs on the ends of the boom and the Driven Element.

Use the #10 x $3/8"$ screw (Item No. 20) to fasten the beta rod shorting clip over the beta rod, as shown in Figure 5, Detail B.

Select the following rods: D1 ($36\frac{3}{8}"$ long) (Item No. 7), D2 ($35\frac{3}{4}"$ long) (Item No. 8) and D3 ($35\frac{3}{8}"$ long) (Item No. 9). 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 1 and Figure 5, Detail A. Be sure they are oriented as shown.

Slip the two (2) U-bolts into the boom-to-mast bracket and fasten it to the mast securely. Tape the coax feedline to the boom and to the mast. Be sure to insulate any connections from the boom or the mast. This completes your installation.

KLLK RPL

	<u>161.64</u>	<u>166.250</u>	<u>170.150</u>
D ₁	35 $7/8"$	34 $5/8"$	33 $5/8"$ 33 $5/8"$ driven element cut to best
D ₂	33 $1/8"$	31 $7/8"$	30 $7/8"$ VSWR
D ₃	32"	30 $3/4"$	29 $3/4"$
	31 $5/8"$	30 $3/8"$	29 $3/8"$
Driven Element	15.00" 13.85"	12.85"	12.05"
	cut to 161.64 4/20/09		

Krylon® is a registered trademark of Borden Chemical Co.

PARTS LIST

Item No.	Part No.	Description	Qty
1	170386	Tube, Boom, aluminum, 1 1/4" x 75"	1
2	175157	Tube, Driven Element, aluminum, 7/16" x 17 1/4"	2
3	160040	Beta Rod, 3"	1
4	385142-1	Clamp, Boom-to-Mast	1
5	385144-1	Backup Plate, Boom-to-Mast	1
6	160036	Tube, R1, aluminum, 3/16" x 39 5/8"	1
7	160016	Tube, D1, aluminum, 3/16" x 36 7/8"	1
8	160019	Tube, D2, aluminum, 3/16" x 35 3/4"	1
9	160021	Tube, D3, aluminum, 3/16" x 35 3/8"	1
10	871704	Balun Assembly	1
11	465420	Insulator (Driven Element-to-Boom)	1
	872073-1	Parts Pack 205S-1, Stainless Steel	1
12	163266	Beta Clip	1
13	455630	Caplug, 1 1/4"	2
14	475639	Caplug, 7/16"	2
15	540067	U-Bolt, 5/16"-18 x 3 5/8"	2
16	505266	Bolt, hex head, 1/4"-20 x 3/4"	4
17	500164	Bolt, hex head, #10-24 x 2 1/2"	1
18	540065	Eyebolt, 5/16", #10-24 x 1 1/2"	4
19	500159	Bolt, hex head, #10-24 x 1 1/2"	2
20	510670	Screw, pan head, Type A, #10 x 3/8"	1
21	555747	Nut, hex, 5/16"-18	4
22	554071	Nut, hex, #10-24	11
23	554099	Nut, hex, 1/4"-20	4
24	564792	Lockwasher, split, 5/16"	4
25	565697	Lockwasher, internal, #10	12
26	562961	Lockwasher, internal, 1/4"	5
27	170376	Half Washer, aluminum	4

Converting English Measurements to Metric

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

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

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

Example:

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

