



TELEX COMMUNICATIONS, INC.

9600 ALDRICH AVE. SO. MINNEAPOLIS, MN 55420 U.S.A.

INSTRUCTION MANUAL

ORDER NO. 410

Five-Element Beam

PN 801107-1

General Description

This antenna is a five-element, Citizens Band beam with a forward gain of 12.3 dB and a front-to-back ratio of 31 dB. A Beta Match system matches it to a 50-ohm feedline and puts the Driven Element at DC ground for noise-free operation and lightning protection. The beam can be rotated with any heavy-duty TV rotator for 360° coverage.

Specifications

Mechanical

Maximum Wind (survival)	90 mph (145 kmph)
Net Weight	23 lbs. (10.4 kg)
Boom Length	24' (7.32 m)
Turning Radius	14' (4.27 m)
Longest Element	19' (5.79 m)

Electrical

Forward Gain (over a dipole)	12.3 dB
Front-to-Back Ratio	31 dB
VSWR (at resonance)	less than 1.5:1
Input Impedance	50 ohms
Lightning Protection	DC ground, driven element

VSWR and Feedline

This beam can be fed with any standard 50-ohm coaxial cable such as RG58/u or RG8/u. For runs over 50' in length, RG8/u polyfoam type is recommended because of its lower losses. The beam has a SWR of 1.5:1 or less at resonance if it is mounted in the clear. The SWR will remain below 2.0:1 over the entire CB frequency range.

Installation

The beam will fit a 1 5/8" to 2 1/2" O.D. mast. A 1 1/4" plumbers pipe is highly recommended for masting material. The antenna should be mounted in the clear and free from surrounding objects. Power lines and any other objects of any mass or length will deteriorate the performance of any antenna. Mount the antenna either vertically or horizontally.

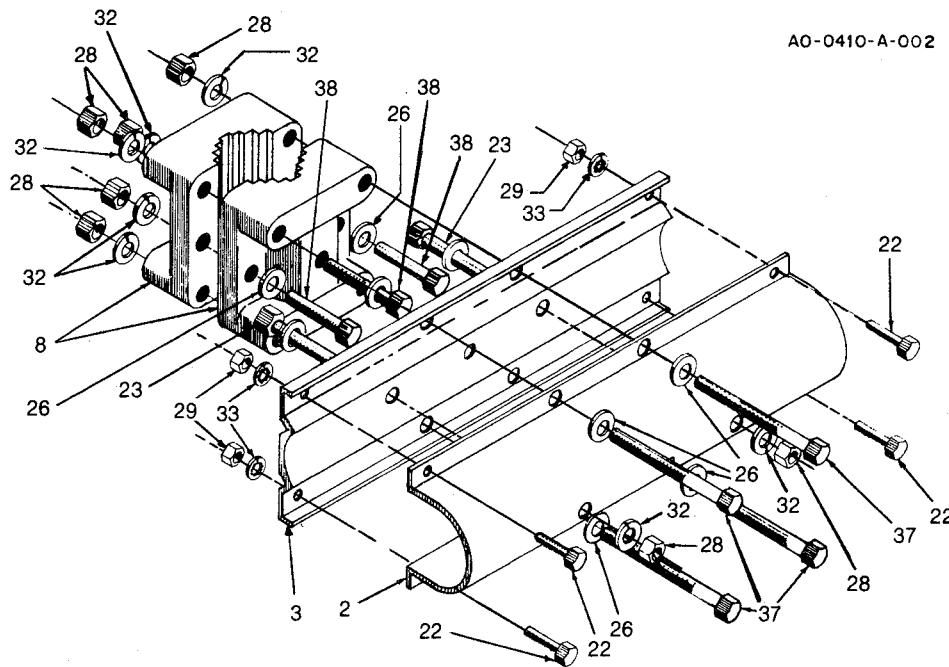
**Step-by-Step
Assembly**

Unpack the antenna and check the parts against the Parts List. Compare the parts with the illustrations.

Attach the cast aluminum brackets (Item No. 8) to the mast using the $\frac{5}{16}$ " x $3\frac{1}{2}$ " bolts (Item No. 38). To further insure the attachment to the mast, drill a $\frac{5}{16}$ " hole in the mast and pin the brackets using the $\frac{5}{16}$ " x $3\frac{1}{2}$ " mast pinning bolts.

Assemble the boom brackets (Item Nos. 2 and 3) loosely together using $\frac{1}{4}$ " bolts, nuts and lockwashers (Item Nos. 22, 29 & 33 [four each]). Refer to Figure 1.

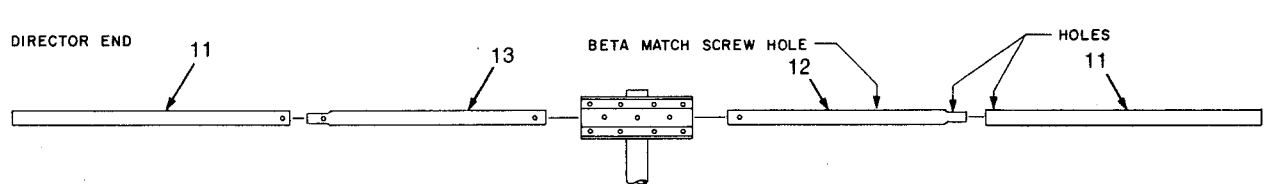
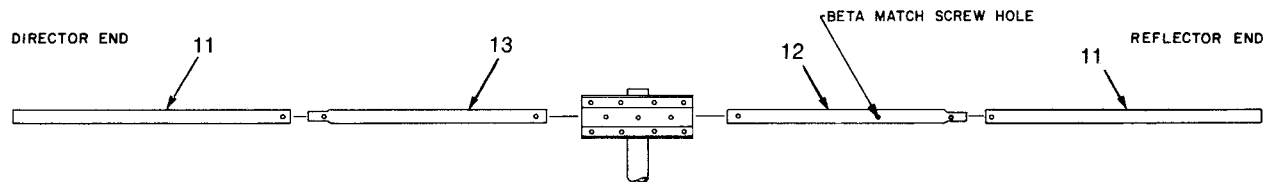
Slip the unswaged ends of the boom (Item Nos. 12 & 13) into the brackets and secure them using $\frac{5}{16}$ " bolt, nut and lockwasher (Item Nos. 23, 28 & 32). Insure the 2" x 75" tubing (Item No. 12) is positioned correctly for desired polarization. Tighten all six bolts securely.



Item No.	Description	Item No.	Description
2	Clamp, boom-to-bracket	28	Nut, hex, jam, $\frac{5}{16}$ "-18
3	Bracket, casting-to-boom	29	Nut, hex, $\frac{1}{4}$ "-20
8	Boom/Mast Casting	32	Lockwasher, split, $\frac{5}{16}$ "
22	Bolt, hex head, $\frac{1}{4}$ "-20 x $\frac{3}{4}$ "	33	Lockwasher, internal, $\frac{1}{4}$ "
23	Bolt, hex, cap, $\frac{5}{16}$ "-18 x $2\frac{3}{4}$ "	37	Bolt, hex head, $\frac{5}{16}$ "-18 x 5"
26	Flatwasher, $\frac{5}{16}$ "	38	Bolt, hex head, $\frac{5}{16}$ "-18 x $3\frac{1}{2}$ "

**Figure 1
Boom-to-Mast Clamp**

Select the two 2" x 75" sections (Item No. 11) and insert over the swaged end of the 2" x 75" tubes (Item Nos. 12 & 13). Fasten with $\frac{1}{4}$ " bolt, nut and lockwasher (Item Nos. 21, 29 & 33). Tighten Securely. (See Figure 2)



Item No.	Description
11	Tubing, drilled, 2" x 75"
12	Tubing, swaged, drilled, 2" x 75"
13	Tubing, swaged, 2" x 75"

Figure 2
Element Attachment

Select the largest set of boom-to-element brackets (Item No. 15). Loosely assemble the brackets using 1/4" hardware (Item Nos. 22, 29, 33, 27, & 31). Slip the assembled bracket on the Reflector end of the boom and set approximately 46" from the center of the boom-to-mast bracket to the center of the Driven Element bracket. Do not tighten at this time. Refer to bracket details.

Refer to assembly view of the antenna, Figures 3 and 4. Select and loosely assemble all of the element-to-boom brackets (Item No. 14) using the same hardware as before.

Place the assembled bracket on the boom corresponding with the approximate locations, R1, D1, D2, and D3.

Install a 2" caplug (Item No. 40) on each end of the boom.

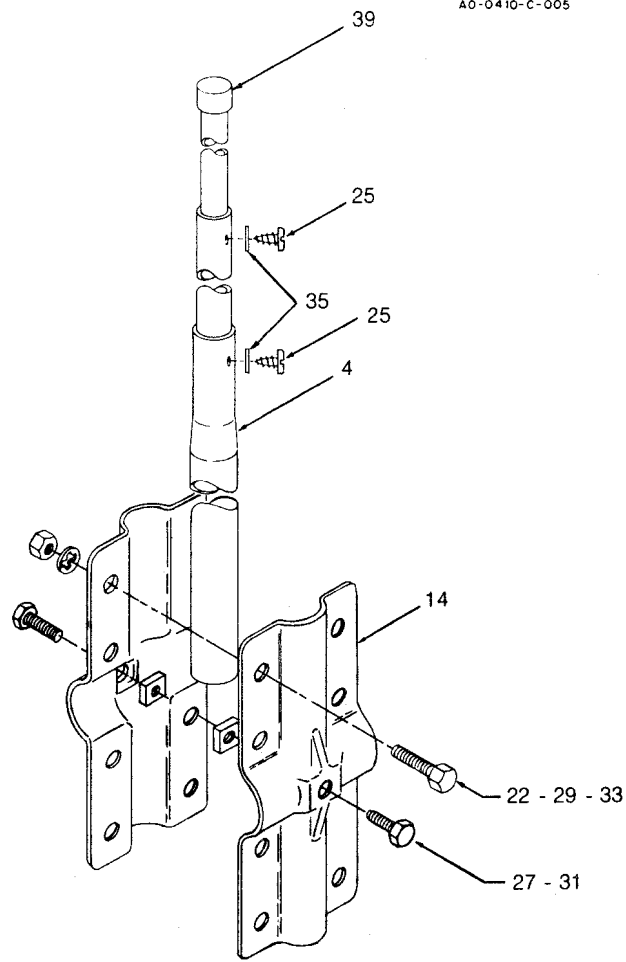
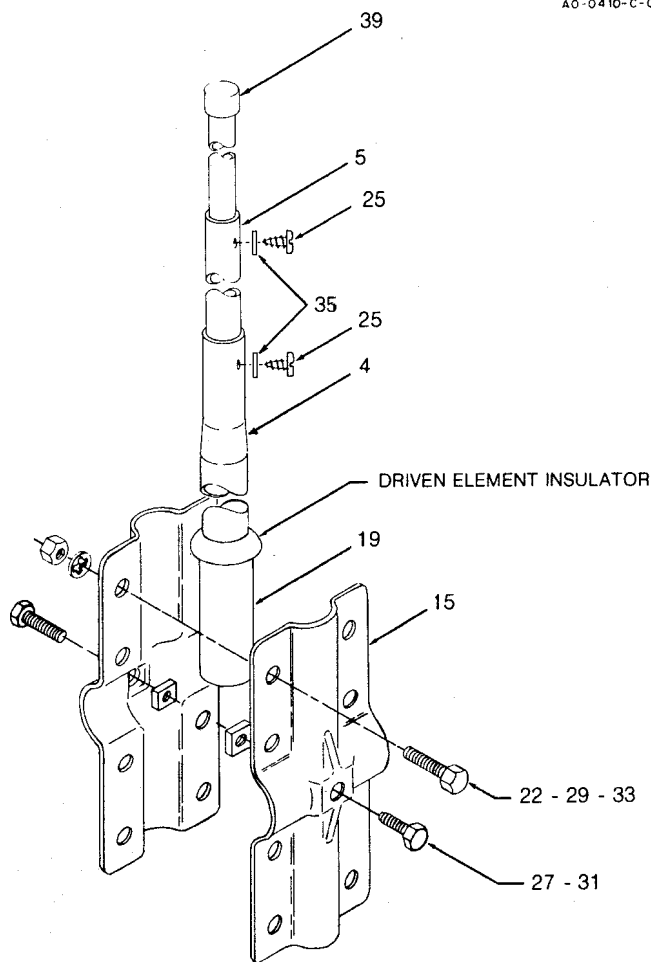
Select two 5/8" x 7 1/2" tubes (Item No. 4) and the Driven Element insulators (Item 19). Slip the unswaged end of the tube into the insulators (press fit).

Select the two 7/16" x 60" element tubes (Item No. 5) and insert into the ends of the 5/8" x 7 1/2" tubes (Item No. 4).

Align the holes in the ends of the tubes and secure using the #6 x 3/8" Type A screw and lockwasher (Item Nos. 25 & 35).

Select the two 3/8" x 39" element tubes (Item No. 16) and insert into the end of the 7/16" x 60" tubes (Item No. 5).

Refer to Figure 4 and adjust the overall length.



Item No.	Description
4	Tubing, swaged, $\frac{5}{8}$ " x $7\frac{1}{2}$ "
5	Tubing, R1, D1-1, DE, $\frac{7}{16}$ " x 60"
14	Bracket, 2" x $\frac{5}{8}$ "
15	Bracket, 2" to $\frac{5}{8}$ "
19	Insulator, $\frac{7}{8}$ " to $\frac{5}{8}$ "
22	Bolt, hex head, $\frac{1}{4}$ "-20 x $\frac{3}{4}$ "
25	Screw, Type A, hex head, #6 x $\frac{3}{8}$ "

Item No.	Description
27	Bolt, anchor, hex head, $\frac{1}{4}$ "-20 x $\frac{3}{8}$ "
29	Nut, hex, $\frac{1}{4}$ "-20
31	Nut, square, $\frac{1}{4}$ "-20
33	Lockwasher, internal, $\frac{1}{4}$ "
35	Lockwasher, internal, #6
39	Caplug, $\frac{3}{8}$ "

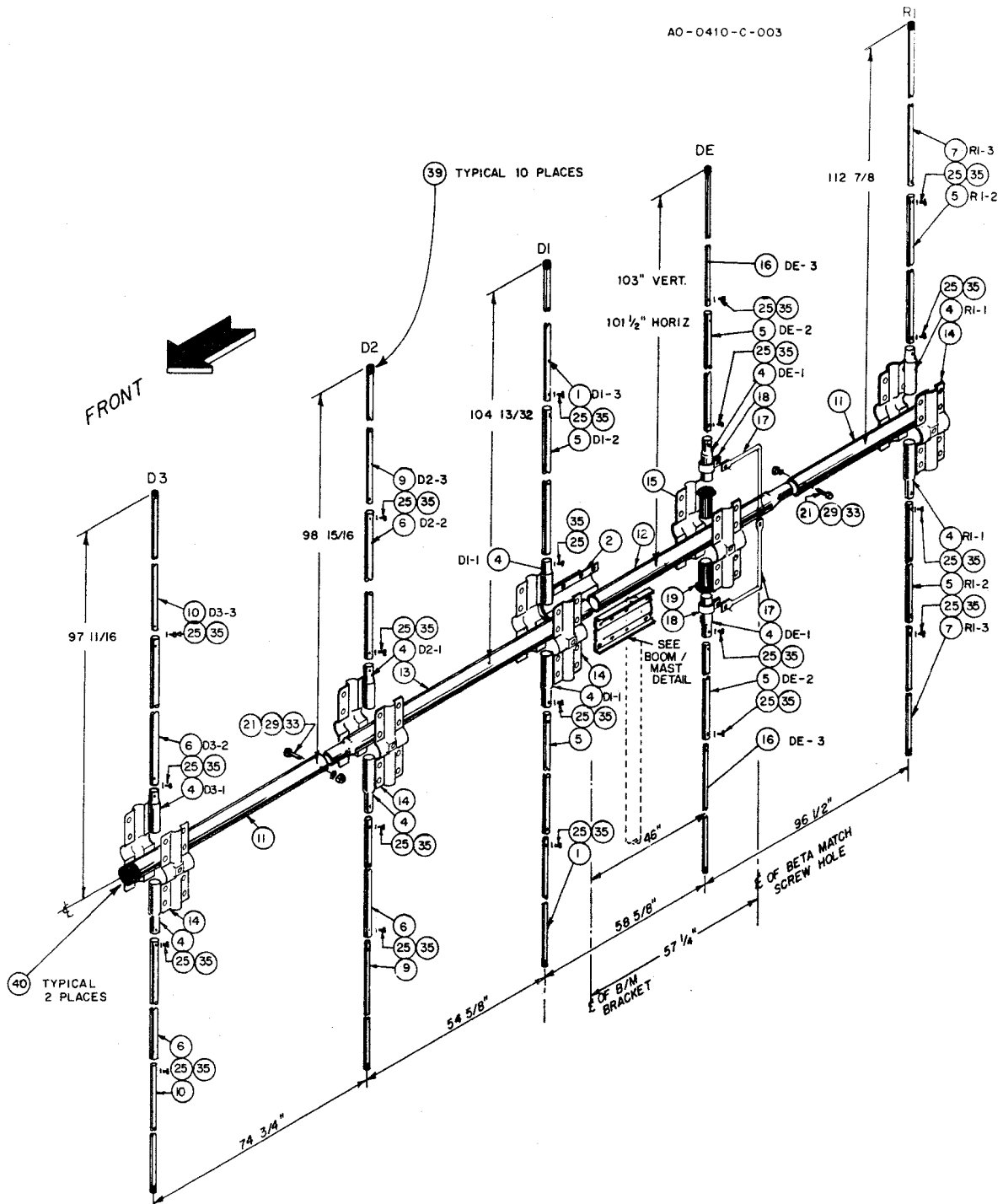
Figure 3
Element Bracket Details

Align the holes in the ends of the tubes and secure using the #6 x $\frac{3}{8}$ " Type A screws and lockwashers (Item Nos. 25 & 35).

With a felt tip pen, mark the two assemblies "DE" (Driven Element).

Select two $\frac{5}{8}$ " x $7\frac{1}{2}$ " element tubes (Item No. 4) and two $\frac{7}{16}$ " x 60" element tubes (Item No. 5) and slip the end of the $\frac{7}{16}$ " x 60" tube (Item No. 5) into the swaged end of the $\frac{5}{8}$ " x $7\frac{1}{2}$ " tube (Item No. 4) and secure with #6 x $\frac{3}{8}$ " Type A screws and lockwashers (Item Nos. 25 and 35) as above.

Select two $\frac{3}{8}$ " x $53\frac{1}{4}$ " element tubes (Item No. 7) and slip the drilled end into the end of the $\frac{7}{16}$ " x 60" tube (Item No. 5). Align the holes and secure using #6 x $\frac{3}{8}$ " Type A screws and lockwashers (Item Nos. 25 & 35).



Item No.	Description	Item No.	Description
1	Tubing, 3/8" x 41" (one drilled 2 3/32")	14	Bracket, 2" x 5/8"
2	Clamp, boom-to-bracket	15	Bracket, 2" to 7/8"
4	Tubing, swaged, 5/8" x 7 1/2"	16	Tubing, 3/8" x 39", two drilled holes
5	Tubing, R1, D1-1, DE, 7/16" x 60"	17	Beta Rod
6	Tubing, D2-1, D3-1, 7/16" x 48"	18	Tubing Clamp, 5/8"
7	Tubing, 3/8" x 53 1/4"	21	Bolt, round head, 1/4"-20 x 2 1/2"
9	Tubing, 3/8" x 48" (one drilled 2 9/16")	25	Screw, Type A, pan head, #6 x 3/8"
10	Tubing, 3/8" x 48" (one drilled 3 13/16")	29	Nut, hex, 1/4"-20
11	Tubing, drilled, 2" x 75"	33	Lockwasher, internal, 1/4"
12	Tubing, swaged, drilled, 2" x 75"	35	Lockwasher, internal, #6
13	Tubing, swaged, 2" x 75"	40	Caplug, 2"

Figure 4
Assembly View of Antenna

Mark these two assemblies "R1".

Select two each of the element tubes (4, 5 & 1) and assemble as in paragraph 4, page 4. Again using #6 x $\frac{3}{8}$ " Type A screws and lockwashers (Item Nos. 25 & 35). Tighten securely.

Mark these two assemblies "D1".

Select two each of element tubes (Item Nos. 4, 6 & 9) and assemble as you did previously. Mark these two assemblies "D2".

Select two each of element tubes (Item Nos. 4, 6 & 10) and assemble as before. Mark these two assemblies "D3".

Install a $\frac{3}{8}$ " caplug (Item No. 39) on the end of each element.

Referring to the assembly view of the antenna, select the two element assemblies marked "DE" and insert into the large set of element-to-boom brackets. Carefully recheck the 46" dimensions, measuring from center of the boom-to-mast brackets to the center of the DE bracket.

Tighten all screws securely. Do not tighten the bolts located in the center of the boom-to-element bracket (Item No. 27) until instructed to do so.

Select two assemblies marked "R1" and insert into the set of element-to-boom brackets located on the Reflector end of the boom. Carefully measure from the center of the Driven Element bracket $96\frac{1}{2}$ " to the center of the Reflector brackets. Tighten all screws securely.

Select the two assemblies marked "D1", insert them into the boom-to-element bracket. Locate them $58\frac{5}{8}$ " from the center of the Driven Element bracket to the center of the element-to-boom bracket. Tighten all screws securely.

Select two assemblies marked "D2" and assemble into the bracket as before. Carefully measure the $54\frac{5}{8}$ " dimension, position and tighten the element as before.

Select the final set of tube assemblies marked "D3" and assemble them using the same procedure as before. Carefully measure the $74\frac{3}{4}$ " dimension. Position and tighten the assembly as before.

NOTE: The antenna will not operate efficiently unless the elements are assembled on the boom at exactly the dimensions called for in the assembly view.

Beta Match

Select the two tubing clamps (Item No. 18) and slip over the Driven Element approximately $\frac{5}{8}$ " from insulator. See Figure 5, Beta Match Detail.

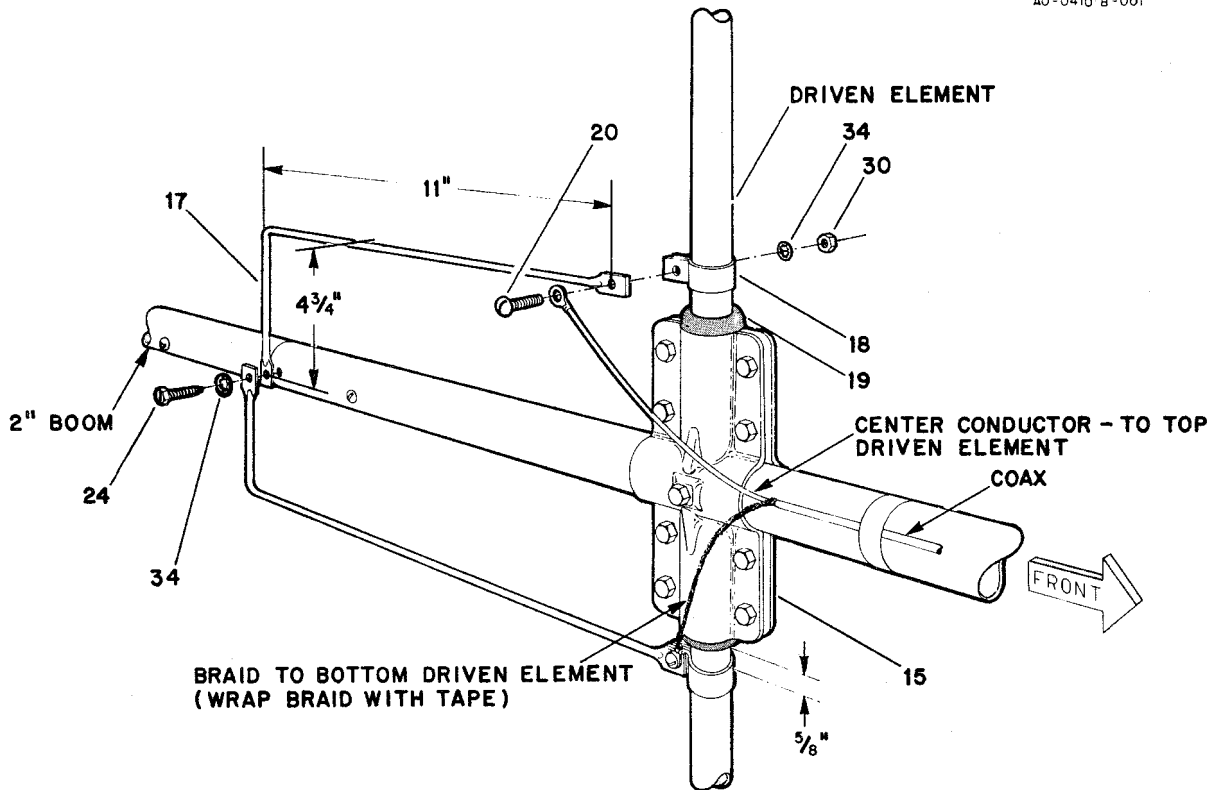
Select the two beta rods (Item No. 17) and assemble using #10 hardware (Item Nos. 20, 34 & 30). Refer to Figure 5, Beta Match Detail.

Strip your coax as shown in Figure 6 and separate the braid from the center conductor.

Connect the center conductor to the top Driven Element and the braid to the bottom Driven Element as shown. Tape the exposed portions of the braid to prevent it from shorting out on the boom.

When the antenna has been completely assembled, secure the boom clamps to the casting using the four (4) $\frac{5}{16}$ "-18 x 5" bolts (Item No. 37). Tighten the $\frac{1}{4}$ " bolts (Item No. 27) at this time.

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Item No.	Description
15	Bracket, 2" to $\frac{7}{8}$ "
17	Beta Rod
18	Tubing Clamp, $\frac{5}{8}$ "
19	Insulator, $\frac{7}{8}$ " to $\frac{5}{8}$ "
20	Screw, round head, #10-24 x 1"
24	Screw, Type A, hex head, #10 x $\frac{3}{4}$ "
30	Nut, hex, #10-24
34	Lockwasher, internal, #10

Figure 5
Beta Match Detail

This completes your installation.

NOTE: Weatherproof the coax where the center conductor and the braid separate using Pli-O-Bond®, neoprene or some similar substance. This will prevent water from entering and possibly ruining your coaxial cable.

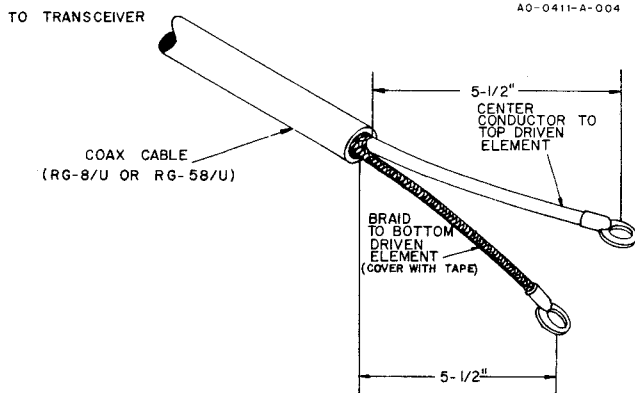


Figure 6
Stripping Measurements for Coax

PARTS LIST

Item No.	Part No.	Description	Qty
1	175230	Tubing, 3/8" x 41" (one drilled 2 3/32")	2
2	172732	Clamp, boom-to-bracket	1
3	172735	Bracket, casting-to-boom	1
4	175270	Tubing, swaged, 5/8" x 7 1/2"	10
5	175271	Tubing, R1, D1-1, DE, 7/16" x 60"	6
6	175272	Tubing, D2-1, D3-1, 7/16" x 48"	4
7	175273	Tubing, 3/8" x 53 1/4"	2
8	102734	Boom/Mast Casting	2
9	175277	Tubing, 3/8" x 48" (one drilled 2 9/16")	2
10	175282	Tubing, 3/8" x 48" (one drilled 3 13/16")	2
11	173754	Tubing, drilled, 2" x 75"	2
12	175264	Tubing, swaged, drilled, 2" x 75"	1
13	175661	Tubing, swaged, 2" x 75"	1
14	161409	Bracket, 2" x 5/8"	8
15	163764	Bracket, 2" to 7/8"	2
16	175276	Tubing, 3/8" x 39", two drilled holes	2
17	170365	Beta Rod	2
	878953	Parts Pack, 410	1
18	171329	Tubing Clamp, 5/8"	2
19	471069	Insulator, 7/8" to 5/8"	2
20	506455	Screw, round head, #10-24 x 1"	2
21	506290	Bolt, round head, 1/4"-20 x 2 1/2"	2
22	506325	Bolt, hex head, 1/4"-20 x 3/4"	45
23	506741	Bolt, hex, cap, 5/16"-18 x 2 3/4"	2
24	511064	Screw, Type A, hex head, #10 x 3/4"	1
25	516681	Screw, Type A, pan head, #6 x 3/8"	24
26	567085	Flatwasher, 5/16"	7
27	505540	Bolt, anchor, hex head, 1/4"-20 x 3/8"	10
28	556945	Nut, hex, jam, 5/16"-18	9
29	556960	Nut, hex, 1/4"-20	51
30	556970	Nut, hex, #10-24	2
31	558685	Nut, square, 1/4"-20	10
32	567080	Lockwasher, split, 5/16"	9
33	567110	Lockwasher, internal, 1/4"	54
34	567125	Lockwasher, internal, #10	4
35	567155	Lockwasher, internal, #6	24
36		(Not Used)	
37	501543	Bolt, hex head, 5/16"-18 x 5"	4
38	501541	Bolt, hex head, 5/16"-18 x 3 1/2"	3
39	455655	Caplug, 3/8"	10
40	455625	Caplug, 2"	2