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hy-gain electronics
DIVISION OF TELEX COMMUNICATIONS, INC.

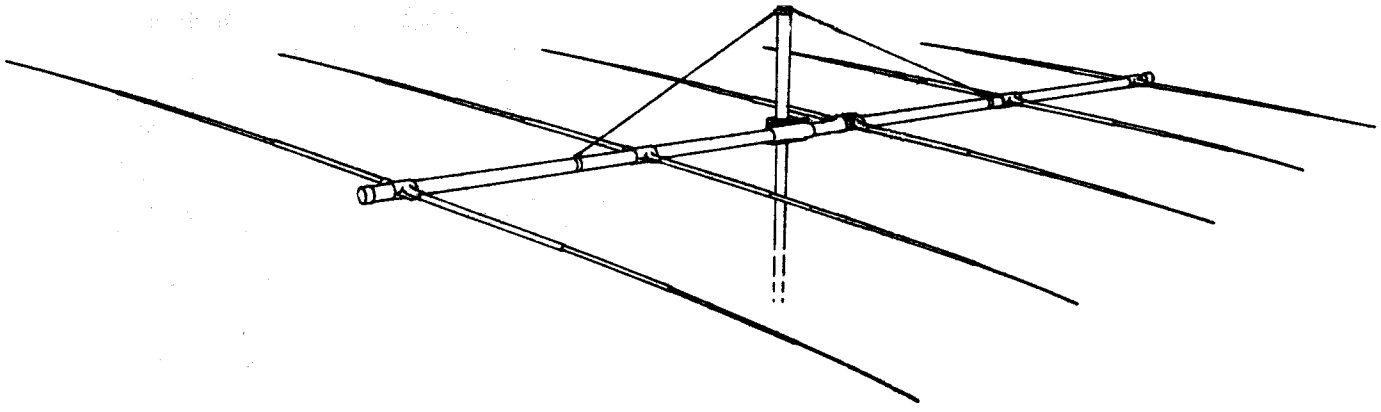
8601 Northeast Highway 6 • Lincoln, Nebraska 68505 U.S.A.
Telephone: (402) 467-5321 telex: Hygain Lcn a 48-4324
EUROPE: 22, rue de la Legion-d'Honneur
93200 Saint-Denis - France
Telephone: 820.98.46 telex: Telcodi 630013

# INSTRUCTION MANUAL

# ORDER NO. 377

**"Long John" MODEL 205BA**
**Five-Element, 20 Meter Beam** PN801144

AO-0377-C-001



**General Description**

The Hy-Gain Model 205BA is a high performance 5 element, 20 meter beam. The "Long John" features 5 full sized elements on a 2" by 34' boom, a Hy-Gain beta-match and a rugged boom-to-match bracket. The 205BA is ideal for stacking with other Hy-Gain "Long Johns"—the 155BA and the 105BA—for unparalleled performance and durability.

**Specifications**

*Electrical*

| | |
|---|---|
| Gain | 11.6 dB max. |
| Front-to-back | 20 to 35 dB |
| VSWR (at resonance) | less than 1.5:1 |
| 2:1 VSWR bandwidth | 500 KHz min. |
| Nominal impedance | 50 ohms |
| Power rating | Maximum legal |
| Matching method | Beta |
| -3 dB beamwidth (Azimuth) | 60° |

*Mechanical*

| | |
|---|---|
| Boom | 2" x 34' (5.08cm x 10.36m) |
| Turning radius | 25' (7.62m) |
| Longest element | 36½' (11.125m) |
| Surface area | 9.0 sq. ft. (0.837 sq. m) |
| Wind load at 80 mph | 230 lbs. (104.32kg) |
| Max. wind survival | 80 mph (128.74 kmph) |
| Mast diameter accepted | 1⅝ to 2½ (3.17cm to 6.35) |
| Weight | 60 lbs. (27.22kg) |

**Installation**

All tubing supplied with the 377 antenna is taper swaged and slotted. It is held in place with compression clamps. For optimum results from the antenna, make all measurements accurate using the dimensions given in Figure 1.

**Boom Assembly**

( ) Select the cast aluminum brackets, boom-to-bracket clamp, and casting-to-boom bracket and loosely assemble as shown in Figure 2. The bracket must be loose in order to finish the assembly of the boom.

( ) Select the center boom section and slide the assembled boom-to-mast bracket to the center of this boom section. Align the holes in the boom with the holes in the bracket and secure as shown in Figure 2.

( ) Install the four other boom sections as shown in Figure 3.

**NOTE:** Measure distances between elements from center to center.

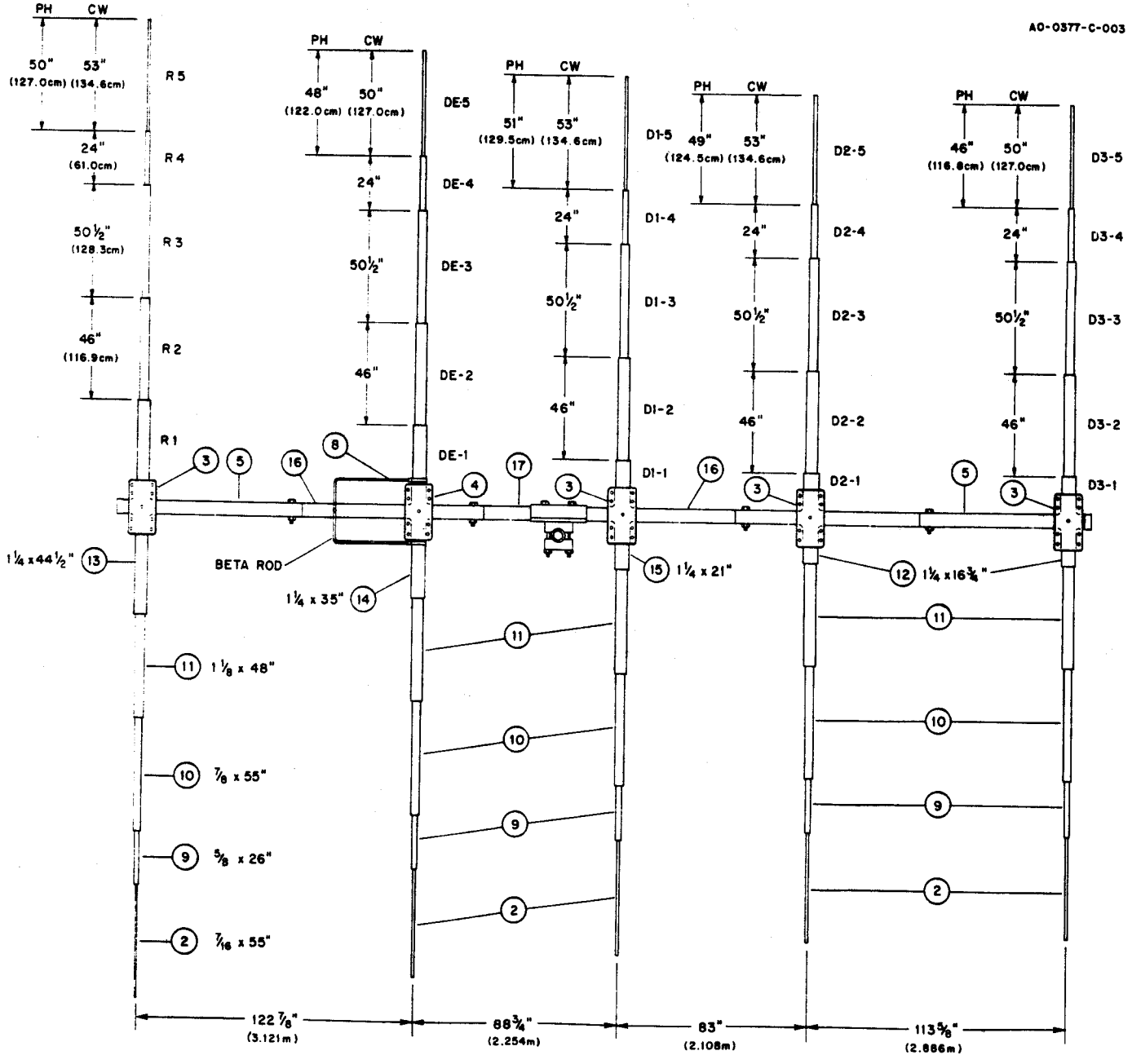



**Figure 1. Overall View of Antenna with Dimensions**

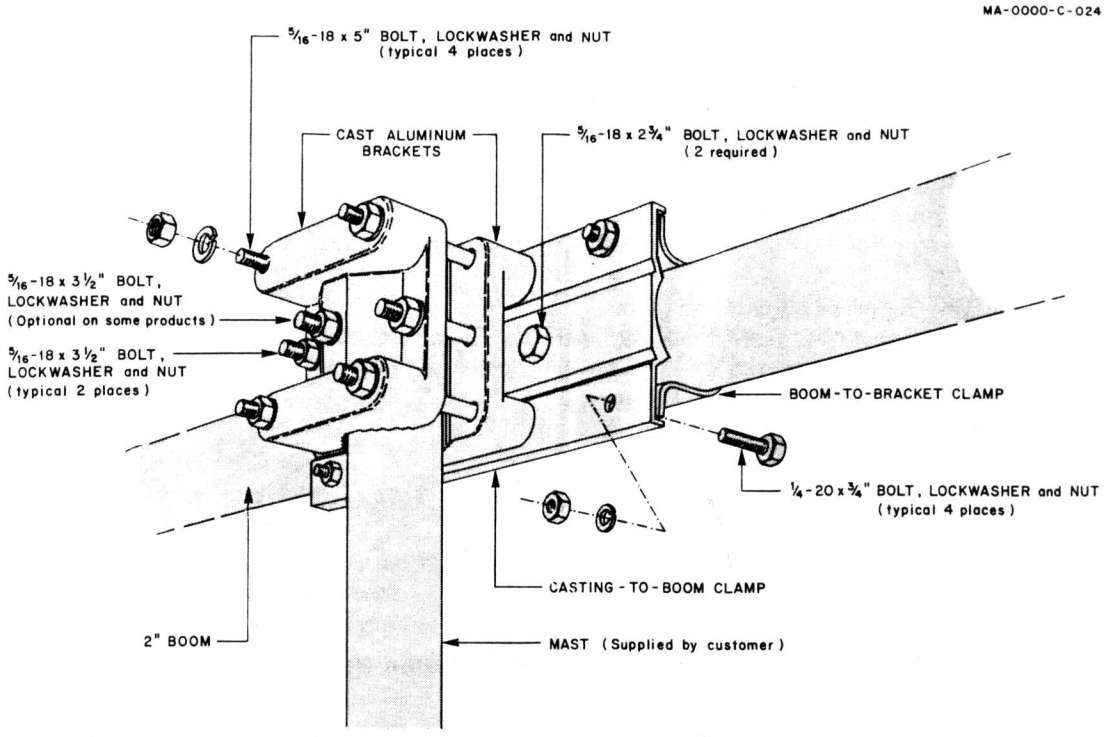
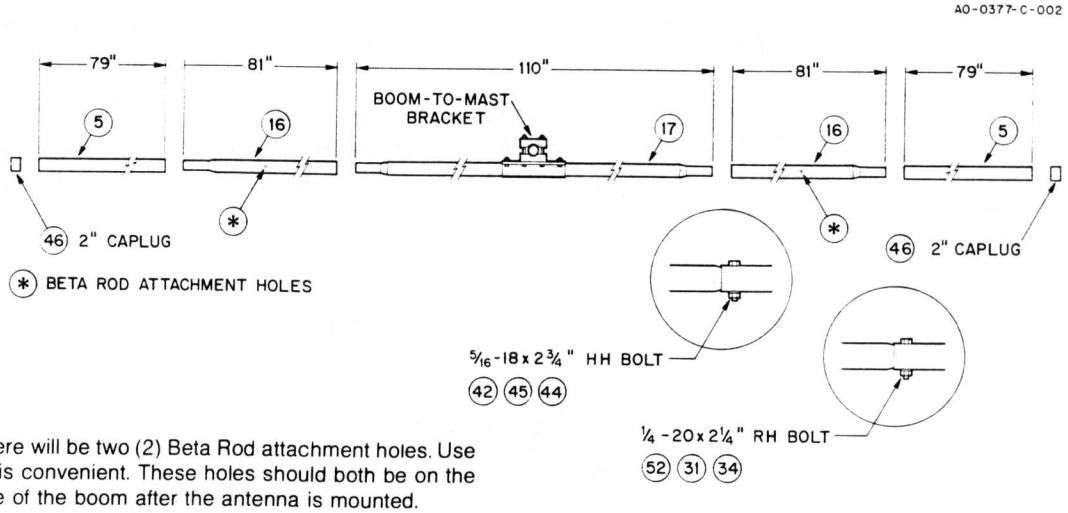



**Figure 2. Boom-to-Mast Clamp**




**NOTE:** There will be two (2) Beta Rod attachment holes. Use whichever is convenient. These holes should both be on the bottom side of the boom after the antenna is mounted.

**Figure 3. Boom Assembly**

**Assembly of Element-to-Boom Brackets**

( ) Select the set of large element-to-boom brackets (item 4) and loosely assemble as shown in Figure 4.

( ) Select the remaining four sets of element-to-boom brackets (item 3) and loosely assemble as shown in Figure 4.

( ) Slide the set of large element-to-boom brackets over a boom end to the driven element position as shown in Figure 1.

( ) Slide the remaining four sets of element-to-boom brackets over a boom end and position them as shown in Figure 1. Exact positioning will be done later.

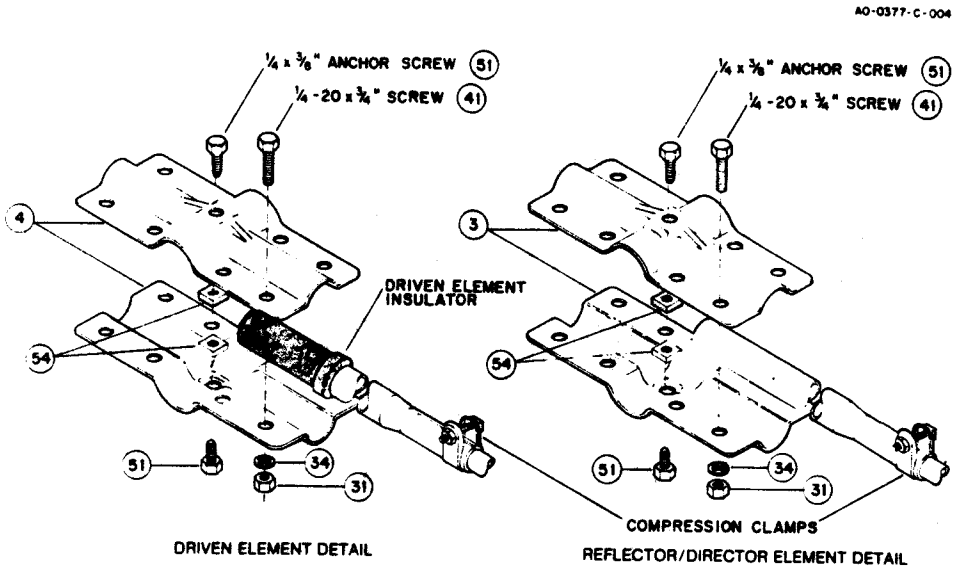



**Figure 4. Element-to-Boom Brackets**

**Assembly of Driven Element and Beta Match**

**NOTE:** The following steps will have to be done first for one side of the boom then repeated for the other side.

( ) Select the DE1 section of tubing. Slip the unslotted end of DE 1 into a Driven Element insulator as shown in Figure 4. Slip the insulated end of DE1 into the bracket assembly on the boom. Tighten the screws to hold the element securely in the center of the bracket at this time.

( ) Select the ¼" Beta rods. Attach the Beta Match to the boom as shown in Figure 5. Loosely attach the opposite ends of the Beta rods to the hex head screws in the Driven Element. Do not tighten these screws at this time, the feedline will attach to this point in a later step.

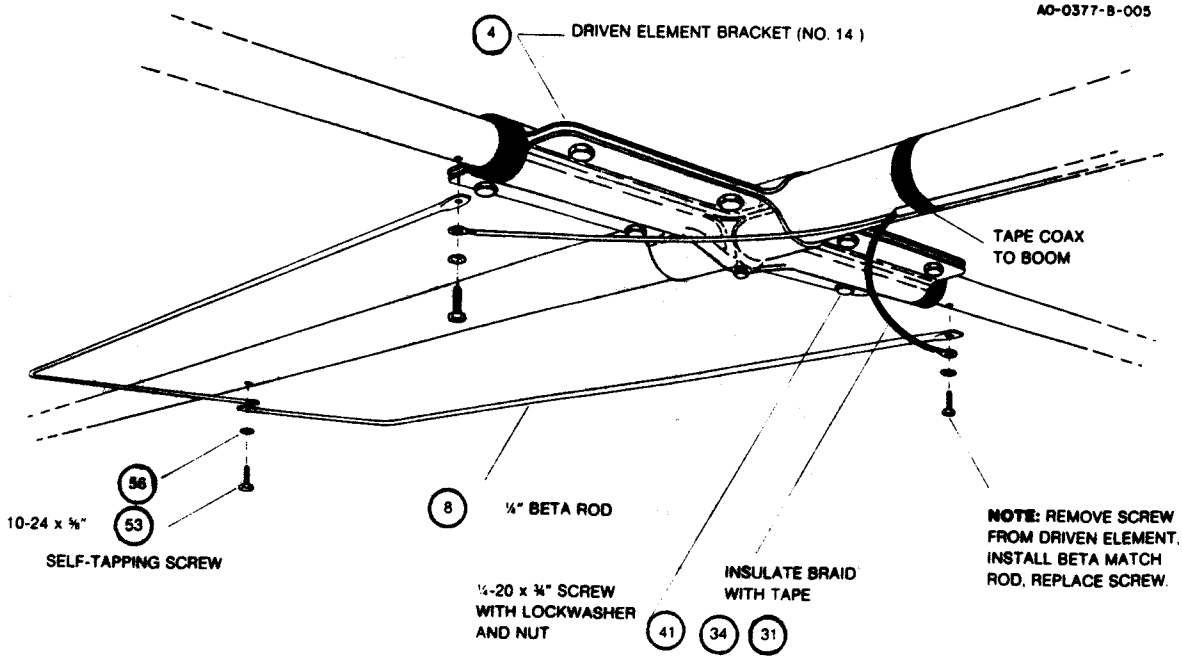



**Figure 5. Beta Match**

( ) Adjust the Driven Element's position on the boom to insure a proper fit. Check to see that the Driven Element will lie in a plane parallel to the earth, then tighten the anchor screws in the bracket securely.

**Compression Clamps**

( ) Select a 1¼" clamp and its associated screw and nut and assemble as shown in Figure 6.

**NOTE:** Figure 6 shows all the clamps with their associated hardware.

( ) Slip the assembled compression clamp over the end of the DE1 section. Select the DE2 section and slip the unswaged end into the DE1 section. Adjust to the dimensions shown in Figure 1 then tighten the clamp securely.

( ) Assemble a 1" clamp as shown in Figure 6. Slip the assembled clamp over the end of DE2.

( ) Select the DE3 section and slip the unswaged end into the DE2 section. Measure the dimensions shown in Figure 1 then tighten the clamp securely.

( ) Assemble a ¾" clamp as shown in Figure 6. Slip the clamp over the end of the DE3. Select the DE4 section and slip the unswaged end into DE3. Measure the dimensions shown in Figure 1 then tighten the clamp securely.

( ) Assemble a ½" clamp as shown in Figure 6. Slip the assembled clamp over the end of DE4.

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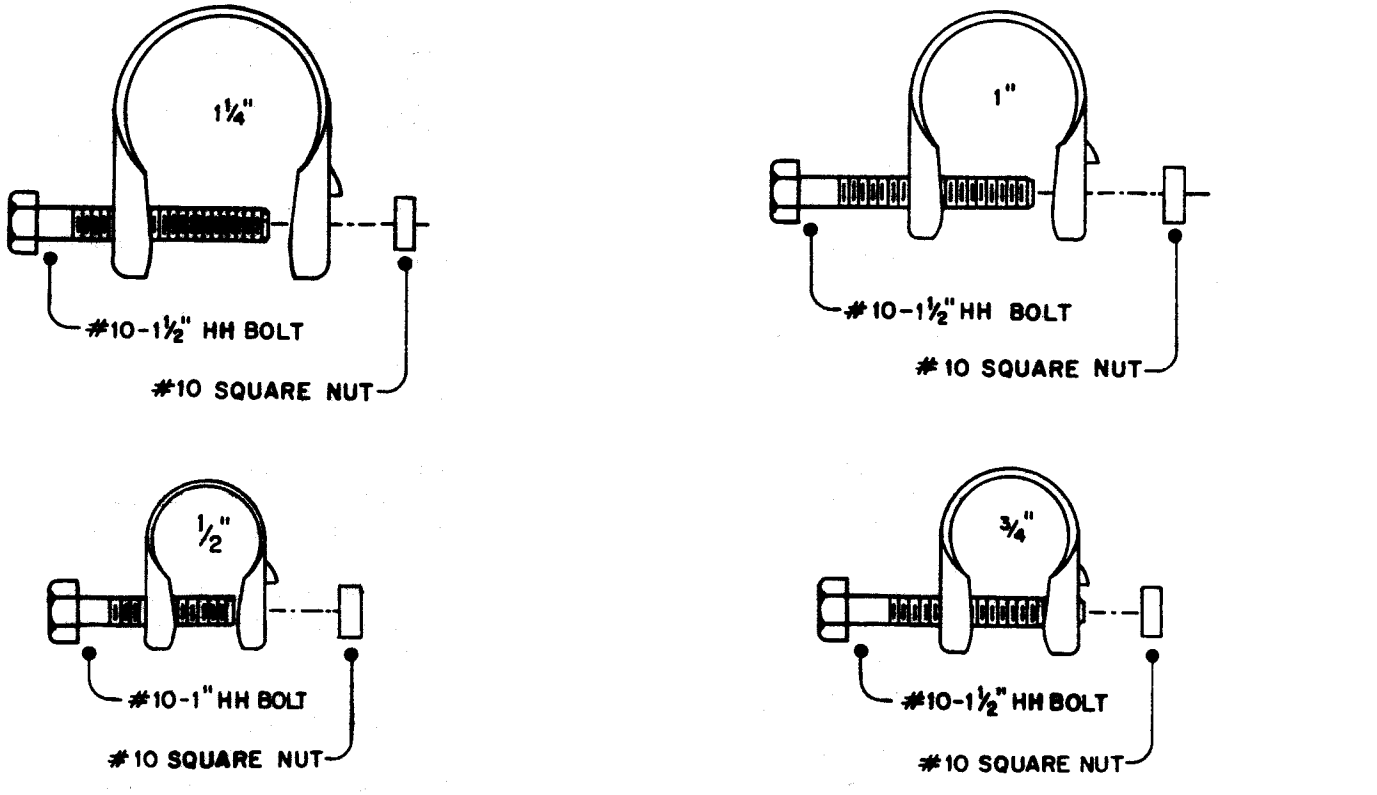



**Figure 6. Compression Clamps**

( ) At this time you must decide which mode of transmission you will use—either CW or Phone.

***CAUTION***

*When you have selected your mode of transmission, you must use the same mode for the remaining measurements. DO NOT try to use averages or various combinations of measurement settings on each element or serious deterioration in the antenna performance will result. The charts shown in Figure 7 should help you decide which mode to select.*

**CW**----------
**PHONE** _____

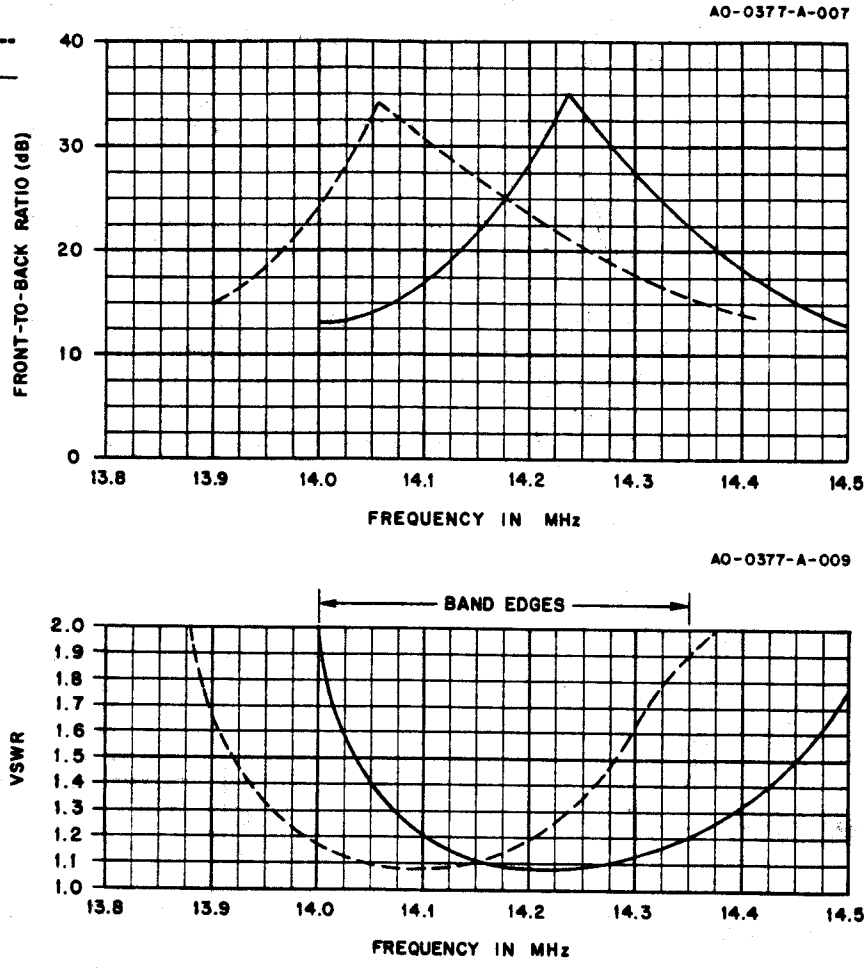



**Figure 7. Front To Back Ratio and VSWR Chart**

**NOTE:** The Front to Back Ratio Chart is typical only for received or transmitted signals at low elevation angles (less than 10 degrees). The VSWR chart is typical only if the antenna is mounted at least 30 feet above ground or at least 10 feet from other HF antennas.

( ) Select the D3-5 section and slip it into the D3-4 section. Adjust the D3-5 section to the dimensions shown in Figure 1 for your mode of transmission. Now tighten the clamp securely.

( ) Place a 7/16" caplug on each end of the Driven Element.

Take care when measuring the tubing lengths for your mode of transmission. Place the clamp near the end of the tube with the joint even with the slot in the tube. Tighten the clamp until the inner tube cannot be turned in the outer tube. Do not tighten the compression clamps until instructed to do so.

**NOTE:** To save time, loosely assemble all of the clamps and their appropriate hardware before beginning further installation of the antenna.

**Assembly of the Reflector**

( ) Select the R1 section of tubing and slip the unslotted end into the bracket assembled on the boom. Tighten the screws to hold the element securely, but do not tighten the anchor screws in the center of the bracket at this time.

( ) Check to see that the Reflector Element will lie in the same plane as the Driven Element. Carefully recheck the distance from the Driven Element then tighten the anchor screws securely.

( ) Assemble the remainder of the Reflector Element in the same manner as the Driven Element. Refer to Figure 1 for tubing descriptions and dimensions and to Figure 6 for compression clamps.

( ) Place a 7/16" caplug on each end of the Reflector Element.

**Assembly of Director 1**

( ) Select the D1-1 section of tubing, and slip the unslotted end into the D1 bracket assembled on the boom. Tighten the screws to hold the element securely, but do not tighten the anchor screws at this time.

( ) Check to see that the Director will lie in the same plane as the other elements and carefully recheck the distance from the Driven Element. Tighten the anchor screws securely.

( ) Assemble the remainder of the Director Element in the same manner as the previous elements. Refer to Figure 1 for tubing descriptions and dimensions and to Figure 6 for compression clamps.

( ) Place a 7/16" caplug on each end of the Director Element.

**Assembly of Directors two and Three**

( ) Assemble the two remaining directors in the same manner as the previous elements. Refer to Figure 1 and 6.

**RF Choke**

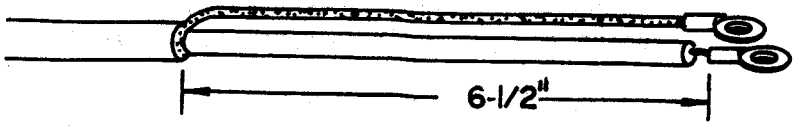
An RF Choke is desirable to isolate the antenna from the transmitter and to prevent stray RF from traveling down the coax shield to the transmitter. A Hy-Gain balun, Model BN-86, is recommended for use as a RF Choke. The BN-86 will allow the antenna to operate more efficiently than is possible with a homemade choke. The balun, Order No. 242, is available from your Hy-Gain dealer.

**Assembly of Homemade Choke**

( ) Wind an RF Choke as shown in Figure 5. The choke must consist of 12 turns of RG-8/u coaxial cable wound with 11" diameter. Allow enough coax at the end to reach from the boom-to-mast bracket to the Driven Element. Strip the end of the RF Choke as shown in Figure 8. Attach the choke to the Driven Element and the Beta Match as shown in Figure 5. It is recommended that you use solder lugs (not supplied) as shown in Figure 5.

( ) Weatherproof the connection using Pli-O-Bond, Neoprene, or some similar substance. Also weatherproof the coax where the conductors leave the protective covering. This will prevent water from entering and ruining the cable. Insulate the braid using weatherproof tape to prevent it from shorting out on the boom.

( ) Securely tape the RF Choke to the boom at the boom-to-mast bracket. When the antenna is mounted on the mast, also tape the RF Choke to the mast. Tape the coax to the boom approximately every 6 inches.




COAX STRIPPING DETAIL

**Figure 8**

**Assembly of The Boom Support Cable**

( ) Select the 2" ID boom support clamps (28) and the boom support straps (27) and assemble securely on the boom approximately 1 foot from each boom end as shown in Figure 9. Attach the turnbuckles (23) to the opposite end of the cable as shown in the illustrations.

( ) Now tape the cables near the boom-to-mast bracket so they will be handy later when the antenna has been mounted on the mast. Make certain the cables are above the elements.

( ) Mount the antenna on your mast using the following method. Allow approximately 36" of the mast to extend above the boom-to-mast bracket for attaching the boom support cable.

**NOTE:** Save excess wire from the boom support cable to tie the turnbuckle.

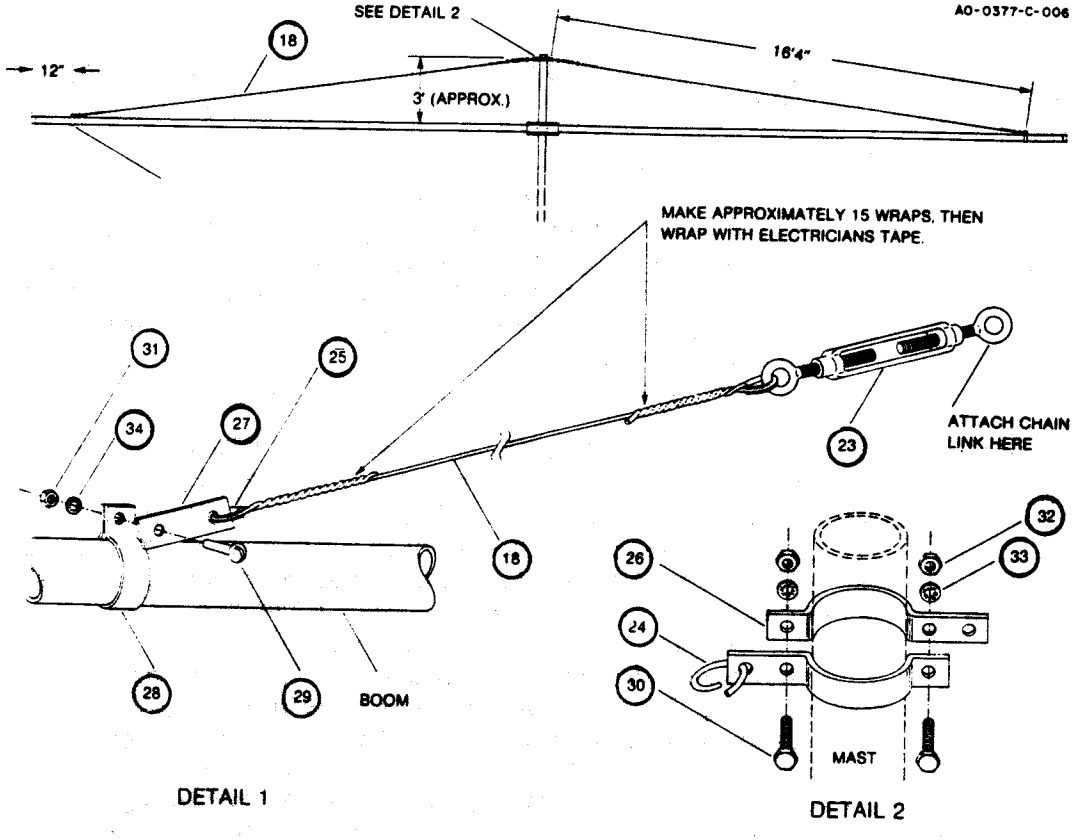



**Figure 9. Assembly of The Boom Support Cable**

( ) Assemble the 1⅝" mast guy strap (26) (2 piece) on the mast as shown in Figure 9. Extend each turnbuckle to its full length then attach to the chain links and tighten each so that the tension is equal in each cable. Tighten the boom support clamp SECURELY. If you can, loosen the bolts in the boom-to-mast bracket and allow the antenna to drop so that the boom lies in a level plane with no sag. Re-tighten the bolts in the boom-to-mast bracket SECURELY. If the boom-to-mast bracket is permanently mounted on the mast, the boom sag can be taken out by mounting the mast guy strap (26) higher on the mast.

( ) Using the excess wire from the boom support cable, wrap 10 turns of this wire on the support cable near each turnbuckle, then thread each wire through the eyebolts and turnbuckle centers and finally the chainlinks and tie off. This will prevent the turnbuckle from loosening during severe weather conditions.

**Installing the Antenna**

**IMPORTANT:** Model 205BA is a fairly large antenna and requires some consideration as to how you are going to get it to the top of the tower. Thoroughly read the section on assembly of the boom support cable before beginning to install your antenna.

( ) Completely assemble the antenna on the ground, then hoist it into position using the setup as shown in Figure 10.

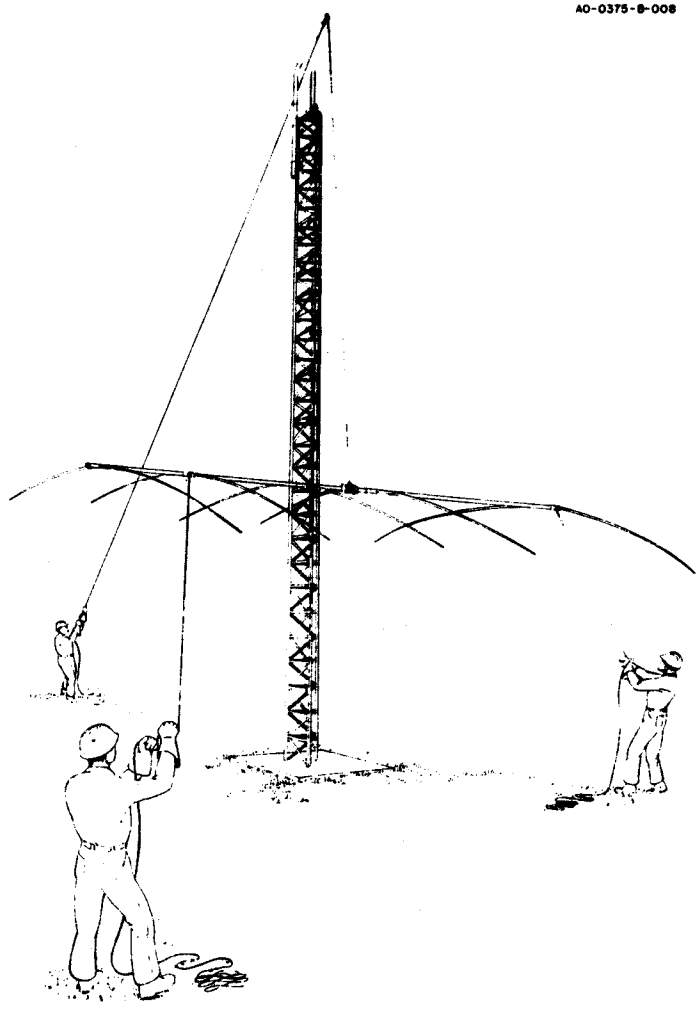



**Figure 10. Raising Entire Antenna to Top of Mast**

( ) Attach the supporting rope to the balance point of the antenna when hoisting. The other two ropes should be loose on the boom so that they can be retrieved after the antenna is in place.

**NOTE:** The boom-to-mast castings have a hole through their centers to allow securing to the mast with the 5/16"-18 x 3½" bolt. It is recommended that the mast be removed and an 11/32" hole be drilled at the desired mast clamp position, then reinstall the mast. If this is not possible, the clamp will hold its position on the mast in all but the most severe weather conditions.

( ) Securely tape the feedline to the mast and your antenna is ready for use.

**Weatherproofing**

To prolong the life of this product in or around coastal areas, it is recommended that all hardware be encapsulated with a silicone rubber compound such as DOW-CORNING silastic rubber or G.E. silicone seal to prevent atmosphere deterioration.

**Lightning Protection**

You must ground your antenna supporting structure. This will also insure noise-free operation. A proper ground consists of a ½" x 8' copper clad, steel ground rod driven into the ground as close as possible to the base of your tower or mast. Connect the rod to the tower or mast using #8 aluminum wire.

For total protection of your equipment it is highly recommended that you use a Hy-Gain Model LA-1 Lightning Arrester. The Model LA-1 is available at your Hy-Gain dealer. THIS COMPLETES YOUR INSTALLATION OF THE 205BA. ATTACH YOUR FEEDLINE TO THE RF CHOKE AND HAPPY DX'ING.

## Parts List

| Item | Part No. | Description | Qty |
|---|---|---|---|
| 1 | 102734 | bracket, cast al. | 2 |
| 2 | 174939 | element end section 7/16" x 55" | 10 |
| 3 | 165919 | element-to-boom bracket #13 | 8 |
| 4 | 165920 | element-to-boom bracket #14 | 2 |
| 5 | 171029 | boom end section 2" x 79" | 2 |
| 6 | 172732 | boom-to-bracket clamp | 1 |
| 7 | 172735 | casting-to-boom bracket | 1 |
| 8 | 175121 | beta rod, ¼" | 2 |
| 9 | 190006 | element section four, ⅝" x 26" | 10 |
| 10 | 190206 | element section three, ⅞" x 55" | 10 |
| 11 | 190300 | element section two, 1⅛" x 48" | 10 |
| 12 | 190906 | D3-1, D2-1, 1¼" x 16¾" | 4 |
| 13 | 871044 | R1, 1¼" x 44½" w/insert | 2 |
| 14 | 871045 | DE-1, 1¼" x 35" w/insert | 2 |
| 15 | 871046 | D1-1, 1¼" x 21" w/insert | 2 |
| 16 | 170424 | boom section, 2" x 81" | 2 |
| 17 | 871017 | center boom section, 2" x 110" | 1 |
| 18 | 691081 | ⅛" x 20' aircraft cable | 2 |
| 19 | 871018 | Parts Pack A 204Mk5 | 1 |
| 20 | 871019 | Parts Pack B 204Mk5 | 1 |
| 21 | 872241 | Parts Pack B 204BA | 1 |
| 22 | 879730 | Parts Pack 394 | 1 |

Parts Pack "A" 204Mk5, 871018, Contains the Following Parts:

| | | | |
|---|---|---|---|
| 23 | 351243 | turnbuckle 7/32 x 2 | 2 |
| 24 | 351244 | chainlink 3/16 open end | 2 |
| 25 | 351700 | wire rope thimble 5/32 | 4 |
| 26 | 381100 | mast guy strap 15/8 ID | 2 |
| 27 | 381253 | boom support strap ⅝" x 2" | 2 |
| 28 | 388861 | boom support clamp 2" ID | 2 |
| 29 | 506305 | screw ¼-20 x 1¼" RH | 2 |
| 30 | 506195 | screw ⅜-16 x 2" HH | 2 |
| 31 | 556960 | nut ¼-20 HH | 2 |
| 32 | 558137 | nut ⅜-16 hex jam | 2 |
| 33 | 567095 | lockwasher ⅜ int. | 2 |
| 34 | 567110 | lockwasher ¼ int. | 2 |

Parts Pack "B" 204Mk5, 871019. Contains the Following Parts:

| | | | |
|---|---|---|---|
| 35 | 380284 | ½" compression clamp | 2 |
| 36 | 380285 | ¾" compression clamp | 2 |
| 37 | 380286 | 1" compression clamp | 2 |
| 38 | 380287 | 1¼" compression clamp | 2 |
| 39 | 500095 | screw #10-24 x 1½" HH | 6 |
| 40 | 502898 | screw #10-24 x 1 HH | 2 |
| 41 | 506325 | screw ¼-20 x ¾ HH | 8 |
| 42 | 506741 | screw 5/16-18 x 2¾" HCS | 2 |
| 43 | 555362 | nut #10-24 square | 9 |
| 44 | 556945 | nut 5/16-18 hex jam | 2 |
| 31 | 556960 | nut ¼-20 hex | 9 |
| 45 | 567080 | lockwasher 5/16 split | 2 |
| 34 | 567110 | lockwasher ¼ int. | 8 |
| 47 | 455644 | caplug 7/16 SC black | 2 |

Parts Pack B 204BA, 872241, Contains the Following Parts:

| | | | |
|---|---|---|---|
| 46 | 455625 | caplug 2 SC black | 2 |
| 47 | 455644 | caplug 7/16 black | 8 |
| 48 | 465833 | insulator 1¼ x 1½ | 2 |

Parts Pack 394, 879730, Contains the Following Parts:

| | | | |
|---|---|---|---|
| 35 | 380284 | ½" compression clamp | 8 |
| 36 | 380285 | ¾" compression clamp | 8 |
| 37 | 380286 | 1" compression clamp | 8 |
| 38 | 380287 | 1¼" compression clamp | 8 |
| 39 | 500095 | screw #10-24 x 1½ | 24 |
| 49 | 501541 | screw 5/16-18-3½ HH | 3 |
| 50 | 501543 | screw 5/16-18-5 HH | 4 |
| 40 | 502898 | screw #10-24 x 1 HH | 8 |
| 51 | 505540 | screw ¼-20 x ⅜ HH | 16 |
| 41 | 506325 | screw ¼-20 x ¾ HH | 36 |
| 42 | 506741 | screw 5/16-18 x 2¾" HH | 2 |
| 52 | 509160 | screw ¼-20 x 2¼" RH | 2 |
| 53 | 526475 | screw #10-24 x ⅝ HH Type T | 1 |
| 43 | 555362 | nut #10-24 square | 32 |
| 44 | 556945 | nut 5/16-18 hex jam | 9 |
| 31 | 556960 | nut ¼-20 hex | 40 |
| 54 | 558685 | nut ¼-20 square | 16 |
| 45 | 567080 | lockwasher 5/16" split | 9 |
| 55 | 567085 | lockwasher 5/16" flat | 4 |
| 34 | 567110 | lockwasher ¼ int. | 55 |
| 56 | 567125 | lockwasher #10 int. | 17 |