

hy-gain

1

Model 153-BAS
3-Element, 15-Meter
Beam Long John
MonoBander



INSTRUCTION MANUAL

WARNING

When installing your system, take extreme care to avoid accidental contact with power lines and other overhead obstructions by any ladder or other installation equipment.

GENERAL DESCRIPTION

This antenna is a three element, 15-meter beam tuned for maximum forward gain over the entire 15-meter band. The antenna and "Beta Match" are factory pretuned for maximum performance. The 153BA-S now includes stainless steel hardware for all electrical and most mechanical connections.

VSWR and Feedline

This antenna is designed for use with 50 ohm coaxial cable. The Hy-Gain Beta Match provides an optimum match with the broadest possible band pass. The RG-213/U coaxial cable is recommended for its lower losses and higher power handling capabilities. A coaxial choke is required to prevent unbalanced current from flowing down the transmission line and affecting the efficiency of the antenna. Make a coaxial choke by forming 12 turns of RG-213/U coaxial cable in a circle with a 6" diameter. See Figure 5. For optimum performance and reliability, use a Hy-Gain Model BN-86 or BN-4000 balun.

Construction

Taper swaged seamless aluminum tubing is used throughout the antenna for maximum mechanical reliability. Compression clamps are used at the element joints for the best possible mechanical connection. Hardware is 18-8 stainless steel except for long bolts used in boom-to-mast bracket.

Installation

The antenna is designed to fit a 1 1/4" to 2 1/2" O.D. mast. A 2" O.D. steel pipe is highly recommended for durable masting material. The mast or supporting structure should be properly grounded for lightning protection and noise free operation. A proper ground consists of a 1/2" x 8' copper clad ground rod driven into the ground approximately 12" from the base of the supporting structure. Attach the supporting structure to the ground rod using #8, or larger, copper wire.

SPECIFICATIONS

Electrical

| | |
|---------------------------------------|--------------------|
| Input Impedance | 50 ohms |
| *Forward Gain, average..... | 7.45 dBi (5.3 dBd) |
| *Front-to-Back Ratio (all lobes)..... | 25 dB max. |
| VSWR..... | less than 1.25:1 |
| Maximum Power | Max. legal |
| Lightning Protection | DC ground |

Mechanical

| | |
|-------------------------------|--|
| Boom Length | 12' 2" (3.70 m) |
| Longest Element..... | 24' 11 1/4" (7.61 m) |
| Turning Radius | 14' 3" (4.34 m) |
| Maximum Wind (Survival) | 80 mph (128 kmph) |
| Weight (approx.)..... | 21 lbs. (9.52 kg) |
| Wind Surface Area | 3 sq. ft. (.27 sq. m) |
| Wind Load @ 80 mph | 77 lbs. (34.9 kg) |
| Accepts Mast..... | 1 1/4" to 2 1/2" O.D. (3.2 cm to 6.4 cm) |

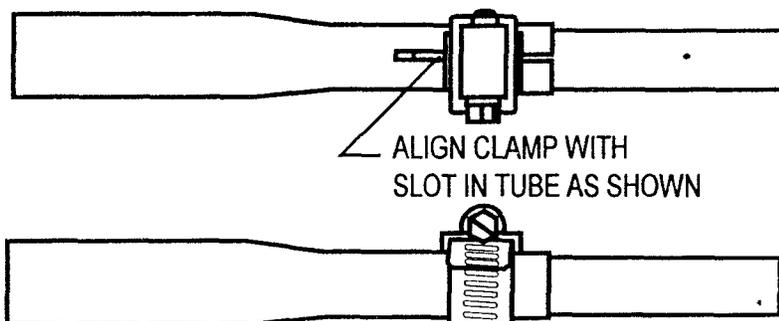
* Gain and Front-to-back verified by computer modeling with the MININEC 3 and YO© computer codes and radiation pattern measure of full size antennas on Hy-Gain's antenna test range.

Compression Clamps

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 over tighten the tubing clamps.



| Part No. | Description | Fits Tubing Sizes |
|----------|---|-------------------------------|
| 358756 | Clamp, Size #6 all stainless steel 5/16" hex head screw | 7/16", 1/2", 5/8" and 3/4" |

Figure 1
Compression Clamps

Assembly of the boom-to-Mast Brackets and Boom

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

Select the boom-to-bracket clamp parts (Item Nos. 11 & 13). Loosely assemble them on the boom ends (Item No. 6), 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 (Item Nos. 24, 25 & 26). Secure the brackets to the two boom ends using the 5/16"-18 x 2 3/4" bolts, lockwashers and nuts (Item Nos. 28, 31, & 32). Tighten these six (6) bolts securely.

Assemble the two cast aluminum brackets (Item No. 7) on the mast at the desired height above your tower. Secure the two brackets together using the two (2) 5/16" - 18 x 3 1/2" bolts, lockwashers and nuts (Item Nos. 29, 31, & 32).

You may wish to drill a hole through your mast so that the remaining 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 (Item No. 30) will be installed when the antenna is installed on the mast.

Select a set of small sized element-to-boom brackets and loosely assemble them on the Reflector end of the boom approximately 2 1/4 inches from the end of the boom to the center of the bracket. Refer to Figure 3 for an assembly detail of the bracket.

Select the R 1 section (7/8" x 84") and slip the unswaged end into the bracket assembled on the boom. Tighten the screws to hold the element securely but DO NOT tighten the anchor screws at this time.

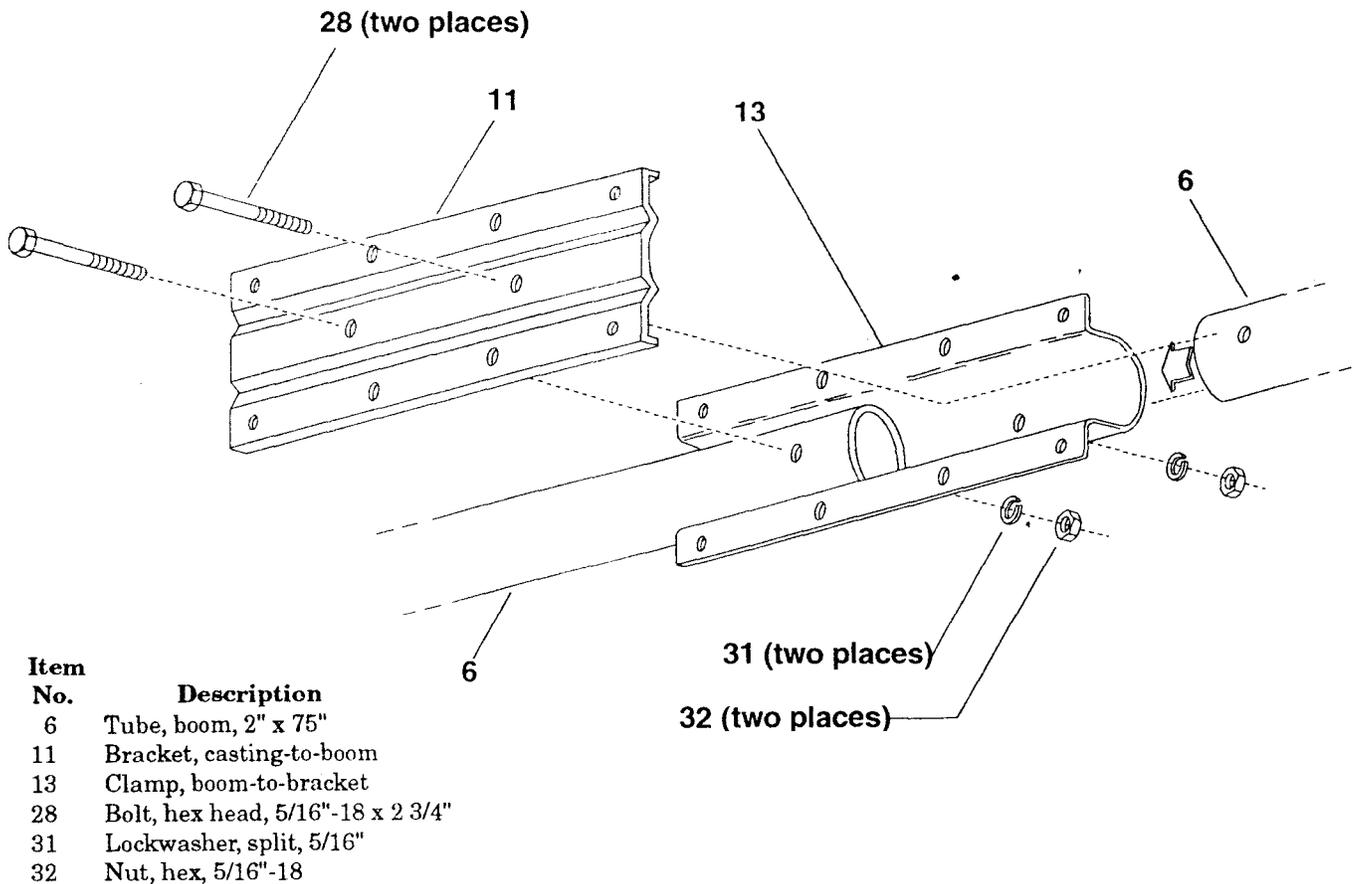
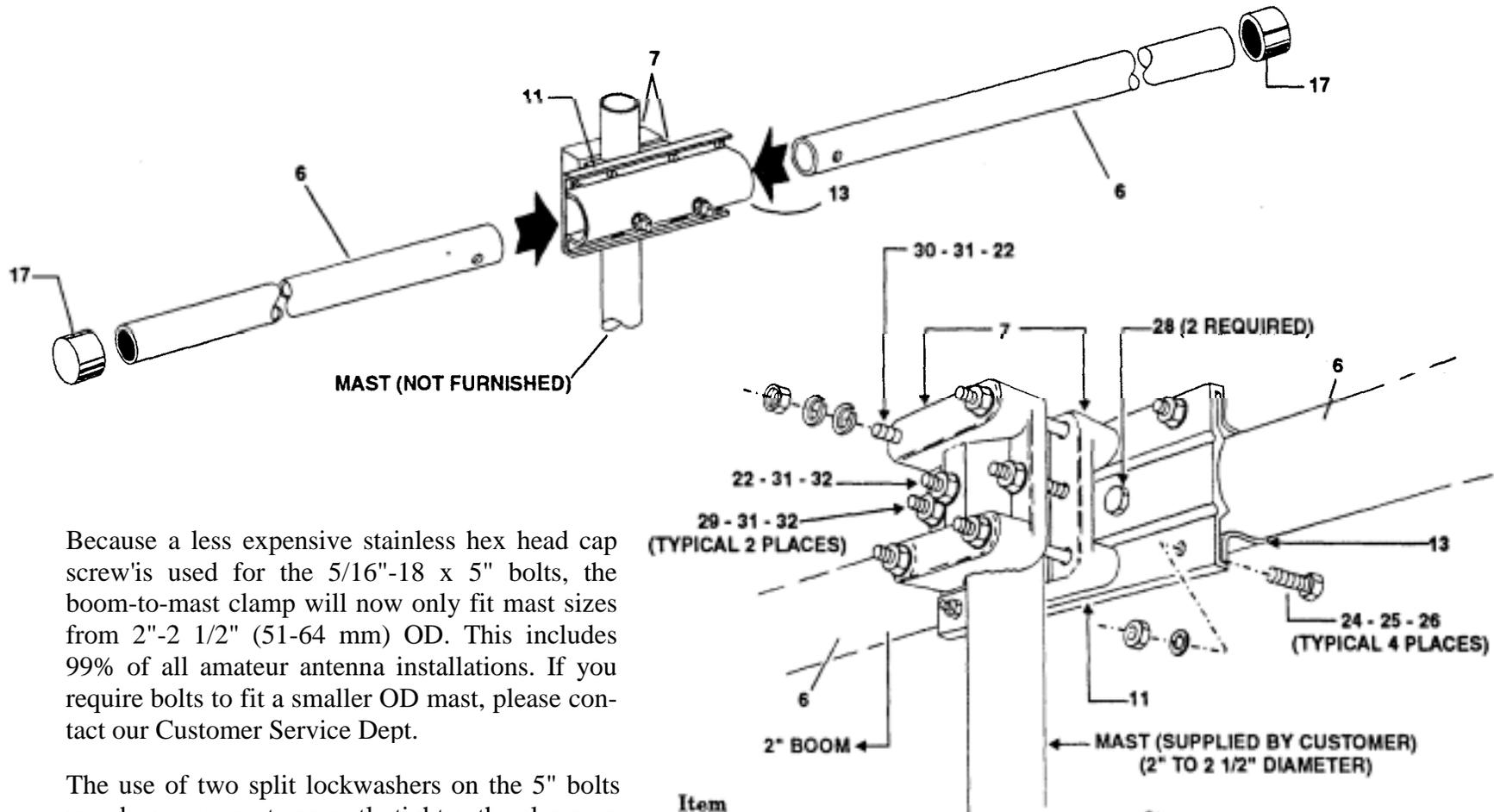


Figure 2 Detail A - Boom-to-Bracket Clamp Assembly



Because a less expensive stainless hex head cap screw is used for the 5/16"-18 x 5" bolts, the boom-to-mast clamp will now only fit mast sizes from 2"-2 1/2" (51-64 mm) OD. This includes 99% of all amateur antenna installations. If you require bolts to fit a smaller OD mast, please contact our Customer Service Dept.

The use of two split lockwashers on the 5" bolts may be necessary to properly tighten the clamp on a 2" mast. Additional washers may be needed if masts slightly smaller than 2" are used.

The use of heavy motor oil on stainless-steel threads will prevent galling of threads.

| Item No. | Description | Item No. | Description |
|----------|------------------------------------|----------|-------------------------------------|
| 6 | Tube, boom, 2" x 75" | 26 | Nut, hex, 1/4"-20 |
| 7 | Bracket, cast aluminum | 28 | Bolt, hex head, 5/16"-18 x 2 3/4" |
| 11 | Bracket, casting-to-boom | 29 | bolt, hex head, 5/16"-18 x 3" s.s. |
| 13 | Clamp, boom-to-bracket | 30 | Bolt, hex head, 5/16"-18 x 5", s.s. |
| 17 | Caplug, black, 2" | 31 | Lockwasher, split, 5/16" |
| 22 | Bolt, hex head, 5/16"-18 x 4" s.s. | 32 | Nut, hex, 5/16"-18 |
| 24 | Bolt, hex head, 1/4"-20 x 3/4" | | |
| 25 | Lockwasher, internal, 1/4" | | |

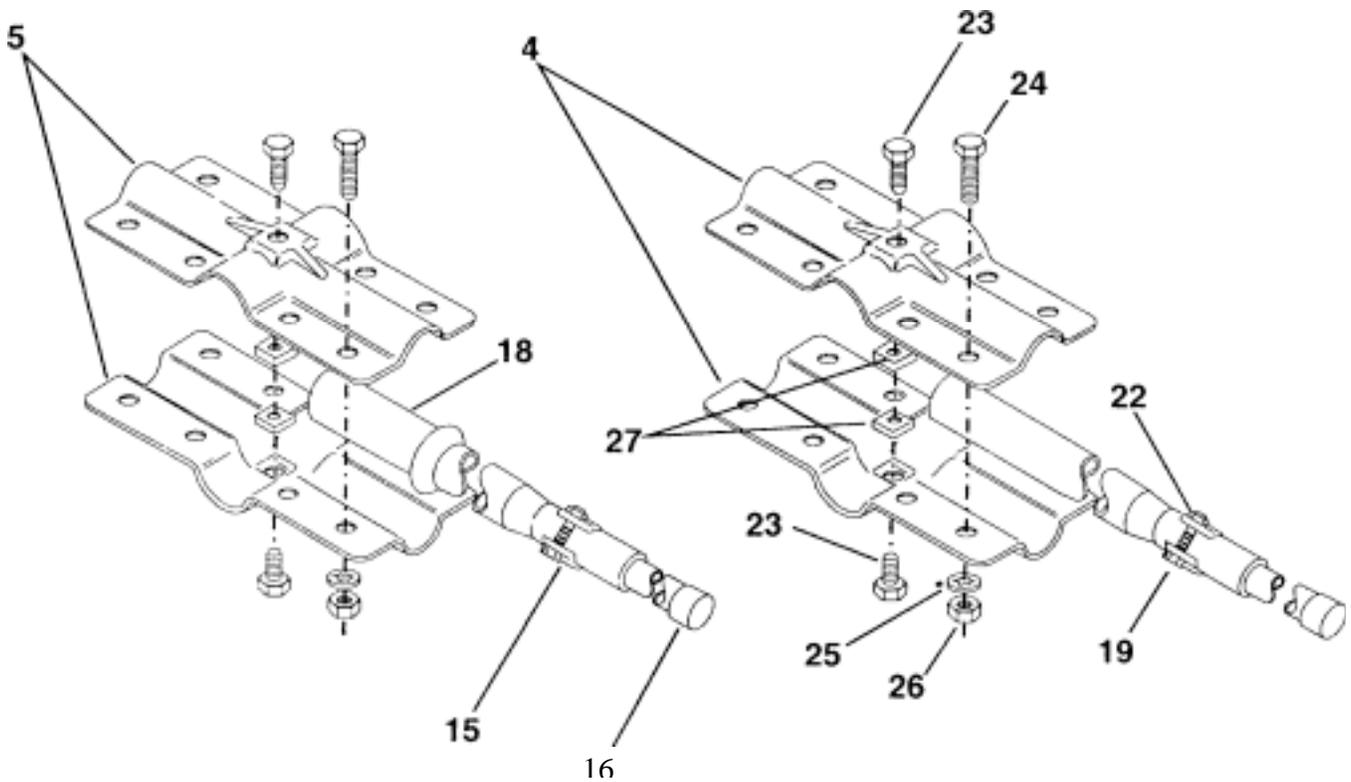
Figure 2 Detail B - Boom Assembly and Boom-to-Mast Clamp

Adjust the bracket until it is 2 1/4 inches from the end of the boom to the center of the bracket and make certain the element will lie in a plane horizontal to the earth when the antenna is mounted on the mast. Now tighten the anchor screws *securely*.

Slip the compression clamps on the swaged ends of the R1 sections. DO NOT tighten at this time.

Select the R2 sections (7/16" x 68") and slip them into the R1 sections. Adjust the tubing to the dimensions shown in Figure 4 for your mode of transmission, either Phone or CW. Now tighten the compression clamps.

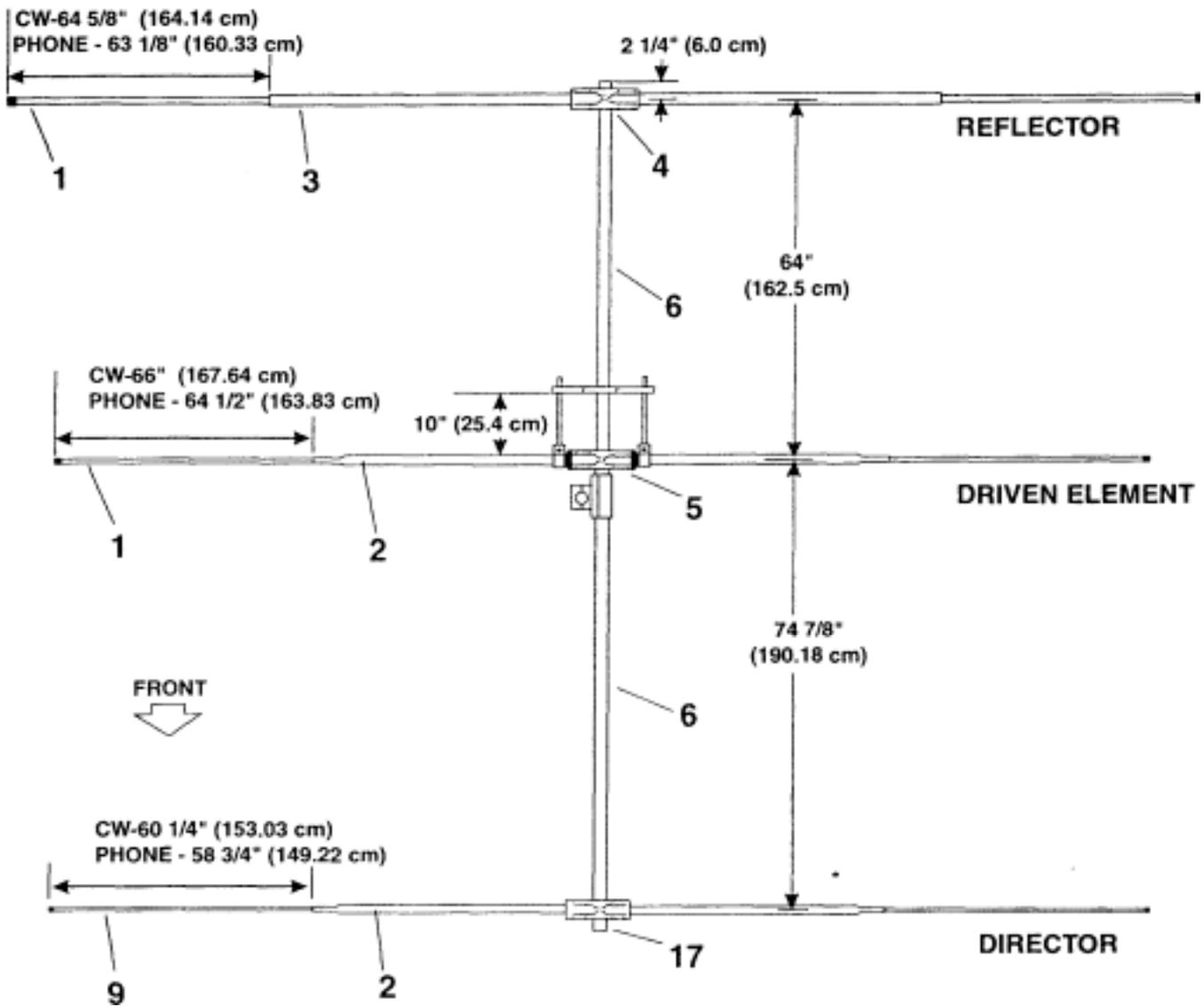
Select the large sized set of element-to-boom brackets and *loosely* assemble on the boom approximately 64 inches from the center of the Reflector element bracket to the center of the Driven Element bracket.



| Item No. | Description |
|----------|------------------------------------|
| 4 | Bracket, element-to-boom, #4 |
| 5 | Bracket, element-to-boom, #13 |
| 15 | Clamp, compression, 1/2" |
| 16 | Caplug, black, 7/16" |
| 18 | Insulator, 7/8" I.D. x 1 1/4" O.D. |
| 19 | Bolt, hex head, #10-24 x 1" |

| Item No. | Description |
|----------|--------------------------------|
| 22 | Nut, square, #10-24 |
| 23 | Bolt, hex head, 1/4"-20 x 3/8" |
| 24 | Bolt, hex head, 1/4"-20 x 3/4" |
| 25 | Lockwasher, internal, 1/4" |
| 26 | Nut, hex, 1/4"-20 |
| 27 | Nut, square, 1/4"-20 |

Figure 3 Element-to-Boom Clamp Assembly



| Item No. | Description |
|----------|------------------------------------|
| 1 | Tube, 7/16" x 68", DE2 & R2 |
| 2 | Tube, 7/8" x 72", swaged, DE1 & D1 |
| 3 | Tube, 7/8" x 84", swaged, R1 |
| 4 | Bracket, element-to-boom, #4 |
| 5 | Bracket, element-to-boom, #13 |
| 6 | Tube, boom, 2" x 75" |
| 9 | Tube, 7/16" x 62 3/4", D2 |
| 17 | Caplug, black, 2" |

Figure 4 Overall Assembly View

Select the DE1 section (7/8" x 72") and the Driven Element Insulators. Slip the insulators over the unswaged ends of the DE1 then slip the insulated ends of the DE 1 into the bracket assembled on the boom. Tighten the screws to hold the element securely, but DO NOT tighten the taper point anchor screws at this time.

Carefully recheck the 64" measurement from the center of the Reflector bracket to the center of the Driven Element bracket. Make certain the Driven Element will lie in the same plane as the Reflector, then tighten the anchor screws *securely*.

Slip two compression clamps on the swaged end of the DE 1 section. DO NOT tighten at this time.

Select the DE2 section (7/16" x 68") and slip them into the DE1 section. Measure the dimensions shown in the illustrations for your mode of transmission. Now tighten the compression clamps *securely*.

Select the remaining element-to-boom brackets and *loosely* assemble on the boom 74 7/8" from the center of the Driven Element bracket to the center of the Director bracket.

Select the D1 sections (7/8" x 72") and slip the unswaged ends into the bracket assembled on the boom. Tighten the screws to hold the element securely, but DO NOT tighten the anchor screws at this time.

Carefully recheck the 74 7/8" measurement from the center of the Driven Element bracket to the center of the Director bracket and check to see that the Director will lie in the same plane as the previous elements. Now tighten the anchor screws *securely*.

Slip the remaining two compression clamps on the ends of the D 1 sections.

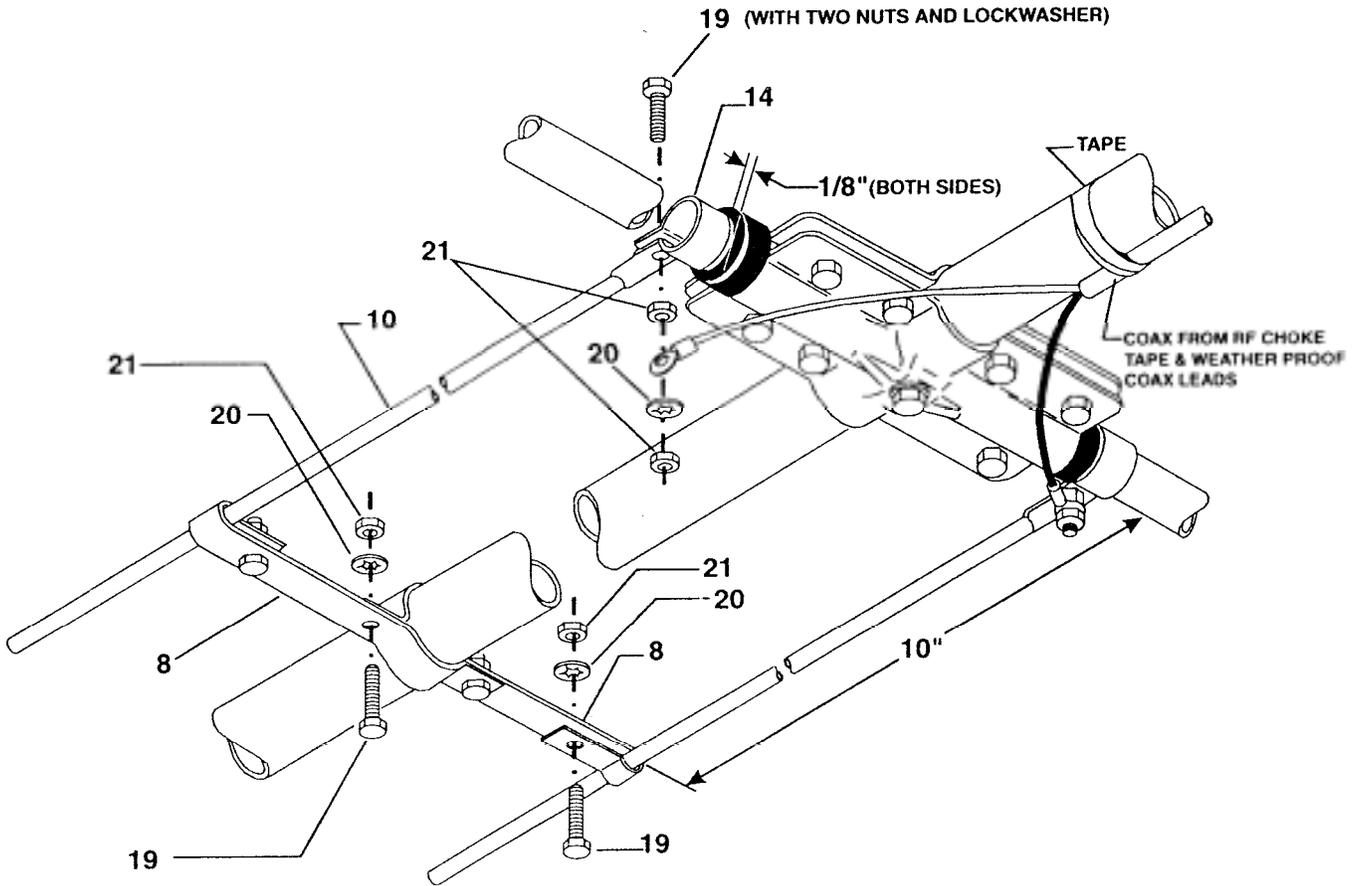
Select the D2 sections (7/16" x 62 3/4") and slip them into the D 1 sections. Measure the dimension shown in the illustrations for your mode of transmission. Now tighten the compression clamps *securely*.

Select the Beta rods, the Beta clamps and the 7/8" tubing clamps. Assemble the Beta Match as shown in Figure 5. Adjust the Beta Match for 10" measured from the inside edge of the Driven Element to the inside edge of the Beta clamp shown in the illustrations. Tighten all screws *securely*.

Form an RF choke using RG-213/U coaxial cable. Refer to detail in Figure 5. The choke consists of 12 turns with a 6" diameter. Allow enough cable extending from the choke to attach to the Driven Element.

NOTE: A Hy-Gain Balun, Model BN-86, can be used in place of the choke for greater efficiency.

Strip the coax extending from the choke and separate about six inches of the braid and center conductor. Connect the braid to one side of the Driven Element and the center conductor to the other side of the Driven Element as shown in Figure 5. Insulate the braid using waterproof tape to prevent the braid from shorting out on the antenna.



| Item No. | Description |
|----------|-------------------------------------|
| 8 | Clamp, beta |
| 10 | Rod, beta, 1/4" x 11 7/8" |
| 14 | Clamp, tubing, 7/8" (for beta rods) |
| 19 | Bolt, hex head, #10-24 x 1" |
| 20 | Lockwasher, internal, #10 |
| 21 | Nut, hex, #10-24 |

Figure 5 Beta Match Assembly

Weatherproof the connections using Coax-Seal© or some similar substance.

Securely tape the RF choke and feedline to the tenna boom. Later, when the antenna is mounted on the mast, the RF choke should also be taped to the mast

Select the rope and cut it into six equal lengths. Slip a length of rope into the end of each element. With about a 1/2" rope extending from the element end, separate the fibers and fold them back over the element. Refer to Figure 6. Now slip a 7/16" caplug over the element and rope. The rope inside the element will dampen vibrations caused by low velocity winds.

Place a 2" caplug on each end of the boom.

The antenna is now ready to be mounted on your mast.

Mount the antenna on 1 5/8" O.D. mast and ground the masting material as previously explained.

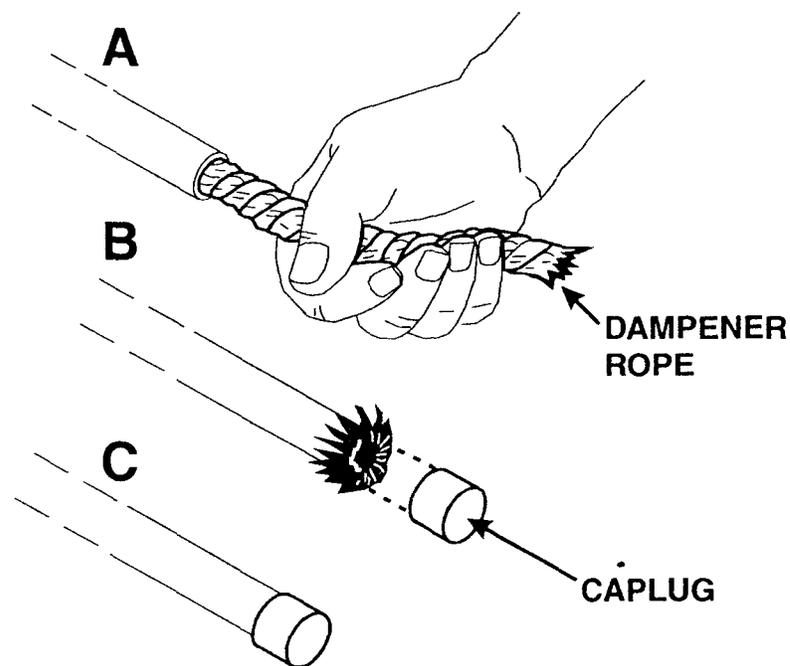


Figure 6 Installing Dampener Rope in Elements

PARTS LIST

| Item No. | Part No. | Description | Qty |
|----------|----------|---|-----|
| 1 | 174868 | Tube, 7/16" x 68", DE2 & R2..... | 4 |
| 2 | 190100 | Tube, 7/8" x 72", swaged, DE 1 & DI | 4 |
| 3 | 174862 | Tube, 7/8" x 84", swaged, R1..... | 2 |
| 4 | 163764 | Bracket, element-to-boom, #4..... | 4 |
| 5 | 165919 | Bracket, element-to-boom, #13..... | 2 |
| 6 | 170475 | Tube, boom, 2" X 75" | 2 |
| 7 | 102734 | Bracket, cast aluminum..... | 2 |
| 8 | 163371 | Clamp, beta | 2 |
| 9 | 170495 | Tube, 7/16" x 62", D2 | 2 |
| 10 | 175943 | Rod, beta, 1/4" x 11 7/8"..... | 2 |
| 11 | 172735 | Bracket, casting-to-boom | 1 |
| 12 | 691138 | Rope, 5/32" x 12' | 1 |
| 13 | 172732 | Clamp, boom-to-bracket | 1 |
| | 872122 | Parts Pack, 236S, Stainless Steel..... | 1 |
| 14 | 163312 | Clamp, tubing, 7/8" (for beta rods) | 2 |
| 15 | 358756 | Clamp, #6, tubing, ss..... | 6 |
| 16 | 455644 | Caplug, black, 7/16"..... | 6 |
| 17 | 455625 | Caplug, black, 2"..... | 2 |
| 18 | 463767 | Insulator, 7/8" I.D. x 1 1/4" O.D..... | 2 |
| 19 | 504069 | Bolt, hex head, #10-24 x 1" | 13 |
| 20 | 565697 | Lockwasher, internal, #10..... | 8 |
| 21 | 554071 | Nut, hex, #10-24 | 10 |
| 22 | 5142400 | Bolt, hex head, 5/16"-18 x 4", ss..... | 1 |
| 23 | 500156 | Bolt, hex head, 1/4"-20 x 3/8"..... | 6 |
| 24 | 505266 | Bolt, hex head, 1/4"-20 x 3/4"..... | 30 |
| 25 | 562961 | Lockwasher, internal, 1/4" | 30 |
| 26 | 554099 | Nut, hex, 1/4"-20..... | 30 |
| 27 | 551367 | Nut, square, 1/4"-20..... | 8 |
| 28 | 506968 | Bolt, hex head, 5/16"-18 x 2 3/4"..... | 2 |
| 29 | 500392 | Bolt, hex head, 5/16"-18 x 3", ss..... | 2 |
| 30 | 500349 | Bolt, hex head, 5/16"-18 x 5", ss..... | 4 |
| 31 | 564792 | Lockwasher, split, 5/16"..... | 9 |
| 32 | 555747 | Nut, hex, 5/16"-18..... | 9 |

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

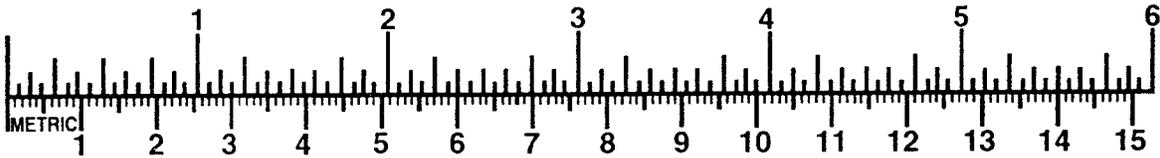
Converting English Measurement to Metric

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:



| FRACTION AND METRIC EQUIVALENTS FOR ONE INCH | | | |
|---|-------------|------------|-------------|
| Fractional | | Fractional | |
| Inch | Millimeters | Inch | Millimeters |
| 1/16 | 1.588 | 9/16 | 14.288 |
| 1/8 | 3.175 | 5/8 | 15.875 |
| 3/16 | 4.700 | 11/16 | 17.463 |
| 1/4 | 6.350 | 3/4 | 19.050 |
| 5/16 | 7.937 | 13/16 | 20.638 |
| 3/8 | 9.525 | 7/8 | 22.225 |
| 7/16 | 11.112 | 15/16 | 23.813 |
| 112 | 12.700 | 1 | 25.400 |

