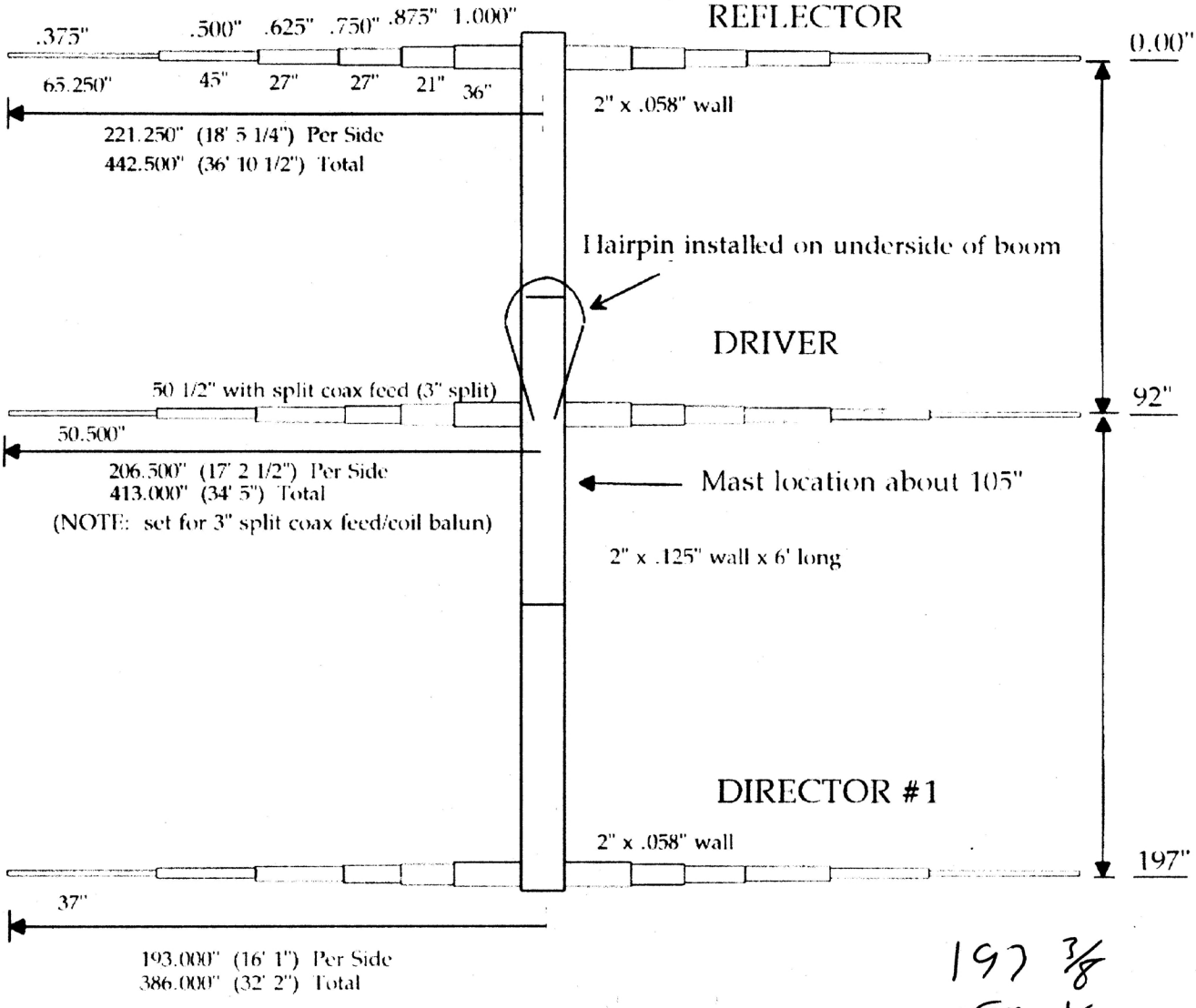
ELITE FORCE EF-320

3 Element 20 Meter Monoband Yagi-style Antenna

FREQUENCY COVERAGE 13.950 - 14.450 MHz



197 3/8

189 1/8

386 1/2

BOOM:
2.00" Diameter
16'9" Overall

WINDLOAD 4.23 Square Feet @ 28 degrees from center line
WEIGHT Approximately 26 Pounds
MAST TORQUE @ 70 mph = 277 inch pounds
TURNING RADIUS 19.8 Feet
POWER RATING 5KW
WIND SURVIVAL 80 mph

FEED SYSTEM: Hairpin Match, 50 Ohms
Gain to Max. Theoretical - -2.2 dB

dw320as.001

Elite Force EF-320/320D

3 element 20 Meter Monoband Yagi Antenna

FREQUENCY COVERAGE: 13.950-14.400 MHz (VSWR 1.5:1 points)

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The EF-320 antenna is a monoband yagi with 3 elements originally on an 18' boom. The boom was shortened slightly to provide flatter VSWR and F/B across the band. The shorter boom shows the F/B to vary only 1dB and the forward gain less than 0.1dB change in the band. There is a reflector, a driver and one (1) director element. The antenna feedpoint impedance is less than 50 ohms and is stepped up through a hairpin to provide an match to 50 coax feedlines. It is designed to be fed through either split coax and an RF choke, or a 1:1 balun. The elements and boom are designed to present a low profile and withstand 80 mph winds (the boom is actually designed in excess of 100 mph). The "D" model is designed for 100 mph elements and the boom is in excess of 110 mph.

All the elements are insulated from the brackets and boom and the driver element is split at the center with a solid fiberglas insulator. Connection to the driver is through a pair of 10-24 stainless machine screws. **Since the driver is a balanced element and coaxial line is unbalanced, a means to choke off antenna current from the outside of the coax should be used.** Two devices are fine: one is an RF choke, made by winding several turns of the coax in a circle close to the feed point; or, a 1:1 balun can be used.

Some of the hardware is stainless steel. It is type 304, not 18-8, which is only rust resistant. The plated hardware is used for the element-to-boom bracket installation, with stainless lockwashers and nuts to enable removal. Stainless U-bolts are not necessary, except in extreme environments and a preferred method is to paint these parts. Stainless hardware is easy to gall, meaning to freeze the nut on the shaft, rendering the bolt useless. If all stainless is required, please contact the factory. The entire antenna can be painted to eliminate any glint in the sun, although all methods have been employed to limit glint already. For example, the tubing is all 6061-T6, non-polished, and the brackets and plates are tumbled.

The mounting system is the easiest to use ever. It is the Easy-On™ mount and is so unique and useful, it is a copyrighted design. Two plates are provided: one is attached vertically to the mast, with a bolt through the top, center hole, being held in place by the mast and protruding outward; the second plate is attached to the boom. When the antenna is raised, the boom plate is placed over the bolt and the antenna is immediately held in place by the bolt and after the lockwasher and nut are on, the antenna is secure. This eliminates the cumbersome multiple hands requirements to attach U-bolts and saddles while trying to hold the lockwashers, nuts and antenna - with the wind blowing!!

On to the assembly.....

Tools required:

A. Wrenches or ratchets, used for attaching the elements to the boom and the boom to the mast.
   1. 7/16"
   2. 1/2"
   3. 9/16"

B. A 3/8" nut driver, or small crescent wrench for the feedpoint 10-24 nuts.

C. Screwdriver to back-up the 10-24 feedpoint machine screws.

D. Hand riveter, also called a "POP™", or blind riveter. These are available from the company, a local hardware store, or possibly your dealer where this antenna was purchased. This is used to secure the element sections together. Use the smallest nozzle (tip) for the 1/8" rivets.

E. A rope to hoist the antenna into position.

F. Some patience and common sense - be careful, as antennas can come into contact with high voltage lines and they are lethal. Also, be careful installing, as towers and masts are also dangerous. Thanks

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The antenna is shipped in sub-assemblies and each assembly section is appropriately identified. There are three (3) elements and each one is divided into two (2) halves: "A" and "B". The assembly sections are then numbered consecutively from the inside out to the tip with the element number first, such as: 1A and 1B, 2A and 2B, 3A and 3B, etc., since there is never the same size tubing twice on a side! If they are identified as 1A and 1B, matching up the tapering sizes for each slement side is all that is required. Element #1 is the 20 meter reflector. The drawing will assist in this process. Assembly requires only that the identifications are matched. All the rivet holes are pre-drilled and will align exactly when the proper sections are matched. The driver element is split at the center and fed with 50 ohm coax through either a 1:1 balun, or an RF choke (i.e. 8 turns, 10" diameter circle). The boom is in several sections and is marked A-A, B-B, etc. Matching these sections and inserting the 1/4-20 bolts will complete the boom assembly. The aluminum mill markings are left on the tubing. If it is desired to remove them, most solvents will wipe them away. Any markings made at the Force 12 factory will quickly fade.

Assembly Instructions:

NOTES:

1) Although the entire antenna has already been pre-assembled, it might be a good idea to double-check the measurements, especially on the elements. Please let us know if there are any discrepancies. Thanks.

2) When using the hand riveter, please be sure the smallest nozzle is in the tool. Sometimes with a larger nozzle, the mandrel of the rivet can get crooked within the tool, which can result in breaking the mandrel before the rivet is "popped." The smaller nozzle also makes a smooth finish on the rivet head.

3) The "A" and "B" halves of the elements are arbitrarily marked, so they do not need to be matched for a particular side (i.e. all half-side "A"'s on a certain side of the boom). The markings are simply for ease in assembly.

4) The PVC element insulators may or may not be already installed on each element. There are two sizes (in diameter) of PVC and they are easy to relate to each element. Slide the appropriate size over the element and center it on the largest tubing in the element (which will be the center piece). The longer pieces go on the non-driver elements. The drivers use two short pieces and they go on both sides of the center insulator, just outside of the 10-24 machine screws.

I. ELEMENT ASSEMBLY

_____**00) NOTE: this entire antenna has already been assembled at the factory. This is how the holes get drilled and how the sub-assemblies are made. This means that every piece will align properly, provided that they are being assembled in the right position.**

_____**00a) It should never be necessary to drill a hole for a rivet, or bolt.**

_____**00b) Each element is dis-assembled and separately bundled, so working with one element at a time is the best method. This will ensure that only the parts for a particular element are available for assembly at one time.**

_____**00c) Please check the measurements and the element positions to double check us at the factory. It is rare that a marking mistake is made, but it can happen.**

___0) Each element is tapered and the taper runs smaller towards the tip. Each section slides into another and to ensure a nice fit, the larger one is crimped/swaged to reduce its size slightly. This means that one end of each section is crimped/swaged and the reduced size of one end can be clearly seen. Only the tip is not done in this manner, since it is the end of the element.

_____0a) Please be sure that the non-crimped/swaged end goes into the crimped/swaged end of the larger piece.

_____0b) If the rivet holes do not align, please check to be sure the section is oriented properly and that the correct side (A or B) is on the correct side. It should not be necessary to drill any holes.

_____0c) Thanks.

_____**1) Lay out the element assembly sections for element #1 (the reflector).**

_____a) Side A

_____b) Side B

_____2) Apply Noalox compound to each of the sections that will slip into another. This can be a thin coat, spread evenly along and around the portion that is inserted into the larger tubing.

_____3) Starting at the tip, slide the tip into the next larger section and align the rivet holes.

_____a) Insert the supplied 1/8" rivets into all rivet holes. It is important to insert all the rivets before any are pulled; otherwise, there is a possibility that the other holes might not align properly. To lessen this possibility, the holes are drilled to the actual rivet size (1/8"), which makes for a tight alignment and snug hole. If at any time it

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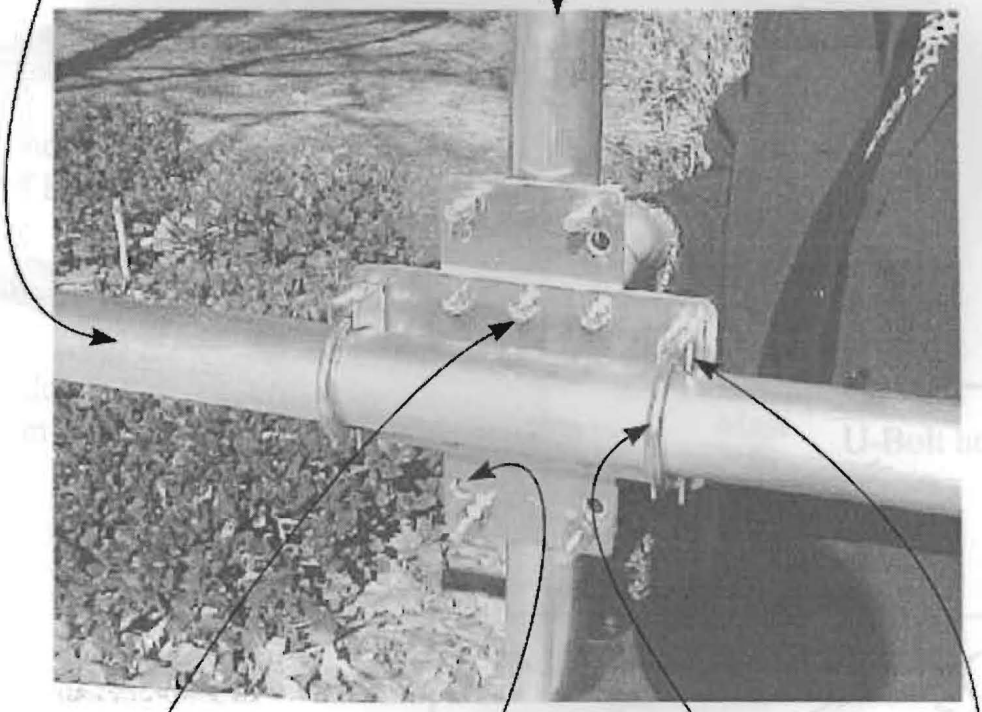
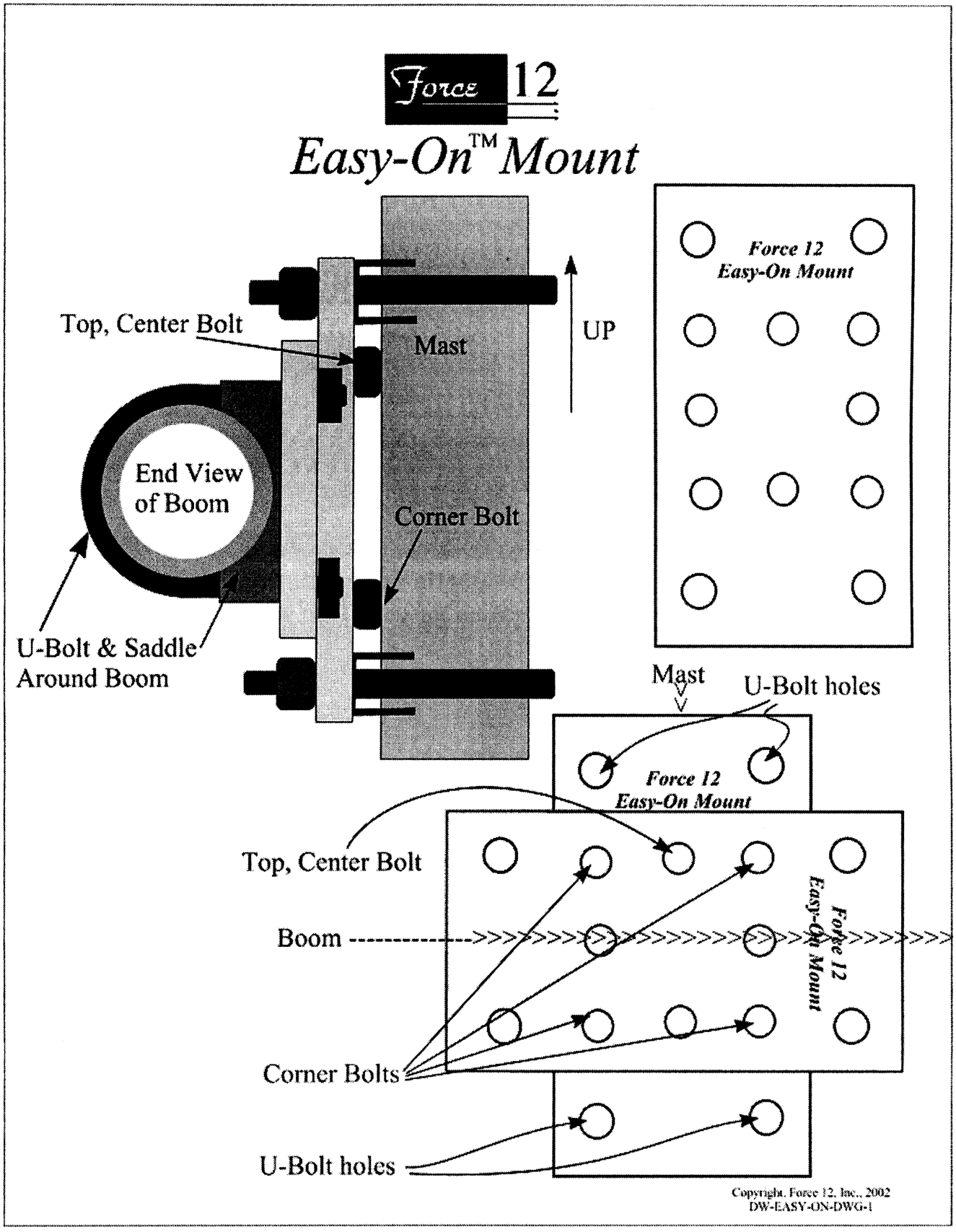
Photo of Easy-On™ Mount



(Note: in this example, extra holes have been drilled for 2 1/2" U-bolts / 2 1/2" mast)


Force 12
Easy-On™ Mount
Top, Center Bolt
Mast
UP
End View of Boom
Corner Bolt
U-Bolt & Saddle Around Boom
Force 12 Easy-On Mount
Mast
U-Bolt holes
Force 12 Easy-On Mount
Top, Center Bolt
Boom
Force 12 Easy-On Mount
Corner Bolts
U-Bolt holes
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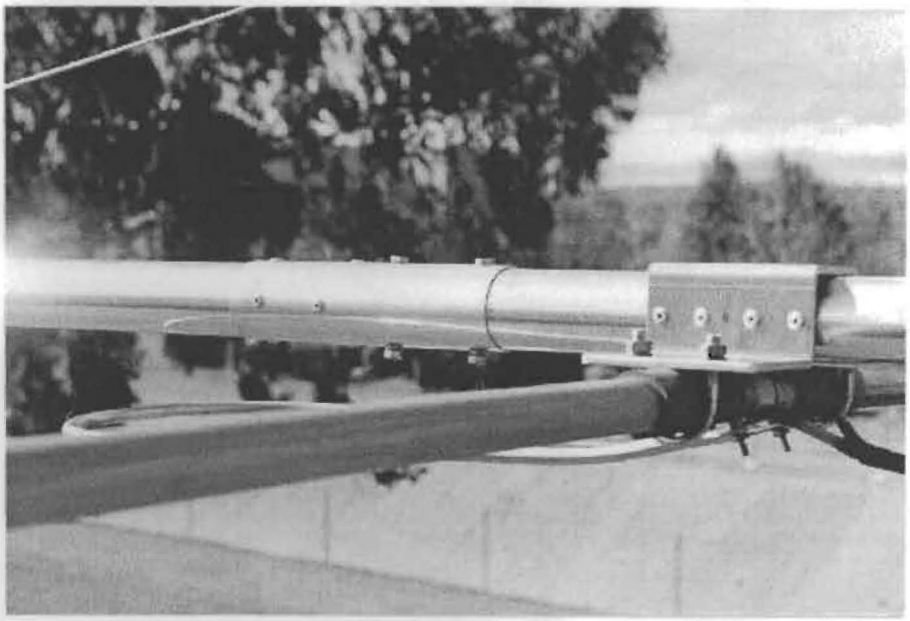
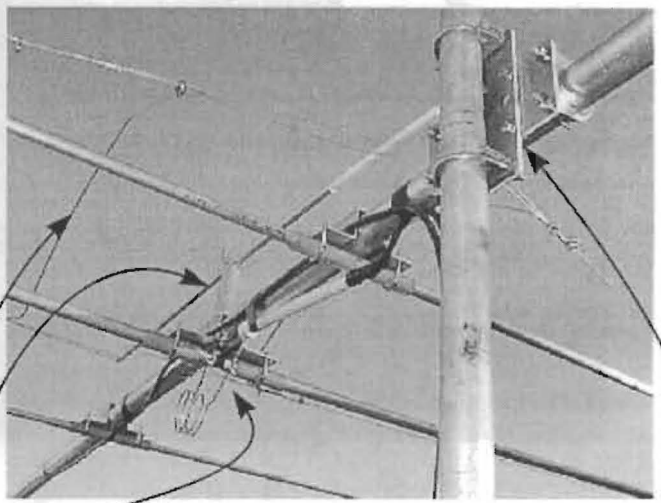
Element to Boom Examples



Driver element, coax attachment (no balun) and hairpin.
Note that the element bracket is not deformed by overtightening of the U-bolts.

PVC slot alignment
on driver elements



Various views (C-4SXL)
Split driver, hairpin & Force 12 B-1 balun
Easy-On Mount™
Center 40 mtr spreader and tuning jumpers