HEX-BEAM

HX-5Bi Multi-band Array

INTRODUCTION:

The HEX-BEAM is a simple, but unique, hexagonal shaped beam. No boom is used. It's shape provides the phasing and coupling needed for optimized performance levels and makes a ½ size beam possible without the performance degradation and other problems usually associated with 2:1 size reduction. The HEX-BEAM's configuration also makes substantial reductions in weight and wind loading possible and eliminates the asymmetric loading problems usually associated with wire beams. Assembly is greatly simplified. When assembled, the array holds itself together, so few fasteners are needed. The completed array has the appearance of a six-sided parabolic dish that is pointed straight up (*see p.9*). In keeping with the goal of "Small & Simple", the HEX-BEAM is direct fed with 50-Ohm cable. This avoids the added complications, associated losses, plus weight and cost of a suitable matching system/systems for each band that is covered. VSWR stays 2:1 or less for operating bandwidth. This meets the requirements of most present equipment.

A review of these instructions is recommended before beginning. They are intended to make assembly of your HEX-BEAM an enjoyable and satisfying experience, whether you're a "veteran" builder or this is your first antenna. Someone familiar with the HEX-BEAM, or assembly in general, may find the diagrams and highlighted main steps are all they need to assemble the array quickly and easily. Helpful and informative comments are included at each step to simplify and expedite assembly if any questions should arise.

CAUTION-the proper equipment, care, and "common sense" are required for a safe and successful installation.
BEWARE OF POWER LINES! – With high voltage, electrocution is possible at great distances – <u>Without</u> physical contact!

TOOLS:

- Regular screwdriver/ ¼" Nut driver (arm clamps)
- 5/16" wrench (element mounting fittings)
- 7/16" open-end wrench/deep socket (mounting stud locknuts/U-Bolts)
- ½" wrenches (thru-bolt)
- 3/16" Allen wrench (hub set screws) *included*
- #1 Phillips screwdriver (insulator lock screws)
- 5/16" drill bit w/ drill (thru-bolt hole @ mast)
- Measuring tape (final adjustment)

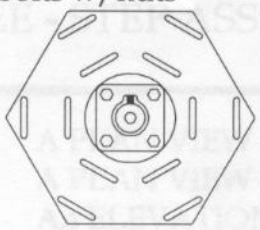
ADDITIONAL MATERIALS:

- A short length of 1-1/4" water pipe (or other pipe w/ 1-11/16" O.D.) can be used for a mast (nipple from a hardware store). **NOTE:** Remove threaded section to eliminate hub damage.
- Ty-Wraps and/or <u>good</u> electrician's tape (Scotch 33+, etc.), coax seal (*included*), silicone sealant

HX-5Bi - BASIC COMPONENTS:

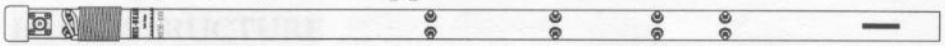
1) Center plate, w/ associated hardware already mounted:

12 U-bolts w/nuts



Thru-bolt

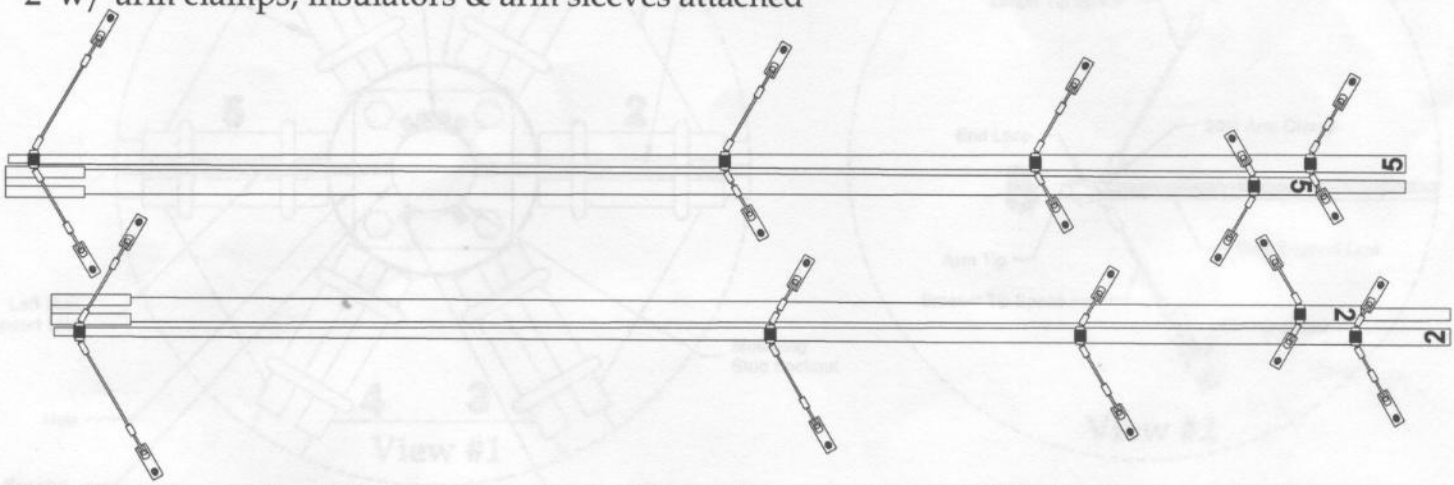
2) Center support, w/ side support lines attached



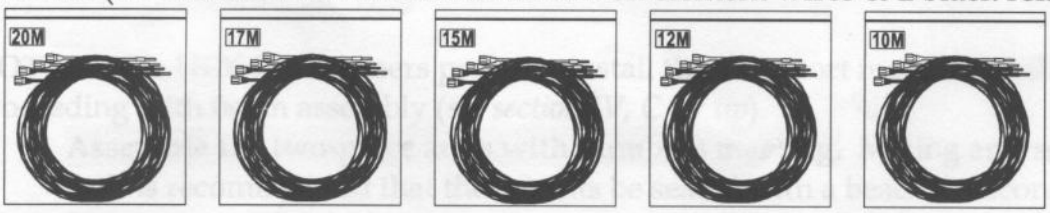
3) 6 two-piece fiberglass arms:

4 w/ arm clamps & arm sleeves attached

2 w/ arm clamps, insulators & arm sleeves attached

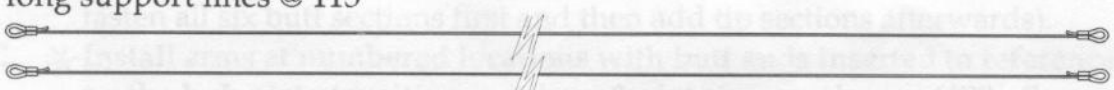


4) Band Pacs (each Band-Pac contains 2 red driven element wires & 2 black reflector wires)



5) Support lines: 2 side support lines (see #2 above)

2 long support lines @ 113"

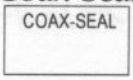


2 short support lines @ 78"

6) Complimentary Accessories:

3/16" Allen wrench

Coax-Seal



Spare Insulator Screws

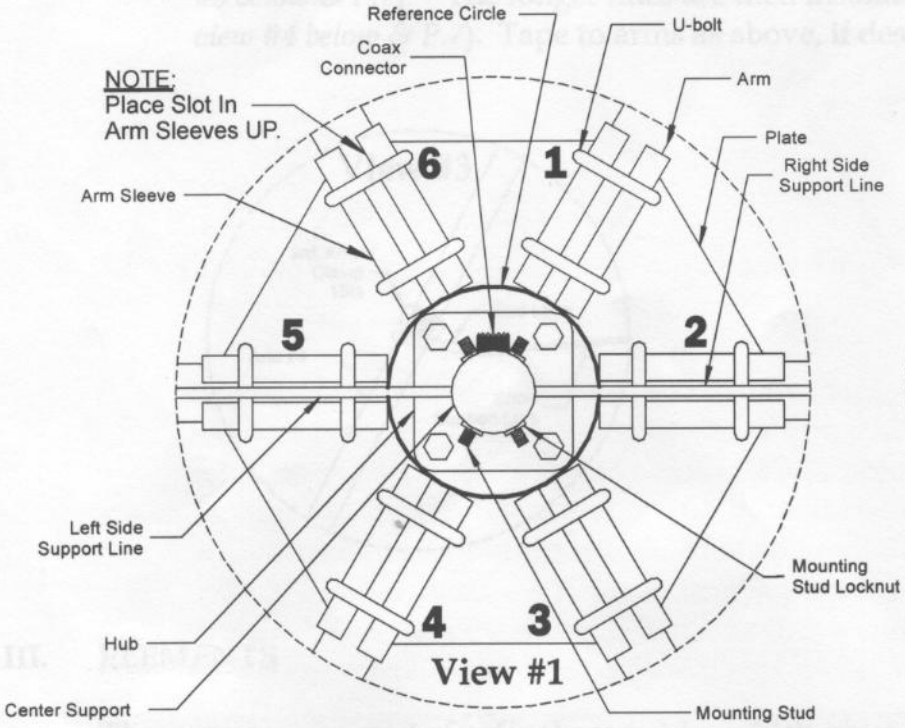
THREE - STEP ASSEMBLY

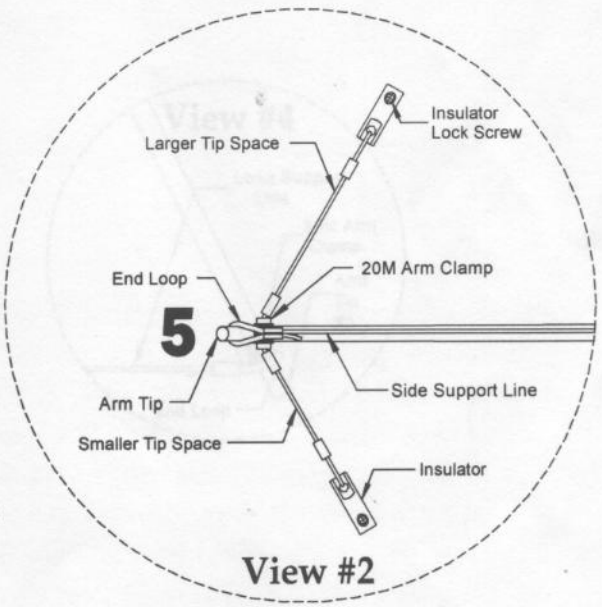
A PLAN VIEW of the partially assembled HEX-BEAM is shown on p. 7
A PLAN VIEW of the completed array is shown on p. 8
An ELEVATION VIEW of the completed array is shown on p. 9

I. BASIC STRUCTURE

NOTE: Coax fitting points Front (i.e. Beam Direction)

A. **Start assembly with center plate.** Numbers face up. U-bolts go at top with nuts at bottom (*see view #1 below & p. 7*). An elevation drawing is shown on *p. 9, view #8.*





NOTE: Some HEX-BEAM users prefer to install their support mast and drill the thru-bolt hole before proceeding with beam assembly (*see section IV, C for tip*).

B. **Assemble the two-piece arms with numbers meeting.** Mating arm sections are numbered 1-6. It is recommended that these joints be sealed with a bead of silicone sealant (applied around ferrule, near joint, before arm tip section is installed). Joints can be tightly wrapped with electrician's tape for temporary applications. (TIP: You may find it simpler to install and fasten all six butt sections first and then add tip sections afterwards).

C. * **Install arms at numbered locations with butt ends inserted to reference circle marked on the hub plate (position numbers & slots in arm sleeves UP!). Secure, but DO NOT CRUSH arms.** Be sure longer space (at end insulators, on arms #2&#5) is toward the front of the antenna and arm fittings are on top of the arms (*see view #2 above & p.7*).

D. **Install center support into upper hub with black reference marks lined up.** Tighten 3/16" Allen screws in hub loosely for now (*see p.9, view #8*). **NOTE: The center support is permanently secured after array assembly.**

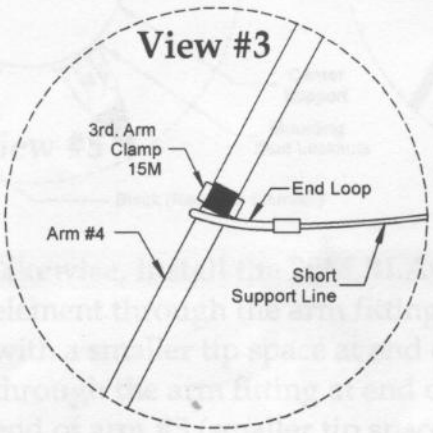
* Slide arms into U-bolts "sideways" and twist 90°/slot up.

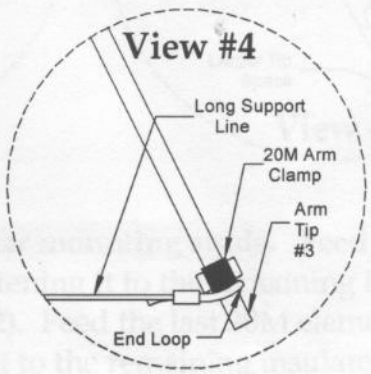
II. SUPPORT LINES:

NOTE: Non-conductive support lines are used in some portions of the HEX-BEAM. These lines are installed before element installation begins.

A. **Unroll the side support lines and install them over arm tips #2&#5 (*see p.3, view #2*).** These lines are attached to the center support. Simply bend arms upward, slip end loops over arm tips and allow them to rest on outer arm clamps. In severe weather areas, these may be taped to arms if desired.

B. **The remaining support lines are installed at the front and rear of the HEX-BEAM.** The shorter lines are installed first by leaving the front and rear pair of arms horizontal, bending the arms toward each other as required and slipping the end loops over the 1st and 2nd outer arm clamps, and allowing them to rest on the **3rd (15M) arm clamp** (*see view #3 below & P.7*). The longer lines are then installed at arm tips as done in step II-A (*see view #4 below & P.7*). Tape to arms as above, if desired.





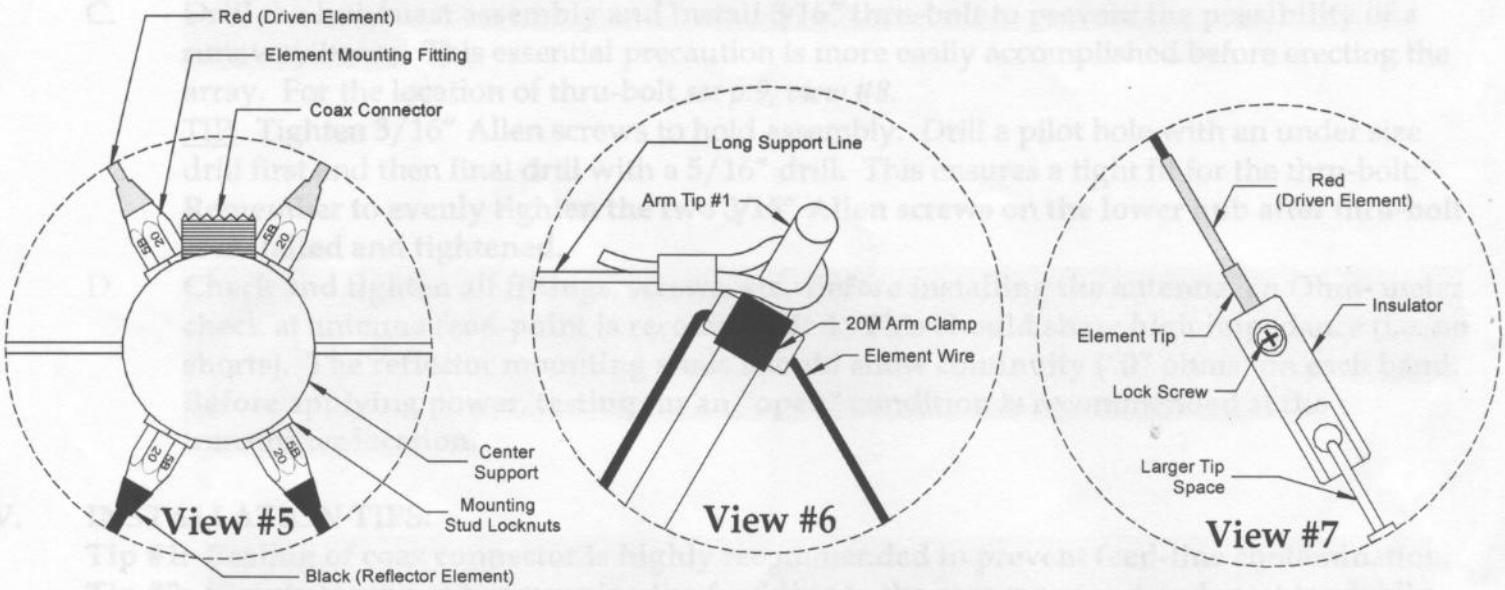
III. ELEMENTS

The array is now ready for final assembly, which gives it its parabolic shape. Element wires are wound in coils marked for band on element mounting fittings. Red is for the driven element at front (coax side) and Black for reflector.

NOTE #1: When fastening elements to the center support with a 5/16" wrench, be sure to also use a 7/16" wrench at mounting stud locknuts **to prevent stud rotation,** which could damage internal wiring harness. ***Be sure not to rotate the mounting stud by over-tightening!!***

NOTE #2: When installing element tips into insulators, **be sure they are all the way in!** A #1 Phillips screwdriver is used to tighten the lock screw. Elements must be anchored firmly, but ***be careful not to damage tip fittings by over-tightening lock screws, resulting in a sheared wire tip!***

A. **Install the two 20M RED elements at top mounting studs at the front (coax fitting side) of antenna (*see view #5 below*).** Fasten with a 5/16" wrench **(see note #1 above).** Unroll element coils carefully to prevent kinks! Feed the right element through arm fitting at end of arm #1 (*see view #6 below & p.8*), fastening it to the insulator **(see note #2)** with the larger tip space at end of arm #2 (*see view #7 below*). In similar fashion, feed the left element through the arm fitting at end of arm #6, fastening it to the insulator at end of arm #5 (larger tip space).



B. **Likewise, install the 20M BLACK elements at top rear mounting studs.** Feed the right element through the arm fitting at end of arm #3, fastening it to the remaining insulator with a smaller tip space at end of arm #2 **(see note #2)**. Feed the last 20M element (black) through the arm fitting at end of arm #4, and fasten it to the remaining insulator at the end of arm #5 (smaller tip space). This will pull the array into shape (*see p.8 & p.9*). **TIP:** If desired, one long Front or Rear support line can be removed, the element tips attached, and then the array pulled into shape with the support line.

C. **In a similar fashion, fasten all remaining element coils to their proper mounting studs (see note #1) and feed them through their respective arm fittings.** When all are fed through, fasten each to their appropriate insulator. **(Remember not to over tighten fittings, see note #2).**

NOTE: Sometimes, the last elements on 12M & 10M end up tight. To ease attachment of these element tips, slide the arm clamps (with the insulators attached) down the arm, attach element tips, and slide arm clamps back up arms until element wires are tight. The other arm clamps might need to be adjusted to keep clamps equidistant from black reference marks on arms.

IV. FINAL ADJUSTMENTS/ASSEMBLY

A. **This completes array assembly. Check that all arms and element wires are in proper alignment. If necessary, arm clamps can be rotated around and/or adjusted along arm (Regular screwdriver/ ¼" nut-driver), to remove sags in element wires. When moving arm clamps on a given band, adjust in slight increments up/down, keeping all six clamps equidistant from the black reference marks. (Be careful not to strip stainless steel clamps by over tightening).** Element wires should be approximately parallel when completed (especially at 10/12M). The array should have a balanced look with no major sags/kinks. Each side of the array should measure 113" ± 1" at the 20M elements.

B. **The center support should now be secured.** Simply loosen the Allen head set screws, lift the center support clear of hub and apply silicone. Re-insert and evenly tighten 3/16" Allen screws. Finally, remove excess silicone making sure that the hub/center support junction is sealed and the drain hole in hub plate is left clear. **This is *especially important* as it assures structural integrity of the center support and hub junction. It also prevents freeze / thaw cycles inside the junction. If this is not done, the hub Allen screws alone will eventually wear into the center support resulting in a loose center support.**

C. **Drill the hub/mast assembly and install 5/16" thru-bolt to prevent the possibility of a runaway beam.** This essential precaution is more easily accomplished before erecting the array. For the location of thru-bolt *see p.9, view #8.*
TIP: Tighten 3/16" Allen screws to hold assembly. Drill a pilot hole with an under size drill first and then final drill with a 5/16" drill. This ensures a tight fit for the thru-bolt. **Remember to evenly tighten the two 3/16" Allen screws on the lower hub after thru-bolt is installed and tightened.**

D. **Check and tighten all fittings, screws, etc. Before installing the antenna, an Ohm- meter check at antenna feed-point is recommended. This should show high impedance (i.e. no shorts). The reflector mounting studs should show continuity ("0" ohms) on each band. Before applying power, testing for an "open" condition is recommended at the transmitter location.**

V. INSTALLATION TIPS:

Tip #1: Sealing of coax connector is highly recommended to prevent feed-line contamination.

Tip #2: Simply taping or ty-wrapping the feed-line to the center support and mast is usually satisfactory. It is recommended that the antenna feed-line be routed along the RIGHT SIDE of the center support and then in a loop over its top and into the feed-point. This gives a visual indication of beam direction *(see p.9, views #8 & #9)*. **DO NOT route coax through the high current areas at the front and back of the array.**

Tip #3: Recommended height above ground is 35-40ft.

Tip #4: If the HEX-BEAM is to be painted, DO NOT paint the elements as severe de-tuning will result.

Tip #5: If disassembling, tighten insulator lock screws to prevent them from falling out.

Tip #6: For some installations (such as those at mid-tower or using a GLEN MARTIN HAZER), one side of the HEX-BEAM can be opened up:

1. Once the array is properly assembled and adjusted, mark the clamp locations on the side arm, which is to be opened (right recommended).
2. Loosen arm clamps on the side arm you are using and slide toward hub to remove tension on element wires.
3. Release element ends from tip insulator and proceed with installing antenna into position.
4. Install and secure element ends as HEX-BEAM is installed. Simply return arm clamps to the previously marked locations as the array is placed into position (20M first, then 17M, etc.). Check for array "balance" and secure all fittings, screws, etc.

GOOD DX!

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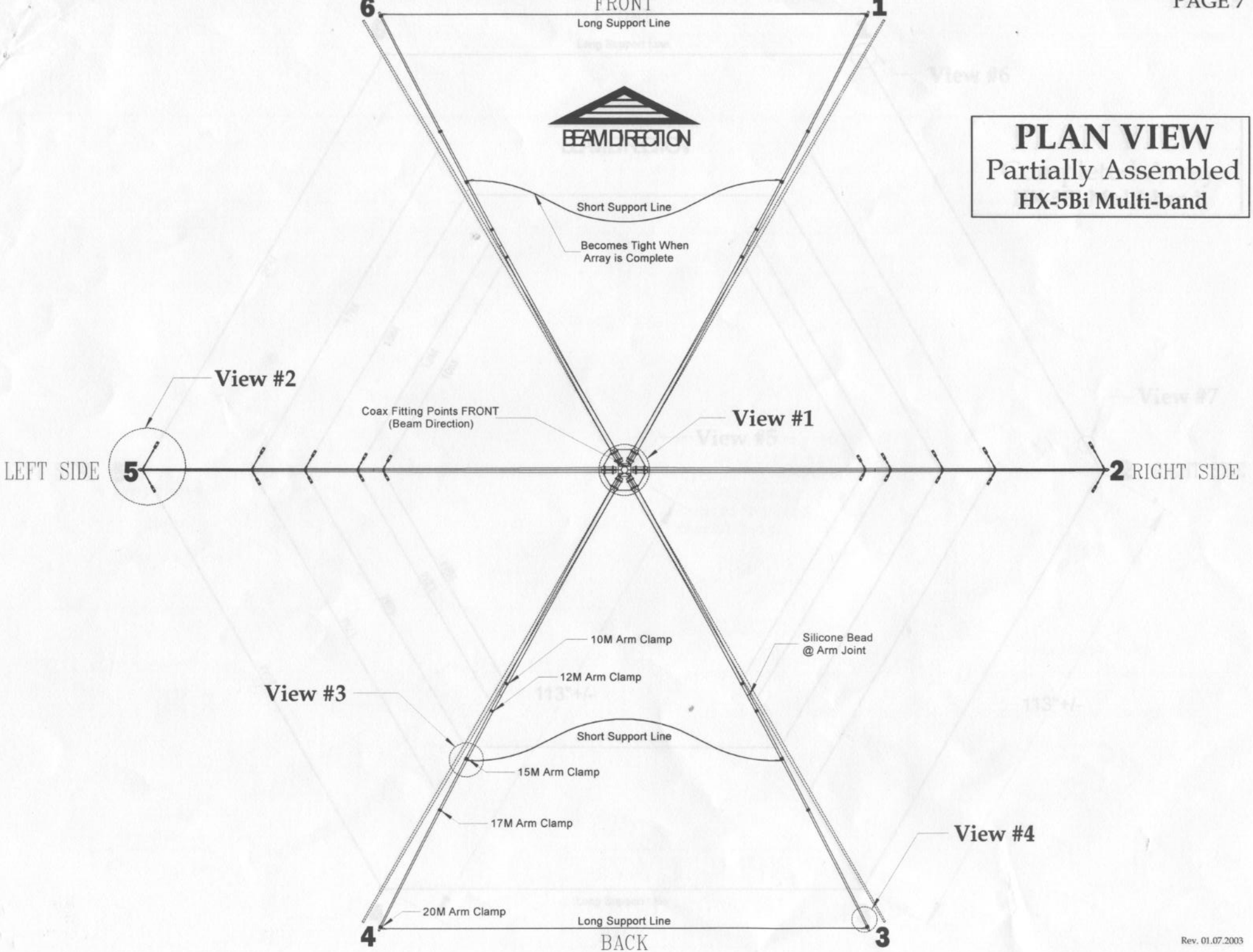
978-386-7900

Rev. 11.11.2006

PLAN VIEW
Partially Assembled
HX-5Bi Multi-band



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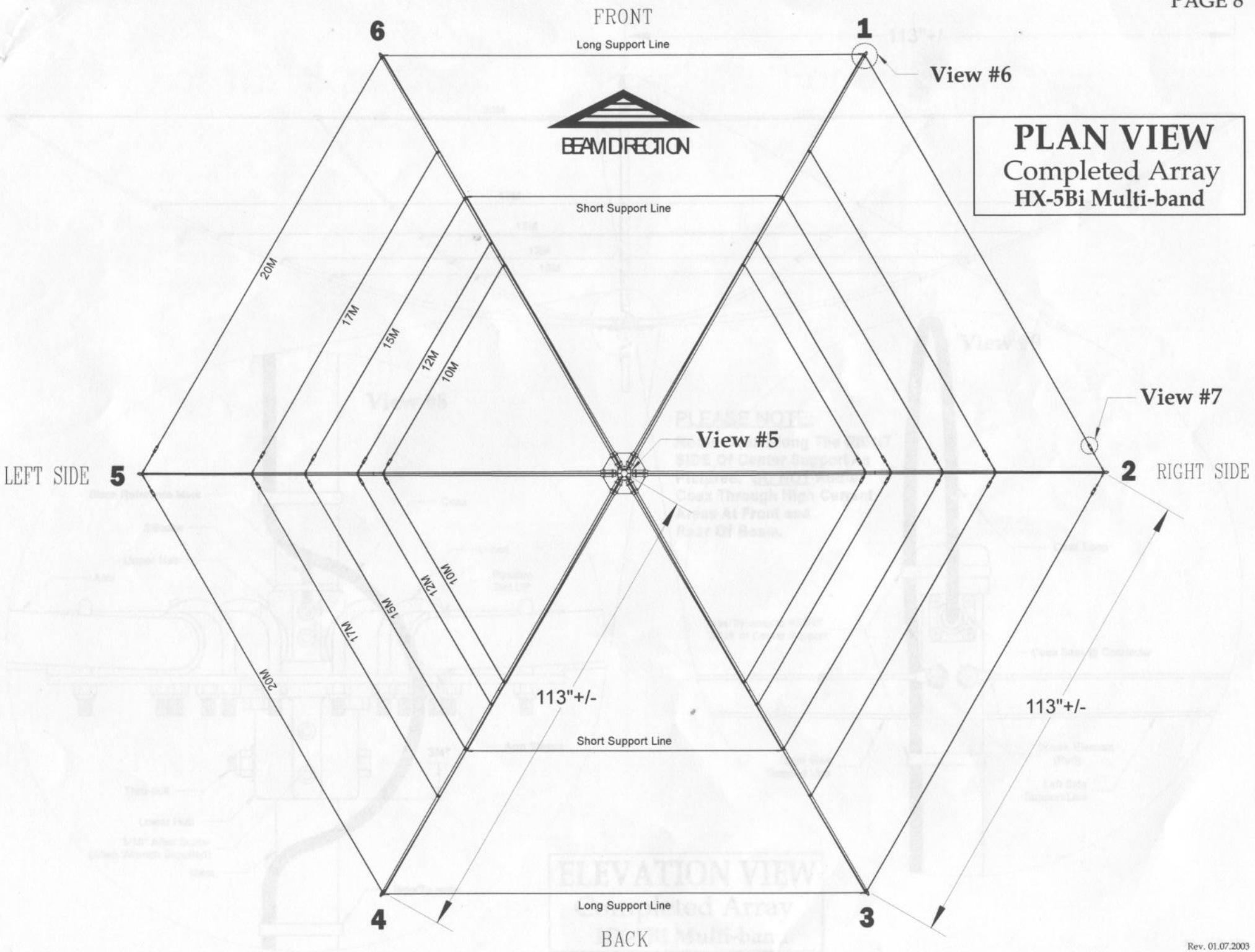

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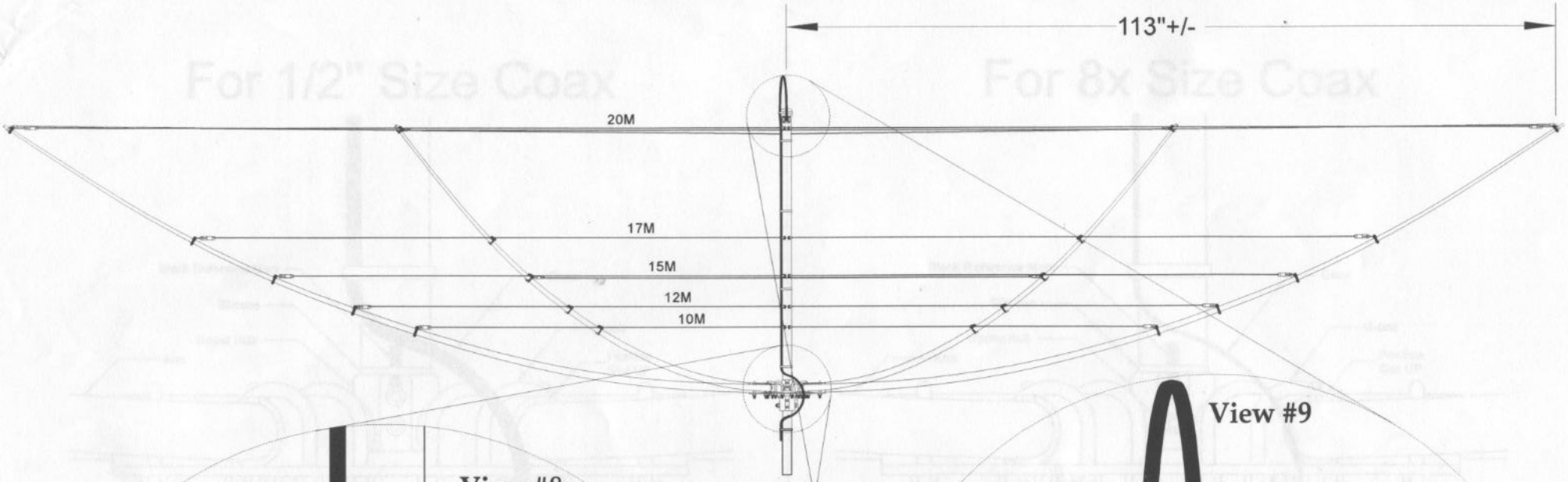
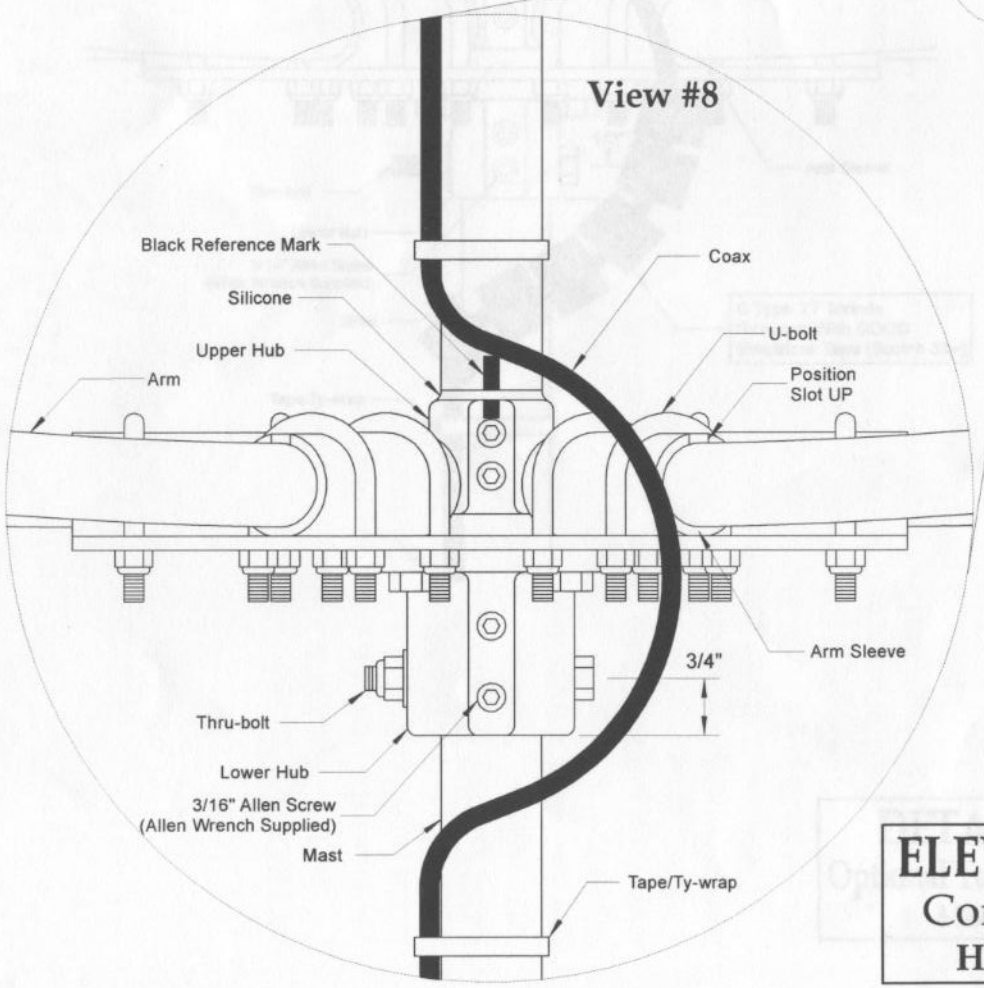
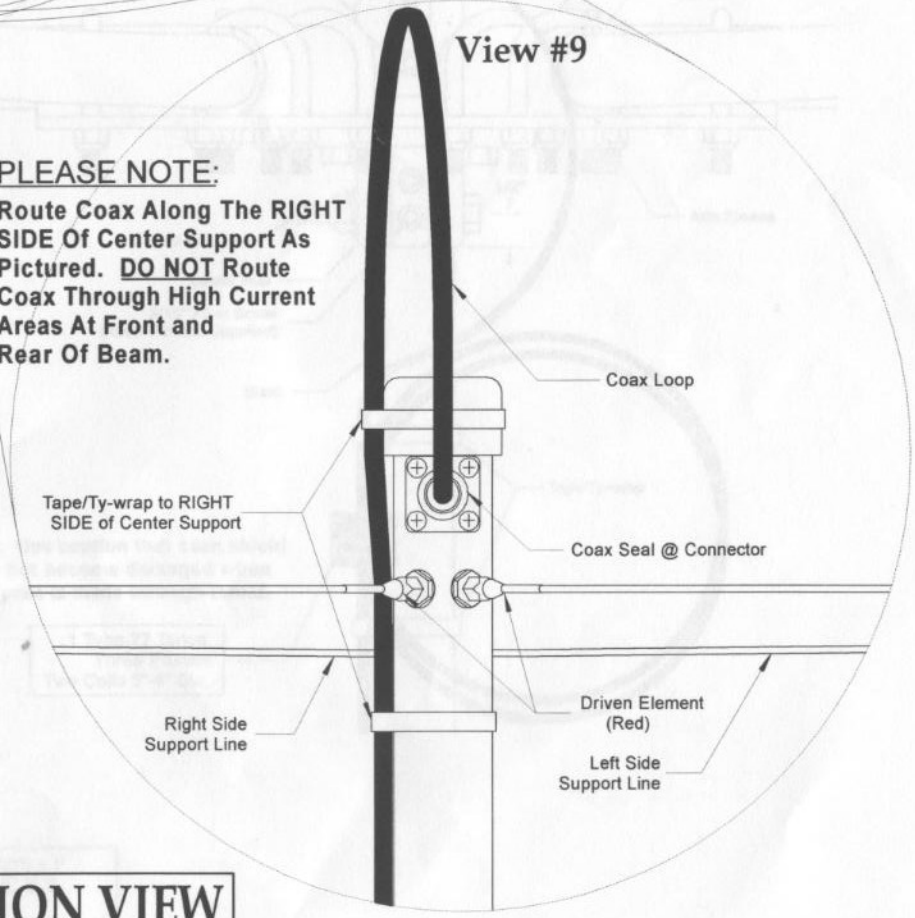






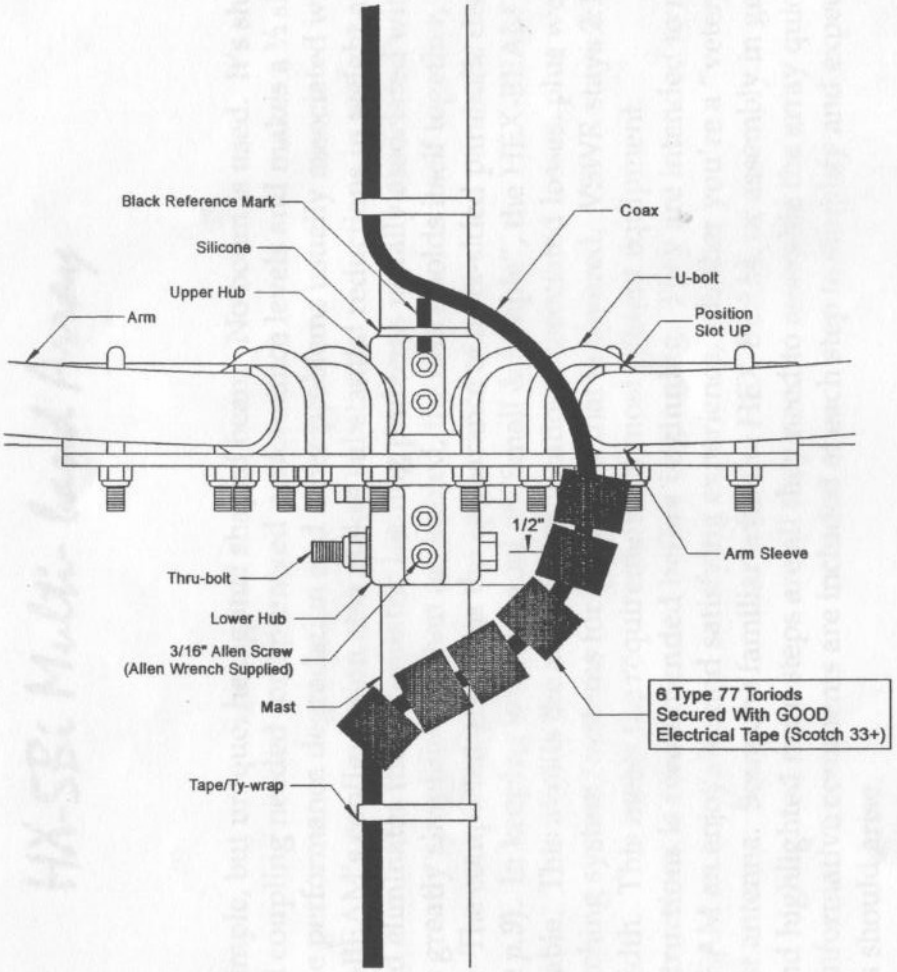
PLEASE NOTE:

Route Coax Along The RIGHT SIDE Of Center Support As Pictured. DO NOT Route Coax Through High Current Areas At Front and Rear Of Beam.

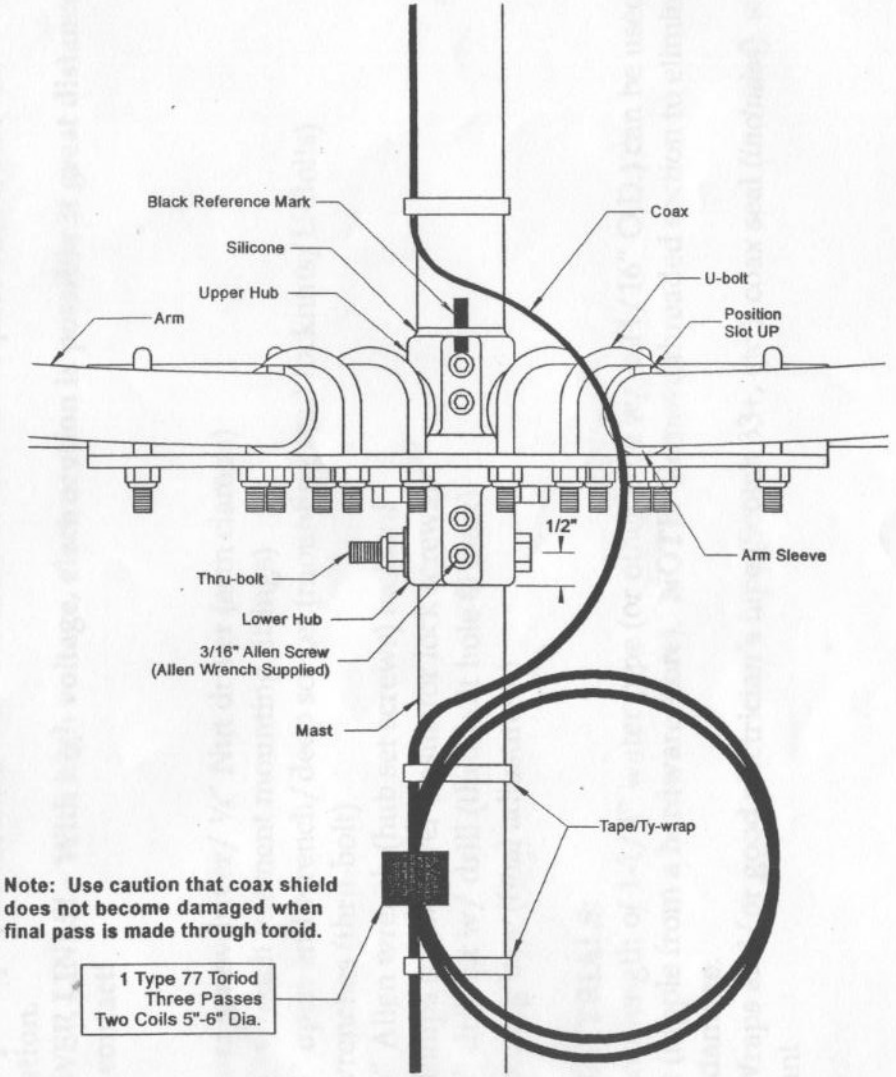
ELEVATION VIEW
Completed Array
HX-5Bi Multi-band

Rev. 11.11.2006

For 1/2" Size Coax



For 8x Size Coax



DETAIL VIEW
Optional Toriod Placement
Model HXi