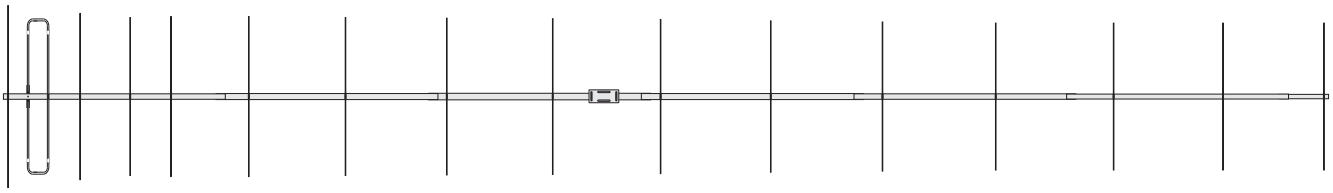
Cushcraft

Amateur Radio Antennas

LFA-2M16EL

16 Element Loop Feed Beam
For 2 Meters

INSTRUCTION MANUAL



CAUTION: Read All Instructions Before Operating Equipment

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VERSION 1A

GENERAL DESCRIPTION

The LFA (Loop Fed Array) Low-Noise Yagi is very different from the traditional dipole fed Yagi in many ways with its primary benefit being unwanted noise rejection. The LFA has a rectangular shaped, full wave loop driven element that is laid flat on the boom between and in-line with the parasitic elements . Then there is the way in which the loop functions. The smaller end sections which run parallel to the boom, are engineered to be 180 degrees out-of-phase with each other. This provides the same effect as is seen within ladder-line feeder; each side cancels the other out and therefore, minimum radiation occurs. In practice this translates to highly suppressed side lobes and side-on signal rejection. This feature also plays a role in reducing F/B (Front to Back ratio), F/R (Front to Rear ratio) and broad-banding of the antenna too. It is these attributes which help give the LFA class-leading all-round performance at almost any boom length and for any given band.

UNPACKING

Unpack the antenna and separate the parts according to the drawings. This will simplify the antenna assembly. Parts have been separated when possible to aid in assembly. Make sure you have the necessary room to assemble the antenna before unpacking. This antenna will be very long when finished, don't try to assemble it inside your house and then move it outside. A car garage with a couple of saw horses or other means of support will make it easy to handle the antenna when putting it together. Assembly over grass is not recommended. There are lots of small things that can get lost forever in grass. Some parts may have extras included so don't worry if you have some left over when your done.

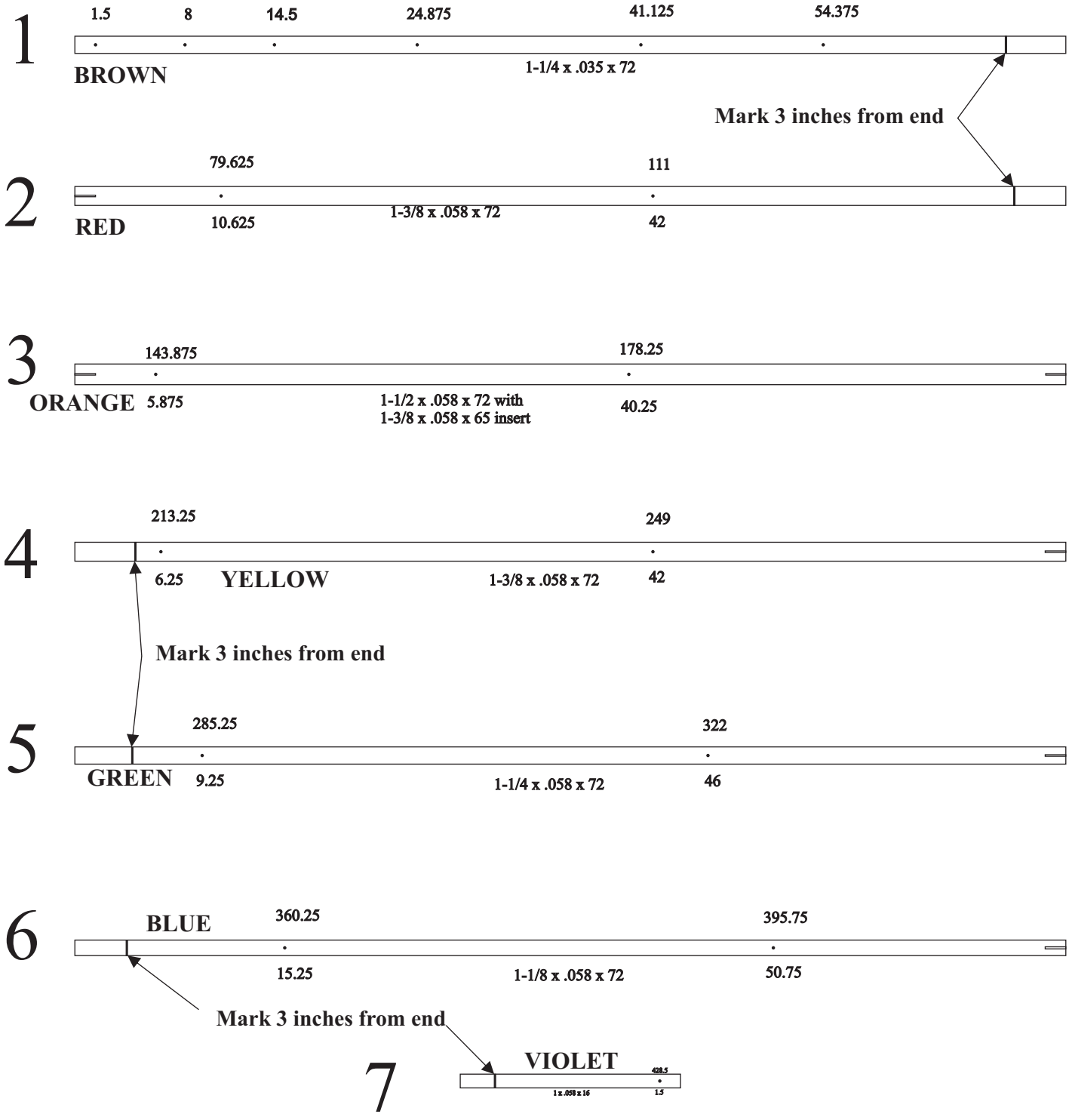
WARNING

WHEN INSTALLING YOUR SYSTEM, TAKE EXTREME CARE TO AVOID ANY ACCIDENTAL CONTACT WITH POWERLINES OR OVERHEAD OBSTRUCTIONS. FAILURE TO EXERCISE THIS CARE COULD RESULT IN SERIOUS OR FATAL INJURY

BOOM IDENTIFICATION

Here are the 7 boom sections with measurements displayed for the pre-drilled holes. The numbers on top are the distance in inches from the rear of the boom when it is correctly assembled. The numbers on bottom are the distance in inches from one side of the individual tube. These numbers are to verify correct location and orientation of each tube. Identify each tube by the color band on it. Once you have identified the tubes, determine which end of the tube will insert into the middle boom section. Mark this side of the tube 3 inches from the end. This mark will be used to set the insertion depth into the next size tubing. If the tubes are put together incorrectly, the elements will be out of place and the antenna will not work properly. Use a sharpie or other marking pen to draw a line on the tube.

THIS MARK IS INDEPENDENT OF THE IDENTIFICATION MARK

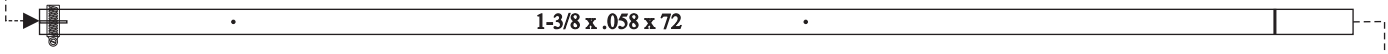


BOOM ASSEMBLY

Rear of Antenna

1

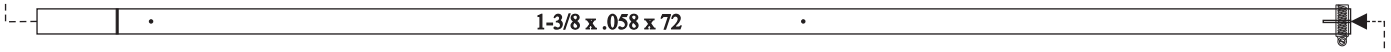
2



Place a #16 hose clamp over the tube before inserting next section

3

4



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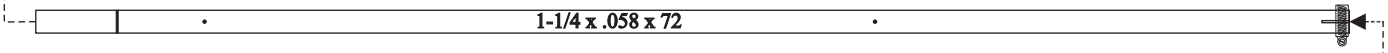

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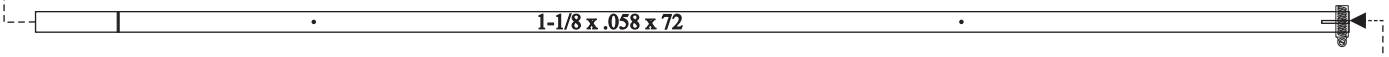

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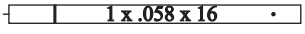


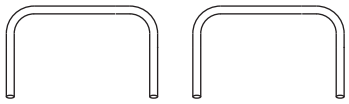
Front of Antenna

Insert each tube 3 inches into the next using the marks you made. Try your best to align the holes in each tube. Tighten the hose clamps just enough so that the tubes do not move. Final alignment of the tubes will likely be needed later. Now would be a good time to support the boom on a couple of saw horses or something similar.

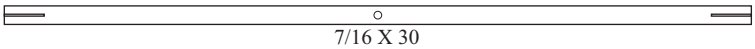
Feed Loop Assembly

To assemble the feed loop onto the boom you will need the following parts.

2 feed loop ends

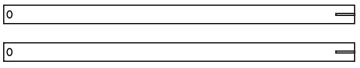


1 long 7/16 tube

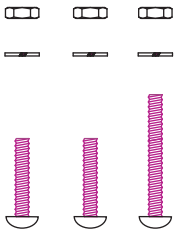


7/16 X 30

2 short 7/16 tube

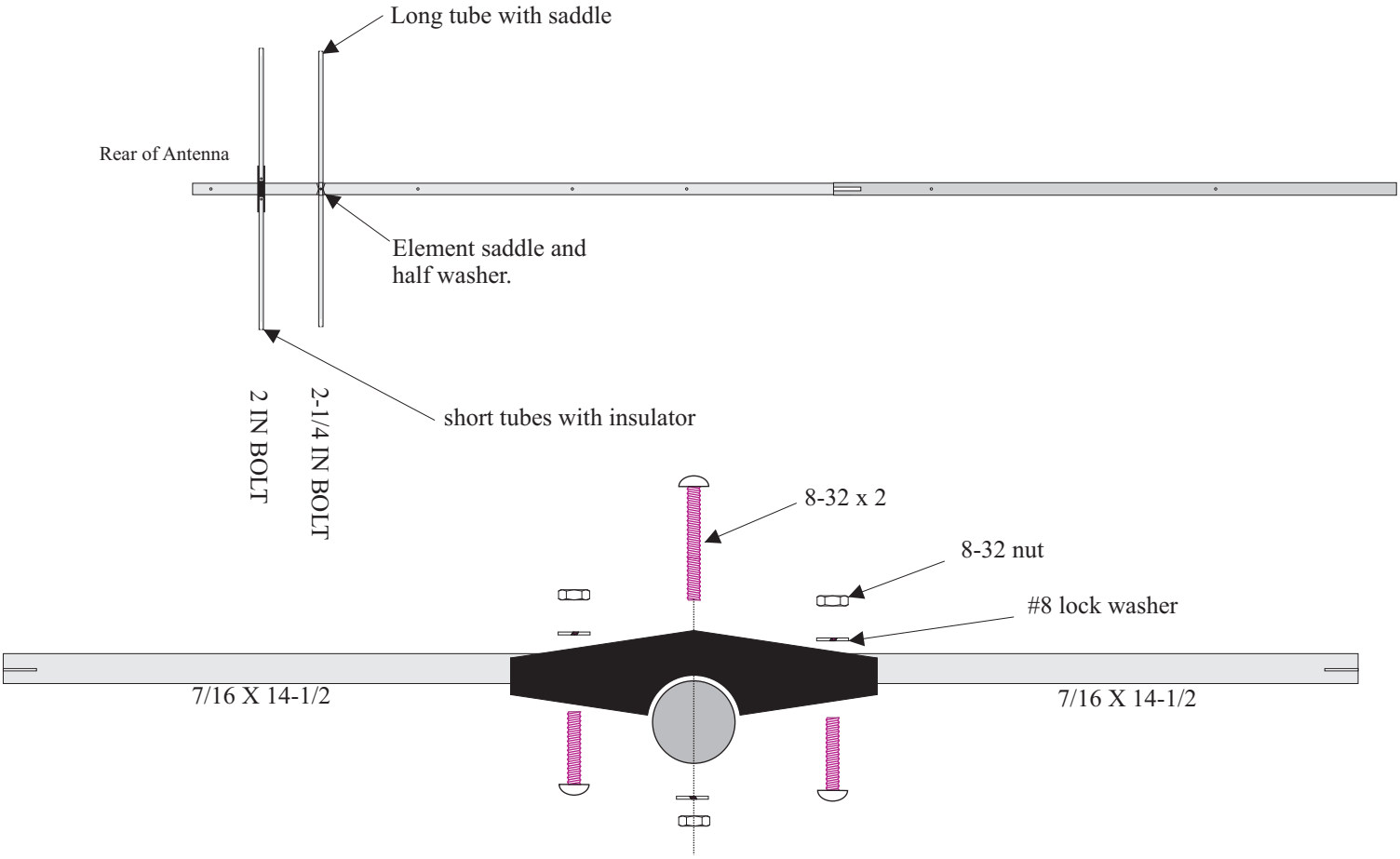


7/16 X 14-1/2



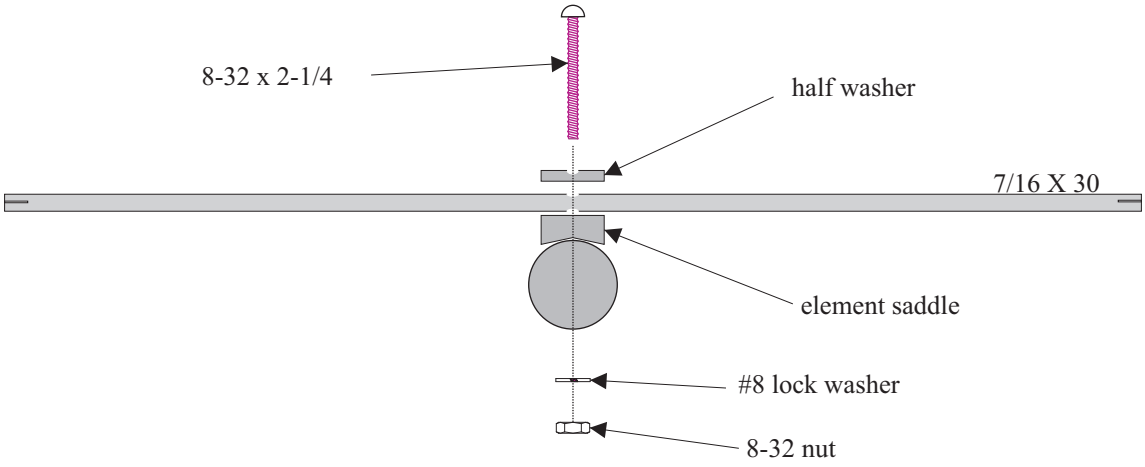
8-32 x 1 bolt
8-32 x 2 bolt
8-32 nuts and lock washers

1 insulator

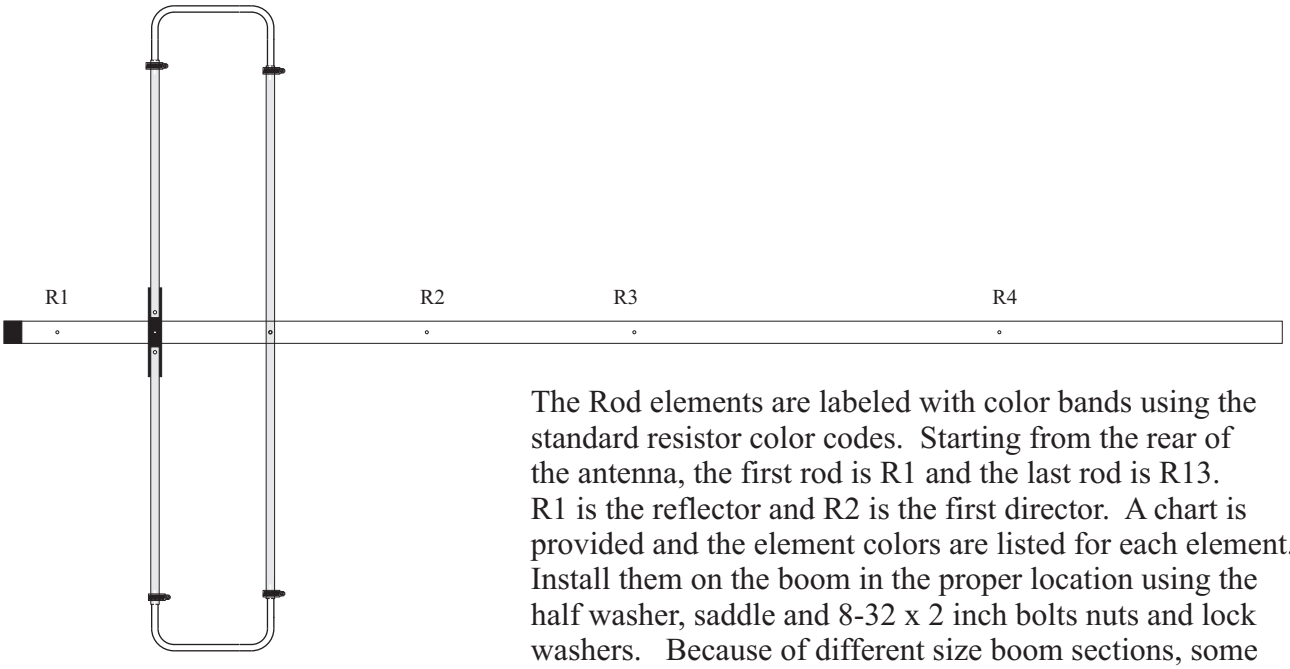


Mount the insulator on the Boom at the second hole from the rear of the antenna using the 8-32 x 2 inch bolt. Attach the two short 7/16 tubes to the insulator using the 8-32 x 1 inch bolt thru the holes in the ends of the tubes. Go ahead and tighten the nuts but do not crush the tubes.

Mount the long 7/16 tube to the third hole from the rear of the boom using a longer 8-32 x 2-1/4 bolt, half washer and element saddle.



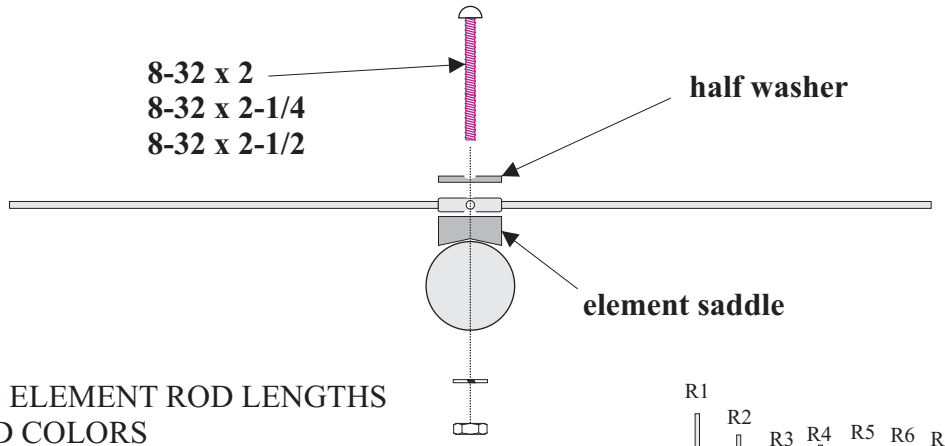
Put one hose clamp over each end of each tube. Insert the loop ends into the 7/16 tubes. Don't force them. Keep them straight as they go in. Leave them loose for tunning the SWR later. The tubes will have enough friction to stay without the hose clamps being tightened.



The Rod elements are labeled with color bands using the standard resistor color codes. Starting from the rear of the antenna, the first rod is R1 and the last rod is R13. R1 is the reflector and R2 is the first director. A chart is provided and the element colors are listed for each element. Install them on the boom in the proper location using the half washer, saddle and 8-32 x 2 inch bolts nuts and lock washers. Because of different size boom sections, some bolts need to be longer to mount the element. These bolt lengths are listed on the next page.

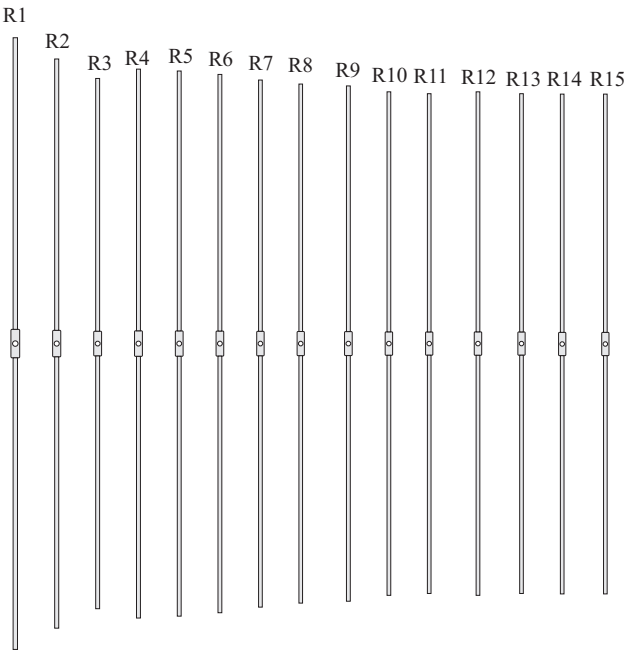
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VILOET	7
GREY	8
WHITE	9

INSTAL THE ELEMENTS

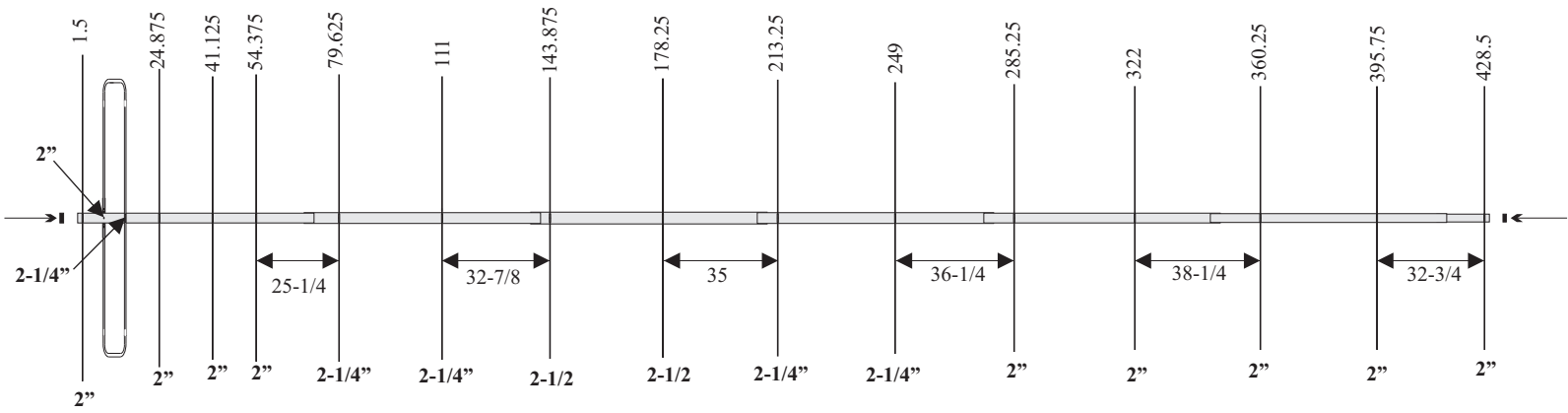


3/16 ELEMENT ROD LENGTHS AND COLORS

R1	41.5	INCH	BROWN (Reflector)
R2	37.9	INCH	RED (Director #1)
R3	36	INCH	ORANGE
R4	36.5	INCH	YELLOW
R5	36.5	INCH	GREEN
R6	36	INCH	BLUE
R7	35.75	INCH	VIOLET
R8	35.5	INCH	GREY
R9	35.15	INCH	WHITE
R10	34.5	INCH	BROWN BLACK
R11	34.	INCH	BROWN BROWN
R12	33.50	INCH	BROWN RED
R13	33.50	INCH	BROWN ORANGE
R14	33.50	INCH	BROWN YELLOW
R15	33.50	INCH	BROWN GREEN



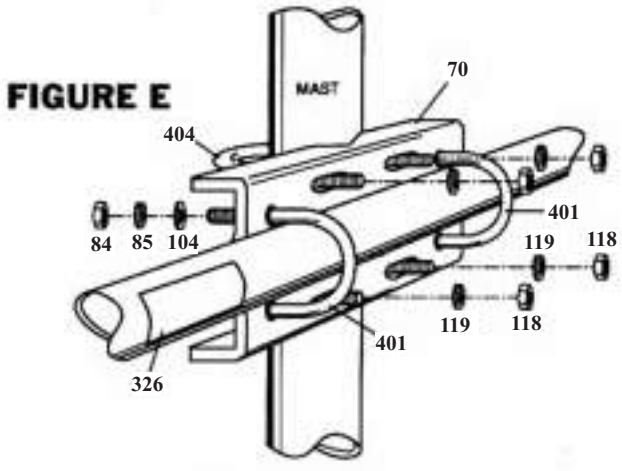
Element Bolt Sizes



Once you have all the elements on in the correct location, check the alignment of the elements on the boom sections. Element locations are given on the top of the diagram above. You may use this to verify correct tube overlap between sections and that the booms are assembled correctly.
Rotate the sections to align the elements if needed and re-tighen the clamps.

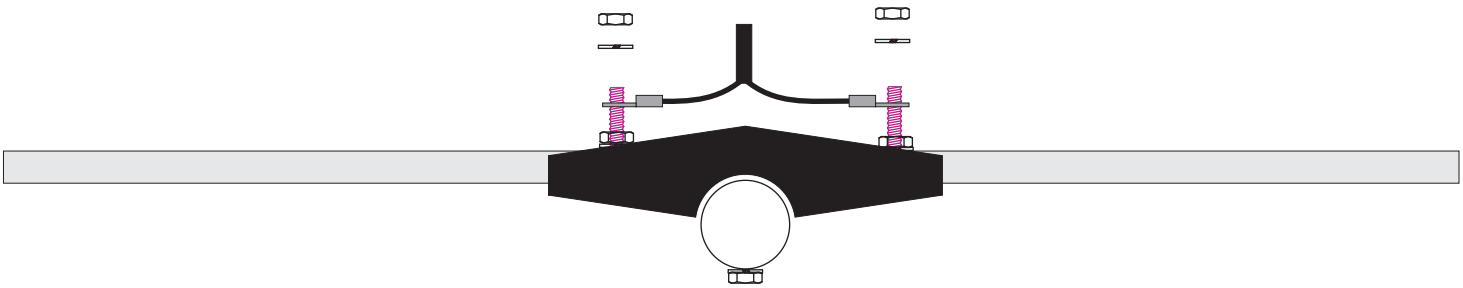
Boom to Mast

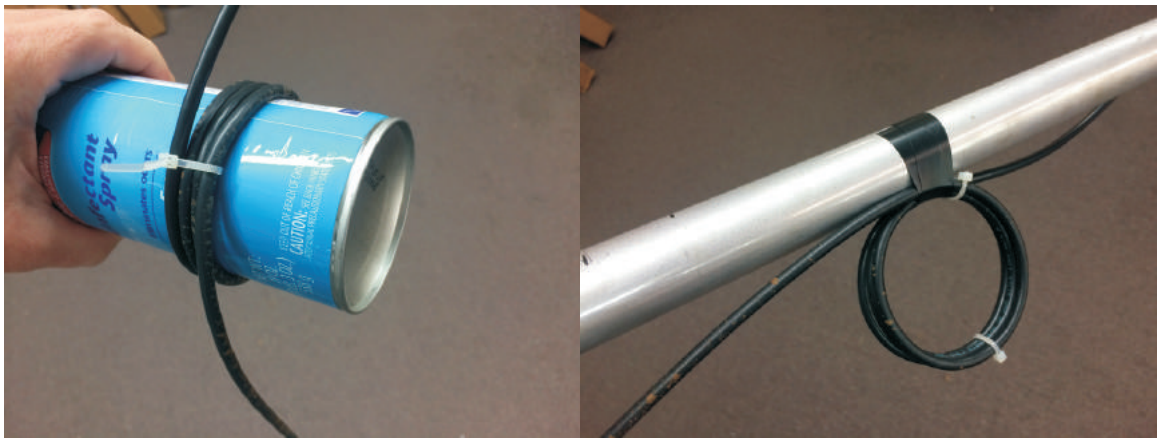
Select the parts shown and install the mast plate onto the boom. The mast plate should be installed on to the largest section of the antenna (boom section #3) . You may balance the boom by installing the plate at the center of gravity of the antenna. You can determine this point by simply holding the antenna and balancing it in your hand. Make sure the elements are in correct orientation before tightening the U-bolts. Do not allow the mast plate to come within 1 inch of the elements on that section.

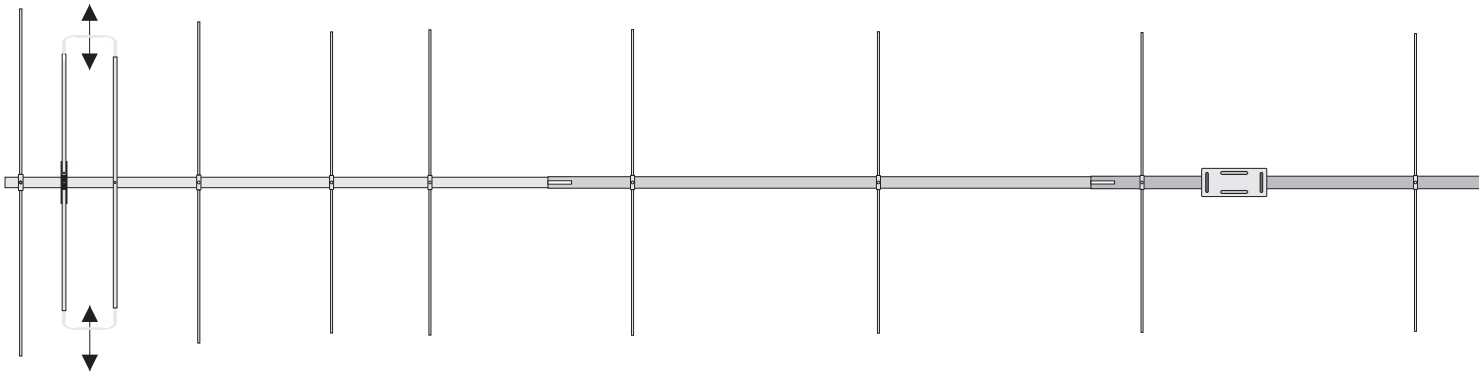


KEY	P/N	DISPLAY	DESC	SIZE	QTY
84	010084		SS LOCK WASHER	1/4" (.64 cm)	4
85	010085		SS HEX NUT	1/4" (.64 cm)	4
104	010104		SS FLAT WASHER	1/4" (.64 cm)	4
118	010118		SS HEX NUT	5/16" (.79 cm)	4
119	010119		SS LOCK WASHER	5/16" (.79 cm)	4
401	010401		SS U-BOLT	1 1/2" x 3" (3.8 x 7.6 cm)	2
404	010404		SS U-BOLT	2 1/2" x 3" (5.5 x 7.6 cm)	2
70	190070		MOUNTING PLATE	4" x 6" (10.2 x 15.2 cm)	1
326	290326		DANGER LABEL		1

Attach your coax to the feed loop using the remaining 8-32 nuts and lock washers. Make the distance of the exposed conductors as short as possible. Seal this connection using a appropriate sealant to prevent water from entering the coax. Wind a choke balun into the coax using a household cleaner or spray paint can. Put 3 turns around the can and secure the coax together using cable ties. Attach the balun to the boom with tape and route the coax along the boom to the mast and go down from there.



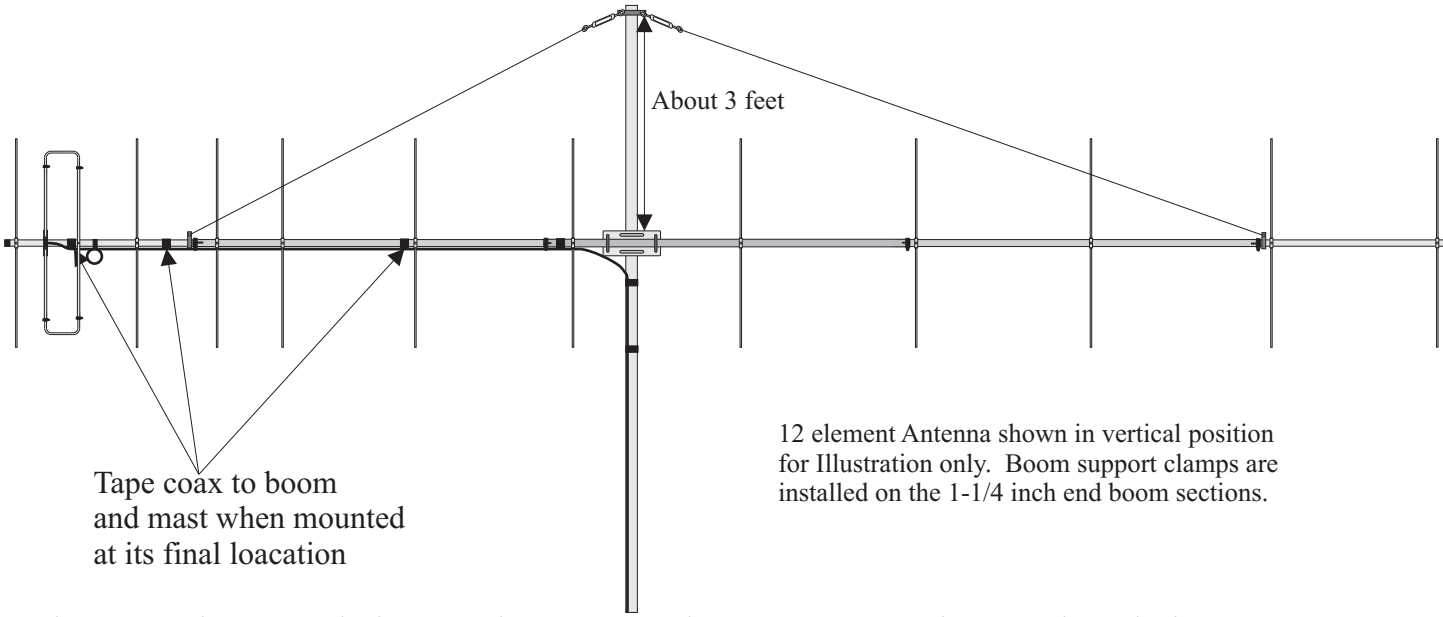




Move out to shift frequency down

Tuning

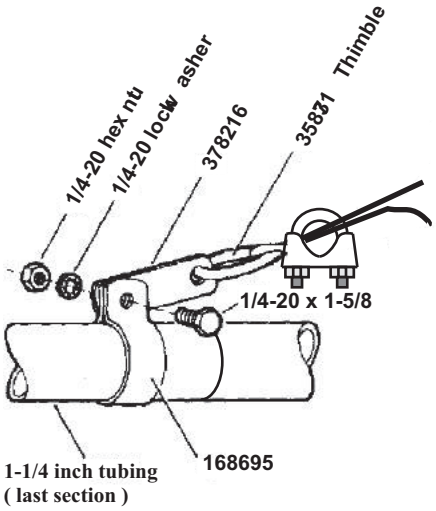
Your antenna is now ready for tuning. Remove it from your assembly area and mount it on a temporary mast at least 8 feet off the ground. Using a SWR analyzer or radio and SWR meter, check for a dip in swr at or about 144.300 MHZ. You should see a dip in the SWR. If not, Check all connections and retest. If the dip is too low in frequency, move the loop ends in toward the boom. Move each side the same and keep them both the same distance from the boom. If the dip is too high in frequency, move the loop ends out away from the boom. It is not necessary to tighten the clamps each time for tuning. Once the dip is centered where you want it, tighten the clamps on the tubes. Do not use a wrench or powered device to tighten the clamps. A nut driver or screwdriver is plenty to do the job.



12 element Antenna shown in vertical position for Illustration only. Boom support clamps are installed on the 1-1/4 inch end boom sections.

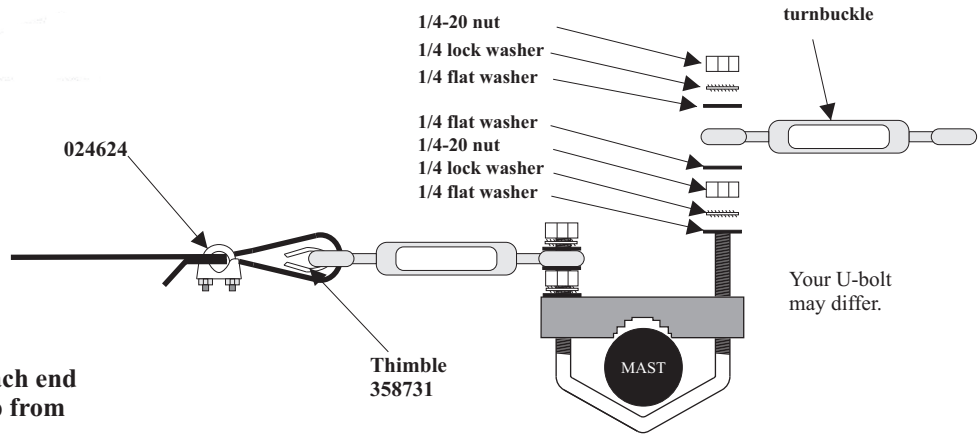
The antenna is now ready for mounting on your pole or tower. Route the coax along the boom and mast. Secure it using cable ties or electrical tape. Check the antenna over one last time to make sure everything is in place and secure. If you haven't already, place the plastic end caps over the end of the booms. When installing the boom support, pull the rope tight. It may stretch over time so you may compensate by adding about an inch of height to the ends of the antenna over the mast mount. Un-screw the turnbuckles all the way and move the clamp up and down to adjust the tension at first. Us the turnbuckles to make fine adjustments to the tension. Don't forget the thimbles on each end of the rope, they prevent the metal from cutting through when the antenna moves.

BOOM SUPPORT



Install the tube clamp at the last joint on each end of the antenna. This will prevent the clamp from slipping.

Tighten the U-bolt first an then tighten the nuts holding the turnbuckle.



Place support clamp about 3 feet above the boom clamp. Use left over rope to prevent turnbuckle from rotating after installation by routing it through the eyelets. Pull the rope tight and tie it off. You may use cable ties or other means of securing the turnbuckle if you wish.

PARTS LIST

part #	Description	Qty
190070	boom to mast	1
010401	u-bolt	2
564792	5/16 split washer	4
555747	5/16 hex nut	4
561177	1/4 lock washer	4
554099	1/4-20 hex nut	10
566344	FLAT WASHER 1/4	10
010404	UBOLT	2
745-3116S	#16 hose clamp	6
745-3104S	#4 hose clamp	4
455630	1-1/4 caplug	1
765-1000	1" caplug	1
465420	driven insulator	1
010229	8-32 x 1	2
010120	8-32 x 2	10
010232	8-32 X 2-1/2	2
014764	8-32 X 2-1/4	5
190028	Half washer	16
190026	element saddle	16
011941	lock washer #8	22
556990	8-32 hex nut	22
164150	ELEMENT R1	1
163790	ELEMENT R2	1
163600	ELEMENT R3	1
163650	ELEMENT R4	1
163650	ELEMENT R5	1
163600	ELEMENT R6	1
163575	ELEMENT R7	1
163550	ELEMENT R8	1
163515	ELEMENT R9	1
163450	ELEMENT R10	1
163400	ELEMENT R11	1
163550	ELEMENT R12	1
163550	ELEMENT R13	1
163550	ELEMENT R14	1
163550	ELEMENT R15	1
178145	DRIVER ELEMENT A 14-1/2	2
178630	DRIVER ELEMENT B 30 "	1
174022	2MTR LOOP END	2
631570	ROPE	30FT
177301-1	BOOM #1	1
177301-2	BOOM #2	1
177301-3	BOOM #3	1
177301-4	BOOM #4	1
177301-5	BOOM #5	1
177301-6	BOOM #6	1
177301-7	BOOM #7	1
5035200	U-BOLT	1
024624	ROPE CLAMP	4
358731	THIMBLE	4
351243	TURNBUCKLE	2
378216	SS STRIP	2
500098	1/4-20 X 1-1/2 BOLT	2
562961	LOCK WASHER	8
168695	1-1/4 TUBE CLAMP	2
195726	SADDLE BRACKET	1

LIMITED WARRANTY

Cushcraft Amateur Radio Antennas, 308 Industrial Park Rd., Starkville, MS 39759, warrants to the original consumer purchaser for one year from date of purchase that each Cushcraft antenna is free of defects in materials or workmanship. If, in the judgment of Cushcraft, any such antenna is defective, then Cushcraft Amateur Radio Antennas will, at its option, repair or replace the antenna at its expense within thirty days of the date the antenna is returned (at purchasers expense) to Cushcraft or one of its authorized representatives. This warranty is in lieu of all other expressed warranties, any implied warranty is limited in duration to one year. Cushcraft Amateur Radio Antennas shall not be liable for any incidental or consequential damages that may result from a defect. Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damages, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state. This warranty does not extend to any products that have been subject to misuse, neglect, accident or improper installation. Any repairs or alterations outside of the Cushcraft factory will nullify this warranty.