JK-402

(2017 Edition)

Two Element 40M Yagi – 18ft Boom

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JK Antennas Limited Warranty and Liability

JK Antennas ("Manufacturer") warrants to the original purchaser that this product will be free from defects in material, and workmanship for a period of one (1) year from the date of purchase. The determination of whether any part or parts will be covered by this limited warranty and whether any part or parts will be repaired, replaced or refunded will be solely determined by JK Antennas. Such determination will be made following evaluation of claim of alleged defect and subject to evaluation of possible misuse, abuse, unauthorized modifications, extreme weather conditions or improper installation. This warranty does not cover delivery, transportation, installation or any other costs that may be incurred from any defect.

The purchaser, final customer, installer and user of these products individually and collectively acknowledge that these products can cause injury or death and individually and collectively accept full responsibility and liability for any and all personal and property damage (direct, indirect and punitive) caused during installation and subsequent use.

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WARNINGS

- **Installation of this antenna near power lines is dangerous. Contact with any high voltage power lines could result in electric shock or loss of life. Do not install this antenna where there is any possibility that the antenna or any part of the supporting structure could come in contact with power lines.**

- **Also ensure that no persons or pets can come in any contact with the antenna after it is installed. Dangerous voltages can exist on the antenna when it is in operation and no part of the system is insulated to prevent shock.**

- **Consult with FCC OET Bulletin 65 to properly evaluate whether the chosen installation site for this antenna will comply with the FCC guidelines for human exposure limits to radio frequency electro-magnetic fields.**

- **This antenna structure is not designed to be used as a support structure. No persons or objects should be supported by or suspended from the antenna structure at any time.**

- **Because most antenna systems are installed at high heights, the installed location must take into account that falling debris may pose a hazard to humans, animals and property on the ground below.**

- **Be aware of and follow all local codes and ordinances when installing this antenna.**

TOOLS REQUIRED

This antenna uses all **SAE standard tool sizes**. Metric fasteners are *not* used on this antenna. Ensure hex keys used are **SAE** sizes to avoid stripping the socket cap screw heads.

Size	Description
5/16”	Nut driver, socket or wrench (for #6-32 nylon lock nuts)
11/32”	Nut driver, socket or wrench (for #8-32 nylon lock nuts)
3/8”	Nut driver, socket or wrench (for #10-24 nylon lock nuts)
7/16”	Nut driver, socket or wrench (for 1/4-20 nylon lock nuts)
9/16”	Nut driver, socket or wrench (for 5/16-18 nylon lock nuts)
7/64”	Allen wrench / Hex Key (for 6-32 socket head screws)
9/64”	Allen wrench / Hex Key (for 8-32 socket head screws)
5/32”	Allen wrench / Hex Key (for 10-24 socket head screws)
3/16”	Allen wrench / Hex Key (for 1/4-20 socket head screws)
9/16"	Socket and ratchet (preferred), or combination wrench, or adjustable wrench (for 3/8-16 Bolts.)

JK402 - 2 Elements on 40M / 18 Foot Boom

ASSEMBLY GUIDELINES

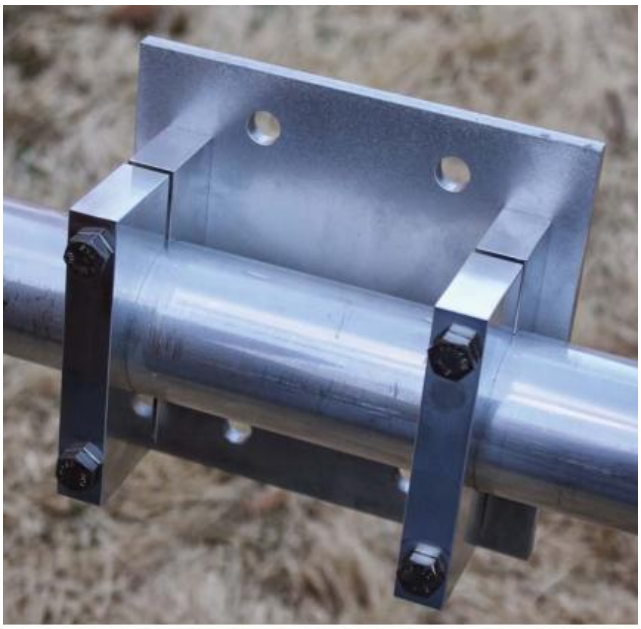
1. Open the boxes and lay out the elements, hardware kits and parts
2. Using the parts list at the end this document, check to make sure all tubing, hardware kits and parts are included (extra numbers of bolts, screws, nuts and washers are included)
3. **The use of Penetrox or Noalox or any other Anti-seize/Anti-Oxidant compound is HIGHLY recommended during installation of this antenna. Use a drop or 2 of this anti-seize paste on all screws before fastening. This will prevent the stainless-steel hardware from accidently locking up. Also a drop or two of the anti-oxidant paste on the element transitions will prevent corrosion in the joints as well ensure long lasting electrical performance.**

The document has been separated into different assembly sections based on the packaged hardware kits. While it is recommended to assemble in the order presented, please adjust as needed based on your working conditions and assembly area.

STEP 1: Boom/Mast Plate Assembly

There are three boom sections starting with a 6ft section with holes drilled on one side at the front (Driven element side), then an 6ft section with holes drilled on both sides, and ending with an 6ft section with holes drilled on one side (Reflector element side). The boom sections are connected to each other using an internal 1⁄4" (0.25" or 6mm) thick sleeve at each boom joint. Mast position for JK402 is directly in the middle of the boom at the 9' mark.

Gather the **Mast Plate**, the **Boom to Mast Plate Kit** (clamps and hardware), and the **Mast to Mast Plate Kit** (clamps and hardware).



Boom/Mast plate
(for illustrative purposes only - this configuration not valid for all antennas)

Recommended method:

1) Mount a short (5 foot tall) temporary mast into the ground.

2) Mount the **Mast Plate** onto the short mast with **Mast to Mast Plate Kit**.

3) Lay out the boom sections in the proper order, and measure and mark the mast position on the appropriate boom section (center section with holes drilled on both ends).

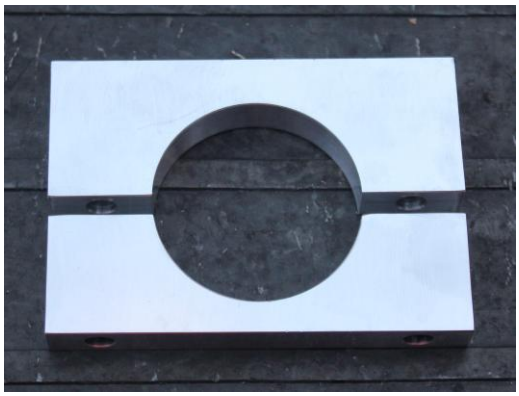
   NOTE: PLEASE Read STEP 3: Truss Assembly on page 14 and slide the Boom-Truss Clamps on the boom BEFORE the element assembly

   Mast position for JK402 is 108" from the rear of the boom (Reflector side).

4) Mount the marked boom section at the identified position onto the Mast Plate using the **Boom to Mast Plate Kit.** Mount the boom section so that the holes at either end face up (toward the sky) and down (toward the ground).

Wider Half of Clamp →

Narrower Half of Clamp Always Mounted on Plate →



IMPORTANT NOTE: All clamp sets have uneven halves (i.e. one half of the clamp set is narrower than the other); the narrower half is mounted on the plate side.

5) Next, insert a boom sleeve into one end of the mounted boom section, and attach with the **Boom Hardware Kit**. Insert the next section of the boom onto the sleeve and attach.

6) Continue completing the rest of the boom assembly, making sure to attach the sections in the appropriate order.

Assembled Boom Joint

STEP 2: Element Assembly

The elements of the JK402 are comprised of various telescoping sizes of aluminum tubing and are designed to be mounted on the **underside** of the boom, following the location and measurements below:

For example … the Reflector element plate will start approx 1.0” from the Rear of the Boom. This will put the Reflector element at 3” from the Rear of the boom.

Please note the Element Channel is 4” wide and the tubing is centered on the element Plate.

40M ELEMENT	POSITION ON BOOM FROM REAR END
REF	3.0”
DRV	213”

First assemble the **Driven Element Center Section** (STEP 2a). Then, gather the Driven Element and other element center sections, and follow the instructions in the **Element to Element Plate** (STEP 2b) and the **Boom to Element Plate** (STEP 2c) sections coming after. Once all the center sections are mounted on the boom at the identified locations, the rest of the element tapers will be assembled off the antenna (STEP 2d).

STEP 2a: Driven Element Center Section Assembly

The Driven Element center section is comprised of two (2) 36" long aluminum tubes with an outer diameter of 1.75” OD, one (1) solid fiberglass rod (1.5” OD), and the hardware found in the **Driven Element Hardware Kit**.

1) Slide one end of the fiberglass rod inside the end of one aluminum tube and align the holes.

2) Place the shorter screw on the hole away from the center and tighten using a nylon nut.

3) Place the longer button-head screw through the hole closer to the center with a serrated lock washer on each side and tighten with a nylon nut.

4) Do the same on the other side so that the fiberglass rod has aluminum tubes attached on both sides.

Once assembled, the Driven Element center section can be mounted onto the element plates and then onto the boom the same as the other element sections in the next step. ***(The above picture shows the Balun "L" straps attached to the dipole element center screws.)***

STEP 2b: 40M Element to Element Channel Assembly

The JK402 40M element center sections are attached to an **Element Channel**. Attach each 40M center section (all 1-3/4" outer diameter tubes) to a 40M element channel using two (2) **Black Polyamide Clamps** and the hardware from the **Element to Element Channel Kit**.

Before applying final torque to the black clamps, there are several alignments that must be completed:

1) Center the mounting plate exactly at the middle of the center section tube.

2) Align the tubes so that when screws are used to attach the next taper, the screw heads will face up (towards the sky).

2) When mounting the Driven Element center, make sure that the exposed screws face away from the Element Plate (down, towards the ground)

After the above alignments are completed, tighten the screws on the black clamps evenly, alternating between each bolt. Do not apply all the torque to one bolt at a time, as this raises the chances of galling occurring when the opposite bolt is tightened. The gap between the blocks should just close when the torque is correct, and there should be an even amount of thread sticking out above each nut. **Do NOT continue to add additional torque after the gap closes.**

CAUTION: Continuous over-tightening can cause the screw-head to jam through the black clamps holes.

40M center sections mounted on element channels

STEP 2c: Boom to Element Channel Assembly

After the 40M center sections are mounted on the channels, the channels are attached to the boom using two (2) clamp sets and the appropriate hardware from the **Boom to Element Channel Kit**. Follow the element positioning indicated in the table in the beginning of Step 2.

40M center sections mounted to boom using two (2) clamp sets

REMEMBER: All clamp sets have uneven halves (i.e. one half of the set is narrower than the other); the narrower half is mounted on the plate side.

IMPORTANT: It is advisable to have a tape measure that can measure down to 1/16th of an inch. Placing the element plates on the boom accurately will ensure the most precise, accurate and effective antenna performance.

Before final torquing, re-check spacing and horizontal alignments of element center sections on the boom using the measurements in the table above. Minor adjustments (quarter inch to half inch) to element positions may be necessary in cases where the elements fall on the boom joints.

STEP 2d: 40M Coil Assembly

Each 40M coil assembly is comprised of two 1.25”OD aluminum tubes, one fiberglass rod, one coil, and the appropriate screws, nuts, serrated lock washers and silicone tape (**Coil Hardware Kit).**

The fiberglass rod has 4 holes, which are ¼” holes. The outside holes from the center and are used for the mechanical mounting of the tubing to the fiberglass. The inside holes are used for mounting the coil using the Full Thread screws.

NOTE: Always use an anti-oxidant (Penetrox) while tightening the screws and nuts.

1) Starting with either the CF or the CB tube, insert the fiberglass rod and line-up the holes. Attach the tubes to the rod through the outside holes using the provided ¼-20 screws and ¼-20 nylon nuts.

2) Repeat on the other side of the fiberglass rod with the remaining tube. Once completed, the section should look like the picture below, with the ¼” holes still open

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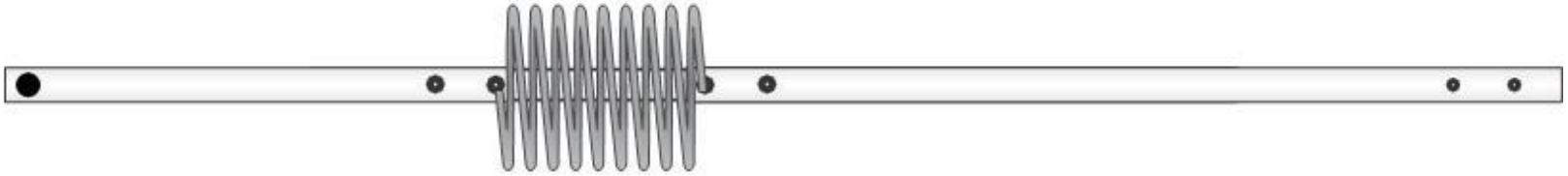
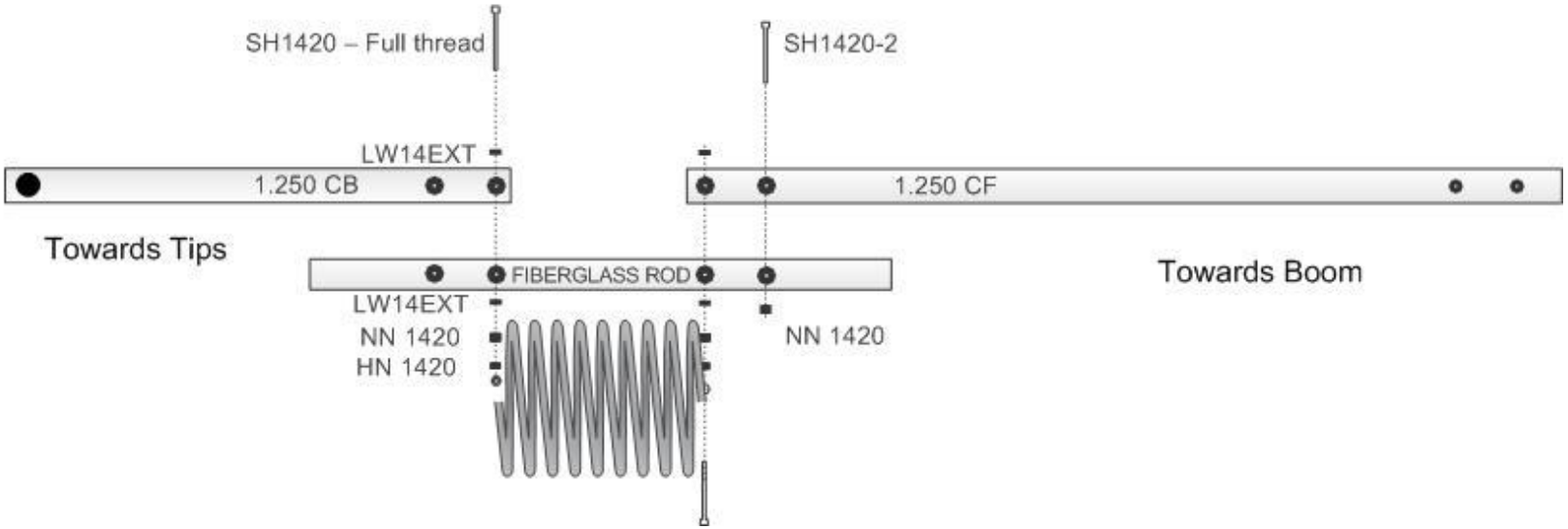
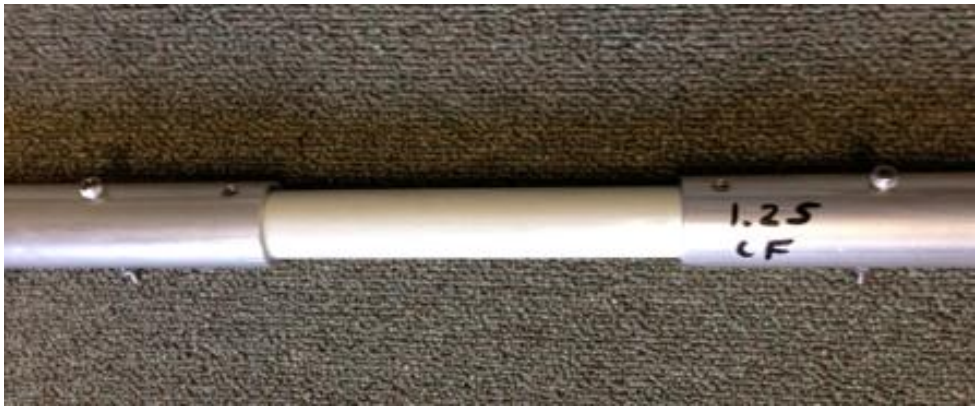
40 Meters Coil Section Assembly – **2017 version**





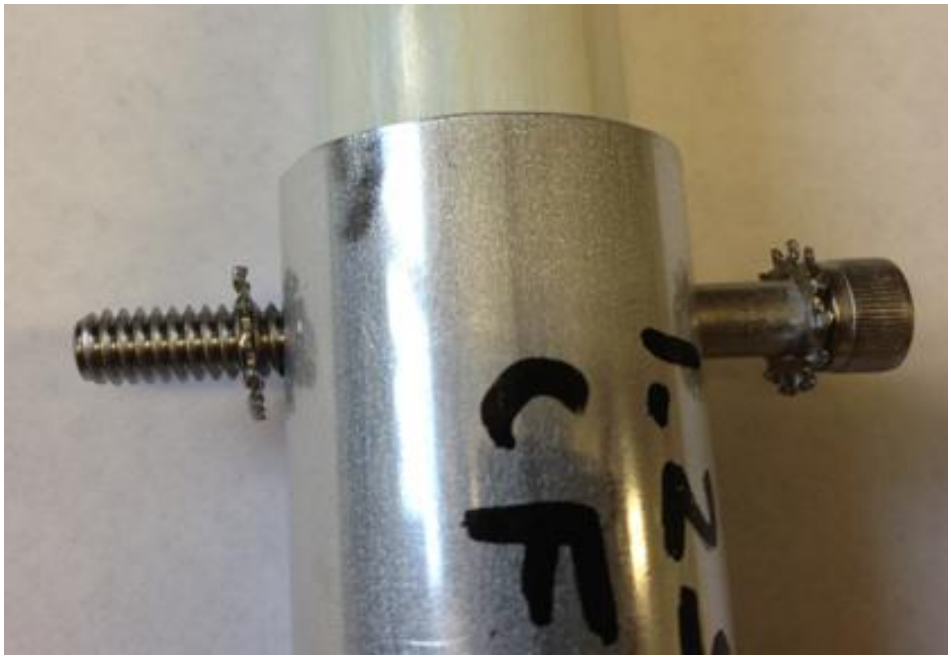
¼” holes (outside) to attach fiberglass rod to aluminum tubes



1/4" holes (inside) to mount the coil

Now, to attach the coils, follow these steps:

3) Place a serrated/tooth washer (LW14ExT) onto a 1/4"-20 Full-thread screw, and insert into one of the 1/4” holes on the fiberglass rod/tube assembly.



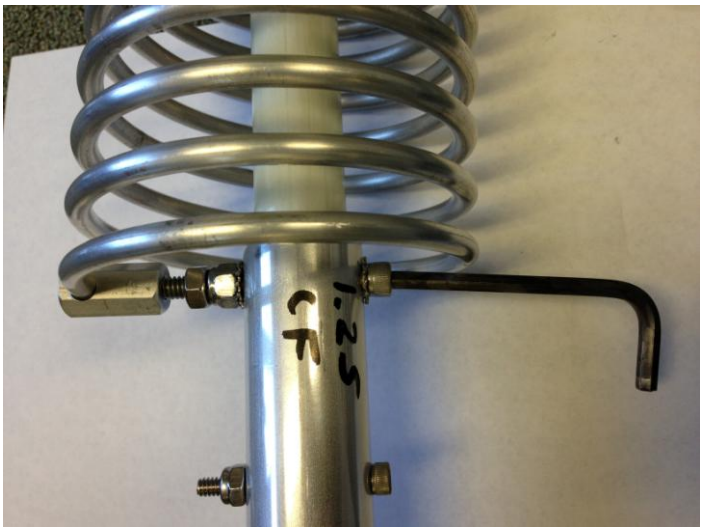
4) Add another serrated/tooth washer onto the screw on the far side of the rod, and finish with a 1/4-20 nylon-nut. Tighten as far as you can, stopping just short enough to still allow the screw to rotate freely.

5) Attach a 1/4-20 plain hex nut and turn it until it reaches the nylon nut.

6) Follow these same steps with the remaining hole on the other side of the fiberglass rod, but this time insert the screw from the opposite side of the rod.

7) Wrap the provided silicone tape over the exposed section of the fiberglass rod (this tape has no adhesive, so it only bonds to itself – stretch and wind the tape over the exposed section, using approximately 24 inches or less of tape on each rod).

8) Slide the coil onto the assembly; thread the Full-thread screw four to five times directly into the coil standoff.



9) GENTLY tighten the hex-nut over the standoff to act as a jam nut.

10) Do the same on the other side.

11) Tighten the nylon-nut firm and tight along the tube.

NOTE: It is very important to have a solid mechanical connection, with the nut and screw making a tight contact over the tubing. Visually inspect the coil assembly for any twists or non-symmetry while tightening these nuts. Adjust them carefully by pulling them back into place. Repeat this same process for all the coil assemblies.

The total assembled length of the "coil assembly" is approximately **59-5/8".**

NOTE: While tightening, take care to NOT put too much pressure over the coil standoffs. We recommend that you hold the standoff with pliers or a wrench to prevent any excess pressure being put on the coil joint to the standoff while tightening the jam-nut.

STEP 2e: Element Taper Assembly

Once the 40M center section has been mounted, and the coil sections have been assembled, the remaining tubes can be sleeved in to complete the tapered element sections.

40M: The 40M element has eight (9) tapered aluminum sections on each side of the 1.75" center section, ranging from 1.5" (largest) to .375" (smallest).

1) Slide 6 inches of the 1.5" OD tube into the center section tube and align the holes. Attach using the appropriate hardware (**40M Element Hardware Kit**) as shown in the table below. (Use a drop of anti-seize paste on all screws).

Transition	Screw Size	Nylon Nut Size
1.75" – 1.5"	SH1024-4	NN1024
1.5" – 1.25"	SH1024-3	NN1024
1.25" - 1"	SH1024-1	NN1024
1" - .875"	SH832-3	NN832

.875" - .75"	SH832-3	NN832
.75" - .625"	SH832-1	NN832
.625" - .5 Slit"	SH632	NN632
.5" Slit - .375"	HC-2	none

2) Slide the CF side of the 40M coil assembly (1.25” tube) into the 1.5” OD tube and attach.

Important : The 1.0”OD tubing has 2 different hole diameters at each end. The larger hole side goes into the 1.25-CB” tubing and the counterbore single hole side towards the 0.875”OD tubing.

3) Continue to assemble and attach the progressively smaller tapers of aluminum tubing, using the appropriate hardware, as shown in the table above.

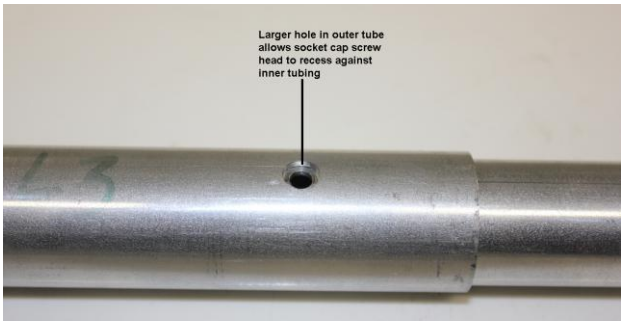
Exposed Length	**36”**	**30”**	**30”+18”**	**33”**	**21”**	**21”**	**33”**	**33”**		**Tip Length**
40M Ref	1.75”	1.5”	1.25"	1"	.875"	.75"	.625"	.5" **Slit**	.375" is the tip	**32.5” – CW 29” - SSB**
40M Drv	1.75”	1.5”	1.25”	1”	.875”	.75”	.625”	.5” **Slit**	.375” is the tip	**17.5”- CW 15” - SSB**

The tips lengths have been optimized for (7.0MHz -7.200MHz) 7.060 +or- performance. – **CW**
The tips lengths have been optimized for (7.050MHz – 7.260MHz) 7.125 +or- performance. – **SSB**

4) The smallest taper on each element is inserted into the slit end of the previous size, and attached using a hose-clamp (and not the screws). The exposed tip length of the smallest taper on each element must follow the table above.

SPECIAL NOTE: The tapers from 1.0” and below use single hole counterbore to tightly nest the screw head onto the tube inserted into it.

Note the joint in the picture below illustrating the counterbored (larger) hole in the outer tube to tightly nest the screw head.



- Each tube has one larger, counterbored hole drilled on one end, on one side. **The side of the tube with the counterbored hole is ALWAYS the outer tube of a joint, with the smaller outer-diameter tube sleeved inside.**
- The element sections are joined together with a single socket head cap screw. In all cases where element sections are telescoped together, the head of the socket head screw will be inserted into the larger diameter counterbored hole through the outer tubing and exit out the other side of the larger diameter tubing.

- **<u>IMPORTANT:</u> Always be aware of the orientation of the larger countersunk hole, and keep them all on the same side as you insert the next tubing section. This way all the socket cap heads remain on the same side of the element tubing.**

NOTE: Always use an anti-oxidant (Penetrox) while tightening the screws and nuts.

We recommend assembled elements to have the screw head on the top side of the element (facing the sky) and the nut on the bottom side of the element (facing the ground).

STEP 3: Truss Assembly

1) Mount the two (2) clamps in the Boom to Truss Cable Kit onto the boom at the following locations:
- At approximately 85 inches from the mast/center on the boom's Reflector side
- At approximately 85 inches from the mast/center on the boom's Director side

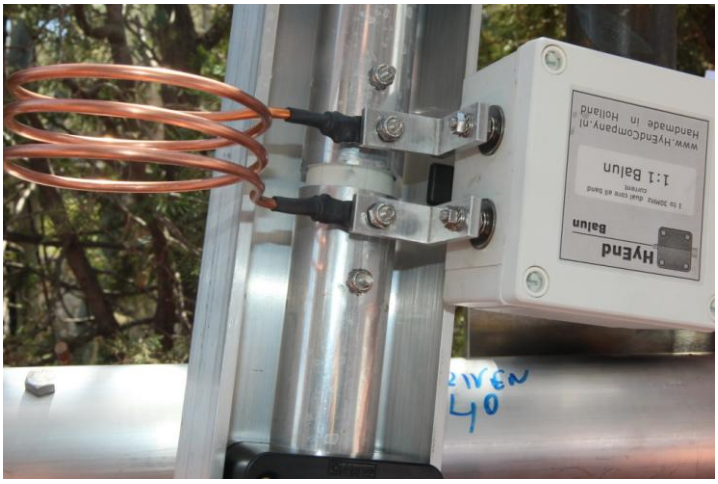
2) Attach the clamp from the Mast to Truss Cable Kit onto the mast, 36 inches or more above the boom, using the provided hardware. Use the plain Hex Nut with Lockwasher and then add the Flat Washer before inserting the Turnbuckles.

3) Mount the eye-side of each of the **Jaw-Eye Turnbuckles** (packaged with **Truss Cables**), one on either side of the Mast to Trust Clamp. Loosen the turnbuckles and apply Penetrox to the threads. Add another Flat Washer and then complete with the Nylock Nut to the Hex Screw on the Mast clamp.

4) Adjust the tensions of the turnbuckles as needed and level the boom after mounting the antenna on the mast.

STEP 4: Balun Assembly

1) Insert serrated lock washers (LW10ExT) from the **40M Driven Element Hardware Kit** onto the longer center exposed screws of the Driven Element.



2) Next, mount the coil and the balun " L" leads onto the exposed screws, with the balun on one side and the shunt coil on the other. **(PLEASE DO NOT ADJUST SHUNT COIL SUPPLIED FROM THE FACTORY) The spacing etc of the coil has been adjusted for your antenna.**

3) Insert another serrated lock washer on each screw

4) Insert the Nylock nut (NN1024) and tighten, but be careful NOT to over-tighten

5) Insert and screw another plain hex nut, which will act as a lock

6) Check the entire setup for snug fit and make sure there are no loose joints in the coil or the balun leads.

STEP 5: Antenna Final Check and Test - Prior to Installation

Dimensions: Although the element lengths are set from the factory, it is highly recommended that you take the time to document and check *all* the dimensions of your assembled antenna with factory dimensions. There is so much time involved in installing the smallest of antennas that is not worth skipping the dimension documentation. We recommend that make a note of all your element spacings and lengths down to a ¼".

Hardware Installation: Verify that all the hardware has been tightened and there are no loose fasteners.

SWR Test: You may connect a SWR analyzer with the antenna only a few feet off the ground to make sure you do not have a short or open circuit anywhere. You can do this by verifying that you do not have an extremely high SWR on each band. Do not be concerned unless the SWR is extremely high. The antenna will not have the specified SWR curves unless it is installed at a height of at least 30 feet above ground. With the antenna at least 6 feet from the ground, you will start to see the SWR "dip" below 2:1 somewhere in or near each of supported frequency ranges. As long as you start to see a dip somewhere around (above or below), you may proceed with installation.

For example in the case of 40M SSB, the dip will be usually below 7.0MHz and close 6.980 MHz depending on height above ground (50" (1.25 meters) + or -) for an antenna tuned for the SSB portion.
For 40M CW, the dip will be usually around 6.9 MHz depending on height above ground. (50" (1.25M) + or -)

Installation: The antenna should be installed by a professional in a safe manner on a support structure that is rated to handle the weight and wind load of this antenna, in all expected weather conditions. The boom to mast plate is supplied with saddle clamps to mount to a mast (user supplied). The JK402 antenna is designed to be fed with 50 Ohm coaxial cable such as RG-8 or RG-213. Pretest the entire run of coax cable with a 50 Ohm "dummy load" to ensure there are no problems with either the coax or the coax connectors. Most SWR issues are due to coax or connector issues and not related to the antenna itself.

Even if the coax was previously being used for another antenna, repositioning of the cable can cause new connector faults to occur. You should also test the cable at the full power you intend to run, if possible.

Surrounding metallic objects (other antennas, guy wires, etc.) can affect the performance of the antenna. If the antenna is not interacting with anything, you can expect the specified SWR curve, gain and front to rear performance. There are no user adjustments necessary for this antenna - any SWR issues indicate a coax and/or connector fault, or interaction of this antenna with another metallic object and those situations must be corrected.

PARTS LIST

BOOM TO MAST ASSEMBLY				
BMP			6" x 6" Mast Plate	1
Boom to Mast Plate				
BMC2.0-3i-3/8		2"	Boom to Mast Plate clamp	2
	HH3816	3-3/4"	Hex Head Screw 3/8-16	4+1
	NN3816		Plain Hex Nut 3/8-16	4+1
Mast to Mast Plate				
U-Bolt		2"	Mast to Mast Plate clamp	2
BOOM & TRUSS ASSEMBLIES				
AT2.0Boom DS		6'	Boom Center Section 2.0" OD	1
AT2.0Boom SS		6'	Boom End Section 2.0" OD	2
AT1.75Sleeve			Boom Sleeve	2
Boom Hardware				
	HH3816	2-3/4"	Hex Head Screw 3/8-16	8+2
	NN3816		Nylon Nut 3/8-16	8+2
Boom to Truss Cable				
BTC		2"	Boom Clamp for Truss Cables	2
	HH3816	3-1/4"	Hex Head Screw 3/8-16	4+1
	NN3816		Nylon Nut 3/8	4+2
Truss Cable				
TC85		85"	85" Truss Cable	2
TBJE0			(800#) Turnbuckle	2
Mast to Truss Cable				
BEC2.0-3i-3/8		2"	Truss Clamp on Mast	1
	HH3816-FT	4-1/2"	Fully Threaded Hex Head 3/8-16	2+1
	NN3816		Nylon Nut 3/8-16	2+1
	LW38		Split Lock Washer 3/8	2+1
	HN3816		Plain Hex Nut 3/8	2+1
	FW38		Flat Washer	2+1
BOOM TO ELEMENT ASSEMBLIES				
40M Channel-1			40M Element Channel	2
Element to Element Channel				
		1.3/4"		
BC1.75		ID	Black Polyamide clamps	8
	SH1420-5	3"	Socket Head Screw 1/4-20	16+2

	NN1420		Nylon Nut 1/4-20	16+2
Boom to Element Channel				
BEC2.0-3i		2"	Boom to Element Plate Clamp	4
	HH1420	3-1/2"	Hex Head Screw 1/4-20	8+2
	NN1420		Nylon Nut 1/4-20	8+2
40M ELEMENT ASSEMBLIES				
6AT1.75			6 ft Alum Tube 1.75" OD	1
6AT1.75			3 ft Alum Tube 1.75" OD	2
3AT1.5			3 ft Alum Tube 1.5" OD	4
3AT 1.25 CFC			3 ft Alum Tube 1.25" Coil Front	4
3AT1.25 CBC			18” Alum Tube 1.25" Coil Back	4
3AT1.0			3 ft Alum Tube 1" OD	4
3AT.875			24" Alum Tube .875 OD	4
3AT.75			24" Alum Tube .75" OD	4
3AT.625			3 ft Alum Tube .625" OD	4
3AT.5S			3 ft Alum Tube .5" OD (slit end)	4
3AT.375			Tips Alum Tube .375" OD	4
Coil Assembly				
	40M Coils		40M Coils – 2017 Edition	4
	FG1.0 Coil		Fiberglass rod 1" OD	4
	Coil Hardware			
	SH1420	1-3/4"	Socket Head Screw 1/4-20	8+2
	NN1420		Nylon Nut 1/4 -20	8+2
	SH1420FT	3"	**FULL THREAD** Socket Head Screw 1/4 -20	8+2
	NN1420		Nylon Nut 1/4 -20	8+2
	HN1420		Hex Nut 1/4 -20	8+2
	LW14ExT		Lock Washer 1/4 External Tooth	16+2
	Tape		Tape	1
Element Hardware				
	SH1024-1	1-1/2"	Socket Head Screw 10-24	4+1
	SH1024-3	2"	Socket Head Screw 10-24	8+2
	SH1024-4	2-1/4'	Socket Head Screw 10-24	8+2
	NN1024		Nylon Nut 10-24	20+2
	SH832-3	1-1/4"	Socket Head Screw 8-32	8+2
	SH832-1	1"	Socket Head Screw 8-32	4+1
	NN832		Nylon Nut 8-32	12+2
	SH632		Socket Head Screw 6-32	4+2
	NN632		Nylon Nut 6-32	4+2
	HC-2		Hose Clamp	4+2
40M Driven Element Hardware (pre-assembled)				
	FG1.5DE		Fiberglass Rod for Driven Element	1
	BH1024-1	2-1/4"	Socket Head Screw 10-24	2+1
	BH1024-2	3"	Socket Head Screw 10-24	2+1
	NN1024		Nylon Nut 10-24	4+2
	FW10		Flat Washer #10	4+2
	LW10ExT		Lock Washer #10 External Tooth	4+2
	KN1024		Keps Nuts 10-24	2+1
	SCOIL		Shunt Coil	1
SUPPLIES				
Balun Brackets				2