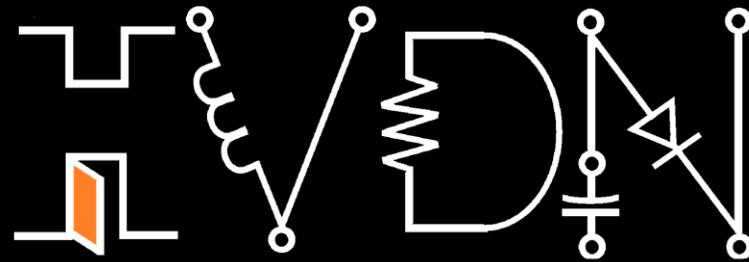


HASviolet

900 MHz Multipurpose Antenna

The "A" in HASviolet



Hudson Valley Digital Network | www.hvdm.org

Assembly Manual V.05

About this assembly manual

The HVDN HASviolet team has decided to make this assembly manual available as an electronic copy only. There is no paper option available from HVDN.

A major design consideration was reusing everyday objects in the construction of this antenna to cut down on waste, including its documentation.

While a paper manual would be helpful, it is also wasteful. Feel free to print your own copy if needed, but having this on a tablet, laptop, computer or smartphone will be more environmentally friendly.

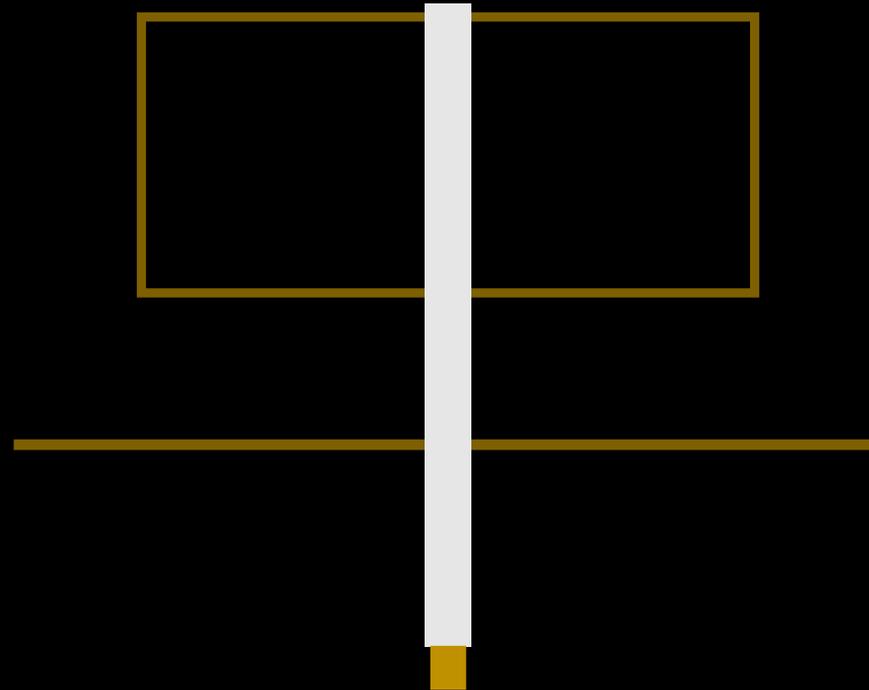
Thanks for your understanding.

About 900 MHz Multipurpose Antenna

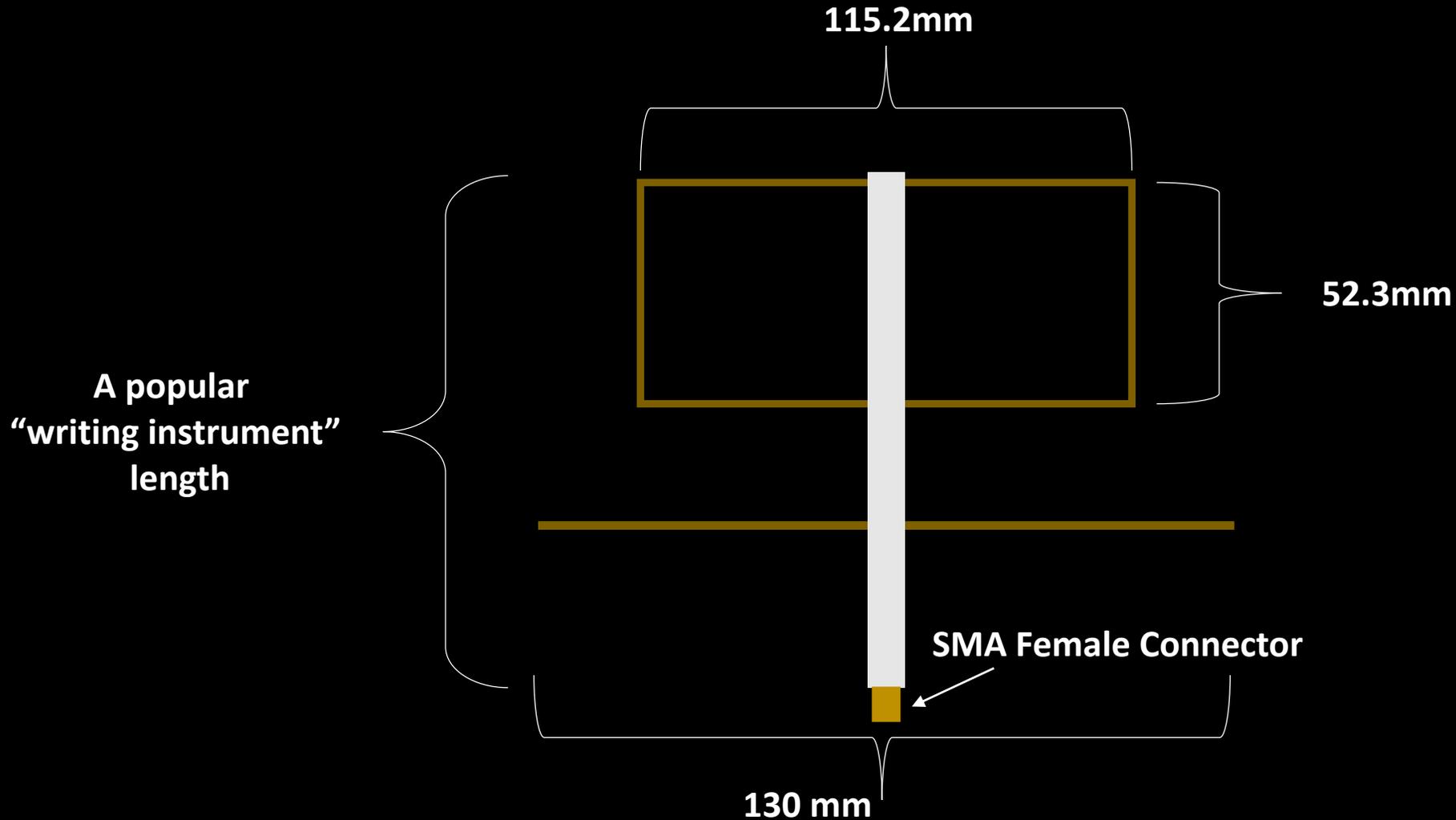
The design influence behind our antenna is to have something:

- Easy to build
- Easy to source materials for
- Be mostly omnidirectional, but with some level of directivity (gain)
- Wide beam width & bandwidth for different use cases for transmit and receive applications

Introducing the HASviolet 900 MHz Antenna



About 900 MHz Multipurpose Antenna



Getting Starts: Tools & Building Material A

The following tools are needed to construct your antenna:

- Shop vice
- Hammer
- Soldering iron & electronics grade solder (60/40 preferred)
- Solder flux
- Lighter
- Crazy glue or other fast set clear glue
- Hobby knife*
- VOM or DMM multimeter*
- Helping hands kit (available from most hobby shops or budget tool sellers)

*Optional, but helpful

Getting Starts: Tools & Building Material B

The following materials are included with your antenna kit:

- 1 - Bent piece of brass stock in the shape of a J. (Unbent length of 335mm)
- 1 - Length of straight brass stock (130mm)
- 2 - 15 cm lengths of small diameter wire (Discarded after final assembly)
- 1 - White “popular” style pen (May include predrilled holes)
- 1 - Short length of heat shrink tubing
- 1 - Length of pre-configured RG-179 75-ohm coaxial cable with SMA connector

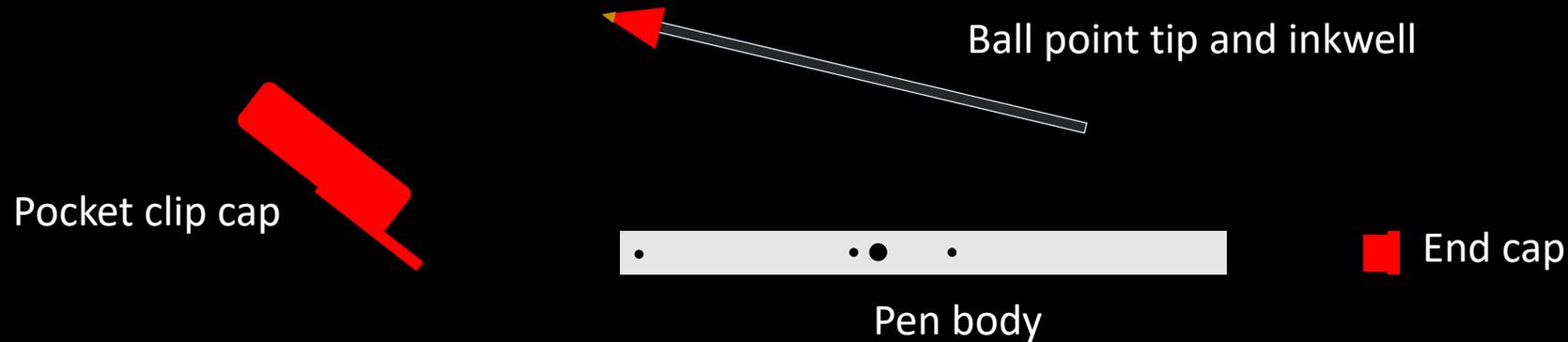
Construction: Step 1A – Kit Expectations



If you purchased an official HASviolet kit, your pen may already come with pre-drilled holes to make antenna assembly quicker and easier.

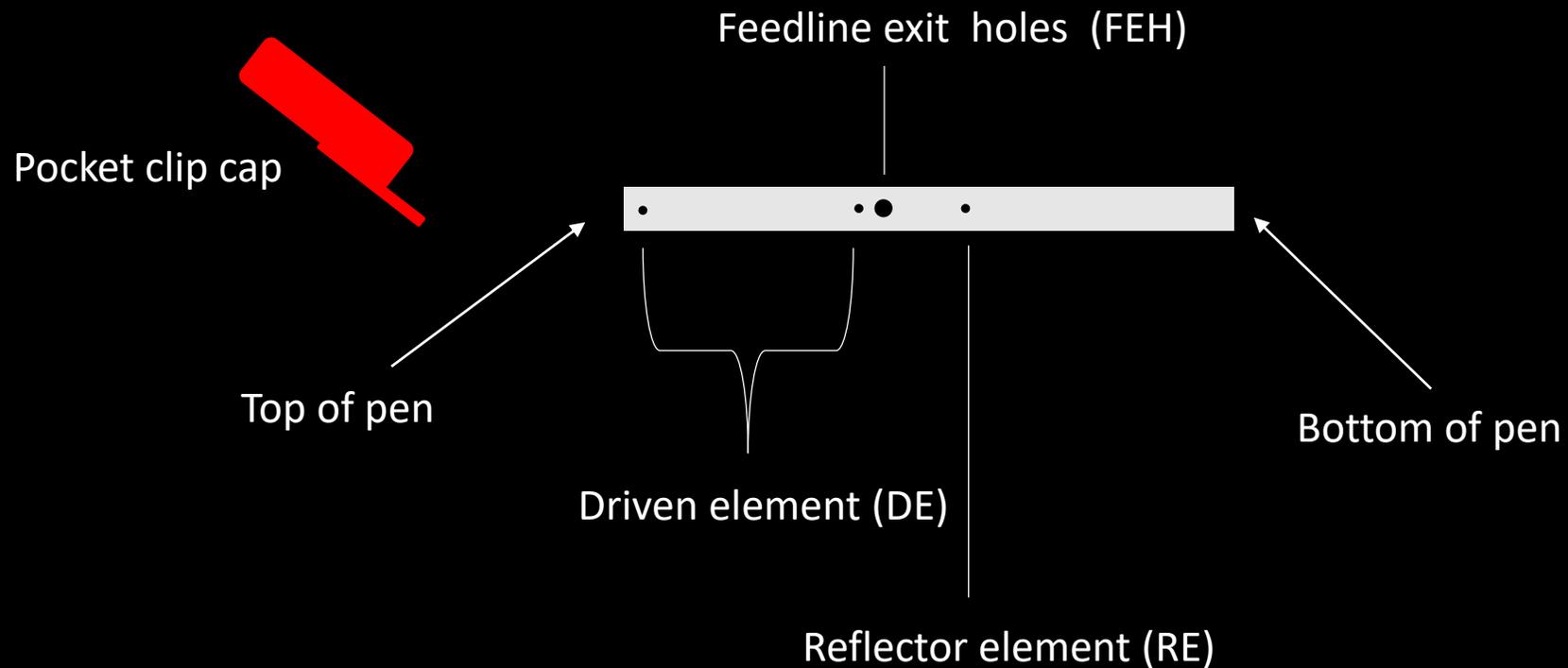
If your pen does not include predrilled holes, please reference page 9 of our technical manual for more details.

Construction: Step 1B – Pen Preparation

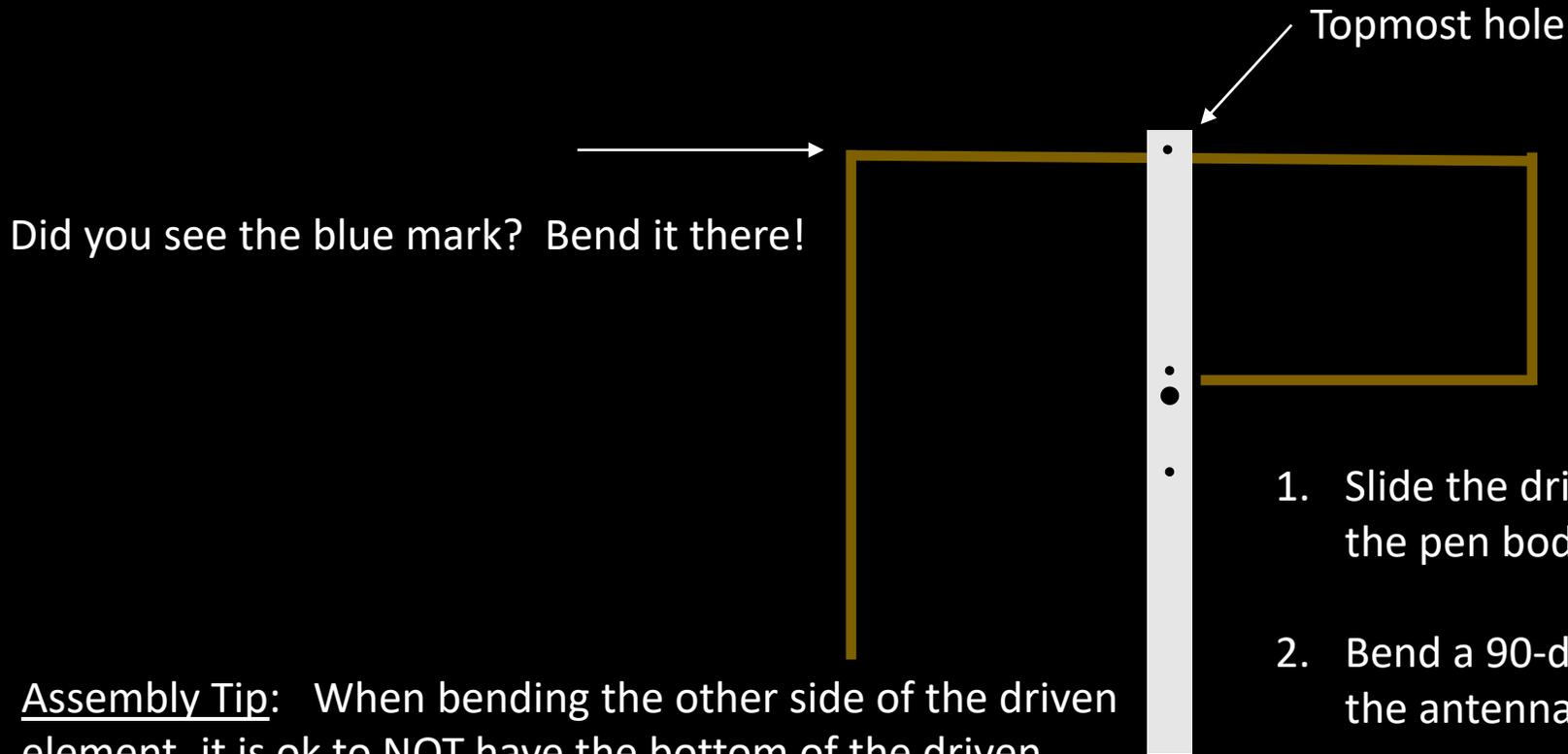


1. Disassemble all parts of the pen so you end up with above four parts.
2. The HASviolet antenna only needs the Pen body and End cap for final assembly.
 - Helpful Tip #1: Use the HASviolet reflector element to help “pop” out the End cap.
 - Helpful Tip #2: Use the inkwell during the matching section construction if required.
 - Helpful Tip #3: The cap of the pen can be placed back on your antenna after final assembly for increased “style”.

Construction: Step 1C – Pen Terms



Construction: Step 2A – 1st Bend

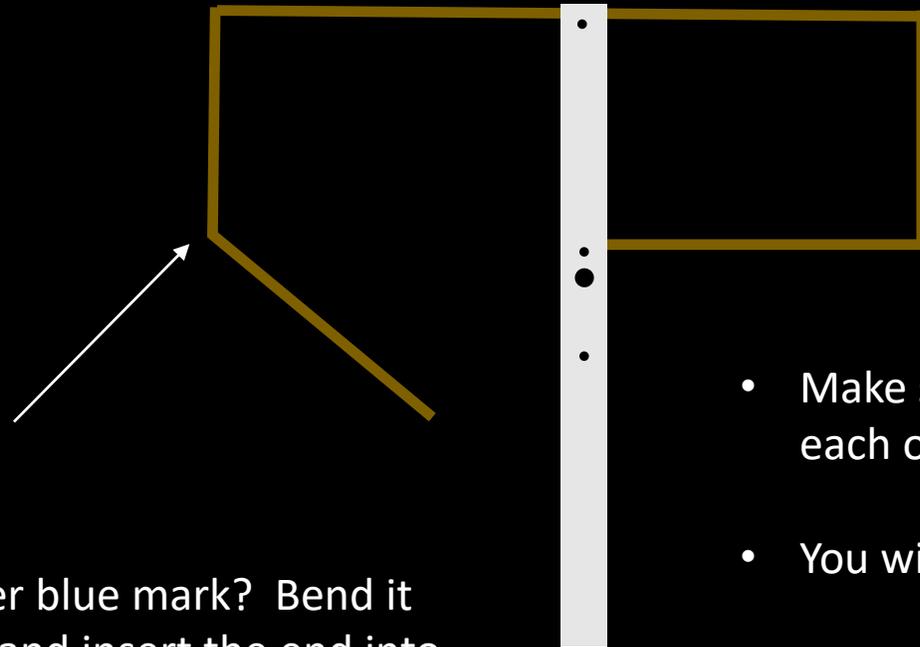


Did you see the blue mark? Bend it there!

1. Slide the driven element through the topmost hole of the pen body
2. Bend a 90-degree angle at the pre-marked point on the antenna element
3. Test fit the bottom part of the driven element through one side of the 2nd hole from the top of the pen body.

Assembly Tip: When bending the other side of the driven element, it is ok to NOT have the bottom of the driven element inside the 2nd hole. Your goal is to get a clean 90-degree angle bend however you can make that happen. The easiest way to do this is with a vise and a hammer.

Construction: Step 2B – 2nd Bend

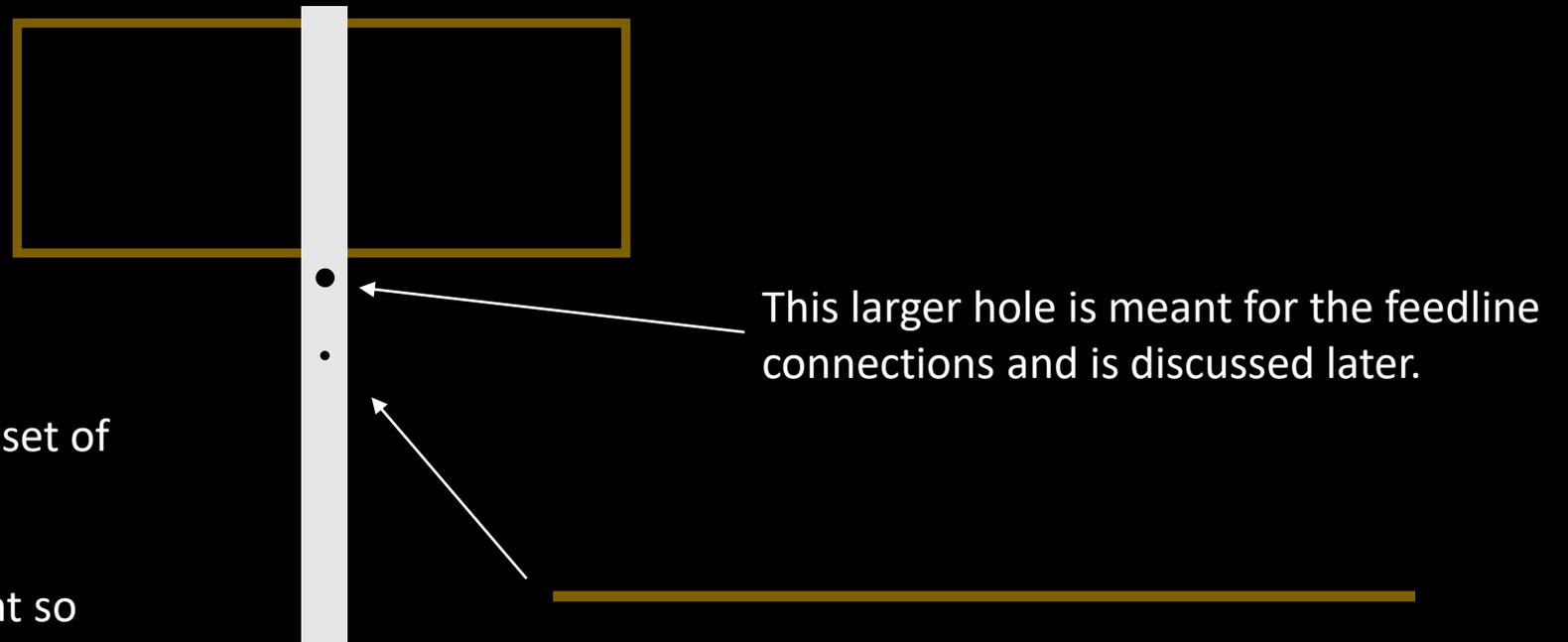


Did you see the other blue mark? Bend it there to 90 degrees and insert the end into the hole ! Yay!

- Make sure the two ends do **NOT** touch each other inside the pen body.
- You will glue these in place later!

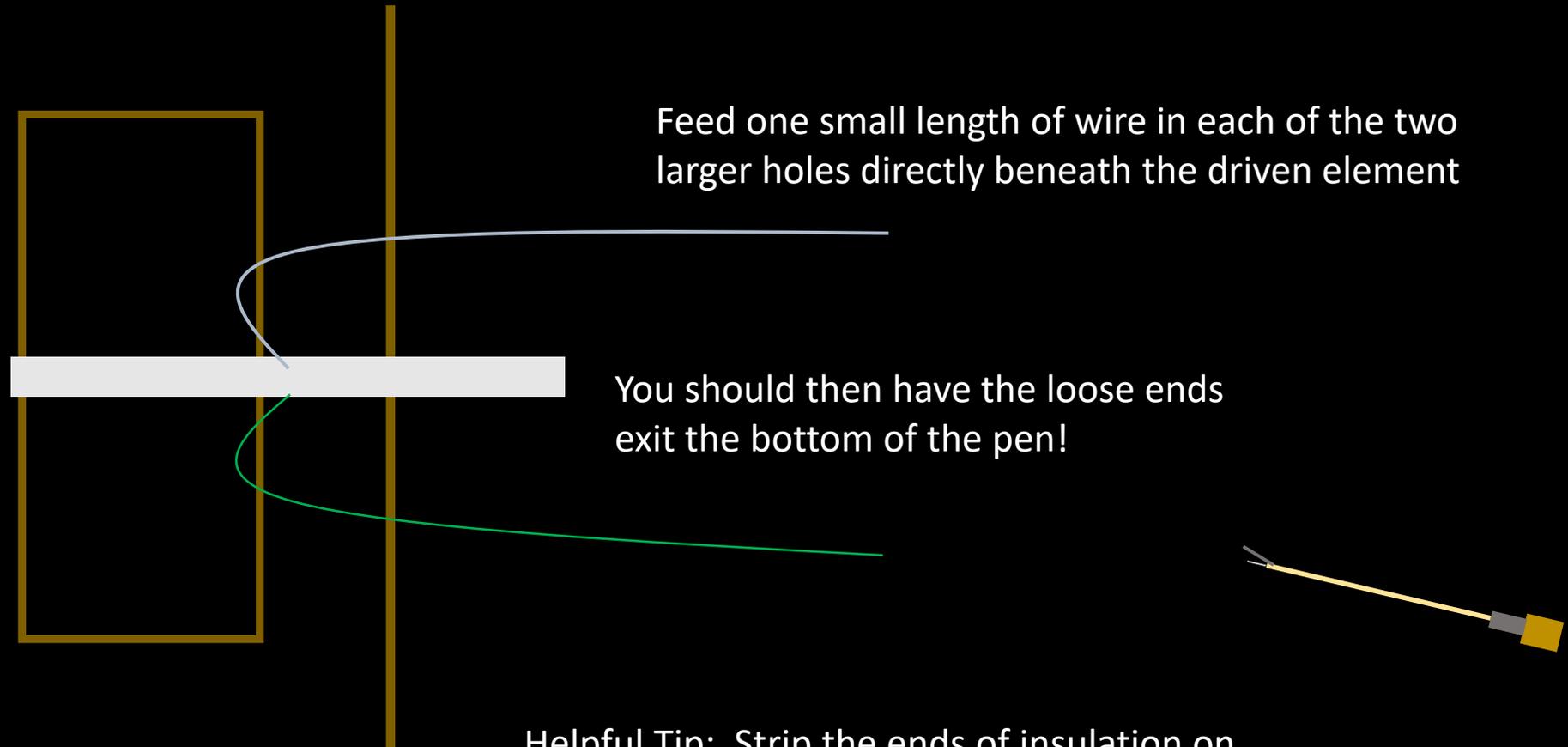
Construction: Step 3A – Finalized Bending

IMPORTANT: Your driven element should look like this.
Do NOT proceed until your antenna looks like the diagram.



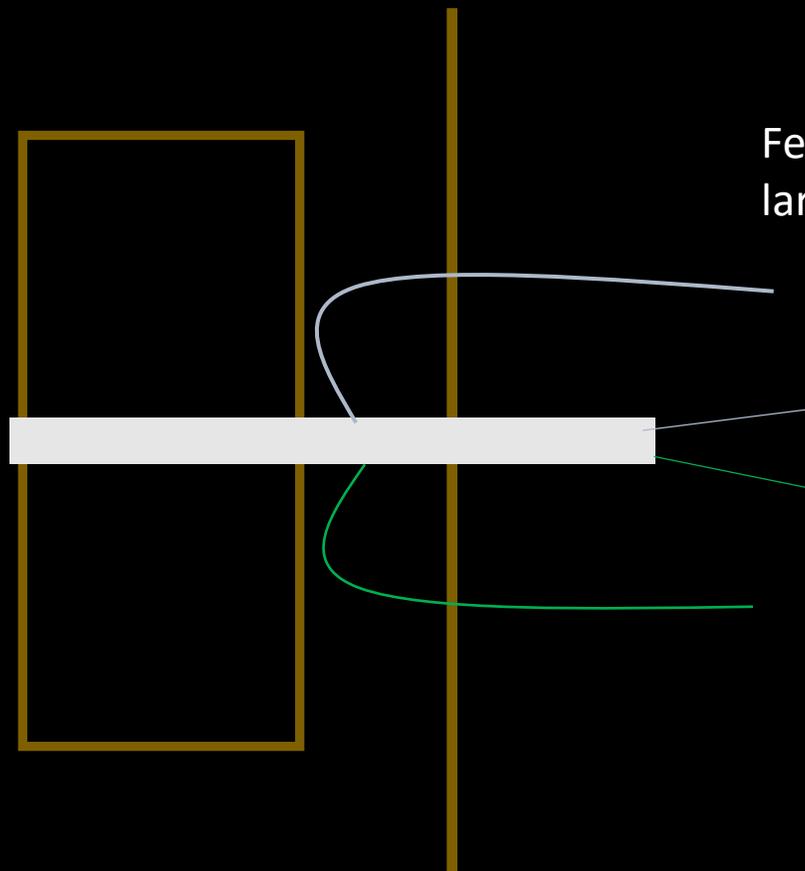
- Slide the reflector into the lowest set of holes to test for fit.
- Center it below the driven element so equal lengths are on either side. This will be important later.

Construction: Step 3B – Feedline Preparation



Helpful Tip: Strip the ends of insulation on wires first before inserting into pen body!

Construction: Step 3C – Feedline Preparation



Feed one small length of wire in each of the two larger holes directly beneath the driven element



You should then have the loose ends exit the bottom of the pen!

Construction: Step 3D – Feedline Assembly



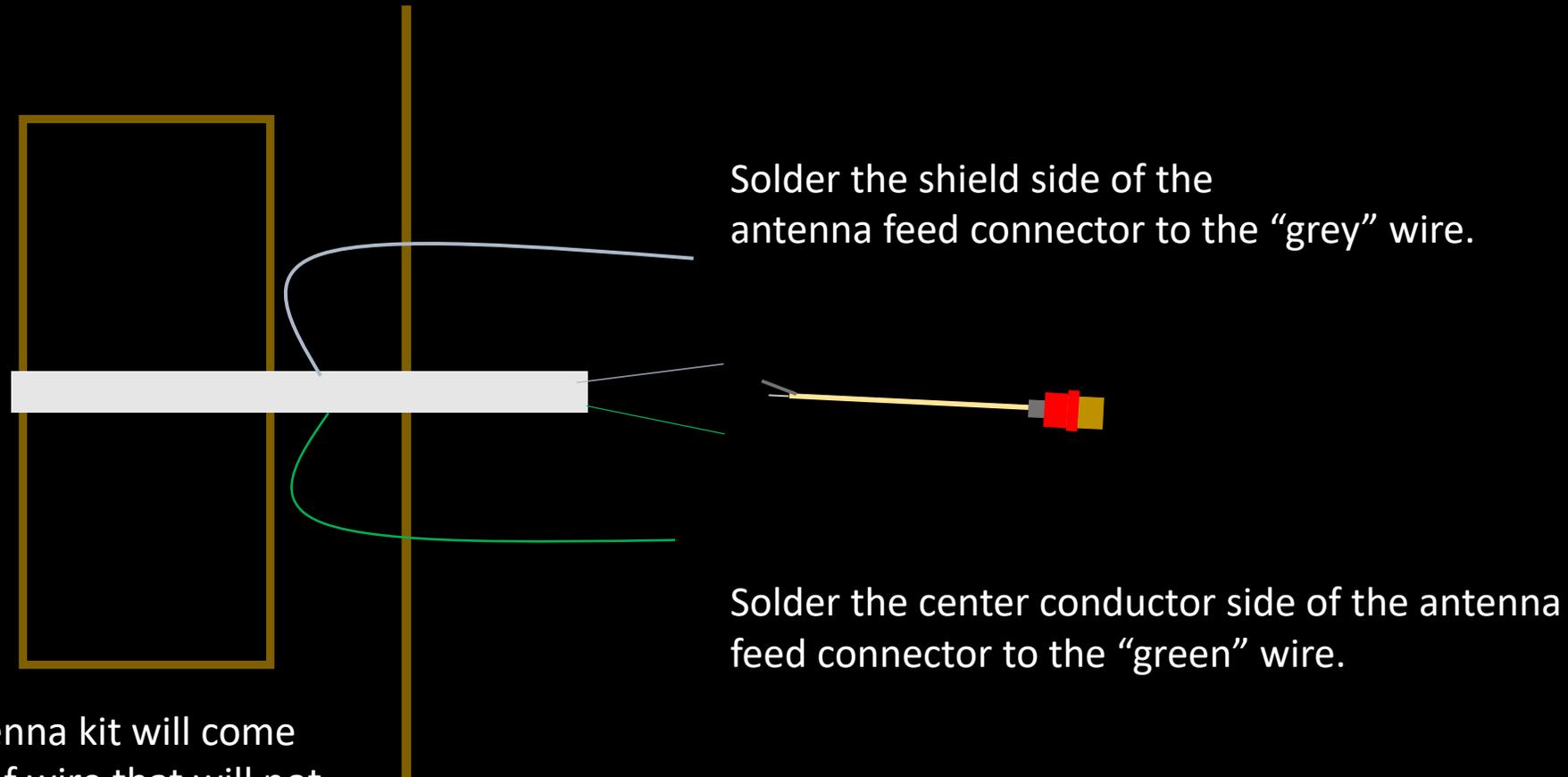
Drill a “tight” hole in the bottom of the end cap. Alternatively, you can use a soldering iron to quickly melt a hole in the bottom and quickly pass the matching element through.

The antenna connector collar will friction fit in the hole you create. If you drill or melt the hole too big, you may want to consider using a new pen or finding an alternate way to secure the connector.

Be mindful and careful when completing this part of the antenna assembly.

Later, we will secure it with a little glue to ensure it is not going to come apart!

Construction: Step 3E – Feedline Progress



Please note that your antenna kit will come with two different colors of wire that will not be the same as those pictured. Green and grey were chosen for illustrative purposes only.

Construction: Step 4A – Matching Section

IMPORTANT: Your matching element may come preassembled with the shield and center conductor already separated. This may make assembly slightly easier.



If your matching section is NOT preassembled with the shield and center conductor already separated, it should have a blue mark on the coax.

This is where you will want to carefully strip the coax and separate the shield and center conductor yourself.

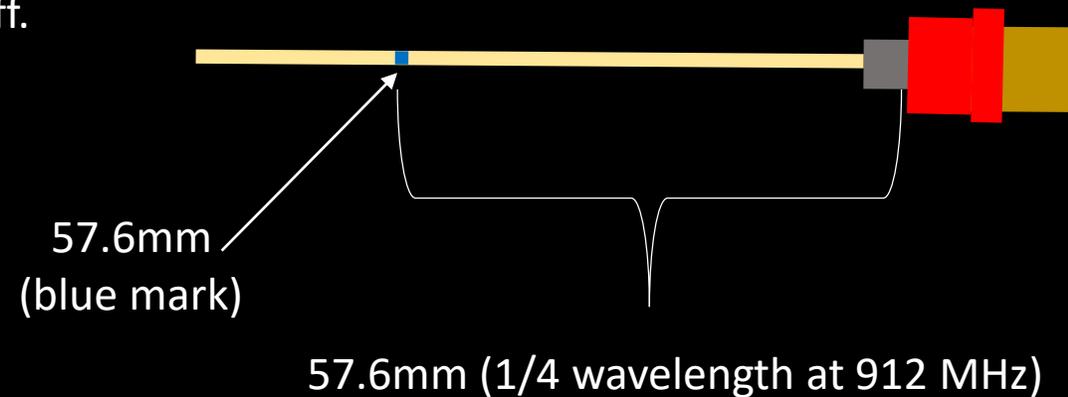
The blue mark is exactly 57.6mm from the base of the female SMA connector. If the marking has rubbed off, please measure and strip the coax there.

Construction: Step 4B – Matching Section

Strip away the outer coax jacket carefully. It is very thin.

Using a razor blade or hobby knife, no more than one complete rotation is all that is needed.

The jacket should then easily slide off.

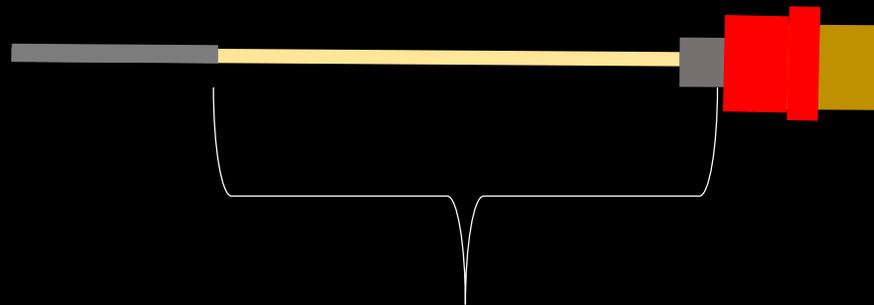


Construction: Step 4C – Matching Section

With the outer jacket removed, the outer shield braid should be exposed

The next step will be carefully separating the shield and passing the center conductor through a hole in the braid.

Close up photos are provided on the next page.



57.6mm (1/4 wavelength at 912 MHz)

Construction: Step 4D – Matching Section



Properly completed matching section with the outer jacket of the RG-179 coaxial cable stripped at 57.6mm

Slowly push down the braid over the center conductor to create a bulge at base of jacket.

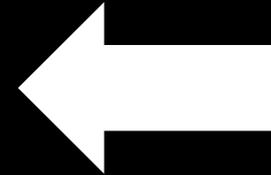
This is where you will carefully pull the center conductor through the braid.



Construction: Step 4E – Matching Section



Carefully use an object such as the pen inkwell, antenna reflector or a hobby knife to slowly probe the center conductor and create a gap for you to pull the insulated center conductor through the braid as close to where the jacket ends.

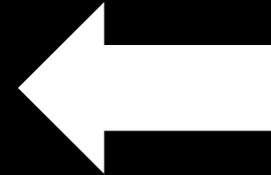


IMPORTANT: DO NOT pierce the insulator of the center conductor of the coax.

Construction: Step 4F – Matching Section



Once you can get to this stage, it should be easy to pull the rest of the center conductor through the braiding. Do not be tempted to unbraid the shield as an alternative method of separating the coax as it will make a mess and complete antenna assembly.

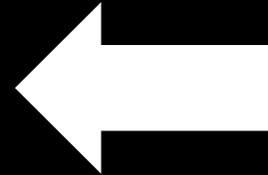


Construction: Step 4G – Matching Section



When complete, this is what it should look like.

Please go take a break after this precision “surgery” before moving forward to the next steps.

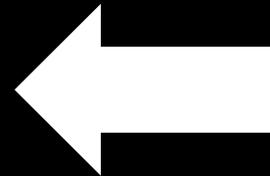


Construction: Step 4H – Matching Section



After stripping about 2-4mm of the coaxial cable center conductor, solder one length of the wire coming out of the bottom of the pen body.

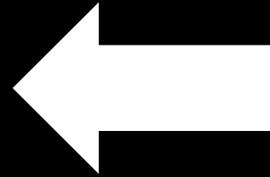
You can easily slide the other wire into the shield before soldering. Make sure your solder joints are very strong and straight. This will make pulling the cable up through pen body easier.



Construction: Step 4I – Matching Section



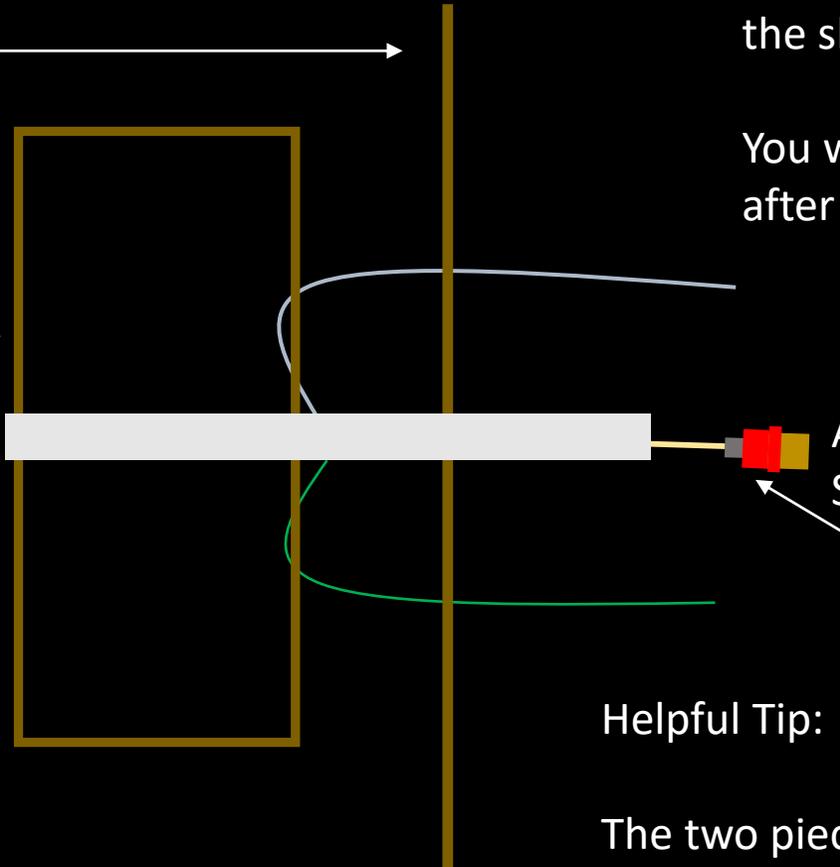
Here is what your coaxial cable will look like before pulling it through the pend body. DO NOT proceed to the next step if your does not look like this.



Construction: Step 5A – Matching Section

You may want to remove the reflector if it gets in your way during this stage of assembly.

You can CAREFULLY slide it back in later while being sure to avoid the coaxial matching section inside



Carefully pull the wires up through the pen body so that the shield and center conductor pass through the holes.

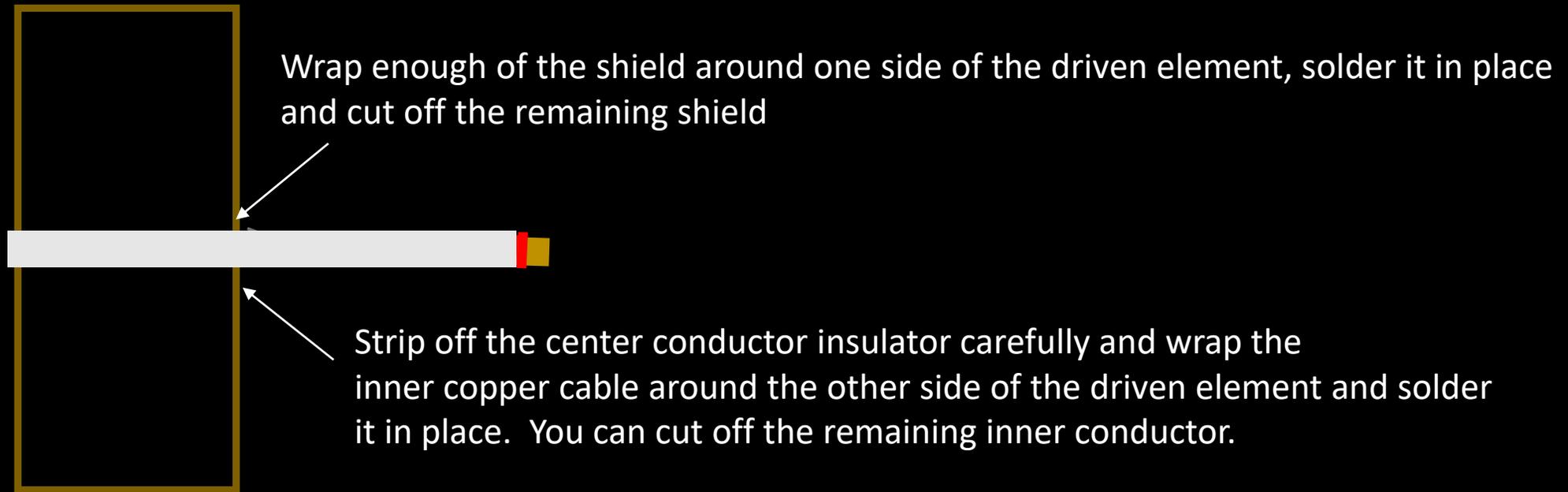
You will de-solder or cut the wire from each end of coax after you have pulled them both through

Add a little glue INSIDE the end cap so that the SMA connector and cap are now permanently joined

Helpful Tip: DO NOT! Glue the end cap to the pen body!

The two pieces of wire can be discarded. They are not needed for final assembly

Construction: Step 5B – Matching Section



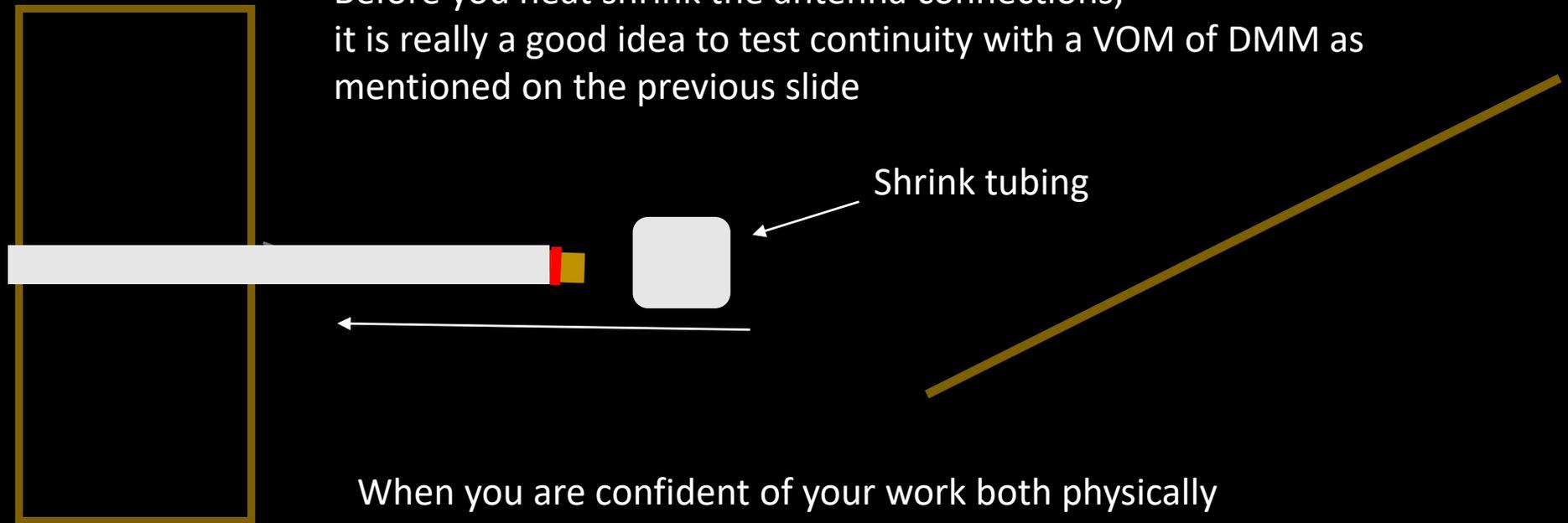
Helpful Tip: If you have a DMM or VOM, you can test for continuity and resistance!

You should read a dead short or under 70 ohms.

One lead of your tester will go to the threaded part of the SMA female connector the other to the center pin.

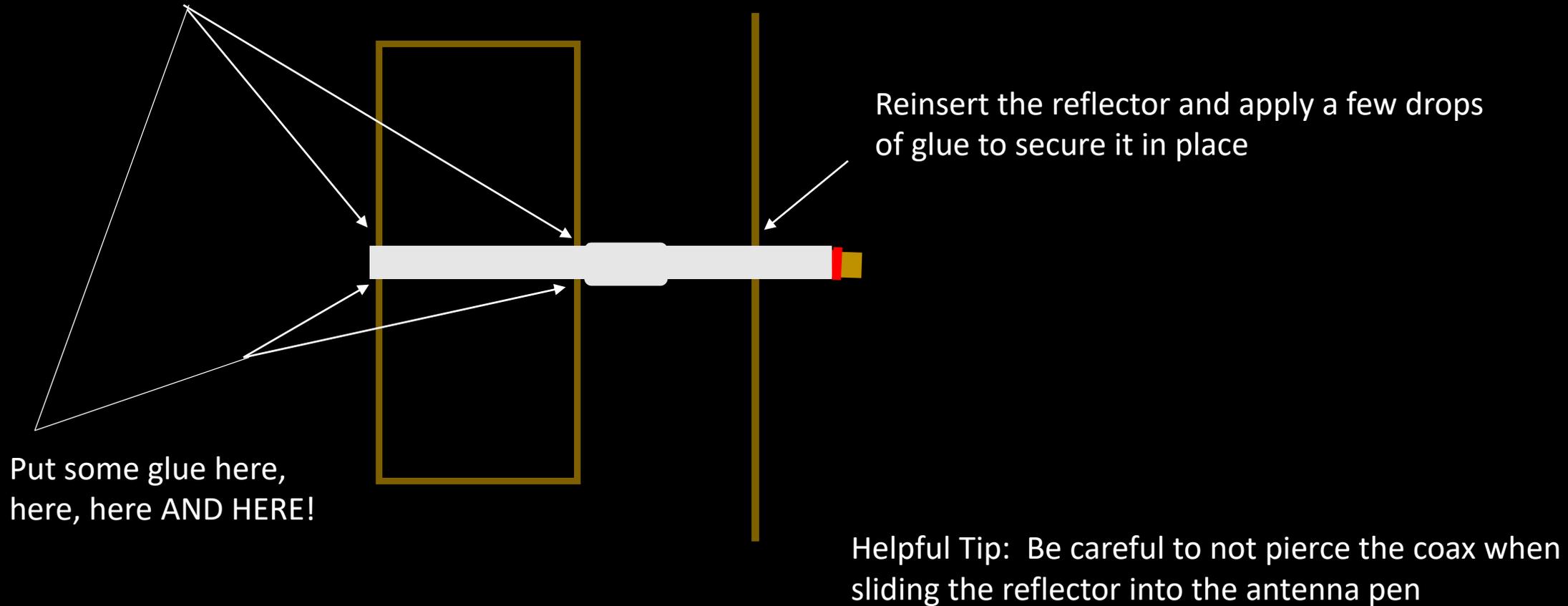
Construction: Step 5C – Matching Section

Before you heat shrink the antenna connections, it is really a good idea to test continuity with a VOM or DMM as mentioned on the previous slide



When you are confident of your work both physically and electrically, you may then use a heat gun or lighter to carefully “shrink” the tubing over the connections!

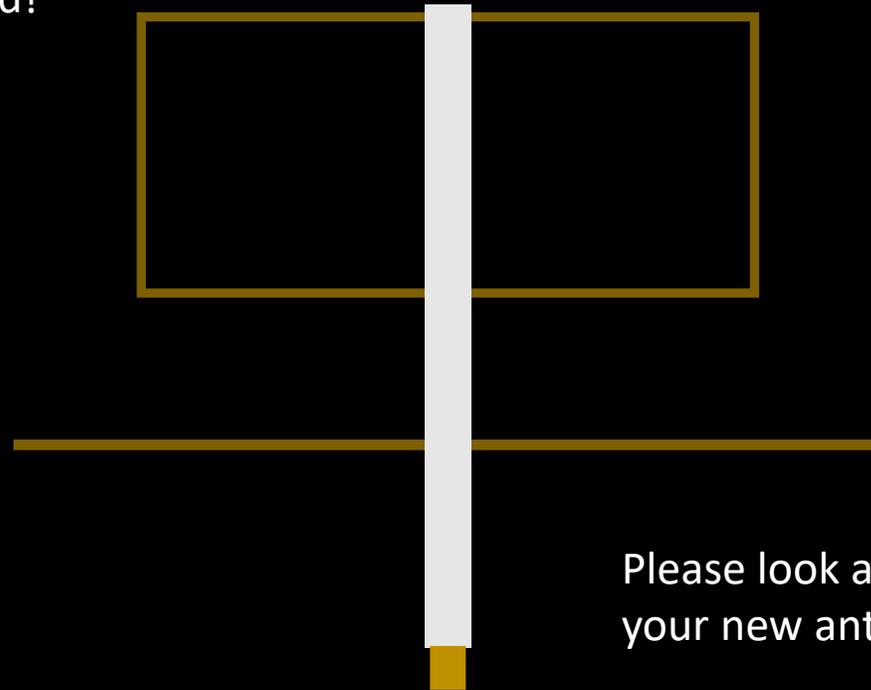
Construction: Step 5D – Final Assembly!



Construction: Step 6 – Initiate signals!

Your HASviolet antenna is now complete.....

.... After your glue has dried!



Please look at our user manual for tips on using your new antenna for 900 MHz applications

HASviolet

900 MHz Antenna

The “A” in **HASviolet**

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