



# ***HAMtronics.uk***

## **Amateur Radio & Electronics Store**

# **Project Kits**

# **Build Instructions**

Project Kit Name:	2M Slim Jim
Project Kit Version:	Version 1.0
Document Version:	Version 1.0

### **Summary**

Thank you for purchasing one of the HAMtronics.uk project kits, we hope you have fun and enjoy building and using your new project. In order to ensure correct functioning and smooth operation, we advise you to read carefully the instructions in full BEFORE starting the build. Then go back and complete each step 1 by 1, taking your time to ensure the correct parts are installed in the correct order. Some of the components (such as LED's and Integrated Circuits) can be susceptible to heat and static damage, so care should be taken when installing and soldering parts.

For help and advice visit the website for more information. You can also submit questions and ask for help using the contact us on the webpage. Please note whilst we will do our best to assist you with the kits, they are kits, we do not provide ongoing support if you deviate from or amend the circuit, components or code associated with these kits. They are meant to be fun and a learning experience. That said we test every kit before dispatch, so you should have no problems getting these to work.

**Please note we accept no liability and provide no warranty in relation to the building of these kits, the instructions here are a guide only. Please follow all your own safety precautions to avoid injury or damage.**

## Kit Contents

Part	Qty	Notes
Ladder Line	1.5M	
RG58 with pre-crimped BNC	1	Length dependant on kit version purchased
Zip tie	1	
Velcro Cable Tie	1	
Clip on Ferrite	1	

## Tools Required

- Soldering iron with small chisel or pointed tip
- Solder
- Wet sponge to clean your solder iron tip
- Safety glasses
- Craft or stanley knife
- Ruler or tape measure
- Small electrical wire cutters
- Patience

## Additional Parts NOT included

You will need some electrical tape to waterproof the antenna once the RG58 has been soldered to the antenna.

## Build Instructions.

This guide had 3 types of instructions

- Normal instructions are shown in bullet points, please complete one step before moving to the next unless instructed otherwise

*Notes and useful tips are shown in italics*

***SAFETY NOTICES: are shown in RED Italics***

*Ensure you have a good working environment, and a good clean soldering iron with which to work. As solder is a molten metal and you are working in close proximity, it is always advised to wear good safety glasses to prevent any molten solder getting into your eyes.*

Ok. Let's get building!

## Step 1. Cut the Ladder Line to the correct length.

As we are building for 2M, we want the length to match the correct frequency of 145.500Mhz, which is the FM calling channel. If you want to build this for a different frequency, please adjust the lengths to suit your requirements. There are several calculators online which you can obtain the correct lengths.

- First, carefully using the wire cutters or craft knife strip back enough of the insulation so that when you bend over the two wires, they cross over each other the width of the ladder line.



- Then solder the two wires together.



*Always be careful when using a knife to strip cable, keep fingers away from the blade. Place the cable on a secure surface and always cut away from your body, never towards it.*

Now for the other end, first we need to carefully measure the overall length of the ladder line and ensure we fold the ends to get the correct length.

The overall length we want to achieve is 141.2cm after we have soldered both ends. Therefore, measure this distance from the soldered end

- Measure 1412mm (141.2cm) from the soldered end.
- Strip back the insulation to the 141.2cm mark

*Note: The 1412mm mark may be in the middle of the solid plastic spacer, if so carefully cut out a section to the required measurement mark.*



- Carefully bend the wire 90 degrees so that the wires cross over each other.



- Re-measure the overall length again to ensure you have exactly 141.2cm!
- Once you are happy with the length, solder the two wires together as before, you can now trim any excess cable.



## Step 2. Cut the Ladder Line gap.

In order to make the antenna elements we need to cut a small gap of 21mm in one of the ladder-line wires. The position and size are important so please take your time to check your measurements before cutting.

*You may find using some masking tape or electrical tape to secure the ladder line onto a piece of scrap wood makes this step easier. It does not matter from which end or which side of the wire you decide to cut.*

The start of the gap should be exactly 464mm from one of the soldered ends. This end will now be called the bottom of the antenna.

The length of the gap should be exactly 21mm. (Length of Green line in photo)

- Measure the start cut 464mm from the bottom end of the soldered ladder line. (point 1)
- Using wire cutters, cut one side of the ladder line wire only! (do not cut both wires in the ladder line!)



- Measure 21mm up the ladder line from this first cut, away from the bottom.
- Using wire cutters, cut the same ladder line wire to remove the 21mm section.

### Step 3. Prepare Ladder Line for Matching Point

The next step is to prepare the ladder line at the point where the RG58 coax cable will be attached. The point at which the cable should be attached can be calculated and used by measuring the distance from the bottom of the antenna.

*For the best results we would recommend the use of an antenna analyser. However, we understand that not everyone will have access to this piece of test equipment. Don't worry if you do not have access to an analyser, just ensure you measure precisely, and the matching point will be very close to perfect.*

The calculated match point for 50ohms is 46mm from the bottom end, (end used in step 2)

- Measure and mark the point 46mm from the bottom end of the antenna.
- Using a sharp knife, carefully strip away the insulation on both sides of the ladder line, you need to strip approx. 1cm of the insulation at the measured 46mm mark.



### Optional Step: using an antenna analyser

If you have or can borrow an analyser, then precise placement of the matching point can be set using the analyser to get the lowest SWR reading plus an exact 50ohm impedance.

Moving the connection point towards the bottom, i.e. less than 46mm will REDUCE the impedance

Moving the connection point towards the top, i.e. more than 46mm will INCREASE the impedance

Find the best match point for your antenna build with the SWR meter.



All measurements should be done with the antenna being supported in free space, not laying on the table or ground. Avoid placing near any metal or conductive material whilst measuring.

Use of crocodile clips or pieces of electrical tape can be used to temporarily attach the coax to the antenna matching point.

Check again once soldered.

## Step 4. Prepare and solder the RG58 Cable

The HAMtronics kit comes with the BNC plug pre-installed on end of the RG58 cable

- Strip back the RG58 cable being careful not to cut the outer shielding as this forms one of the two wires.
- Twist the outer shield one side of the coax and the inner strand the other side.



- Place the RG58 on the ladder line pre stripped area and solder onto the antenna, ensuring that the centre feed is attached to the long side of the ladderline. The Shield is attached to the short side (i.e. side we just cut a section out in step 3)





- Using a sharp tool, make holes either side of the RG58 cable and using the cable tie secure the coax to the ladder line so any pressure is not transferred to the solder joints.



Final step on the RG58 is to attach the clip on Ferrite if its not already attached just above the BNC connector.

## Step 6. Waterproof and attachment

Using electrical tape, securely wrap all points where the ladder line wire is exposed. This includes:

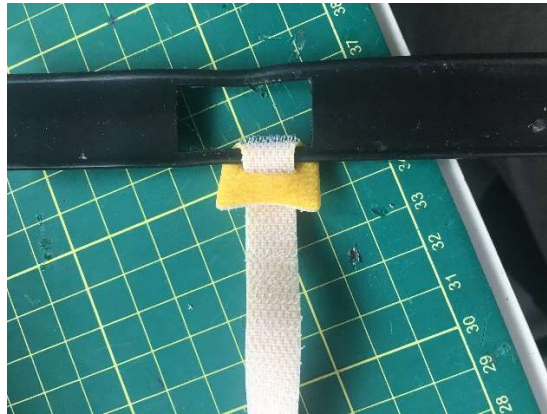
Both soldered ends

Coax connection point

Air gap

Note: As an alternative, heat shrink tubing can be used. Not supplied in the kit. Be careful not to crush the spacer and reduce the distance between the ladder line elements.

Finally attach the Velcro cable tie to the top of the antenna. This can then be used to attach the antenna to a pole or suitable hanging point and can be used to keep the cable tidy when in storage.



### Thanks

*We hope you enjoyed building this HAMtronics Kit, and hope you get lots of use from it. Check back on the website for future kits. If you have an idea for a kit, let us know you may see your name featured on a kit as the designer! 73 - MOONH - HAMtronics.uk*