MAIANA BLUE Assembly Manual

Revision 1.0
July 2025

Based on original Peter's MAIANA project and **original assembly manual**.

Kit Contents

The kit will arrive with all of these parts in a small box. These are:

1. The main PCB and basic UART/USB breakout in an ESD envelope
2. The antenna tube (two telescopic sections)
3. The 3D printed end cap for the antenna tube
4. The antenna core (coiled and stripped coax with SMA male on one end)
5. The main case (40mm outside diameter tube)
6. 40mm diameter heat shrink tubing, black
7. 25mm diameter heat shrink tube, black (enough for 2 builds)
8. 1m of 10mm diameter heat shrink tube, blue, folded
9. Threaded adapter for mounting on usual rail or deck GPS antenna mounts.

The main PCB, the UART/USB adapter, the antenna and the end cap are packed inside the main tube, for better protection during shipping.

What you will need

To complete the installation you will need:

● A soldering iron for the RJ45 connector and “breakaway” pin headers of the UART adapter
● Some kind of instant glue to secure the end cap of the antenna tube
● A pair of strong scissors for cutting (thick) heat shrink tubing
● A heat gun for the heat shrink tubing. You will need this both on your workbench for the initial assembly, as well as on your boat for the final installation. If you don’t have a proper heat gun, see this article here for some alternate options. That said, beware of anything that projects a flame, as it can easily melt the PVC enclosure!
● A Cat5 cable for connecting the main unit to the breakout board in the cabin. This should be a regular “patch” cable and not a “crossover” cable. Pick one with appropriate length and flexibility to suit your installation. The exact configuration of the cable (568A or 568B) is not important.
Cat8 cable can be used also, for the more exposed sections outside the boat and Cat6 for the rest of sections inside the boat, all in the same line.
Sections can be connected by this RJ45 Connector Outdoor Waterproof Female To Female: https://aliexpress.com/item/1005006199584847.html

ESD CAUTION: Many electronic components on the MAIANA BLUE boards are sensitive to electrostatic discharge. Although both the adapter and the main board feature strategically placed TVS diodes, these will not necessarily protect the circuit from a discharge at some random location **due to touch**. So make sure you follow these really basic rules:

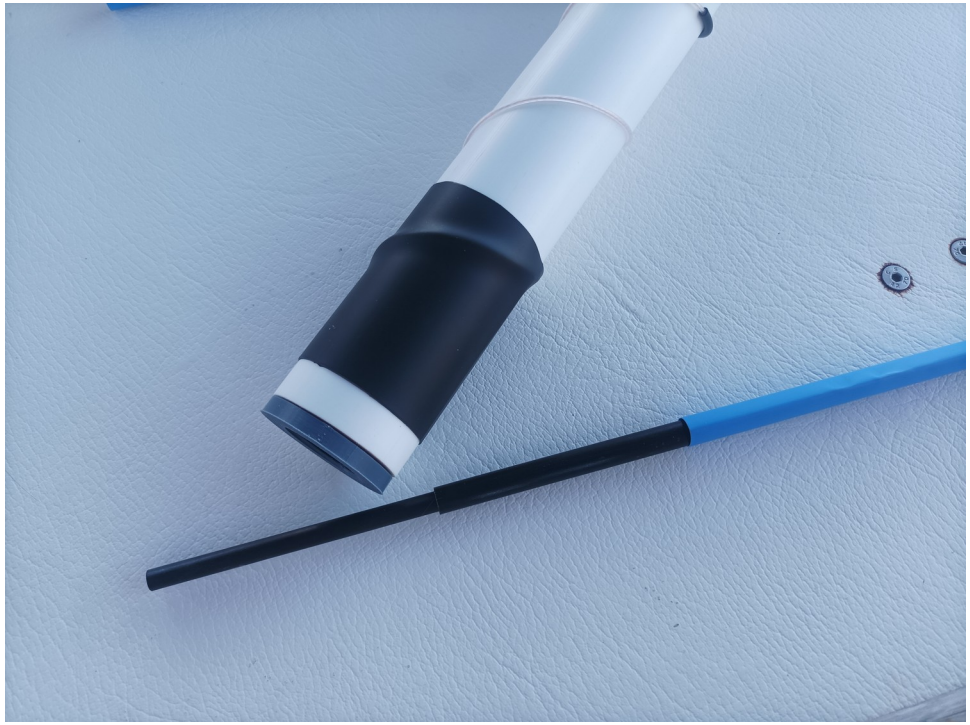
● Work on an ESD-safe surface, ideally an ESD mat. Metal and wooden surfaces are usually safe. Avoid plastic ones.
● When you arrive at your workstation, stop walking and ground your hands immediately before touching any electronics. Ideally, you should start by putting on a grounding strap.

This is by no means a comprehensive guide, but it covers the most common mistakes. For more information, **read this.**

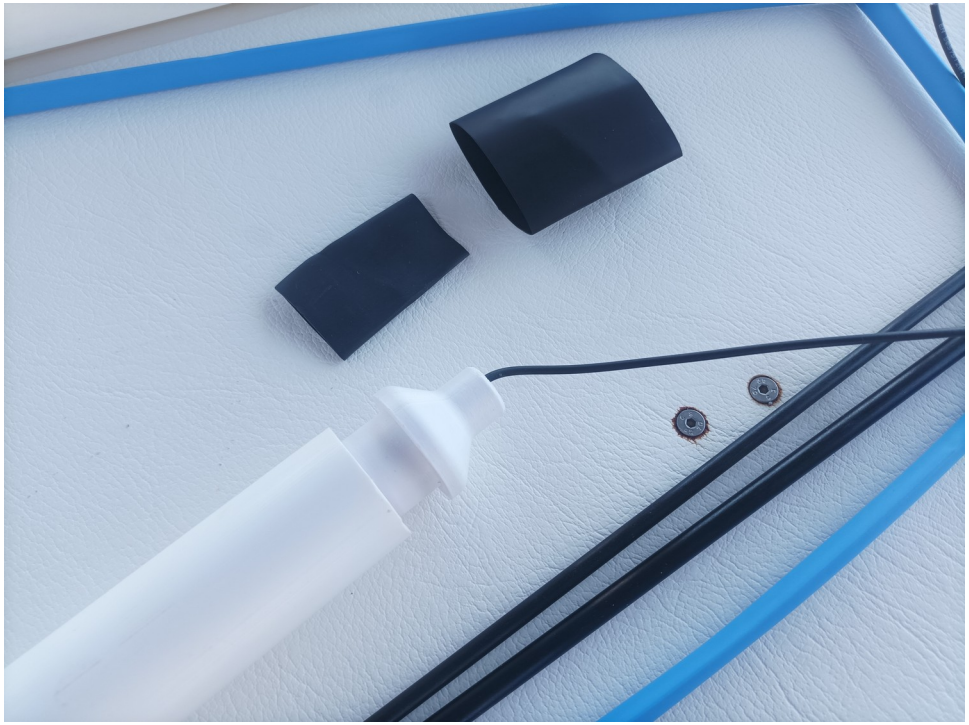
Assemble the antenna

The antenna will arrive in a very compact configuration. The heat shrink tube that coats the antenna tube will be folded as shown for shipping. This won’t affect its performance.

The antenna radome is made of two telescopic epoxy wound filament tubes which are inside the blue tube.

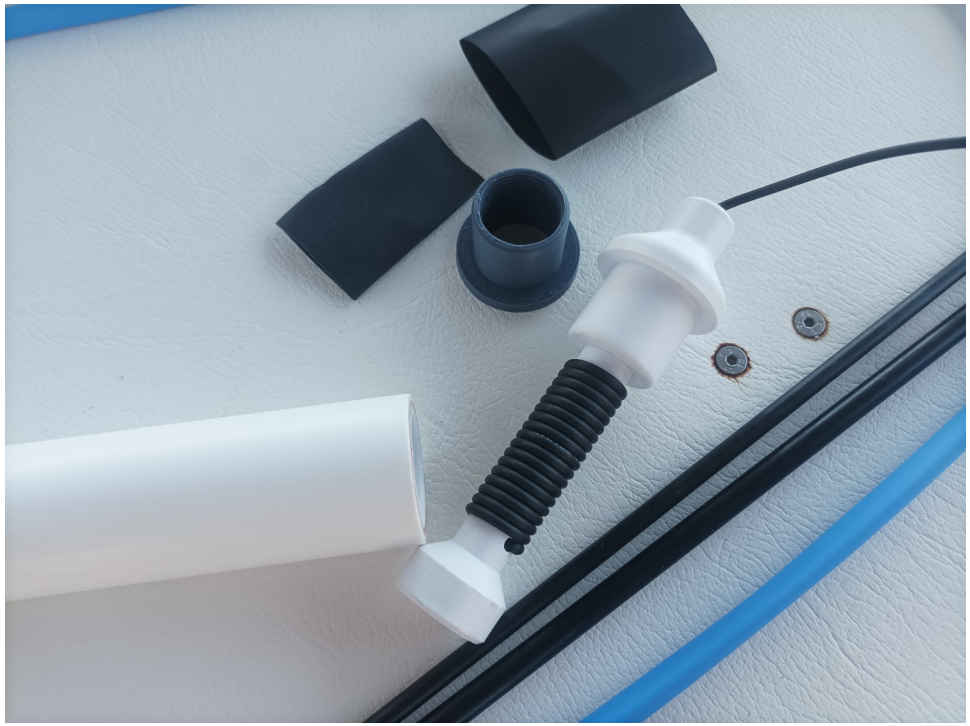


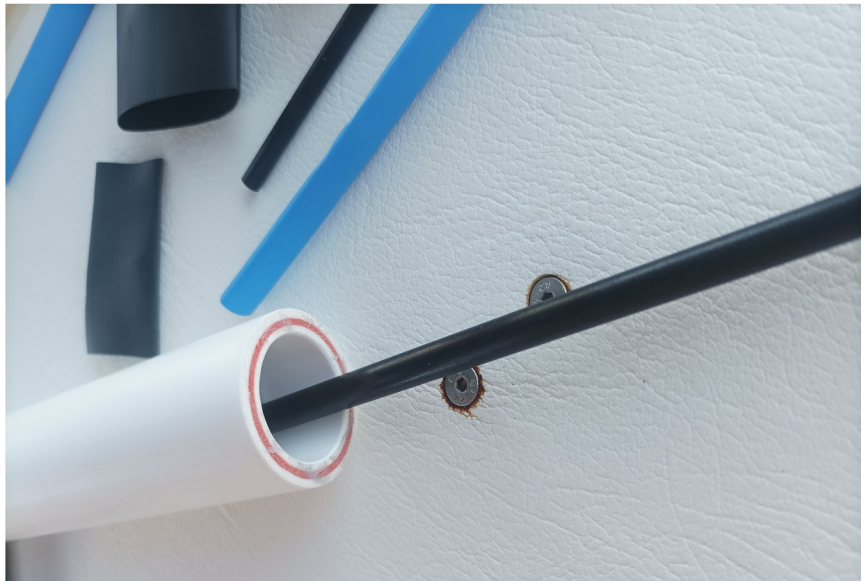
The larger black heat shrink tube is holding the smaller black shrinking tube and the end of antenna cable. Pull it out gently.



Then, remove the antenna assembly by firmly holding the white tube and pulling (and rotating) the conical printed part. Some force should be applied.

In the same way, remove the threaded adapter from the other end of the larger white tube.

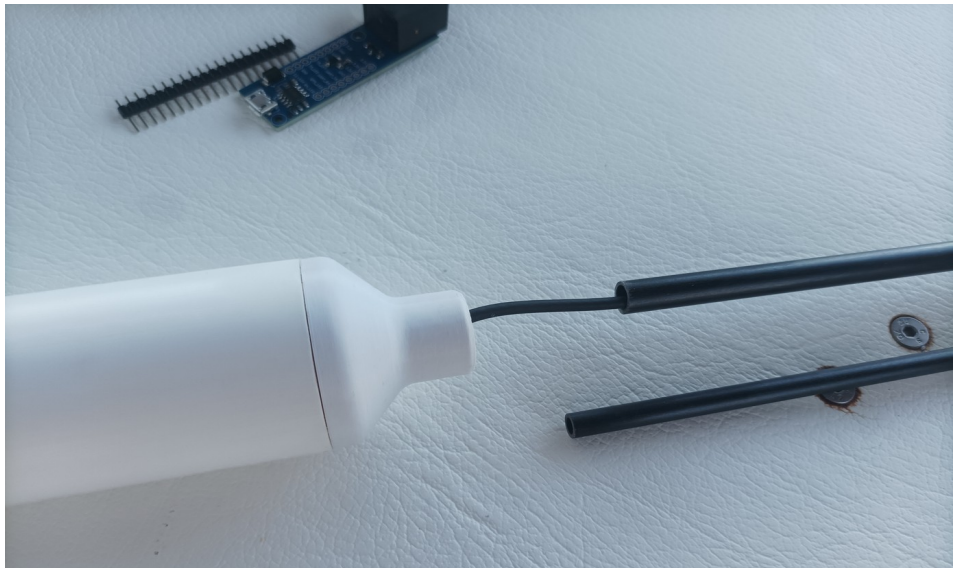


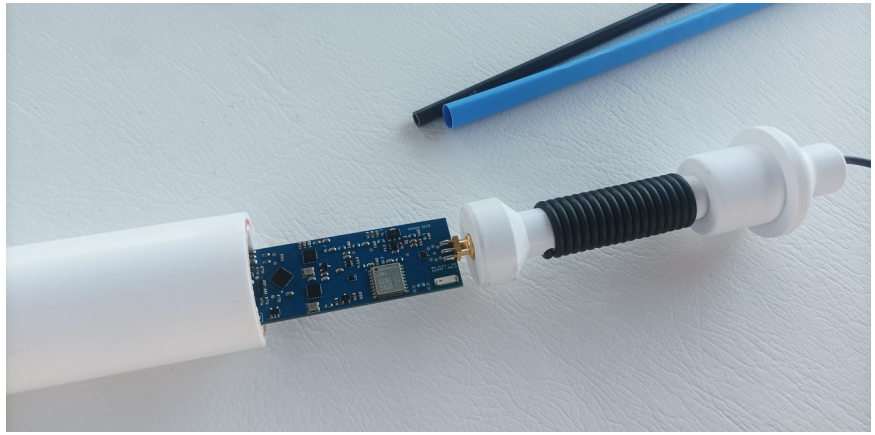


Use one antenna rod and push out the ESD envelope which is inside the larger white tube.

Attach the PCB to the antenna assembly and slide it back into the larger tube (main case)

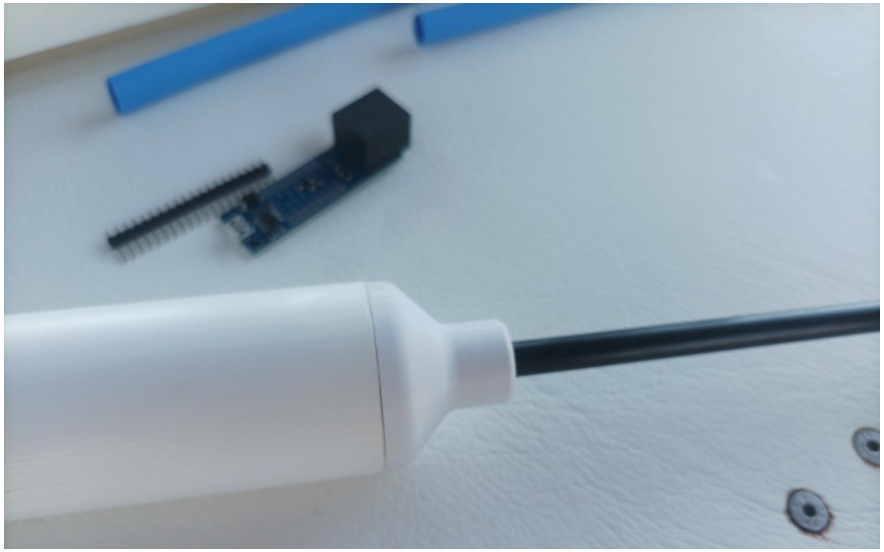
Gently but firmly, hold the PCB from the body of SMA female connector (golden metal component) and tighten it into the antenna’s SMA male connector.



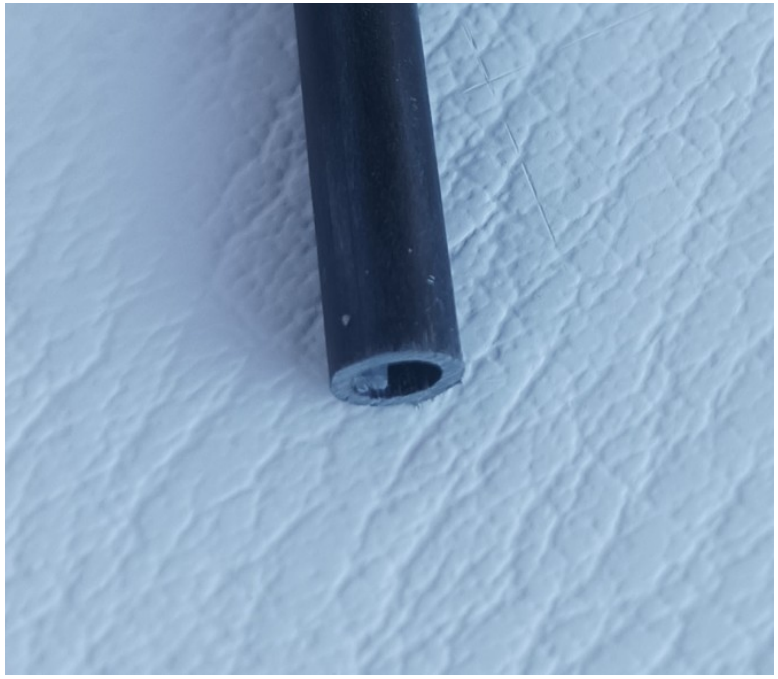


Then push the larger antenna tube over the cable and through the antenna subassembly until it stops moving.

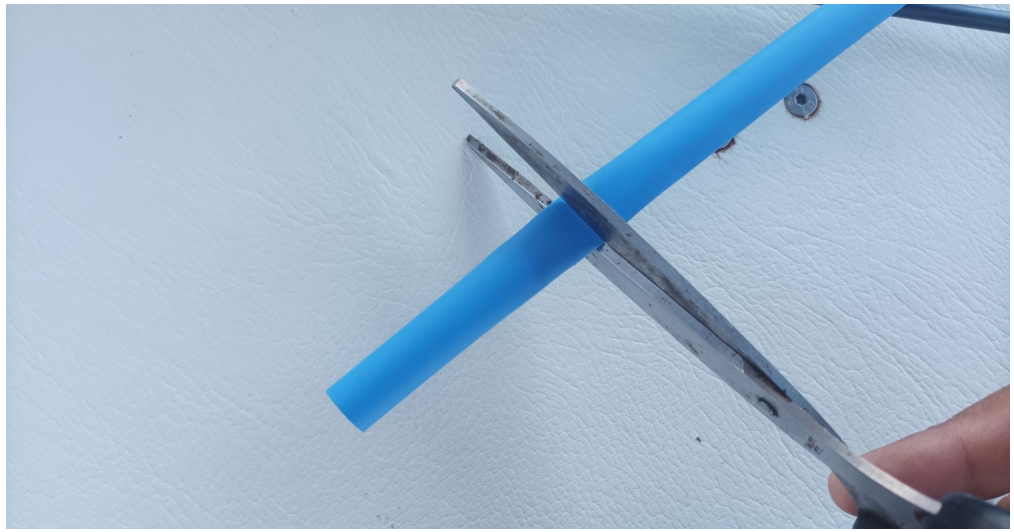
It should slide in for 50mm.



Now insert the narrow tube over the cable and through the wide tube. Keep pushing through until the cable shows up on the other end, then pull back slightly until it’s flush. This is the optimal configuration for mechanical strength



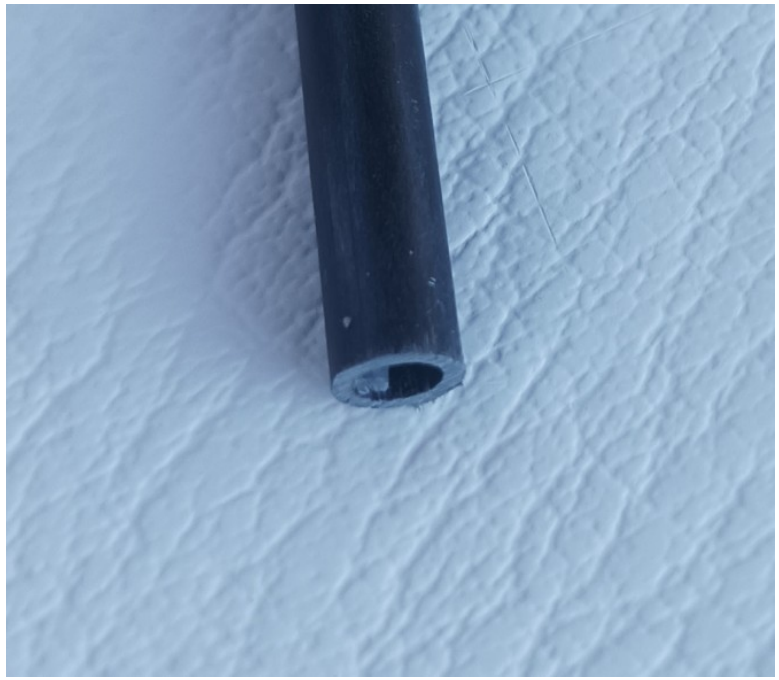
Use a scissor and cut a pice of 60mm of the blue heat shrink tube



Pull it over the antenna’s tubes, around 15-20mm above the larger tube and 45-40mm above smaller tube.

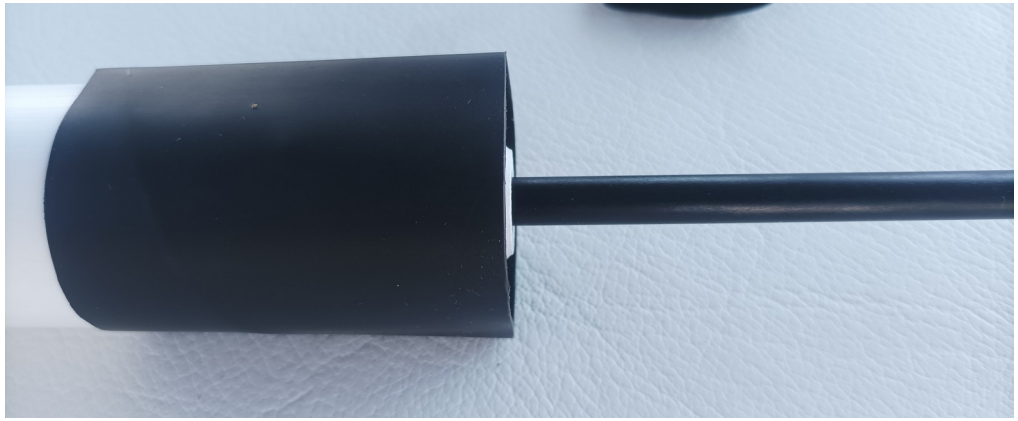
Use a heat gun and start at the end of the larger tube and keep melting the heat shrink thoroughly while rotating it

Recheck the position of the cable at the end of the smaller tube. If need it, you’ll still be able to adjust the smaller tube position.



Take the 40mm diameter of the heat shrink tube and place it like in picture:

Try to flush it’s end with the end of antenna’s 3D printed body.



Using the heat air gun, start melt it from the other end of the heat shrink tube.

Try not to overheat it, especially above the 3D printed part.

At the end should look like this:

Cut in half the 25mm diameter heat shrink tube and place it like in picture:

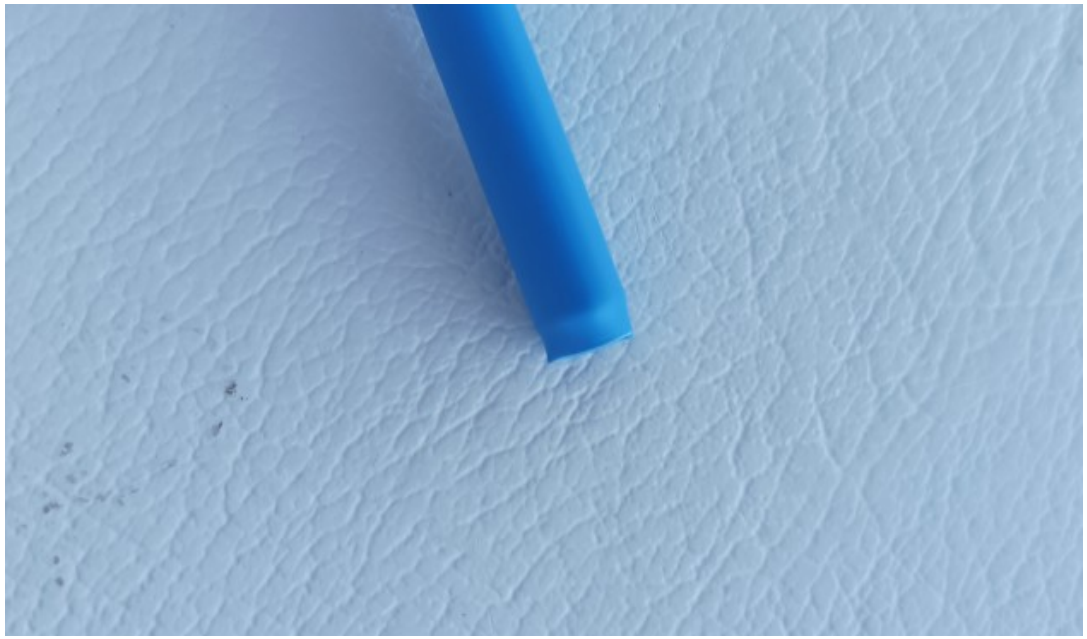
Use the hot air gun and melt it, starting from the 3D printed part end.
Again, take care not to overheat it, especially above the 3D printed part.

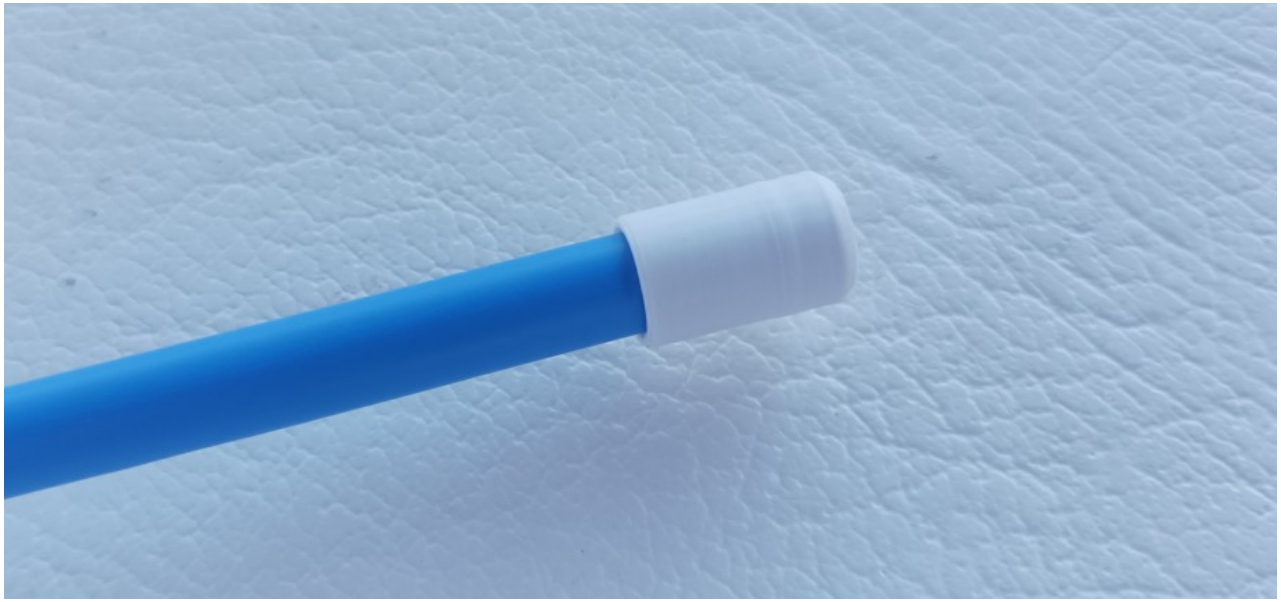
At the end, should look like this:

Then, push the blue heat shrinking tube over the antenna black tubes until will cover the previous melted black tube.

Melt the blue tube around antenna’s tubes, until the upper end.

Cut the excess of the blue tube at 1-2mm after the antenna’s fiber tube end

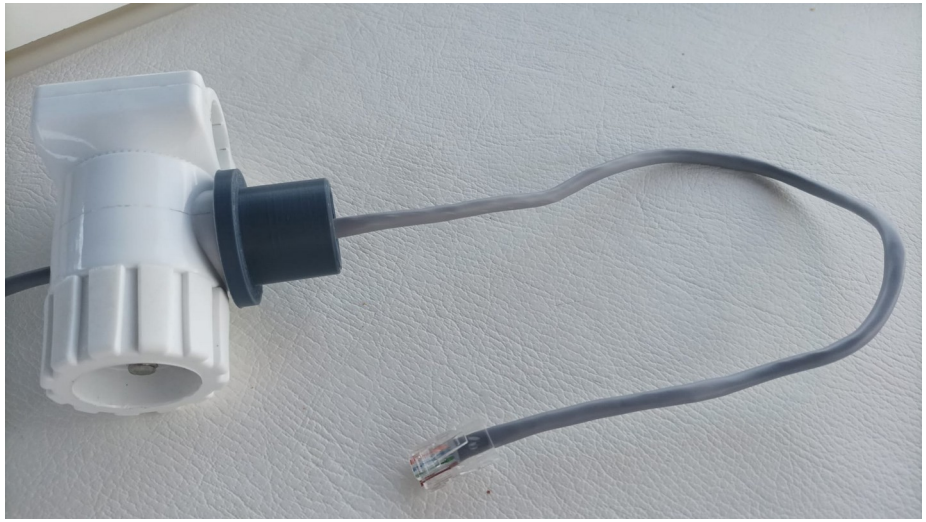




Push the 3D printed end-cap over the melted blue tube end.

1-2 drops of super-glue will fix it in final position

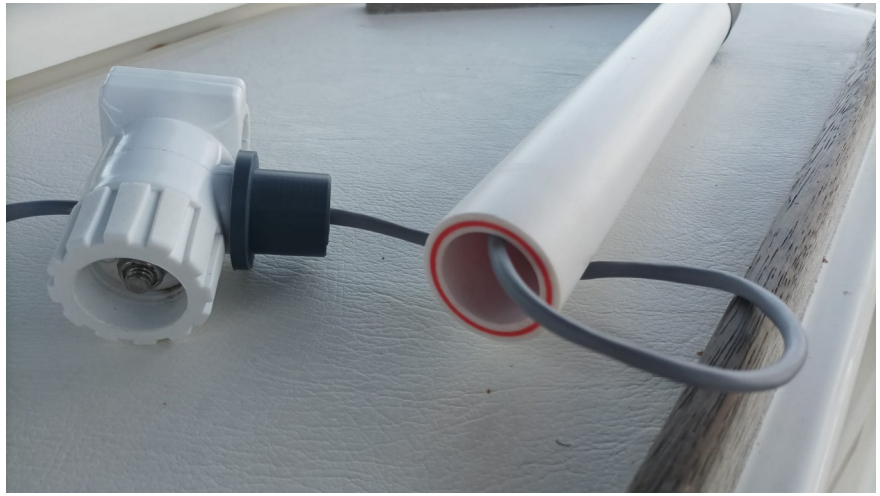
Optionally, you can use the 3D printed threaded adapter flange, for mount Maiana Blue base tube in a standard antenna rail mount:

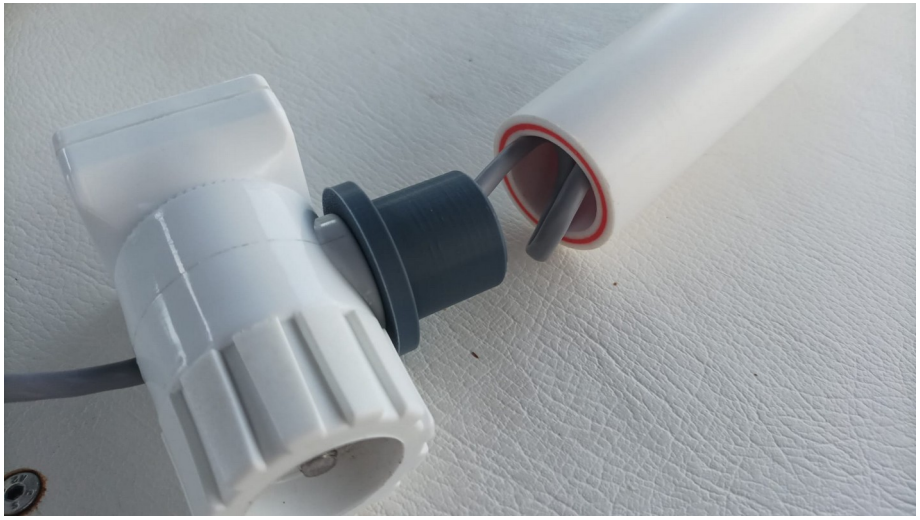


Place the adapter flange to the antenna mount

Pull the Cat5 cable through the antenna mount and leave approximately 15–20 cm of cable extending out from the adapter.

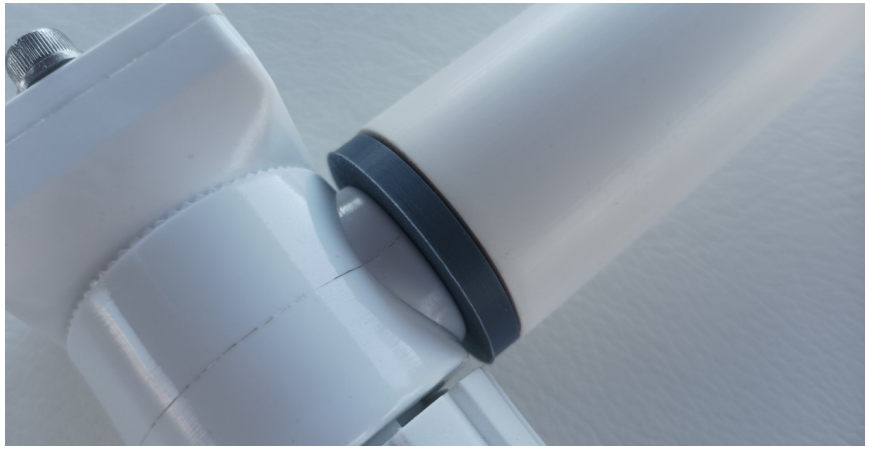
Connect the RJ45 connector to Maiana Blue board.
Sometimes it is very difficult to connect the cable when the main PCB is already inside the enclosure and I always need to push it with a screwdriver or similar.





Make 1-2 coils of the exposed cable and gently push inside the white tube. This extra length of coiled cable will be useful if you need to unmount the Maiana Blue.

Then push the Maiana Blue base tube over it.



Optionally, you can secure the large tube to the 3D printed adapter by drilling a hole and using a small screw, or more.

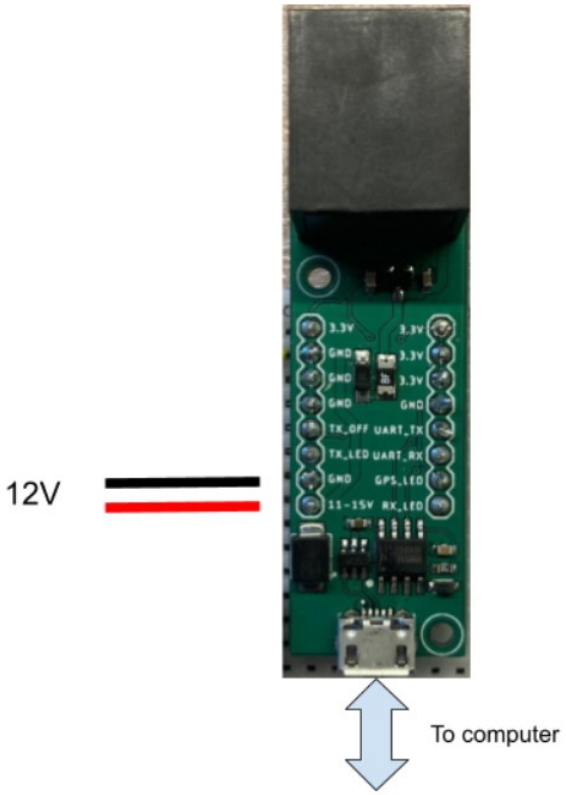
You can do this operation before passing the cable through antenna mount, to avoid damaging the cable.

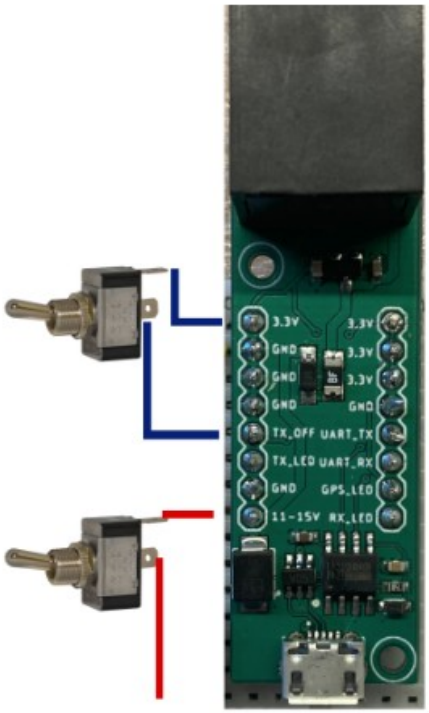
Pay attention not to use a longer screw, not to damage the cable.

UART Adapter

This adapter is included in every kit. You will need to supply 12V from a battery or a power supply and connect the USB cable to the computer. Alternatively, you may choose to wire the UART RX and TX lines directly to an adapter or the Raspberry Pi pin headers.

The breakout board should be mounted below deck, somewhere where it’s going to be protected from the elements. How and where it is fitted is entirely your choice.



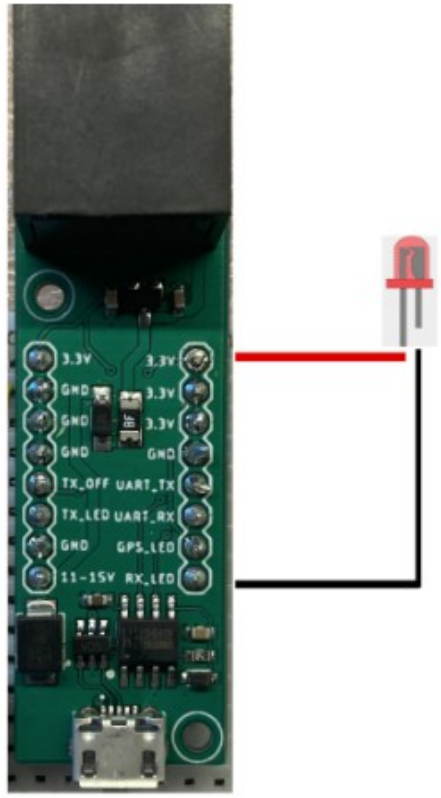


If you want a power and/or TX switch, you can use simple rocker switches as shown here.
A 1A-rated SPST can simply interrupt the main 12V supply.
If you want a hardware switch for “silent mode”, you need to remember that transmission is disabled if the TX_OFF signal is driven to a logic “high” (above 2V), so wire it as shown here.

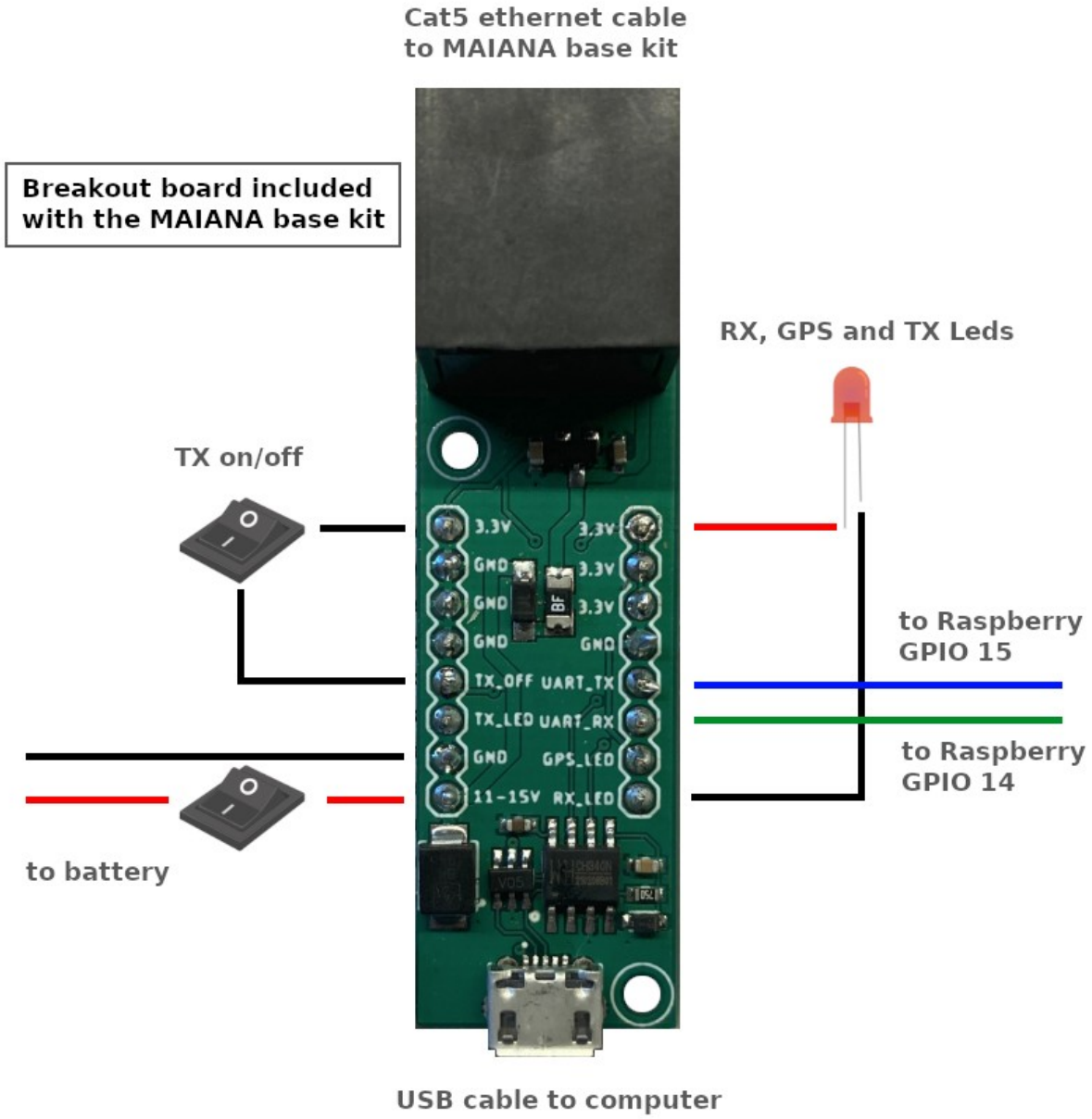
If you intend to wire LEDs, this is the correct way. The LED signals are open drain outputs. Rather than supplying a voltage, they pull the cathode of the LED to GND via a built-in 100 Ohm resistor.

The voltage you apply to the anode is flexible (up to 30V tolerated), but the breakout supplies 3.3V so take advantage!
That said, some LEDs may still draw too much current and will need an extra resistor added in series.

You can wire that on either the anode or the cathode side



A compact wiring diagram can be seen here.
It include also the connection pins for Raspberry Pi.



Provisioning

Configure the COM port for 38400 bps, 8 bit data, no parity, one stop bit. Attach the serial terminal to this port and power up the system. You should see a continuous feed of NMEA0183 sentences.

To interact with the unit using commands, configure your serial terminal application (like Termite for Windows or CuteCom for Linux) for line input with CRLF (‘\r\n’) termination. Then send the *cli* command (you may need to send it more than once). The unit should reboot and respond with this output:

> *CLI mode. Send the 'reboot' command or cycle power to exit.*

With the terminal really quiet now, it’s a lot easier to send the station command for provisioning.
This command has eight comma-separated arguments with no quotes or spaces in between. It must be sent in one line like this:

> *station mmsi,name,callsign,type,len,beam,portoffset,bowoffset*

The arguments are:

- *MMSI (you should have one for your boat already)*
- *Boat name (up to 20 alphanumeric characters, no punctuation. Use all caps)*
- *Call sign (may be empty if you don’t have one)*
- *Type (this is the numeric type of the vessel, see below)*
- *Length in meters (integer only)*
- *Beam (width) in meters (integer only)*
- *Port offset (meters from the port side where the unit is located).*
- *Bow offset (meters from the bow where the unit is located).*

For vessel type, here are some numeric values that apply to class B transponders:

- *30 - Fishing*
- *34 - Diving*
- *36 - Sailing*
- *37 - Pleasure craft*

Choose whichever you think is appropriate.

When you send the command, the unit will program the data into its EEPROM and respond with the $PAISTN proprietary sentence.
Here is an (invalid vessel) command example:

station 987654321,NAUT,,37,0,0,0,0

*response:$PAISTN,987654321,NAUT,,37,0,0,0,0*2A*

If you made a mistake, you can always send the station command again. If this looks like it worked, issue the *reboot* command to restart the unit.