MAIANA™ Assembly and Installation Manual

Kit Contents

The kit will arrive with all of these parts in a 36" mailing tube. These are:

1. The main PCBA (in ESD envelope)
2. The USB/NMEA0183/NMEA2000 adapter (in ESD envelope)
3. The antenna tube
4. The antenna core (coiled wire with SMA male on one end)
5. The main case (high-UV resistance PVC)
6. Two 1.5" 2:1 heat shrink tubes, black
7. One ¾" 4:1 heat shrink tube, black

What you will need

You will need an electric heat gun for the heat shrink tubing. You will need this both on your workbench for the initial assembly, as well as your boat for the final installation:

The unit is designed for mounting on 1" OD steel railing or a similar diameter fiberglass mast. This is the preferred way to install it. You may, of course, use your own mechanism, but then you're responsible for sealing the cable end from moisture.

Finally, you will need to furnish your own Cat5 cable for connecting the main unit to the breakout board in the cabin. Pick one with appropriate length and flexibility to suit your installation. The exact configuration of the cable (568A or 568B) is not important.

Assemble the antenna

Simply attach the transponder board to the SMA female end of the pre-assembled antenna core as shown here: Make sure you tighten it adequately so it doesn't come loose. Use *hand tightening* only, no wrench.

Now push the entire lower assembly into the housing tube. It may be a tight fit, and it may even be necessary to sand the inside of the tube for the two ends to mate comfortably. This is by design, as the joint between the PVC and the polyolefin tubing forms a secondary water seal.

With the lower assembly completed, feed the end of the antenna cable through the tube and push the tube until it stops. It should be a little tight.

This is a good time to practice connecting the transponder end of the Cat5 cable. You should be able to simply push the cable into the jack until it latches:

To release the cable, simply insert your index finger into the bottom of the tube to push the latching tab. This may work better if your cable does not have a rubber boot. Practice doing this until you're comfortable. You will have to repeat this step during the final installation on your boat.

Seal the antenna

Place one of the 1.5" heat shrink tubes as shown here, and use the heat gun to shrink it until the entire tube has taken the shape of the housing. It's best if you start at the bottom and work your way up, while rotating the unit with one hand.


For a strong bond, apply extra heat near the bottom of the seal until you see it glaze.

Now, insert the ¾" tube over the cap as shown, and shrink it quickly without overheating and deforming the assembly. This forms your primary water seal. The main unit is now ready for installation on the boat.

Test and provision the system

Now that both subassemblies are ready, it's a good time to wire them together and test them. Place the main unit near a window if possible, connect the two boards with a Cat5 cable, and wire the breakout box to a 12V supply as shown here.
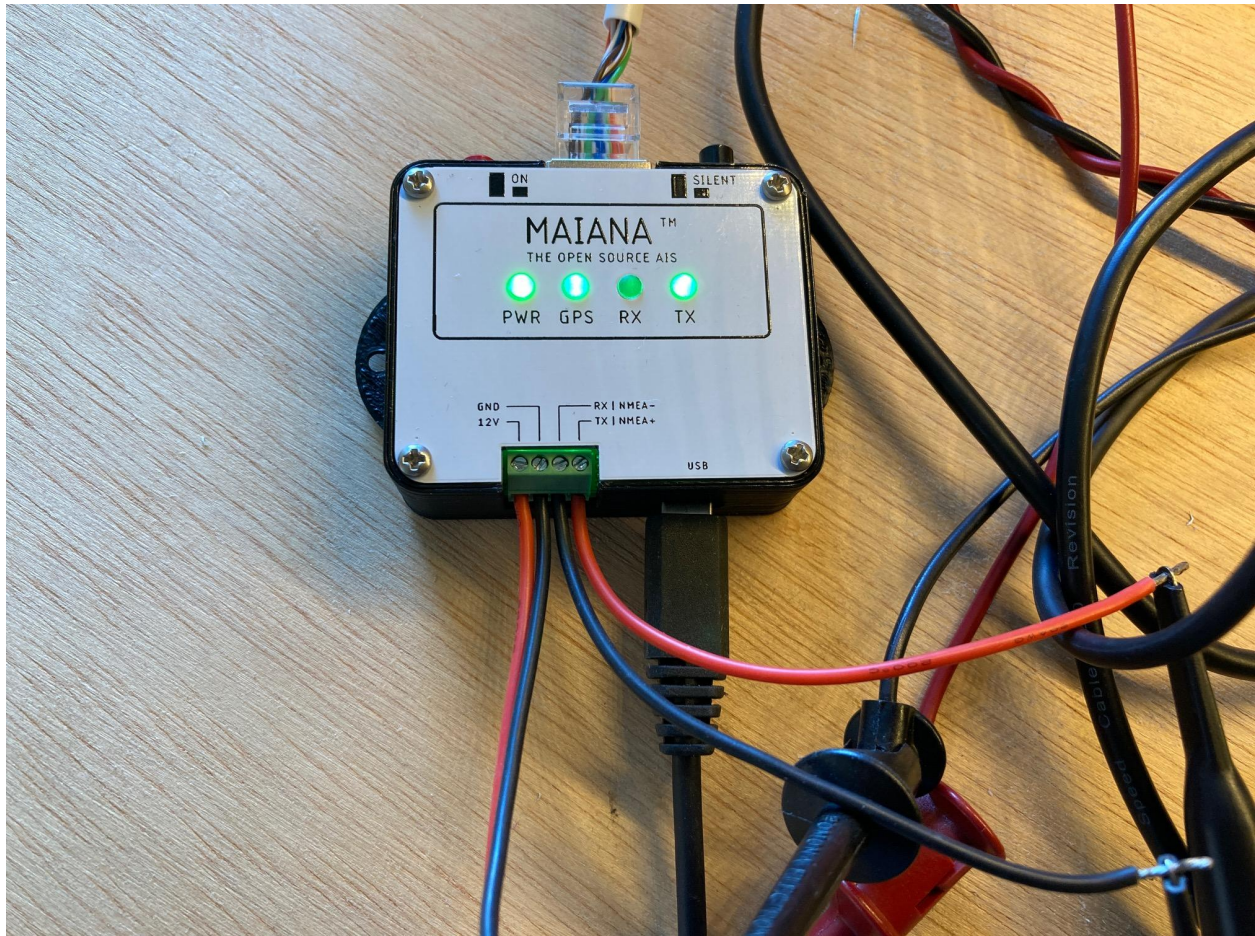
The wires labeled "NMEA+" and "NMEA-" make up the differential output that must be wired to your NMEA0183 gateway. If you don't use differential signaling on your boat then wire "NMEA+" and "GND" instead.

The NMEA0183 (RS422) interface is output *only*, so you cannot use it to speak *to* the unit. For this purpose, the adapter also has a USB connector for bidirectional serial port access. You can use both interfaces at the same time.

If your unit has not been programmed with your boat's data, now it's time to set up the USB connection.

First, if your PC doesn't have the driver for the WCH340 USB to serial adapter, [download it from here and install it](#).

Now plug a micro USB cable into the unit and use a terminal application like Termite (highly recommended for simplicity). Configure the COM port for 38400 bps, 8 bit data, no parity, one stop bit.

Power on the device by supplying 12V and pushing the red on/off switch to the ON position. You should immediately see NMEA output in your serial terminal, mainly from the GNSS.

The GPS LED will be off and will remain off until the GNSS module obtains a fix. Whether this happens at this stage depends on the quality of GPS reception at your location.

The RX LED blinks every time an AIS packet is received, so if you are near other AIS transmitters you should be able to see it work.

Initially, the TX LED will stay off, no matter what you do with the "Silent" switch. That's because the unit has not been provisioned yet, so it has nothing to transmit. Now is a good time to go through this step.

To interact with the unit using commands, configure your serial terminal application for line input with CRLF ('\r\n') termination. Then send the *cli* command (you may need to send it more than once to flush any noise in the serial port buffer). 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 MCU flash 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. Now, unless the TX switch is in the off position, the "TX" LED should light up, indicating that the unit is configured for transmission. When you slide the TX switch to the off position, the LED should turn off, indicating transmission is disabled. Make sure to test this. If the light stays on, there's some problem with the Cat5 cable or one of the boards.

When transmission is enabled, the TX LED will blink for 100ms immediately after a packet is transmitted.

Final installation

The antenna housing is designed for mounting on 1" OD railing, which is fairly standard for boats. It can also work with 1" OD fiberglass masts.

Feed the Cat5 cable through the railing and make sure there is at least 20cm of slack where the unit will mount, then place a 1.5" wide heat shrink tube at the edge of the railing. Now snap the R45 into the transponder board like you practiced before, and feed the transponder case through the tube (you may need to twist to coil the cable into it).

Once the casing is fully seated, you can bring the heat shrink tube up to cover the joint:

Finally, use the heat gun to shrink the tube. Apply heat generously, until the material glazes. That should be all for the exterior unit!

To mount the breakout box, select a location on your boat that will stay dry and connect the 12V wires to a source of battery power (perhaps your "instruments" breaker if you have one). You can use wood screws to attach the unit to a bulkhead or cabinet if you like, but it can also work with velcro. Then connect the adapter to your NMEA0183 gateway and you should be good to go!

If you run into trouble, email me directly: peter.antypas@gmail.com

Enjoy!