

FlyingBoats! User Guide

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Contents

Overview.....	2
Connections and Setup.....	2
Power.....	2
Antenna.....	2
Mounting Location.....	3
WiFi Connectivity Options.....	3
WiFi Access Point Mode.....	3
WiFi Client Mode.....	4
Configuring Settings.....	4
WiFi Settings.....	5
GDL90 Output Settings.....	5
Usage and Operation.....	5
Misc. Info.....	6
FlyingBoats! Firmware Update Instructions.....	9
Troubleshooting Tips.....	10
FAQ.....	11

Overview

The FlyingBoats! AIS to GDL90 converter is an in-cockpit VHF marine radio receiver with WiFi connectivity. It receives and decodes Automatic Identification System (AIS) position reports being broadcast by ships and converts them to ADSB-like traffic reports for display in ForeFlight.

Ship locations can be viewed directly on the moving map in ForeFlight, allowing pilots to see vessels that are within the ForeFlight glide ring at a quick glance.

Use Cases:

- Ferry flying
- Single engine IFR over water
- Offshore & maritime aviation

Connections and Setup

Power

The FlyingBoats! receiver can be powered from a 5V USB power supply via the supplied USB mini cable, or from a 9-36V DC power supply via the green connector on the back of the unit. If supplying power via the green connector, use the two outer terminals marked “PWR” and “GND”. The two inner terminals marked “NMEA -” and “NMEA +” should not be used.

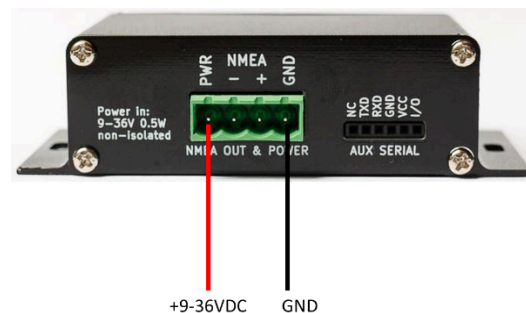


Figure 1 -9-36V DC Power Connection

Antenna

Depending on how the device is mounted, the provided VHF antenna can be connected to the BNC connector on the receiver directly or using the provided 90-degree adapter. An external VHF antenna can also be connected to the BNC connector, if desired.

Mounting Location

When using the provided “rubber duck” BNC antenna, the best range will be achieved if the antenna is placed in a window. Reception may be possible with the antenna in a different location, but range may be reduced. With the antenna in a window, locations may be received up to 100 nm away when cruising at 10,000 ft.



Figure 2-Example Mounting Location

WiFi Connectivity Options

The iPad device running ForeFlight must be connected to the same WiFi network as the FlyingBoats! receiver to receive data from it. This can be achieved in one of two ways:

1. The FlyingBoats! receiver can act as a WiFi client and connect to an existing in-cockpit WiFi network
2. The FlyingBoats! receiver can act as a WiFi access point that the iPad can connect to.

Note: The FlyingBoats! receiver is capable of operating in both modes simultaneously – it can connect to another WiFi network while at the same time creating its own WiFi network as an access point.

WiFi Access Point Mode

If the iPad is not already connected to an existing in-cockpit WiFi network, it can connect directly to the FlyingBoats! WiFi network to receive AIS position reports. At the same time, it can connect to another device (such as a Garmin transponder or glass panel device) via Bluetooth to receive ADSB position reports.



Figure 3- iPad Connected to FlyingBoats! WiFi network

WiFi Client Mode

If the iPad is connecting to an existing in-cockpit WiFi network to receive ADSB position reports (for example, from a Stratux, Stratus, or Sentry device), the FlyingBoats! receiver can connect to that WiFi network to send AIS position reports to the iPad.

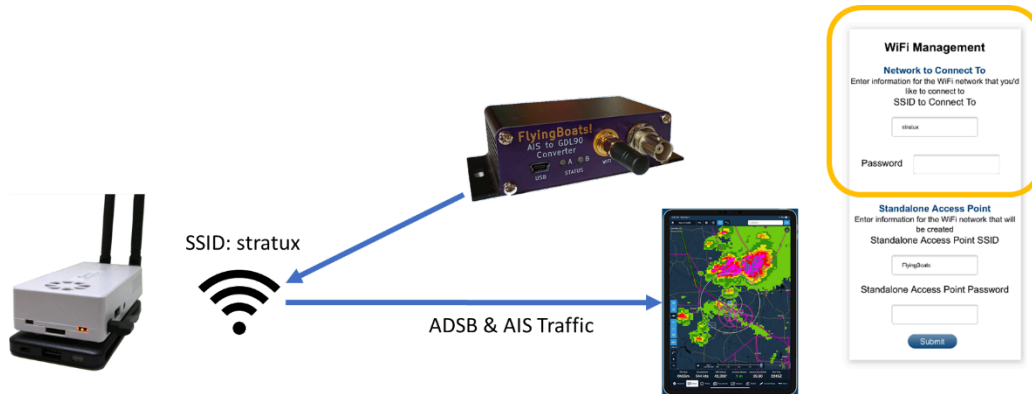
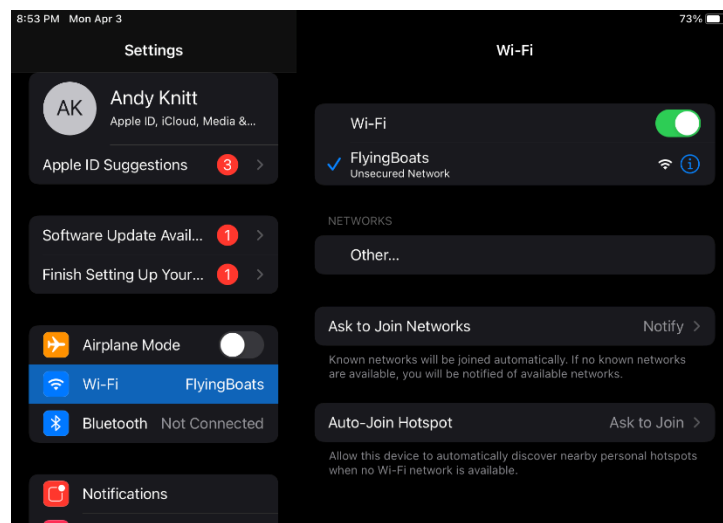


Figure 4- FlyingBoats! connects to existing Stratux WiFi network

Configuring Settings

To configure the FlyingBoats! settings, connect the iPad to the FlyingBoats! WiFi network. In the iPad settings, go to WiFi and connect to the “FlyingBoats!” network.



Once successfully connected to the FlyingBoats! WiFi network, open a web browser and navigate to <http://192.168.4.1> to access the settings page.

The screenshot shows a web browser interface for 'FlyingBoats!'. The address bar shows '192.168.1.234' and 'Not secure'. The page has a dark blue header with the text 'FlyingBoats!'. Below the header, there are three main sections:

- WiFi Management**: This section contains two sub-sections. The first, 'Network to Connect To', has a text input for 'SSID to Connect To' (containing 'stratux') and a 'Password' input. The second, 'Standalone Access Point', has a text input for 'Standalone Access Point SSID' (containing 'FlyingBoats!'), a 'Standalone Access Point Password' input, a checked checkbox for 'Forward NMEA messages to UDP port', and a text input for 'UDP port to broadcast NMEA messages to' (containing '9000'). A 'Save' button is at the bottom of this section.
- GDL90 Output Settings**: This section has two checkboxes: 'Display positions of structures (wind farms, oil platforms, etc.)' (unchecked) and 'Display positions of moored vessels' (checked). A 'Save' button is at the bottom.
- Utilities**: This section contains three links: 'View current vessel list', 'View mmsi.txt', and 'View firmware info'.

WiFi Settings

WiFi settings can be changed in the “WiFi Management” portion of the page, where you can change the SSID (network name) and password of the WiFi network that the receiver creates (default SSID is “FlyingBoats!” with no password) or specify the SSID and password of the in-cockpit WiFi network that you want the device to connect to (default is “stratux” with no password).

Click the “Save” button to save changes to WiFi settings.

NMEA Output to UDP

The “Forward NMEA Messages to UDP Port” selection allows the receiver to forward the AIS position reports to marine chartplotter apps that are capable of receiving NMEA data over a UDP port. This is for users who would like to use an app other than ForeFlight to display vessel locations. See the “Using with Marine Apps” appendix for more information.

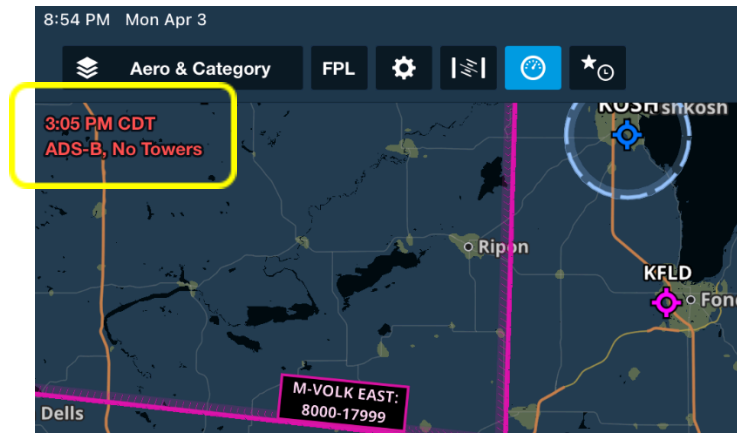
GDL90 Output Settings

These settings determine whether certain types of AIS traffic reports will be sent to ForeFlight for display.

- To display the position of stationary maritime structures such as oil platforms and wind turbines, check the corresponding box.
- To display the position of vessels reporting a status of “moored”, check the corresponding box. Unchecking this box can help reduce clutter in port areas. Note: Vessels reporting a status of “anchored” will always be displayed.

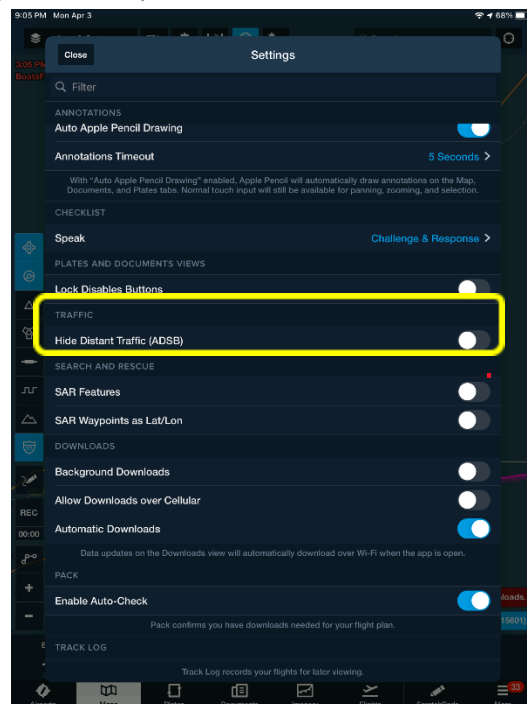
Usage and Operation

Once the iPad and the FlyingBoats! receiver are both on the same WiFi network, open ForeFlight. After a few minutes, the text in the upper left portion of the map screen should change to red font and say “ADS-B, No Towers” or “BoatsFly, No Towers”. This is an indication that the FlyingBoats! receiver is talking to ForeFlight. AIS position reports should now show up as “traffic” in ForeFlight.



Misc. Info

- 1) All AIS traffic will be displayed at 0 MSL altitude.
- 2) You'll likely need to turn the “Hide Distant Traffic (ADSB)” setting OFF in ForeFlight to get ships to show up on the map due to the altitude difference between you and them.



a.

- 3) AIS position reports are sent by vessels every few seconds. However, the vessel name is only sent every 5 to 6 minutes. When you first start seeing a vessel on the map, its name will not be known. Instead, the first eight digits of the vessel's MMSI number will be displayed as the

“name”. Once an AIS transmission containing the vessel name is received, the MMSI number will be replaced with the first eight characters of the vessel name.

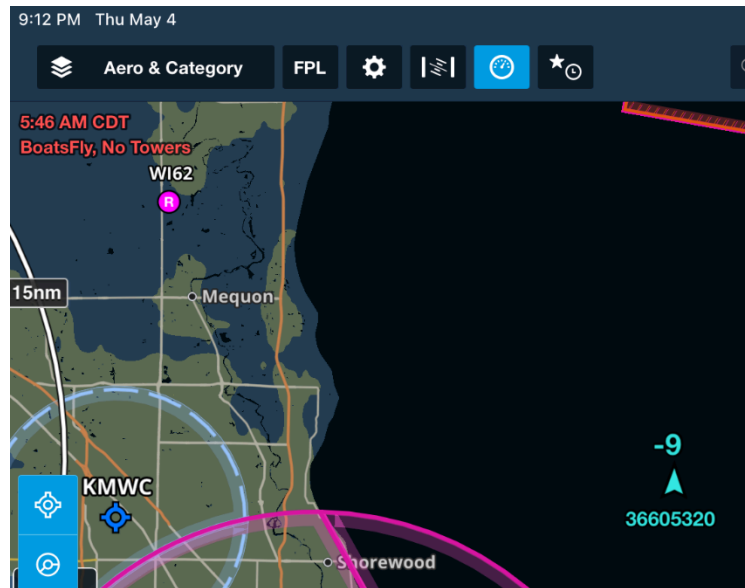


Figure 5 – First 8 digits of MMSI displayed before vessel name is known

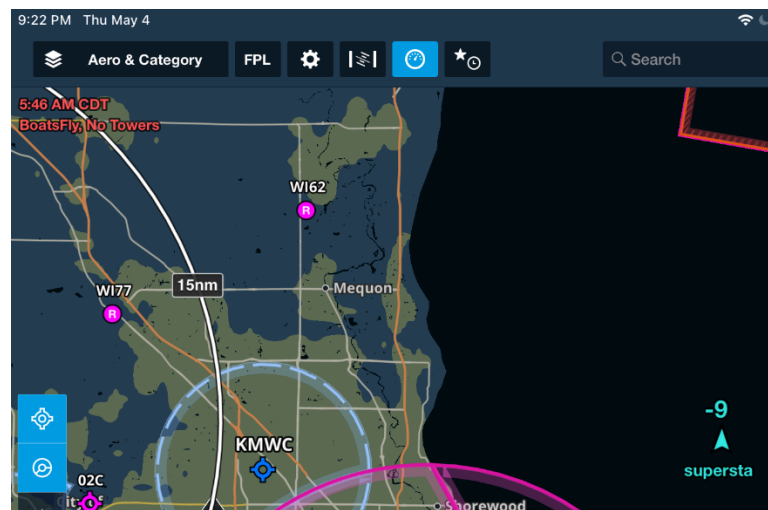
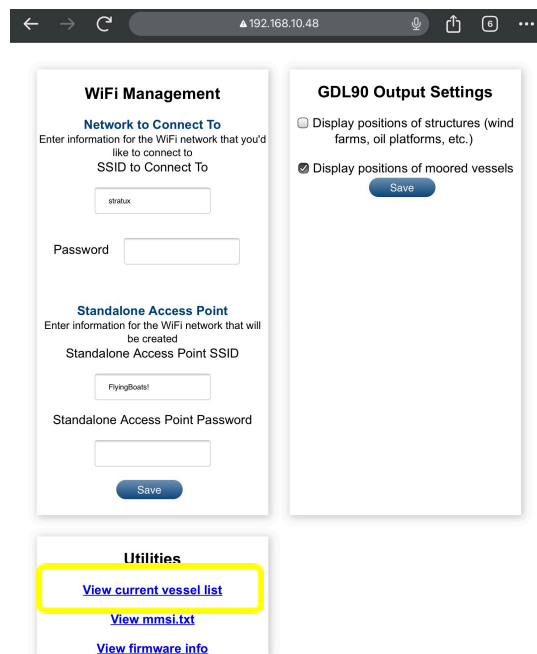
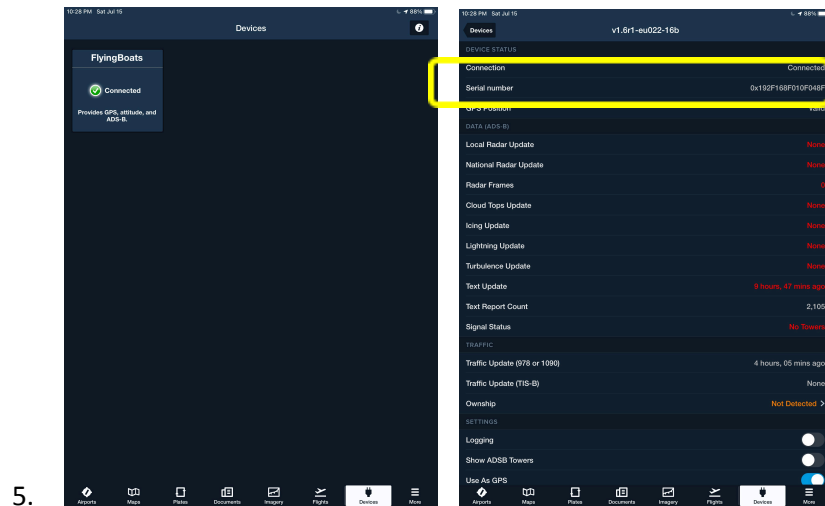


Figure 6 - First 8 characters of vessel name displayed

- a. If you want to see the full vessel name, you can use a web browser to navigate to the FlyingBoats! page and click on the “View current vessel list” link.
 - i. When connected directly to the FlyingBoats! WiFi network, navigate the web browser to 192.168.4.1
 - ii. If the FlyingBoats! device and your iPad are both connected to a different WiFi network (for example, a Stratux WiFi network), you can find the IP address to access the FlyingBoats! page by going to the Devices page in ForeFlight and

locating the FlyingBoats device. Then locate the “Serial number” field. The IP address to navigate to is encoded into the serial number field as follows:

1. Ignore the leading “0x”
2. Treat each “F” character as a decimal point “.”
3. Ignore the last “F” character
4. For example, if the serial number is 0x192F168F010F048F, use this IP address in your browser: 192.168.010.048



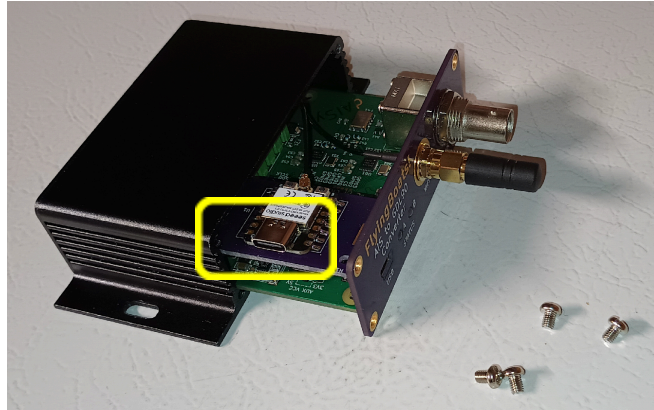
iii.

- b. The unit stores vessel name information in onboard memory, so if the power is cycled, it will still display previously saved vessel names.

FlyingBoats! Firmware Update Instructions

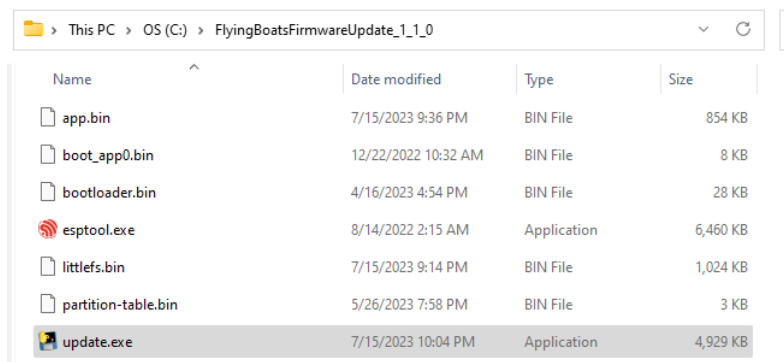
15 June 2023

1. Remove the four screws from the front panel using a Phillips head screwdriver. Slide the front panel out and locate the USB-C connector on the WiFi daughterboard.



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2. Use a USB-C cable to connect the WiFi daughterboard to your Windows PC.
3. Download the firmware update ZIP file and unzip/extract the contents.
4. Locate the "update.exe" file and double click on it to run it.



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5. A screen will pop up and the firmware update will start. It should take about one minute to complete. When the screen tells you that the firmware update is complete, press Enter to exit.

```
C:\FlyingBoatsFirmwareUpdate >
Stub running...
Changing baud rate to 921600
Changed.
Configuring flash size...
Flash will be erased from 0x00000000 to 0x00006fff...
Flash will be erased from 0x00008000 to 0x00008fff...
Flash will be erased from 0x0000e000 to 0x0000ffff...
Flash will be erased from 0x00010000 to 0x0001ffff...
Flash will be erased from 0x00290000 to 0x0030ffff...
Warning: Image file at 0x0 doesn't look like an image file, so not changing any flash settings.
Compressed 28000 bytes to 28016...
Wrote 28000 bytes (28016 compressed) at 0x00000000 in 0.6 seconds (effective 396.0 kbit/s)...
Hash of data verified.
Compressed 3072 bytes to 3083...
Wrote 3072 bytes (3083 compressed) at 0x00008000 in 0.1 seconds (effective 295.1 kbit/s)...
Hash of data verified.
Compressed 8192 bytes to 47...
Wrote 8192 bytes (47 compressed) at 0x0000e000 in 0.1 seconds (effective 526.9 kbit/s)...
Hash of data verified.
Compressed 873904 bytes to 874260...
Wrote 873904 bytes (874260 compressed) at 0x00010000 in 13.1 seconds (effective 533.1 kbit/s)...
Hash of data verified.
Compressed 1048576 bytes to 1048902...
Wrote 1048576 bytes (1048902 compressed) at 0x00290000 in 15.9 seconds (effective 528.6 kbit/s)...
Hash of data verified.
Leaving...
Hard resetting via RTS pin...
Firmware Update Complete. Press Enter to Exit
```

a.

Using with Marine Apps

To use the FlyingBoats! receiver to send data to a marine chartplotter app, the “Forward NMEA Messages to UDP Port” option must be enabled in the WiFi Management settings.

The chartplotter app must be capable of receiving AIS data in NMEA format via a UDP port and must be configured to receive multicast UDP messages from the FlyingBoats! receiver.

- If the chartplotter app is connected to the FlyingBoats! WiFi network, configure the app to listen to IP address 192.168.4.255 on UDP port 9000 (or whichever UDP port number you specified in the FlyingBoats WiFi Management settings)
- If the chartplotter app and FlyingBoats! receiver are both connecting to a different onboard WiFi network, configure the chartplotter app to listen to the multicast IP address for the network (set last octet to 255). For example, if the chartplotter app’s device has an IP address of 192.168.1.137, configure it to listen to 192.168.1.255 on UDP port 9000 (or whichever UDP port number you specified in the FlyingBoats WiFi Management settings)

WiFi Management

Network to Connect To
Enter information for the WiFi network that you'd like to connect to

SSID to Connect To

Password

Standalone Access Point
Enter information for the WiFi network that will be created

Standalone Access Point SSID

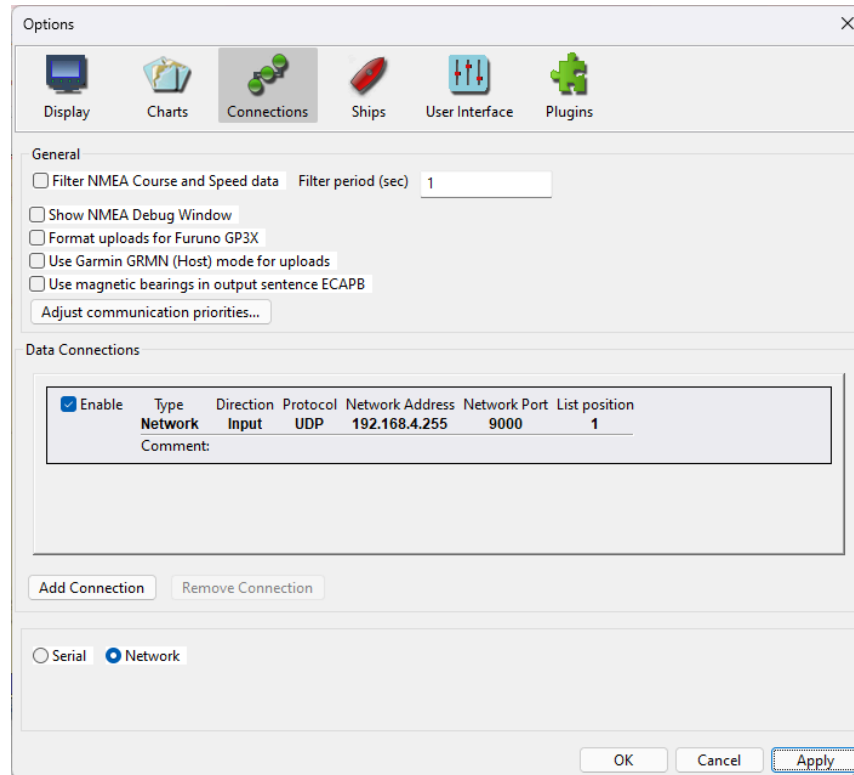
Standalone Access Point Password

☒ Forward NMEA messages to UDP port

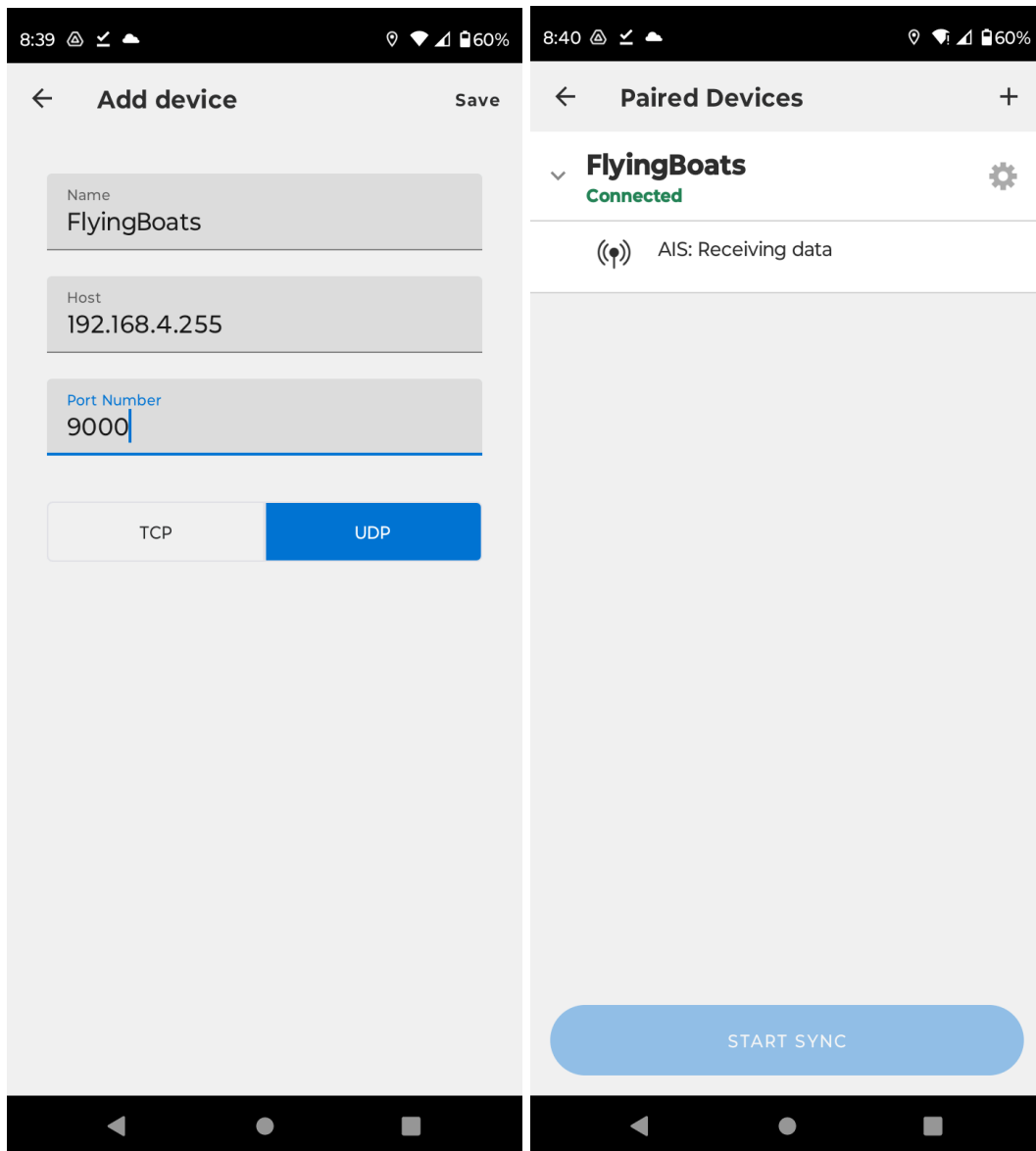
UDP port to broadcast NMEA messages to

Save

Example - OpenCPN (Windows) Settings for NMEA data over UDP



Example - Navionics Boating Android App Settings for NMEA data over UDP



Troubleshooting Tips

I'm connected to the FlyingBoats WiFi network, but ForeFlight isn't indicating that it's receiving ADSB.

On the iPad WiFi setting screen, ensure that there is a blue checkmark next to the FlyingBoats! network. If the blue checkmark is not present, try disabling and re-enabling WiFi on the iPad and reconnecting to the FlyingBoats! network.

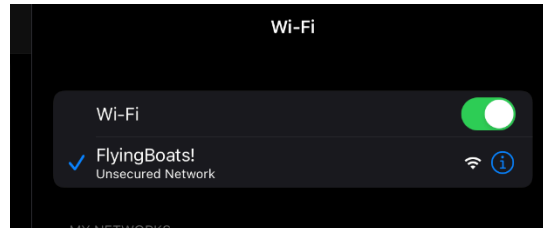


Figure 7 - Blue Check Mark - OK

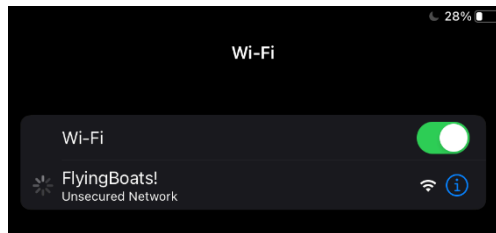


Figure 8 - No Blue Check Mark - Not OK

FAQ

Q: Why are only the first 8 characters of the vessel name displayed?

A: This is a limitation of the GLD90 data format that is used to send information to ForeFlight. This data format was designed to accommodate aircraft tail numbers which have a max length of 8 characters.

Q: Can the AIS traffic be displayed using a different icon in ForeFlight to distinguish between AIS and ADSB traffic more easily?

A: Not currently. This is a limitation of ForeFlight. A feature request has been made with the ForeFlight team to enable different icons for different types of traffic, but it's unknown if/when this feature might be added.

Q: How far away will I be able to see ships?

Reception range will vary considerably based on altitude and the location of the receive antenna. With the antenna in the cockpit window, reception has been over 100 miles when cruising at 10,000 ft.

Note that other electronics or avionics in the cockpit may interfere with the AIS receiver's reception, particularly when an external antenna is not used. For example, moving the receiver from the glare shield (which is near other avionics) to a side window may improve reception.

Q: Is Garmin Pilot supported?

A: Not currently. It's being investigated but there is no ETA on when it might be supported.

Q: Is iFly EFB supported?

A: Not currently. It's being investigated but there is no ETA on when it might be supported.

Q: Can I display the AIS traffic on my G1000/Dynon/other glass panel?

A: No. It's unlikely that it will be possible to display AIS traffic on a certified avionics system.

Q: Can I display the AIS traffic on a marine chartplotter program or app?

A: Yes, if the app or program supports receiving NMEA data via a UDP port. See the "Using with Marine Apps" section of this guide.