

Hydro Contest Material Helpers

The **Hydro Contest electronics system** consists of several components:

- **CubeOrange Autopilot** with its **carrier board** and **PDB board**
- **SIYI A2 Mini Camera**
- **HereLink Radio Controller**

This guide walks you through the assembly, configuration, and setup process.

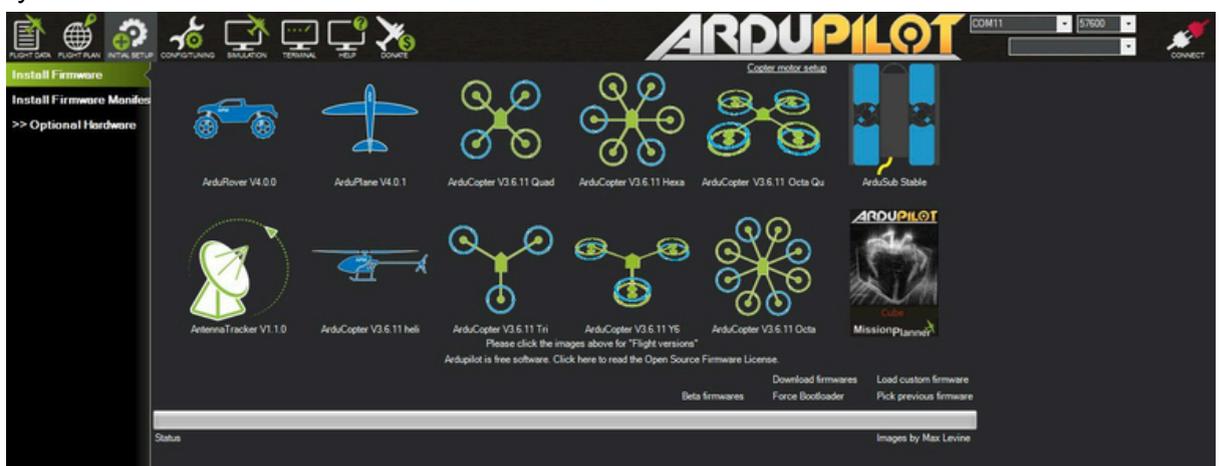
1. Assembling the System

1.1 Preparing the CubeOrange

1. Insert the **SD card** into the **CubeOrange** (if not already inserted).
2. Install **Mission Planner**:
 - Download: [MissionPlanner-latest.msi](#)
 - Install the software on your PC.
3. Connect the CubeOrange to your computer using a **USB cable**.

1.2 Installing ArduPilot

1. Open **Mission Planner**.
2. Navigate to **Initial Setup** → **Install Firmware**.
3. Select the appropriate version for your application and follow the on-screen instructions.
 - **Recommended Version: ArduRover stable-4.5.7**
4. Once installed, **disconnect and reconnect** the CubeOrange to perform a power cycle.



The Latest supported and recommended version is ArduRover [stable-4.5.7](#)

1.3 Calibrating the Accelerometer

- Follow this guide: [Accelerometer Calibration](#).
- Once calibration is complete, unplug the CubeOrange.

2. Hardware Assembly

2.1 Mounting the CubeOrange

- Secure the **CubeOrange** to the **carrier board** using screws.
- Follow the installation guide: [Airbot Mini Carrier Board](#).

2.2 Connecting the Carrier Board to the PDB

- Follow this guide: [Connecting the Carrier Board to PDB](#).

2.3 Connecting the GNSS Unit

- Use the instructions here: [GNSS Unit Setup](#).
- For **ArduPilot setup** and **compass calibration**, follow: [GNSS Parameters & Compass Calibration](#).
 - **Note:** Do not perform PX4 updates, RTK settings, or other modifications.

3. Configuring the Power and Communication

3.1 Current Monitor Parameters

1. **Power on** the flight controller and connect it to **Mission Planner**.
2. Navigate to **Config** → **Full Parameter List** and modify the following:
 - Follow this guide: [Setup Parameters](#).
 - Set `SERIAL1_BAUD` to **921**.

4. Connecting the Camera and Air Unit

4.1 Power Supply Setup

- Configure your power supply module to **12V output**: [Power Supply Configuration](#).

4.2 Connecting SIYI A2 Mini Camera

- The **SIYI A2 Mini camera** is **not directly compatible** with the **HereLink Air Unit 1.1** due to connector differences.
- Follow this video to modify the camera cable: [Camera Cable Routing](#).
- Double check the cabling using the cable colors and the camera and herelink manuals.

4.3 Wiring the Camera and Air Unit

1. **Power Connection:**
 - Connect the **camera** and **Air Unit power cables** (red & black) together.
 - Connect them to the **12V power supply module output**.
 - This ensures a **stable 12V supply** to both components.
2. **Data Connections:**
 - Connect **Air Unit UART** → **CubeOrange Telem1 port**.
 - Connect **Air Unit S.Bus** → **Flight Controller RCIN**.

5. HereLink Configuration

5.1 Initial Setup

- Follow the **official setup guide**: [HereLink User Guide](#).

5.2 Updating QGroundControl (QGC)

As of June 2024 the Herelink comes pre-installed with QGC-4.0.8. If you wish to upgrade to QGC-4.4 (or higher) which includes improved camera and gimbal support follow these instructions:

1. Open the [QGC releases page](#)
2. Click on the “Herelink” link and download the QGroundControl-Herelink.apk file

3. On the Herelink
 - Open settings by pulling down from the top of the screen and select the gear icon
 - Select “About Phone”, scroll down and click “Build Number” multiple times to enable developer mode
 - Return to settings by clicking the back arrow button
 - Scroll down to “Developer Options” and enable “USB debugging”
 - Connect the Herelink to a PC via USB cable
 - Pull down from the top and select “USB charging this device” and change to “Use USB to Transfer files”
4. On the PC
 - Open a windows file explorer
 - Open the Herelink’s filesystem (check under “This PC”)
 - Drag-and-drop the Herelink-QGroundControl.apk file (downloaded above) to the Herelink’s internal file system
5. On the Herelink
 - Pull down from the top and select “USB for file transfer” and restore “Use USB to” “Charge this device”
 - Open settings by pulling down from the top of the screen and select the gear icon
 - Select “Storage”, “Internal shared storage”, scroll down and select “Explore”
 - Click on “Herelink-QGroundControl.apk” and select “INSTALL”
 - To ease starting Herelink open the Herelink Launcher application, select the grid icon on the bottom right, click on “Herelink-QGroundControl” and select, “Add to Favorites”
 - When QGC is first started it will ask for various permission (select “Allow” for all), preferred units and Vehicle firmware (select “ArduPilot”

[This video](#) demonstrates how to update the QGC version in a general sense

6. Configuring Buttons on HereLink

- Follow this guide to configure buttons: [HereLink MAVLink Buttons](#).
- **Recommended Settings for Hydro Contest:**
 - **Manual Mode** ([Manual Mode Guide](#)) – Direct user control.
 - **Hold Mode** ([Hold Mode Guide](#)) – Stops the boat in place.
 - **ARM** – Enables motor power.
 - **DISARM** – Stops motors.
 - **Motor Emergency Stop** – Immediate motor shutdown in case of issues.

7. Autopilot Configuration

The **autopilot** is primarily used for **monitoring and radio passthrough** to motors.

- **Setup Guide:** [ArduPilot Rover Setup](#).
- **Mandatory Parameters:**
 - `FRAME_CLASS = 2` → Boat configuration.
 - **Radio Control Calibration.**
 - **Accelerometer Calibration.**
 - **Compass Calibration.**
 - **Motor Configuration:**
 - **Motor1** = Steering
 - **Motor3** = Throttle ([Motor Config Guide](#)).

Failsafe & Safety Features

- Configure **failsafe actions:**
[Failsafe Setup](#).

The full tuning of your boat isn't need as the autonomous control won't be used, but you can still do them at your convenience to learn more about the autopilot and your boat.

Throttle Limits

`MOT_THR_MAX`: Throttle maximum

Throttle maximum percentage the autopilot will apply. This can be used to prevent overheating an ESC or motor on an electric rover

Throttle Slew

The [MOT_SLEWRATE](#) parameter can be used to limit how quickly the throttle output can change.

- a value of 100 allows the throttle output to change over its full range in one second
- a value of zero disables the limit

8. Video sharing

To get the video on the Herelink QGC (on the update QGC app), on the general setting, set the video source as RTSP Video Stream and RTSP URL as `rtsp://192.168.144.25:8554/main.264`

QGC helps here

:https://docs.qgroundcontrol.com/master/en/qgc-user-guide/settings_view/general.html#video

To share the video when connecting the Herelink to a wifi router, install the following app :

<https://apkpure.com/proxy-server/com.icecoldapps.proxyserver>

Then configure a new TCP proxy as following :



Settings

Server name

test

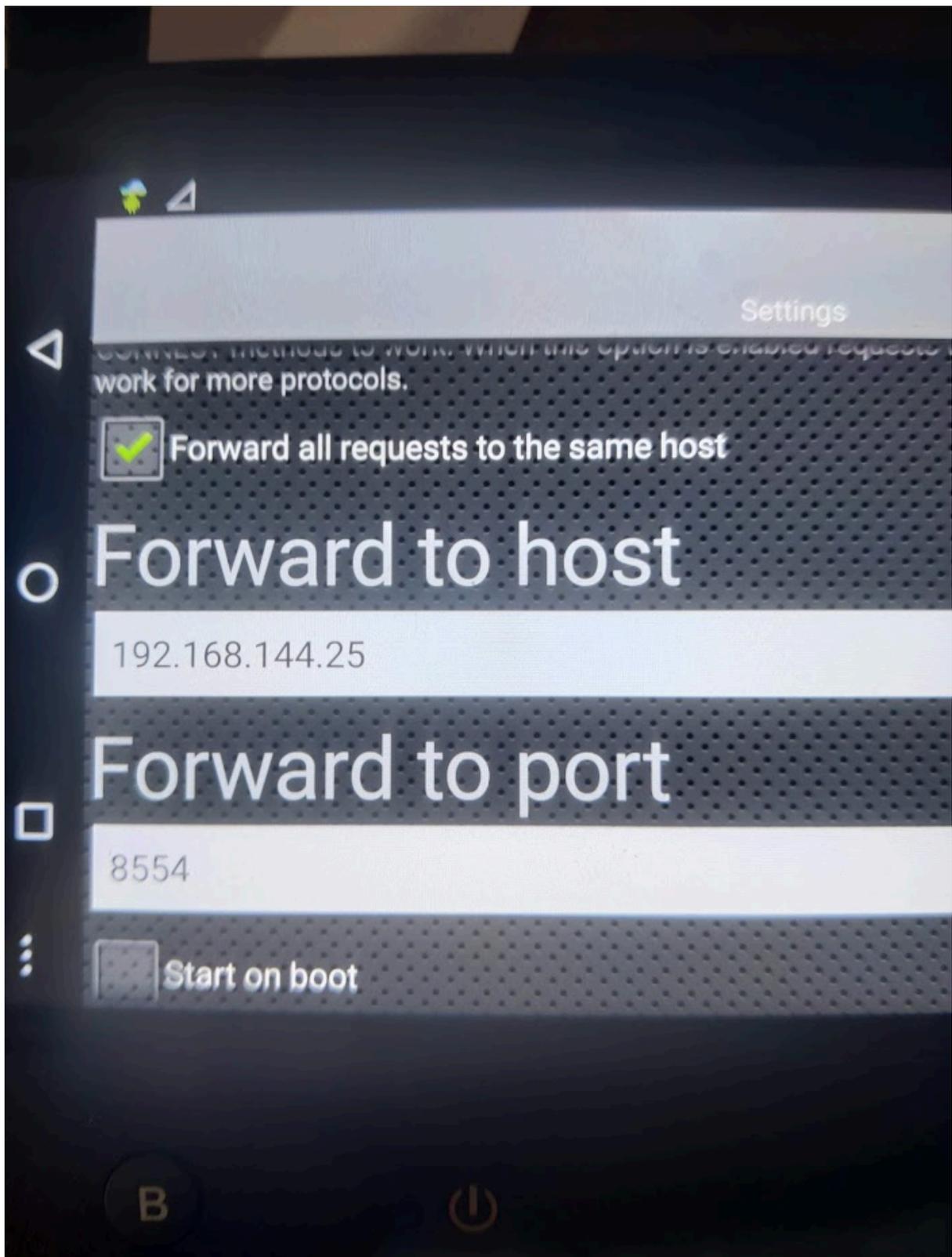
Run on port

9090

Get random port



Only allow access from certain IP(s)



That means that any tcp packets on the remote controller port 9090 will be routed to 192.168.144.25 on port 8554, and on the other way, the camera will send from port 8554 to the remote controller port 9090 that will forward to whatever connect vlc, any viewer, etc.

(you can choose whatever port you need, not necessary 9090)

From your laptop on the same network as the Herelink, you should be able to access the video stream using the url (on vlc for example) : `rtsp://HERELINK_IP:9090/main.264`