UAV Power Up Procedure and Pre-Flight Checklist

Mission Planner Ground Station Setup Checklist

Drivers and software needed for the ground station PC (assumes Windows 7 PC or emulation on Mac OSX)

- o Latest Mission Planner Software (Not version 2, this is in beta and has many bugs, e.g. 1.2.99 is fine) - https://github.com/diydrones/MissionPlanner
- o USB 2.0 Video Capture Driver - http://www.mediafire.com/download/ecc2y734jjefy08/Easycap+Drivers+for+Windows+7.zip
- o 3DR radio Driver – Should install automatically when plugged in for the first time

Steps:

1. Connect the composite video out from the FPV video receiver to the EasyCap video capture card
2. Ensure EasyCap Video Capture card is plugged in to the computer
3. Plug in the FPV video receiver to its wall wart adapter (12v) or portable power supply (3s LiPo battery works)
4. Ensure the USB 3DR radio is plugged into the computer
5. Open Mission Planner
6. In the "Config/Tuning" tab on the top of the Mission Planner, select the "Planner" tab on the left
7. In the "Video Device" drop down menu, select the appropriate video capture device (our device should appear as: "STK1160" or "USB 2.0 Video Capture Device")
8. Make sure the "Enable HUD Overlay" box is checked and press the "Start" button
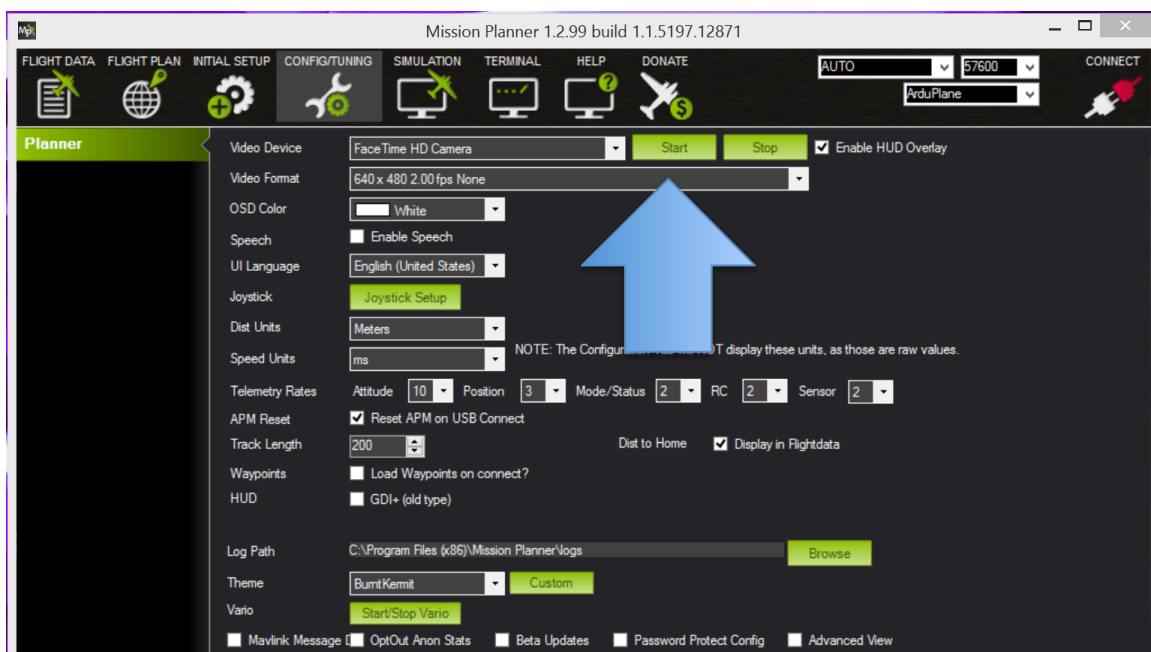
9. Hit the "Flight Data" tab towards the top left of the Mission Planner to view the Heads-Up Display and to ensure there is white-noise on the screen (actual video should appear when we power up the UAV)

UAV Setup Checklist and Power Up Procedure

1. If the propellers aren't mounted, refer to the image below to attach them
2. Ensure UDOO and Galileo are connected to the power distribution board via appropriate barrel plugs (12v and 5v labels)
3. Ensure all peripherals are plugged into the ArduPilot and UDOO boards
   - FPV Antenna and Transmitter -> Camera and Power Distribution Board
   - 3DR Radio -> ArduPilot's telemetry port (ensure the connector to the 3DR radio is connected correctly, red wire to 5v on the radio)
   - Power Module -> ArduPilot's PM port
4. Ensure batteries (2x ThunderPower 7800 mAh 3s LiPo batteries) are strapped in and secure
5. Turn on RC Transmitter, ensure throttle stick is at lowest position
   - Ensure transmitter has sufficient battery life (above 9.4 volts)
   - Ensure that there are no trims on any channel on the radio (unless absolutely necessary, trims should be taken care of on the APM), you can check for trims by looking at the visual display on the transmitter
   - Ensure that the "gear" switch is in its lowest position (stabilize mode) for take-off
6. Place the UAV to desired take off location (must be relatively flat)
7. Plug in both batteries to the Power Module to power the UAV (leave the UAV motionless afterwards, as the gyroscope calibration requires no movement for 5 seconds afterwards)
8. Connect to the UAV using Mission Planner
   - Ensure USB 3DR radio is plugged into the computer
   - In the top right corner of Mission Planner, select Baud Rate '57000'
   - Select Com Port to the com port of the 3DR radio
   - If prompted, select "ArduCopter" in the drop down menu below the com port and baud rate
   - Press the "Connect" Button
   - Wait for telemetry data to load
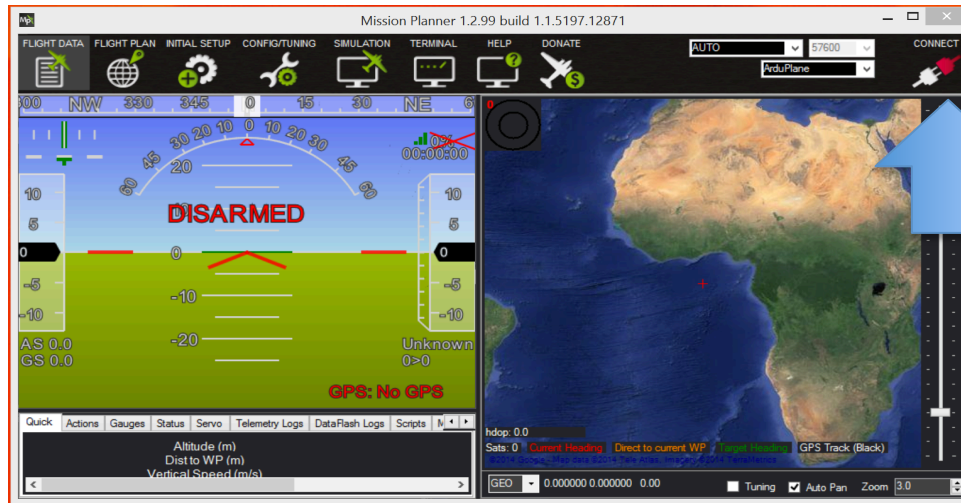
9. Wait for the mission planner to display "Disarmed" in Red over the HUD
   o If a failsafe event occurs or a pre-flight checklist fails, the UAV will fail to arm, please consult the troubleshooting page
10. **Hold the throttle stick down to the right (full yaw right) for 5 seconds to arm the UAV** (and no more than 15 seconds, this will enable a feature we do not want)
11. At this point, the motors will either spin or NOT spin depending on how the UAV feels that day (actually though, so it is important to stay clear of the UAV when arming). To determine if the UAV is armed even if the motors do not spin up, there are two indicators:
   o Mission Planner will display the word "ARMED" in red lettering over the HUD for about 5 seconds after arming
   o The red LED on the ArduPilot will be solid (and blinking if disarmed)
   o *Note*: A double blink of the red LED indicates a pre-arm check has failed and the UAV will not arm. A specific indication of the pre-arm check may appear on the mission planner's HUD. If not, the UAV must be powered down and connected to the mission planner through USB to troubleshoot
12. If a pre-arm check does fail, please consult http://copter.ardupilot.com/wiki/prearm_safety_check/ for troubleshooting
13. **Throttle up to take off**
14. *Note*: the UAV will automatically disarm if the throttle is all the way down for 15 seconds
15. **To enable Alt-hold or Auto mode (to enable SLAM navigation and control of the UAV) toggle the "gear" switch on the transmitter to its highest position**
16. To regain full manual control of the UAV, switch "gear" into its lowest position again to enable "stabilize mode"

17. To power down the UAV, simply land, disarm (throttle down and to the left for 2 seconds) and unplug the batteries. Make sure the RC transmitter is powered off as well.
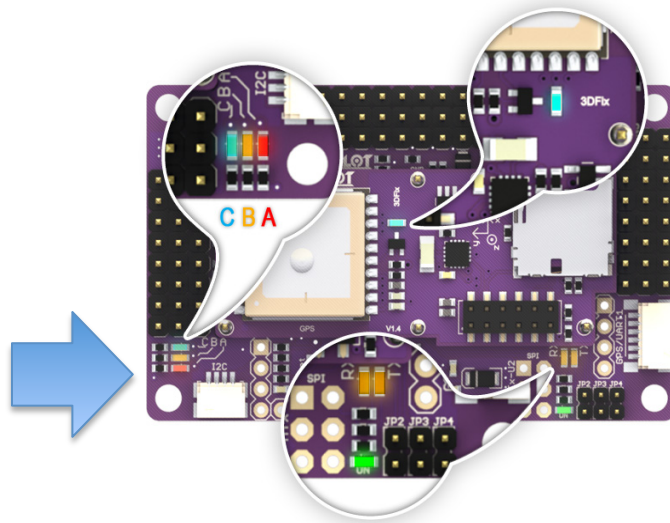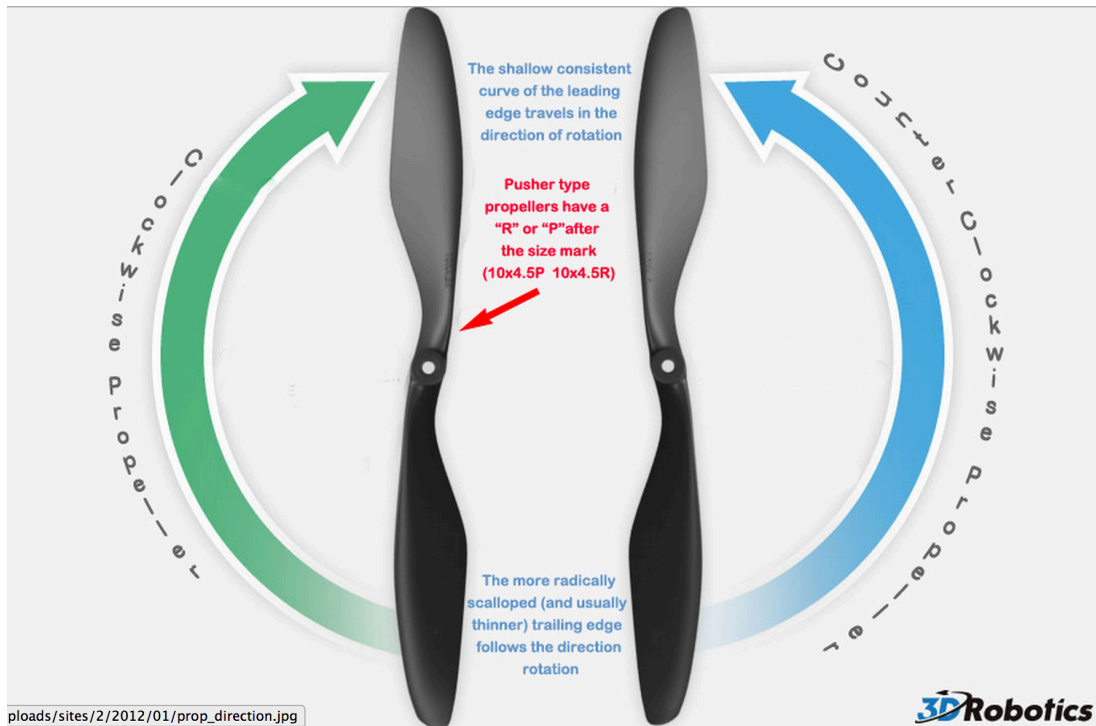

Notes and Tips on Flying

o The UAV may act irrationally and flip over or crash without any gradual warning if the battery is depleted excessively. This means that it is important to keep an eye on the battery information displayed on the HUD during flight. For a 3S battery, the UAV should be immediately grounded given one of the following conditions are met:
   ▪ Disarmed Battery Voltage (voltage when the UAV isn't flying) reaches 10.3 volts or lower
   ▪ Battery Voltage while flying reaches 9.6 volts or lower

o Due to the enormous power of our system, simple pitch, roll, throttle and yaw movement require very little throw on the transmitter's control sticks.

Mounting the Propellers

1. Identify if each propeller is a clockwise or counterclockwise propeller (use the info graphic for help)

The shallow consistent curve of the leading edge travels in the direction of rotation

Pusher type propellers have a "R" or "P"after the size mark (10x4.5P 10x4.5R)

The more radically scalloped (and usually thinner) trailing edge follows the direction rotation

Clockwise Propeller

Counter Clockwise Propeller

ploads/sites/2/2012/01/prop_direction.jpg

3DRobotics

2. Press the propeller and its bolt assembly onto the motor shafts. Ensure that the appropriate CW or CCW propeller is mounted to the correct motor (assuming the arrow part of the APM in the info-graphic below is the front of the UAV, follow the pattern on the info-graphic)

3. Tighten the propeller's nut assembly by inserting a screwdriver or Allen wrench into the hole and tightening it to the motor shaft (it may help to hold the motor's casing)
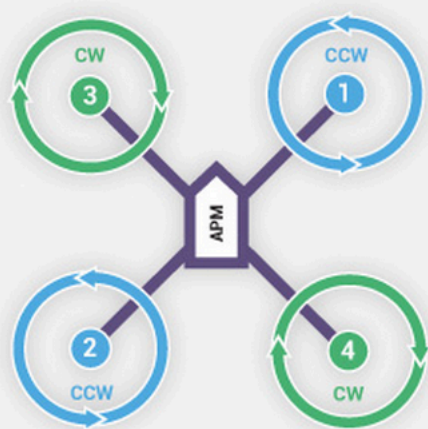
QUAD X

COUNTER-CLOCKWISE ROTATION
USE NORMAL PROPELLER