

Dji Phantom 4 to Emlid Reach Timing link.

Flying a Mission

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The Reach unit and antenna are installed on your Phantom 4 drone and it is time to fly your first mission..... Wait a second! Here are some things you need to think about.

1. Is the unit fully secured, with no danger that the antenna upright could impeded on the propellers?
2. With the LED cap installed and your Reachview app open can you see the camera time being recorded when you take a photo? If you cannot it may be du to a little light leaking into the sensor and preventing the blink being dark enough. Put a bit of tape around the edges and try again.

So we are good to go?

Well Yes.

Here are some things you might need to know to help you make sense of the data, or fly tighter missions

TIMING

1. The reach event is triggered by the LED on the front of the Phantom blinking off just before the photo is taken. With the way the timing is fed to the Reach this is where any timing error could creep in. In my method this is +/- 15m/s but it could be more. To fix this the timing of your individual drone needs to be measured and then the data processed in a slightly different way. A lot more work (by you needs to be done to get an estimate of the time of centre of exposure as a lag behind the LED trigger. It can be done but it is time consuming and iterative. This is why you will pay US15K for a calibrated PPK phantom 4 from companies such as <http://www.klauppk.com/>
2. If you really want that level of accuracy are prepared to spend a bit more time in the field, but not spend the dollars then using Pix4D capture in safe mode makes the drone stop at each location prior to taking the image, thus reducing the criticality od small timing errors.
3. If you use photoscan you can derive the optimised INS offset which you can turn into a timing offset.

ANGLES and ORIENTATION

1. Structure from Motion does not care about the orientation information provided for each point, this is good as a 1 degree error in roll would equate to a 2m positional error at 120m altitude. This does point out an issue of which you do need to take note. Having a bunch of images taken 120m above the ground and expecting cm level accuracy on the ground is not going to happen without at least a single reference point. I use my launch point, I sit on the

target for 5 minutes pre launch and collect data for processing as a static PPK position. This gives me an anchor point for the matching of my final orthoimage or DEM. Additional verification points may be required depending on your purpose or client.

2. A great way to minimise distortion is to take your images 5-10 degrees off nadir to build tension between lines in opposite directions.
3. Flying two grids at different altitudes also helps to make the solution more robust.
4. If you have significant objects in your survey try to fly at least 3 (but preferably 5) times the height of the highest object. If this is not possible, fly a cross grid at a different altitude with an increased off nadir angle. This is to provide the images with sufficient similarity in geometry to allow match to occur and tie points created.

TYPICAL MISSION with a local base station using a second reach unit.

1. Turn on the base, either at a known location or derive the coordinated for the base.
2. Turn on the base wifi hotspot, turn on base logging, output corrections via tcp server
3. Put down a target and place the phantom with reach installed on the centre.
4. Turn on the reach on the phantom and ensure it connects to the base via wifi and is getting corrections via the base. This step is not compulsory but it allows you to ensure you get a fix solution prior to launch and increases the chance of a good post processing result. Typically this takes 5 minutes.
5. Go to the camera tab in reachview. While the drone is turned off the image event time should increment every second
6. Turn on the drone
7. The front LEDS should be on and the camera event stop incrementing.
8. Ensure that 'turn off front LED's when shooting' is turned on in the DJI app.
9. Take a test picture and ensure the time of the last camera event updates.
10. Fly the mission.
11. End mission, if you do this in exactly the same spot that you started you have a second check point, especially for altitude.
12. Turn off drone
13. Turn off Reach.

Move on to processing.