**THE DAY BEFORE**

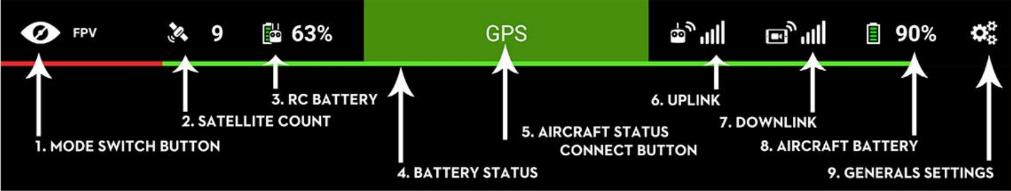
**1**

1. Check weather forecast – confirm or cancel transport, food, staff, volunteers, etc. accordingly. Check for flight area restrictions.
2. Fully **charge** all drone **batteries** (6) (*batteries auto-discharge to safe storage level*), **controller** and **tablet**.
3. Tablet **internet** - check balance \*121# - if enough credit, then buy 24-hr internet \*777\*7149\*099738# (29THB) or top up credit at Lotus Express first.
4. Save all **data** on memory card to storage (laptop or ext. HDD) and create a backup (ext. HDD or DropBox).
5. Insert memory card in drone, connect to controller and use Litchi or DJI GO to reformat the card ready for new data. **Make sure the card remains in the drone.**
6. Check for any firmware **updates** needed for drone or software updates for Litchi/DJI-GO.
7. Program **flight plan**(s) into Litchi.
8. **Print out:** flight plan maps, tables of GPS co-ordinates of waypoints and ground sample points (if different from WP’s) and previous plot photos.
9. **PACK**: polystyrene **Drone Case**: the phantom with memory card, controller, cables (controller-drone and drone-computer), props and spares, drone charger, spare memory card(s) + card reader and drone registration document.
10. All batteries in fire-proof bags.
11. Separate **backpack**: tablet, tablet charger and Powerbank, hand-held GPS (+spare batteries), binoculars, anemometer, instruction cards, flight log book.
12. **Laptop bag**: laptop and manuals for the phantom and Litchi. Plot maps, datasheets and/or previous reference photos.
13. Folding **table, ground marker** landing sheets, umbrella.
14. If needed – plot markers, poles and/or balloons.

**FLYING DAY - PREFLIGHT CHECK**

**2**

1. Declare who is the **pilot**, **spotter** (with binoculars) and log **recorder** – *pilot is responsible for pre-flight check.* Select appropriate launch site.
2. Inspect drone and props for damage. Remove the **two** **gimbal guards. Attach props** – black ringed to black dots. Do **NOT** turn on the drone.
3. Check **tablet battery level**. Turn on **mobile data** (top pull-down menu). Then attach it to the controller & connect by USB cable.
4. **Turn on controller (check bat.)** Setrear **mode** switch set to **P.**
5. Insert drone battery. Place drone on a landing mat at the desired **home point** and turn it on. Use drone batteries in numerical order (following on from previous flight days).
6. Disconnect and reconnect cable from tablet to the controller. Select **LITCHI** app from the popup menu on the tablet, select “only once”. Litchi app should open – showing map and (after 30 seconds) the **home point (green dot)**.
7. Check **pairing** – drone<>controller – uplink/downlink signals are full.
8. Check **satellite count** >10.
9. Calibrate **compass**.
10. Left scroll wheel – **check camera** gimbal; snap a test photo and record short test video.



1. Open settings (cogs symbol upper right). Select “Aircraft” tab and scroll down:

**3**

1. set **go home altitude (RTH)** to at least 80 m;
2. select **signal lost behaviour** to “Return to Home”;
3. check **safety features** enabled: “Vision Position System”, “Collision Avoidance”, “Active Obstacle Avoidance”, “Landing Protection” & “Precision Landing”;
4. check that “**Log Flights**” is enabled;
5. set maximum location **accuracy** to 1-2 m;
6. turn on Front Aircraft **LED’s**
7. Click on the “eye” top left. In the dropdown menu, select “**waypoints**” (or GS= “ground stations”).
8. Click on folder icon (upper left of screen) – click on **mission file** you want to load. The waypoints will appear on the map. The waypoint mission has been loaded into the tablet and controller (but not into the drone yet).



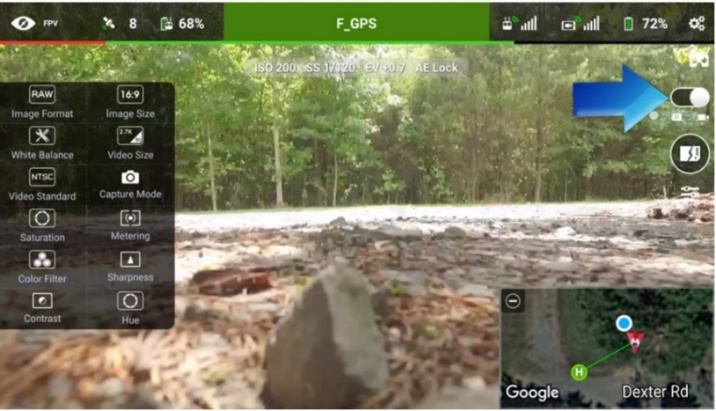
1. Tap on “**mission settings**”, set appropriate “Heading Mode” (WD if including oblique circuit, TNW if not). “Finish Action”=none, Path Mode=straight lines. Set cruising speed.

**4**

1. Adjust position of **first/last waypoints to be coincident with the home point.** Include “tilt camera =0 (zero) in actions for final waypoint.
2. Batch edit all waypoints to constant height **above ground** (higher than any objects between them). Check highest point in mission. In “Aircraft” settings, adjust RTH height and max height appropriately.
3. Check all waypoints: speed is set to “cruising”; no curves.
4. **Lock and resave** mission.

**CAMERA**

1. Open camera settings (3 bars under the shutter button).
2. Press “Capture Mode”. Select “time lapse”. Set interval

3 seconds. Note change in appearance of shutter button.

1. Check shutter speed (towards top of screen). If slower than 1/800, adjust ISO and F stop, until SS is 1/800 or faster. EV -0.7 is recommended.

**TAKE OFF**

**5**

1. Check wind speed does not exceed 15 miles/h or 24km/h (6.7 m/s).
2. Final **check of flight area** for obstacles, vehicles and people.
3. Ensure onlookers are behind the pilot 10 m from the drone. Spotter, logger & brolly-holder ready. Announce “**ARMING**!”
4. Press the “**play button**” lower left of screen – on the popup, see “uploading mission” to drone to 100%.
5. If a preflight report appears. Check the warnings and **that the mission can be completed well within remaining battery life.**
6. Tap “GO” - the drone will automatically fly to the first way point (which should be directly to the set mission-altitude above the home point).
7. As the drone climbs, **rotate left scroll wheel** on the controller to manually point the **camera directly down**.
8. Press the **shutter button** on the tablet – the camera starts taking pictures at 3-second intervals. Clock symbol on the shutter button replaced by white circle (no blue circle).

**IN FLIGHT**

**6**

1. The drone will fly the flight plan autonomously, even if “signal lost” is indicated. The “spotter” visually monitors the drone with binoculars, whilst the pilot monitors the screen and calls out flight telemetry (battery level, way point, altitude etc.) to the logger. **DO NOT TOUCH THE STICKS.**
2. In the event of a problem, immediately press the **PAUSE** button on the tablet screen. Thumbs OFF levers. Let drone hover. Pilot and spotter assess situation. If no obstacles above drone, press **RTH** (return to home) button (right silver button on controller) for 5 secs. The drone will ascend to RTH altitude (step 11.a) and return along a straight flight path to the home point.
3. If an obstacle is above the drone, slowly back the drone away (right lever slightly down). Then press RTH button.
4. Spotter and pilot monitor the drone closely during RTH flight. In case of an obstacle along the RTH flight path, press **PAUSE** on the tablet, ascend the drone (left lever upwards) and fly it home manually.
5. If Litchi resumes waypoint-mission or restricts manual control after pausing, toggle the flight mode switch from "P" to "S"(sport) and back to “P”. This terminates the mission. Drone hovers in place. Press RTH or manually fly the drone to home point**. If signal lost, WAIT.** The drone should autonomously return to the home point.



**RTH**

**LANDING**

**7**

1. Waypoint mission complete – drone hovers over the home point (step 15.). Land the drone manually on clear ground, free of vegetation, at least 10 m in front of the pilot.
2. Throttle back (left stick slightly downwards) to bring the drone down to about 5 m above the home point. Rotate the drone (left stick gently to left/right) until you see the rear green battery light directly ahead (“red arrow” lower left pointing north). The drone is now facing forwards relative to the controller.
3. Use right stick to position the drone over landing point. Throttle (left stick) very slightly down again to descend very slowly. As soon as the drone touches ground, pull the left stick fully down and hold fully down for 3 seconds. Propellers turn off. Pilot shouts DISARMED. Thumbs off sticks. Spotter turns off drone battery.
4. Spotter turns off the drone.
5. Review flight – note lessons learned in log book.
6. Catch landing – spotter stands back from landing pad 10 m – signals to the pilot to lower the drone slowly to 2-3 m. Once the drone is completely stable, the spotter walks under the drone and grabs the drone legs with both hands. The pilot immediately pulls left stick down for 3 seconds to and turns off the drone. Thumbs off sticks. The spotter turns off the drone battery

**PACKING UP**

**8**

1. Remove memory card from drone and store safely. Replace the gimbal guards.
2. Power-down the tablet.
3. Polystyrene case: drone, controller, all props, cables and charger.
4. All batteries in fire-proof bags.
5. Backpack: tablet, charger/Powerbank. Hand-held GPS. Binoculars. Instruction cards. Drone log books.
6. Laptop case: laptop, memory cards, manuals for phantom & Litchi. Flight documents
7. Collect all ground markers.
8. Stow folding table
9. Recheck area for anything left behind.

**9**

**THE NIGHT AFTER – BATTERY CARE AND SAFETY**

1. Transfer all data to storage and make a backup.
2. Recharge all drone batteries to full capacity on a heat-resistant hard surface (concrete or tiles) in a well-aerated, dry room. Do not leave the room – keep an eye on the batteries. Disconnect the charger from the mains if smoke or noise occurs and keep a bucket of sand nearby to extinguish fire.
3. Connect tablet to controller, turn on and open DJI GO. Do not attach props to drone. Place battery in drone. Turn on and connect to controller/tablet. Under battery settings in DJI GO, check for even charge among the battery cells and set the “discharge rate to safe level” (no. days to reach safe level), to 3 days or depending on when you plan to fly next. Keep batteries out with air circulation for 3 days until they discharge to the safe level.
4. Store the batteries at the safe discharge level (3.85 volts) or 30% 2 green lights in a fire-proof bag on a non-flammable surface – not in the drone case or the backpack.