SOLO
AGCO EDITION

AGRICULTURE FROM A
NEW PERSPECTIVE

Operation Manual
Solo AGCO Edition with Agribotix Survey System

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HOW IT WORKS

Your final product will be complete aerial maps of your field at high resolution. These are available in a variety of types and formats for analyzing your crop's health. You will use your Solo along with the Agribotix system to gather photographic data, which can then be turned into aerial field maps through Agribotix cloud processing.

1. First, create an automated flight plan for your Solo using the program Tower on any Android device (phone or tablet). This flight plan will be uploaded to Solo.

2. You will then mount one of your modified GoPro cameras onto Solo, set to take a picture at a regular interval.

3. With the camera ready, you will launch the Solo and it will automatically fly the flight path you recently uploaded to it.

4. Once the flight is complete, you will use the program Field Extractor to upload your images to Field Lens.

5. After about four hours, you will receive email notification that your results are ready. Log into Field Lens to view and download the results.

Required Components

- Agribotix modified GoPro 4 cameras (NIR and RGB)

- An account with Field Lens
  This is the Agribotix web application where you will upload photo sets for processing. Sign up at www.AGCO.agribotix.com.
  Note: 1 year of processing is included in your AGCO Solo Edition

- Field Extractor on a Windows PC
  This is the Agribotix desktop application for formatting and uploading your photo sets to Field Lens. Download this from the 'Downloads' tab when signed into Field Lens.

- An Android device
  We recommend using a Nexus 9. It is also better to have a data plan so you can use cellular networks, although this is not required. On this device, you will need to install the following applications, all available on the Google Play store:

 ClockSync - Monitors the time offset between your Android device and Atomic time.

 GoPro App - Used to sync the GoPro clocks to the tablet's clock via WiFi.

 Tower - Use this to plan your automated survey flights and upload them to the Solo.

 3DR Services - This performs automated background tasks for Tower. It requires no user interaction.

 Solo App - Use this to alter your Solo's basic flight performance parameters.

About the Apps

There are a lot of different applications involved in this process and it's easy to get confused. The app you will use the most is Tower. This will allow you to plan your flights and monitor them in progress. Second most important is the GoPro App, which you will use to time sync your cameras before each flight. The Solo App is only necessary for altering the Solo's flight performance settings. Finally, 3DR Services performs a number of automated background tasks for Tower, but never requires any interaction on your part.

About the Cameras

Your two GoPro cameras are modified specifically for agricultural survey use. They are not suited to be used as a regular stock GoPro.

- The NIR camera captures near infrared light, which is invisible to the human eye. Near infrared light is strongly reflected by healthy vegetation and is a good indicator of crop health. Near infrared images are used to generate the most valuable crop data products through Farm Portal.

- The RGB camera captures color in the regular visual spectrum. This is used to generate a regular color map of your field, which is useful for comparing actual crop colors to your other data products.

For detailed information on GoPro operation, see GoPro Features, Detailed - page 19 - 20.

WARNING
Your drone must remain within line of site and below 400 feet altitude at all times
while executing a survey flight. You also must be on the lookout for manned aircraft.
If a manned aircraft encroaches on your airspace, it is your responsibility to avoid it.

Please refer to the FAA guidelines here: https://www.faa.gov/uas/

If new to UAV's, the included AMA document is also helpful. See AMA Guidelines - page 21

FIRST-TIME SETUP

! Before attempting to use the Agribotix Survey System, please learn how to operate your Solo. Refer to the Solo-specific documentation included in your kit and Solo information portal (http://3drobotics.com/kb/solo).

A) Charge Your Cameras

Your cameras do not come charged. You will need to charge them before use with the included GoPro USB charging cable.

B) Settings in the Solo App

1. Connect to Solo.
2. Go to the upper left menu > Settings > Solo.
3. Change Altitude Limits to 122 meters (400 feet) by clicking 'Altitude Limits' then scrolling to '122.0 M'.
4. Change Flight to 'Very Fast'. In the 'Solo' menu, go to 'Performance' and move the top bar all the way to the right.
5. Change Camera Pan to 'Very Slow' by moving the bottom bar all the way to the left.

C) Mandatory Settings in Tower

1. Open Tower.
2. In the top left menu go to Settings > Telemetry Connection Type > and select UDP.
3. Optional: Your system is set to use metric units. We recommend you use metric, but you have the option to change to Imperial.

TO DO THIS
Go to Settings in the top left menu > User Interface > Unit System > and choose to use either Metric or Imperial.

D) Pair Solo WiFi to Android Device

Pair Solo WiFi to Android Device and Update Solo Software (using the instructions in the Solo Setup Guide).

E) Pair cameras to GoPro Ap

STEP I. BEFORE LEAVING FOR THE FIELD

A critical part about this process is that the time on your camera must precisely match the time on your Android Device. This is necessary so Field Extractor can correctly format your imagery when you are uploading. This time syncing is described below.

I A) Sync Tablet to Atomic Time

You can set up your Android device to automatically sync to atomic time whenever it is on a WiFi or cellular network. You can then use the application ClockSync to see the exact offset between the Android device's time and Atomic time.

1. Go to the Settings for your Android Device then System > Date & Time > and turn on 'Automatic date & time'.

2. To check the time offset, open ClockSync and see the 'Local offset' value. This must be under 1 second.

3. If not under 1 second, go to Android device Settings > Date & Time > and switch 'Automatic date & time' off and then back on.

4. If the offset will not drop under 1 second, restart the Android device and check the offset again in Clock Sync. If still over 1 second, try the above sequence again.

I B) Get Maps of Flight Area (if necessary)

This is only necessary if your Android device does not have cellular or internet reception at your flight location. Normally, Tower has access to a variety of web-based maps such as Google Maps. Without internet access, you will need to store the maps for that area on your device. If this is the case, refer to Get Maps of Flight Area - page 16.
Note: Ensure that your planned flights will comply with all local, state, and federal regulations

STEP 2. IN FIELD, BEFORE FLIGHT

2 A) Sync Camera Times to Tablet

1. Turn on the GoPro.

2. Open the GoPro app on your Android device.

3. Select 'Connect Your Camera' at the top of the screen.

4. Select 'HERO4' and follow the instructions on screen.

5. Once the WiFi connection is established, your GoPro will automatically synchronize it's internal clock with that of the Android device.

6. If the Android device fails to detect the GoPro despite following the above instructions, turn both devices on and off and redo the above steps. Simply power cycling the systems will often work out any bugs.

7. DO NOT turn off the cameras between the time you sync them and the conclusion of the flight.

2 B) Prepare the Camera for Flight

1. Choose a camera type. Use the RGB camera to get a regular color map of your field. Use the NIR camera to get more advanced field maps which will accentuate the most and least healthy areas of your field.

2. The camera must have the default settings of 'time-lapse' (intervalometer) mode with a picture every 2 seconds. This way, after turning the camera on, you just press the shutter button once and it will begin taking a picture every 2 seconds until you press the shutter button again. Your camera comes preset this way. If you ever have problems and need to check these settings, see GoPro Features, Detailed - page 18, and the following segments Default Start Mode - page 19 and Intervalometer Rate - page 19.

3. Prepare your drone for flight:
   a) Mount the camera to the Solo.
   b) If you are using a rigid mount, ensure it is set so it is 10 degrees forward from straight down. If you are using a gimbal, make sure it is set to point the camera straight down.

2 C) Connect Android Device to the Solo

This is done through the Solo controller's WiFi network.

1. Turn on the Controller.

2. Go to Settings for your Android device.

3. Select WiFi, then 'SoloLink_xxxxxx'

4. Turn on Solo on the ground and at its takeoff location.

5. Open Tower and tap 'Connect' at the bottom of the window.

6. When the connection has been successfully made, 'Connect' will be replaced by 'Arm' and 'Dronie'.

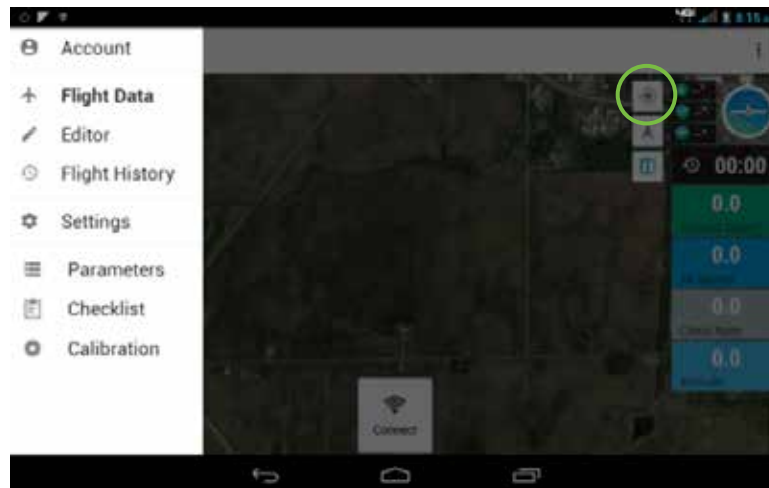# STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower

You will establish the boundary of your survey area and a survey pattern will automatically be generated for that area.
You can then set parameters for the survey pattern specific to your mission.
For an overview of Tower features, see Tower Features, Detailed - page 15.

1. Use the compass button to center the map in Tower to your GPS location (circled in green below).
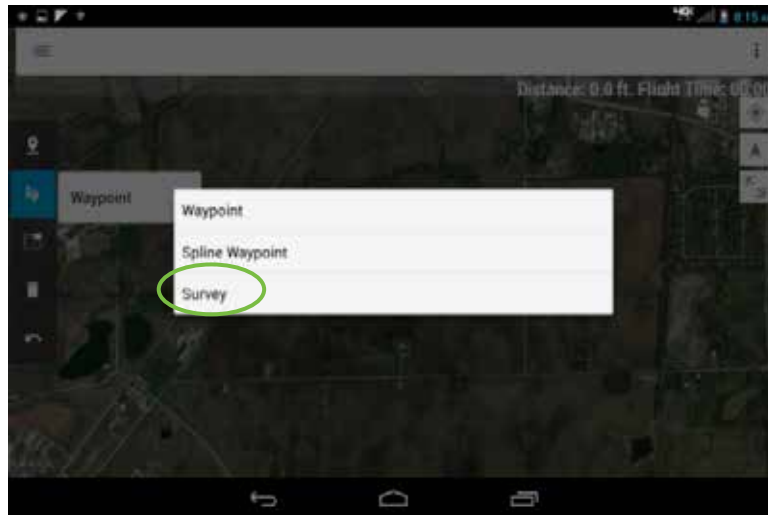

2. Click the 3 horizontal lines in the top left corner of the Tower app.

3. Click "Editor".

4. When the editor window is open, click the squiggly line (circled in green below).
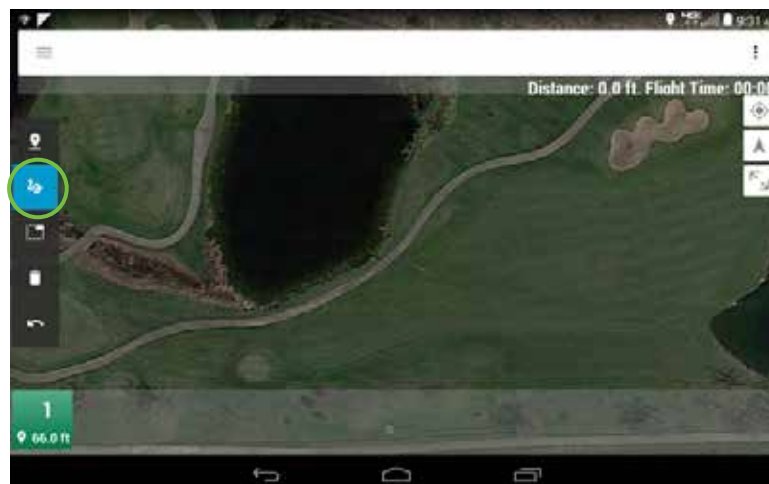
STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower - CONTINUED

5. Click Waypoint and then Survey.

6. Use your finger to draw the outline of the area to be mapped. Tower will automatically determine the flight path and waypoints. The survey area should extend approximately 20 meters (65 feet) beyond the edge of the target area on all sides.
   a. Note: For flight efficiency, make the shape as direct as possible to the area that you desire to cover.

7. If you are not satisfied with the flight path, use the Trash can to clear the mission and begin again at step 5.

STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower - CONTINUED

8. Click the Survey Polygon (circled in green below) and the flight parameter screen will open.
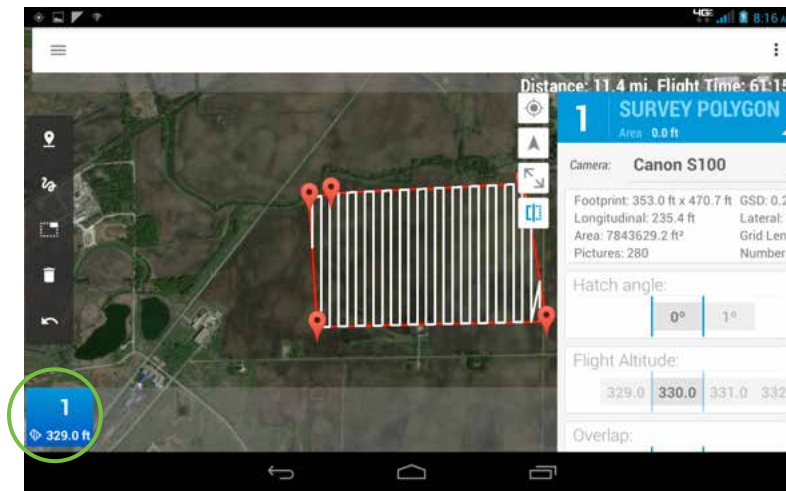

9. Recommended Flight Settings:

    a. Camera: Canon S110/S120 (this is the lens profile to match the customized camera).

    b. Hatch Angle: This can be used to change the flight direction (Example: Fly East-West vs. North-South).
        Set the hatch angle to fly most efficiently based on the area you have selected to cover. The optimal direction
        is perpendicular to the wind. If wind conditions are light or do not exist, set the hatch angle to orient for the
        fewest switchbacks in the route.

    c. Flight Altitude: 328 feet (roughly 100 meters) – this is an ideal balance between flight time efficiency and
        camera resolution. For flights requiring a higher camera resolution, fly a lower altitude. Always ensure that
        the altitude will allow for safe and legal operation of the vehicle.

    d. Overlap: 50% is the default setting and this does not need adjusting. Since we are utilizing the intervalometer
        from the camera and taking a photo every 2 seconds, we do not need to consider the overlap in Tower – this
        would be used if Tower was triggering the camera to take a photo.

    e. Sidelap: 80% is recommended for best results. This determines the width of the flight path and the amount
        of side to side overlap of the photos.

STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower - CONTINUED

10. Once the mission is planned, click the 3 vertical dots in the top right corner of the Tower app and select "Upload Mission".
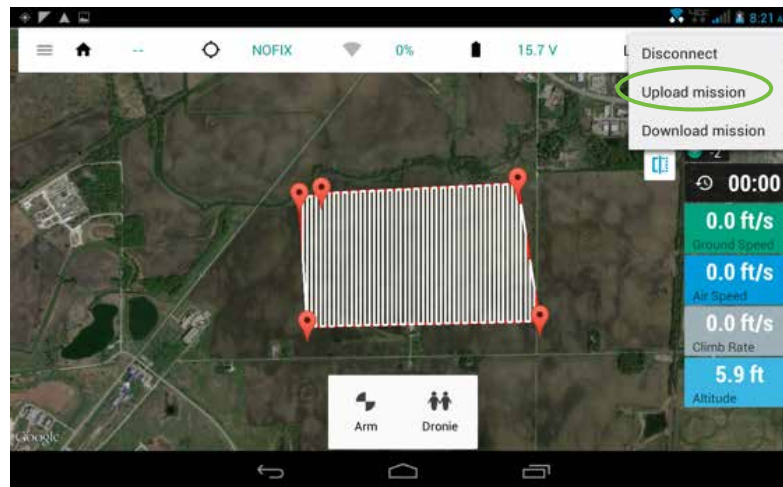

11. A prompt will pop-up: "Do you want to append a Take-Off and RTL to your mission?" -> Always Click OK

    a. This will tell the vehicle that its current position is the Take-Off and Return to Launch point.

    b. Note: In the Settings menu of the Tower App, this prompt can be eliminated by setting this feature to "Always".

    c. To access and change this setting: Click the 3 horizontal bars in the top left corner of the Tower app and select "Settings", then "User Interface", then "Preference Dialogs" and then "Auto insert 'TakeOff' and 'RTL'/'Land' to mission." When the pop-up opens, select Always.

12. When the mission coordinates have been saved to the vehicle, a verbal command will be given from the tablet (if the volume is turned up): "Waypoints saved to drone".

13. After receiving this command, turn on and engage the camera by pressing the shutter button once.

14. Step a safe distance away from the vehicle.

STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower - CONTINUED

15. Click the 3 horizontal bars in the top left corner of the Tower app and select "Flight Data".
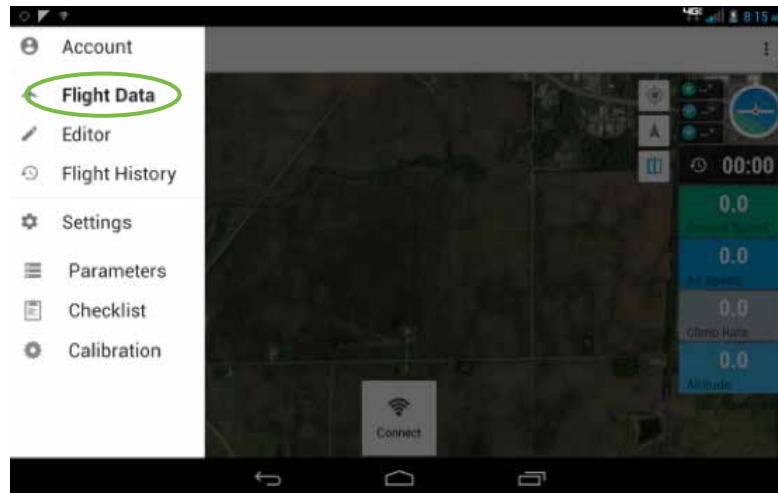

16. When you are ready to fly, click on the "Arm" button. A "Slide to Arm" bar will then appear in the middle of the screen. Slide the bar to the right with your finger (similar to unlocking an Apple device).
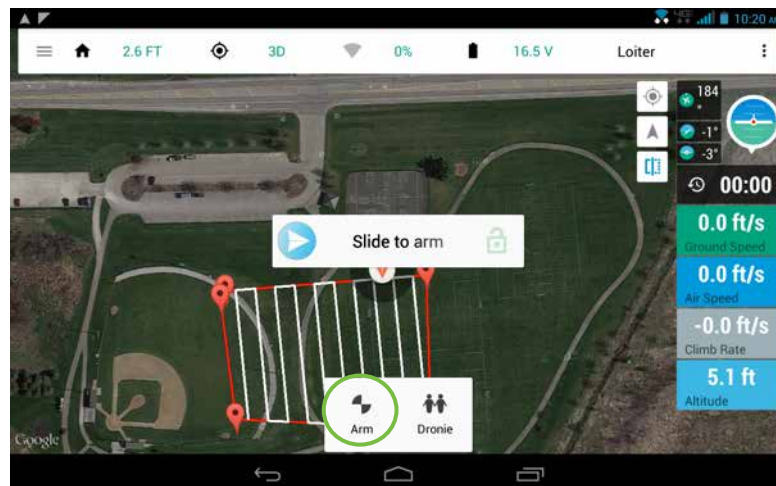
STEP 2. IN FIELD, BEFORE FLIGHT - CONTINUED

2 D) Plan a Flight with Tower - CONTINUED

17. After Solo has armed and the motors are spinning, click on the "Auto" button. A "slide to take off in auto" bar will then appear in the middle of the screen. Slide the bar to the right with your finger (similar to unlocking an Apple device). Solo will then proceed to the first waypoint and begin the autonomous mission.
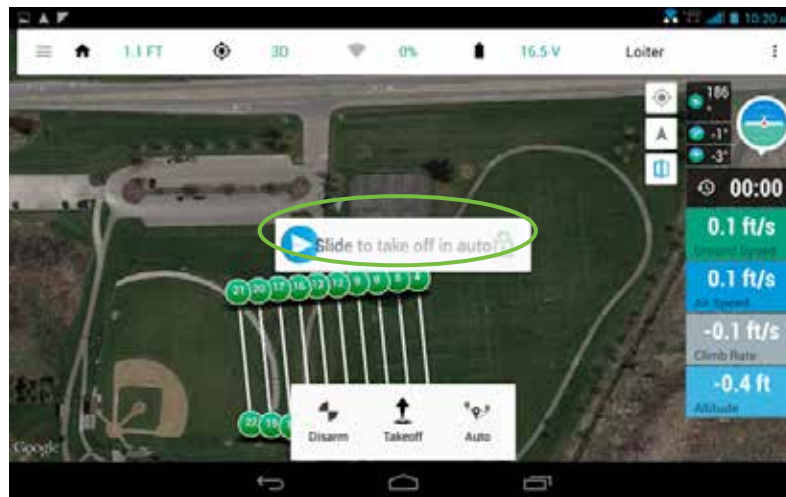

2 E) Save the Flight Plan

You can save flight plan files for later use.

1. In the Editor view, go to the right side menu and select 'Export to file'.
2. Type in your file name and hit 'OK' to save this file for later use.
3. To reload your file into the Tower Editor, select 'Import from file' from the right side menu.

STEP 3. COMPLETE MISSION

1. After landing, disconnect from Solo in Tower. Select 'Disconnect' from the top right menu.
2. Turn off the GoPro intervalometer by pressing the shutter button once more.
3. Your survey flight is complete and you may turn off the Solo and GoPro.
4. If flying another survey mission immediately after, allow one minute before turning the intervalometer back on. Later, this allows the image processing software to distinguish individual flights from a single set of photos.
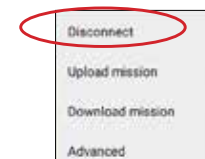
STEP 4. PROCESS IMAGERY

1. If you have the GoPro App installed on your PC (not required for this process), make sure it will NOT automatically import photos. In the GoPro App, go to GoPro Importer > General > and deselect 'Use GoPro Studio to import…'

2. Extract the Micro SD card from your camera.

3. Use the Micro SD adaptor to insert the SD card into a Windows PC. Ensure the adaptor is not locked.

4. Plug your Android device into a USB port of the same Windows PC.

5. Open Field Extractor.

6. If Field Extractor detects an Android device, the Android icon at the bottom of the window will turn green (red circle). If your Android device is not detected or Field Extractor reports that it cannot find the correct flight log, unplug it, close all programs, restart it, and try again.

7. The 'History' button (blue circle) will take you to the Farm Intelligence Portal to view your previous uploads. 'Support' (purple circle) takes you to an FAQ web page. The Field Extractor interface has four windows: Images, Utilities, Clock, and Settings. You will only need to use Images to upload your image sets. Simply follow the instructions in the four Steps. For additional instructions, click the 'Help' tab (green circle).

8. When you get to Step 2 of the upload process, input a time offset of '0'. With other Agribotix systems, it is necessary to input a time offset here, but since your camera time was synced with the Android device, the time offset will be zero.

When Finished

Your upload will begin and you will be taken back to Step 1 of the Flight Upload procedure. You can monitor your upload in the bottom left corner of the window.

About 4 hours after your upload is complete, you will receive an email informing you your results are ready for viewing. You can then log into Farm Lens to see your results and download them as you please.

APPENDICES

Tower Features

There are two main windows in Tower: Editor and Flight Data. Editor is used to plan flights. Flight Data is used to monitor flights and interact with the drone when connected.

Flight Data Window

A. the left menu has options for planning and monitoring flights as well as configuring Tower and your drone.
B. home location.
C. HDOP (GPS accuracy). The lower #, the better.
D. telemetry signal strength.
E. battery voltage. (tap for additional battery info)
F. flight mode. Press this to change it.
G. telemetry connect/disconnect and mission upload/download.
H. not used.
I. telemetry data.
J. drone's location and orientation.
K. GCS location.
L. not used.
M. Arm/Disarm.

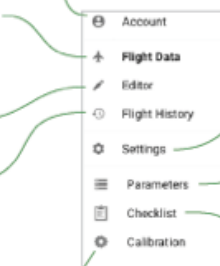You can customize the user interface and telemetry connection.

You can sign into a Tower account. This is not necessary.

The default window for Tower. This window is used to monitor your drone's status.
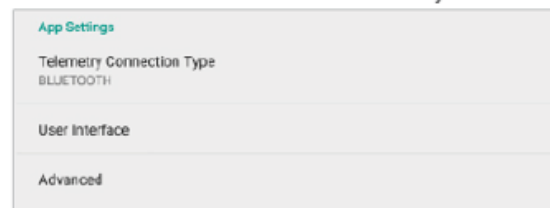
Plan and change flight paths.

Playback recent flights.

A tool for calibrating your accelerometer. This is done automatically as part of your drone's startup routine.
If the startup calibration fails, use this as a backup method.

Allows you to customize your drone's performance parameters. Please only change settings as instructed in this manual. In general, you should not change any of your drone's parameters.

A useful pre-flight checklist.

APPENDICES

Mode Change

! **Be extremely careful when changing modes.**

Some of them, such as Acro, are very difficult to control. To change modes through your GCS telemetry link, click the mode indicator at the top right of the Flight Data display. Only select from the five supported modes, and only select Stabilize when disarming the drone after landing.

Simply tap your desired mode and it will update the Enduro's flight mode through the telemetry link.

Status Indications

Tower comes preset to give you audio status notifications during your flights.
These can be customized.

1. In the left side menu, go to Settings > User Interface > Speech Output.
2. Here, you can also change your status indications or disable them all together.
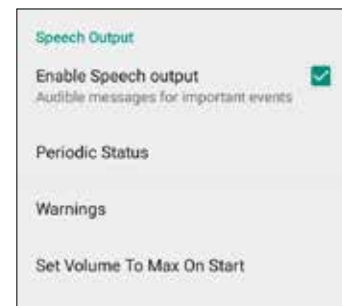
Getting Maps of Flight Area

These can be used if you do not have a cellular connection in the field

Temporary Simple Method

Tower will automatically store the maps of any area you zoom into when connected to the internet. Unfortunately, Tower has a limited memory for this, so it only works for small areas, such as a few fields at a time. Once you zoom into a different area, Tower will erase previous areas from it's memory.

To do this, simply zoom in on the area you want pre-fetched while your tablet has an internet connection. Tower will automatically save the map tiles of this area for whatever resolution you zoom into.

Remember, this is only temporary and has limited storage capacity. The map may disappear from your device's memory after a few power cycles or if you zoom into another area. If this is your method of choice, you must do this each time before heading to the field.

APPENDICES

Complex Permanent Method

This is the best way to pre-fetch maps for Tower, but it also takes a bit longer.

You must use a separate program, Mission Planner, to pre-fetch your desired maps, then find these maps on your PC and drag them into the Tower folder on your Android device.

1. On a PC, download Mission Planner from here http://ardupilot.com/downloads/?did=82

2. Open Mission Planner and go to the FLIGHT PLAN window.

3. Click and drag on the map and use the scroll bar on the right to find the field you want to survey.

4. Hold ALT, left click & drag the mouse to select the area you want to pre-fetch.

Alt + Left Click

5. Right click and select: Map Tool > Prefetch "Ready ripp at Zoom = xx" (see Fig. 1). Click yes and a progress bar will appear. This can take tens of minutes. When it says "Fetching tile at zoom (20)" (see Fig. 2) you can hit the Esc key multiple times until it stops. This number (20) represents the zoom level. You will not need any more map detail beyond this resolution.

Fig. 1

Fig. 2

6. Find the pre-fetched map files on your computer in the folder Program Files (x86)/MissionPlanner/gmapcache/TileDBv3/en/
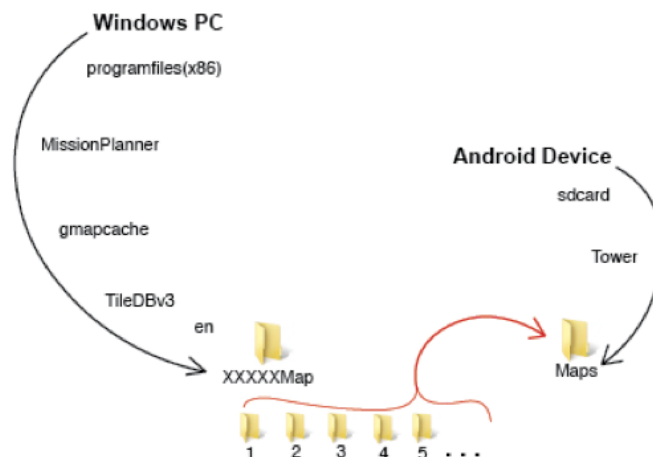
APPENDICES - CONTINUED

Complex Permanent Method - CONTINUED

7. From here, select the map type you had selected when pre-fetching the maps.
    For example, GoogleHybridMap, GoogleSatelliteMap, or BingMap.
8. You will next see a list of numbered folders. These represent the degree of zoom for the map tiles within those folders. If you were to open those folders, you would see folders with ID numbers for that area, and within those folders, the actual map tiles.

9. When viewing the folders numbered by zoom level, you can see the time you pre-fetched them in the 'Date modifies' row. Use this to figure out which folders are for the area you just pre-fetched. You will need to copy these folders onto your Android device to have maps in the field without internet connection.

10. Connect your Android device to your PC.

11. Access the device and find the folder "/sdcard/Tower/Maps/". If you cannot find a 'Maps' folder, create one.

12. Copy the map folders from step 5 to this folder.

13. In Tower, select the left side menu and go to Settings > User Interface > Maps Provider Preferences... and check the 'Use Offline Maps' box.

14. You only need to do this once for any given flight area. The maps will remain in the Android device's memory indefinitely.

⚠ Depending on the size of the area you have pre-fetched, this transfer could take up to several hours.

APPENDICES - CONTINUED
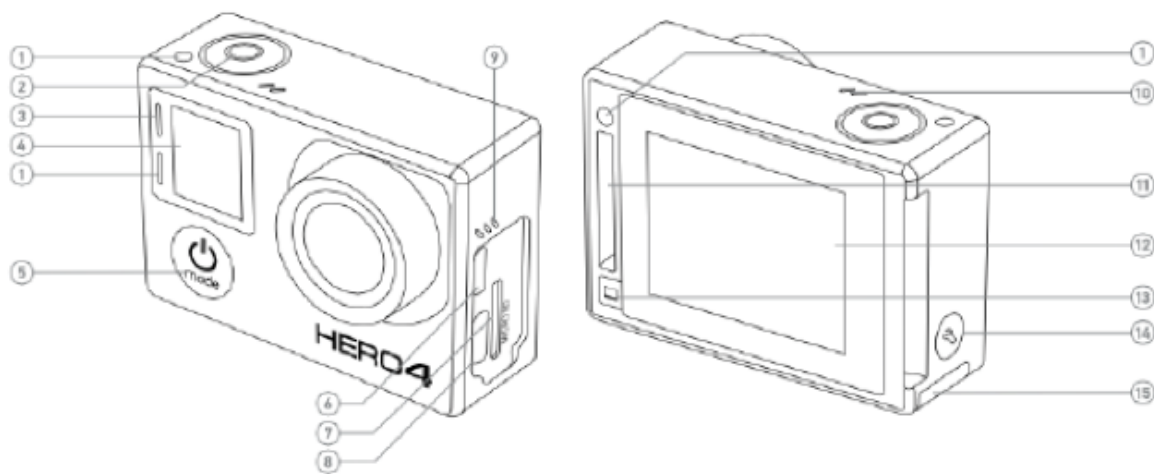
GoPro Features, Detailed

This covers the basic operations of your *GoPro 4+ Silver* camera relevant to your Agribotix system. For more details on GoPro operation, see the GoPro manual online at...
http://ebcdn2.gp-static.com/uploads/product_manual/file/256/UM_H4Silver_ENG_REVF_WEB.pdf

Basic Operation

Your GoPro camera comes preset with a 2 second intervalometer as the default mode. You will need to adjust the time and date for your region. You may need to reconfigure these settings at some point. The following are instructions on how to operate your camera and reach the ideal settings.

1. Camera Status Light (red)
2. Shutter/Select Button [⊙]
3. Wireless Status Light (blue)
4. Camera Status Screen
5. Power/Mode Button [⏻]
6. Micro HDMI Port (cable not included)
7. microSD Card Slot (microSD card not included)
8. Mini-USB Port (supports composite A/V cable/ 3.5mm stereo mic adapter, not included)
9. Audio Alert
10. Microphone
11. HERO Port
12. Touch Display
13. Touch Display Sleep/Wake Button [▭]
14. Settings/Tag Button [⚙]
15. Battery Door

- After start-up, press once to start camera function.
- Red status light indicates photos being taken.
- If selecting options, press once to select.
- In your GoPro's standard configuration, press the shutter/select button once to start 2-second time-lapse photography (intervalometer).
- Press it again to stop.

- Press once to turn on.
- Press again to select different options on the Touch Display.
- Hold down to turn off.

APPENDICES - CONTINUED

Go Pro Default Start Mode

1. Hit the Mode button.

2. On the touch screen, go to Setup.

3. Scroll down the menu to Default Mode.

4. Select Time Lapse.

5. When finished, Exit at the top of the Setup menu.

Intervalometer Rate

Your camera's intervalometer will come preset to 2 seconds (one picture every 2 seconds), an ideal rate for agricultural imaging. If this is somehow changed, follow the steps below to return it to a 2-second rate. Depending on your application, you may want to experiment with a different photo rate.

1. Ensure you are in Time Lapse mode and hit the Settings button.

2. On the touch screen, go to Interval.

3. Select 1 Photo / 2 Seconds.

4. When finished, Exit at the top of the Setup menu.

Pro-Tune

The GoPro's Pro-Tune settings allow advanced customization of your imaging.

Most important are the white balance and ISO limit. Agribotix will preset these to 6500K and 400 respectively, but you may want to change these for personal preference.

TO SET THESE
Settings button > Multi-Shot Settings > Protune > ON   White Balance: 6500K   ISO limit: 400

Charging

You can charge your GoPro with the USB charging cable provided in your AGCO SOLO EDITION kit.

APPENDICES - CONTINUED

Note:

These are merely guidelines and NOT THE LAW. Please refer to the FAA guidelines here: https://www.faa.gov/uas/

Academy of Model Aeronautics National Model Aircraft Safety Code

Effective January 1, 2014

A. **GENERAL**: A model aircraft is a non-human-carrying aircraft capable of sustained flight in the atmosphere. It may not exceed limitations of this code and is intended exclusively for sport, recreation, education and/or competition. All model flights must be conducted in accordance with this safety code and any additional rules specific to the flying site.

1. Model aircraft will not be flown:
   (a) In a careless or reckless manner.
   (b) At a location where model aircraft activities are prohibited.

2. Model aircraft pilots will:
   (a) Yield the right of way to all human-carrying aircraft.
   (b) See and avoid all aircraft and a spotter must be used when appropriate. (AMA Document #540-D.)
   (c) Not fly higher than approximately 400 feet above ground level within three (3) miles of an airport without notifying the airport operator.
   (d) Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed use agreement.
   (e) Not exceed a takeoff weight, including fuel, of 55 pounds unless in compliance with the AMA Large Model Airplane program. (AMA Document 520-A.)
   (f) Ensure the aircraft is identified with the name and address or AMA number of the owner on the inside or affixed to the outside of the model aircraft. (This does not apply to model aircraft flown indoors.)
   (g) Not operate aircraft with metal-blade propellers or with gaseous boosts except for helicopters operated under the provisions of AMA Document #555.
   (h) Not operate model aircraft while under the influence of alcohol or while using any drug that could adversely affect the pilot's ability to safely control the model.
   (i) Not operate model aircraft carrying pyrotechnic devices that explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.
   Exceptions:
      • Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight.
      • Rocket motors (using solid propellant) up to a G-series size may be used provided they remain attached to the model during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code but may not be launched from model aircraft.
      • Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Team AMA Program Document. (AMA Document #718.)
   (j) Not operate a turbine-powered aircraft, unless in compliance with the AMA turbine regulations. (AMA Document #510-A.)

3. Model aircraft will not be flown in AMA sanctioned events, air shows or model demonstrations unless:
   (a) The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.
   (b) An inexperienced pilot is assisted by an experienced pilot.

4. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.

B. **RADIO CONTROL (RC)**

1. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.
2. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.
3. At all flying sites a safety line(s) must be established in front of which all flying takes place. (AMA Document #706.)
   (a) Only personnel associated with flying the model aircraft are allowed at or in front of the safety line.
   (b) At air shows or demonstrations, a straight safety line must be established.
   (c) An area away from the safety line must be maintained for spectators.
   (d) Intentional flying behind the safety line is prohibited.
4. RC model aircraft must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.
5. RC model aircraft will not knowingly operate within three (3) miles of any pre-existing flying site without a frequency-management agreement. (AMA Documents #922 and #923.)
6. With the exception of events flown under official AMA Competition Regulations, excluding takeoff and landing, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and the pilot's helper(s) located at the flightline.
7. Under no circumstances may a pilot or other person touch an outdoor model aircraft in flight while it is still under power, except to divert it from striking an individual.
8. RC night flying requires a lighting system providing the pilot with a clear view of the model's attitude and orientation at all times. Hand-held illumination systems are inadequate for night flying operations.
9. The pilot of an RC model aircraft shall:
   (a) Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.
   (b) Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.
   (c) Fly using the assistance of autopilot or stabilization system only in accordance with the procedures outlined in AMA Document #560.

C. **FREE FLIGHT**

1. Must be at least 100 feet downwind of spectators and automobile parking when the model aircraft is launched.
2. Launch area must be clear of all individuals except mechanics, officials, and other fliers.
3. An effective device will be used to extinguish any fuse on the model aircraft after the fuse has completed its function.

D. **CONTROL LINE**

1. The complete control system (including the safety thong where applicable) must have an inspection and pull test prior to flying.
2. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category.
3. Model aircraft not fitting a specific category shall use those pull-test requirements as indicated for Control Line Precision Aerobatics.
4. The flying area must be clear of all utility wires or poles and a model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.
5. The flying area must be clear of all nonessential participants and spectators before the engine is started.

PRODUCT SUPPORT

Mission Planning (Tower App)

Reference the Tower support page on the
3DR website http://3drobotics.com/kb/tower-support/

SOLO Hardware

Reference the SOLO support page on the
3DR website: http://3drobotics.com/kb/solo/

Agribotix software

Reference the FAQ link https://agribotix.zendesk.com/hc/en-us or email support@agribotix.zendesk.com

Ordering

Contact AGCO Parts Customer Service 800-728-1773

You can also contact your Field Parts Manager or the AGCO Parts UAV Product Specialist