App Manual

For use with DJI™ drones

Version 2.3.1

Drone Amplified, INC

FIRE MANAGEMENT TECHNOLOGY

IGNIS

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1 System Requirements

The app is compatible with Android Lollipop (5.0) and above. The Android operating system can be upgraded by going to Settings, About, System update.

Minimum System Requirements:

Operating System: Android Lollipop (5.0)

CPU: Quad-Core, 1.2 GHz

RAM: 1GB

Recommended System Requirements:

Operating System: Android Nougat (7.0)

CPU: Quad-Core, 1.5 GHz

RAM: 2GB

The app is compatible with the following DJI™ drones:

- INSPIRE™ 1
- INSPIRE™ 1 Pro
- INSPIRE™ 1 RAW
- INSPIRE™ 2
- MATRICE™ 100
- MATRICE™ 600
- MATRICE™ 600 Pro
- PHANTOM™ 3 Standard
- PHANTOM™ 3 4K
- PHANTOM™ 3 Professional
- PHANTOM™ 3 Advanced
- PHANTOM™ 4
- PHANTOM™ 4 Pro
- PHANTOM™ 4 Advanced

2 Privacy and Versions

The Ignis app has two main versions: a general-purpose version, and a privacy-enhanced version. The DJI SDK that this app uses to control a DJI drone can potentially upload flight logs to DJI's servers. The privacy-enhanced version of this app implements a firewall to ensure that no flight data will leak over the internet. The general-purpose version is recommended for customers without this concern, and allows for an internet-connection during flight so maps can be automatically downloaded during flight. Besides this, there are only a few minor differences between the versions, and these will be pointed out in the following sections. See section 11 to learn more about the privacy-enhanced version.

3 Main Menu

Figure 1: Main Menu of Ignis app.

The first time you launch the app, you will be asked to agree to the End User License Agreement, and to give the app certain permissions. The app can function without the Location permission, but it will not be able to display your device's location on the map. The other permissions are necessary for the DJI Mobile SDK to operate, and to save files such as flight logs to an accessible location on your device.

When the app is launched, a screen similar to Figure 1 will be displayed. If you are using the privacy-enhanced version of the app, these menu options are split across two apps. Press the FLY button on the first screen to see the other options. Status and error messages

will display at the bottom of the screen, such as whether or not the app is connected to the remote controller or drone.

3.1 First Time Registration

In order to use the app to fly a DJI drone, the DJI Mobile SDK used by the app must be registered. This process is automatic. However, for first-time registration, the app must be connected to the internet. After the app has successfully registered once, it can be used without an internet connection.

In the privacy-enhanced version of the app, the first-time registration process must be manually started, and will temporarily disable the firewall. Follow the instructions displayed on the main menu.

3.2 Connecting the Remote Controller

When you connect the remote controller to your mobile device using a USB cable, you may see a prompt to pick which app should be opened when this USB accessory is connected. If you do see this prompt, select this app, and the status at the bottom of the main screen will change to either: "Connect to drone: Failure (Disconnected from drone)" if the drone is not on, or "Connect to drone: Success" if the drone is on.

If you do not see this pop-up and another app automatically opens, that app may have been selected as the default app to open. Go to your Android device's Settings, Apps, and click on that app. Next, to the Open by default setting for that app, and clear defaults. Now, reconnect the controller, and you should see the prompt.

4 Download Maps

This app uses Mapbox for its satellite imagery and maps. Mapbox provides high-resolution satellite imagery across the globe, and allows users to download maps for offline usage. This allows for flight in locations that have no internet connection.

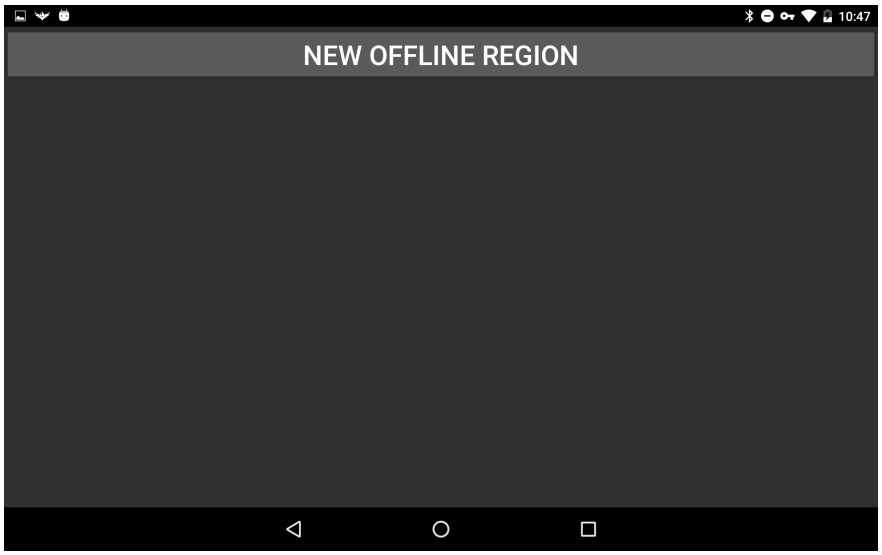

Figure 2: Offline Regions Screen

Pressing the "DOWNLOAD MAPS" button on the main menu will open a screen similar to Figure 2. This screen will display all of the maps you've downloaded, but it is currently empty in this Figure.

4.1 New Offline Region

Figure 3: Selecting a region to download

Pressing the "NEW OFFLINE REGION" will open a screen that shows a map of the world. Zoom in, translate, and rotate the map until the region that should be downloaded is dis-

played on the screen. Once the map has been zoomed in far enough, download buttons will appear in the bottom right corner of the screen, as shown in Figure 3. You have options to download "High Definition" imagery or "Standard Definition" imagery of the viewed region. The "High Definition" imagery is the most detailed imagery available for that region, but results in a large download. Touch one of the download buttons to start downloading all of the satellite imagery tiles in that region.

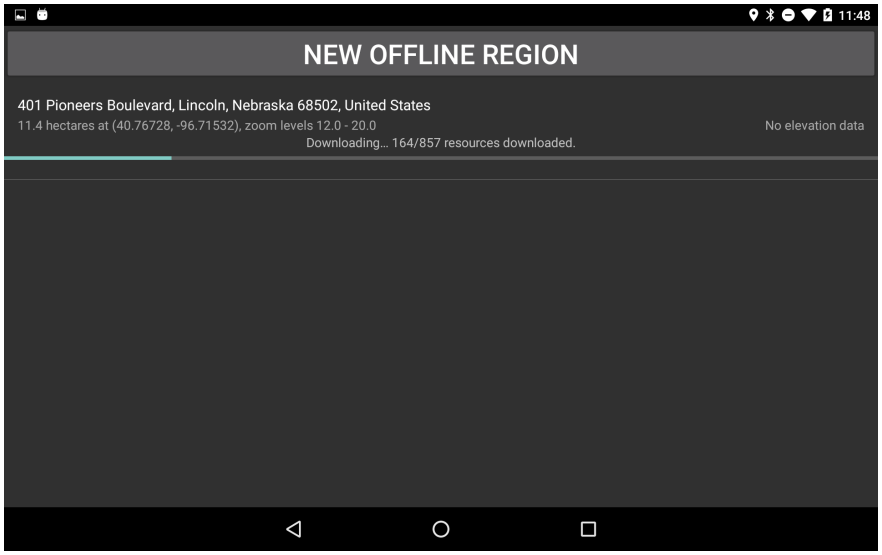

Figure 4: Downloading a region

After pressing the download button, the app will return to the previous screen, shown in Figure 4, where the download progress will be displayed. While the region is downloading, the app can be used to start downloading another region, or for other functions by navigating to other screens in the app. Don't close the app while a download is in progress, or the download may not complete. In the event the app was closed before a download was completed, the region should be deleted and re-downloaded, as it may not contain imagery of the entire region.

4.2 Managing Regions

Each downloaded region appears in a list below the "NEW OFFLINE REGION" button. These entries give some basic information about the location, size, and zoom levels of the map. If an entry in the list in the list is touched, it will display a "VIEW" and a "DELETE" button.

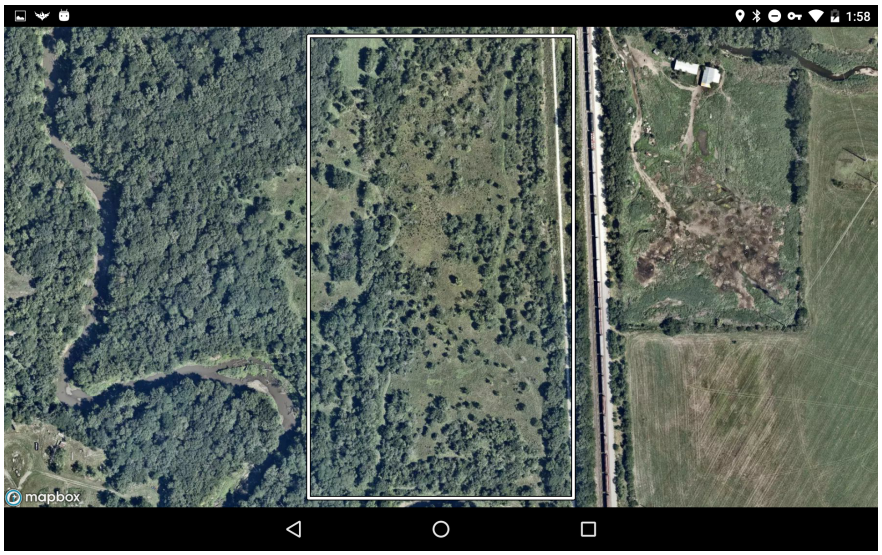

Figure 5: Viewing a downloaded region

Pressing the "VIEW" button will show the downloaded region, as in Figure 5. However, this isn't an accurate representation of what tiles are saved for offline usage, as Mapbox will download tiles to fill this view in if the app is connected to the internet. Additionally, Mapbox will cache tiles that have been recently viewed, so it's possible that tiles that haven't been explicitly downloaded can be viewed offline. Disconnect from the internet, then view the region to get a better idea of what tiles are downloaded.

Pressing the "DELETE" button will start the deletion process for that region. Please wait until the deletion is completed. This button can also be used to stop downloading a region.

Any number of regions can be downloaded, but there is a limit to the number of map tiles that are allowed to be saved. If the download fails because the Mapbox Tile Count limit was exceeded, try deleting a few other regions to free up space.

4.3 Elevation Maps

This feature is currently under development.

5 Settings

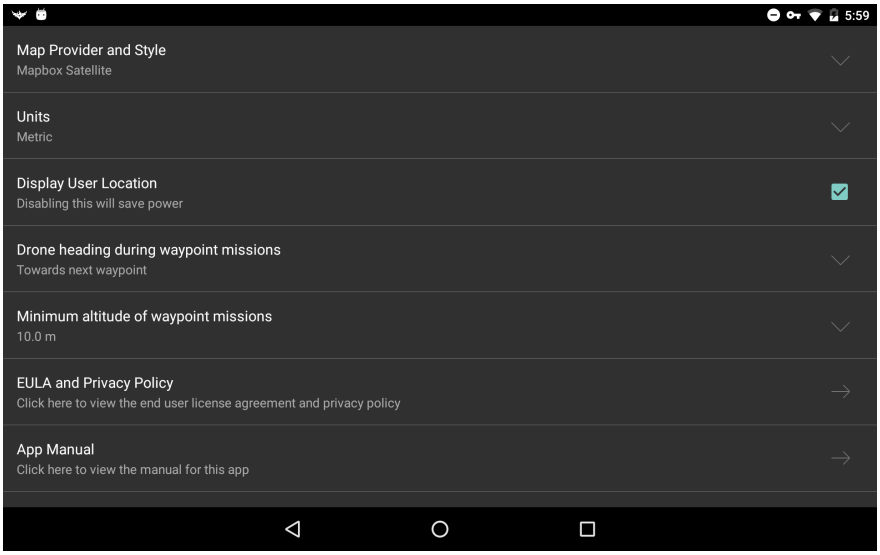

Figure 6: App Settings

Pressing the "SETTINGS" button from the main menu will open a screen where the app's settings can be changed, shown in Figure 6. The following is a description of each setting:

Map Provider and Style Sets the map style to use when flying. You can choose between Mapbox Satellite and Streets, Mapbox Outdoors (topographic map), Mapbox Satellite, and Mapbox Streets. If you are flying offline, use Mapbox Satellite in order to see downloaded maps.

Units The app's units can be set to Imperial, Nautical, or Metric. Imperial uses feet for distance measurements, miles per hour for velocity measurements, Fahrenheit for temperature measurements, and acres for area measurements. Nautical is like Imperial, but uses knots for velocity. Metric uses meters for distance measurements, kilometers per hour for velocity measurements, Celsius for temperature measurements, and hectares for area measurements.

Display User Location Enabling this makes the tablet's location appear on the map. Location must also be enabled on the tablet for this to work. However, locating the device will consume a significant amount of the tablet's battery power.

Drone heading during waypoint missions Allows you to switch between different modes for the drone's heading during waypoint missions. Towards next waypoint means that

the drone will turn to face the next waypoint when it starts the mission or reaches a waypoint. Controlled by remote controller means that the drone will turn to face the first waypoint when it starts the mission, but will then not make any more heading adjustments after that. In all modes, the yaw control stick on the remote can be used to adjust the drone's heading whenever it is not turning.

Minimum altitude of waypoint missions The minimum altitude allowed to be configured for waypoint missions. If you lower this, take care to double check the altitude of the waypoint missions you start.

EULA and Privacy Policy This will display the app's EULA and Privacy Policy. You must have an internet connection to view this.

App Manual Displays this Manual.

6 Drone Setup

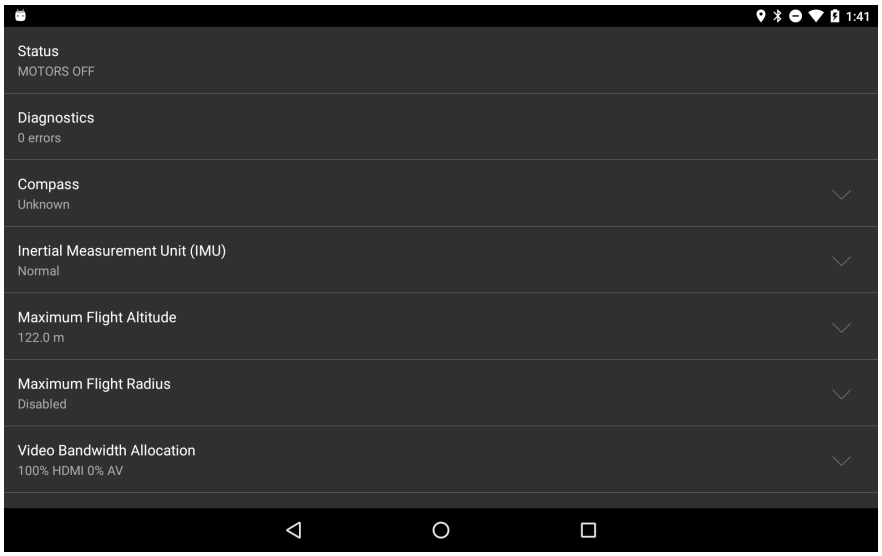

Figure 7: Drone Setup

Pressing the "DRONE SETUP" button from the main menu will open a screen where the drone's settings can be changed, and advanced information can be viewed. You must be connected to a drone in order to view this. The following is a description of each setting:

Status Displays the overall status of the drone, as you would see if you were flying.

Diagnostics Displays DJI errors and warnings produced by the drone.

Compass Displays information about the compass, and allows you to perform a compass calibration.

Inertial Measurement Unit (IMU) Displays information about the Accelerometer(s) and Gyroscope(s) on the aircraft. IMU calibration is currently under development.

Maximum Flight Altitude Allows you to adjust the drone's maximum allowed flight altitude above its takeoff point.

Maximum Flight Radius Allows you to adjust the drone's maximum allowed distance from home. Move the slider all the way to the right to disable this.

Video Bandwidth Allocation This setting is only available on the Matrice 600. Allows you to adjust the proportion of the video bandwidth streamed from the drone between the HDMI input and the AV input.

Lost Link Procedure Sets the procedure the drone will follow if it loses connection with the remote controller.

Minimum Go Home Altitude If the drone is below this altitude when the Go Home procedure is initiated, it will first ascend to this altitude before returning home.

C1 Button Function Pressing the C1 button on the controller will have this function while the app is connected. Currently only recentering the gimbal is supported. Note that these functions are implemented by the app and won't work if no app is connected to the remote controller.

C2 Button Function Pressing the C2 button on the controller will have this function while the app is connected. Currently only recentering the gimbal is supported. Note that these functions are implemented by the app and won't work if no app is connected to the remote controller.

Model The model of the drone

Drone Name A user-settable name for the drone.

Flight Controller Serial Number The serial number of the drone's flight controller.

Flight Controller Firmware Version The flight controller's firmware version. This is not the same as the version number of the firmware package on DJI Assistant 2.

Remote Controller Name A user-settable name for the remote controller. Maximum 6 characters.

Remote Controller Serial Number The serial number of the remote controller.

Remote Controller Firmware Version The remote controller's firmware version.

7 Flight Logs

Flight logs are generated in a csv format and are saved in:

Drone Amplified/Flight Logs

More features involving flight logs are currently under development.

8 Georeferenced PDFs

PDF files with georeferenced maps (such as those created by Esri ArcMap) can be displayed as an overlay on the map while flying. Simply place the pdf files in the directory:

Drone Amplified/Georeferenced Pdfs

Restart the app after adding pdf files to this directory. The closest pdf map will be displayed on the map in the flight activity. Not all georeferenced pdfs may be supported. If you have a georeferenced pdf that is not being displayed, or is not displayed correctly, please email it to appdev@droneamplified.com.

In the flight activity, the map recentering menu will contain a button to toggle the display of georeferenced pdfs. By default, pdfs will be displayed.

9 Ignis Setup

9.1 Connection Options

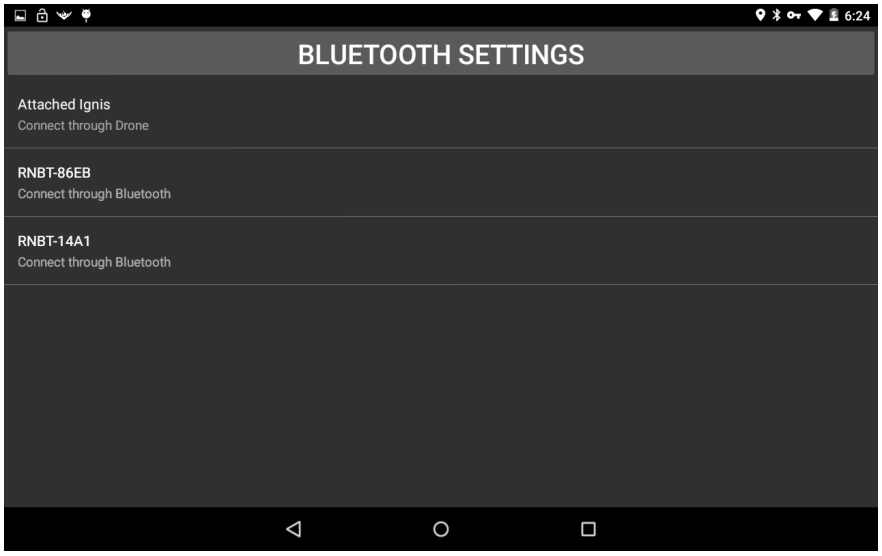

Figure 8: Ignis Setup connection options.

Press the "IGNIS SETUP" button on the main menu to open up the Ignis connection options screen, shown in Figure 8. Below the "BLUETOOTH SETTINGS" button is a list of the ways to connect to Ignis. Each bluetooth device the tablet is paired to is listed, as well as an option to connect to Ignis through the drone, if there is a connection to Ignis through the drone.

9.2 Bluetooth Settings

Pressing the "BLUETOOTH SETTINGS" button will open up the Android device's bluetooth settings. This screen can be used to enable Bluetooth, scan for nearby devices, and pair with them. The password to pair with Ignis is 1234. Ignis must be paired before it can be connected to through Bluetooth.

9.3 Connecting through Bluetooth

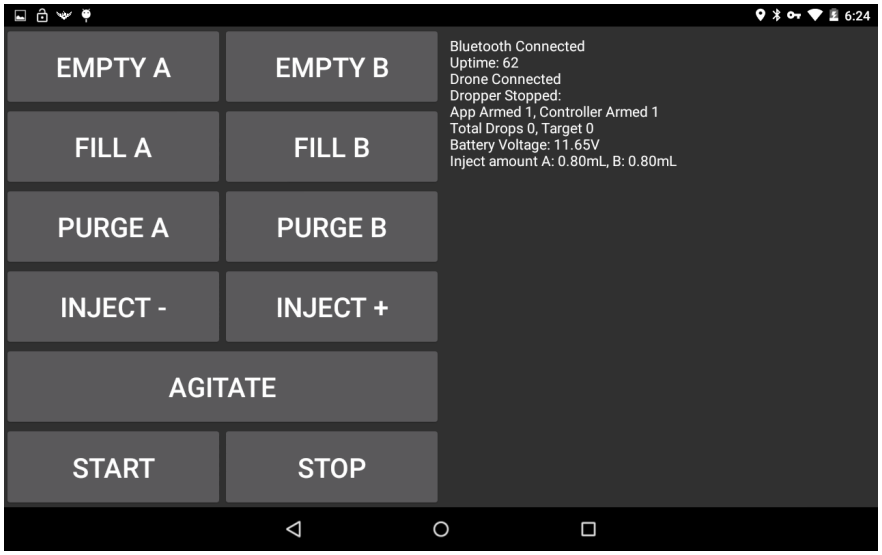

Figure 9: App when connected to Ignis through Bluetooth.

To setup Ignis through Bluetooth, check what its Bluetooth address is by opening the battery cover, then touch the corresponding name in the connection option screen shown in Figure 8. This will open a screen similar to Figure 9. While the app is attempting to connect to Ignis, the status will display "Bluetooth Disconnected", and will change to "Bluetooth Connected" once it connects. This may take up to 10 seconds. Once the app begins to receive messages from Ignis, Ignis's status will be displayed on the right, as shown in Figure 9. The following is a description of each button:

EMPTY A Completely empties syringe A

EMPTY B Completely empties syringe B

FILL A Completely fills syringe A

FILL B Completely fills syringe B

PURGE A Injects with syringe A. Use this repeatedly to clear any air out of the syringe.

PURGE B Injects with syringe B. Use this repeatedly to clear any air out of the syringe.

INJECT - Decreases the injection amount of A and B by 0.1 mL.

INJECT + Increases the injection amount of A and B by 0.1 mL.

AGITATE Spins the hopper motor for a short period. Use this to make sure ignition spheres get into the chutes before takeoff.

START Starts dropping. Use this to test dropping while on the ground.

STOP Stops dropping.

9.4 Connecting through the Drone

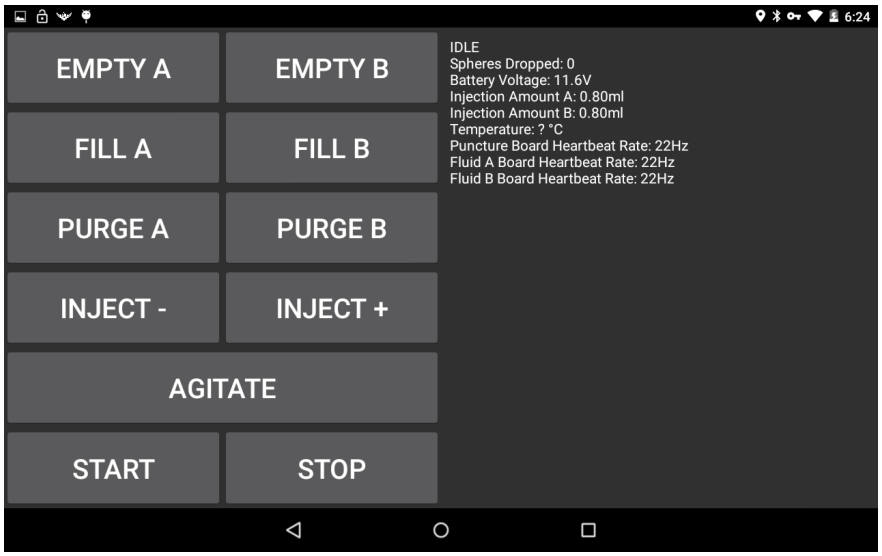

Figure 10: App when connected to Ignis through the Drone.

In case Ignis cannot be connected through Bluetooth, there is the option to setup Ignis through the drone. Make sure Ignis is connected to the drone, the drone is on, the controller is on, the tablet is connected to the controller, and the app says it is connected to the drone. If the app is receiving messages from Ignis, then the option to connect through the drone will appear as in Figure 8. Touch this option to connect to Ignis through the drone, which will open up a screen similar to 10. This screen may display the Ignis's status on the right slightly differently than the Bluetooth setup, but the buttons on the left have exactly the same functionality.

10 Flying

Touching the "FLY" button from the main menu will open the screen used to fly the drone and control Ignis. Figure 11 shows an example of this flight screen, and enumerates important

interface elements.

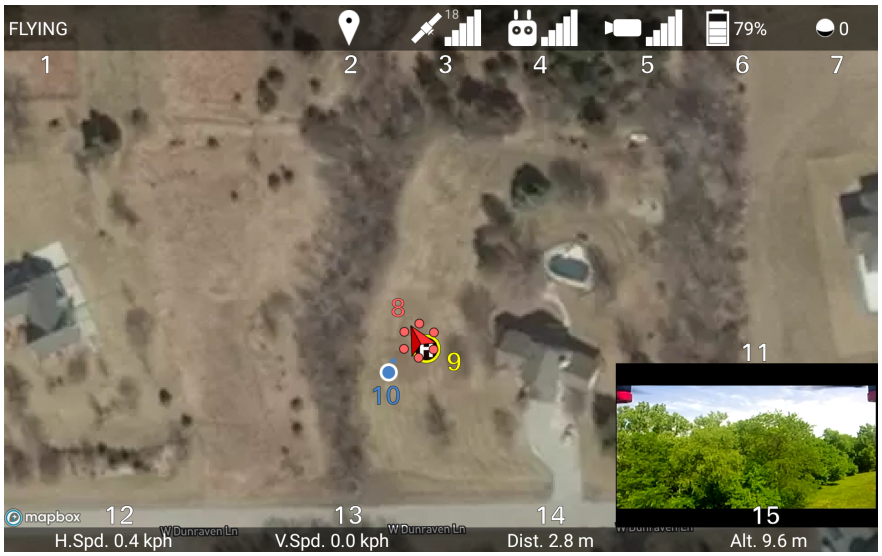

Figure 11: Main interface elements while flying.

This screen puts Android into Immersive mode, and hides the navigation and status bars. In order to back out of this screen, swipe down from the top to reveal the status and navigation bars, then press the back button. The following is a description of the enumerated interface elements shown in Figure 11.

1. **Overall Drone Status** This can be one of several states:

   DISCONNECTED The drone is not connected.

   IMU PREHEATING The inertial measurement unit is preheating. Please wait for it to finish.

   COMPASS ERROR The compass cannot accurately identify the drone's position.

   MOTORS OFF The motors are off.

   MOTORS ON The motors are on.

   GOING HOME The drone is returning home or auto-landing. Use the go-home button on the controller to leave this state.

   FLYING The drone is flying and is under the control of the remote controller.

   WAYPOINTS The drone is following programmed waypoints. In this state, the remote controller can only yaw the vehicle, or use the pitch control to adjust the drone's velocity along the waypoint path. If a failure occurs in the DJI Mobile SDK while the vehicle is following waypoints, or waypoints are being uploaded

to the vehicle, then there is a possibility that the app will report the state as WAYPOINTS when the drone is actually FLYING, or vice versa. Use the "Stop" button under the Waypoints Menu, or switch the controller into P mode to leave the WAYPOINTS state and regain manual control of the drone.

2. **Waypoints Menu Button** Touching this icon will open up the Waypoints Menu.

3. **Map Recentering Menu Button & GPS Signal Strength** Touching this icon will open the Map Recentering Menu. This icon also shows the strength of the GPS signal the drone is receiving, as well as the number of satellites it is receiving signal from.

4. **Auto Takeoff / Auto Landing Menu Button & Uplink Signal Strength** Touching this icon will open the Auto Takeoff / Auto Landing Menu. This icon also shows the strength of the radio signal from the remote controller to the drone.

5. **Camera Menu Button & Downlink Signal Strength** Touching this icon will open the Camera Menu. This icon also shows the strength of the radio signal from the drone to the remote controller, which primarily carries video signal.

6. **Battery Menu Button & Lowest Battery Level** Touching this icon will open the Battery Menu. This icon also displays the lowest energy percent remaining of all the batteries in the drone.

7. **Ignis Menu Button & Number of Ignition Spheres Dropped** Touching this icon will open the Ignis Menu. This icon will spin while Ignis is dropping. If Ignis is connected, the ? will display the number of ignition spheres that have been dropped.

8. **Drone Location and Attitude** This marks the location and orientation of the drone. The icon will also pitch and roll to reflect the attitude of the drone. Touching this will toggle Focus mode, which will center the drone in the screen, and is convenient for manually flying the drone with the controller.

9. **Home Location** This is the location that distance is measured relative to, and where the Drone will fly to if the Go Home procedure is initiated.

10. **User Location** This will display if the "Display User Location" setting is enabled, and Location enabled on the tablet. This blue and white dot displays the location of the user. A blue triangle adjacent to the dot indicates which direction the user is facing.

11. **Live Video Feed** This displays the video being streamed from a camera connected to the Drone's HDMI or AV port. Touching this will maximize it. Touching this while it is maximized will return it to normal size.

12. **Drone Horizontal Speed** Displays the horizontal component of the speed of the drone.

13. **Drone Vertical Speed** Displays the vertical component of the velocity of the drone.

14. **Horizontal Distance between Drone and Home** Displays the horizontal component of the distance between the drone and the home point.

15. **Altitude of Drone above Takeoff Location** Displays the altitude of the drone above the takeoff location.

10.1 Map Recentering Menu

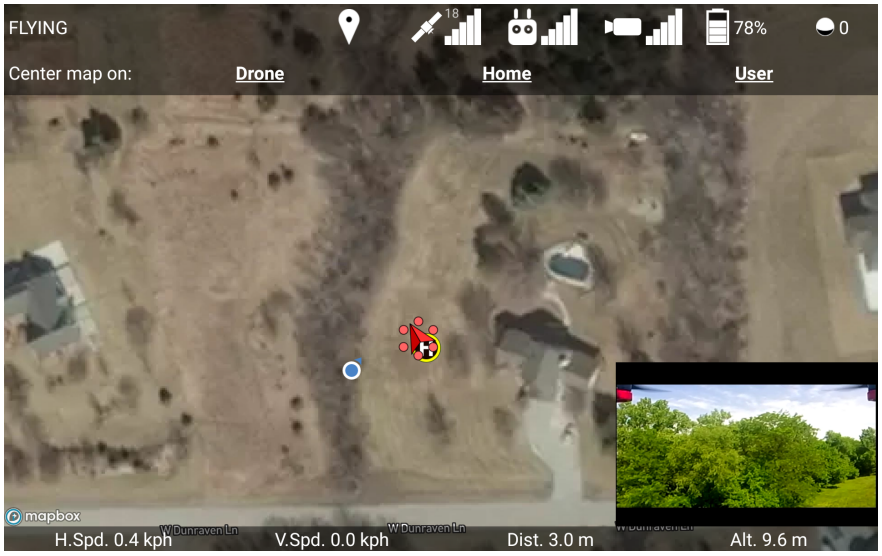

Figure 12: Map Recentering Menu

Touching the GPS satellite icon at the top of the screen will open the Map Recentering Menu, shown in Figure 12. Touch either “Drone”, “Home” or “User” to recenter and rezoom the map on that. Touch the map or the menu button again to close this menu.

10.2 Auto Takeoff / Auto Landing Menu

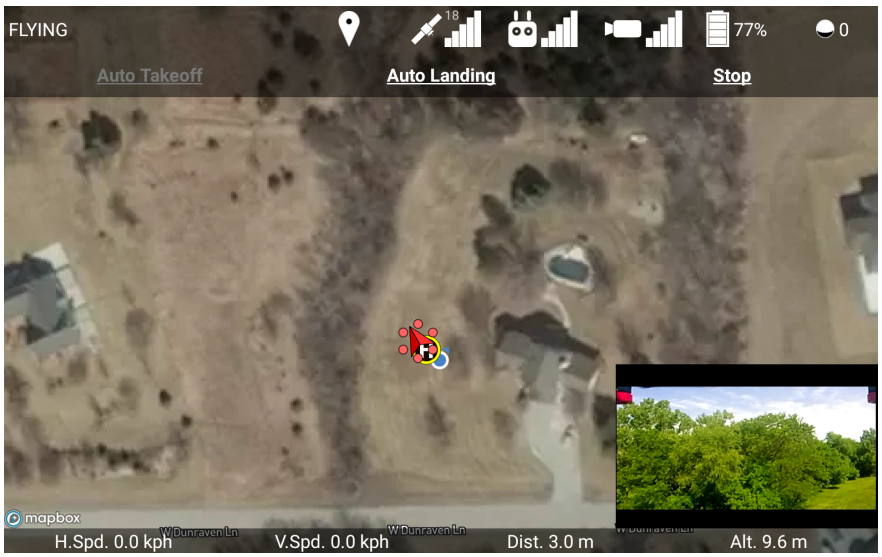

Figure 13: Auto Takeoff / Auto Landing Menu

Touching the controller icon at the top of the screen will open the Auto Takeoff / Auto Landing Menu, shown in Figure 13. Touch "Auto Takeoff" when it is white to initiate an automatic takeoff. This will make the drone hover 1 meter above the ground. Touch "Auto Landing" when it is white to initiate an automatic landing. This will make the drone slowly descend in-place until it reaches the ground, after which it will turn off its motors. The controller can also be used to guide the drone as it lands. The Go-Home button on the controller can also cancel the Auto Landing. Touch "Stop" to stop an automatic takeoff or landing. Touch the map or the menu button again to close this menu.

10.3 Camera Control

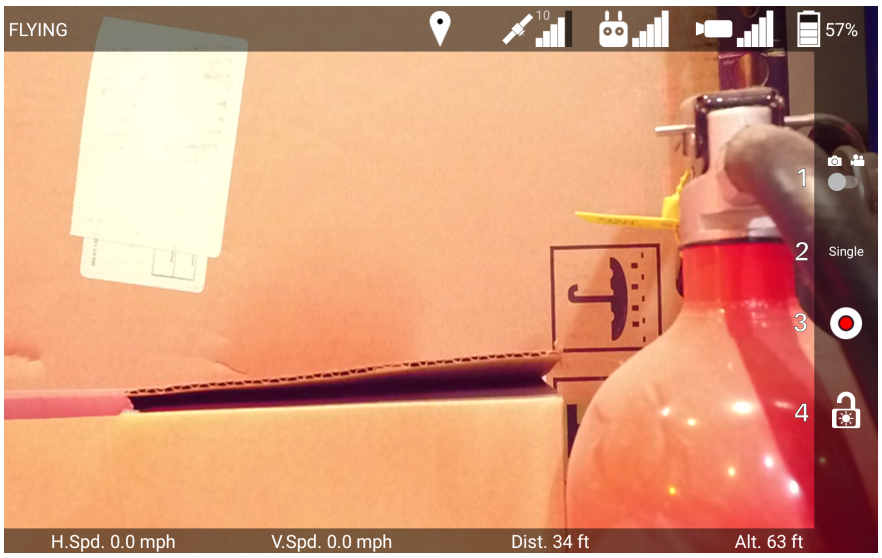

Figure 14: Maximized camera view

Touching the minimized video feed in the corner of the screen will maximize the video feed so it fills the screen, as shown in Figure 14. Additionally, if the drone has a DJI camera, a sidebar with some camera controls will appear. The sidebar's camera controls are enumerated in Figure 14, and a description of each button is below. Touching the video feed will hide the camera control sidebar, and minimize the video feed into the corner so that you can view the map again. Touching and dragging on the video feed will move the gimbal so that the video feed scrolls under your touch.

1. **Camera Mode Switch** Use this switch to change the camera between photo mode (left), and video mode (right).

2. **Photo Capture Mode / Recording Time** If the camera is in photo mode, this displays the capture mode (Single or Burst). If the camera is in video mode, this displays how many minutes and seconds have been recorded by the current recording.

3. **Start / Stop Capture Button** If the camera is in photo mode, press this button to take a picture. If the camera is in video mode, press this button to start recording. While recording, this button will change into a white circle around a red square. Press this button again to stop recording.

4. **Toggle Auto Exposure Lock Button** If this icon is unlocked, the camera can automatically adjust its exposure. If this icon is locked, the camera will not change its current ISO / shutter / aperture settings. Touch this button to toggle this state.

Touching the video camera icon at the top of the screen will open the Camera Menu, shown in Figure 15.

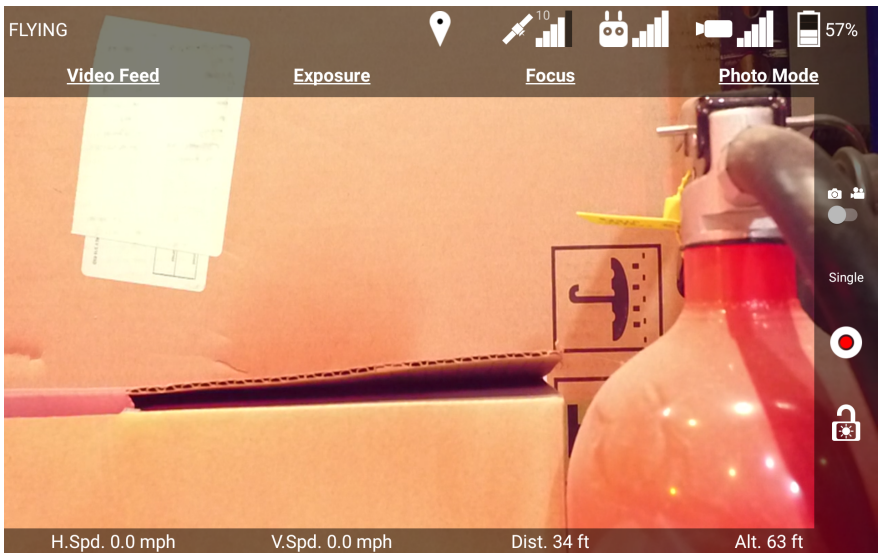

Figure 15: Camera menu

You can access this menu if the video feed is minimized as well. The camera menu shows options for changing the Video Feed, the Exposure, the Focus, and the Photo Mode. The exposure, focus, and photo mode can only be adjusted on DJI cameras. If no DJI camera is connected, the Camera Menu will instead show the Video Feed Menu.

If a thermal camera is connected, you will see an additional "Thermal" option, which will allow you to change between Visible, IR, Picture in Picture, or Multi-Spectral Dynamic Imaging (which enhances the IR view with edges detected by the visible camera).

Touching the Video Feed option from the Camera menu will show the Video Feed Menu, shown in Figure 16.

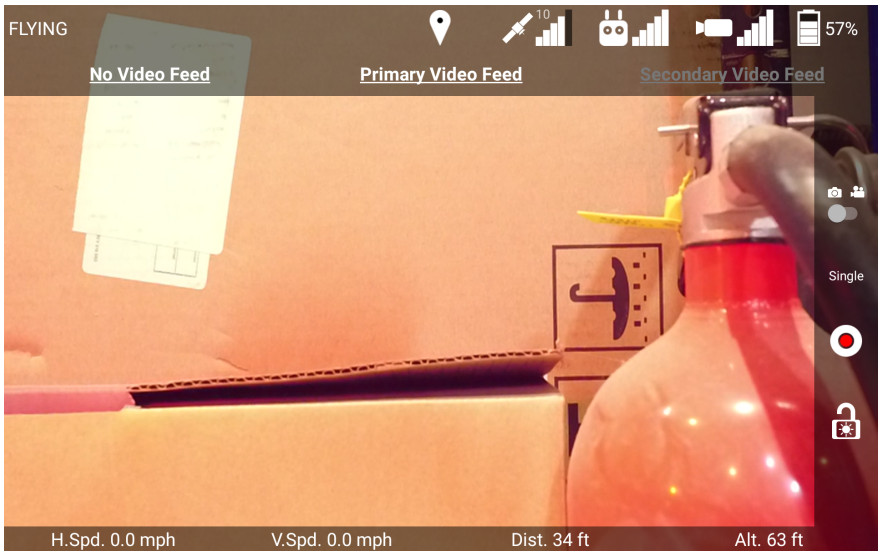

Figure 16: Video Feed Menu

Touch either "Primary Video Feed", or "Secondary Video Feed" to display video from that source. If the app isn't receiving any data from the Primary or Secondary, then that option will be grayed out. The "No Video Feed" option will remove the video display from the interface.

Touching the Photo Mode option from the Camera menu will show the Photo Mode Menu, shown in Figure 17.

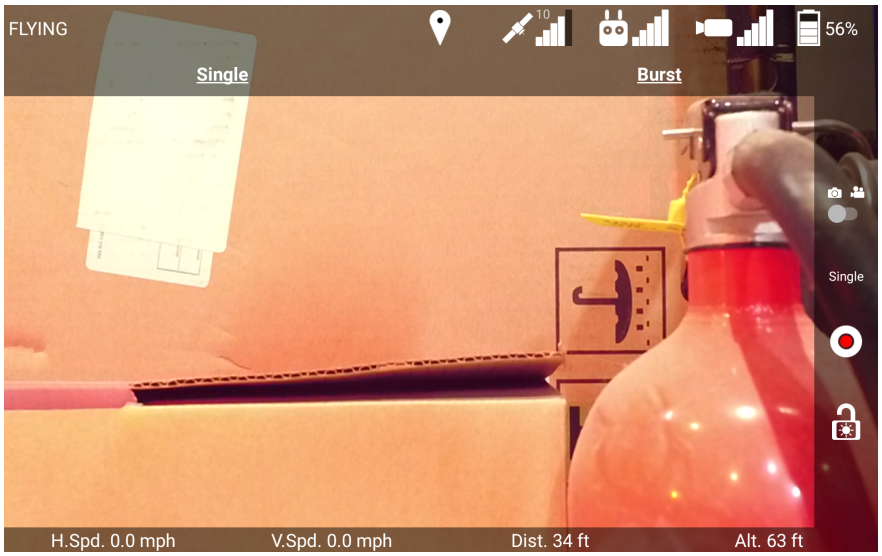

Figure 17: Photo Mode Menu

Touch either "Single", or "Burst" to switch to that photo mode.

Touching the Focus option from the Camera menu will allow you to focus the camera, as shown in Figure 18.

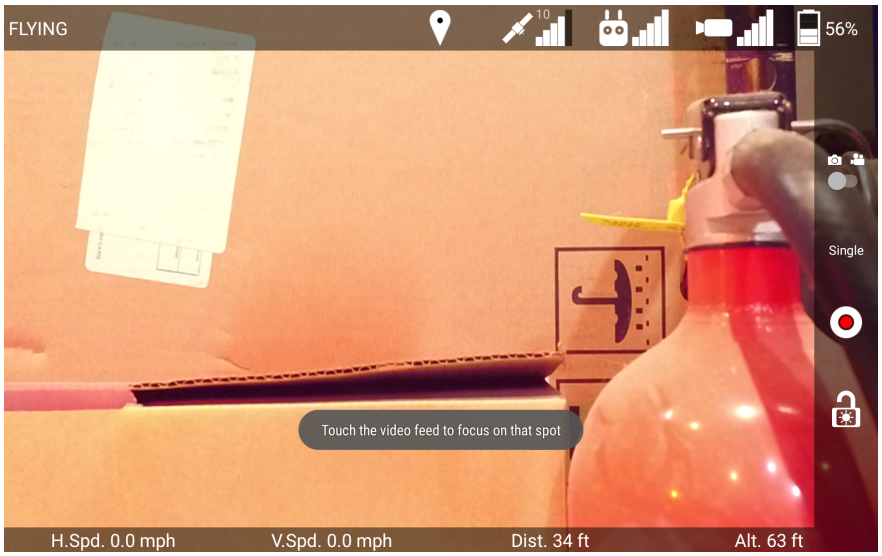

Figure 18: Instructions to focus the camera.

The video feed will automatically maximize when you choose to Focus the camera. The next time you touch the video feed, the camera will automatically focus on that point. Touching the video feed again will have the normal minimizing/maximizing functionality.

Touching the Exposure option from the Camera menu will show the Exposure Menu, shown in Figure 19.

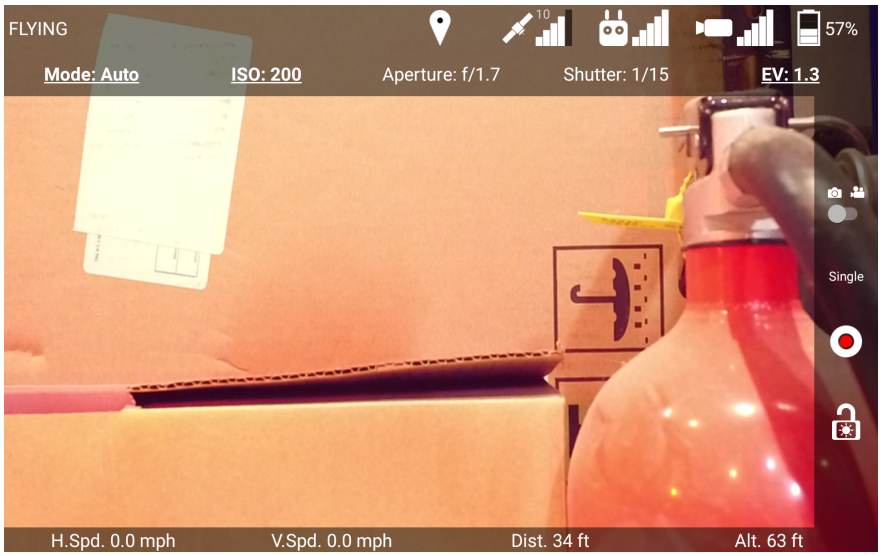

Figure 19: Exposure Menu

This menu shows the current mode, ISO, aperture, shutter, and exposure compensation settings. Depending on the current exposure mode, different settings are adjustable. The adjustable settings are indicated by being bolded and underlined. In Auto mode, as in Figure 19, the ISO and EV can be adjusted.

Touching the Mode option will open the Exposure Mode Menu, shown in Figure 20.

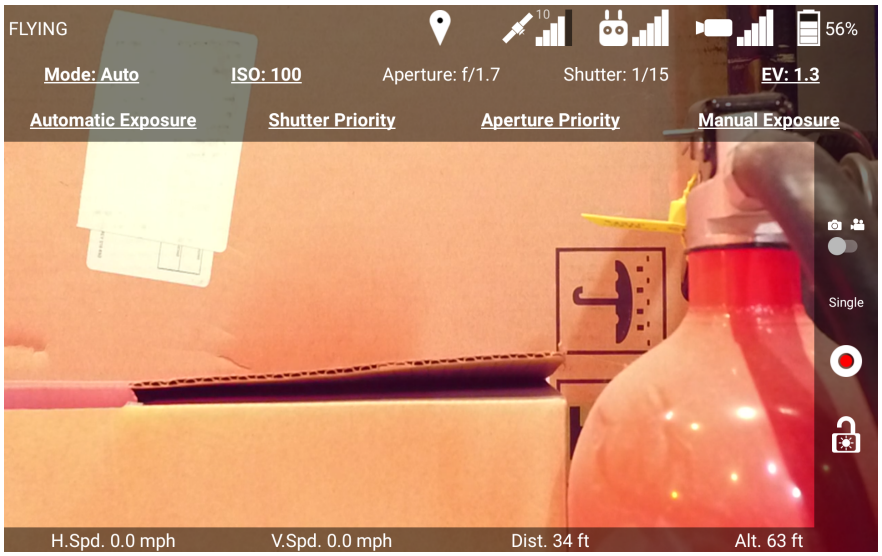

Figure 20: Exposure Mode Menu

This menu lets you change between the four exposure modes:

Automatic Exposure Allows you to manually adjust ISO and exposure compensation. Aperture and shutter are manually adjusted.

Shutter Priority Allows you to manually adjust ISO, shutter, and exposure compensation. Aperture is automatically adjusted.

Aperture Priority Allows you to manually adjust ISO, aperture, and exposure compensation. Shutter is automatically adjusted. Not all DJI cameras support Aperture Priority mode.

Manual Exposure Allows you to manually adjust ISO, aperture, and shutter. You cannot set ISO to Auto in this mode.

Touching the ISO option in the Exposure Menu will open the ISO setting selector, shown in Figure 21.

Figure 21: ISO Setting Selector

Swipe left and right along the ISO setting selector to scroll through the possible values. The ISO will be set to the center setting, which is contained within the two indicator triangles. In Automatic Exposure, Shutter Priority, and Aperture Priority modes, you also have the option to set ISO to Auto.

Aperture, Shutter, and EV can be set using a similar scrolling interface. However, not all cameras will support all aperture and shutter values.

10.4 Battery Menu

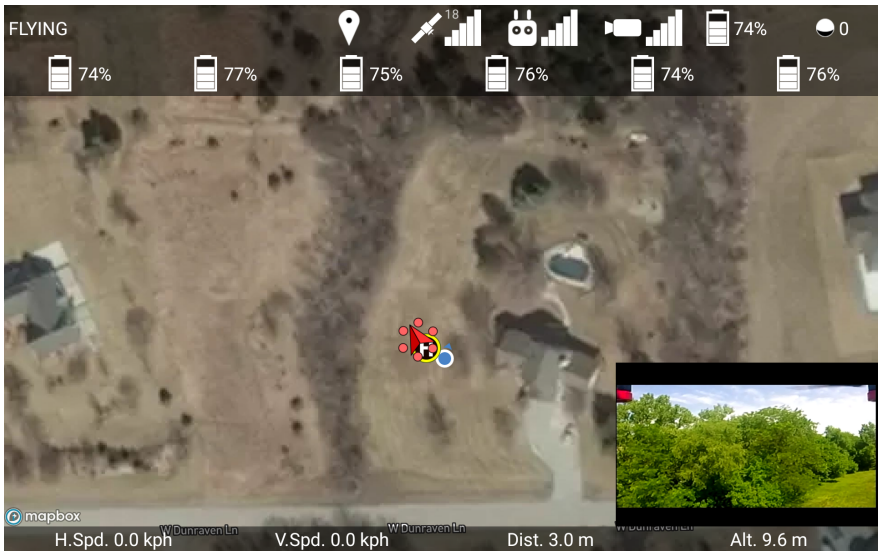

Figure 22: Battery Menu

If the drone has multiple batteries, then touching the battery icon at the top of the screen will open the Battery Menu, shown in Figure 22. This displays the energy percent remaining in each battery on the drone. Touch the map or the menu button again to close this menu.

10.5 Ignis Menu

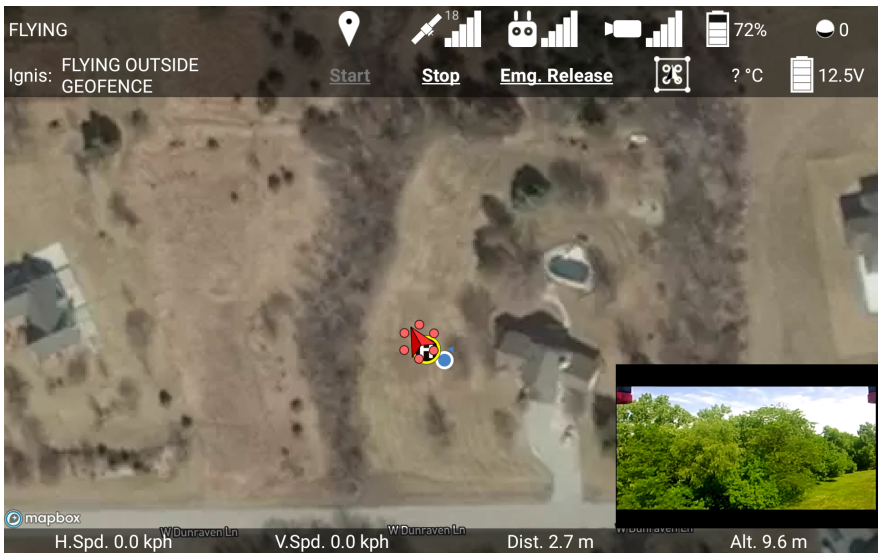

Figure 23: Ignis Menu

Touching the ignition sphere icon at the top right of the screen will open the Ignis Menu, shown in Figure 23. This displays the current status of Ignis, as well as the temperature sensor reading, and the battery voltage. The temperature sensor reading will turn yellow and then red if the temperature reads extremely high. If the current status of Ignis is yellow, then Ignis has stopped dropping because it encountered an abnormal condition. Ignis allows dropping to start again. If the current status of Ignis is red, then Ignis has stopped dropping due to a hard error. Ignis will not allow dropping to start again until it is power-cycled. If the temperature sensor or ignis status are red or yellow, then the ignition sphere icon at the top-right of the screen will also turn red or yellow to alert the user to the problem even if the Ignis Menu isn't open. The Ignis status could be one of:

DISCONNECTED The app does not have communication with Ignis.

IDLE No problems.

DROPPING Ignis is dropping.

DISARMED BY CONTROL BAR The control bar Arm/Disarm switch is in the Disarm position. The switch must be moved to the Arm position in order to start dropping.

FLYING OUTSIDE GEOFENCE The drone is flying outside the geofence. Dropping is stopped and cannot be started. You must define a geofence and fly the drone within that area.

HIGH TEMP The temperature sensor on Ignis is reading an abnormally high temperature (>55 C).

LOST DRONE PWM Connection between Ignis and the Drone was broken. Attempt to restart dropping. If problem persists, land.

LOST DRONE DATA Connection between Ignis and the Drone was broken. Attempt to restart dropping. If problem persists, land.

WRONG DRONE MODE Remote controller was switched to mode A. Or, the drone lost connection to the remote controller. Switch the remote controller into mode P or F. Regain radio connection between the controller and the drone. Attempt to restart dropping.

LOW BATTERY Ignis battery voltage dropped below 11.3 V. Use the app to check that the battery voltage is above 11.4 V. If it is, and you don't need to drop many more ignition spheres, attempt to restart dropping. Otherwise, land and replace the battery.

COMMUNICATION TIMEOUT Ignis failed to communicate with one of its sub-boards. Attempt to restart dropping. If problem persists, land. Contact Drone Amplified for support.

HATCH MOTION ERROR One of the hatches failed to open or close. Attempt to restart dropping. If problem persists, land.

LOST CONNECTION TO APP Drone Amplified app closed. Attempt to Restart dropping once the app is running again.

LOST CONNECTION TO CONTROL BAR Control bar became disconnected. Reconnect the control bar on the remote controller. Attempt to restart dropping.

UNKNOWN ERROR Ignis stopped for a reason that the app could not parse.

PUNCTURE MOTOR MOTION ERROR Puncture motor had difficulty moving. An ignition sphere may have been too difficult to puncture, or the lead screw may be too dirty. This error could lead to an in-flight fire. Monitor Ignis's temperature and use the camera to check for an in-flight fire.

INJECTION A MOTION ERROR Injection motor on side A had difficulty moving. The needle on the A side may be plugged. Land and check if needle A is plugged. If it is, clear the plug.

INJECTION B MOTION ERROR njection motor on side B had difficulty moving. The needle on the B side may be plugged. Land and check if needle B is plugged. If it is, clear the plug.

MOVE TIMEOUT Ignis stopped because an unidentified motor was having trouble moving. Dropping cannot be started again until Ignis is power-cycled.

EMERGENCY RELEASE TRIGGERED The emergency release was triggered. Land and reattach the dropper.

UNKNOWN HARD ERROR Ignis stopped for a reason that the app could not parse. Dropping cannot be started again until Ignis is power-cycled.

Touch the "Start" button to start dropping. Touch the "Stop" button to stop dropping. Touch the "Emg. Release" button to open a confirmation menu. Then touch "Yes" to trigger Ignis's emergency release.

Touch the map or the menu button again to close the Ignis menu.

10.6 Geofencing

Figure 24: Geofencing Menu

Touching the boxed drone icon in the Ignis menu opens the Geofencing Menu, shown in Figure 24. While this menu is open, touching spots on the map will mark that location as a corner of the area constrain Ignis to. Touch each corner of the burn area in a clockwise or counter-clockwise order to specify the burn area. You can use the Undo and Clear buttons to remove corners that have been added.

Ignis will not be allowed to drop if the drone is flying outside the geofenced area, or if the drone is flying and no geofenced area has been defined. If the drone leaves the geofenced area, Ignis will automatically stop dropping.

Touch the boxed drone icon again to close this menu.

10.7 Waypoints Menu

The remote controller must be in mode F in order for the drone to fly along waypoints.

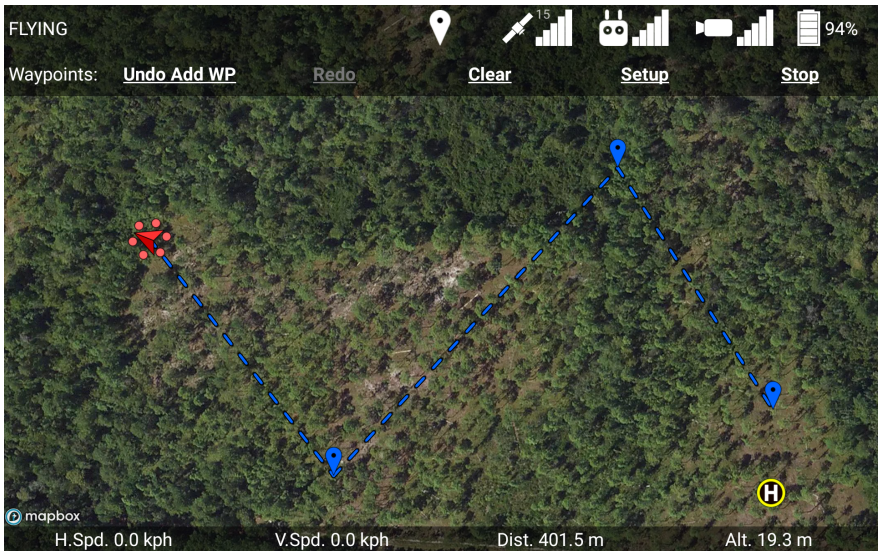

Figure 25: Waypoints Menu

Touch the Waypoint icon at the top of the screen to open the Waypoint Menu.

While the Waypoint Menu is open, touching the map will place a waypoint at the touched location. Figure 25 shows a sequence of 3 waypoints that have been placed. Touch the "Clear" button to remove all of the waypoints. The "Undo" and "Redo" buttons can be used to undo and redo adding, clearing, and moving waypoints.

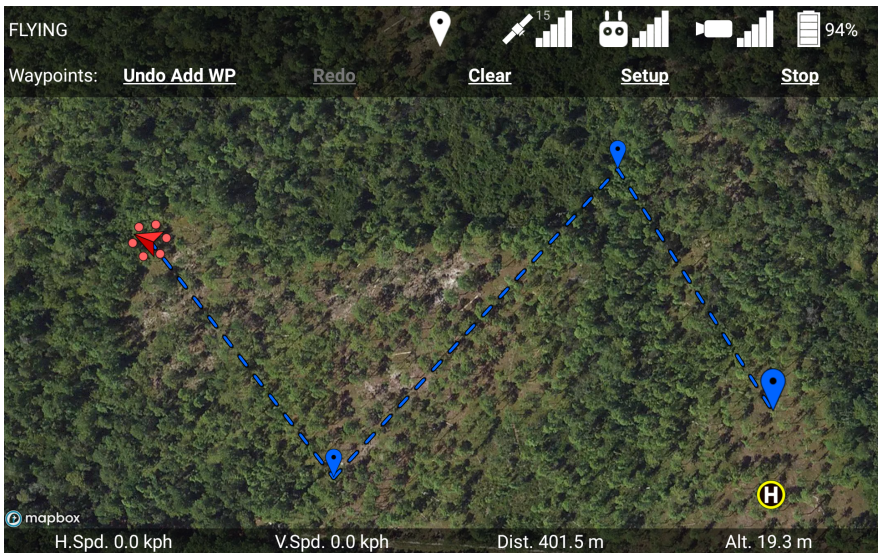

Figure 26: Touch a waypoint to select it. In this image, the last waypoint is selected.

Figure 27: Touching somewhere on the map will move the selected waypoint to that location.

If you touch a waypoint, it will select it, indicated by it becoming larger, as shown in Figure 26. If you touch a new location on the map, the selected waypoint will be moved to that location. Touch the waypoint again to deselect it.

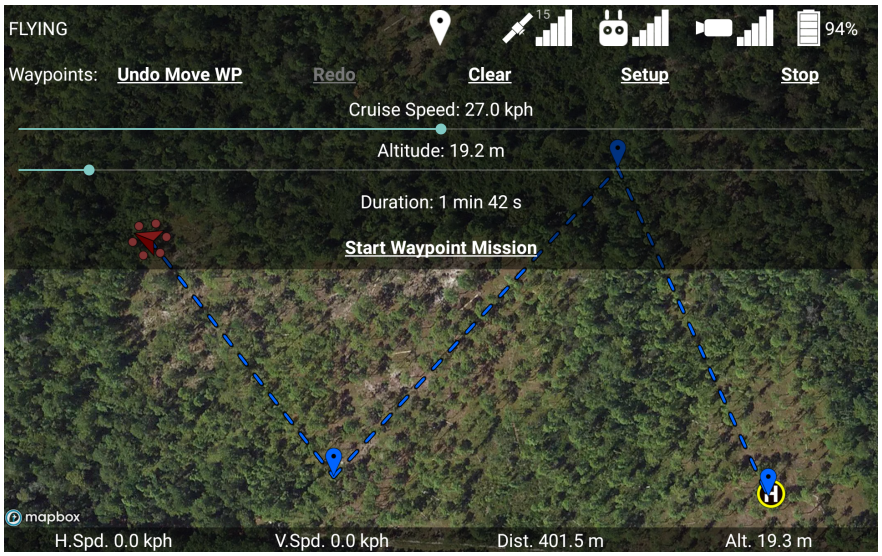

Figure 28: Adjusting the cruise speed and altitude of the waypoint mission.

Press the "Setup" button to open a submenu with sliders to adjust the drone's cruise speed and altitude to fly at along the waypoints, shown in Figure 28. The cruise speed is the speed the drone will fly along the waypoint path at when the pilot leaves the pitch control stick in a neutral position. While the drone is flying along the waypoint mission, the pitch stick can be used to increase or decrease the drone's speed from the cruise speed. The

altitude defaults to the drone's current altitude. The duration is the estimated amount of time the waypoint mission will take, given the current settings. Press the "Start Waypoint Mission" button below the duration estimate in Figure 28 to upload the waypoint mission to the drone.

Figure 29: Uploading a waypoint mission.

The waypoint path will become solid instead of dashed to indicate it is being uploaded and executed, as shown in Figure 29. Once the mission is done uploading, the drone will begin to fly along it, and its status will change from FLYING to WAYPOINTS.

You cannot modify the waypoint mission while it is executing. If you place new waypoints, the drone will not automatically fly to them unless you stop and restart the waypoint mission. Each waypoint will be automatically removed as the drone reaches it, allowing you to easily resume the waypoint mission if you stop it. The drone will hover in place once it reaches the last waypoint.

Press the "Stop" button in the waypoints menu at any time to stop the waypoint mission and regain manual control, or switch the controller into P mode. If you press the "Start Waypoint Mission" button while a waypoint mission is executing, the current mission will be stopped, and a new one will be started.

10.8 Ignition Lines

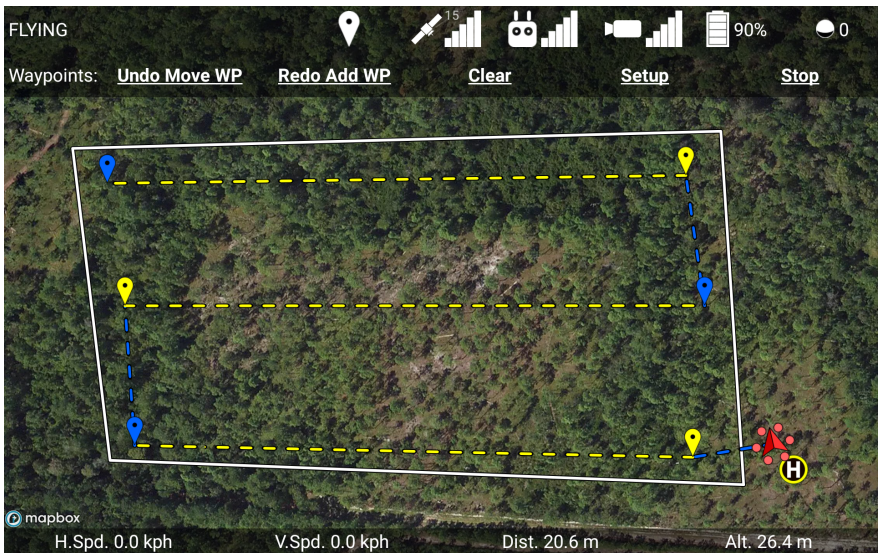

Figure 30: Touch dashed lines of the waypoint path to toggle dropping along that part. Ignis will drop ignition spheres along yellow lines.

The waypoints can also be used to control Ignis's dropping. Touch a dashed line along a waypoint mission to toggle it between yellow and blue, as shown in Figure 30. Ignis will automatically start dropping when it reaches a yellow portion of the waypoint path, and will stop dropping when it reaches a blue portion of the waypoint path. The last waypoint is always blue, indicating that Ignis will automatically stop dropping at the end of the waypoints. You cannot activate/deactivate a part of a waypoint path after that part has been uploaded and turned solid.

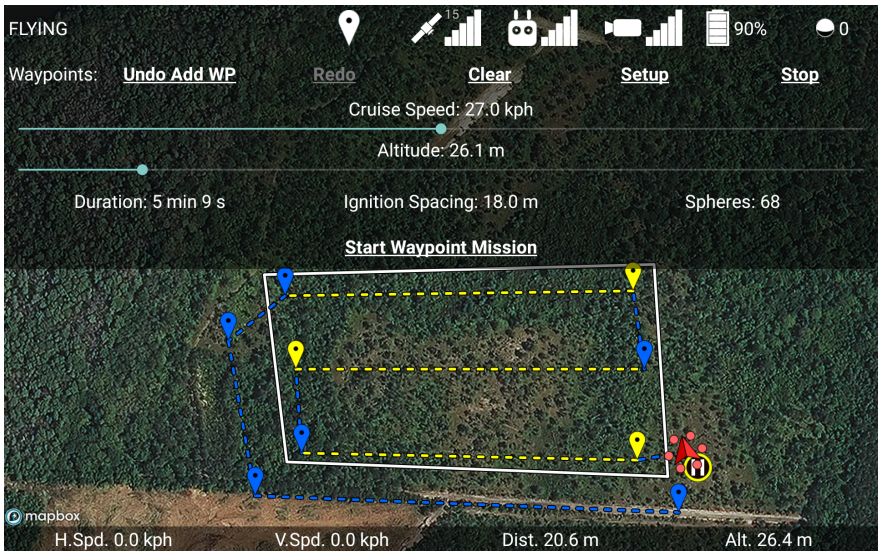

Figure 31: Setting up a waypoint mission with drop lines.

The waypoint setup menu in Figure 31 will display additional information about the planned mission, such as the estimated spacing between each ignition sphere (controlled by cruise speed), and the estimated number of ignition spheres required for the mission.

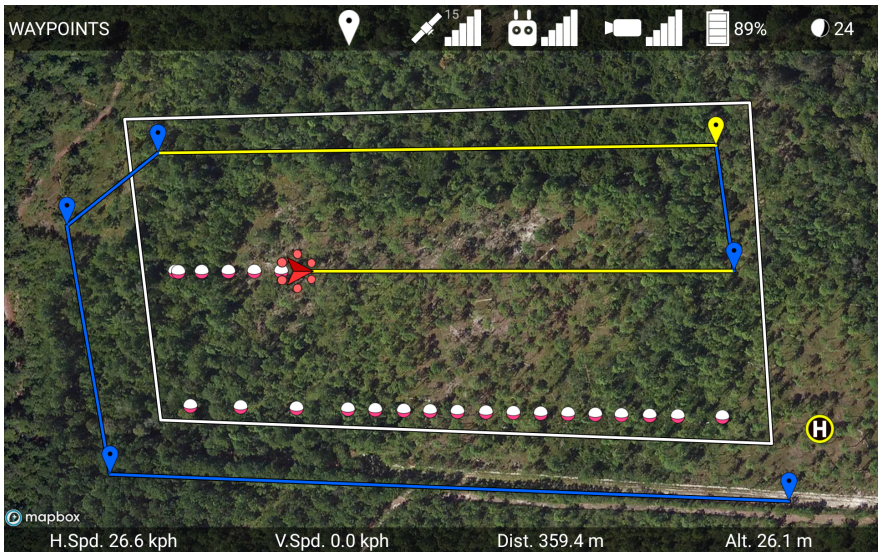

Figure 32: Dropping ignition spheres along a burn line.

Figure 32 shows the Ignis automatically dropping ignition spheres as the drone flies along these waypoints.

11 Privacy Mechanisms

The privacy-enhanced version of the app has two mechanisms that prevent data leakage.

The first mechanism is a firewall that blocks all internet traffic that could leak data. The privacy-enhanced version of the app is actually divided into two Android applications. The first application is the DA Launcher app, which does not include any DJI code, and is therefore safe to allow access to the internet. The second application is the DA Flight app, which is used to actually fly the drone, and therefore includes DJI code which could potentially leak data. The DA Launcher app creates a Virtual Private Network (VPN) service that blocks all internet traffic from the DA Flight app, effectively acting as a firewall. Since the DA Launcher creates a Virtual Private Network, this app is incompatible with other Virtual Private Network apps. Uninstall other VPN apps in order to ensure that DA Launcher firewall functions properly. The firewall will automatically start after the device is booted, so the DA Flight app can be safely run even if the DA Launcher app hasn't been run first.

The second mechanism is a fail-safe in case the firewall is somehow compromised. This could happen if the DA Launcher app is uninstalled, or force-stopped. The DA Flight app makes a check 20 times a second that checks that the VPN is active, and checks that the app cannot connect to the internet. If the DA Flight app detects that the VPN is not active, or that it can connect to the internet, it will immediately kill its process. This immediately kills the DA Flight application and all of the services started by the DJI Mobile SDK, preventing any leakage of data.