

# Mission File Specification

Drone Amplified, INC

Implemented in app version 2.9.0

FIRE MANAGEMENT TECHNOLOGY

# IGNIS



## 1. File Format

All Drone Amplified apps will save and load missions in this format. Mission file saving and loading was first implemented in version 2.9.0.

The mission file is formatted as a comma-separated-value file (.csv). This is a plain-text file encoded in UTF-8. Each line represents one row, and columns are separated by commas. Line endings are Unix-style ("\n").

The first row is a header row that contains the names of the columns, in English. All mission files will use these column names, regardless of the user's language. The later rows are data rows, containing sequences of values for those columns.

All values are interpreted as signed decimal numbers. Any characters besides numeric digits, period, hyphen, or spaces in the value will result in the value being interpreted as invalid.

Not all columns will contain data on every row. If a line has fewer columns than the first line did, assume the rest of the columns are blank. The last character of the file will be a newline character ('\n'), so depending on how the file is parsed, you may encounter a blank line at the end.

Future versions of this format may include new columns. Therefore you shouldn't assume a particular ordering to the columns, and instead you should use the header row to identify where the columns are to ensure forwards-compatibility. New versions of the format will not change the names of existing columns, to ensure backwards-compatibility.

## 2. Mission Data Summary

Each column of the mission file specifies some part of the mission, and all columns are optional.

Some columns contain information about things that are in lists, such as waypoints, or vertices of a region. For these columns, each data row contains information about one of the items in the list. Rows that have blank or invalid data for one of these list items are ignored.

Some columns contain information that applies to the mission as a whole. These columns only have a value in the row immediately below the header row, and their value in all other rows should be blank or ignored.

The columns of the mission file describe three major parts of a mission:

- Waypoints
- Transect Region
- Geofence

The Waypoints are the actual path that the drone will fly along, and information about how it should fly that path, such as the cruise speed, or the lost link procedure.

The Transect Region specifies a polygonal region of the world, and information that can be used to generate a flight path that crosses it in a series of transects. This is an aid that can be used to create waypoints.

The Geofence is used with Ignis, and defines a polygonal region of the world. Ignis will only drop ignition spheres within this region.

When a mission is loaded, only the columns it specifies replace the app's current configuration. For example, if you have a mission file that only contains information about the geofence, and a mission file that only contains waypoints, you could load both missions to combine the geofence and the waypoints.

### 3. Column Descriptions

This section describes the columns that can appear in the mission file. Each column is described in this format:

**Column Name**

Example Value

Description.

The column names are written exactly as they appear in the mission file. Some column names include units or explanations in parentheses. These are part of the column name.

If you are creating this file by hand, you do not need to type the column name exactly. For robustness, the parser is case-insensitive and identifies columns based on abbreviated versions of their names. You don't need to include the parts of the column name that are in parentheses.

The following are the descriptions of the columns:

**Waypoint Latitude**

40.731967

A list column containing the latitude of each waypoint in the list. In order for this waypoint to be loaded, it must have a valid latitude, longitude, and altitude value. Latitude is written in decimal format.

**Waypoint Longitude**

-96.750632

A list column containing the longitude of each waypoint in the list. In order for this waypoint to be loaded, it must have a valid latitude, longitude, and altitude value. Longitude is written in decimal format.

**Waypoint Altitude (m above reference)**

59.00

A list column containing the altitude of each waypoint in the list. In order for this waypoint to be loaded, it must have a valid latitude, longitude, and altitude value. This is measured in meters above the elevation of the reference location. If the reference latitude and longitude columns are not specified, then the reference location is defined as the ground beneath the first waypoint. If this waypoint mission is loaded and the app does not have the terrain elevation map to relate the mission's reference elevation to the elevation of the drone's takeoff location, then it will assume the elevation of the reference is equal to the elevation at the drone's takeoff location.

**Ignite Previous Segment**

0

A list column for use with Ignis. If the value is 1, then that means that Ignis should drop ignition spheres along the previous segment of the waypoint path. For the first waypoint, this means the segment from the drone to the first waypoint. If this column is not specified, then it is implied to be 0.

**Transect Region Latitude**

40.732527

A list column containing the latitude of each vertex of the transect region polygon. Latitude is written in decimal format. In order for this vertex to be loaded, it must have a valid latitude and longitude. There is an implicit edge connecting the last vertex to the first to close the polygon, so there is no need to repeat the first vertex.

**Transect Region Longitude**

-96.823570

A list column containing the longitude of each vertex of the transect region polygon. Longitude is written in decimal format. In order for this vertex to be loaded, it must have a valid latitude and longitude. There is an implicit edge connecting the last vertex to the first to close the polygon, so there is no need to repeat the first vertex.

**Geofence Latitude**

40.731544

A list column containing the latitude of each vertex of the geofence polygon. Latitude is written in decimal format. In order for this vertex to be loaded, it must have a valid latitude and longitude. There is an implicit edge connecting the last vertex to the first to close the polygon, so there is no need to repeat the first vertex.

**Geofence Longitude**

-96.750287

A list column containing the latitude of each vertex of the geofence polygon. Latitude is written in decimal format. In order for this vertex to be loaded, it must have a valid latitude and longitude. There is an implicit edge connecting the last vertex to the first to close the polygon, so there is no need to repeat the first vertex.

**Reference Latitude**

40.731967

The latitude of the reference location. The reference longitude must also be specified in order for this to be valid. The waypoint altitudes are measured relative to the elevation of this location. If the reference latitude and longitude are not specified, then the reference location is implied to be the ground underneath the first waypoint.

**Reference Longitude**

-96.750632

The longitude of the reference location. The reference latitude must also be specified in order for this to be valid. The waypoint altitudes are measured relative to the elevation of this location. If the reference latitude and longitude are not specified, then the reference location is implied to be the ground underneath the first waypoint.

**Cruise Speed (m/s)**

15.0

The speed the drone should try to maintain while flying along the waypoint mission. This is saved if the mission contains waypoints or a transect region. Maximum speed of 15.0 m/s.

**Snap Altitude (m AGL)**

59

The altitude above ground level that new waypoints should be placed at. This is saved if the mission contains waypoints or a transect region.

**Drop Spacing (m)**

5.5

The distance in meters between drops that Ignis 2 should drop at. If this mission is used with Ignis 1, then Ignis 1's drop timing will be set to this distance divided by the cruise speed.

**Drop Timing (s)**

2.4

The time in seconds between drops that Ignis 1 should drop at. If this mission is used with Ignis 2, then Ignis 2's drop spacing will be set to this times the cruise speed. This column is ignored if the Drop Spacing (m) column is in the file. Ignis 1 has a minimum drop timing of 2.4 s between drops.

**Curve Range (m)**

1

The distance from a waypoint at which the drone should start curving its flight path towards the next waypoint. If this value is less than 0.2, the drone will stop at each waypoint. DJI drones always stop at the first waypoint regardless of this value.

**Vertical flight path to first waypoint (0 = Straight)(1 = Safe)**

1

The path the drone will fly to the first waypoint. If 0, the drone will fly a straight line directly to the first waypoint. If 1, the drone will first ascend to the waypoint's altitude and fly horizontally to the waypoint. If the drone is already higher than the waypoint, it will instead fly horizontally until it is directly above the waypoint, and then descend to the waypoint.

**Drone Heading (0 = Towards next Waypoint)(1 = Controlled by RC)**

0

How the drone should turn whenever it reaches a waypoint. If 0, the drone will turn towards the next waypoint. If 1, the drone will turn towards the first waypoint when the mission is started, but then will not automatically turn at any waypoint afterwards.

**Lost Link Procedure (0 = Continue mission)(1 = End mission immediately)**

1

How the drone should behave if it loses connection to the RC while it is on the mission. If 0, it will continue flying the mission to completion. If connection to the RC has not been regained, it will execute its lost link procedure. If 1, it will end the mission immediately and execute the lost link procedure as soon as connection to the RC is lost. We strongly recommend using the end mission immediately option.

**Transect Line Spacing (m)**

100

The spacing in meters between transect lines in the transect region. The first transect line will start half this far into the transect region, and then each transect line will be offset by this distance.

**Transect Zig-zag Heading (degrees clockwise from North)**

90

Each transect will be flown positioned perpendicular to this direction, and the flight path will end with the transect furthest along in this direction.

**Distance between photos (m)**

20.25

The horizontal distance in meters that should be flown along the flightpath before the next photo is taken. Currently, this is only used to display a visual guide showing what area each photo will cover, but in the future, this will control when the app takes a photo with a DJI camera.

**Time between photos (s)**

5.3

The time in seconds between when photos are taken. Currently, this is only used to display a visual guide showing what area each photo will cover. If the Distance between photos (m) column is in the file, this value is ignored.