

MISSIONS

USER MANUAL



Solex

Missions in Solex are different from Tower. They're intended to have more capability, but be simpler to live with. They're loaded into the vehicle the same way, but if Solex is connected to the vehicle while it's flying, it can do extra things while the mission is being flown. Also the way a mission appears on the solexMap is a bit different in Solex. Instead of things like "Set Speed" appearing as separate waypoints, waypoints themselves have speed settings that take effect when that waypoint becomes the current waypoint.

Mission Editor

The primary way to create and edit missions is in the Mission Editor, accessible from the main menu. The list of Missions you've created is seen from the Mission list (which appears when you click the "Missions" button on the left). The toolbar at the top lets you add or delete waypoints to/from a mission, or undo recent changes you've made.

First Mission

Click New Mission on the menu. (If you just opened the Mission Editor, this step isn't necessary.)

Setting a location

If you just opened the mission editor, it should be positioned at your current location on the solexMap. (Unless you're on a Samsung device, which it doesn't seem to very often.) If you have a specific place you want to create a mission at, then select "Search Address" from the menu. (You'll need an internet connection for this.) Type in the address, ZIP code, etc. you're interested in, and it will show you a list of addresses matching what you typed. Pick one, and the solexMap will pan to that location. You can also search for a lat/lng directly by typing it into the search field.

Dropping Waypoints

To drop waypoints into a mission, click the "+" marker in the toolbar, which will then turn green. To the right on the toolbar, there will be a drop-down list of waypoint types that you can drop. Pick Waypoint for now, and click in several places on the solexMap. At each point, you'll drop a marker. (If you click too closely to another marker, it won't drop one. This is so you avoid dropping a bunch of waypoints at the same location.) (Tip: It's a good idea to drop a waypoint at the start of your mission and drop another one right next to it to serve as the first waypoint. Then change the first one to a Takeoff item.)

Spline Points

Spline points cause the vehicle to fly in a smooth path between them, without stopping abruptly. The vehicle does this by calculating a "spline path" between points, with extra waypoints in between. Solex represents this on the screen by generating similar splines. So you'll notice that if you draw a path with spline points, the line between the points will curve to them. **It's important to note**, however, that this line does *not* necessarily reflect the actual line your vehicle will fly on a mission. The algorithm that calculates the splines on the solexMap screen is not the same one that calculates the path the vehicle will fly. So if you get the idea that you can use spline points to fly really close to something based on the lines you're seeing on the screen, the advice is **don't**.

Changing a Waypoint

Suppose you just dropped 5 waypoints, and you want the first item to be a takeoff point. Click either the first location on the solexMap, or the first item in the horizontal list at the bottom. To your right, you'll see a panel slide out with a bunch of sliders on it. These are attributes of the waypoint that you can edit. The top sliders are common to most waypoints. The next set (under "Details") is the set of attributes specific to that type of waypoint. In the case of a Waypoint, you get delay, acceptance radius, yaw angle, and so on. At the bottom, you'll see "Actions", which are covered later.

Since we want to change the first item to a Takeoff, just click the top of the panel, and it will drop down a list of items. Click "Takeoff" in the list. The panel's contents will change to show just the relevant attributes for a Takeoff. It also disappears off of the solexMap, because a Takeoff doesn't really have a defined point; it's just the location your vehicle is sitting when it takes off.

Here's something else to try: Click the second item in the mission and try to change it to a Takeoff. Notice how you can't. That's because it makes no sense to take off from somewhere inside the mission. In the same way, you can't change something in the middle of a mission to a Land or RTL point, because that makes no sense either.

But you can change an intermediate waypoint to something else. Try selecting "Circle" instead of Takeoff. Now you're looking at a Circle waypoint. You see attributes for setting the number of turns and the circle's radius. Mess with the Radius slider, and you'll see the circle's radius change on the solexMap. Now change it to Spline or something. Pretty straightforward.

Multi-Select

You can click the "multi-select" or drag-select tool on the toolbar and drag across a number of waypoints to change something about them as a group. There are some rules to how this works:

- You can always edit the altitude and speed of the items you select as a group.
- If the items you select are all of the same type, you can edit type-specific attributes for them. For example, changing the Yaw Angle on a group of Waypoints affects all of the selected Waypoints. The other attributes (delay, etc) are left as they are for each item. Only the items you change are applied to all of the selected items.
- If you select a group of items that are the same type, you can change their type collectively. For example, selecting a group of Waypoints and changing them to Splines or Circle items is possible.
- If you select a group of items that contains different types, you can only change altitude or speed. You cannot change type, or any of the type-specific attributes, since it would make no sense to do so.

That's about it.

Deleting a Waypoint

Click the trash can icon on the toolbar and pick something to delete, either by clicking the item on the solexMap, or in the bottom list. It will disappear. If you didn't mean to do it, hit the Undo button, and it will re-appear.

To stop deleting things when you click them, click the trash can icon until it's not highlighted.

Changing Waypoint Order

You can change the order of waypoints in a mission by long-pressing them in the bottom list and dragging them forward or backward. Note that you can't do things like dragging a Takeoff forward, an RTL backward, etc. The idea is to restrict changes you make here to ensure the changes make sense.

Terrain Following

Altitudes in missions are defined as distance from the ground (AGL) at the takeoff location. So if you draw a mission in the editor that encompasses, say, a hill or valley, you'll have to manage your waypoint altitude carefully to avoid either flying too high, or flying into the side of a hill. Or, you can use the **Follow Terrain** action in the Mission Editor.

In order to use this, you have to have access to an internet connection. Draw all of your waypoints on the solexMap wherever you see fit. Once you've done so, select "Follow Terrain..." from the menu (it will be grayed out if you don't have an internet connection, or your mission is empty). On the dialog box that appears, click **Apply Elevations**. Solex will look up the elevation for each location in your mission to find the ground elevation at each location. Then for each location in the mission, it will add the difference between the first location's elevation and the current location's elevation to the current location's altitude.

Note: You only need the internet connection while you're applying elevations to waypoints during mission editing. You don't need it to fly the mission. Also, if you move any waypoints after applying elevations, you should apply elevations again to make sure their altitudes work with their new ground elevations.

So, for example, suppose you have a mission where the first waypoint is at the bottom of a 30-meter hill and the next waypoint is at the top of the hill, and the altitudes of both waypoints are at 10 meters. After applying elevation, the altitude of the second top-of-the-hill waypoint will be 40 meters.

Warnings

Suppose you set a waypoint at the bottom of a hill, and another one some of the way down the far side of a hill or at the bottom of the opposite side. In this case, Solex will look for the highest elevation between those points and check whether the angle to the high point is higher than the angle between the destination points. If it is, it will warn you of problem areas and mark them on the solexMap so you can put additional waypoints of your choice there. Drop additional waypoints, and drag them to the right position in the bottom waypoint list view. Once they're in place, run Terrain Follow again.

On infrequent occasions, Solex might flag a point right next to a waypoint as a possible error. This can happen on terraced fields if you drop individual waypoints on the tops of the terraces. In this case, you can just click Use Anyway in the warning dialog that appears, and elevations will be applied normally.

Note that terrain following does not apply to multi-point waypoint items such as surveys, Wall Scan, Tower Scan, Structure Scan, etc. Only the altitude of the item itself will be adjusted.

Saving a Mission

Click "SAVE" on the title area, specify a name for your mission, and click "SAVE" again. There you go. Now your mission should appear in the list you see when you select "Missions".

ROIs

You might have gotten creative and changed the point to an ROI, and noticed that it got "broken off" from the other points in the mission. There's no line going to it. That's because ROIs aren't part of the path your vehicle flies; they're things for your vehicle to look at while it's flying around. So go ahead and change a waypoint to an ROI. It will have a name "reset". Change this to something else, like "Test". Now you have a named ROI in your mission. Drag it so it's positioned on something interesting on the solexMap.

Actions

Actions are a lengthy topic, but you're probably wondering what to do with an ROI now that you've read about them.

Really the only thing you can do with an ROI is look at it. So, to tell the mission that you want to look at an ROI, select some other waypoint (or spline, etc) in your mission and scroll down to "Actions" on the side panel. Click "ADD". One of the items you'll see in the list is "Set ROI". Pick that. You'll see a new action in the Actions section called "Set ROI", with "click to set" next to it. Click "click to set", and you'll see a list of the ROIs currently in the mission. Click the one you created (Test), and hit OK. Now the action says "Set ROI Test". When your vehicle is flying a mission, it will turn and start staring at the ROI's location as it begins its approach to this waypoint.

At each waypoint in the mission, you can set a different ROI, making your vehicle look at different things as it flies along. To reset the ROI (so your vehicle just flies normally), add a "Set ROI" action to a waypoint and set it to "None (reset)". At that point in the mission, your vehicle will just fly normally.

That's basically how Actions work.

You could try adding another action to a waypoint, like "Start Video", "Stop Video", "Set LEDs", etc. At that point in the mission (actually, on the approach to that waypoint), Solex will perform whatever actions are defined for it.

Note that some actions are labeled "in-app" in the list where you select them. In-app actions are actually executed by Solex when the vehicle reaches a waypoint where they're to be executed. This means that a connection between Solex and the vehicle is required for them to execute successfully. Ones that are not labeled "in-app" execute on the vehicle itself, and don't depend on a connection.

Note that some of the actions occur in the mission itself (e.g. Set Servo, Set ROI), and others occur within Solex as it monitors the mission's progress. For this reason, it's a good idea to define in-app actions at a point in the mission where Solex has a connection to the vehicle. If you build some kind of long-range mission that takes it out of radio range (which you should not do anyway, for legal/safety reasons), none of the in-app actions will work although the mission will otherwise fly normally.

A note on "Set LEDs"

First of all, the TTS voice in Solex doesn't pronounce "LEDs" correctly. Secondly, there seems to be a conflict in the Solo where sometimes it will set the LEDs according to the action, and other times it will ignore the command and just keep pulsing the LEDs like it does when it's flying autonomously.)

Flying Missions

Flying missions, as you might expect, is done from the Map view in the flight screen. So when you go into the Map view, one of the layers is "Missions". Click that, and you'll see a list of missions.

Click one, and a panel containing "Send" and "Arm" buttons will appear. Click "Send" and the mission will be generated and sent to the vehicle. At that point, the Arm button can be used to arm the motors. Once you've done that: If your mission has a Takeoff point, you can click Start and the mission will start on its own. Otherwise, you can click Takeoff, and then Start. Alternatively, you can launch manually, and then click Start.

Skipping to Items in Mission

Once underway, you can click a waypoint on the solexMap and you'll see a prompt asking if you want to fly to that location in the mission. If you click "Yes", your vehicle will stop what it's doing, fly directly to that location in the mission, and continue from there.

Pausing/Resuming Missions

You can hit "Pause" to freeze the mission in mid-air. At this point, you can either hit "Resume" to resume flying, "Home" to RTL, or hit the "FLY" button on your transmitter to take manual control and fly normally. "Land" lands the vehicle right where it is, which you'll most likely only want to do in special cases. In the case of "Resume", your vehicle will start flying at the last speed it was flying at according to the waypoint speeds in your mission. If no waypoint speeds were set in a mission, then it will resume flying at the overall mission speed.

Editing from the Mission Layer

To edit a mission from the Mission layer, click the "Edit" button on the layer list panel. The currently-loaded mission will load into the Mission Editor, and it will appear. Mess around with it, press Save, and press Back. It should appear in the Mission Layer with the updates in place. You'll still need to send it to the vehicle manually.

Recording a Mission

The Map view has a "Flight Path" checkbox on the upper-right panel. Turning this on causes a green line to be traced wherever you fly. To clear or reset it, turn the check box off and on again. Once you've flown around a path you'd like to repeat, open the Missions layer after you've landed, and select "GENERATE MISSION". This will create a new mission called "Flight Path " followed by the date and time (you can rename it in the Mission Editor). The mission is created as all Waypoint items, and their altitude and location will match whatever your vehicle is at while flying.

Drawing a Mission with Lines

You can draw sequences of waypoints by drawing a line on the solexMap. Click the little "wiggly line" icon and you'll see the view change slightly, as a cue that you're drawing. Draw a shape on the solexMap. Waypoints of the selected type will appear in a line, reproducing the line you drew.

One thing to note about this. In order to avoid adding hundreds of waypoints from a drawn line, Solex filters out locations it considers unnecessary. So it decides on a minimum spacing between waypoints based on how much area the solexMap is covering. You'll notice that if you zoom in so the solexMap is covering a small area (like a back yard), the waypoints will be spaced about 10 feet or less apart. Conversely, if you zoom out so the solexMap is viewing a really large area (measured in miles), waypoints can potentially be miles apart. So, zooming in/out lets you control how far the waypoints are spaced.

Also, if a line's path doesn't represent a significant heading change (< 5 degrees), Solex won't insert an extraneous waypoint. The idea is that only waypoints needed to replicate the path are added.

You can use line-drawn waypoints in conjunction with the Add button too.

Clearing a Mission's Path from the Screen

You might want to remove a mission's markers from the solexMap so you can see a new flight path trace. Just click "CLEAR" on the Mission layer. This will remove all of the layer's markers, making it as if no mission is selected.

Console

The "console" is a little window that displays what's going on in the mission as it flies. You can click the little "cartoon bubble" icon in the upper right on the solexMap view to see it. Click it again (or the "X" in the title bar of the console) to close it.

Mission-related Vehicle Settings

Vehicle Settings has two mission-related settings: Mission Speed and Default Mission Altitude. **Mission Speed** is the WPNAV_SPEED parameter in your vehicle, and determines how fast it flies a mission by default, although you can obviously override mission speed for each waypoint. **Default Mission Altitude** just controls the default altitude for a waypoint when you start a new mission in the Mission Editor. Note that if you change a waypoint's altitude, all waypoints dropped after that one will have the same altitude by default.

Surveys

Surveys are kind of their own thing within missions. A Survey is an item in a mission that contains its own waypoints. Your vehicle won't fly straight to the waypoint, but will follow the path determined by the Survey.

Creating a Survey

To create a Survey, click the Add button and pick "Survey" from the waypoint type list. Tap the solexMap where you want the center of the survey to be, and it will display a message saying to draw the survey region. Draw a shape, and a polygon will be created that approximates what you drew. If you want a square, draw something vaguely square-shaped, and a polygon will appear that's sort of square-shaped. It won't be perfect, but it's OK because you can adjust it.

To adjust a Survey, use the normal editing tools. Move polygon points by dragging them around, and delete them by clicking the Delete button and clicking the points. If you don't like a move or delete you've just done, hit Undo and it will go back to where it was.

You can move an entire Survey around by dragging the center point. The whole collection of points will move along with it.

Survey Settings

Make sure you're not in "Delete" mode in the editor, and click on the center point of a Survey (or click on it in the horizontal list at the bottom). The Details panel will appear with settings for the Survey. You can adjust angle, overlap/sidelap, and whether to start taking pictures automatically when your vehicle enters the survey area. The Lock Orientation option makes your vehicle always face the same direction as it flies the survey.

To make a Spline Survey (a Survey involving spline points, hence the name), click Spline Survey and it will show the spline path the vehicle will take when flying the survey.

Tower Scan

Tower Scan is a type of mission item that allows for scanning things like wind turbines, radio towers, water towers, etc. It's meant to fly around a target at a specified radius, taking pictures (or recording video) as it goes.

A Tower Scan can be assigned the following attributes:

- Base Altitude: The value of the "Altitude" attribute
- Type: More on this below
- Top Alt: Highest altitude used in the scan
- Step Height: Altitude increase between scan runs
- Radius: Distance from the target
- Start Angle: The angle relative to the target where the scan starts. For example, to start on the East side of a target, specify 90.
- Scan Angle: How far the scan encircles the target. 360 is a complete circle, 180 is a half circle, and so on.
- Leg Count: How many "legs" to appear in the scan
- Take Pictures: For Vertical Scans, set a picture distance interval for taking pictures as the vehicle rises and falls. For Horizontal scans, take a picture at each stopping point.
- Reverse: Reverse the scan path so it starts at the opposite end. For example, for a scan starting on the East side of a target, start on the West side and go East.

The minimum number of legs is 3. In this case, the vehicle will fly to one side and point at the target, fly to half-way between that point and the other side, and finally to the other side. Obviously the number of legs you select influences the number of generated waypoints, the number of pictures taken, and the time required to fly the scan. Don't go nuts with the leg count, or the mission will take a very long time to complete.

Horizontal vs Vertical

There are two types of Tower scan: Horizontal and Vertical.

A Vertical scan starts at the base altitude of a scan leg and flies straight up to the top of the leg. Once there, it moves over to the next leg, and flies straight down to the base altitude. It continues this pattern until the end of the scan. If you have "Take Picture" turned on, it stops at intervals on the way up or down and takes a picture.

A Horizontal scan starts at the base altitude and flies horizontally, stopping for 2 seconds at each leg (and optionally taking a picture). Once it completes a row, it rises by the Step Height altitude value and flies back the other direction through each leg, stopping at each point and taking a picture.

NOTE: When setting up a Tower Scan, pay close attention to the path drawn on the solexMap. The path will show entry into and the exit from the scan, which may not appear on the side of the tower scan you expect it to. This is because the path crosses from left to right and back during the scan, and the exit point (the one which heads to the next waypoint) will be on the side where the scan finishes. The path is clearly shown on the solexMap, so you can avoid crossing over to a waypoint that could cause your vehicle to collide with the object you're scanning. If you want to change the exit side of the scan, you can do so by adjusting the step height or top altitude of the scan.

Wall Scan

Wall Scan is a mission item type useful for doing linear scans of straight areas from the side. To use it, drop a Wall Scan item on the location you want to scan. Set the Wall Length setting to the length of the scan, and it will expand on either side of the dropped location. Use the At Distance setting to control how close to the location the vehicle will fly. Use Scan Angle to control which direction the scan will go. Scan Angle is expressed in degrees relative to the dropped point, with the scan direction being 90 degrees to that. So for example if you drop the point on a location and leave Scan Angle at 0 (North), the vehicle will fly on the North side of the object from East to West (or vice versa, depending on whether you have Reverse checked in the Wall Scan options). To fly North/South on the East side of the object, set the Scan Angle setting to 90 (East). Options are as follows:

- Wall Length: Length of the wall you're scanning.
- At Distance: Distance you want to fly from the wall.
- Scan Angle: Angle relative to the wall. 0 is North, 90 is East, and so on.
- Rows: Specifies how many rows to scan. A value of 1 will go from one end of the wall to the other. Each additional row will cause the vehicle to rise by the Step Height (below) and double back the other way.
- Step Height: How much to increase altitude for each additional horizontal run.
- Horz. Points: Specifies how many points are in a horizontal run.
- Take Pictures at points: Turn this on to take a picture at each point specified in "Horz. Points". If you want to record video of the scan instead, don't check this box. If you want to take pictures based on flight distance rather than points, add a "Camera Trigger" action to this waypoint with the desired distance.
- Aim at Center: If this is turned on, the camera will pan to point at the main marker for this item. If turned off, the vehicle will point straight ahead and fly back and forth sideways.

Grid

This is a fairly complex mission item that can do a lot of different things, but requires some planning in order to use it.

A Grid acts a bit like a survey, in that it causes the vehicle to travel a path back and forth over a polygon area. But instead of controlling the distance between survey runs (the lines going from end to end) by way of camera parameters, you specify the distance between the runs directly via the **width** attribute.

The normal mission-item attributes like Speed and Altitude are present if you need to specify them. **Angle** controls the angle relative to North that the lines on the Grid will be oriented.

Turns

You can specify the speed at which the vehicle flies (or rolls, as this is meant to be used with rovers as well) along runs, vs how fast it performs turns at the ends. You can also specify actions to be performed at the start of a turn, as well as at the start of a run. So imagine you have something attached to the vehicle that you want to turn on at the start of a run and off during turns. Run actions and Turn actions let you do that.

The **Turn Margin** attribute affects how closely the vehicle will change from Run to Turn speed (and vice versa) from the end of the run.

Turn **Delay** and **Run Delay** can be used to control how long the vehicle waits between speed changes. This is useful if you've assigned an action that takes some time to complete before the vehicle should continue the mission.

Guide Point

Depending on how it's configured and tuned, a vehicle may tend to wander after it makes a turn at the end and heads toward the waypoint at the opposite end of the run. Or, like a plane, it might swing wide around the waypoint and head to the opposite end at an angle. If this is undesirable, you can add Guide points to each run to give the vehicle something close to aim for, and get on track more quickly. You can also assign actions to be run at each Guide point if you want too. You can control how many Guide points there are between the ends of a run with the **Guide Count** attribute.

Loiter to Alt (Plane)

Loiter to Alt is a plane-specific waypoint type that tells a plane to spiral up or down over a given location until it reaches the specified altitude. It's useful when you have limited room in which to change altitude.

TIP: Loiter to Alt does not mess around. When you use it to climb, the plane will climb fairly aggressively to the desired altitude. When you use Loiter to Alt to decrease altitude, the plane may shut its motor down and enter a huge sweeping dive, similar to dives you may have seen in movies involving planes that plummet to earth after engine failure or being shot down. The first time you see this, you will likely experience the urge to scream or pass out, or soil yourself. Be strong, and resist the urge. The motor will restart and the plane will level off at the desired altitude.

Do Land Start (Plane)

Since planes have to use a specific landing approach (comprised of possibly a few waypoints followed by a Land item), it's necessary to have a location within a mission to indicate the start of the landing sequence. This is what the Do Land Start waypoint type can be used for. When you fly a plane mission that has a Do Land Start item in it, clicking the Land button will skip to that item's position in the mission, and immediately begin the landing sequence. Once that happens, the plane is considered to be in the process of landing. You can abort the landing by pressing the Abort button (which appears after passing Do Land Start), in which case the mission will skip to the Do Land Start item's position in the mission again.

Vehicle Type

While you're editing a mission, you can specify which kind of vehicle (copter, plane, rover) the mission is for. When you select a vehicle type, the types of waypoints available in the mission is limited only to items appropriate for that vehicle type. For example, a Plane-type mission has Loiter to Alt and Do Land Start items, but a Copter-type mission doesn't.

Dynamic ROIs

While you're running a mission, you can specify a ROI outside of the mission. The options at the top of the Mission info panel (where Send, Arm, etc are shown) control this. If you select "Me", your current location will be used as the ROI, and as you move, it will update. This is handy if, for example, you're moving in a vehicle or on foot and want the vehicle to pan toward you as you move.

The other option is **Touch**, which lets you specify a ROI point by touching the solexMap. When you have this turned on and touch the solexMap, a black marker will appear, and the vehicle will pan to point at that location. You can tap anywhere at any time, or drag the marker to change it.

To turn both of these off, select **None** from the options, and the vehicle will resume panning normally.

This obviously isn't as repeatable and consistent as explicit ROI commands in a mission, but that is more or less the point.

Future versions of Solex will allow incoming ROIs to come from Solex Target and other sources.

Download

To check which mission you have loaded on the vehicle, or to validate that a mission you sent was sent correctly, you can use the Download button in the Mission Layer. When you do this, Solex requests a list of waypoints from the vehicle. If a mission is loaded on the vehicle, it will eventually call back to Solex with a list of waypoints. At that point, Solex will draw a set of yellow markers on the solexMap showing the items in the mission. Once it's done that, you can launch the mission from the Mission Layer. Note that if the mission was originally a mission with in-app actions (Start Video, etc) associated with waypoints, those actions won't be run. The original Solex mission has to be loaded for in-app actions to be found for a given waypoint as it arrives.

Show Mission

Once you've downloaded the mission from the vehicle, you can click "Show Mission" in the Mission Layer to view details of the mission. This will show the waypoints, Change Speed commands, Camera Trigger distances, Takeoff and RTL points, etc. It's handy for checking to make sure the mission is going to do what you think it's going to.

Import / Export

There's a file format known as "QGC" that is supported by several different GCS apps (like QGroundControl, unsurprisingly). If you want to export a Solex mission for use in one of those, you can use the Export Mission item on the Mission Editor's menu. Note that if you do this, any in-app actions you defined for waypoints (Set LEDs, Start/Stop Video, etc) won't be exported, because they're not supported by other GCSes. All waypoints, speed-change commands, etc, however, will be.

Importing QGC files

You can also import a mission created in a different GCS into Solex. Once you do this, you'll need to set the ROI actions on waypoints manually, since there's really no way for Solex to know which waypoints you intend to have assigned to ROIs.

Importing CSV files

Solex supports the import of CSV files that describe a path with altitude and yaw data. If you create a CSV file that looks like this:

```
latitude,longitude,altitude(m),heading(deg),curvesize(m),rotationdir,gimbalmode,gimbalpitchangle  
37.0147402238,-113.5530467166,5.3696548082,62.9999592118,0.2,0,2,-3.0780659642
```

Solex can import this and make a mission out of it. The `lat/lng/altitude` fields specify the location of each waypoint. If the `heading(deg)` field has a value of > 0 , the waypoint will have an explicit yaw setting specified on it. `curvesize(m)` isn't currently used, nor are `rotationdir` or `gimbalmode`.

This will all be updated at some point to be more comprehensive and allow for ROIs to be specified among other things.

To import a file like this, open it in any app on your Android device that supports opening files (eg Google Drive or Dropbox). On Dropbox, you need to select the little "popup menu" item to the right of a .csv file's name, and select "Open with..." from the menu. When you do that, Solex should appear as a possible target for opening the file. Select Solex from the list, and it will ask if you want to import the file. If you say "Yes" and the file is valid, it will generate a mission from the points it finds in the file.

Camera Settings

Solex includes all of the camera info that's known to DroneKit. When you connect to a vehicle, Solex will download and save all of the camera info provided by DroneKit, and save it in the `camera/` directory on your device.

When you open the details view on a Survey waypoint, you'll see the available cameras. Obviously for the Solo, the selection of cameras isn't going to be as wide as the one shown in the list; you'll want to select the appropriate GoPro Hero camera for your setup.

If you need to add cameras, you can do that too. First you create a file like the one shown below, then ensure you have the **Store files externally** option turned on in Vehicle Settings. Once you've done that, you'll be able to find camera files in under `/sdcard/Solex/camera`. This is the directory where you'll put your camera file. Once you've done that, you'll be able to use it in a Survey.

Sample camera definition

```
{
  "name": "GoPro Hero 3+ Black (Wide)",
  "sensor_width": 6.17,
  "sensor_height": 4.55,
  "sensor_res": 12,
  "focal_length": 2.8,
  "overlap": 50,
  "sidelap": 60,
  "landscape": false
}
```