FLYING EYE

User Manual

Parachutes & Flight Termination System
GeoFencing Standalone

DJI Matrice 3 (Dock 2)

Made in France

Summary

1. Standalone GeoFencing Use 01 - 17
 1.1. Introduction 01
 1.2. Machine Interaction 03
  1.2.1. Standalone Remote Control 03
  1.2.2. Main interface screen 05
  1.2.3. Specific sequences 08
   1.2.3.1. Switching on and off 08
   1.2.3.2. USB storage mode 09
  1.2.4. FTS status 09
  1.2.5. Geofencing status 10
  1.2.6. Standard operating procedures 12
   1.2.6.1. Loading the fence 12
   1.2.6.2. Standard use 13
  1.2.7. Fence structure 14
  1.2.8. Fence invalidation 16
2. GeoFence Editor 17 - 22
 2.1. Presentation 17
 2.2. Login and user management 18
 2.3. Editing commands 19

1. Standalone GeoFencing Use

1.1. Introduction

This document summarizes the specifications of the GeoFencing system in its Standalone application. The system consists of a remote control that can be fitted to the drone's own remote control, a receiver mounted on the machine, as well as a flight termination system (FTS), a parachute and a set of mounting parts for integration on the target drone (battery extender, mounting bracket, connection cable, etc.). The following figure shows the components required to install the FTS/Parachute system with geofencing on the Matrice 3.

Pic.1: FTS/Parachute system component with Geofencing for Matrix 3 (version 1).

The part fitted to the drone is autonomous, enabling standard use of the machine as specified by the manufacturer. The following images show the complete system mounted on a DJI Matrice 3.

Pic.2: Receiver and parachute attached to Matrice 3.

Pic.3: Battery extender for mounting the FTS on the Matrice 3 (version 2).

FTS/Parachute and geofencing are operated from the Standalone remote control on the ground. It is fitted to the drone's remote control and communicates with the receiver via a dedicated channel (868MHz) independent of those used by the drone.

All interactions with the system are carried out via this remote control, including:

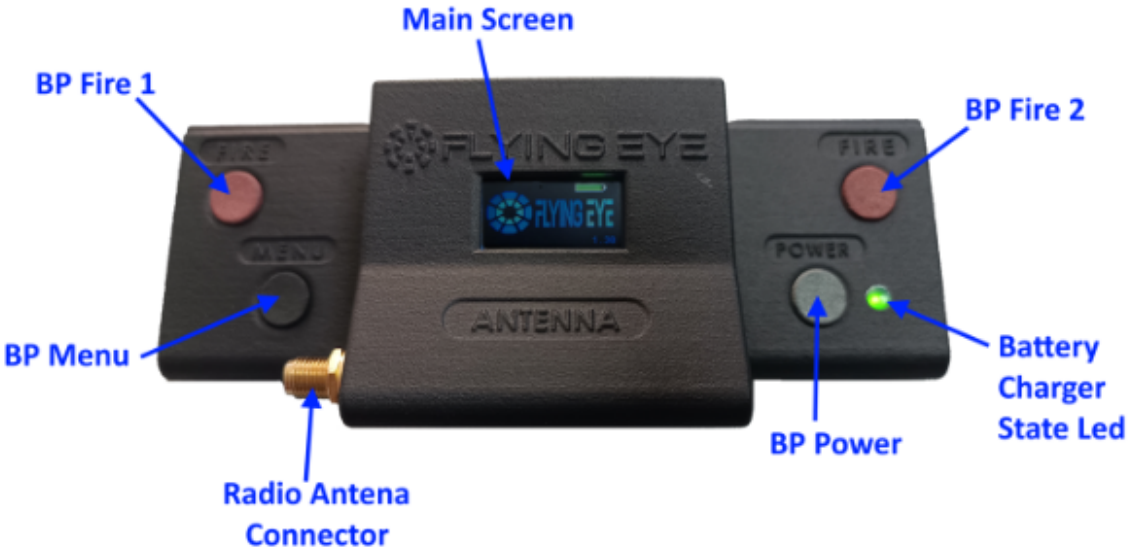
- motor cut-off and manual parachute release,
- continuous visualization of FTS status,
- radio signal quality with the receiver,
- remote control battery status,
- and real-time geofencing supervision (operating mode, drone status in the fence, error management).

1.2. Human Machine Interaction

1.2.1. Standalone remote control

The remote control is therefore the central element in the use of the system. It has several interface elements enabling the user to interact with the FTS/Parachute with Geofencing.

The following figure shows these elements :



Pic.4: HMI Standalone remote control (v4.0).

The list of components is as follows:

- The **BP Power** push-button switches the remote control on and off. The sequence of both is close to that of DJI (by system cohesion), which corresponds to a short press followed by a long press.
- The **BP Menu** button activates the remote control's USB transfer mode, which extracts the usage logs and enables you to update the drone's fence.

For safety reasons, this mode must be used with the machine switched off, in the following sequence. The remote control must be switched on by holding down the menu button throughout the switch-on sequence (short, then long press on the Power button).

The remote control can be considered as a generic USB storage device (standard USB key).

- Fire 1 and Fire 2 push-buttons for manual cut-off. Both buttons must be pressed simultaneously to trigger the cut-off.
- The radio antenna connector enables the appropriate antenna to be attached to the machine, usually a standard stick antenna, ensuring system operation within a guaranteed maximum perimeter of 2 km.
- The main display shows all the system's feedback, and is described in detail in the next section.

1.2.2. Main interface screen

The main display is the heart of the system's HMI. It provides telemetric feedback with the receiver, and continuously supplies the user with its status. The following figure shows the various display sections.

Pic.5: Main screen composition.

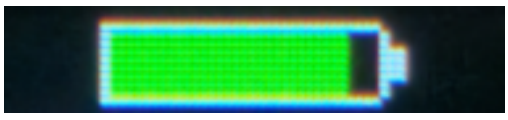
The operating display is divided into four distinct parts:

- **Radio link status with the receiver**

Pic.6: RSSI icon for radio signal quality.

The status icon shows four bars illustrating the RSSI level of radio communication:
-4 bars -> Very strong signal (optimal operation)
-3 bars -> Strong signal (normal operation)
-2 bars -> Normal signal (correct operation, no micro cut)
-1 bar -> Weak signal (possible micro cut, be careful)
-0 bar with red cross -> Loss of Signal

- **Remote control battery status**



Pic.7: Battery status icon.

The battery icon is represented by a color-coded battery whose level represents the remote control's battery level :

- A green variation indicates a correct battery level, corresponding to normal use of the remote control. Always start a flight with the battery charged.

- A change to orange indicates a low battery level, and care should be taken if the system is in flight. However, the battery level is sufficient to complete the current flight. The remote control must be recharged before the next flight.

- A change to red indicates a critical battery level, and we strongly recommend that you stop flying and fully recharge the battery.

- **The status of the FTS cut-off system on board the machine (cut-off status, parachute assembly errors, etc., detailed in the next section).**

- **The status of the Geofencing system on board the receiver, whether it is active or not, and indicates the status of the drone in the fence (detailed in the next section).**

1.2.3. Main interface screen

1.2.3.1 Switching on and off

When the remote control is switched on, the following welcome image is displayed :

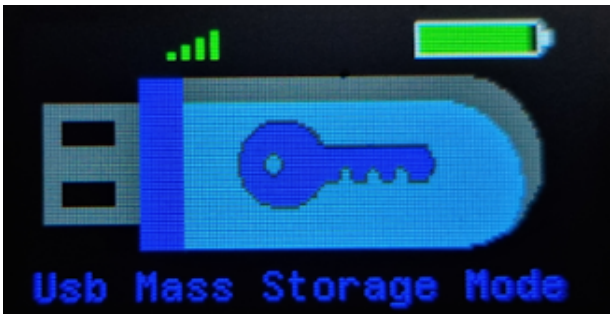
Pic.8: Remote control welcome image.

To enhance user-friendliness, during the switch-on sequence (short press followed by long press), the image is displayed complete on the first short press, then the logo wheel progressively lights up on the second press to indicate the time required for the long press. Once the wheel is complete, the user knows he can release the button and the sequence is complete.

The same applies to the switch-off sequence: the image is displayed on the first press to indicate the switch-off request, then on the second press, the logo wheel progressively fades out, and when the wheel has disappeared, the user can release the button, the sequence is complete.

1.2.3.2 USB storage mode

To indicate that USB mode has been activated following the USB storage mode activation sequence, i.e. a power-on sequence with the Menu button pressed. The following image is displayed :



Pic.9: Remote control storage mode image.

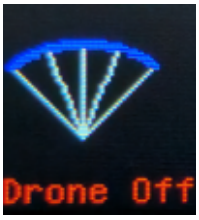
It's best to connect the remote control to the computer before proceeding with this sequence, as the USB will be installed immediately. The remote behaves like a standard USB key when in this mode.

To exit and return to standard remote control operation, a power-down sequence is required, or the remote control must be rebooted.

1.2.4. FTS status

The status of the FTS, i.e. the cut-off system, is displayed on the left-hand side of the main screen. The following icons can be displayed and correspond to a particular status:

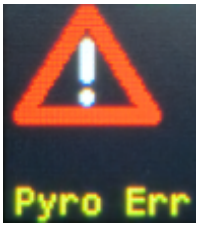
Indicates that the cut-off system is fully operational, the drone is powered up and the user can initiate manual cut-off.



Indicates that the system has been switched off, either manually by the user or by the geofencing system. The display flashes a red square around the icon.

Indicates that the radio link with the receiver is broken. The drone may not be switched on, or may be out of range.

Indicates that the pyrotechnic charges are not connected. Please check parachute assembly.

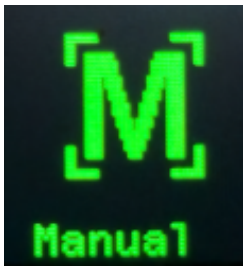


If the pyrotechnic charges are damaged or incorrectly connected, they must be inspected and the assembly checked.

1.2.5. Geofencing status

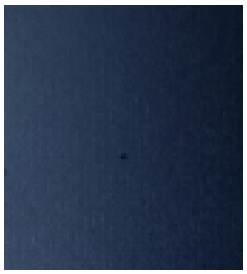
The geofencing status is displayed on the right-hand side of the main screen, with the following icons corresponding to a particular status :

This icon is displayed quickly on startup to indicate that geofencing is being initialized (waiting for the machine's telemetric return). This time may be very short, and it may not be displayed in time.)

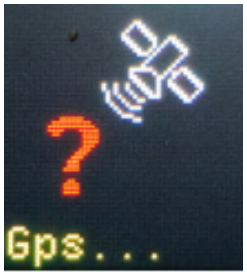


Indicates that geofencing is deactivated, only manual tugging is possible. Manual mode is used when no fence is available on the remote control.

Indicates that loading of the fence from the remote control to the receiver is in progress; this may take some time for large fences (about 1 min for a 150-point fence). This icon is also displayed on power-up to indicate that the remote control is synchronized with the receiver (checking the integrity of the fences contained on each side).



A blank screen may be displayed when the drone is switched off and the connection to the radio is broken. The FTS No Radio icon is then displayed on the left of the screen (see above).



Indicates that geofencing is active, but that the GPS signal is not yet accurate enough to activate it. The user must wait for a reliable signal before taking off.

Indicates that the drone is inside the fence, and the user can take off and navigate in the active fence in complete safety.

Indicates that the drone is approaching the edge of the fence or a No Fly zone, in which case caution is advised.

Indicates that the drone is out of the fence, with automatic triggering, and the FTS icon will be displayed on the left when the cut is effective.

1.2.6. Standard operating procedures

1.2.6.1 Loading the Fence

To load a new fence, the user must switch the remote control to USB storage mode and root the fence file with the following name and format :

fences.json

This file can be created using the Fence Editor tool, available online from FlyingEye at the following address

www.geofence-editor.flyingeye.fr

Once the fence file has been loaded into the remote control, the latter must be restarted, then the drone must also be restarted. Loading the fence into the receiver is indicated by the Loading icon, and is accepted when fencing is enabled by the fencing status icons. If the fence is invalid (incorrect structure or format), the system will automatically switch to manual mode, and the fence must be corrected using the tool.

1.2.6.2. Standard Use

Standard use of geofencing requires the following operation. The remote control must be switched on first, so that the active fence is available. The drone is then switched on to load a new fence, or to confirm that the fence on board the receiver matches that on the remote control. Once the fence has been validated, the GPS signal confirmed and the icon indicating that the drone is inside the fence, the user can take off and complete the mission.

The standard sequence of use can be described as follows:

- Switch on remote control
- Check battery status
- Turn on drone
- Check radio signal quality

- FTS status check (active pyrotechnic charge, no faults)
- Fencing status check (drone inside)
- Take-off and operational mission
- Drone landing and shutdown
- Remote control shutdown
- Recharge drone battery or replace battery
- Recharge remote control battery if necessary

1.2.7. Fence structure

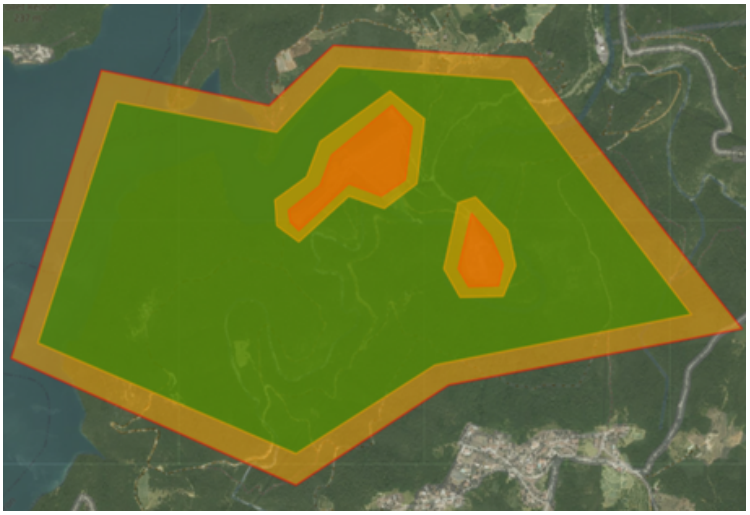
As a reminder, the structure of a fence is made up of several elements:

The main fence: this corresponds to the authorized perimeter of the flight. All exits mean automatic neutralization of the machine (engine and parachute shutdown).
The Warning fence corresponds to the internal perimeter of the fence outside which the machine approaches the edge of the fence, informing the user (pilot) of a possible risk of exiting the fence.
The No Fly Zone is a strict no-fly zone inside the fence. If the drone enters the fence, it will automatically be neutralized. The current maximum number of NFZs is five.

The Warning No Fly Zone corresponds to the safety perimeter around each No Fly Zone, informing the user of the risk of approaching the No Fly Zone. The current maximum number of Warning NFZs is five.

The following figures show several examples of valid Fence Editor fences.

Pic.10: Example 1, complete fence valid with NFZ.



Pic.11: Example 2, complete fence valid with NFZ.

Pic.12: Example 3, complete fence valid without NFZ.

1.2.8. Fence invalidation

The criteria for invalidating a fence relate to the integrity of each element. There can only be one fence associated with a single warning fence. By definition, each fence perimeter drawn must correspond to a single, closed, uncrossed polygon. Similarly, there can only be a maximum of five NFZs associated with a maximum of five Warning NFZs.
Although permitted, it is recommended that you define a warning fence internal to the main fence, and that you define a Warning NFZ external to their associated NFZ. Furthermore, the definition of NFZs and Warning NFZs is optional.
It is the user's responsibility to define a valid fence and ensure that it is loaded. It is also the user's responsibility to take off within the active fence, otherwise the fence will not be activated on start-up, but only when the drone enters it.

In the event of theft without fence, it is necessary to ensure that the fence is deactivated (no fence at the root of the remote control in USB mode) and that the Manual icon is displayed.

2. GeoFence Editor

2.1. Presentation

In order to edit a fence, a specific tool is deployed as a Web server. Called GeoFence Editor, it provides access to all possible editing tools for designing a fence compatible with Standalone use. Here's an overview of its interface.

Pic.13: GeoFence Editor.

Its design is deliberately minimalist to enhance user ergonomics. A header is displayed at the top of the page, specifying the logged-in user, user options, application version, and a logout button.

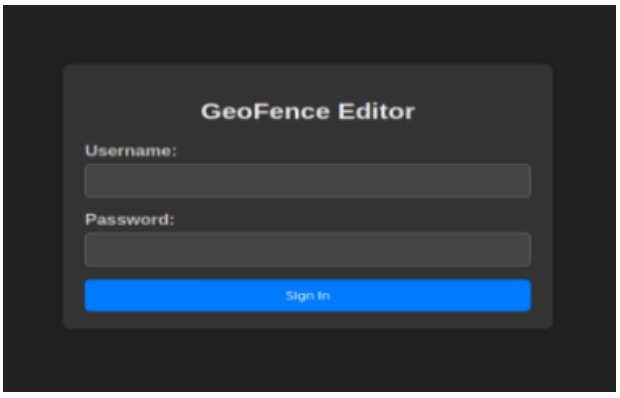
Next, a map is displayed, which can be customized by choosing tiles (street view and/or satellite view) with transparency management (tool at top right). Editing tools are found on the left, in the form of a set of commands. These are described in detail in the following section.

The address for accessing this service is: (currently being deployed)

www.geofence-editor.flyingeye.fr

2.2. Login and user management

Access to the service is secure, and only clients of a standalone system are authorized. Connection to the service is therefore via this login page.



Pic.14: GeoFence Editor Login.

Once logged in, users can access their account settings by clicking on the following “setting” logo :

	Access to the user parameter page. Allows you to change your password and personalize your user account.

Each customer is automatically opened an account with a default password. On first login, customers are advised to personalize their password via this interface.

2.3. Editing commands

Editing is performed through the use of selectable commands in the form of buttons on the left-hand side of the editor, on top of the map. When the user clicks on one of these, it is highlighted to indicate that it is active. Each of these is represented by the following icons and corresponds to the following functionalities :

	The search engine enables users to easily find a specific location by entering the name of a town or address. A dialog box appears, in which the user can type the name into a text field and validate with the “Search” button.
	Editing the main fence. Draws the fence polygon (orange with red border). Click to enter edit mode, click on the map to draw, then validate the contour by selecting the first point or by clicking this button again.
	Editing warning Fence. Draws the warning polygon associated with the Fence (green with orange border).
	Editing No Fly Zone (NFZ). Draw NFZ polygon (red with red border).
	Warning NFZ editing. Draw polygons associated with NFZs (orange with red border).
	Switch to polygon editing mode. Allows the user to correct polygons already drawn, add and/or delete points.

	Deleting polygons. Allows the user to delete a targeted polygon.
	Backup. Saves the current Fence in the json format expected by the Standalon remote control (geojson standard with extended properties).
	Fence loading. Allows the user to reload a fence previously edited.
	Cleaning. Allows the user to delete all fences currently being edited (reset editing to zero).

The editing procedure is very simple and ergonomic:

- Use the search engine to find the location of your system.
- Draw the main Fence and confirm.
- Draw the warning Fence and confirm.
- Add No Fly Zone (NFZ) and validate (optional step).
- Add NFZ warnings and validate (optional step).
- Meticulously adjust each point with the editing tool.
- Save the Fence as “fences.json”.
- Connect the remote control via USB and start it up in MassStorage mode.
- Copy the fence file fences.json to the root (be careful to respect the file name).
- Restart the remote control (in normal mode).
- Restart the machine and wait for the fence to load.
- Once activated, the fencing status confirms loading.
- The user can proceed with the flight.

FLYING EYE

WWW.FLYINGEYE.FR

INFO@FLYINGEYE.FR

09.72.62.78.50

400 AVENUE ROUMANILLE
GREEN SIDE - BATIMENT 1B
06410 BIOT / SOPHIA ANTIPOLIS

V1 18th February 2025