

# GPS-F3F v1.0

## User guide

### 1.1 DESCRIPTION

*GPS-F3F* is a Lua script for practising F3F runs without physical bases or timing gear. Instead, the script uses GPS telemetry to track the model.

The script reproduces the full F3F experience including 30-sec countdown, on/off course announcements, leg counts and run time.

For latest version see <https://rc-soar.com/edgetx/lua/gpsf3f/>

**V1.0 changes from Beta 3:** revised packet codes and status messages.

### 1.2 REQUIREMENTS

The following are required:

#### Transmitter

- Mono radio with 128x64 screen (Boxer, Pocket, Zorro, GX12 etc.), or
- Colour radio with 480x272 colour screen (TX16S etc.)

#### Operating system

- Mono radios: EdgeTX 2.10 or later, or OpenTX 2.3.15
- Colour radios: EdgeTX 2.10 or later

#### RF protocol

- Any protocol which supports GPS telemetry should work, though only tested with ELRS so far.

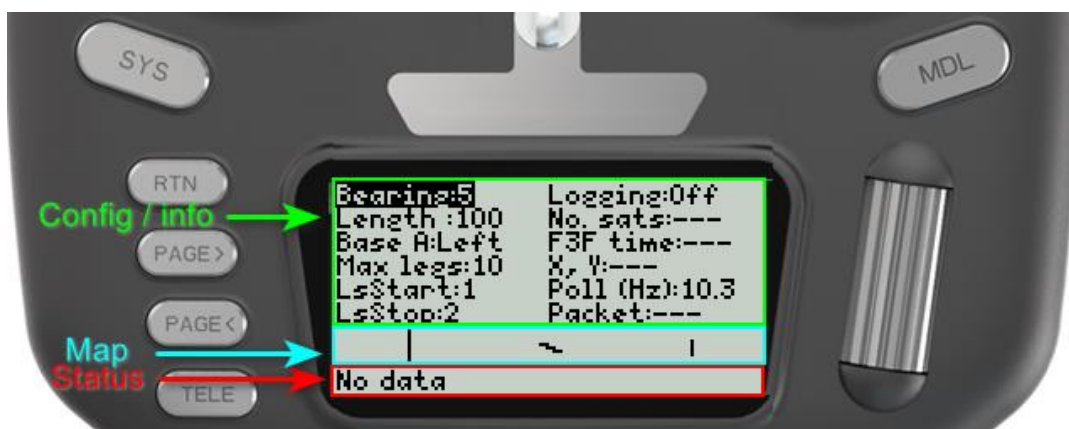
#### Sensor

- GPS Sensor supplying a 'GPS' data stream with Lat/Lon values

*The author's development setup consisted of **Radiomaster Pocket (ELRS)**, **Radiomaster ER8GV receiver** and **Radiomaster ERS-GPS sensor (mode 1)**. Also tested using **RM Zorro** and **Steve Chang's GPS sensor**.*

### 1.3 THE SCREEN

The script screen is divided into three panels:



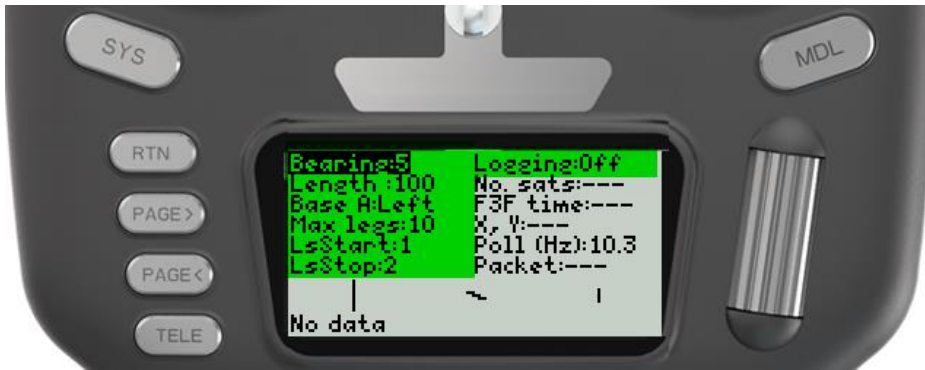
- The top panel is for course configuration and info.
- The middle panel shows a rudimentary map showing the model's position relative to centre.
- The lower panel shows a single status line.

## 1.4 CONFIGURATION/INFO PANEL

The Config/Info panel is for configuring the course and monitoring the system.

### 1.4.1 Configuration fields (editable)

The configuration is entered in fields marked in green below:



- **Bearing:** compass bearing (0 – 360 degrees) of base sighting line towards windward horizon.
- **Length:** the length of the course (10 - 100 meters)
- **Base A:** the direction (Left or Right) of base A from the pov of pilot facing the slope.
- **Max legs:** the number of legs to time. Normally 10 but can be increased for extended practice.
- **LsStart / LsStop:** logical switches numbers for start/stop (see below).
- **Logging:** logging on/off (see section 1.11)

All configuration parameters except Logging are saved between sessions

### 1.4.2 Information fields (read only)

These fields are for info and cannot be edited.



- **No. sats:** number of satellites reported by the sensor
- **F3F time:** time of the last completed F3F run (secs x 100)
- **X, Y:** X and Y coordinates (meters) of the sensor relative to home position. X is positive towards the RH base, Y is positive away from slope.
- **Poll (Hz):** the rate at which the script polls sensor telemetry (Hz x 10). Refreshed every 10 seconds. Expect 20Hz for mono tx's, ~16 Hz for colour tx's.
- **Packet:** packet status:
  - F = fresh packet
  - C = not fresh but still current
  - W = waiting for data
  - N = no sensor found
  - E = data error

Once a connection is established, the packet status should alternate between **F** and **C**.

## 1.5 INSTALLATION/UPDATING

Depending on the radio, *GPS-F3F* runs either as a telemetry script or a widget. To install or update the script:

1. Download the ZIP package and extract the files.
2. Start the transmitter in bootloader mode and connect via USB. The SD card should be visible as a new drive.
3. Drag the unzipped SCRIPTS folder to the root folder of the SD card. This will create and/or populate folders \SCRIPTS\TELEMETRY and \SCRIPTS\TELEMETRY\f3f.
4. Open the unzipped SOUNDS folder; then drag the .wav files to the SOUNDS\{language} folder on the SD card. Example: if you use 'English' locale, copy the .wav files to the SOUNDS\EN folder.
5. **Colour radios only:** select the unzipped WIDGETS folder and drag to the root of the SD card.
6. Terminate the USB connection and reboot the transmitter.
7. **Mono radios:** in the Model setup > Display menu, select 'script' and choose 'gpsf3f'  
**Colour radios:** select the gpsf3f widget and assign to full screen window. ***Additionally, select Full Screen mode (this is needed for EdgeTX to receive user input). To enter Full Screen mode, long press Enter, the press Enter again and select 'full screen'.***

## 1.6 CONFIGURE START/ABORT SWITCHES

The script requires two logical switches for starting and aborting a run. These will normally be based on physical switches. For example, to start/abort using switch SA, create two logical switches LS40 and LS41 (say):

```
LS40: AND, SA-down, ---  
LS41: AND, SA-up, ---
```

Next, enter the logical switch numbers in the **LsStart** and **LsStop** configuration fields (see section 1.4.1). In this example, you would set **LsStart** to 40 and **LsStop** to 41.

**Tip:** if possible, choose the same logical switch numbers in every model that uses the script. This will avoid the need to reconfigure **LsStart** and **LsStop** when you change models. The underlying physical switches can be different for each model.

## 1.7 BENCH TESTING

After installation, it's time to check it all works! Testing is best done outdoors for reliable GPS reception.

1. Switch on tx, rx, and wait for satellites. An alert is sounded when GPS data is received.
2. Press the MDL/MENU button (sets the centre of the virtual course)
3. Press Start and check that 'model launched' is sounded.

If you don't hear any alerts, then check that the volume is turned up and that the .wav files are in the correct location. If you still can't hear 'model launched', check that the **LsStart** logical switch is correctly configured.

## 1.8 SETTING UP THE VIRTUAL COURSE

Before your first flight at a new slope, set up the virtual course as follows:

1. Open the compass app on your mobile device. Take a bearing of a suitable sighting line (this is the line a buzzer man would use).
2. Enter the bearing in the Configuration panel (see section 1.4.1)
3. Set the side of base A and the length of the course.

This only needs to be done once, the course details being retained between power cycles.

## 1.9 FLYING INSTRUCTIONS

To fly the course:

1. Establish the RF link and wait for satellites.
2. While holding the model, stand at the centre of the course then press the **MDL/MENU** button. This (a) establishes the centre of the course and (b) activates the map.
3. Launch the model and press the Start button (as configured in **LsStart**).

After you start the run, the following will be sounded:

1. 'Model launched' followed by 30-second countdown
2. 'Off course', then 'On course'
3. Number of legs completed
4. Final run time

The F3F timer is started either at the end of the 30 sec countdown or when the model enters the course, whichever is sooner. The run may be aborted or restarted at any time using the Start and Abort switches.

## 1.10 ERROR HANDLING

Any lost or bad GPS packets will sound an alert and abort the run. Restart by activating the Start switch.

## 1.11 LOGGING (ADVANCED USERS, REQUIRES EDITING OF SCRIPT)

The script offers a custom logging facility for investigating GPS packets received by the script. This feature is disabled by default. To enable it, edit main.lua in the \SCRIPTS\TELEMETRY\f3f folder: change **main.isLoggingEnabled** from **false** to **true**. Logging can then be activated and deactivated via the config menu.

Each time logging is activated, a new .CSV file is created in the \LOGS folder. A record is written every script cycle.

**NOTE: Regular logging (via special function) should be disabled to avoid overloading the system!!**

## 1.12 LIMITATIONS

Like any GPS based system, there are some limitations to be aware of

- Latency in the system will mean that there is a small delay with buzzes and callouts
- GPS sensors tend to bail out at around 4G and in prolonged inverted flight.
- There may be a small amount of drift in the lat/lon values during a session.

## 1.13 NOTES

- For ELRS, a packet rate of 333Hz set and TLM of 1:2 is recommended.
- The script is executed at ~20Hz on mono radios, and ~17Hz on colour, so slightly better performance can be expected with the former.
- The precision of GPS location data depends on the number and distribution of the satellites. For more info see [Dilution of Precision](#) (Wikipedia).
- Flight testing was performed using Radiomaster hardware. If you test with other gear I would love to hear from you, please contact me with details of your setup including ELRS configuration and make of sensor.

## 1.14 ACKNOWLEDGEMENTS

My thanks to Radiomaster for providing the ERS-GPS unit.

- [Radiomaster home page](#)
- [Radiomaster ERS-GPS sensor](#)

## **1.15 CONTACT**

Your feedback will help improve the system; I can be contacted here: <https://rc-soar.com/email.htm>.

Happy F3F'ing  
Mike Shellim