

ESP-IDF GPS Logger

User manual

Document information

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This manual describes logger operation, controls, log downloads, configuration, and firmware updates.

Screen figures are rendered from the firmware display code for the 2.13-inch e-paper display (250 × 122 pixels). Values are examples. Other displays use other layouts.

Contents

1 Device parameters	3
2 Usage	3
2.1 GPS mode	3
2.1.1 Main GPS display — Speed	3
2.1.2 Receiver information — Init	4
2.1.3 Settings subview	4
2.1.4 Results subview — Stats	4
2.1.5 Race-start subview — Start	5
2.1.5.1 Setup	5
2.1.5.2 Display	6
2.2 WiFi mode	7
2.2.1 Access-point view — AP	7
2.2.2 Station view — STA	7
2.3 Automatic firmware update	7
3 Push button	8
4 Computer connectivity	9
4.1 Connection	9
4.2 Download device data	9
5 Device configuration	10
6 Firmware update	10
6.1 GPS Analyzer mobile app	10
6.2 Browser update	11
References	11

1 Device parameters

Processor	ESP32 or ESP32-S3
GPS receiver	u-blox M8, M9, or M10, depending on the device
Storage	Internal flash and/or microSD card, depending on the build
Flash memory	ESP32: 4 MB or 16 MB, depending on the build. ESP32-S3: 16 MB
Display	E-paper, or 1.9-inch ST7789 LCD (320 × 170 pixels), depending on the build

E-paper options include 2.13-inch, 250 × 122 pixels (SSD1680), and 1.54-inch, 200 × 200 pixels (SSD1681).

Use firmware that matches the hardware. Device source and configuration information: [1].

2 Usage

The logger has two main modes: GPS and WiFi. A separate charging view can appear during charging.

2.1 GPS mode

GPS mode contains the main Speed display, Init, Settings, Stats, and the Start race-start subview. Use double-clicks to select a view while stopped. While moving, double-click switches between Speed and Start.

1. If the logger is in WiFi mode, hold the button for about 4 seconds.
2. Release the button to select GPS mode.
3. Open Init with double-clicks.
4. Check the GPS receiver and recording rate.
5. Use GPS mode during the session.

2.1.1 Main GPS display — Speed

Speed is the main display during movement.

Upper row: the label at the left names the metric. For most metrics, the left value is the best result of the current run and the right value is the session best. One click selects the next metric. The example shows the default 10 s metric, Run.

Large number: the current GPS speed in the selected unit. Without a valid GPS signal, it shows ---. The bar along the bottom shows the progress of the current run.

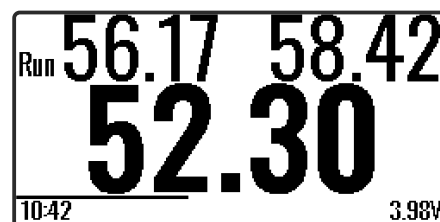


Figure 1: Speed: 10 s metric in the upper row, current speed below. Values in km/h.

2.1.2 Receiver information — Init

The first line shows the receiver model and the recording rate. The next lines show the satellites in use per system (G GPS, E Galileo, B BeiDou, R GLONASS), the HDOP (h), the speed accuracy (a), the time to the first fix (fx), and the free log space. Check this view before recording. It can also appear while the receiver is not ready.

The status line shows the time, the speed unit, a dot while files are logged, the satellite count with the navigation-mode letter, and the battery voltage.

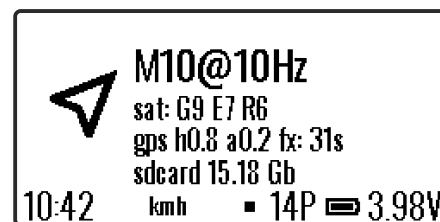


Figure 2: Init: receiver and rate, satellites, accuracy, and free space.

2.1.3 Settings subview

Display: the top line identifies the configuration group. The middle line names the selected item. The lower line shows its current value.

On the device, use one click to select an item in Settings. Use three clicks to change its value.

Hold the button for about 2 seconds. Release the button to change the group. Available groups depend on the build.



Figure 3: Device settings: group, item, and selected value.

2.1.4 Results subview — Stats

Stats shows session results when results are available. Each field has a metric label and its value. The first page shows the last 10 s result (10sLst), the best 10 s result (10s), and the average of the five best 10 s results (Avg). The session page shows the time, the distance, and the best 2 s, 10 s, 30 min, and 1 h results.

One click selects the next results page. The selected fields and grid depend on the build and display. Stats can appear automatically while stopped.

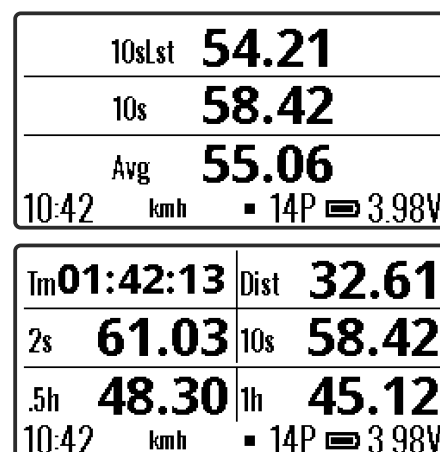


Figure 4: Stats: first page (top) and session page (bottom). Speeds in km/h, distance in km.

2.1.5 Race-start subview — Start

Start contains the start-line setup, countdown, and race-start display. It is a subview of GPS mode.

2.1.5.1 Setup

Start is available in builds with GPS logging. The timer can run without a GPS signal.

Timer preset

1. Open Start with double-clicks.
2. With the timer stopped, hold the button for at least 0.7 seconds.
3. Release the button before 2 seconds.

Each short hold selects the next preset: 2, 5, 4, 3, then 1 minute. If the timer runs, the display shows RUNNING. The preset does not change.

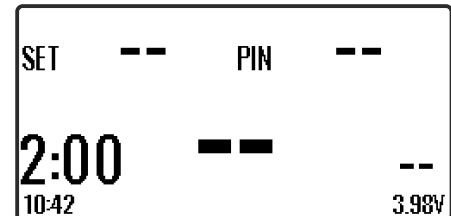


Figure 5: Start setup: SET / PIN identifies the next endpoint.

Start line

A valid GPS position is necessary. The endpoints must be 5 to 1000 m apart.

1. At the pin end, hold the button until PIN SET appears, about 2 seconds.
2. Release the button before 4 seconds.
3. At the committee-boat end, hold the button until BOAT SET appears.
4. Release the button before 4 seconds.

NO FIX, TOO CLOSE, or TOO FAR means the logger did not accept the endpoint.

Countdown

1. At the countdown signal, press the button once.
2. At a later minute signal, press once to synchronize the timer.
3. After the start, press once to reset the timer.

A second press in the initial 5-second undo window cancels the countdown.

Synchronization rounds down to a whole minute. Within 10 seconds below a minute boundary, it rounds up.

Examples: 2:35 → 2:00. 1:58 → 2:00. With less than 50 seconds left, a synchronize press has no effect.

The line and preset remain after a restart. The running countdown does not. The next endpoint capture starts a new pair.

Switching to Speed does not stop the timer. Countdown presses work only in Start. GPS logging continues while Start is open.

Advanced settings

Open Config → start for the preset, line, side, range, and event settings.

The mark_bearing mode uses one known endpoint and a direction. The bearing_cdeg value uses tenths of a degree.

Start event logging needs start.log_events, TXT logging, and open files. It is off by default.

2.1.5.2 Display

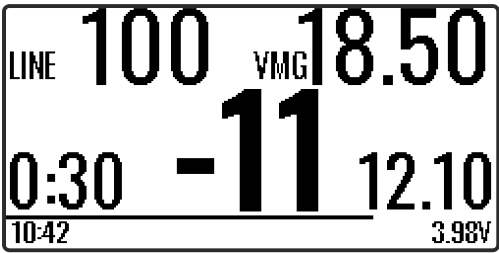


Figure 6: Start display. Example values; speed unit: km/h.

The large number is the estimated arrival difference, in seconds.

Negative	You will arrive early at the current approach speed.
Positive	You will arrive late at the current approach speed.
--	No valid estimate. This does not mean zero.

After the start, the large field shows --. The bar along the bottom shows the countdown progress.

Screen fields

LINE	Distance to the line segment, in meters.
PIN / BOAT	Distance to the nearest endpoint when you are past that endpoint.
OCS	The GPS calculation places you on the course side of the stored line.
VMG	Speed toward the nearest point on the line segment. A negative value means movement away.
Lower left	Time to the start, then elapsed time with a + sign.
Lower right	Approach speed necessary to reach the line at the start.
NO / GPS	No valid GPS signal.
SET / PIN or BOAT	The next endpoint to set.
FAR / KM	The line is outside the range limit. Distance uses kilometers. The default limit is 5000 m.

The estimate needs a stored line, a valid GPS signal, movement toward the line, and a line within range.

Check the line and its stored pre-start side before use. OCS is a GPS estimate, not an official race decision.

2.2 WiFi mode

WiFi mode shows the active network, IP address, and hostname. Use the values shown by your logger. Double-click changes the supported WiFi mode. AP + STA is available in builds that support both modes together.

2.2.1 Access-point view — AP

The logger creates a local WiFi network. The **AP:** line shows its name: ESP and four characters from the device address. The password is **password**. ESP32-S3 builds also show it on a **pwd:** line.

addr: shows the device IP address, 10.10.10.1. The next line shows the local hostname: esp and the same four characters in lowercase.

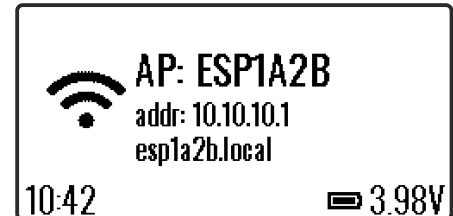


Figure 7: WiFi AP view on the 2.13-inch e-paper display. ESP1A2B and esp1a2b are example names.

2.2.2 Station view — STA

The logger joins a configured WiFi network. The **STA:** line identifies the network or connection status. Once connected, **addr:** shows its IP address.

Connect the phone or computer to the same network. Internet access is not necessary for the device interface. See section 4.1.



Figure 8: WiFi STA view after connection. Example values.

2.3 Automatic firmware update

Config → fw_update contains update_enabled and update_channel. Automatic update is on by default. update_channel selects the stable or unstable channel. Release firmware uses stable by default.

This function needs build support and a station network with internet access.

1. At the update message, press once to select Update or Postpone for 24h.
2. Hold the button for about 2 seconds.
3. Release the button to confirm the choice.

Without confirmation, the update attempt stops after 60 seconds.



Figure 9: Device update confirmation. One click changes the choice.

3 Push button

The default button times are 2 seconds, 4 seconds, and 7 seconds. Custom firmware can use different times.

3.1 Clicks

1 click	Speed: Change the upper field. Stats: Change the results page. Settings: Select the next item. Start: Start, cancel, synchronize, or reset the countdown. Update message: Change the choice. Alert: Close the alert.
2 clicks	GPS, stopped: Change the view. GPS, moving: Switch between Speed and Start. WiFi: Change the network mode.
3 clicks	Settings: Select the next value. The logger saves the value. Other views: Rotate the screen.
4 clicks	E-paper: Refresh the full display. Other displays: Change the brightness.

3.2 Hold actions

0.7 to less than 2 s	GPS: Add a WAYPOINT entry to the TXT log. Start, timer stopped: Select the next timer preset.
About 2 s	Settings: Change the group on release. Update message: Confirm the choice on release. Other ordinary views: Shut down on release.
About 2 s in Start	Set the next start-line endpoint. Release before 4 seconds. This action does not shut down the logger.
About 4 s	Release to switch between GPS and WiFi.
About 7 s	The logger restarts while you hold the button.

When stopped, the GPS view order is Speed → Init → Settings → Stats → Start. Available views depend on the build.

A waypoint needs a valid GPS signal, open log files, and TXT logging. The display shows WAYPOINT, NO FIX, or NO LOG.

In the charging view, press the button to wake the logger.

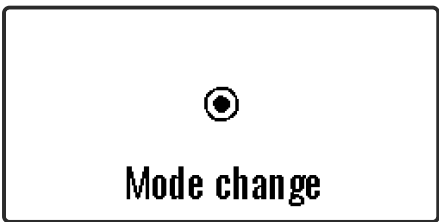


Figure 10: Button-hold feedback. The action depends on the active view.

4 Computer connectivity

4.1 Connection

1. Hold the button for about 4 seconds.
2. Release the button to select WiFi mode.
3. Read the network name and address on the display.
4. Connect the phone or computer to the logger network.
5. Open the displayed address in a browser. Include http:// before the address.

AP mode creates a local network. The password is password. Internet access is not necessary for the device interface.

In station mode, connect to the same network as the logger. Some builds support AP and station mode together.

If the .local address does not open, use the displayed IP address. In AP mode, this is http://10.10.10.1.

4.2 Download device data

GPS → log_format selects one log format. SBP, UBX, and GPX are standard options. OAO and GPY need build support. The default is SBP.

The log_txt switch controls TXT logs. The standstill_gate setting stops file logging at or below standstill_thr.

The threshold uses the selected speed unit. It does not change button navigation.

1. Open Files.
2. Select a log file to download it.

For several files, use the checkboxes and Download selected. Other available actions include Delete selected and Archive selected.

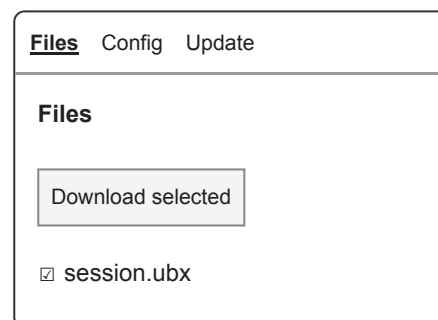


Figure 11: Files: select a file or download the selected files.

5 Device configuration

1. Open Config.
2. Open the necessary settings group.
3. Change the setting.
4. For a text field, press Enter to save.
5. Check for the Saved message.

Selections and switches save when changed. A slider saves when you complete the change.

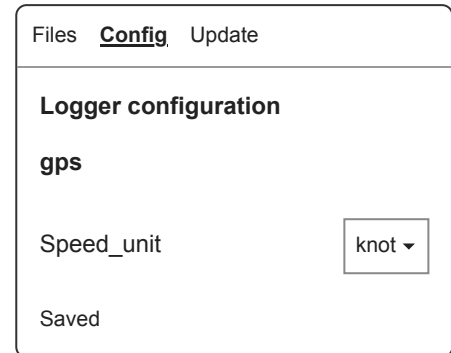


Figure 12: Config: change a value and check the Saved message.

6 Firmware update

Use a firmware image for your hardware. The .bin extension does not identify compatible hardware.

6.1 GPS Analyzer mobile app

GPS Analyzer [2] is the main app for logs, settings, firmware, and session analysis.

1. Connect the mobile app to the logger over WiFi.
2. Open the logger page in the app.
3. Select FW.
4. If a release is available, select Download & Install.
5. After the download, confirm the installation.
6. Keep the phone connected until the logger restarts.
7. Connect again to check the firmware version.

Downloads need internet access. Installation uses the local WiFi connection. The web app provides a download link instead of installation.

For a file already on the phone, use Select firmware file and Upload.

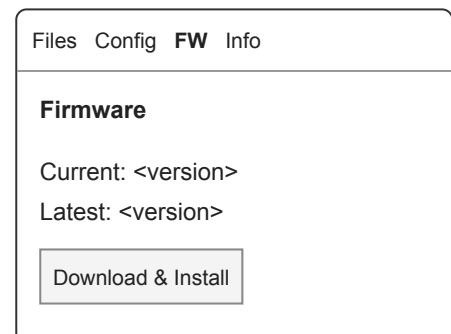
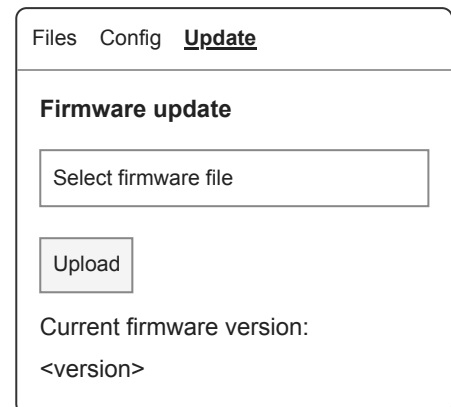


Figure 13: GPS Analyzer: the FW tab provides the mobile installation action.

6.2 Browser update

1. Download a compatible firmware file.
2. Connect to the logger over WiFi.
3. Open Update in the logger interface.
4. Select the file under Firmware update.
5. Select Upload.
6. Wait for the logger to restart.
7. Connect again to check the firmware version.



The screenshot shows a web interface with three tabs: 'Files', 'Config', and 'Update'. The 'Update' tab is selected and underlined. Below the tabs, the section is titled 'Firmware update'. It contains a text input field with the placeholder text 'Select firmware file'. Below this field is an 'Upload' button. At the bottom of the section, it says 'Current firmware version:' followed by a placeholder '<version>'.

Figure 14: Browser update: select the firmware file, then select Upload.

References

- [1] **ESP-IDF GPS Logger.** Source and device documentation.
<https://github.com/aivoprykk/espidf-gps-logger>
- [2] **GPS Analyzer.** Mobile app, web app, and help.
<https://gpsanalyzer.majasa.ee/>