



App address: wingslevel-app.ppinha.com · Website: wingslevel.ppinha.com · Contact: wingslevel@ppinha.com · Edition of October 2026 (version 0.18-beta)

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How to read this manual

Names of buttons and menu items are written in **bold**, exactly as the app shows them. "Settings → Terrain Manager" means: open Settings (the gear icon), then tap Terrain Manager. The screenshots are taken from the app itself on a phone in portrait unless stated otherwise.

1. What WingsLevel does

WingsLevel turns your phone or tablet into a backup glass cockpit for VFR flying:

- **Attitude indicator** with pitch ladder, bank scale, turn indicator and slip ball.
- **Speed, altitude and vertical-speed tapes** from GPS combined with the phone's accelerometer, with an altitude bug.
- **HSI** (horizontal situation indicator) with magnetic compass rose, heading bug, bearing pointer and a GPS course-deviation bar.
- **Direct-To** any airport or navaid in the world, with distance, ETA and ETE, and guidance on the attitude view: a sign on the destination, the flight path marker and the heading to fly.
- **Runway approach path**: when you line up with a runway, its extended centreline and gates down an advisory 3° path, with sideways and glide path scales.
- **Nearest** airports and navaids, and **search** by ICAO code and country, with runways and frequencies.
- **Synthetic vision**: 3D terrain behind the horizon, coloured by height above you, with runways, taxiways and aprons, lakes, rivers, motorways and main roads.
- **Night mode, landscape** and **full-screen attitude** layouts, and a **flight recorder**.

Why "GPS-aided"

A phone's accelerometer cannot tell gravity from the aircraft's own acceleration. In a coordinated turn, an ordinary phone app slowly decides the wings are level while you are still banked. WingsLevel runs a GPS-aided Kalman filter, the technique used in real inertial navigation systems: it compares what the sensors measure with how the GPS says the aircraft actually moved, and keeps the horizon where it belongs in turns, on the takeoff roll and when you change power.

Works offline

Once installed, everything runs on the phone: the instruments, the airport and navaid database, and synthetic vision for the terrain areas you downloaded. The GPS works without mobile signal. Your position and sensor data never leave the phone.

Limitations. Speed is GPS ground speed, not airspeed. Altitude is GPS altitude (mean sea level), not pressure altitude: it will differ from your altimeter. Browsers give no access to the phone's barometer. Airport and terrain data are not official AIP data and may be incomplete or out of date.

2. What you need

Phone	Requirements
Android (recommended)	Android 10 or newer, Google Chrome, and a gyroscope (most phones since 2018). Chrome gives the best sensor access.
iPhone / iPad	iOS or iPadOS 16.4 or newer, Safari.
Tablet	Works in portrait and landscape (chosen in Settings). The landscape layout shows attitude and HSI side by side.

- A sturdy mount that holds the phone **upright, facing you**, and does not vibrate.
- A charging cable for long flights: the screen stays on and the GPS is always running.
- A Wi-Fi connection once, to install the app and download the terrain for the areas you fly in.
- Storage: about 12 MB for the app and airport data, plus the terrain you choose (a few MB to a few tens of MB per country; detailed mountain terrain can add a few hundred MB).

Try the app on the ground first, in your own aircraft and mount, before relying on it in flight.

3. Installing the app

WingsLevel is a web app: you install it from the browser, with no app store. Installed, it has its own icon, opens full screen, keeps the screen on and works with no connection.

Android (Chrome)

1. Open **wingslevel-app.ppoinha.com** in **Chrome**.
2. Tap the **⋮** menu at the top right and choose **Install app**. On some phones the item is called **Add to Home screen**; then tap **Install**. If Chrome shows an install banner at the bottom, you can tap that instead.
3. Open **WingsLevel** from the home screen or the app drawer.
4. When asked for your location, choose **While using the app**. Without location the GPS aiding, the tapes and Direct-To cannot work.

iPhone and iPad (Safari)

1. Open **wingslevel-app.ppoinha.com** in **Safari**.
2. Tap the **Share** button (the square with an arrow pointing up), scroll down and tap **Add to Home Screen**, then **Add**.
3. Open **WingsLevel** from the new icon on the Home Screen. Always start it from this icon: only the installed app runs full screen.
4. On the first start, iOS asks for access to **Motion & Orientation** and to your **location**. Allow both.

Declined a permission by mistake? Android: Chrome → **⋮** → Settings → Site settings → Location (and Motion sensors), allow the app's address. iPhone: Settings → Safari → Motion & Orientation Access and Location, allow; then close WingsLevel fully and open it again.

After installing

Open the app once while still online and leave it open for a minute: it stores itself and the airport and navaid database on the phone. Then download your terrain (chapter 14). If you fly a taildragger, set Settings → **Taildragger: Nose Up on the Ground** to its ground angle before you level the horizon (chapter 6).

4. Starting the app

The safety notice

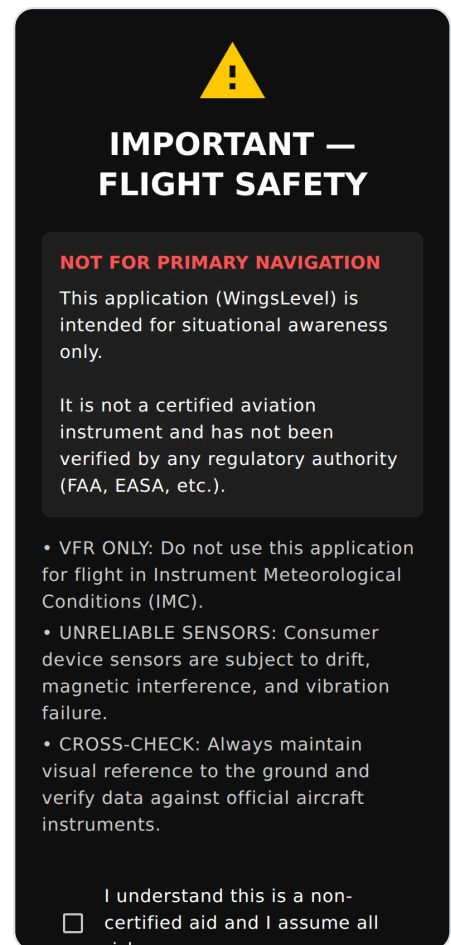
Every time the app starts, it shows the flight-safety notice. Read it, tick **I understand this is a non-certified aid and I assume all risks**, then tap **OPEN WINGSLEVEL**.

On iPhone, this tap is also when iOS asks for motion access: allow it.

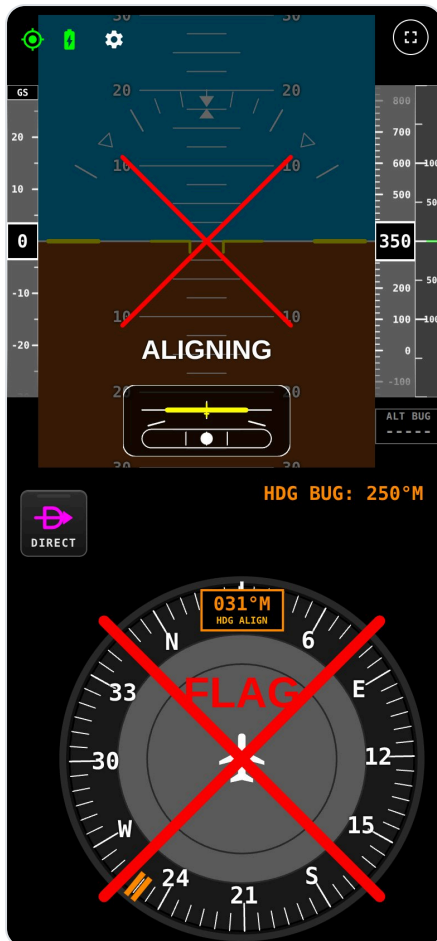
Aligning

For about five seconds after opening, the attitude shows **ALIGNING** with a red cross while the filter settles. Keep the phone still in its mount during this time. The instruments come alive by themselves.

The GPS icon at the top left then turns green once there is a good position (chapter 5).



The safety notice at every start.



ALIGNING: keep the phone still for a few seconds.

Before engine start

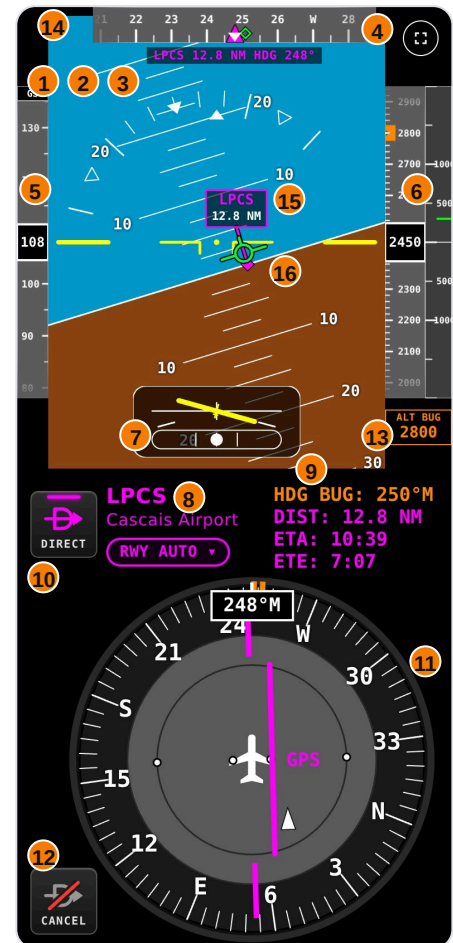
1. Mount the phone upright, facing you.
2. Open WingsLevel and accept the notice.
3. Wait for ALIGNING to clear and the GPS icon to turn green.
4. Level the horizon (chapter 6).
5. Set a Direct-To if you want one (chapter 10).

Keep WingsLevel in front during the flight. When another app covers it or the screen locks, the sensors pause, and the attitude needs a few seconds to settle again when you come back.

5. The screen at a glance

In portrait the attitude indicator is at the top and the HSI below it.

- 1 **GPS status:** green = good fix, yellow = weak or old fix, red = no position. In night mode, shades of red (chapter 17).
- 2 **Battery:** charge level, with a lightning bolt while charging.
- 3 **Settings** (gear icon).
- 4 **Full screen:** attitude only, with a heading tape.
- 5 **Speed tape:** GPS ground speed in knots.
- 6 **Altitude tape** in feet MSL, with the **vertical-speed** scale on its right.
- 7 **Turn indicator and slip ball.**
- 8 **Direct-To destination:** code and name; tap for airport information. The **RWY** chip under it picks the runway for the approach path (chapter 10).
- 9 **HDG BUG:** the heading bug's value in degrees magnetic, with DIST, ETA and ETE under it during a Direct-To.
- 10 **DIRECT** key: choose a destination.
- 11 **HSI:** heading box, compass rose, course and deviation.
- 12 **CANCEL** key: remove the Direct-To.
- 13 **ALT BUG:** the altitude bug's value in feet; tap the altitude tape to set it (chapter 8).
- 14 **Heading tape** with the magenta pointer at the heading to fly, and the destination, distance and heading under it.
- 15 **Destination sign:** stands on the destination, with its code and distance.
- 16 **Flight path marker** (green circle): where the aircraft is really going.



Items 14 to 16 show only during a Direct-To (chapter 10). Landscape and full-screen layouts are described in chapter 17.

6. Mounting and levelling

Mounting

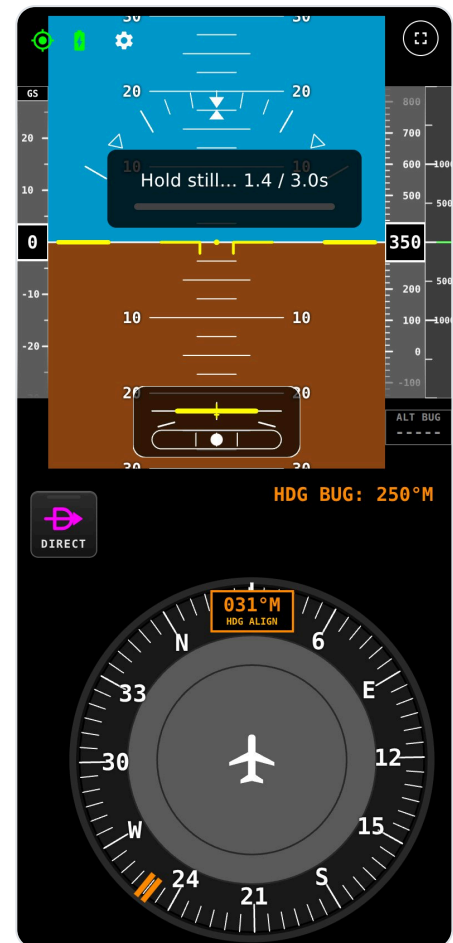
Mount the phone upright (portrait or landscape), screen facing you, as square to the aircraft as you can. A small tilt is fine: **Level** removes it. A mount that shakes adds noise to every instrument. For a sideways mount, first choose **Landscape** in Settings (chapter 17).

Level Horizon

Tell the app how the phone sits in the mount, so the horizon reads level when the aircraft is level.

1. On the ground, on level ground if possible, with the phone in its mount.
2. Open Settings and tap **Level Horizon (Hold Still)**.
3. Keep still. A box shows **Hold still...** with a progress bar.
4. When it shows **LEVEL: captured**, you are done. The setting is kept for next time.

If the box shows **LEVEL: motion detected**, **LEVEL: too much vibration** or **LEVEL: timeout (try again)**, wait for a calmer moment and tap Level again.



Levelling: hold still until "LEVEL: captured".

Levelling in flight

Above 30 kt, Level is only accepted in steady, straight and level flight, so a turn or a climb is never stored as level. If you are turning, the box says **LEVEL: turning (fly straight and level)**; if you are accelerating, **LEVEL: accelerating**. Fly straight and level and try again.

Taildraggers

A taildragger sits nose up on the ground. Level Horizon stores whatever attitude the aircraft has while you level, so without help a taildragger levelled on the ground would read level while parked and several degrees nose down in level flight. To fix this, tell the app the ground angle:

1. Open Settings and, under **Taildragger: Nose Up on the Ground**, tap **+** until it shows your aircraft's nose-up angle on the ground (for example 11.0° nose up). Each tap is 0.5°. The flight manual or a phone level app on the cabin floor or a longeron gives the angle.
2. On the ground, tap **Level Horizon (Hold Still)** as above.

The attitude then shows the ground angle while parked (for example 11° nose up) and level in straight and level flight. If cruise still does not read level, adjust the angle with **-** or **+** in flight: the change applies at once. The angle is kept for next time and works in portrait and landscape.

A Level taken in flight (above 30 kt) already makes level flight read level, so the ground angle is not used after it; Settings then says so. Levelling in steady cruise is another way to level a taildragger. For a tricycle aircraft leave the setting at **Off (0°)**.

Nose alignment

The phone may point slightly left or right of the aircraft's nose. The app learns this by itself on each takeoff roll, with no action from you. After moving the mount or the phone, tap Settings → **Reset Nose Alignment (after remounting)** so it learns again on the next takeoff.

Fine pitch trim

Tapping the attitude indicator once shows a technical overlay; while it is shown, dragging up or down on the attitude trims the pitch by small amounts (up to $\pm 20^\circ$). Tap again to hide it. Most pilots never need this: use Level instead.

7. Attitude, turn and slip

The attitude indicator shows the aircraft symbol (yellow, red in night mode) against the horizon, with a pitch ladder and a bank scale at the top. The sky pointer at the top shows your bank.

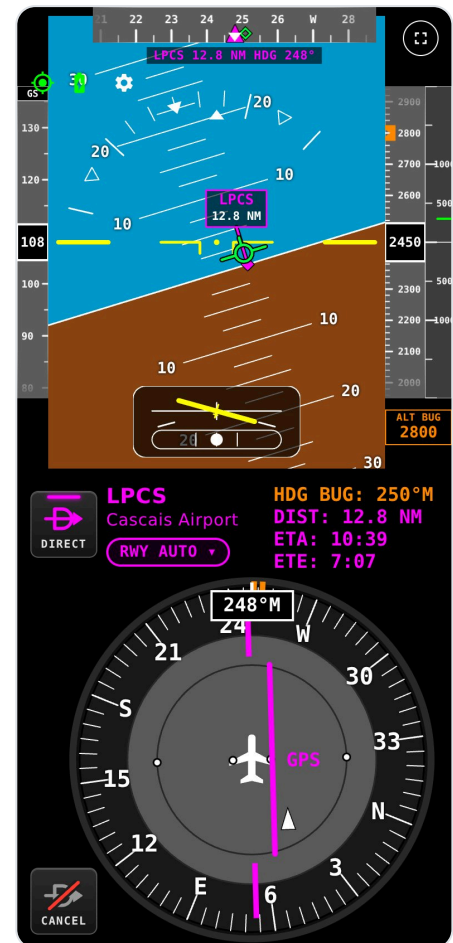
Turn indicator

The small aircraft in the box at the bottom shows the rate of turn. When its wing tip is on the mark, you are in a **standard-rate turn** (3° per second, a full circle in two minutes). A roll with no turn shows no turn.

Slip ball

The ball under the turn indicator works like the real one: centred in coordinated flight, displaced to the side of a slip or skid. "Step on the ball" to centre it. It stays centred in a coordinated turn even if the phone is slightly rolled in its mount.

If the phone's motion sensors stop, the horizon is replaced at once by a red cross and **ATTITUDE FAIL**. WingsLevel never shows a frozen attitude as if it were live (chapter 21).



A right-hand standard-rate turn: 17° bank, wing tip on the mark, ball centred.

8. Speed, altitude and vertical speed

Speed tape (left)

Ground speed in knots from the GPS, smoothed by the motion sensors between GPS fixes, marked **GS** at the top. It is not airspeed: with a headwind it reads less than your airspeed indicator, with a tailwind more.

Altitude tape (right)

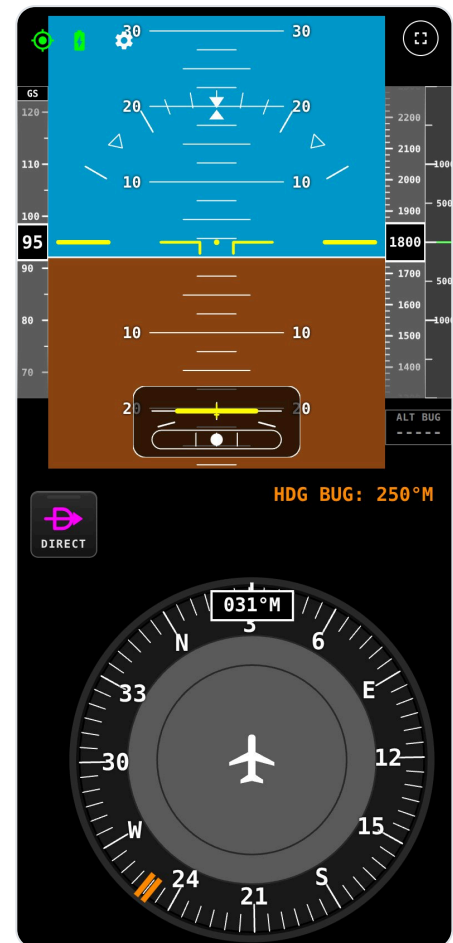
GPS altitude in feet above mean sea level. It differs from your altimeter, which shows pressure altitude corrected by QNH: use the altimeter for altitude and separation.

Vertical speed

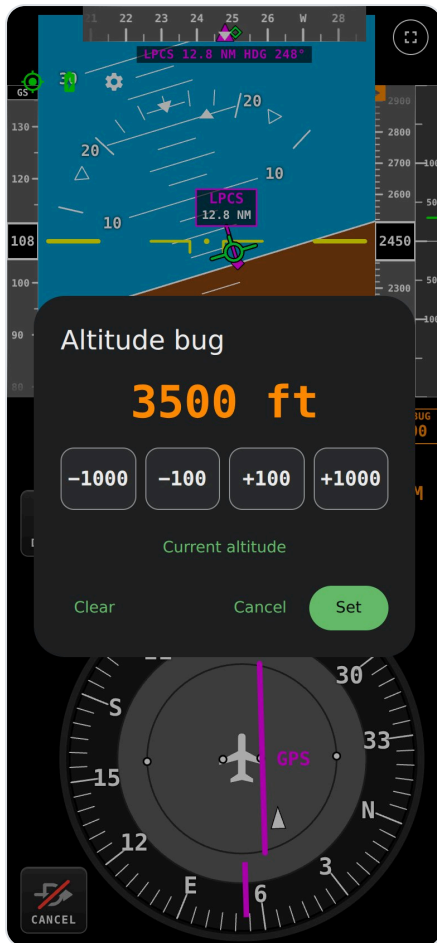
The scale to the right of the altitude tape shows the vertical speed in feet per minute (500 and 1000 marks), from GPS altitude combined with the accelerometer. It reacts faster and more smoothly than GPS alone, but is less precise than a barometric VSI. It reads 0 while the aircraft stands still.

When the GPS is poor

If the last GPS fix is older than 5 seconds, or the position comes from mobile networks instead of satellites, the speed and altitude tapes show a **red X** instead of an old value.



95 kt ground speed, 1800 ft, level flight.



Setting the altitude bug to 3500 ft.

Altitude bug

Use the altitude bug to remember an altitude you plan to fly or were cleared to. Like the tape, it marks GPS altitude.

1. Tap the **altitude tape**, the vertical-speed scale next to it or the **ALT BUG** box under them.
2. The **Altitude bug** box opens at your current altitude, rounded to 100 ft.
3. Change it with **-1000**, **-100**, **+100** and **+1000**, or tap **Current altitude**.
4. Tap **Set**.

The orange bug shows on the altitude tape. When it is beyond the scale, it waits at the top or bottom edge. Its value shows under the tapes as **ALT BUG**, which reads ----- while no bug is set.

To change it, tap the tape again. **Clear** removes it and **Cancel** keeps it as it was. Like the heading bug, it is not kept when the app is closed.

9. The HSI and heading bug

The HSI shows a compass rose that turns with the aircraft. The box at the top shows your heading in degrees **magnetic** (°M), like your compass, charts and ATC. The magnetic variation comes from the World Magnetic Model for your position, so you never need to set it.

Until the takeoff roll has learned how the phone is turned relative to the nose (chapter 6), the heading box is **amber** with **HDG ALIGN** under the heading: it may be a few degrees off until then.

Heading bug

Drag your finger around the **outer ring** of the HSI to move the orange heading bug. The phone vibrates lightly at each degree (Android). The bug's value is shown at the top right as **HDG BUG: 250°M**. Use it to remember a heading you were given or planned.

Aligning the compass card

If the HSI heading differs from your aircraft's compass or heading indicator, drag your finger in a circle **inside the rose** (between the aircraft symbol and the numbers) to turn the card until they match. The correction is kept and shown under the heading as **CARD** (for example **CARD +5°**). A new magnetic calibration (chapter 20) sets it back to zero.

Course and deviation

With a Direct-To active, the HSI shows the magenta course to the destination, the course-deviation bar (how far left or right of the course you are) and a TO/FROM arrow. **GPS** next to the bar reminds you the course is from GPS. Fly towards the bar to get back on course.



Heading 248°M, bug at 250°M, Direct-To Cascais with the aircraft slightly right of course.

10. Direct-To navigation

Setting a Direct-To

1. Tap the **DIRECT** key at the left of the HSI.
2. Choose **Nearest Airports**, **Airports** (search), **Nearest Nav aids** or **Nav aids** (search).
3. Tap the airport or navaid in the list.

The HSI returns with the magenta course from where you were to the destination.

The Direct-To banner

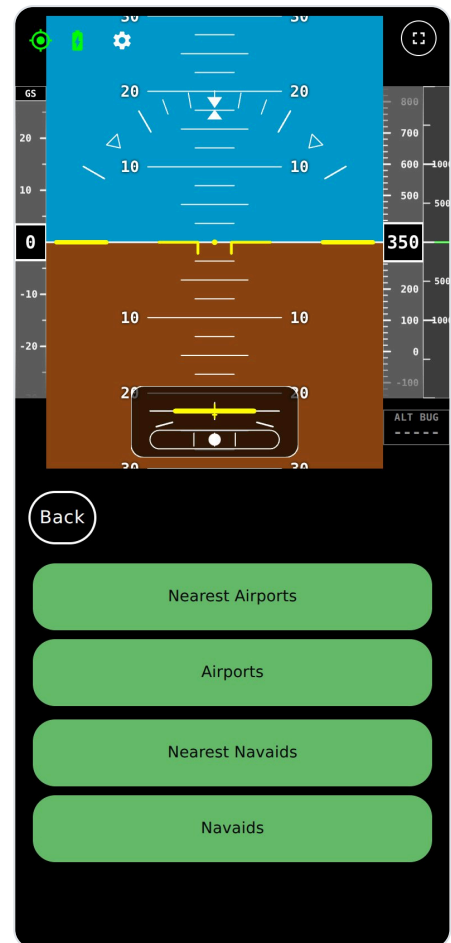
At the top of the HSI the banner shows the destination's code and name. At the top right, under **HDG BUG**, in magenta:

- **DIST**: distance in nautical miles,
- **ETA**: estimated time of arrival (phone's local time),
- **ETE**: time en route, at the current ground speed.

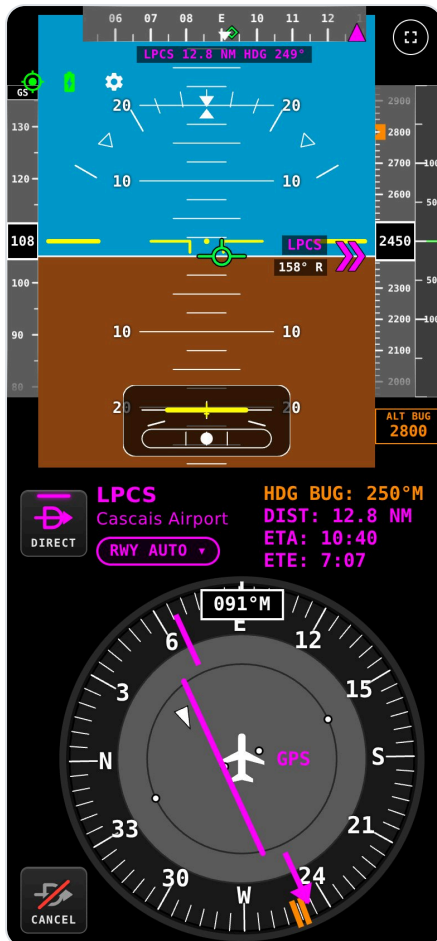
Tap the banner for the destination's information (chapter 12).

Cancelling

Tap **CANCEL** at the bottom left of the HSI. To go somewhere else, just set a new Direct-To.



The Direct-To menu. Back returns to the HSI.



Cascais is behind the right wing: turn right 158°.

Guidance on the attitude view

During a Direct-To the attitude view guides you to the destination too, with or without synthetic vision. The HSI is unchanged.

- A **sign** with the destination's code and distance stands on the destination, drawn in the view like the terrain.
- The green circle, the **flight path marker**, shows where the aircraft is really going (GPS track and climb angle). Turn until the circle sits on the sign. It shows above 20 kt ground speed.
- When the destination is outside the view, a magenta **arrow** at the side shows which way to turn, with the code and the turn (for example **158° R**).
- The **heading tape** at the top of the attitude view has a magenta pointer at the heading to fly, the wind correction you are flying included, and the destination, distance and heading to fly under it (for example **LPCS 12.8 NM HDG 248°**).

The flight path marker and the sign come from the same heading, so even with a small heading error, putting one on the other still gives the right track.

Choosing the runway in advance

For an airport, the chip under its name in the banner reads **RWY AUTO ▼**. Tap it for the airport's runways with their surface and length, and tap the one you plan to land on: the runway approach path (chapter 11) then shows that runway at this airport. **AUTO** lets the app pick the runway you line up with.

11. Runway approach path

When you line up with a runway, the attitude view shows an advisory approach to it, with or without synthetic vision. There is nothing to set up: it is a VFR aid for a stable final, not a published approach.

What you see

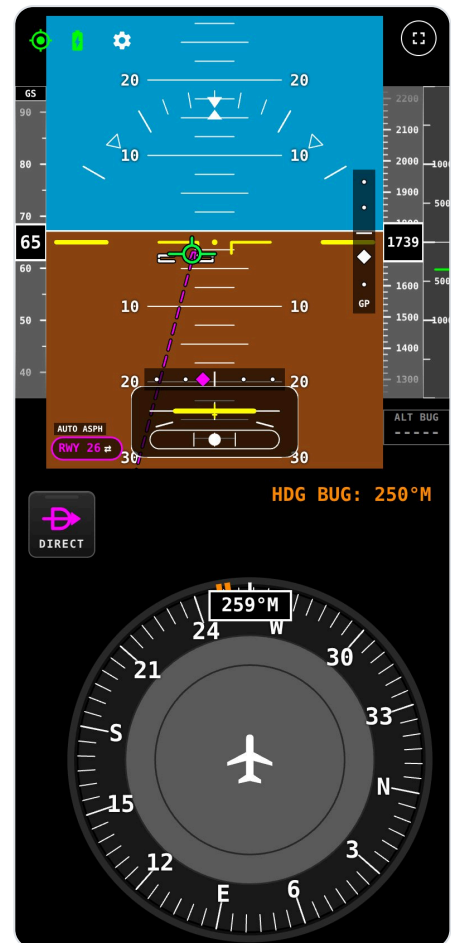
- The runway outline and its **extended centreline** on the ground, magenta and dashed out to 5 NM, with a bar every NM.
- White **gates** every 0.5 NM down a 3° path to 50 ft over the threshold. The gates are as wide and high as the scales: inside the gate means inside the scales.
- The green **flight path marker**: put it on the threshold and fly it through the gates.
- A **sideways scale** above the turn coordinator: the magenta diamond is where the centreline is.
- A **glide path scale** at the right edge: the white diamond is where the path is (below the centre: you are high). It reads **NO GP** when the GPS is not accurate enough for it.
- The **runway** at the bottom left, for example **RWY 26** ➡, with **AUTO** or **PICKED** and the surface above it.

Both scales get finer as you get closer to the runway. In night mode everything is red.

When it shows

The path shows when you fly towards a runway within 5 NM of its threshold and less than 2,000 ft above it, faster than 30 kt, close to the extended centreline and in the runway direction (within 45°, so it appears as you turn onto final). It does not show on downwind, on base or after a takeoff. It goes when you pass the threshold, turn more than 90° away or go around (climbing for 5 seconds), and comes back on the next final.

The runways come from the aviation data and, where it has them, from OpenStreetMap. Runways whose position is only estimated are left out.



Final for runway 26 at Birrfeld, 1.1 NM out, slightly right of the centreline and a little high.

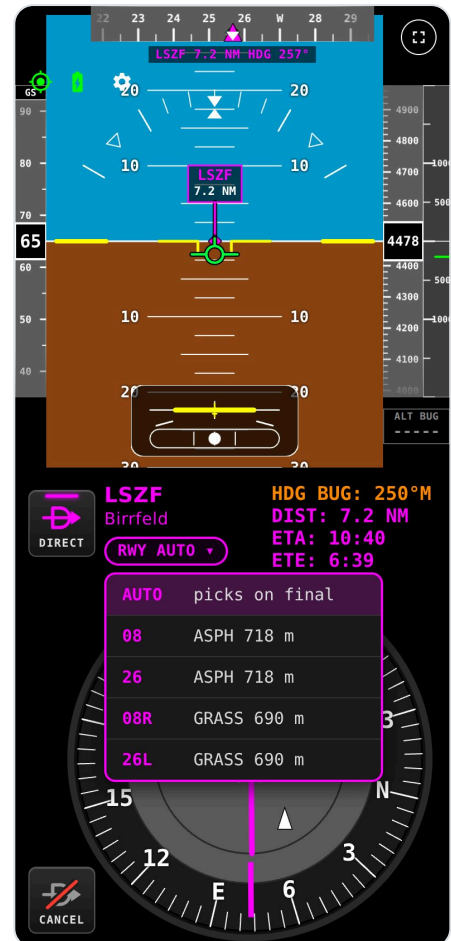
Choosing the runway

AUTO picks the runway whose centreline you are closest to; between parallel runways close together, the paved one. Tap the runway at the bottom left for the parallel runway (it then reads **PICKED**), and tap again to hide the path for this approach.

During a Direct-To to an airport you can pick the runway beforehand: tap the **RWY** chip under the airport's name and choose the runway (chapter 10).

Turning it off

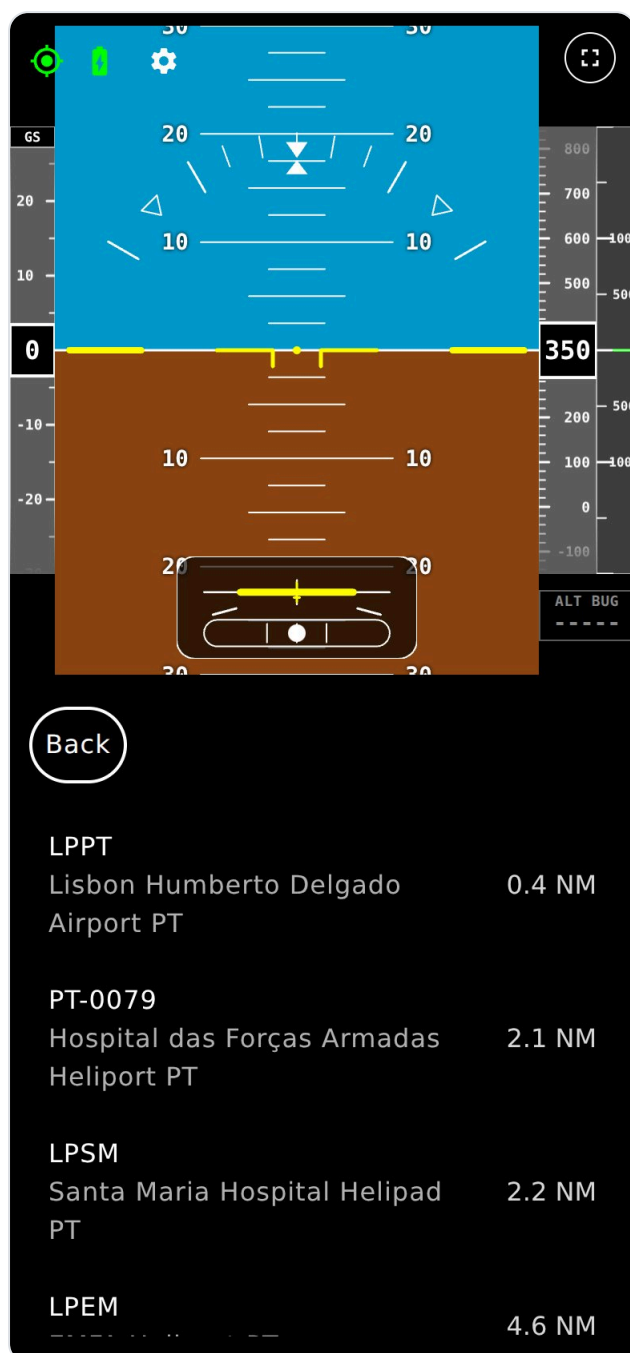
Settings → **Runway Approach Path** → **Off**. **Auto** turns it back on.



The runways of Birrpfeld (LSZF) under the Direct-To.

The approach path is advisory, built from GPS and open data. It is not a published approach, shows no obstacles and must not be used in cloud or to go below a safe altitude. The glide path uses GPS altitude: cross-check with your altimeter and the PAPI, and look outside.

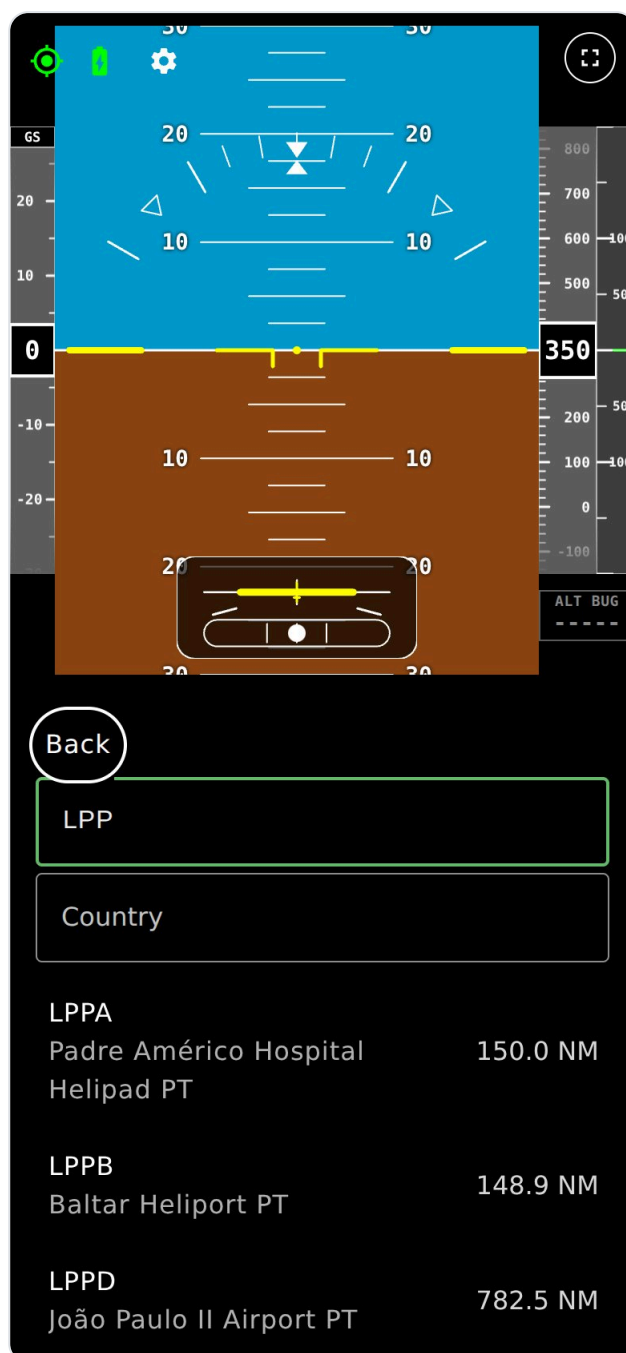
12. Nearest, search and airport information



Nearest Airports, by true distance from your position.

Nearest

Nearest Airports and **Nearest Nav aids** list the closest ones to your GPS position anywhere in the world, with the distance in nautical miles. The list includes airfields, heliports and seaplane bases. Without a GPS position the list shows **No GPS position yet**.



Airports search: "LPP" lists every code starting with LPP.

Search

In **Airports** or **Nav aids**, type the start of the ICAO code or identifier in the first field (for example **LPP** or **LPPT**). The second field, **Country**, narrows the list by country code (for example **PT**). Results appear as you type.

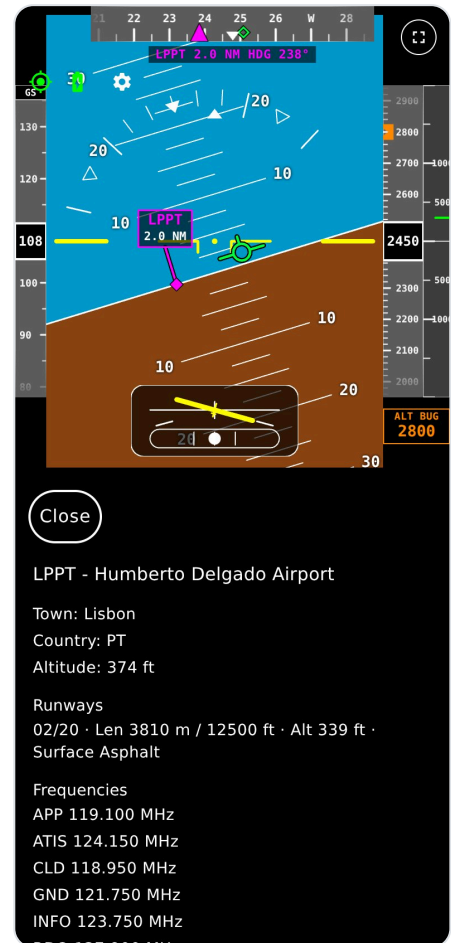
Airport and navaid information

Tap the Direct-To banner to see the destination's details:

- town, country and elevation,
- **Runways** in use: designators, length in metres and feet, elevation and surface,
- **Frequencies** with what each one is for: approach, ATIS, tower, ground, information and others (Birrfeld's 124.700, for example, is Zurich Information, not the aerodrome),
- for a navaid: its type, frequency and position.

Tap **Close** to return to the HSI.

Check frequencies and runway data against the official AIP and charts before use.



Information for Lisbon (LPPT).

13. Synthetic vision

Synthetic vision draws the terrain around you in 3D behind the attitude indicator, so you see high ground even in haze. It covers the whole world.

Turning it on

Settings → **Enable Synth Vision**. The same button then reads **Disable Synth Vision**. (If it reads **Synth Vision (Pro)**, synthetic vision is not included in your version of the app.)

What you see

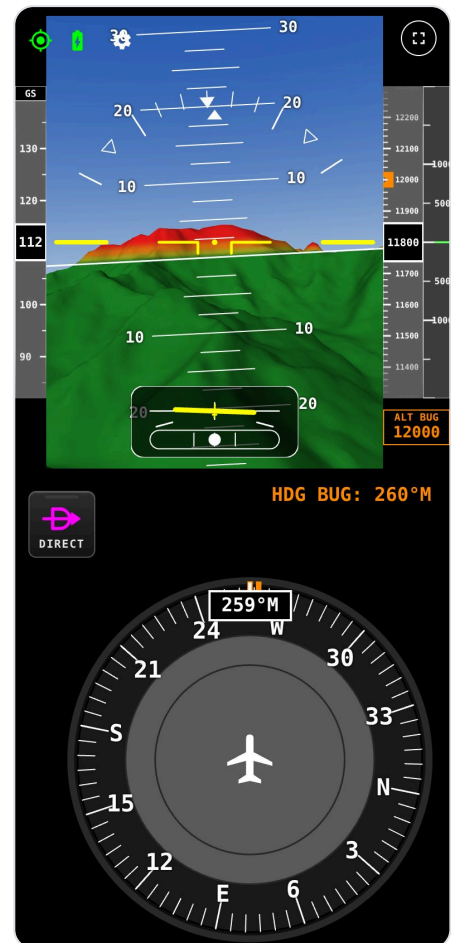
- Terrain coloured by height **relative to you**: green and brown well below, **yellow** near your altitude, **red** at or above it.
- Lakes and rivers in blue, motorways and main roads, all from OpenStreetMap; the sea where the terrain is at sea level. There is no haze: the view stays sharp out to the horizon.
- Runways by surface: paved runways grey with threshold bars, centre line and numbers; grass runways green with white edge lines and numbers; gravel, sand and dirt runways brown with numbers. A letter (L, R or C) only appears where the airport has parallel runways with the same number. Closed runways are not drawn.
- Where OpenStreetMap has the airport, the runways sit where they really are, with the **taxiways** (yellow centre line) and **aprons** on the ground. Runways whose position is only estimated from the airport position are drawn without markings: treat them as approximate.
- In mountain areas, detailed 90 m terrain out to 12 km around you.

Offline

Terrain is loaded from the terrain you downloaded in the Terrain Manager (chapter 14). Online, missing terrain is downloaded as you fly and kept. Where no terrain is available, the view shows **No tile**.

In night mode the terrain switches to a dim red palette. When the GPS is lost, the terrain is estimated for up to 30 seconds (**GPS LOST: terrain estimated**), then switched off until the GPS returns (**GPS LOST: terrain off**), so it never shows a normal-looking scene in the wrong place.

Synthetic vision is for awareness only. Never use it to navigate around terrain or cloud.



Near Monte Rosa at 11,800 ft: the high ground ahead is shown in yellow and red.

14. Terrain Manager: offline terrain

The Terrain Manager keeps the terrain of the areas you fly in on the phone, so synthetic vision works without a connection. Do this at home, on Wi-Fi.

Opening it

Settings → **Terrain Manager (offline areas)**. Tap **Done** to close it.

The list

- At the top: how much terrain is on the phone and the free space.
- **Where you are**: the areas around your position, smallest first.
- Then every area by continent (Europe, North America, ...). Tap a continent to open or close it. Each area is one country, A to Z. The United States, Canada, Australia and Brazil are listed per state or province (for example **United States: Colorado** or **Canada: Québec**). The continent you are in, and any continent where you have terrain on the phone, is open.

Each area shows its **Terrain** size and, in mountain areas, a **Detailed 90 m** layer with its own size.

Downloading

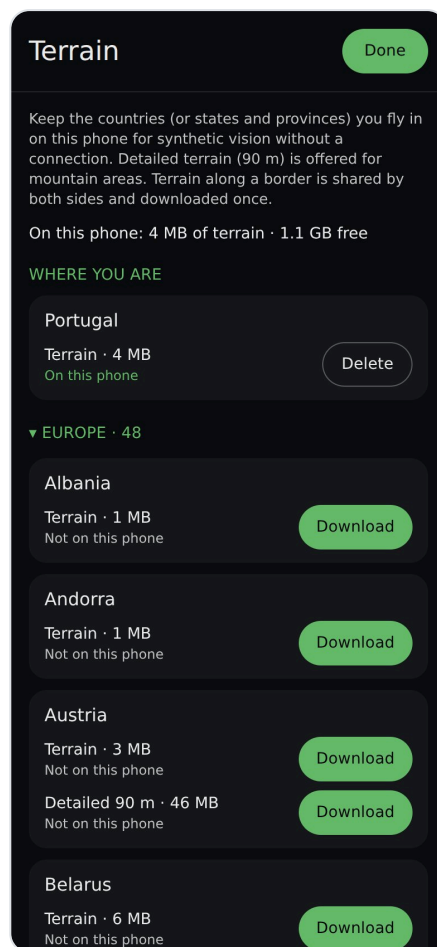
1. Tap **Download** next to the area (and next to Detailed 90 m if you fly in the mountains).
2. A progress bar shows the download. You can keep using the app.
3. Tap the button again to stop; **Finish download** continues later where it stopped.
4. When done, the area shows **On this phone**.

Shared terrain

Terrain comes in squares of one degree. A square on a border belongs to both countries, and it is downloaded only once. A country may therefore already show some tiles as saved because a neighbouring country you downloaded uses them (for example "12 / 99 tiles on this phone"). Tap **Finish download** to get the rest.

Airport layouts, lakes and roads

The airport layouts (runways, taxiways, aprons), lakes, rivers, motorways and main roads that synthetic vision draws are saved with the terrain of each area, so they work offline too. Areas downloaded with an older version get them the next time the app is online.



Portugal is on the phone. Europe is open, its countries A to Z; tap a continent to open or close it.

Deleting

Tap **Delete** and confirm. The app keeps any terrain that another downloaded area still needs.

Sizes

Most countries take a few MB to a few tens of MB. Detailed 90 m terrain for a mountainous country such as Switzerland or Austria adds up to a few hundred MB. Downloaded terrain is kept when the app updates.

Before a trip to a new area, open the Terrain Manager on Wi-Fi and download it. Without a download, only the terrain synthetic vision has already displayed is kept on the phone.

15. Aviation data updates

The airport, runway, frequency and navaid database is stored on the phone, so Direct-To, Nearest and search work offline.

Automatic updates

A few seconds after the app starts with a connection, it checks for new aviation data. It downloads only the parts that changed (airports, runways, frequencies or navaids), checks them, and keeps them offline. Nothing needs to be done.

Checking by hand

1. Open Settings and tap **Update Aviation Data**. While it works, the button reads **Checking for Aviation Data...**
2. The line under the button then says **Up to date**, or **Updated:** followed by the parts that changed.

The line also shows the date of the data on the phone and where it came from ("from this server", or "built into the app" before the first update).

Before a flight, open the app once while online so it can fetch the latest data. The data comes from the open OurAirports database and is updated regularly, but it is not official AIP data.

Storage

The database takes about 12 MB. The phone may remove it if storage runs very low; opening the app online restores it.



Settings, with Update Aviation Data and its status line.

16. App updates

New versions of WingsLevel are never installed without asking. Whenever the app is opened with a connection, it checks for a new version and downloads it in the background, but it keeps running the version you have until you choose to update.

The update message

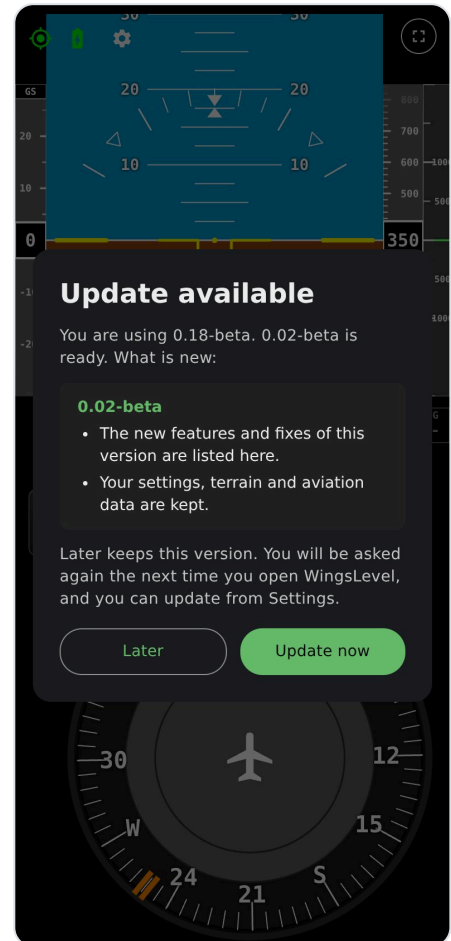
When a new version is ready, a message shows the version you use, the new version and what is new in it. During the beta, versions are numbered 0.01-beta, 0.02-beta and so on. The message has two buttons:

- **Update now** switches to the new version. The app restarts; this takes a few seconds.
- **Later** closes the message and keeps the version you have. You can keep flying with it as long as you like.

After Later, the message comes back every time you open the app, until you update. While an update is waiting, Settings also shows an **Update Available** button with the new version number; tap it to see the message again.

Offline, no message is shown and the app starts as usual. If the new version cannot be downloaded when you tap Update now, the message says so and the app stays on your version; try again with a connection.

Do not update just before or during a flight. Update on the ground, then check that everything works (Level, GPS, your terrain) before you take off.



The update message (example).

- Your settings (level, nose alignment, heading correction, night mode, screen orientation), your downloaded terrain and your aviation data are kept when you update.
- The version is shown at the bottom of Settings (for example **WingsLevel 0.01-beta**), followed by the app's address.
- To fly with the latest version: open the app on Wi-Fi the day before and tap **Update now** if the message appears.

Reinstalling

If the app ever misbehaves after an update, close it fully (swipe it away from the recent apps) and open it again. As a last resort, remove it from the home screen and install it again (chapter 3); you will need to download your terrain again and redo Level.

17. Night mode, portrait or landscape, full screen

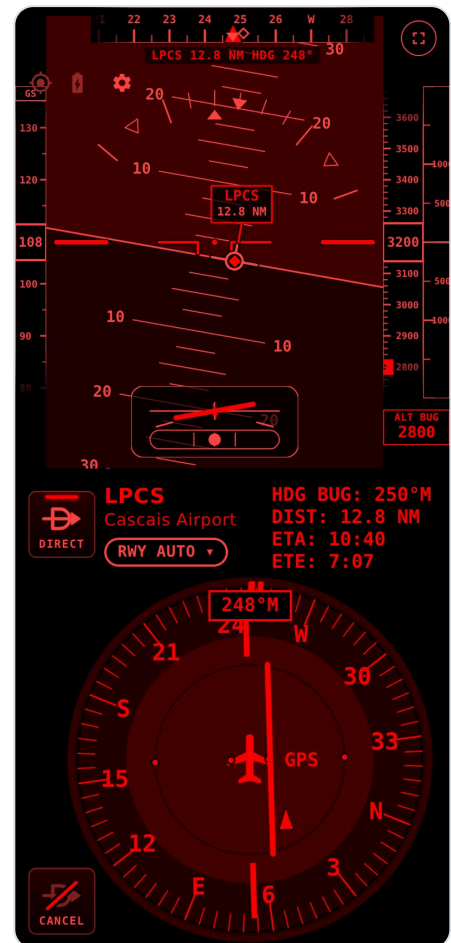
Night mode

Settings → switch **Night Mode (Red)** on. Every instrument, button, list and dialog turns red on black to protect your night vision, and synthetic vision uses dim red terrain. Switch it off the same way. Lower the phone's brightness as well.

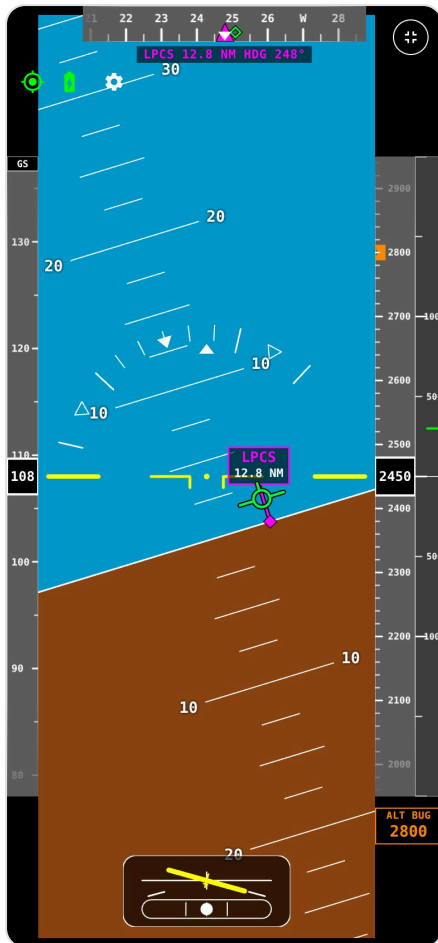
The aircraft symbol, the turn indicator and the GPS and battery icons are red too. Instead of green and yellow, their shape and brightness show their state: dim red when all is well, brighter for a weak GPS fix or low battery, brightest for no position or an almost empty battery.

Full-screen attitude

Tap the **full-screen** button at the top right of the attitude indicator. The attitude fills the screen, with a heading tape at the top. Tap the button again to bring the HSI back.



Night mode.



Full-screen attitude with heading tape.

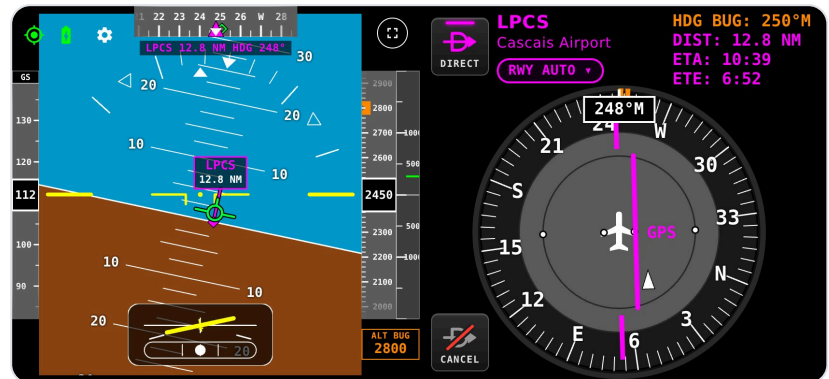
Portrait or landscape

The app does not follow the phone's auto-rotate: in a steep turn the screen stays as it is. Choose the orientation under Settings →

Screen Orientation: Portrait (the default on phones) or

Landscape, where attitude and HSI appear side by side.

Landscape suits tablets and yoke mounts.

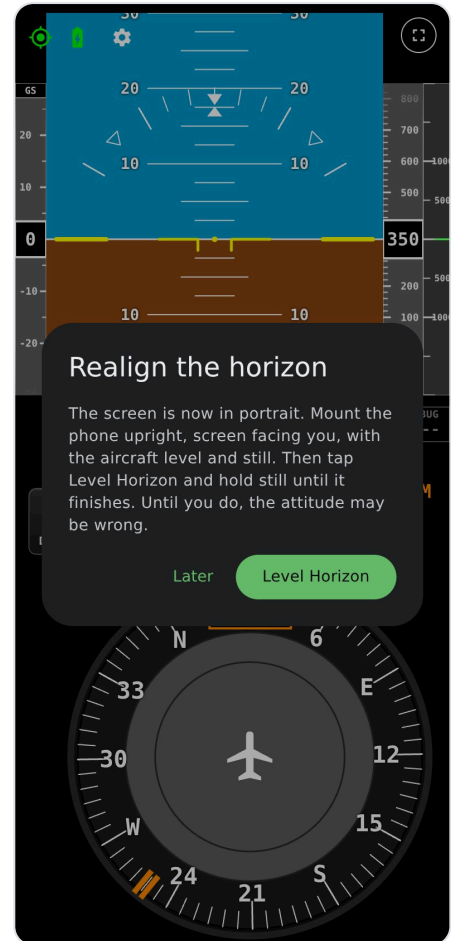


Landscape layout.

Realign after a change

After switching, the app asks you to **Realign the horizon**: turn the phone in its mount, keep the aircraft level and still, and tap **Level Horizon**. Until you do, the attitude may be wrong. **Later** closes the message; you can level any time from Settings (chapter 6).

On Android, with WingsLevel installed, the system holds the orientation. In a browser tab and on iPhone the system cannot be told to hold it, so WingsLevel turns its own picture back if the phone rotates. For the smoothest display there, also switch off the phone's auto-rotate (screen rotation lock).

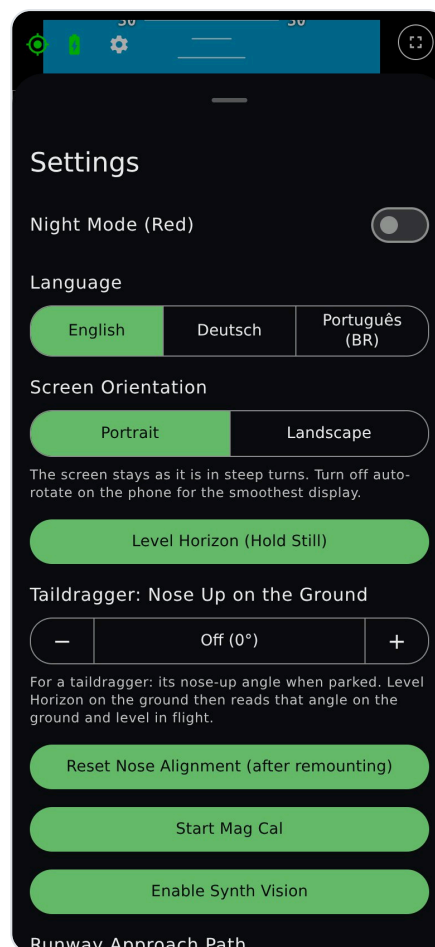


After changing the orientation: realign the horizon.

18. Settings reference

Tap the gear icon to open Settings. Drag the handle at the top down, or tap outside, to close it.

Item	What it does
Night Mode (Red)	Instruments, buttons and dialogs in red on black (chapter 17).
Language	English, Deutsch or Português (BR).
Screen Orientation	Portrait or Landscape, held in steep turns. Asks you to level again after a change (chapter 17).
Level Horizon (Hold Still)	Stores the mount's tilt so the horizon reads level (chapter 6).
Taildragger: Nose Up on the Ground	The aircraft's nose-up angle when parked, in 0.5° steps, so a Level on the ground reads level in flight (chapter 6).
Reset Nose Alignment (after remounting)	Forgets the learned nose offset; it is learned again on the next takeoff roll.
Start Mag Cal	Guided compass calibration with a progress bar (chapter 20).
Enable Synth Vision	3D terrain behind the attitude (chapter 13).
Runway Approach Path	Auto shows the approach path when you line up with a runway, Off never (chapter 11).
Terrain Manager (offline areas)	Download and delete terrain areas (chapter 14). The line below shows the terrain on the phone.
Update Aviation Data	Checks for new airport and navaid data (chapter 15).
Start Flight Recorder / Save Flight Log	Records sensor and GPS data (chapter 19).
Update Available: v...	Only when a new app version is waiting: shows what is new, with Update now and Later (chapter 16).
Version line	App name, version and address (chapter 16).



The Settings sheet.

19. Flight recorder

The flight recorder logs the raw motion-sensor and GPS data of a flight, to review it afterwards or to share it with us when reporting a problem.

Recording

1. Settings → **Start Flight Recorder**. A red ● **REC** timer appears on the attitude indicator while it runs, and the button shows the elapsed time.
2. Fly as usual. The log is saved on the phone every few seconds, so if the app closes you lose at most a few seconds.
3. After landing: Settings → **Stop Flight Recorder**.

Saving the log

Tap **Save Flight Log**. The phone's share sheet opens with the log file (a compressed `.csv.gz` on iPhone, a `.csv` on Android): send it with WhatsApp, email or another app, or save it to your files. If no share sheet opens, the file downloads instead. The status line shows the file name and size. Save still works after the app was closed and reopened.

A recording takes about 15 MB per hour before compression. The log stays on the phone only; nothing is sent anywhere unless you share it.

20. Magnetic calibration

The heading comes from the phone's compass, the gyroscope and, once you are moving, the GPS track. A phone compass that has not been calibrated, or that sat near a magnet, can be tens of degrees off. Calibrate it when the heading does not match your aircraft's compass, and after the phone was near a magnetic mount, a speaker or a charger.

1. Tap Settings → **Start Mag Cal**. A box shows the steps and a progress bar.
2. Take the phone out of its mount and step away from metal, speakers and chargers.
3. Slowly draw a figure-of-eight in the air, turning the phone face up, face down and on each side. The bar fills as the compass sees the Earth's field from every direction.
4. When the bar is full the app says **Compass calibrated** and shows the new heading. Put the phone back in its mount and tap **Done**.

Calibration resets the compass card alignment (chapter 9) and takes the heading from the compass at once. Check it against your aircraft's compass; if it still differs, align the card. On an iPhone the box also shows the accuracy the phone reports for its compass (for example $\pm 12^\circ$): keep turning until it is small.

Where the browser gives the app the raw magnetometer (some Android phones), the app also works out the phone's own magnetic errors and keeps them. Everywhere else the motion lets the phone recalibrate its own compass. If no compass reaches the app at all, it says so; the heading then follows the GPS track once you are moving. **Cancel** stops at any time; after 90 seconds without enough turning the app asks you to try again.

21. Warnings and failure indications

WingsLevel shows at once when it cannot be trusted, instead of showing old values.

What you see	Meaning and action
ALIGNING and red cross	Starting up. Keep the phone still for a few seconds.
Red cross, ATTITUDE FAIL , "no sensor data"	The motion sensors stopped. Do not use the attitude. Bring the app to the front, or close and reopen it.
Red cross and FLAG on the HSI	Heading not valid (same cause). Use the aircraft's compass.
Red X on the speed or altitude tape	No recent, accurate GPS position. Check the GPS icon.
GPS icon yellow (night mode: brighter red)	Weak or older fix: values may lag.
GPS icon red (night mode: brightest red)	No position: check that location is allowed and the phone can see the sky.
LEVEL: ... messages	Level was refused; see chapter 6.
No rotation sensor available	This phone has no suitable motion sensor; the attitude cannot work on it.
No tile in synthetic vision	No terrain for this area on the phone: download it (chapter 14).
GPS LOST: terrain estimated , then terrain off	No GPS: terrain estimated for 30 s, then off (chapter 13).
Amber heading box, HDG ALIGN	Nose offset not learned yet: heading may be a few degrees off (chapter 9).
NO GP on the approach path	GPS too imprecise for the glide path: use the centreline only (chapter 11).



Sensors and GPS lost: attitude, HSI and tapes all flagged.

If a flag appears in flight, stop using WingsLevel for that information and fly by your aircraft's instruments and outside references.

22. Troubleshooting

The horizon is not level on the ground

Tap Settings → **Level Horizon (Hold Still)** with the phone in its mount (chapter 6).

A taildragger reads nose down in level flight

Set Settings → **Taildragger: Nose Up on the Ground** to the aircraft's ground angle and level again on the ground, or adjust the angle in cruise until level flight reads level (chapter 6).

The horizon is slightly off after moving the mount

Level again and tap **Reset Nose Alignment**; the nose offset is learned again on the next takeoff roll.

The GPS icon stays red

Check that location is allowed for the app (chapter 3), that the phone's location is on and set to high accuracy (Android), and that the phone can see the sky: metal roofs and heated windscreens can block the GPS.

The attitude is not moving (iPhone)

Motion access was not allowed. Settings → Safari → Motion & Orientation Access: on. Then close WingsLevel fully and open it again from the Home Screen icon.

The HSI heading differs from the compass

Calibrate the compass first: Settings → **Start Mag Cal** (chapter 20). If it still differs, drag in a circle inside the compass rose to align the card (chapter 9). Phones near metal, magnetic mounts, speakers or chargers can disturb the heading.

Synthetic vision shows "No tile" or no terrain

Download the area in the Terrain Manager on Wi-Fi (chapter 14), and check that **Enable Synth Vision** is on.

The runway approach path does not show

Check that Settings → **Runway Approach Path** is on **Auto**. It shows only when you fly towards the runway on final, within 5 NM and less than 2,000 ft above it, and not for runways whose position is only estimated (chapter 11). If you tapped the runway at the bottom left until the path went, it comes back on the next final.

Airports are missing or old

Open the app online and tap **Update Aviation Data** (chapter 15).

The screen turns off or the app stops in the background

Keep WingsLevel in front. Some phones drop "keep the screen on" when the battery is low or in battery-saver mode: keep the phone charging.

The app doesn't open full screen (iPhone)

Open it from the Home Screen icon, not from a Safari tab.

Something else

Record a flight with the flight recorder (chapter 19) and send the log with a short description to wingslevel@ppoinha.com.

23. Data sources and credits

- Airport, runway, frequency and navaid data: OurAirports (ourairports.com, github.com/davidmegginson/ourairports-data), public domain. Not for navigation: the data may be incomplete or out of date.
- Terrain (synthetic vision): produced using Copernicus WorldDEM-90 © DLR e.V. 2010-2014 and © Airbus Defence and Space GmbH 2014-2018 provided under COPERNICUS by the European Union and ESA; all rights reserved.
- Airport layouts (runways, taxiways, aprons), lakes, rivers and roads in synthetic vision and the runway approach path: © OpenStreetMap contributors (openstreetmap.org/copyright), available under the Open Database License (ODbL).
- World Magnetic Model WMM2025: NOAA NCEI / British Geological Survey (public domain).
- EGM96 geoid model: NGA (public domain); grid prepared with egm96-universal by Nicolas Vanhoren (MIT License).
- Material Icons: Google, Apache License 2.0.

Safety notice. WingsLevel is a non-certified situational-awareness aid. It is not approved by EASA, the FAA or any other authority, must not be used for primary navigation or IFR flight, and consumer phone sensors can drift or fail. Always maintain visual reference and cross-check with the aircraft's instruments. The pilot in command remains responsible for the safe conduct of the flight.