

Meteorological Aided Spotting and Navigation User Manual



Privacy Statement:

This app uses GPS sensor data to compute navigation guidance and to request winds aloft for the current area. It stores a device identifier and licensing data to manage access. No data is sold; data is used only as needed for weather/winds and account verification.

Safety Notice

This app is a secondary aid only. It is not a certified instrument, and is not a substitute for your altimeter, training, experience, or normal skydiving decision making. Use your primary references first. If the app disagrees with your altimeter or with what you know from skydiving, trust your training and your primary indicators first.

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Cautionary Statements will be denoted in applicable sections as below.

DANGER

Information or situations that, if ignored, will cause death or serious injury. Because this application is a secondary indicator, the user should always fall back on their best judgement, experience, and safe skydiving practices to safely complete a skydive. Therefore, there will be no more danger statements throughout this document.

WARNING

Information or situations that, if ignored, may cause death or serious injury.

! CAUTION !

Information or situations that, if ignored, may cause moderate or minor injury.

Information

Supplemental Information.

Summary

MASN is a Garmin watch skydiving aid that provides situational awareness from pre-jump through landing. Before takeoff, it displays environmental conditions for jumping. Before exit, it provides positional awareness and safe exit separation. Under canopy, the application provides navigation guidance with meteorological variables. The app is intended only as a secondary aid and must never replace your altimeter, judgment, or standard jump procedures.

Use

- Open the app on the ground in the boarding area and confirm the correct DZ target and current position.
- Wait for account verification and wind loading, once prompted to start, press START prior to boarding the aircraft.
- Use the Spot screen in the aircraft for jump run awareness.
- After deploying your parachute, use the Canopy screen for canopy positional awareness.
 - If you require a live estimation of your current canopy flight i.e. Reserve canopy, toggle Live mode.
 - Default canopy screen will utilize user input values for canopy characteristics.
- The Landing screen will automatically appear low to the ground.
- Exit with double-BACK when you are done or let the app auto-close after landing.
- Activity will be available for review in Garmin Connect application on your mobile device.

Recommended Watch Settings

Setting	Recommended	Explanation
Watch > Satellites	All + Multiband	Best overall GPS position and altitude consistency for this app build.
Watch > Display > During Activity > Timeout	No Timeout	Keeps the screen available during the jump.
Watch > Touch > During Activity	Off	Reduces accidental touch inputs in the aircraft and under canopy.
Watch > Settings > Sensors & accessories > Compass > North Ref.	True	Allows for computations with online resources. When comparing heading with aircraft heading, be sure to account for declination as most aircraft operate with reference to magnetic north.
Power mode	Avoid battery-saving mode that reduces GPS performance	Aggressive battery saving can reduce update quality and affect altitude or position stability.

Connect IQ Settings

Connect IQ app > DZ Lat/Lon	Paste exactly as formatted in google maps	The app uses this point for distance, bearing, CPA, return guidance, and wind requests.
Connect IQ app > Elevation Offset	Only if needed, default 0	Use when the landing area elevation differs from the point where you pressed START.
Connect IQ app > Turn Altitude	Your normal pattern or setup altitude to final	Used by landing timing and canopy return calculations.
Connect IQ app > Glide Ratio	Your canopy glide ratio	Used for deployment and canopy return planning in User mode.
Connect IQ app > Descent Rate	Your canopy sink rate	Used with glide ratio for canopy planning in User mode.

! CAUTION !

Garmin smartwatch GPS connections are susceptible to shielding from surrounding metal. The skin of the aircraft, specifically the area under the wing on high-wing mounted aircraft, could result in loss of GPS signal. Sitting towards the rear of the aircraft and with your wristwatch towards the outboard side of the aircraft will increase the likelihood of maintaining a GPS connection.

Buttons

Button	Screen	Action
START	Startup / Ready	Begins the jump session and captures the current GPS altitude as the session AGL zero.
START	Spot screen	Switches to the Canopy screen.
START	Canopy or Landing	Returns to the Spot screen.
BACK twice	Any screen	Exits the app. From the main jump screens this also saves the activity.
DOWN	Canopy only	Toggles the return-by calculation between User mode and Live mode.

Automatic behavior

When valid altitude data is available, the application will automatically change to the Canopy screen at 3000 feet AGL and to the Landing screen at the turn altitude AGL plus 1000 feet. After landing, the app will save the activity to your Garmin Connect app and automatically close once it determines you are on the ground.

Unit of Measure

All units of measure are denoted. All heading degrees are reported in reference to True North. All altitudes, unless otherwise marked, are reported in AGL. Distances are reported in nautical miles to match aircraft instrumentation.

Older devices

This application is written to Garmin API 1.2.0 to be as accessible to as many Garmin Smartwatches as possible. Developments in technology of newer released Garmin Smartwatches increase processing capability and GPS antenna capability. All testing was conducted on watches that were released after 2022, your experience may vary based off of your device.

Start Screens

! CAUTION !

Do not treat the first GPS altitude you see as automatically valid. Watch the displayed altitude and MSL for a short period and press START only when it looks steady. If the number is drifting or clearly wrong, wait longer or restart the app before using it. If you know what the ground elevation above MSL is for the location you are at, you can reference that for when to START the program to lock the AGL zero altitude.

! CAUTION !

If application has less than 5% battery life remaining, it may not have enough power to function for the entirety of your skydive. Empirical testing on a Fenix 7XSS has shown that the application utilizes about 8%/hr of battery.

! CAUTION !

All weather information is predictive and should be treated as such. Weather information could be incorrect or missing. Use best judgement, experience, safe skydiving practices and drop zone procedures for time critical decision making.

Startup:

- Startup is used to acquire GPS, display your current MSL altitude, verify the account, load winds, and display weather information.

- When you press START on the ground, the app takes the current GPS altitude and uses it as the jump-session ground reference for AGL altitude.
- The application will then gather its preliminary data and notify the user when it is ready to start.
- Open the application on the ground in the boarding area prior to boarding the aircraft.
- Do not press START until the displayed MSL altitude is steady and the status line is READY. START is intended to be pressed prior to boarding the aircraft.



Figure 1: Startup / pre-weather example



Figure 2: Ready / weather-loaded example

Field	Explanation
Time	Current watch time.
Target Lat / Target Lon	Target DZ coordinates loaded from the Connect IQ settings.
Current Lat / Current Lon	Current GPS position from the watch.
MSL	Your current GPS-based altitude reading before the jump starts. Let this settle before pressing START.

Surface wind	Surface wind and gust information once weather data has loaded.
Blue Triangle	Surface wind direction
Cloud lines	Cloud summary such as lowest cloud layer, thickest layer, and clear-above height when that data is available. If clouds exist above 13,500, the application will describe it as overcast/scattered/isolated above 13,500.
Wind levels	The number of wind levels incorporated into the wind model.
Status line	Shows whether the app is still searching for GPS, checking the account, loading winds, locked, or ready.
Press START	Appears when the app is ready to begin. Use this only after the displayed GPS altitude looks steady on the ground.
Pair Code	May appear if the account is locked and requires developer approval.

Startup status messages

Status	Explanation	Action
GPS: Searching...	The watch does not yet have a usable GPS fix.	Wait for GPS to settle before starting.
Checking Account...	License or account verification is in progress.	Wait.
Locked: ...	The app did not pass the license check.	If a pair code appears, send it to the developer.
Loading Winds...	The app is requesting winds and weather data.	Wait if you want the full wind-driven model or press START to query starting the app without wind data.
No wind data	Wind loading did not complete.	Press START once to arm the override and START again to continue without winds.
Ready	All checks complete, ready to jump.	Confirm the altitude is steady, then press START on the ground to set the session zero.

Wind Model

Due to limitations with Bluetooth transmission, the entire wind model may not be transferred from your mobile device to your watch. The number of “wind levels” is directly proportional to the resolution of your wind model. The winds aloft are pulled from the surface to 13000 feet MSL at every 1000 ft. A wind model with >10 wind levels has higher resolution, while a wind model with <3 wind levels can still build a navigation plan, but with more error.

Surface Winds

Surface winds are taken as the lowest available wind layer reported in open-meteo (up to 10 m/ 32 ft). The wind speed and gust may be reported to be slightly different than what is felt on the ground as a result.

Weather

All weather information (Cloud percentages/altitudes, winds aloft, surface winds) is taken from the next forecasted hour at the target location from when the app was started. The weather is refreshed every time the app is started. Weather information is sourced from open-meteo.com

Spot Screen

WARNING

This application is NOT intended for freefall use. Readings refresh once per second and are not often enough to support freefall decision making.

WARNING

GPS connectivity may be intermittent, always visually verify your exit spot and follow drop zone procedures prior to exiting the aircraft.

! CAUTION !

When compared to your dedicated skydiving altimeters, there may be deviation between barometric altimeters and your watch’s altimeter reading. There is inherent error with barometric altimeter calculations; however, they can provide a general area of the altitude you are at with a higher refresh rate. GPS altimeters provide a true altitude but are susceptible to signal interference, and slow refresh rates. When there is a major deviation between the altimeter reading on your app and your primary altimeter, defer to your primary altimeter and safe skydiving practices.



Figure 3: Spot Screen Example

Field	Explanation
Red triangle	Direction to the DZ relative to your current heading.
Heading	Current heading in degrees.
Dist to CPA	Distance along jump run to the closest point of approach to the DZ.
Offset Left / Right	How far left or right is the DZ from the current jump run track.
Ground Speed	Current ground speed in knots.
Exit Sep	Time to cover 0.25 nautical miles at the current ground speed.
Deploy by	Lowest suggested deployment altitude based on user input canopy characteristics and the currently loaded wind model. Red text means the computed deployment altitude is above your current altitude.
Bottom altitude line	Current GPS-derived AGL altitude in feet, using the session zero that was captured when you pressed START on the ground. Verify this altitude with your altimeter to ensure proper function.

Closest Point of Approach

The application has opted to utilize distance to CPA as opposed to distance to target. Although not all drop zones utilize an offset for their day-to-day skydiving operations, using distance to CPA instead of distance to target can accommodate spotting when there is and when there isn't an offset. While the plane is circling during climb, CPA may look odd because it is only applicable on jump run. If no offset is planned, the distance to CPA is the same as distance to target and any offset will probably be a result of pilot error.

Deploy by

The Deploy by calculation is based off the user input glide ratio and descent rate in addition to the wind model. If you are unsure of what your glide ratio is, utilize the normalized glide ratio while under canopy on the canopy screen while flying steadily and input that into the app.



Figure 4: Closest Point of Approach Visualization, the watch face is an example of what would be displayed for a user in the plane.

Canopy Screen

WARNING

In the United States, it is a violation of federal law for skydivers to fly through clouds. Although the application increases positional awareness, flying through or in proximity of clouds is prohibited by US federal law and could result in serious injury or death.

WARNING

The canopy screen is designed to be a quick reference for you to glance at the screen, get the information you need and focus on your canopy flight. Avoid losing situational awareness of traffic around as a result of analyzing the watch screen for extended periods of time.

! CAUTION !

Using “live” mode allows the watch to estimate and normalize your glide ratio based off of forecasted winds at your altitude. While under high performance canopies and/or during high-performance maneuvers, the smartwatch may have difficulty determining glide ratios accurately. Allowing your canopy to flight cycle and fly at normal glide provides the most accurate glide ratio and descent rate.

! CAUTION !

If the watch altitude and your primary altimeter disagree, follow your primary altimeter and standard jump procedures.

Canopy Screen:

- The canopy screen is intended to be a quick reference to allow the user to focus on canopy flight. If the watch algorithm does not predict you will land at the intended target, it will notify you with large red text.
- As it is unlikely that the user will be able to observe their watch in a normal attitude while their hand are utilizing the toggles, therefore the white triangle is for orienting the user to front (assuming left-handed wear).



Figure 5: Canopy screen examples. The left watch is portraying a canopy that has enough glide in the current conditions to reach the target. The right watch portrays a canopy that does not have enough glide in the current conditions to reach the target.

Field	Explanation
White triangle	Reference marker for your current heading.
Red triangle	Direction to the target relative to your heading.
Blue triangle	Wind direction at your current altitude, shown as where the wind is coming from.
Top heading value	Current heading in degrees.
Dist	Current distance to the target in nautical miles.
Back By	Estimated altitude at which you would reach the target if you fly directly toward it now.
Range	Estimated glide to the ground on your current heading
GR	Wind-normalized glide ratio
Descent	Measured descent rate

Independent canopy predictors

The Back by calculation and the current/target glide ratios both provide predictors on whether the user will make it to the target Lat/Long by 1000 ft over their input final turn altitude. The back by calculation utilizes either the user input glide ratio and descent rate with the forecasted winds aloft model or will estimate your still-air glide ratio to predict returnability. While the current and target glide ratios will take your live performance and predict returnability.

Live Canopy

User mode uses your configured glide ratio and descent rate from the Connect IQ settings. Live mode normalizes your canopy characteristics to the current wind effect and plans the rest of your canopy flight with the remaining wind model. Live mode is especially useful when you may not know your canopy characteristics, i.e. flying your reserve.

Color Coding

The watch face is designed to alert the user if there are issues with a quick glance. If the algorithm on the watch believes the user will return to the designated target with no issue, indicators will be green. If the data suggests the user may not make the designated area, indicators will be yellow. And if the data suggests that the user will not make it to the designated area, indicators will be red.

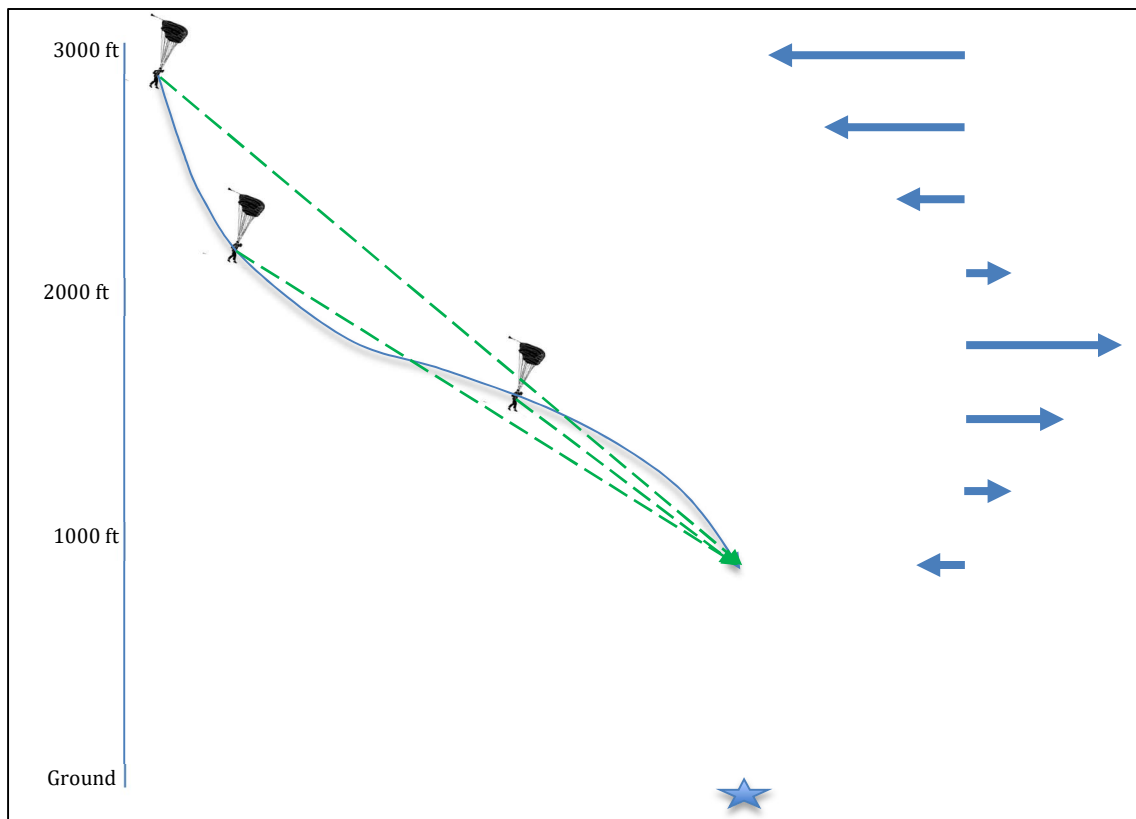


Figure 6: 2D representation of wind model on Canopy Performance. The green dashed line depicts the application algorithm taking into account all wind effects for the remainder of your canopy flight to predict your landing location. The black line represents the actual canopy flight and the blue arrows depict the winds at each altitude.

Review Screen



Figure 7: Review Screen Example

Field	Explanation
Last Canopy Event	The Lat/long, altitude, and time of the last canopy opening you've had, main or reserve
Accuracy	Distance to target at landing
Freefall	The detected time of freefall in m:ss
Canopy	The detected time of canopy flight in m:ss
Red Triangle	Points in direction of input target

! CAUTION !

To save battery, the application turns off GPS once landing has been detected. As a result, on the review screen, the red triangle will point at your target WRT your landing point. The red triangle heading will update WRT orientation of your watch; however, it will not update with horizontal movement.

Cutaway

In the event of a canopy cutaway. The Garmin detects your "last canopy event" to provide an accurate

position of where your cutaway occurred. Inputting your latitude, longitude, altitude and time of cutaway into <https://skydivingtools.com/cutaway> may greatly increase your chances of recovering your canopy.

Activity Recording

- When the jump session starts, the app records an activity that can later be viewed in Garmin Connect.
- The saved activity will display the GPS track and altitude, which can be stored as a CSV or GPX for further analysis.
- If you exit from the startup screen before the jump session begins, the activity is discarded instead of saved.
- If you exit from the main jump screens, or the app auto-closes after landing, the activity is saved.

Troubleshooting

Scenario	Explanation	Corrective Action
The app stays on the startup screen	It is usually still waiting on GPS, account verification, or wind loading.	Read the status line first and wait for the checks to complete.
The displayed GPS altitude will not settle on the ground	The watch has not produced a stable GPS altitude yet.	Move to a more open area. If the altitude does not settle, restart the app.
Wind data never loads	The weather request did not complete.	Use the no-wind override if needed. Press START once to arm it and START again to continue without winds.
A field shows ---	That field does not currently have enough valid input data.	This commonly happens if heading, altitude, position, or wind-profile data is missing.
The app feels wrong compared with your altimeter	The watch altitude may be unreliable even if lat/lon still looks good.	Follow your primary altimeter.
Pair code shown / app locked	The app did not pass the account check.	Send the displayed pair code to the developer.
Wind levels are low	Only part of the wind profile loaded.	The model can still work, but with less fidelity. Plan for errors in navigation predictions. Or restart the application to attempt wind pull again.
You want to exit before starting a jump	The jump session has not begun.	From the startup screen, press BACK twice. The app exits without keeping a jump activity.
You want to end the session manually	The jump session is active.	From Spot, Canopy, or Landing, press BACK twice. The app saves the activity and exits.

End User License Agreement

Read before use

This section is written as a user acknowledgment and can be edited by the app owner before distribution. The core intent is that the user clearly understands that the app is only a secondary indicator and that normal skydiving judgment and primary instruments remain controlling.

1. License grant

Initial _____

The app owner grants the user a limited, revocable, non-transferable license to use the app on a compatible device for personal use. The user may not copy, sell, sublicense, reverse engineer, or redistribute the app except as separately permitted in writing.

2. No warranty

Initial _____

The app is provided as-is and as-available, with no promise that it will be uninterrupted, accurate, complete, current, or fit for any particular purpose. GPS, weather, winds aloft, cloud summaries, licensing checks, and recorded activity fields may be delayed, unavailable, incomplete, or wrong.

3. Secondary indicator only

Initial _____

The user acknowledges that the app is only a secondary reference tool. It is not a certified aviation instrument, not a primary altimeter, not a primary navigation source, and not a substitute for formal skydiving training, personal judgment, standard operating procedures, or required equipment.

4. User responsibility

Initial _____

The user is solely responsible for pre-jump planning, aircraft procedures, spot decisions, exit decisions, deployment decisions, canopy pattern decisions, landing decisions, obstacle avoidance, separation, emergency procedures, and compliance with all applicable rules, training standards, and drop zone requirements.

5. Primary instruments and procedures control

Initial _____

If the app conflicts with the user's altimeter, visual references, radio instruction, aircraft procedures, canopy judgment, or any other primary cue, the user agrees to disregard the app and follow training, experience, and primary indicators. The user specifically acknowledges that a standard skydiving altimeter remains a primary instrument and that the app must not be relied on as the sole source of altitude information.

6. Configuration risk

Initial _____

The user acknowledges that incorrect settings such as DZ coordinates, DZ elevation, elevation offset, turn altitude, glide ratio, or descent rate can materially change outputs. The user is responsible for verifying all settings before use.

7. Connectivity and data dependencies

Initial _____

The user understands that some features depend on GPS availability, weather responses, wind-profile loading, account/license checks, and device sensors. Any of these may fail before or during a jump.

8. Account access, subscription, and approval

Initial _____

The app owner may require payment, account approval, pairing, subscription renewal, or other activation steps before the app or some features will function. Access may be suspended, refused, or revoked at any time in the app owner's discretion.

9. Operational data and privacy

Initial _____

The user understands that the app and related services may store or process device identifiers, pair codes, license/account checks, target coordinates, usage timestamps, recorded activity data, and similar operational information needed to support the app.

10. Software changes and updates

Initial _____

The app owner may modify, suspend, or remove features, screens, calculations, messages, workflows, subscription rules, or supported devices at any time, with or without notice. Continued use after an update or change constitutes acceptance of the modified app behavior.

11. Not for freefall decision making, including wingsuiting

Initial _____

The user acknowledges that the app is not intended for freefall decision making, including wingsuiting. The user agrees not to rely on the app for freefall navigation, freefall separation, wingsuit navigation, or any other time-critical freefall decision.

12. Limitation of liability

Initial _____

To the maximum extent permitted by law, the app owner, developer, and distributor will not be liable for any direct, indirect, incidental, consequential, special, exemplary, or punitive damages, including bodily injury, death, property damage, lost data, lost use, or operational error arising out of or related to use or inability to use the app.

13. Assumption of risk

Initial _____

Skydiving is an inherently hazardous activity. By using the app, the user knowingly accepts all risks associated with skydiving and all risks associated with using a supplemental electronic tool during skydiving.

14. Termination

Initial _____

This license may be terminated at any time by the app owner or by the user. Upon termination, the user must stop using the app.

User acknowledgment

I understand that this app is a secondary indicator only.

I will rely on my training, my experience, and my normal skydiving procedures first.

I will use my primary altimeter and other primary skydiving indicators for actual altitude awareness and decision making.

I understand that the app is not for freefall decision making, including wingsuiting.

I understand that GPS, wind, weather, or other data may be missing, delayed, or inaccurate.

I accept the risks and terms described in this document.

Full Name

Signature

USPA/Organizational license #

Date

Pair Code
