SafeTurn Plus™ Portable Mini Glass Backup Instrument

Technical Specifications / Operation

Last updated 2/16/2026

The RADIANT **SafeTurn Plus** is designed to show simultaneous **turn (yaw)** and **bank (roll)** information, plus **barometric altitude**, **Kollsman**, **vertical speed (VSI)**, and **AGL** (advisory). Yaw information is derived from a solid state gyroscope. Roll information is derived from a solid state accelerometer. Altitude is derived from an internal barometric pressure sensor; VSI and AGL are computed from altitude and configuration settings. All information is presented digitally and graphically on a single vivid LCD screen, inside a portable case.

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1. Introduction

SafeTurn Plus is a portable, battery-powered **turn coordinator / inclinometer** that expands SafeTurn's proven gyro/accel engine with an integrated **Altimeter + VSI + AGL** "mini glass" feature set. It uses the same foundational processing used in our panel instruments—gyro/accel processing, selectable Gyro Filter, calibration flow, and temperature compensation—adapted to a handheld, self-powered format. SafeTurn Plus is not TSO'd or NORSEE-approved and must be treated as an advisory aid only; do not use as a primary flight instrument.

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2. What's in the Box

- SafeTurn Plus instrument
- USB charging cable (type may vary by production batch)

Optional accessory: **Panel Mount Holster** (sold separately) for 3-1/8" instrument holes or flat-surface mounting.

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3. Controls & Indicators

Front display (primary items)

- Turn indicator (left/right) with smooth, readable motion

- Slip/Skid “Ball” (lateral acceleration)
- Digital yaw rate (°/s) continues beyond the graphic range
- Digital altitude window
- Digital Kollsman window (IN/HPA), user adjustable
- Digital VSI (numeric) and VSI tape (trend)
- Digital AGL and AGL tape (advisory; user configurable)
- Battery Gauge (top-left): four stacked segments (Green/Green/Yellow/Red) with a small “button” cap at the top

Buttons (same two-button philosophy as SafeTurn)

- **Left (short press):** DIM (cycle brightness / toggle bright↔dim)
- **Right (short press):** BARO / SET (used for Kollsman & setup functions)
- **Right (long press ≥7 s):** CAL (store offsets and reboot)
- **Both (short press, simultaneous):** Gyro Filter level 0→1→2→3→0

Automatic functions

- Temperature compensation: firmware maintains yaw/ball stability and barometric stability over typical cockpit temperature changes
- Settings retention: Gyro Filter and user settings are retained across power cycles

Side of unit

- USB port (for charging only)
- USB charging LED (inside unit, visible when under charge)
- Power switch (slide up to turn on)

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4. Power & Battery

- Internal single-cell Li-ion (nominal 3.7 V)
- Typical runtime: ~5 hours (full brightness), 10+ hours (reduced brightness), up to ~20 hours (minimum brightness). Actual runtime varies with temperature and usage.
- Charging: connect to USB power. A full charge is recommended prior to first use.

4.1 Battery Gauge Behavior

Four vertical segments (top to bottom): **Green / Green / Yellow / Red**

- Top Green: near-full state of charge (nominal ≥ ~3.90 V)
- Second Green: healthy mid-range (nominal ~3.72–3.89 V)
- Yellow: reduced capacity (nominal ~3.55–3.71 V)
- Red (solid): low battery (nominal ~3.40–3.54 V)
- Red (blinking): critical battery (nominal < ~3.40 V)

Notes: Thresholds are nominal and may vary slightly with load and temperature. The gauge self-heals if any part of the screen is repainted by other functions.

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5. Mounting Options

- **Portable use:** place on a stable, visible surface in your cockpit. The display is sunlight-readable; reduce brightness for night/low light.
- **Panel Mount Holster (optional accessory):** a rigid enclosure that screws into a standard 3-1/8” instrument hole (no electrical connection). It provides a convenient parking spot in your aircraft. The holster can also be mounted to flat surfaces using corner holes or adhesive tape.

CAUTION: Ensure the instrument and any mount do not interfere with flight controls or required instrumentation.

Below is a drop-in “Setup and Configuration” section for the SafeTurn Plus manual, written in the same form/style as the SafeTurn page (numbered sections, short bullets, two-button philosophy). It assumes the same baseline button scheme you already publish for SafeTurn (Left = DIM, Right long = CAL, Both short = Gyro Filter). (Radiant Technology)

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6. Setup and Configuration (SafeTurn Plus)

SafeTurn Plus ships ready to use, but several items are user-configurable. All setup is done with the same two buttons.

Button behavior (setup context)

- Left (short press): changes the highlighted value (or cycles options)
- Right (short press): advances to the next setup item (or accepts)
- Right (long press ≥7 s): CAL (store offsets and reboot)
- Both (short press, simultaneous): Gyro Filter 0→1→2→3→0

Note: CAL stores gyro/accel offsets; it does not "fix" an incorrect BARO / unit / AGL setup. Set BARO/units/AGL first.

6.1 Entering / Exiting Setup

1. Enter Setup: Right short press. The first adjustable field will highlight (blink).
2. Change a value: Left short press cycles or increments the highlighted field.
3. Next field: Right short press advances to the next setup item.
4. Exit Setup: stop pressing buttons; the unit will automatically save and return to normal display after a short timeout.

Settings are retained across power cycles.

6.2 Selecting ROW (Rest Of World) Units

SafeTurn Plus supports unit conventions commonly used outside the U.S. (e.g., hPa instead of inHg).

1. Enter Setup (Right short press).
2. Press Right until UNITS is highlighted (typically shows IN or HPA).
3. Press Left to toggle:
    - IN = inHg-based baro convention (U.S. style)
    - HPA = hPa-based baro convention (ROW)
4. Let the unit time out to save and return to normal display.

6.3 Setting BARO / Kollsman

BARO (Kollsman) aligns the displayed altitude to local pressure setting.

1. Enter Setup.
2. Advance to BARO (Kollsman) field.
3. Use Left to adjust BARO (small steps; hold/tap as needed).
4. Let the unit time out to save.

6.4 AGL Setup (Advisory)

AGL on SafeTurn Plus is baro-derived (advisory). It is intended for quick pattern/training awareness and must not be treated as terrain-aware or certified AGL.

6.4.1 Setting the AGL Reference (Field Elevation / “Zero”)

AGL requires a reference so the instrument knows what “ground level” is.

1. Enter Setup.
2. Advance to AGL REF (or FIELD) field.
3. Use Left to adjust the reference until AGL reads approximately correct for your current airport/field.
4. Let the unit time out to save.

Practical tip: set AGL reference on the ground before flight (or in stable, unaccelerated straight-and-level flight if needed).

6.5 Selecting AGL Tape Range (Scale)

SafeTurn Plus allows the AGL tape to be scaled for your mission (pattern work vs. higher altitude awareness).

1. Enter Setup.
2. Advance to AGL RNG (AGL Range) field.
3. Use Left to cycle ranges (example set):
    - 500 (tight pattern emphasis)

- 1000 (typical pattern emphasis)
- 2000 (general training / local area)
- 5000 (broader awareness)

4. Let the unit time out to save.

If ROW units are selected, the displayed AGL range will follow the selected unit convention.

6.6 Other Adjustable Items in SafeTurn Plus

In addition to BARO/UNITS/AGL settings, SafeTurn Plus includes the same pilot-tunable items as SafeTurn:

- Brightness: Left short press toggles Bright↔Dim (or steps brightness if configured that way) (Radiant Technology)
- Gyro Filter: Both short press cycles 0→1→2→3→0 (retained) (Radiant Technology)
- Calibration (CAL): Right long press ≥7 s stores offsets and reboots (Radiant Technology)

If you paste the exact screen labels you used in firmware (e.g., “UNITS / ROW / HPA / IN”, “AGL RNG”, “FIELD”, etc.), I can tighten this so it matches *exactly* what the pilot will see on the display (no “AGL REF (or FIELD)” ambiguity).

7. Calibration (CAL)

Perform calibration on a level reference (bench) or in straight-and-level, unaccelerated flight.

1. Establish stable, level conditions.
2. Press and hold **Right (≥7 s)** to **CAL**.
3. The unit will store offsets and reboot; normal operation resumes automatically.

When to calibrate

- After first use or significant maintenance
- If the ball does not center while wings-level
- If a turn is indicated while straight

If calibration is attempted during turns/acceleration, results may be inaccurate. Repeat under proper conditions.

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8. Care & Safety

- Do not expose to liquids, fuels, or solvents.
- Avoid extreme temperatures; very low temperatures reduce battery runtime.
- Charge only with appropriate USB power sources.
- This product contains a Li-ion battery. Do not puncture, crush, or short the battery. If the case is damaged, discontinue use.

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9. Troubleshooting

- **Ball not centered / turn indicated while straight:** perform CAL under proper conditions (level/unaccelerated).
- **Display too bright at night:** reduce brightness (DIM).
- **Short runtime:** cold temperatures and high brightness reduce runtime; recharge fully and reduce brightness.
- **Altitude seems "off":** verify Kollsman setting matches local baro; confirm unit system (IN/HPA) is correct.
- **AGL seems "off":** verify AGL configuration and understand AGL is advisory and baro-derived (not terrain-based).

If problems persist, contact support@radiantinstruments.com with your order information and a description of the behavior.

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10. Specifications (typical)

- Power: 1-cell Li-ion (nominal 3.7 V)
- Runtime (typical): ~5 h full brightness; 10+ h reduced; up to ~20 h minimum brightness
- Indicators: 4-segment battery (two greens, yellow, red) with critical blink

- Controls: Left DIM; Right BARO/SET; Right long (≥7 s) CAL; Both short = Gyro Filter 0–3 (retained)
- Processing: RTCC-derived firmware with temperature compensation
- Displayed turn rate ranges: Graphical airplane up to ±5.0 °/s; Digital yaw >±10.0 °/s
- Altimeter range: 0–20,000 ft (typical)
- Dimensions / weight: 2.5 x 2.5"; ~50 grams (portable enclosure)
- Operating temperature: [0 to 45C]
- Warranty: [3 year]

Regulatory: Advisory use only. Not TSO'd/NORSEE-approved. Do not rely on SafeTurn Plus as a primary flight instrument.

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11. Accessory: Panel Mount Holster (Optional)

A dedicated holster that fits a 3-1/8" panel cutout or flat-surface mount. No electrical connection; simply provides a secure place to park the instrument in your aircraft. Sold separately.

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12. Diclaimers

Products from Radiant Technology are not designed to be used in applications where their failure would endanger safe flight or human life in any way. They are intended solely for use in VFR conditions. They are not certified to meet any Technical Standard Order and are not produced under a Parts Manufacturing Authority (TSO / PMA).

As a result, if permanently installed in the aircraft, they are suitable only for use in experimental and ultralight aircraft, and in Light Sport Aircraft, if meeting the requirements of the respective manufacturer. Specifically not for use as a primary display instrument in certified aircraft.

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13. Warranty

Your new Radiant Technology instrument carries a three-year warranty from the invoice date. Please contact us at support@radiantinstruments.com should your product need warranty service. There is an additional charge for international warranty service.

14. Return / Refund Information

Must be returned in new, uninstalled, resalable condition within 14 days after receipt. Ship to Radiant Technology, PO Box 20690, Wichita KS 67208.

Format and baseline button/battery language mirrors the existing SafeTurn manual, with SafeTurn Plus additions aligned to the SafePanel "mini glass" feature definitions (Kollsman IN/HPA, ROW, VSI/AGL concepts). (Radiant Technology)