



Altimeter + VSI Combo

Analog-style digital altimeter and vertical-speed instrument

Technical Specifications / Operation

Last updated 5/31/2026 - Firmware revision B026

Aircraft Spruce Part #	Radiant MFR Model #	Panel format
10-07652	RI-2024-1	2 1/4-inch panel cutout version
10-07653	RI-2024-2	3 1/8-inch panel cutout version

IMPORTANT: Advisory use only. Not TSO, PMA, or NORSEE approved. Do not use as a primary or required flight instrument.

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1. Introduction

The **RADIANT Altimeter + VSI Combo** combines a classic dual-needle altimeter presentation, a digital altitude readout, a settable Kollsman window, a small analog vertical-speed indicator, and a digital vertical-speed readout on one compact 320 x 240 color LCD screen. The instrument is designed for experimental, ultralight, and Light Sport Aircraft applications where an economical advisory altimeter/VSI display is desired.

Firmware B026 is the pressure-tested firmware covered by this manual. It uses fractional barometric altitude internally, a faster altitude response filter than earlier builds, and a six-second VSI trend window. These changes are intended to give a stable but responsive pressure-altitude and vertical-speed display.

The Combo is value-driven and intentionally simple. It does not include density altitude, GPS altitude, pitot/static airspeed, an external temperature probe, data logging, or a pneumatic barb adapter. It uses the pressure available at the instrument body, typically cabin or panel-area pressure.

Flight-safety note: This product is not a certified altimeter and is not a substitute for required aircraft instruments, required inspections, or safe pilot judgment.

2. Intended Use and Limitations

- Aviation use is advisory only. Do not use the Combo as a primary flight instrument, required aircraft instrument, or substitute for approved altimeter/VSI equipment.
- The instrument is intended for VFR experimental and ultralight aircraft use, and for Light Sport Aircraft only when allowed by the aircraft manufacturer and applicable rules.
- The displayed altitude and VSI are pressure-derived. They can be affected by local altimeter setting, cabin pressure, leaks, vents, airflow around the panel, temperature, power quality, sensor tolerance, and mounting location.
- The instrument is not terrain-aware and is not GPS-based. It does not know field elevation, obstacle elevation, or terrain clearance.
- Do not install or operate the unit where it blocks required instruments, interferes with flight controls, or distracts the pilot.
- For pressurized aircraft, the instrument will indicate pressure altitude associated with the pressure at the instrument, which may be cabin pressure rather than outside static pressure. It is not intended for pressurized-aircraft primary use.

3. Models and Part Numbers

Aircraft Spruce Part #	Radiant MFR Model #	Description	Mounting note
10-07652	RI-2024-1	Altimeter + VSI Combo, 2 1/4-inch version	For 2 1/4-inch panel installations. The left side of the panel opening must provide rectangular clearance so the full screen is visible.
10-07653	RI-2024-2	Altimeter + VSI Combo, 3 1/8-inch version	For 3 1/8-inch panel installations. Uses the larger round panel format / adapter arrangement supplied for this version.

Both versions run the same B026 Combo firmware behavior described in this manual unless a production label, insert, or service bulletin states otherwise.

4. What Is Included

- Altimeter + VSI Combo instrument in the selected panel format.
- Model-appropriate mounting hardware and/or adapter parts, if supplied with the production batch.

Not included unless specifically supplied: circuit breaker/fuse holder, wiring.

5. Quick Start

1. Install the unit securely in the correct panel opening for the model being used. The 2 1/4-inch version needs left-side rectangular screen clearance; the 3 1/8-inch version uses the larger panel format / adapter arrangement.
2. Connect black wire to aircraft ground and red wire to switched, fused 9 to 16 V DC aircraft power. Use a suitable fuse, typically 1 amp. Do not exceed the voltage limits in Section 19.
3. Power the instrument from the aircraft master/avionics switch or other appropriate switched power source.
4. If you wish, run the setup wizard, described below. You can skip that for normal feet mode.
5. Set the Kollsman value to the current local altimeter setting. Press the left button briefly to decrease and the right button briefly to increase.
6. To return to standard pressure, briefly press both buttons together. This resets the Kollsman value to 29.92 in US mode or 1013.5 hPa in ROW mode.
7. Allow several seconds after power-up for the altitude path and VSI trend buffer to stabilize. The VSI is intentionally held at zero for the first 9 seconds after power-up while its trend buffer fills.
8. Use the large altimeter dial and digital altitude for altitude awareness. Use the small VSI dial and digital VSI for climb/descent trend awareness.

Before flight: Compare the Combo indication with the aircraft approved instruments and known field conditions. If indications disagree or behave unexpectedly, do not rely on the Combo for flight decisions.

6. Display Layout

The screen has one fixed operating view.

Area	What it shows	Notes
Large left dial	Analog-style altimeter dial with two white needles.	Long hand makes one revolution per 1,000 ft. Short hand makes one revolution per 10,000 ft; dial numerals 0-9 represent thousands for the short hand. The dial is always feet-based.
Yellow Kollsman value	Settable altimeter setting inside the large dial near the 3 o'clock area.	US mode shows inHg as 29.92. ROW mode shows hPa as whole hPa with a small 5 marker when the setting is at a half-hPa step.
Upper-right small dial	Analog-style VSI dial.	Dial labels depend on US/ROW mode and selected VSI scale.
Digital VSI window	Current vertical speed.	US mode displays fpm. ROW mode displays integer m/s. Negative values use a minus sign.
Digital ALTITUDE window	Current barometric altitude after Kollsman and CAL offset.	US mode displays feet. ROW mode displays meters. The value is pressure-derived and advisory.
Bottom button hints	Minus near the left button and plus near the right button.	These indicate Kollsman adjustment direction during normal operation.

Display colors: The Kollsman value is yellow. Major digital windows and needles are white. Green bezel outlines are readability and grouping cues only. Negative VSI is indicated by a minus sign in the digital VSI window and by the small VSI needle moving into the DN direction.

7. Button Operation

The Combo uses two front buttons. The left and right buttons can be tapped individually or together. A short tap is a brief press and release. A long hold is approximately half a second or longer.

Gesture	Normal operating action
Left short	Decrease Kollsman setting one step.
Right short	Increase Kollsman setting one step.
Both short	Reset Kollsman to standard pressure: 29.92 inHg in US mode, or 1013.5 hPa in ROW mode. The reset is saved immediately.
Left long	Advance brightness to the next dimmer level.
Hold Left continuously	Continue cycling brightness about once per second while held.

Gesture	Normal operating action
Right long	No normal operating action; advances the setup wizard while in setup mode.
Both long	No normal operating action.

Gesture at power-up	Action
Hold Right while applying power	Enter the setup wizard. Release the button after the setup screen appears or after the instrument begins setup entry.
Hold Left while applying power	Reserved.
Hold Both while applying power	Reserved.

Button timing: Keep normal Kollsman taps brief. If a press is held long enough to be recognized as a long hold, it may cycle brightness or advance the setup wizard instead of changing the value.

8. Normal Operation

8.1 Power-on behavior

- The screen blanks briefly, then paints the large altimeter dial, small VSI dial, Kollsman value, digital VSI, and digital altitude windows.
- The Kollsman value, unit mode, VSI scale, and CAL offset are loaded from nonvolatile memory.
- The pressure sensor begins feeding the altitude filter. The VSI remains zero for the first 9 seconds while the trend buffer fills with real altitude samples.
- After startup, Kollsman changes are saved automatically.

8.2 Pressure source behavior

The Combo uses an internal barometric pressure sensor. It reads the pressure present at the instrument. It is not connected to a pitot/static system. For best results, mount the unit where cabin or panel pressure is stable and representative. Avoid direct blast from vents, leaks, propwash through an open panel, heater outlets, or sealed compartments.

Cabin pressure matters: If cockpit pressure differs from true outside static pressure, the Combo altitude can differ from the aircraft approved altimeter. This is especially important in closed, drafty, or pressurized aircraft.

9. Kollsman Setting

Use the Kollsman setting just as you would on a conventional altimeter. Set it to the current local altimeter setting for local indicated altitude, or reset to standard pressure when pressure altitude is desired.

Mode	Displayed Kollsman units	Adjustment step	Nominal range	Standard reset
US / FT	inHg, shown as 29.92 style display	0.01 inHg per button tap	29.00 to 31.00 inHg	29.92 inHg
ROW / MT	hPa, shown as whole hPa with optional small 5 marker	0.5 hPa per button tap	950.0 to 1050.0 hPa	1013.5 hPa reset value

- Press Left short to decrease the Kollsman value.
- Press Right short to increase the Kollsman value.
- Press Both short to reset to standard pressure: 29.92 inHg in US mode or 1013.5 hPa in ROW mode. This reset is saved immediately; the previous Kollsman value is not retained.
- In hPa mode, the main four digits show whole hPa. A small yellow 5 next to the value indicates the half-hPa step, for example 1013 plus the small 5 marker means 1013.5 hPa. ISA standard pressure is 1013.25 hPa; the Combo rounds the ROW standard reset to 1013.5 hPa because the hPa adjustment grid is in 0.5 hPa steps.
- Changing Kollsman immediately changes the displayed altitude. It does not create a VSI climb/descent because VSI is calculated from the underlying pressure-altitude trend before Kollsman and CAL display offsets.

10. Altimeter Operation

The altimeter indication is **pressure-derived**. It combines the pressure sensor reading, Kollsman setting, and user CAL offset to display an indicated altitude. The large analog-style dial provides a familiar steam-gauge view. The digital altitude window provides the direct numeric value.

Display item	Meaning
Long white altimeter hand	Hundreds-of-feet hand; one full revolution per 1,000 ft.
Short white altimeter hand	Thousands / 10,000-ft hand; one full revolution per 10,000 ft. Dial numerals 0-9 represent thousands for this hand.
Digital ALTITUDE window	Whole altitude value after Kollsman and CAL offset. Feet in US mode; meters in ROW mode.
Yellow Kollsman	Current barometric setting used to correct the pressure altitude to indicated altitude.

Unit-mode note: In ROW mode the digital altitude window displays meters, but the large analog altimeter dial remains a feet-based dial. Use the digital value for metric altitude.

Response note: The altimeter should respond promptly to pressure changes while still smoothing sensor noise.

11. VSI Operation

The VSI is calculated from recent barometric altitude trend. It is not a separate mechanical variometer. This instrument calculates vertical speed from a six-second pressure-altitude history, using sub-foot internal altitude resolution. This gives a stable readout while preserving useful climb/descent response. In ROW mode, the digital VSI and small dial labels are calibrated directly in meters per second at the dial positions.

VSI item	Meaning
Small analog VSI dial	Needle shows climb/descent trend. UP indicates climb; DN indicates descent.
Digital VSI window	US mode shows feet per minute. ROW mode shows integer meters per second.
Selectable VSI scale	Default +/-2,000 fpm analog scale, or optional +/-1,000 fpm analog scale for finer needle sensitivity.
Digital range	Digital VSI is clamped at +/-9,999 fpm in US mode, with equivalent rounded m/s display in ROW mode.
Dead zone	Rates within about +/-30 fpm are displayed as zero to reduce jitter.
Startup behavior	VSI displays zero for the first 9 seconds after power-up while the trend buffer fills.

Setup mode	Analog scale choice	Dial labels	Digital VSI units
US / FT	+/-2K default	1 / 2 / 1, meaning 1,000 / 2,000 / 1,000 fpm markers	fpm
US / FT	+/-1K optional	500 / 1 / 500, meaning 500 / 1,000 / 500 fpm markers	fpm
ROW / MT	+/-2K equivalent	5 / 10 / 5 m/s markers, calibrated at the dial positions	m/s
ROW / MT	+/-1K equivalent	2.5 / 5 / 2.5 m/s markers, calibrated at the dial positions	m/s

12. US / ROW Unit Modes

Setting	US / FT mode	ROW / MT mode
Kollsman	inHg, e.g. 29.92	hPa, e.g. 1013 with optional small 5 marker
Digital altitude	feet	meters
Large analog altimeter dial	feet	feet-based dial; use digital window for meters
Digital VSI	feet per minute	meters per second
Small VSI dial labels	fpm-oriented labels	m/s labels
Setup row UNT	FT	MT

Changing unit mode: Changing the unit mode in the setup wizard resets the Kollsman setting to 29.92 inHg or 1013.5 hPa for the new mode. Re-set the current local altimeter setting before flight.

13. Setup Wizard

The setup wizard is used for unit mode, VSI scale, and altitude calibration trim. To enter it, hold the right button while applying power.

Wizard row	Display	Purpose	Short press action
UNT	FT or MT	Select US/feet/inHg or ROW/meters/hPa mode.	Either button toggles between FT and MT.
VSI	2K or 1K in US; 10 or 5 in ROW	Select analog VSI scale endpoint.	Either button toggles between the two scale choices.
CAL	Numeric offset	Trim displayed altitude. Stored internally in feet.	Left decreases; Right increases. US step is 10 ft. ROW step is about 2 m.

Wizard controls:

- Short press either button to change the value on the active row.
- Long hold either button to advance to the next row.
- On the CAL row, long hold commits all wizard values - UNT, VSI, and CAL - to memory and exits to normal operation.
- There is no separate abort button in B026. To abandon changes before committing on the last row, power-cycle the instrument before the final long hold.

The setup screen includes the following instruction placard:

**TAP EITHER TO CHANGE
LONG HOLD TO ADVANCE/COMMIT
POWER CYCLE TO EXIT**

14. Altitude Calibration Trim

CAL is a user altitude trim. It is intended for small correction of the displayed altitude to compensate for sensor tolerance, installation bias, or long-term sensor aging. CAL is stored in feet internally and is limited to +/-500 ft.

- CAL changes the displayed altitude only.
- CAL does not change the underlying pressure sensor reading.
- CAL does not affect the VSI calculation.
- In US mode, CAL displays and steps in feet, 10 ft per press.
- In ROW mode, CAL displays in meters and steps about 2 m per press, while still being stored internally as feet.

Suggested calibration method: Set the Kollsman to the correct local altimeter setting and compare the Combo with a known reliable altitude reference, such as a calibrated aircraft altimeter, surveyed field elevation under stable pressure conditions, or a calibrated pressure chamber. Adjust CAL only after the instrument has stabilized.

Do not hide installation problems: Large CAL values may indicate an incorrect Kollsman setting, poor pressure location, cabin/static pressure bias, wiring/power trouble, or a damaged sensor. Investigate before simply trimming the display.

15. Installation and Wiring

15.1 Panel mounting

- Use the correct model for the intended panel format. Do not force the 2 1/4-inch model into an opening that hides the left side of the screen.
- The 2 1/4-inch installation requires left-side rectangular clearance. If this clearance is not provided, the upper and lower left corners of the screen may be hidden by the panel.
- The 3 1/8-inch installation uses the larger standard panel opening / adapter arrangement supplied for that model.
- Use the supplied mounting hardware if provided. Do not overtighten. The case is a 3D-printed black nylon material and should be clamped firmly but not crushed.
- Verify that the display, buttons, wiring, and connector area remain accessible after installation.
- Secure the harness so vibration, wire weight, or connector strain cannot pull on the instrument.

15.2 Wiring

Connection	Use
Black wire	Aircraft ground / ship ground.
Red wire	Switched, fused aircraft DC power, 9 to 16 V DC.
Fuse / breaker	Use an appropriate protective device, typically 1 amp, and power through a master/avionics or other suitable switch.

- Operate only from 9 to 16 V DC. Do not exceed 16 V on the power input.
- Observe aircraft wiring practices for strain relief, over-current protection, chafe protection, and separation from controls.
- The instrument is designed to be powered externally. It has no internal flight battery.
- For bench/demo use, power the unit from a suitable 9 to 16 V DC source if current capacity is adequate. For aircraft installation, use protected aircraft power. Tip: 9 volt batteries are often substantially less than 9 volts.

15.3 Pressure / static considerations

- This Combo model has no barb adapter in the standard configuration and is intended to read cabin/panel-area pressure.
- Avoid mounting where heating/cooling vents, leaks, or panel cavities create pressure errors.
- If the aircraft's cabin pressure differs from outside static pressure, the Combo may disagree with the aircraft's certified/static-system altimeter.

16. Power and Brightness

The Combo is powered from external DC power. The firmware provides built-in brightness control through the front buttons.

Item	Behavior
Operating supply	9 to 16 V DC.
Upper limit	Do not exceed 16 V DC.
Typical current	Approximately 105 mA, depending on brightness and supply conditions.
Low-voltage operation	Operation below 9 V is outside the specified input range. Treat low voltage as abnormal for installed aircraft use and check wiring, power source, fuse/breaker, and ground.
Brightness control	Left long cycles through brightness levels. Holding Left can continue cycling brightness about once per second.
External switch	Power should be externally switched through the aircraft master/avionics switch or another appropriate switch.

Power quality: Unstable supply voltage, poor ground, excessive wire resistance, or vibration-sensitive connections can cause resets or display instability. Correct wiring problems before flight.

17. Care, Safety, and Operating Environment

- Keep the instrument dry. It has no stated water-ingress rating.
- Do not expose the instrument to fuel, oil, solvents, cleaning chemicals, or water spray.
- Clean the display only with a soft dry cloth unless Radiant provides production-specific cleaning instructions.
- Avoid prolonged storage in hot closed cockpits or vehicles where display and electronics temperatures may exceed safe limits.
- Recommended operating environment is a dry cockpit/panel environment, typically -10 C to +60 C (14 F to 140 F). Recommended storage environment is typically -20 C to +70 C (-4 F to 158 F).
- If the case, display, wiring, or connector is damaged, discontinue use and contact Radiant support.
- Do not modify the case, mount, wiring, or pressure access path without Radiant guidance.

18. Troubleshooting

Symptom	What to check
No display after power-up	Check aircraft power, ground, fuse/breaker, master/avionics switch, connector seating, and 9 to 16 V DC at the instrument.
Display resets or flickers	Check for supply voltage below 9 V, poor ground, loose connector, harness strain, or intermittent aircraft power.
Display too bright or too dim	Use Left long to cycle brightness. Holding Left will continue cycling brightness about once per second.
Altitude disagrees with aircraft altimeter	Set the same Kollsman value, confirm US/ROW mode, allow the unit to settle, check CAL offset, and consider cabin/static pressure differences.
Altitude changes when Kollsman is changed	Normal behavior. Kollsman is the altimeter setting and directly changes indicated altitude.
VSI reads zero after startup	Normal for the first 9 seconds while the trend buffer fills. Very small rates within about +/-30 fpm also show zero.
VSI seems backwards in chamber test	Remember: decreasing pressure simulates climb; increasing pressure simulates descent.
VSI needle pegs but digital value continues	The analog dial pegs at the selected scale endpoint. Digital VSI remains available up to its display clamp.
Wrong VSI scale	Enter setup by holding Right at power-up. Change the VSI row between 2K/1K in US mode or 10/5 in ROW mode.
Wrong units	Enter setup by holding Right at power-up. Change the UNT row between FT and MT.
Kollsman hPa display has a tiny 5	This indicates a half-hPa setting, such as 1013.5 hPa.
2 1/4-inch screen corners hidden	The required left-side rectangular clearance may be missing or blocked by the panel opening.
Setup changes were not saved	The wizard only commits when you long-hold on the CAL row, the last row. Power-cycling at any earlier row, including the VSI row, discards changes.
Buttons do not do what expected	Keep short taps brief. A long hold changes brightness in normal operation or advances setup while in setup mode. Right long and Both long have no normal-operation function in B026.
Instrument exposed to water or fuel	Disconnect power, discontinue use, allow it to dry if safe to do so, and contact Radiant if there is any sign of damage or malfunction.

19. Specifications

Item	Specification
Firmware revision covered	B026 pressure-tested Combo firmware.
Product models	RI-2024-1, 2 1/4-inch version; RI-2024-2, 3 1/8-inch version.
Aircraft Spruce part numbers	10-07652 for RI-2024-1; 10-07653 for RI-2024-2.
Display	320 x 240 color LCD, analog-style and digital combined display.
Primary sensor	Internal MPL3115A2-family barometric pressure sensor, altitude mode.
Pressure source	Internal/cabin/panel-area pressure. No standard barb adapter.
Altitude display	Analog dual-needle feet-based dial plus digital altitude window.
Digital altitude units	Feet in US mode; meters in ROW mode.
Nominal altitude range	0 to 20,000 ft product nominal range. Digital display is a fixed 5-character numeric window.
Kollsman display	inHg in US mode; hPa in ROW mode.
Kollsman range	29.00 to 31.00 inHg, or 950.0 to 1050.0 hPa.
Kollsman standard reset	29.92 inHg in US mode, or 1013.5 hPa in ROW mode.
User altitude trim	+/-500 ft, stored internally in feet. Does not affect VSI.
VSI display	Small analog VSI dial plus digital VSI window.
VSI digital units	Feet per minute in US mode; meters per second in ROW mode.
VSI analog scale	Selectable +/-2,000 fpm default or +/-1,000 fpm finer scale; metric labels shown in ROW mode.
VSI digital clamp	+/-9,999 fpm before ROW conversion/display rounding.
VSI dead zone	Approximately +/-30 fpm displayed as zero.
VSI update method	Pressure-altitude trend over a six-second history window; startup zero for the first 9 seconds.
Altitude filtering	B026 1/4 IIR pressure-altitude filter, approximately 2-second time constant at the 2 Hz sensor cadence.
Power input	9 to 16 V DC.
Current draw	Approximately 105 mA typical, brightness dependent.
Low-voltage behavior	Operation below 9 V is outside the specified input range; installed aircraft use should maintain normal supply voltage.
Dimming	Built-in front-button dimming with multiple brightness levels.
Case material	3D-printed black nylon / chopped carbon-fiber nylon production case.
Weight	Approximately 2 oz / 57 g, production configuration dependent.

Item	Specification
Panel formats	2 1/4-inch and 3 1/8-inch versions.
Unsupported features	No GPS altitude, no airspeed, no density altitude, no outside-air-temperature probe, no data logging, no certified static-system connection in standard configuration.
Regulatory status	Advisory use only. Not TSO, PMA, or NORSEE approved.

20. Disclaimers

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.

If installed in an aircraft, they are suitable only for experimental and ultralight aircraft, and for Light Sport Aircraft when meeting the requirements of the respective manufacturer. They are specifically not for use as a primary display instrument in certified aircraft.

The Combo provides advisory pressure-altitude and vertical-speed information only. It does not determine safe terrain clearance, obstacle clearance, weather minima, aircraft performance, flight legality, static-system airworthiness, or pilot decision-making.

Always operate within the limitations of the aircraft, applicable regulations, approved instruments, and pilot training. Do not interact with the instrument in a way that distracts from flying the aircraft.

21. Warranty and Returns

21.1 Warranty

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

21.2 Returns / refunds

Returns must be in new, uninstalled, resalable condition within 14 days after receipt unless a separate written purchase policy states otherwise. Ship approved returns to Radiant Technology, PO Box 20690, Wichita KS 67208.

21.3 Support

For support, contact support@radiantinstruments.com. Include the model number, part number, firmware revision if known, purchase source, installation details, aircraft type, and a clear description of the issue. If the firmware revision is not visible on the unit, include the serial number, production label information, invoice date, or service record. Photographs of the installation and display can be helpful.

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