

# How High RT™

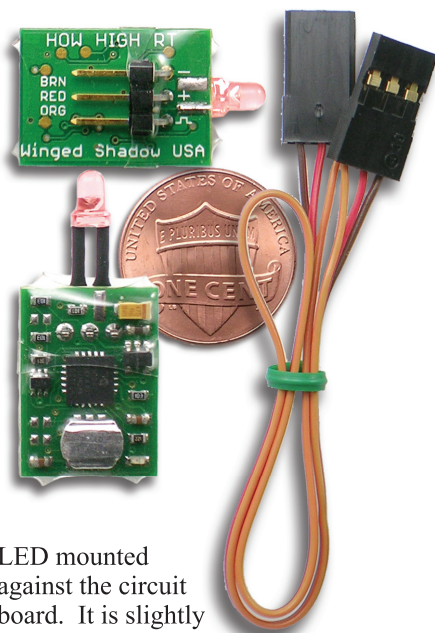
## Model Aircraft Altimeter

The *How High RT* is a precision instrument with a wide range of altitude reporting capabilities. It was designed specifically for model aircraft but is equally useful in many other applications. Like the altimeter in a full-scale aircraft, the *How High RT* determines altitude by sensing tiny changes in atmospheric air pressure. It uses a state-of-the-art pressure sensor and proprietary calculation techniques to provide a level of accuracy previously unavailable in such a low cost instrument.

In its most popular configuration, the *How High RT* is a stand-alone maximum altitude reporter. It simply plugs into any R/C receiver for power. No additional equipment is needed. Alternatively, it will run off a separate battery (3V-12V) or the optional *Smart Bat* battery board. It provides peak altitude readings when they are most useful – at the field, right after a flight. A single light-emitting diode (LED) reports altitude data through a series of flashes.

This instruction sheet details basic operation and provides background for other capabilities and configurations.

The unit is available with two LED options. The standard LED has 1/4-inch leads that can be bent to provide flexibility in mounting. The compact option has the



LED mounted against the circuit board. It is slightly more compact and rugged.

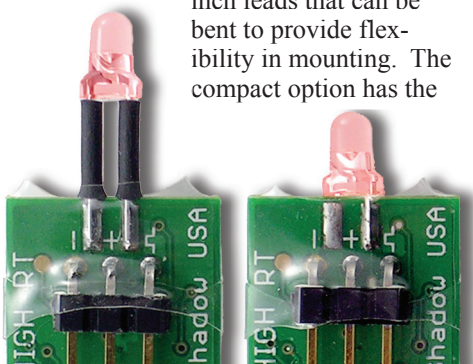
The *How High RT* can also act as a real-time altitude sensor. With a simple cable change it can plug into Spektrum or Hitec brand telemetry products and provide in-flight altitude information. The real-time altitude is also output as a serial data stream for do-it-yourself telemetry or data logging. Refer to the “Real-Time Altitude Instruction Supplement” for details.

## OPERATION

Understanding how the *How High RT* operates will help you decide where to install the unit – so, we will cover this topic first.

Using the *How High RT* is easy:

- 1) Turn the unit on
- 2) Make your flight
- 3) Read the peak altitude



## WARRANTY

We want you to be happy with your purchase. If you are not satisfied with any product purchased directly from us, return it within 30 days for a full refund of your purchase price. We also provide a one-year replacement warranty on any device that stops working properly - regardless of cause (even crash damage).

Add convenience and capability to your *How High Altimeter*:

## See How™

Display Unit for the *How High™* Altimeter and the *How Fast™* Airspeed Instrument

- Eliminates Flash Counting
- Ten-flight memory
- No added airborne weight
- High-speed data transfer
- Enables In-Flight Capturing of Altitudes or Airspeeds
- Capture up to 9 points per flight - triggered by your R/C transmitter
- Easy post-flight viewing

[www.WingedShadow.com](http://www.WingedShadow.com)

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## How High RT™

Model Aircraft Altimeter

### SPECIFICATIONS

#### Output Methods:

Grouped Light Flashes  
High-speed Optical Data  
Real-time Digital Data

#### Peak Altitude Range:

35 to 9999 ft. (11 to 3050 m) AGL

#### Internal Resolution:

0.41 ft. (0.13 m) @ sea level

#### Report Resolution:

1 ft. (1 m) Above Ground Level

#### Voltage Input:

3.0V min., 12.0V max.

#### Current Input:

1.6 mA average, 5.0 mA peak

#### Size (Circuit Board):

.8 x .6 x .18 in. (20 x 15 x 5 mm)

#### Weight:

0.05 oz. (1.4 g) excluding cable

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## How High RT™

Model Aircraft Altimeter

- 35 to 9999 ft. AGL
- 1 ft. (1 m) Resolution
- Works on its own or with the *See How™* display unit.
- Real-time output for telemetry systems.

## 1) Power Up

Apply power to the *How High RT*. If you have it plugged into your R/C receiver, this is as simple as turning on your receiver switch. The LED will light up for about 3 seconds indicating the feet/meters setting. A flickering LED indicates 'meters' mode; a steady LED indicates 'feet' mode.

The unit will then report the peak altitude of your last flight using a series of flashes. For example, an altitude of 324 feet (or meters) will report as 3 flashes followed by a pause, 2 flashes, another pause, then 4 flashes.

### flash-flash-flash flash-flash

### flash-flash-flash-flash

Each group of flashes represents one digit. Leading zeros are suppressed, so 89 will report as 8 flashes, pause, 9 flashes. Altitudes as high as 9999 feet (3050 meters) can be reported. A zero is represented by a quick double flash (you will know it when you see it). After the last flash of the altitude report, the LED will remain off for 4 to 6 seconds so you will know the report is complete. New units will initially display a factory test value between 1000 and 1100.

## 2) Your Flight

After the altitude report, the *How High RT* will enter measurement mode and the LED will output a brief flash every 2 seconds. This "heartbeat" lets you know the unit is on and all is well. Throughout the flight the *How High RT* makes 144 measurements of the atmospheric pressure and temperature every second. The altitude is calculated and updated every one-half second.

## 3) Reporting Peak Altitude

After landing, you can view the maximum altitude of your flight two ways:

**A. Cycle the power.** Simply turn the unit off, and then turn it back on. It will perform the power-up sequence described previously; blinking the LED to

report peak altitude. It does not matter how long you have the power off (one second or one year).

**B. Use the *See How Display*.** Hold the *See How Display* (sold separately) up to the LED and your flight data is transferred and displayed digitally. This optional accessory features a 10-flight memory and adds the ability to view up to 9 additional altitudes captured during your flight. You do not have to cycle the power, after transferring the data the *How High RT* is ready for your next flight.

## Notes on Operation

- The altitude information is saved in non-volatile memory, so you can view it as often as you like. Simply cycle the power.
- When your next flight reaches an altitude of 35 feet (11 meters) above the ground, the *How High RT* will allow the old flight data to be overwritten by new flight data. Your plane must fly at least this high for the altitude to be recorded.
- The *How High RT* always reports altitude above ground level (AGL). The ground-level (zero) reference is taken at power-up (immediately after the altitude report completes). It is updated each time the power is cycled or when data is transferred to the *See How* display.
- You never need to zero or adjust the unit. It automatically compensates for barometric pressure and field elevation.

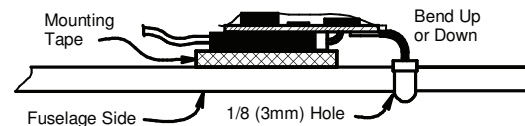
## INSTALLATION

The best place to mount your *How High RT* altimeter is inside your model's fuselage. On most planes, the air pressure inside the fuselage is equal to the pressure of the surrounding air – which is exactly what we want to measure. When this is not possible, the *How High RT* can be mounted externally. Be aware that air

flowing over a surface creates a localized area of low pressure. To reduce errors, choose a location where surface airflow is minimized. For example, mounting the unit on the fuselage side behind the wing can often give acceptable results, while mounting it on the airfoil surface on top of the wing will produce large errors (after all, airplanes fly by producing low pressure above the wing).

The unit can be mounted using double-sided foam tape ("servo" tape) or sticky-backed Velcro®. For temporary installations it can be simply wrapped in foam and wedged or rubber-banded in place – just so it won't rattle around. The LED can point in any direction. If you use a separate container be sure it is not airtight (add a few pin holes).

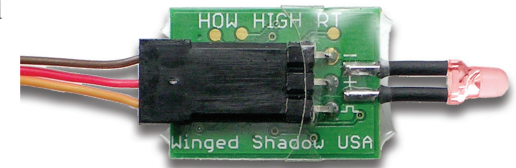
The LED does not need to be viewable during flight – so you can mount the unit under a hatch. However, for easiest viewing, it is nice to have the LED protrude through the fuselage. Simply drill a 1/8" (3mm) hole.



The standard LED with 1/4" leads can be bent as shown for flexibility in mounting. Bend the leads slowly to prevent damage. If you have the compact LED version, do not attempt to bend the leads.

## Electrical Connection

The *How High RT* features interchangeable cables. To plug the unit into an R/C receiver, use the cable with the black servo-style connector at each end.



Plug either end into the pins on the back of the *How High RT*. Observe the polarity markings. The board is marked with both the wire colors BRN/RED/ORG and their respective symbols -/+/- (to the right of the connector). Be sure that the connector is centered and not offset high or low.

Plug the other end into any unused servo channel on your R/C receiver. The supplied universal connector works with most radio brands. Again, observe polarity. The brown wire should be on the same side as your servo's brown or black wires. If all your channels are in use, you can use a Y-harness to share a channel with an existing servo. Use only the channel slots designated for servos. Do not use a slot labeled "Bind", "DSC", or "Data".

For free-flight models, rockets, or for portability you can use the *Smart Bat* battery board (sold separately) to transform the *How High RT* into a self-powered altimeter. Simply slide the *Smart Bat* onto the connector on the back of the circuit board.

You can also connect the unit to any power source from 3V to 12V. Connect the RED wire to the POSITIVE (+) battery terminal. Connect the BROWN and ORANGE wires to the NEGATIVE (-) battery terminal. For batteries less than 7V the ORANGE signal wire can be left unconnected. Take care; reversing the Positive and Negative polarity will damage the unit.

### Selecting Feet or Meters

To change the units used when displaying altitudes:

1. Turn the power on. The LED will come on steady (feet) or flicker (meters) for about three seconds.
2. As soon as the LED turns off, switch off the power (within 1/2 second).
3. Repeat steps 1 & 2 **four** times in a row. The mode will switch from feet to meters (or vice versa). The change will take effect on your next flight. The last flight in memory will not change.