See How™

Hand-Held Display

The *See How* hand-held display works with the *How High* Model Aircraft Altimeter and the *How Fast* Airspeed Instrument. Finger waving and flash counting are eliminated – simply hold the *See How* up to either airborne unit to transfer flight data. With a 10 flight memory and 9 data capture memories per flight, it adds convenience and capability to the basic instruments.

These instructions assume that you are familiar with the operation of your How High *or* How Fast*. You should review the instructions for the appropriate product before proceeding.*

The *See How* does not install in your airplane. It stays on the ground (in your pocket or your flight box). There is no added weight to your plane, no chance of losing it with a lost plane, and a single *See How* can be used with any number of *How High* and *How Fast* units.

Airspeed results are always shown to a tenth of a MPH (or km/h) with a decimal point. Altitudes have no decimal point. For example, 859 would be an altitude, 85.9 would be an airspeed.

Navigating Memory

You could use the *See How* simply to display maximum altitude/airspeed data and never be concerned with the flight memory or capture memory functions. However, since you may have just received your new *See How* (and no doubt want to see it do something), we will discuss the memory-control push buttons first.

Turn the unit ON by pressing either push button. The *See How* will automatically turn itself OFF if idle for more than a minute. At turn-on, the display will show the peak reading of your most recent flight. For demonstration purposes, new units are loaded with three example flights in memory. The display should indicate 1023, which is the peak altitude of Flight #3 in our 3-flight example.

If your unit shows something else, you can reload the demo data by pressing and holding both buttons at the same time. Continue holding them for a full 12 seconds (until

1023 appears on the display).

The display will always show units that match your airborne device – feet or MPH for English; meters or km/h for metric.

At turn on, or after a data transfer, the display is static, as you see it here. Now, press either button once. Note that the display starts toggling back and forth between two screens – F3 P and 1023. You have entered memory display mode. F3 P indicates that you are viewing "Flight #3", "Peak".

Press the **Flight** button. The display changes to F1 P : 712 – the peak of Flight #1. Repeatedly pressing the **Flight** button will cycle through the peak values of our three example flights. Since only three flights have been recorded, pressing the button after Flight #3 wraps around to Flight #1.

The *See How* can store up to 10 flights. The first flight stored into empty memory is always Flight #1. Each subsequent transfer goes into flight numbers 2, 3, 4, and so on – up to flight 9. After Flight #9, data from the next flight will go into a special memory called Flight #0. Continued transfers will overwrite the Flight #0 data. So, even if your memory is full, you can still transfer and view the latest flight data. Flight memories 1 through 9 are never overwritten (until memory is cleared) and the highest number represents the newest flight.

Battery Replacement – CR2032

The battery in the *See How* will last the typical flyer well over a year. When the battery is low, the display will dim and become harder to read. Replace the battery with a CR2032 lithium coin cell (widely available at grocery, drug, hardware, and photo stores).

Remove the two screws that secure the back plate, open the case, and remove the circuit board. Avoid bending the leads on the internal LED. Use a toothpick or similar probe to slide the old battery out of its holder and toward the bottom of the circuit board. Slide the new battery into the holder with the "+" side away from the board. Reinstall the circuit board and replace the back plate and screws.

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).

Visit our website www.WingedShadow.com for information on our full line of products!

See How™

Hand-Held Display

FEATURES

- Works with all *How High* and *How Fast* units.
- Display stays on the ground – no added weight in the plane
- Post-flight data transfer via optical data port
- 100 Memories – 10 flights, with peak plus 9 captured values per flight
- 4-Digit LCD display; Simple 2-button control
- Works with any number of *How High* altimeters and *How Fast* instruments
- Enables in-flight data capture
- Included, installed battery (CR2032) lasts over a year

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See How™

Hand-Held Display

- **Use with the *How High* and *How Fast* Flight Instruments (Sold Separately)**
- **Quick Optical Data Transfer**
- **No Waving or Counting**
- **Multiple Flight Memories**
- **Enables In-Flight Capturing**

	Peak	Capture 1	Capture 2	Capture 3
Flight #1	712	230		
Flight #2	450			
Flight #3	1023	78	6	925

Table 1

Viewing the Capture Memories

Press the **Flight** button repeatedly until F1 P :712 is again displayed. Now press the **Capture** button. The display shows F1C1 :230. This represents "Flight #1", "Capture #1". The value 230 was captured during flight. More information on how to capture altitudes and speeds will be covered later. For now, we can see that example flight 1 had a peak altitude of 712 with an altitude of 230 captured at some time in the flight. Repeatedly pressing **Capture** will cycle through any captured values plus the peak.

Table 1 illustrates the contents of the example memory. In brief, pressing the **Flight** button lets you select a specific flight number. Pressing the **Capture** button lets you view all the information for that flight.

Each flight memory can hold up to 9 captured values as well as the peak. For most pilots, the *See How* will store a full day's flight information. You can review the data as often as you like and construct a table like the one above to permanently record your actual flights.

The *See How* will retain the flight information until you choose to clear the memory. To clear the memory, press both buttons and hold them until CLr appears on the display (about 3 seconds). The display will go to 0 and all data will be cleared.

Transferring Data

On the top-left of the *See How* case is an Optical Data Port. If you look into the Data Port opening, you will see the top of a Light-Emitting Diode (LED), much like the LED used on the *How High* and *How Fast*.

Transferring data is easy. Just hold the *See How* up to the airborne unit for a few seconds. Here are the details:

1) Make sure the airborne unit is turned on. Normally you would transfer data at the completion of a flight. However, you can perform the transfer any time that the airborne unit is on.

2) Turn on the *See How* by pressing either button. If the unit is already on, you do not need to press or hold a button to initiate the transfer.

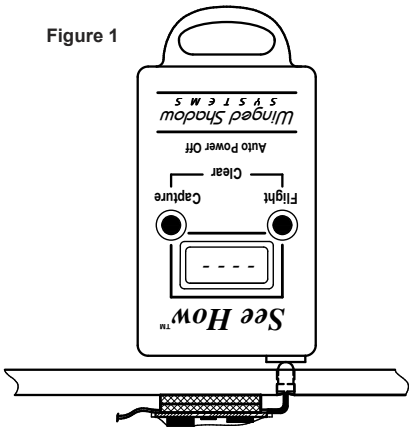
3) Position the *See How* so that the Optical Data Port on the top of the case aligns with the LED on the airborne unit (Figure 1).

4) Hold the *See How* in this position for about a count of four. It will detect the LED flash and initiate high-speed communication between the two devices. (The transfer takes less than a second, but it may take up to two seconds to establish communications.) During the transfer the display will show ----.

5) Upon successful transfer, the display will briefly indicate PASS and then show the peak altitude or airspeed of your flight.

As far as the *How High* or *How Fast* is concerned, transferring data into the *See How* is equivalent to activating the report by waving your finger in front of the LED. After the data transfer is complete, your *How High* or *How Fast* is ready for your next flight. You do not need to cycle the power off and on or perform a finger wave (although you can if you like).

Figure 1



Unsuccessful Transfers

If the transfer is initiated, but fails to complete the display will read FAIL. If the transfer never starts, the display will not change from its pre-transfer state. Most often, these conditions are caused by misalignment of the Optical Data Port and the LED. Make sure that the Data Port is positioned directly over the LED. When a failure occurs, the transfer is automatically re-attempted with each flash of the LED.

Make sure that the *How High* or *How Fast* is mounted so that the LED beam is perpendicular to the mounting surface and can shine directly into the Data Port. Although the LED's dome may look straight, it may be at an angle as shown in Figure 2.

Removing the *See How* before the transfer is complete can also cause a failure. Be sure to hold the unit still for about 4 seconds.

Data from the flight (including the peak value and any captured values) will automatically be stored in the next available flight memory. This occurs regardless of what memory location you might have been viewing when the transfer takes place.

When the data is transferred, the *See How* checks to see if the same flight information is already in memory. If so, the data is not stored in a new location. This way you can read a flight multiple times without fear of filling the memory with duplicate data.

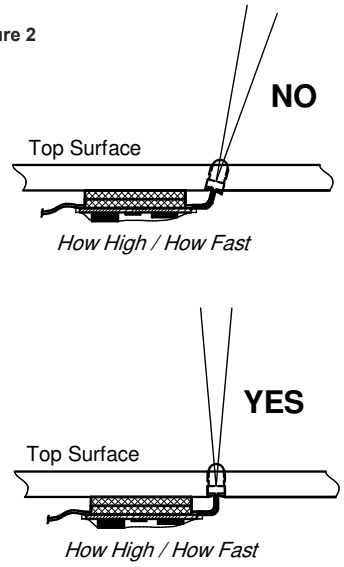
Capturing Altitudes and Airspeeds

Capturing in-flight data requires that your airborne unit is plugged into a transmitter-controlled channel on an R/C receiver. Installations that use a separate battery or a power-only receiver slot will always provide the peak value, however, you will not be able to capture additional in-flight data.

Capturing an altitude or airspeed requires moving the switch, knob, or stick on your transmitter that is associated with the channel into which you have plugged the airborne unit. Move that control to its full "ON" position and the current altitude or airspeed will be captured. For example, if you use the retractable landing gear channel, flipping the gear switch ON will trigger a capture.

Note that you can use a "Y-connector" to share a channel with a servo. If you use a channel for a tow-hook release, a camera shutter, a "bomb" release, or other special function; sharing that channel can give you automatic data captures each time you trigger the event.

Figure 2



A capture is triggered when the servo signal rises above 75% of travel for at least a second. It will not trigger again until the servo signal drops below 70% for at least 2 seconds before rising again. This prevents multiple samples if the switch is left in the ON position.

Whenever a capture is triggered, the LED on the airborne unit will give a quick triple-flash. This makes it easy to check for proper operation. You may need to change your transmitter's travel adjustment, end-point adjustment, and/or servo direction setting to insure the 75% signal is reached.

Although the *How High* can capture any altitude at any time, your plane must still exceed 50 feet (15 meters) for new flight data to be available. Therefore, you can capture altitudes below 50 feet as long as your flight exceeds 50 feet at some point.

Similarly, the *How Fast* can capture airspeeds less than 15 MPH (24 km/h) provided that your plane exceeds this speed at some time during the flight.

Rapidly changing temperatures can produce minor errors that are especially apparent in low altitude or low airspeed readings. A good practice is to wait at least one minute after applying power before capturing an altitude or airspeed.

You can capture up to nine values during each flight. If you attempt to capture more, only the first nine will be stored. The peak value is always automatically captured.