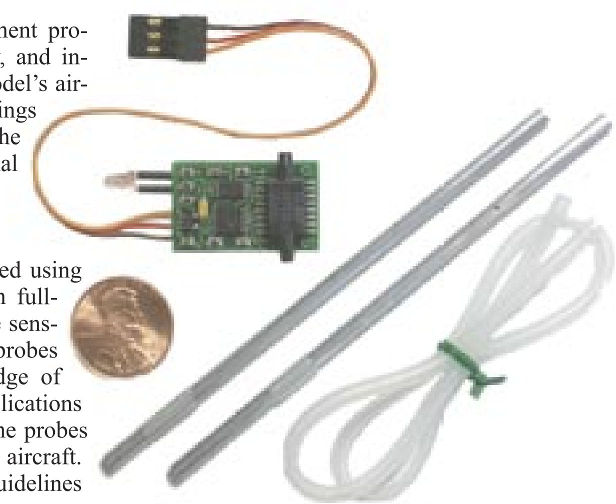
How Fast™

Model Aircraft Airspeed Instrument



The *How Fast* Airspeed Instrument provides you with a simple, easy, and inexpensive way to measure your model's airspeed. It provides at-the-field readings right after your flight – without the need for a computer or any additional equipment.

INSTALLATION

The *How Fast* measures airspeed using the same technique that is used in full-scale aircraft – differential pressure sensing. The included Pitot and static probes normally mount in the leading edge of your plane's wing. In some applications (gliders, pushers, twins, and jets) the probes can be mounded in the nose of the aircraft. The same alignment and spacing guidelines apply.

Mounting the Probes

Choose a location far enough out on the wing to be clear of direct air from the propeller (propwash). Figures 1 and 2 show a typical installation.

Follow these guidelines:

1) The probes should point directly into the direction of flight. They should be parallel to the fuselage centerline and the level flight line. Careful alignment will give you the most accurate readings. However, probes that are off by as much as 3 degrees will still provide reasonable results.

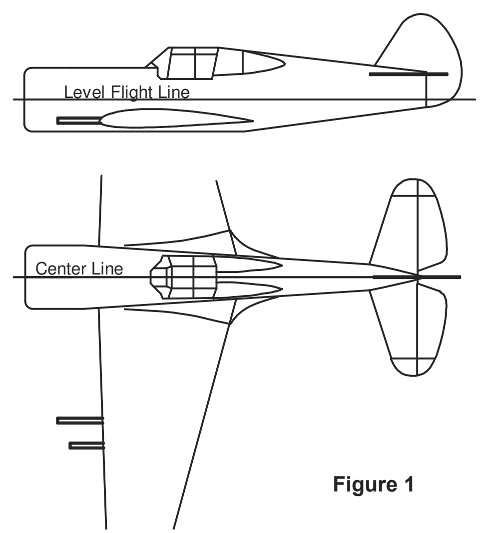


Figure 1

2) The end of the Pitot probe (the straight-through tube) should extend at least ½ inch (12 mm) beyond the leading edge of the wing.

3) The static probe has one end sealed and a series of small side holes. The plugged end faces forward. The small holes should be at least ½ inch (12 mm) from the leading edge of the wing (see Fig, 2).

4) Position the two probes at least ½ inch apart.

5) The probes should be mounted rigidly so that they maintain their alignment during flight. You can shorten the inside-the-wing portion of the tubes to fit your specific installation. Clean the tubes with alcohol (or other solvent) and glue in position with epoxy, hot-melt, or other glue.

How Fast™

Airspeed Instrument

- Reports Max Airspeed
- 1 MPH (1 km/h) Resolution
- No Computer Needed
- Sensor Probes Included

Version: ☐MPH, ☐km/h

How Fast™

Airspeed Instrument

SPECIFICATIONS

Output Method:
Finger-wave activated; Grouped light flashes representing digits

Airspeed Range:
15 to 500 MPH (24 to 800 km/h)

Report Resolution:
1 MPH (1 km/h)
0.1 with optional *See How* display

Voltage Input:
3.2V min., 12.0V max.

Current Input:
1.3 mA

Size (Circuit Board):
1.05 x 0.65 in. (26.7 x 16.5 mm)

Weight:
2.7 grams (Circuit Board & Wires)

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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).

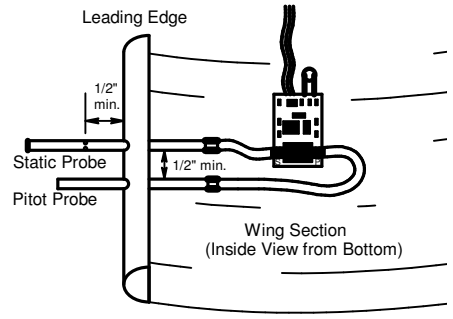

Figure 2

We have tested installations in built-up balsa, solid foam, plastic, fiberglass, and flat-surface wings with good results. Glue the tubes to ribs, or add support structure as needed to insure a solid mount. The probes do not need to exit precisely through the center of the leading edge (you can mount them above or below the airfoil centerline). However, they should still extend the recommended distance beyond the forward-most surface.

Mounting the Circuit Board

The exact position of the circuit board is not critical. It is so small and light (2.7 grams) that it can be mounted out on the wing close to the probes.

You will need to access the Light-Emitting Diode (LED) on the circuit board to read the airspeed. We recommend drilling a 1/8 inch (3mm) hole in the top surface of the wing so that the LED can point toward the sky for easy activation and reading. Figure 3 shows an example installation. The LED lead wires can be bent for flexibility in mounting. Using your fingers, bend the LED wires slowly to prevent damage. Hold the circuit board in place with a small square of double-sided foam tape or Velcro.

Use the supplied flexible tubing to connect the probes to the sensor on the circuit board. Connect the straight-through Pitot tube to the side of the sensor marked "P". Connect the static tube to the side marked "S".

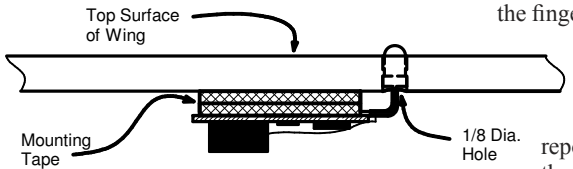

Figure 3

The length of the flexible tubing connecting the sensor to the probes is not critical. If you choose to make long runs you can substitute model fuel line (or landing gear air tubing) for the supplied light-weight tubing to reduce the chance of pinching or kinking.

Electrical Connection

For R/C aircraft, simply plug the *How Fast's* connector into any unused servo channel on your receiver. If all channels are in use, you can use a "Y" adapter (available at your local hobby shop) and share a channel with a servo. If you need longer wires, use a standard aileron extension.

The *How Fast* is supplied with a "universal" connector that is compatible with most brands of R/C equipment. Align the brown wire on the same side of the receiver block as the black or brown servo wires. On DSC-compatible receivers do not use the "DSC" or "DSC/battery" slot.

For free-flight (and other stand-alone applications) you will need to provide a voltage source between 3.2V and 12V. You can use a mating connector (or cut off the existing connector) and add a battery holder and a power switch. Connect the RED wire to the POSITIVE (+) battery terminal. Connect the BROWN and ORANGE wires to the NEGATIVE (-) battery terminal.

OPERATION

Using the *How Fast* is easy. Simply turn the unit on, make your flight as usual, and read your maximum airspeed after you land.

At power up, the LED will light for about 3 seconds then go dark for another 3 to 6 seconds. It will then blink briefly every 2 seconds. This "heartbeat" lets you know the system is on and working. The *How Fast* samples the airspeed every second throughout your flight.

After the flight, activate the airspeed report **before turning off power**. With the LED pointing toward the sun, or the brightest part of the sky, wave your finger back and forth across the LED as shown in Figure 4. (See the info box on the next page for tips on perfecting the finger wave).

When the unit recognizes your wave, the LED will come on for 4 seconds. At this point, stop waving and start counting! The *How Fast* will report the maximum airspeed by flashing the LED.

For example, a peak speed of **123** will report as one flash followed by a pause, two flashes, another pause, and then three flashes.

Tips for Activating the Airspeed Report:

- You can practice activating the report at any time (even before installation).
- Come very close (or lightly touch) the LED as your finger passes over.
- The sensor is looking for a pattern of light and shadow. Make sure the LED is pointed directly at the sun, bright sky, or other light source and not blocked by your shadow.
- Move your finger completely past the LED on each side by at least an inch (25mm).
- Don't go too slow. About two "round trip" cycles per second is good.
- Flexing your hand at the wrist gives better results than just moving the finger.
- Indoors, incandescent light sources provide easier activation than florescent lights.
- Usually, only 2 or 3 passes are needed. If it is not working, try re-aiming the LED toward the light.

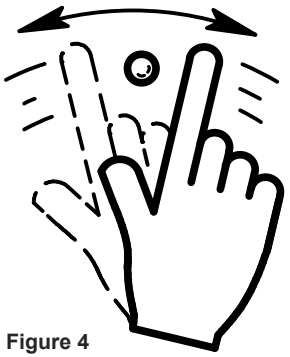

Figure 4

flash
flash-flash
flash-flash-flash

Each group represents one decimal digit. Leading zeros are suppressed, so 89 will report as 8 flashes, pause, 9 flashes. A zero is represented by a quick double-flash. After the last flash of the speed report the LED will be dark for about 4 seconds then resume its 2-second heartbeat.

Standard units report in miles per hour (MPH). Metric units report in kilometers per hour (km/h). Speeds as high as 500 MPH (or 800 km/h) can be reported.

After a flight, activate the airspeed report <u>before</u> turning the power off! Otherwise, data for the flight will be lost.

Once you have activated the airspeed report, the results are stored away in memory. You can then turn power off. You can repeat the airspeed report as often as you like (in case you miscounted or forgot the result). When you turn on the unit again, your last saved speed will still be in memory.

When your next flight exceeds a speed of about 15 MPH (24 km/h), the *How Fast* will recognize the new flight and allow the old data to be replaced.

The *How Fast* makes reference measurements at power-up and when you activate the report. On windy days, avoid pointing the probes directly into the wind at these times.

ALTITUDE CORRECTION

Just like the airspeed instrument in full-scale aircraft, the *How Fast* reports indicated airspeed (IAS). IAS is extremely useful since it consistently aligns with aerodynamic parameters such as stall speed. However, IAS only equals true airspeed (TAS) at sea level on a "standard day". True air speed is affected by air density, which varies with altitude, and to a lesser extent temperature and humidity.

Multiply the correction factor from the table below by the *How Fast* reading to get true airspeed. For example, if your field is 2000ft above sea level – use the 2000ft value of 1.03. If the *How Fast* indicates 75 MPH then:

TAS = 75 x 1.03 = 77.25 MPH

Using your approximate field elevation (above sea level) for altitude will provide good results. Note that a 1000ft change in altitude makes only a 1.5% change in airspeed.

For further improved accuracy, you can use a density altitude calculator to adjust your altitude for barometric pressure, temperature, and humidity. Online density altitude calculators are available at sites such as: http://www.pilotfriend.com/calcs/calculators/density.htm

Altitude in Feet	Correction Factor
0	1.000
1,000	1.015
2,000	1.030
3,000	1.045
4,000	1.061
5,000	1.077
6,000	1.093
8,000	1.127
10,000	1.163

Altitude in Meters	Correction Factor
0	1,000
2.500	1,011
5.000	1,022
7.500	1,034
10.000	1,046
12.500	1,058
15.000	1,070
20.000	1,095
30.000	1,147