

Anemometer Validation Report

By:
Daniel Potter
and
Devon Kaneko

Period: 5th
Date: 1/25/04

Abstract: Our intention is to discover the precision, accuracy, and resolution of the Skymate SM-18 anemometer. By doing this we will be able to more efficiently use the equipment and understand its readings and function. This will lead to a better understanding of the data achieved.

Anemometer Validation Report

Method: We will discover the accuracy resolution and precision by conducting three trials with the anemometer out the window driving at a controlled speed. These controlled speeds are 5 mph, 10 mph, and 15 mph.

*We took into account the fact that when we assumed that the movement of the device being directly proportional to the wind passing through it is only true in a windless environment. We also understand that when any object (a car) passes through the air at some speed a wake is formed. These wakes have lower pressures and wind speeds at the surface of the moving object. To account for this we held the anemometer far enough away from the car to get an accurate reading.

Prediction: We predict that the data will be somewhat off due to air movement from other cars and gusts of wind.

*Our data was recorded with the average setting of the anemometer to ensure an average across the variances.

Speed of car (mph)	Trial 1	Trial 2	Trial 3	Average
56.25 mph	4.45 knots	4.32 knots	4.30 knots	4.32 knots
106.25 mph	8.53 knots	8.91 knots	8.73 knots	8.72 knots
156.25 mph	12.97 knots	13.32 knots	13.30 knots	13.19 knots

*1 knot = .514m/s = 1.15 mph

Speed of car (mph)	Calculated
56.25 mph	4.34 knots
106.25 mph	8.69 knots
156.25 mph	13.04 knots

Resolution: ± 0.02 knots

Precision: We used the standard deviation formula to find our precision.

$$s = \frac{\sum(X-a)^2/n-1}{60.005 \text{ knots}}$$

Anemometer Validation Report

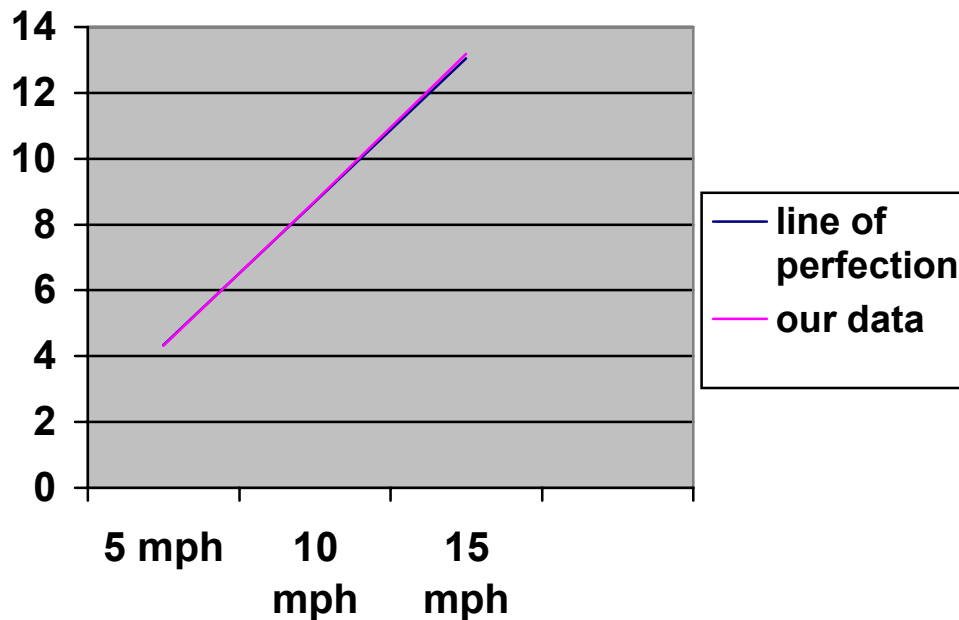
Accuracy:

Our test at 5 mph had a .4% percent error.
Our test at 10 mph had a .3% percent error.
Our test at 15 mph had a 1.1% percent error.

Analysis: We feel that our experiment fit the request and that it was extremely accurate with an exception. Our third trials percent error was nearly four times the percent error. We predict that the wind speed at fifteen miles per hour was not a constant speed due to the wind during the trial. Also the anemometer is designed to read slower speeds.

Graph: Our graph shows our calculated values VS the values that we obtained.

knots



Our graph shows that our measured values were extremely close to the calculated relationship between knots and mph.