

3354 Kirkham Road  
Columbus, OH 43221  
December 6, 1982

TO: Ted Corbitt  
Allan Steinfeld  
A. J. Vander Waal  
Len Evans  
Bill Hauda  
Bob Baumel  
Bob Letson  
Ken Young        Alan Jones

Dear All,

I am writing this letter to introduce myself to you, and I hope to establish some correspondence which will result in our job as course-measurers and certifiers becoming easier.

In 1977 I began selling a small pace calculator. Alan Jones bought some, and a year later informed me that Bob Letson was selling his own. Curious, I wrote to Bob and we had some fun discussing our products. Last year I was asked to help out with certifying a course. I knew nothing about certification procedures, but remembered seeing Bob Letson's name in NRDC News so I wrote to him and Ted Corbitt, and I was off and running on my new career.

I'm a mechanical engineer, age 47, working at Battelle Memorial Institute. Been there 16 years. I work mostly in the field of underwater life support, but have many other things to do as well. Spent most of 1978 working in a coal mine in West Virginia as Jack of all trades engineer. I've been married for 23 years and have two sons, age 16 and 18.

I've been a runner for ten years, and have finished over 100 races ranging from 1 to 109 miles. I've been involved in the numerical aspects of running performance for almost as long, and have written articles for Runner's World, American Scientist, and Ultrarunning on the subject of speed/distance/age.

When I got started in the certifying game, I began to see that certain aspects of accuracy were lacking. As an engineer I know that you can't have all the data you want, but sometimes have to to the best with what you've got. I think that we can do a better job than we're doing now, and that we can do it without much extra effort. The difference lies in how we use the data we get, not so much in how we get it.

I know that I'm the new boy on the block, and that many of you are old hands at this. Maybe I'm beating a dead horse. I certainly don't want to be a pain, but I'd like to do what I can to make course measurement better.

I think that if we discuss the subject, we may collectively find a more accurate approach to measurement. I have done some heavy thinking on the subject, and have written a proposed change to the measurement method. Please read it and let me know what you think.

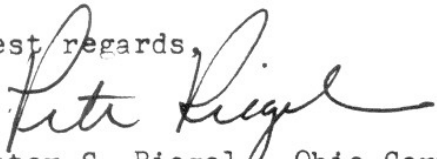
If I get sufficient correspondence on the subject, I'll try to summarize it every month or so and send everybody a summary of how the thinking is going on the subject.

At the same time, I realize that Ted Corbitt has the last word on the subject. Since he has a correspondence load that I can only imagine, I'm assuming the role as communication center on this particular subject.

I believe that most of the courses certified today are shorter than the shortest possible route. I think it's a weakness in our method, and I think that we can improve it.

Want to help? Read the enclosed "MEASURING A 'SHORT' COURSE" and tell me what you think.

Best regards,



Peter S. Riegel - Ohio Certifier

P.S. Just for fun I got ten engineers at the office to do some measuring on a flat floor paved with 12" tiles. When they were able to measure along a line their measurements had half the error as when they had to measure a diagonal.

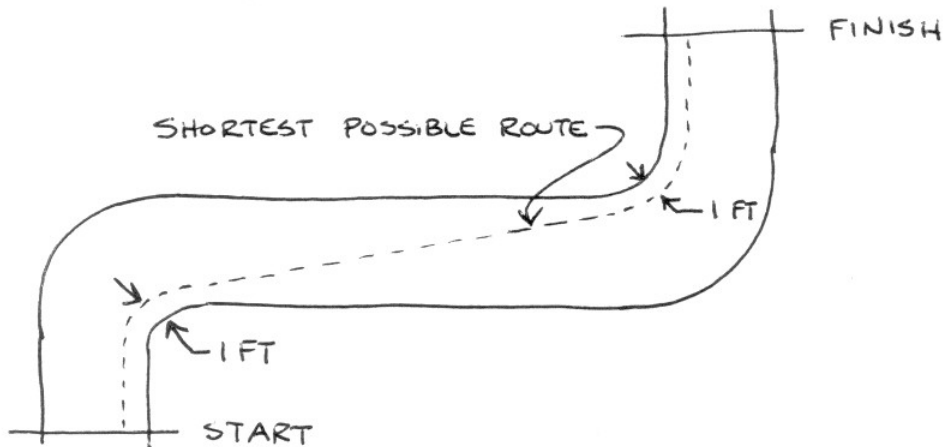
Also, using their measurements along a line as "calibration" measurements, and using the calibration to measure a diagonal, the measurements overwhelming resulted in "short course".

We all used a measuring wheel we'd never used before, and everybody did exactly the same thing. Only one out of the ten measured a "long course", and only by a little. The rest were short by a significant amount.

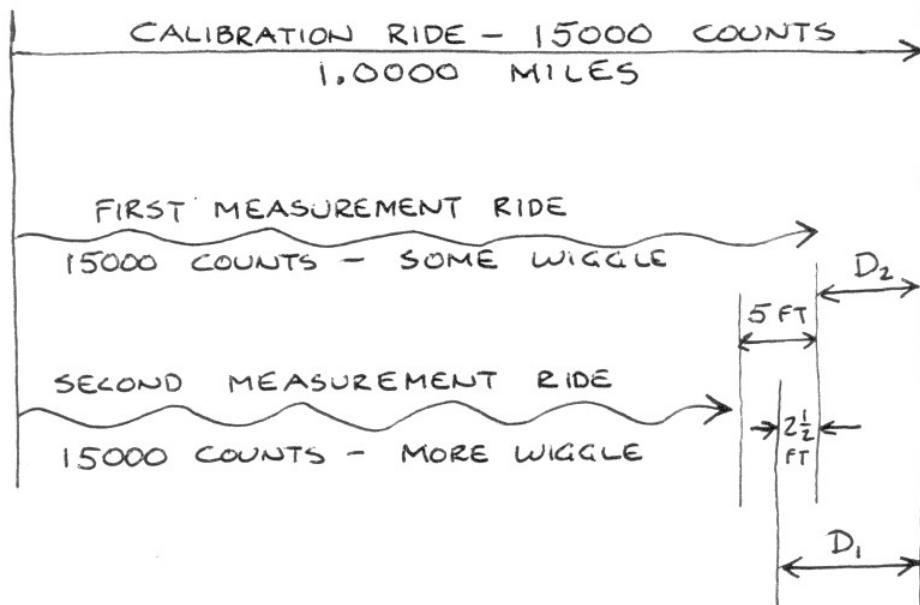
A measuring wheel isn't a bike, but the idea is the same. It does confirm to some degree my claim that we're measuring short. If anyone's interested I'll bore you with the technical details.

### MEASURING A "SHORT" COURSE - AN EXAMPLE

I am contacted by the director of the "Miracle Mile" who wants to have his course measured for certification. The proposed course is shown below:



I ride my one-mile calibration course and find that my measurement should take 15000 counts (my final calibration also gives this value, so my constant for the day is 15000). Now I go out and measure the course. What happens? See below:



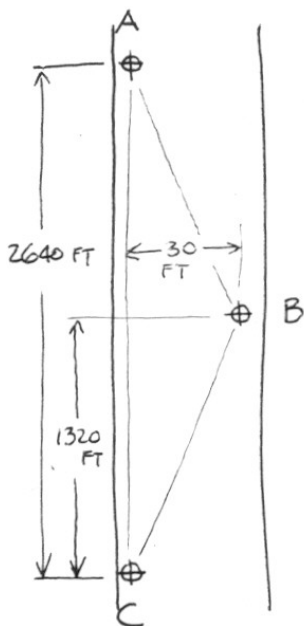
Because I could follow a line (the curb or centerline) on my calibration run I rode it nice and straight. When I did the actual measurement, however, I had to eyeball the shortest possible route, and my path deviated from that route by an amount that depended on my judgement and riding skill. As a result, both my measurements came out short.

I average the measurements. The average is short as well. How much is it short? Nobody knows - all I know is that my two measurements agreed to within 5 feet per mile. To account for potential shortness I add 0.1 percent (5.3 feet) to the measured course. Is the course now long enough? Once again, nobody knows. My course could well be short, even though I went by the book and got "good" seeming measurements.

This is a bad situation. If a person follows our instructions conscientiously, and winds up with a short course, something is wrong with the instructions. What? Here's what I think:

- 1) The calibration ride should somehow be made to better reflect the actual riding and measurement situation.
- 2) Once two measurements are done, and they agree within reasonable precision (.1 percent), the measurement that gives the longest course should be used, not the average of the two measurements.

Improving the Calibration Procedure - Refer to the following diagram:



Lay out A-C on one side of road.  
 Lay out B about halfway between A&C (small error here won't affect overall accuracy)  
 Measure offset of B from line A-C and calculate path length A-B-C.

Path A-C = 2640 feet ( $\frac{1}{2}$  mile)  
 Path A-B-C = 2640.68 feet

#### Calibration of Bike

Ride path A-B-C as the calibration course. You will have no curb to guide you, and the calibration will better reflect your performance under actual conditions.

