To: Ted Corbitt, David Katz, Allan Steinfeld, A. J. VanderWaal, Len Evens, Bob Baumel, Bob Letson, George Delaney, Carl Jeansonne, Carl Wisser, Kevin Cahill, Alan Jones, Tom Knight, Ben Buckner, Ken Young, Tom Benjamin, Raymond Hintz, Allan Phillips, Donna Phillips, Tom Duranti, Gordon Dugan

Feb 28, 1983

MEASUREMENT NEWS #3

- an unofficial forum for the discussion of course measurement techniques and related topics.

I'm sending out this third edition a bit late because of laziness and other commitments of my time. However, since nothing earth-shaking has happened, no ill-effects should be felt.

I've begun to prune the list of people I'm sending this to. I'm including all of the regional representatives of the LDR Standards Committee, plus selected others. For those of you who haven't been in on this from the beginning, I'm trying to establish and maintain a network of communication to help us do the best job of measuring and understanding what we do. I invite letters on all aspects of measurement. Nothing in this is official - it is just a place for us to pass on things we've learned, to offer opinions, to criticize, bitch and complain.

If you really want to unload, go ahead and do it. I will not pass on to the bunch any hurtful remarks, but I like gossip as well as anybody. If you really have an opinion that seems to be at variance with established practice, let's hear it. Others have too. If we're doing something wrong, discussion and data will often resolve the matter.

Write to me at: Peter S. Riegel, 3354 Kirkham Road, Columbus, OH 43221

or call at 614-451-5617 (home, not after 10) or 614-424-4009 (work, 8 to 4:30)

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Editorial Ego Tripping - One respondent writes "Your newsletter looked like it was 100% Peter Riegel editorial. Is this what you want? Or are you intending to print the opinions (work) of others?"

Point well taken. I've tried to tone down things a bit, but I'm sure that you'll find that there remains a lot of PR opinion. I've tried, this time around, to include some work of others (notably Bob Letson, who has sent mucho stuff over the time I've known him). I'd like to pass on the work of others too, if you'll just send some. Sometimes I'll just mention what you say, and comment on it, and sometimes I'll include the whole thing, if it's not too long.

As is surely obvious, I do this thing at different times, and even on different typewriters. I will now proceed to cut & paste and hope that what follows is of value to you.

Dishonest Measurement Data

I had a chance to review the measurement "data" for a marathon course that was run last fall. It had been measured by a guy who measures courses for pay, and promises a "certified" course. Advertised as such, a bunch of people ran it and naturally a bunch of them qualified for Boston. However, certification had not been applied for. When I finally got the data I found that the guy had made a miscalculation on his original calibration, but when the final calibration was done, the course came out to exactly 26M 385Y with no final adjustment required. He even remembered to use the 1.001 and to use the measurement that made the course the longest, even though he measured last fall before those things were required. I ask my measurers to take temperatures, and he even did this, in spite of the fact that I'd not instituted that requirement until January. His "observed" temperatures were 15° colder than those recorded at the airport 8 miles away for the same day.

Believing that his calibration sheet was a pack of lies I called the guy and came to the conclusion that he really did know how to measure, and did a fairly decent job. Because I have no real proof that he fiddled his data, I approved the course for 1982 only, out of pity for those Boston-bound people. No age records were set at the race.

Have any of you had to deal with this kind of baloney? How did you handle it? I told the guy straight out that I thought his data was fishy, and I hope that he will not try to do it again. I don't want to discourage him from measuring, because, after all, he knew how to manipulate those numbers.

He managed to measure the whole marathon twice in one day, and was only 8 feet apart at the end, and was never more than 5 feet apart at any intermediate point. Fantastic. I just wish I could believe it.

Any of us could go out and measure a course in a car and still fudge up some data that would make it look just fine. I didn't want to ruin the guy's course-measurement reputation in his area, so I gave him a break this time, but if I catch him at it again I'll have to be tougher. I'm still not sure whether I was tough enough, but I felt sorry for those poor people who entered thinking the course was certified when it wasn't.

From now on, in Ohio, I will not certify any course that has not had its data submitted by race day. These after-the-fact certifications put a lot of pressure on the measurer to come up right, especially when they've been paid to deliver a certified course. If he finds that he didn't do some crucial step, what's he going to do? Say "Sorry, guys, but you can't go to Boston after all" or just "adjust" his data a little.

It does happen. Let's hear some of your war stories.

Temperature and Measurement

On January 29 I measured a 10 K course on a local bike path. It was out/back. On the "out" measurement I laid out all the marks for a 10 K race. On the "back" I checked the locations of all of the previously-established points. I took temperatures at precal and postcal, and before/after each measurement.

Just for fun I calculated the measured length of the course in three ways:

1) The old way, using average measured counts and average calibration.
2) The new way, using average calibration and the minimum count (so that longer course resulted)
3) A temperature-corrected way, using estimated calibration constants based on observed temperatures during calibration and measurement.

The data and calculations are shown on page 4. To nobody's surprise, temperature did have an effect. Some conclusions from the exercise:

1) Agreement between measurements is likely to be better when two people measure together than when one person does two sequential measurements, because temperature during measurements will be the same.
2) Total disagreement on course length was a maximum of 5.99 feet/5K, regardless of method used. This makes me sleep better, because the 1.001 gives a 15 foot edge.
3) The newly-approved method gave the longest course. I applied for certification using it.
4) This was done in winter, on an overcast day. My calibration changed 12 counts for 10 degrees. That's a lot. Summer measurements are likely to be calibrated cool (AM & PM) and measured hot (midday). This could be overcome by requiring a cal ride between each course measurement, but I'd hate to do that for a pimpy little 5K.

If we could use a short calibration course, measured on the course itself, or very close, it would be no hardship to recal between measurements. Since my 2988.79 ft course was 3 miles away, though, I figured the standard way was OK.

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Bob Letson recorded a similar effect, and he used his computed constants as his official ones. I think it's a more accurate way to find the true constant, but I don't think that we should ever think of recommending it as a method for neophyte measurers to use. I'd personally approve any measurement that used that method, but only if it was as well-documented as is Letson's. Most people would get confused and make a botch of it. See excerpt from Bob's letter on page 5.

(4)

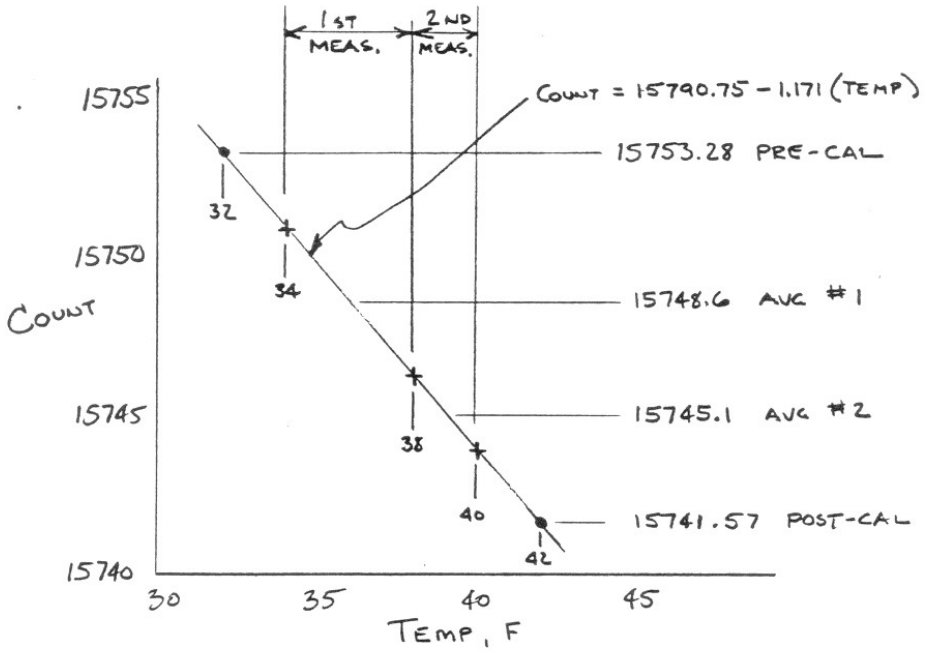
PARK OF ROSES 10K (5K OUT, 5K BACK) 1/29/83

PRE-MEASUREMENT CALIBRATION – 9AM, 32 F = 15753.28 COUNTS/MILE
(4 RIDES OVER 2988.79 FT COURSE)

FIRST MEASUREMENT & MILE LAYOUT OF 5K W/ALL MARKS FOR 10K — START 10:20 AM, 34 F; FINISH 11:45 AM, 38 F — 48943 COUNTS

SECOND MEASUREMENT TO CHECK POSITION OF ALL MARKS — START 11:45 AM, 38 F; FINISH 12:10 PM, 40 F — 48921.5 COUNTS

POST-MEASUREMENT CALIBRATION – 1 PM, 42 F (2 RIDES) — 15741.57 COUNTS/MILE



METHOD		L MEASURED LENGTH, MILES	DIFFERENCE, FEET	$\left(\frac{L-3.106856}{5280}\right)\times 5280$ FEET
OLD METHOD USING AVG. COUNT – AVG. CAL	$\frac{48932.25}{15747.43}$ =	3.10732	7.21	2.43
NEW METHOD USING MINIMUM COUNT – AVG. CAL	$\frac{48921.5}{15747.43}$ =	3.10663	7.21	–1.17
TEMP. CORRECTED CALIBRATION – 1ST MEAS.	$\frac{48943}{15748.6}$	3.10777	3.57	4.82
TEMP. CORRECTED CALIBRATION – 2ND MEAS.	$\frac{48921.5}{15745.1}$	3.10709		1.25

Elevations

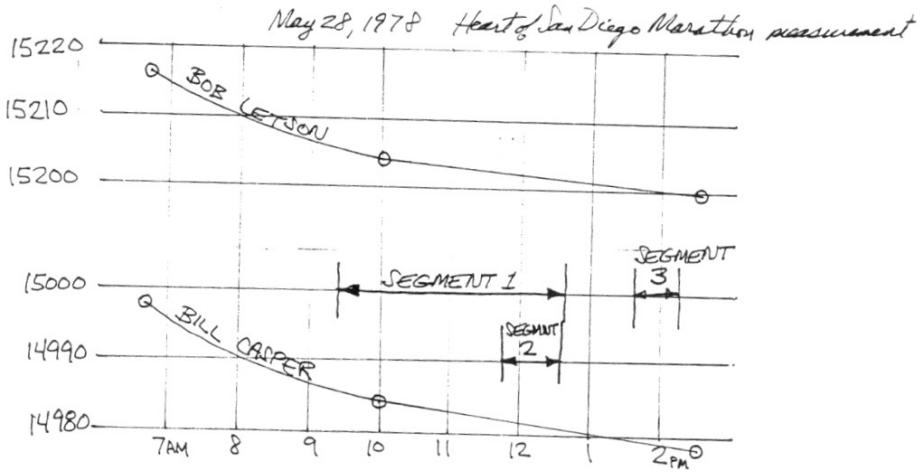
There is a question on the Application for Certification form that asks the elevations of start, finish, high and low points. Start and finish elevations are used by Ken Young to determine whether the course is closed or point-to-point.

The questions are simple, but it's not simple to get the answers. Access to topographical maps of the course area is required. Because I live in Columbus, the state capital, I have access to the Department of Natural resources stock of topo maps. When I want a map of an area of a state other than Ohio, I have to write to USGS for an index map, wait 2 or 3 weeks, then order what I want, wait 2 or 3 weeks, and get my maps. A typical marathon course can require three to five maps, at $2.00 each.

I don't begrudge the time or cost, because I enjoy playing with maps. However, poor Joe Blow in East Podunk just wants to measure a course and get it certified. What is he to do? Is the benefit we get from the elevation information in proportion to the time and effort required to obtain it?

I believe that Ken's need for decent start/finish elevation information is valid. Without elevation restrictions some really weird courses could be hoked up just to generate records. Is there a way we can make life easier for poor Joe? I'd like to find one. If, for example, the start and finish are 100 feet apart, I can see no need for elevation information at all. On the other hand, the difference should be known if there is a difference of a few miles between start and finish.

How do all you measurers deal with this? Let me know.



The constants used for measuring Segments 1, 2, and 3 were computed graphically, by taking the midpoint in time. For example, Segment 3 midpoint = 2pm = 15200/LETSON 14979/CASPER

CALIBRATION CHANGES FROM BOB LETSON — USED TIME OF DAY RATHER THAN TEMP. AS INDEPENDENT VARIABLE. SEE P. 3.

Bob Letson - asked me to reconsider my position on "freezing" the wheel when measuring on short calibration courses. I had said that I didn't see much value in it. Well, I used the "freeze" method on my last calibration on a standard course, and I found that I like it a lot. By freezing the wheel and restarting in the other direction without slip, I eliminate the small error due to inability to read the counter accurately to a fraction of a count. I took intermediate readings, of course, at the end of each cal run, but didn't let the wheel move. On this particular calibration the total variation was smaller than I ever got before. I attribute this to the freezing, I thank Bob for pointing out its advantages, and I intend to continue to use the method whether or not we get to use short courses or not.

Bob also sent along some interesting dope regarding several calibration courses in the San Diego area. Originally laid out with steel tapes, these courses were recently checked by EDM, and some show considerable difference between measurements. Reasons for the difference probably come from the combination of temperature and tension. A difference of 10 pounds in pull will cause a difference of 1 foot per mile. So will a 30F difference in temperature. In Southern California the sun makes the pavement much hotter than the surrounding air. The tape is much closer to the pavement temperature than it is to the air temperature. The temperature used to calculate the temperature correction should be the pavement temperature, not the air temperature. When measuring, I put the thermometer down on the pavement and shade it while taking the temperature. There's still got to be some error there, but I think I'm doing better than if I just used air temperature. Of course, the best way is to do it at night, but who's going to do that? In Ohio I have plenty of overcast days, but in San Diego they're fewer.

David Katz - By now everybody knows that David went to Miami and measured the Orange Bowl Marathon and also did a recheck of the Race of the Americas 10 K. The super thing about the marathon measurement was that he tucked in behind the leaders and did the job as the race progressed. Since it was a recheck I assume he didn't hop off the bike to check all the intermediate miles. Sounds like fun.

Question: We all might be called on to do a remeasurement if a record gets set. Just what are we supposed to do? It's not spelled out. For recheck purposes I assume that:

1) One measurement is sufficient, if the course checks out OK. If it doesn't, then another is required.
2) Intermediate miles don't have to be checked.
3) In determining whether the course is short, the remeasurer does not get to add .1 percent to his calibration constant.
4) Although it's not required, I'll be recalibrating between each whole course measurement, and taking frequent temperatures. If hairs have to be split, it's good to have all the data that might be needed to resolve any questions.
5) The calibration course used should be checked as well as the course, or a new one laid out. Don't assume anything.

Tom Benjamin - sent me a huge envelope detailing the enormous hassle when the 1980 Paul Masson Marathon came up short because the runners went off-course. It was one of the most-measured courses I've ever heard of, yet the whole thing went in the toilet because the runners went wrong. In trying to find out just how far they did go, some interesting data regarding bike-measure vs electronic witch-doctoring was developed. Like the Montreal Olympic Marathon, the electronic measurement xhxwxdxthxxxthx gave a different reading than the bike. However unlike Montreal, the electronic measurement gave a shorter course than the bike. So now we have one data point each way. Nobody seems sure exactly what course was electronically measured. It might not have been the SPR. Intuitively one is led to believe that straight-line electronic measurements should indicate a shorter reading for a given distance than does a bike, because of road undulation, but since calibration courses undulate too, perhaps 'taint so.

If we define the length of the course as that measured by a perfect calibration ride followed by a perfect following of the SPR we do not need to worry about electronic measurements "proving" us wrong. Electronic measurements are for land surveyors, not course measurers. Our system of measurement must be one where we can check each others' work, and we surely can't get into an apples/oranges hassle with electronics.

I don't think there's any disagreement about this. Proponents of electronic measurement may be correct in their assertions about accuracy, but our system of certification still relies on bike measurement as "official".

Tom also sent a copy of a proposed Course Certification Standard drafted by Ramon Oliu, chairman of the Association of International Marathons (AIMS). It's a lot like what we are already doing, and he goes into a lot of detail about calibration, taping etc.

In only one specific area do I find myself in disagreement. Oliu mentions that the accuracy of the method is 1 part in 1000. I disagree. I believe that we can measure to a precision of 1/1000, but that the accuracy we actually achieve is as yet unknown. If we get two or three measurements that agree within, say 2 feet per mile, we think that's pretty good. But all we really know is that we all agreed on a common distance. We probably have a decent measurement, but we don't really know for sure.

The only way I can figure to get a perfect measurement would be to survey the SPR and set up steel rails to guide a measuring wheel so it can't deviate at all. Then we'd know that we were pretty near perfect. Please don't think I advocate this - I think that the 1.001 factor covers us just fine.

Opinion - I believe that, using our present method of measuring, a course really is somewhere between 1 and 1.001 times its nominal length.

Short Baselines - Tom Benjamin reports that Tom Knight is trying to replicate Bob Letson's short baseline experiment. If the conclusions remain the same, strong justification will exist to permit the use of short baselines for calibration courses. I await these results eagerly. The labor saved in taping a short cal course can be considerable. Also, the fewer tape lengths used, the fewer chances for a measurement blunder. I have my fingers crossed.

Fishy Data Again - I got some measurement data from someone, and his cal constant was around 19220 counts per mile. I scratched my head and figured that he probably used a moped with a 20 inch wheel. Not specifically a no-no, I suppose, but I'd never seen such dope. I called the guy, and he claimed that he had used a 27 inch bike. After some questioning, I found that his Jones counter was an antique that had a 26 tooth big gear. Ted Corbitt checked with Alan Jones and found that there are a few of these dinosaurs around, so don't be too surprised if you someday get freaky high calibration counts.

Is a moped OK for measuring? I can't see why not, except that the tires are fatter than a regular bike. I suppose that even a motorcycle would be ok if properly used with the counter. There would be less rider wobble to counteract the soft-tire effect. I've not been asked to OK any dope from a moped or motorcycle yet, but I suppose that if it's used in our standard manner that it would yield OK data. Any opinions?

If high speeds were used, the counter might blow up.

Corners - Bob Baumel and Bob Letson have both mentioned the large effect that taking a corner wide can have on measurement error. Both also mentioned the problem of negotiating a short-radius turn. If the front wheel is kept a foot from the curb, the back wheel will bump the curb on tight turns. Fortunately for us, the standard radius for a curb in my neighborhood is 12 feet, which is in the non-bump range. I suppose that there are tighter curbs, but I haven't found one yet. So far, it's a non-problem for me. Also, I must confess that if it comes to a pinch, I'll just go ahead and be a little sloppy if the turn is extra pesky. But only if I think I can do so without a significant loss of accuracy.