

MEASUREMENT NEWS



#13 - October, 1985

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Measurement News (MN) is distributed free to all members of the Road Running Technical Committee of TAC (everybody listed in NRDC News). Some foreign people are also included in the free distribution.

Subscriptions are available for \$15 per year. Back issues are available for \$2.50 each.

NOTE: If you save MN you are not missing #11. I mistakenly put out two #10's, then skipped to #12. There is no #11.

MN is our way to talk to one another, so that we all know what's going on. It also serves to provide guidance from the RRTC Vice Chairmen to the regional certifiers.

MN wants to make measurement as good as it can be. All opinions and grievances are solicited. No cows are sacred. If you have a new measurement technique, or if you think things should be done differently, send in your contribution to MN. Your opinion will be given space. Nothing changes until somebody tries!

Nice, clean typed stuff is most welcome, but send what you can.

* * * * *

INTERNATIONAL CONTRIBUTIONS

Inside you will find some thought-provoking material sent by Gaby Duguay of Canada. He is a real old-timer at measuring, having been at it for over ten years. He's in the throes of getting Canadian road measurement in order, and judging by what you'll see inside, is making good progress.

LONDON/ROTTERDAM

We've had correspondence from Aldo Scandurra, Chris Brasher (Race Director, London Marathon, and AIMS President), John Disley (Course Director, London Marathon and AIMS European Coordinator for Measurers). It seems that some pressure is being brought to bear on Rotterdam to get the course remeasured before Lopes' run will be recognized. Whether this will ultimately result in a remeasurement of London as well is unclear.

IAAF is getting into the road-record recognition business, and is in the process of formulating standards for courses and records.

At the risk of making even more of a nag out of myself, I have urged AIMS and IAAF to seriously consider the requirement for a validation measurement after a record is set, rather than relying on the services of a known good measurer and then accepting it as valid if a record is later set. I pointed out that in the US, the fear of remeasurement shortness has had the beneficial effect of making everybody aware of the importance of riding the SPK. I think validations are the only thing that will be ultimately be accepted by the skeptics in the press and public. I don't know what will ultimately be decided, but I'd sure like to see a system with the same credibility as ours come about. (

FINAL SIGNATORIES

Have you wondered what a final signatory is and what he does? When Ted Corbitt first came out with his list of them I was one, and I interpreted it as meaning that Ted thought I was good enough to do review work on my own. I noticed several other guys also made FS's who had been doing good work in reviewing courses.

When I took over as eastern VC, I inherited all of Ted's FS's. At first we were not on the same wavelength, but now everybody is operating according to what I think is in accordance with our rules. I found that there were two FS's who did no review work at all - David Katz and Ben Buckner. David had worked closely with Ted in the past and Ted knew that he was a good measurer, so he awarded him the FS. Ben, a professor of Geodetic Science and Surveying at Ohio State (Now at East Tennessee State), had contributed much valuable guidance to Ted over the years. He gets a bellyfull of grading courses in Ohio - or he would probably be writing this instead of me. Ted thought he was worthy of the FS too. So David and Ben remain FS's, even though they don't do review work. When they measure courses, they just certify them and send the certs to me, just like everybody else. But I don't check their measurement info.

Two of the regional certifiers (one a FS) did not work out. One was totally inactive and one was unable to handle certification work on top of his job, and I removed these people and replaced them.

I have created some FS's of my own. The standard I use is a personal one. If I find that the regional certifier consistently submits properly reviewed and corrected material, and if the maps are consistently adequate, then after a while I get a sense that it is a waste of time for me to go over the person's stuff, and I express my confidence in the person by telling him he's a FS, and letting NRDC know so they can list him as such. I am not creating any FS's who do not review courses.

As this year has gone by I have found that almost everybody has the capability to do it, and I expect that soon everybody in the east will be a FS.

I do not consider these appointments to be lifetime ones that bind my successor. They last only as long as the work remains good.

TRACK MEASUREMENTS AND THEIR EFFECT ON ROADS

Should road measurement philosophy be like tracks? A lot of correspondence has been flying around concerning what to do when a marginal track measurement is obtained.

If a track measures out to 399.99 meters by anyone's measurement should this be considered to be absolutely correct? If the answer is yes, then almost half the tracks in the world will be unsuitable for competition.

Because of inevitable measurement error, a track that is truly 400.01 meters in length will be found short about half the time. Yet I can recall no instance in which a record was disallowed because the track measured out slightly short. I suspect that the original surveyor's statement is accepted as fact in these cases.

Some tracks don't have paperwork, and it is on these that the remeasurement causes a problem.

If an allowance is made for tracks, should not such an allowance be made for roads as well, say 5 meters in 10k?

This question will be discussed at the TAC meeting, I expect.

②

ADJUSTMENTS AFTER VALIDATION

Scott Hubbard writes: "If a course is close to passing or failing a validation, I feel two rides should be taken. I also feel, and I may have mentioned it before, it should be shortened to the distance it's supposed to be. For example, if I were to validate the '85 Old Kent Riverbank 25 km course, and find it to be 25009 meters in distance, the 'extra' 9 meters should be dropped from the course for future races".

Ed. Note: Present procedure is:

1) If the course is certified to latest standards, and is OK on validation, even if it should come out to 25001, the certification remains valid and no adjustments need be made. (But I'd tack on the SCPF if I were the race director, just in case another validation came along, because I like to sleep nights.)

2) If the course is not certified (yes, some courses not certified to latest standards do get validated - usually as a result of an old record being cleared up), consider the validator's ride as a single measurement, and use present procedures, i.e. if the validator got 25009, then 16 meters should be added (assuming that the validator got the shorter measurement and there's another that comes within 0.08 percent.

"ACCURATE" VS "LONG ENOUGH"

Al Phillips writes: "I'm sure you're aware that I'm not happy with the way measurement for certification has finally evolved & is now cast in stone with the "Course Measurement Procedures" booklet. Although you are still saying "accurate race courses" what is really meant is "at least long enough" - this is not the same thing. I notice that one of my half-joking suggestions to add yet one more fudge-factors to insure the "long-enough" syndrome has actually been put into the booklet. This is the statement that when measuring calibration courses with a steel tape, although the opening paragraph says "accuracy of the calibration course is vital", it says that "if the temperature is above 68 F, you do not need to make a temperature correction, although it is recommended" - if less than 68 F, it "must be applied". Evidently accuracy is not that vital as long as it's "long enough".

Ed. Note: Al is not the only one who is unhappy with aspects of the Measurement Book. I myself don't like some things about it. I console myself with the idea that it is at least something, where before we had nothing. All the procedures in it are the result of argument, reasoning, and compromise. Somebody pointed out to me that a Russian diplomat once quipped to the press "A good compromise was reached - nobody is satisfied."

Although I find the book to be flawed, it at least is fairly clear, and best of all, it does produce courses that come out pretty close to nominal when a good rider checks them. It works.

Once the initial printing of 2000 is exhausted, more will have to be printed. Now is the time to make suggestions for change. I personally hope that no major changes occur, because the reeducation of all those measurers would be a very tough job. And I believe that what we have, although imperfect, is good enough.

THE TAC MEETING

At the TAC meeting there will be an opportunity for everybody to give me face-to-face hell for the way I have been doing things, and there will be a chance for someone to take over the eastern VC job if he wants to go for it. This is the way things are supposed to work. If someone can do it better, he or she should have the job. We can't afford time-servers in the certification game. There's too much work to do.

So if you think you'd like a shot at this job, start writing to people and calling them, and get your politicking in order.

I will state right now that I like what I'm doing, and wish to keep at it for next year, so I'll fight back unless I think you can do it better than I'm doing. If you win the post, I'll just keep on plugging in my own region and work through you just as you have worked through me.

The next guy, when I finally do get out of this job, will have his own standards. If you're a FS, expect to have to prove yourself again with the new guy.

RANDOM COURSE CHECKS

Any system such as ours should have a way to check peoples' work. But it is simply not possible to check every single course. What should be done?

Here's what I'm going to do. Every once in a while I will write to a certifier and ask him for the measurement package on a course he has certified. I will expect it ASAP. I will look at it and hopefully be satisfied that things are correct. If there is a delay in my getting it I will suspect that time is being taken to make it look good. I don't expect perfection.

Sauce for the goose is sauce for the gander. My own files are open to anybody who wishes to ask. I will send out the envelope the morning after I get the request.

We are all familiar enough with the numbers to decipher each other's thought processes on these courses. I am not looking for correctly filled-out forms - I am looking to see that the procedures are substantially correct.

I will send out the information with no resentment at being asked. Any certifier who asks any other certifier for course information should get it pronto and without griping. You may be curious as to how a certain measurement went. Well, all you have to do is ask. Be prepared to pay for the cost of copying and postage. The NYC Marathon file is an inch thick. The Columbus Zoo 5 Mile Run is thinner.

Open files are essential to the credibility of all of us. Anyone who is afraid to show his work probably has something to hide. I don't. I cut an occasional corner, but I don't think my work is too bad, all things considered, and you can see it if you wish. Just as anybody should be able to see yours. We all might operate differently if we knew nobody would ever check. Let's let in the light.

REPEATABILITY OF MEASUREMENTS AND COURSE TRUE VALUE MEASUREMENT CONSIDERATIONS

September 23, 1985

July 21-22, 1984 we conducted a National Measuring Clinic in Ottawa (Canada's capital).

Through the financial support of Fitness Canada, following an idea proposed by Norm Patenaude and myself, each province was invited to send at least one of their best course measurers to be trained and evaluated. All other interested measurers were welcome, but at their own expenses. In all, 19 measurers made it, and all ten provinces were represented.

I measured two separate "a little over" 5 kilometres loops and divided the measurers in two separate groups. Anne Wardlaw had chosen especially winding courses so we could test how close to the shortest possible route (SPR) was followed by the measurers. Before the course measurement, the measurers were given instructions to follow the straight line route as much as they could when diagonals were encountered and to measure 20 centimetres from roads without curbs and 30 centimetres from roads with curbs. Also to make the test a bit more fair, they were asked not to ride on gravel road corners even though the SPR could be there, always stay on asphalt. When encountering parked cars they were told to use a parallel course beside the car(s) and lift bicycle back to original course.

The five(5) kilometre loop was measured twice by each participant and statistics were collected for the first and second measurement over the 5 kilometres course distance and the total distance of ten(10) kilometres. The purpose was to determine the relative consistency between the measurements within themselves and in comparison to others.

One problem that was pointed out as both teams finished measuring was that B-TEAM didn't all do the same measuring and hadn't been explained the same task as the A-TEAM. That could explain why some of the people in the B-TEAM didn't perform so well.

Following are the results of the comparative measurements for the same loop measured twice by the same measurer, and then the comparative measurements between the same ten kilometres course measured by different measurers.

Example: B.C. in TEAM-A measured the longest 10 Km and had the lowest difference between his two 5 Km measurements. and D.Y. (Toronto Marathon measurer) was 4.59 meters short of B.C.'s measurement but only had 31 centimetres difference between his two 5 Km loop measurements.

For purposes of comparison between the two groups, I went out and measured the A-TEAM course once (5 km loop twice) and the B-TEAM course once (same as I did with A). As I had expected I was in front of almost everyone in the A-TEAM and the same with the B-TEAM. Norm Patenaude, the other national course certifier said he hadn't been measuring for a year and that's why he was observed by Anne and myself measuring outside the SPR at one point, and eventually measuring a shorter 10 km course than me.

.../2

General comments:Data analysis: or what'cha may call it:

In Canada, we tell measurers that when they measure a course twice and the difference between their two measurements is more than .06% of the total distance, they should check what is wrong, (in the U.S.A. the figure is .08%) and correct it.

Without statistical analysis of the test results, we can easily see that all measurers at the clinic, expert and novice, could manage to come well within the .06% difference, with the exception of the A.P. novice.

(Refer to the COURSE MEASUREMENT DATA SHEET in the TAC Course measurement procedures booklet, for the mention of the .08%)

From this first test on five kilometres, we can see that it seems relatively easy for any measurer to duplicate their first measurement of a course, even though they were not following the S.P.R.

From the second test on ten(10)kilometres, if we accept the premise that good measurers should come to .05% of the actual measurement of the course, and since we don't know for certain the actual measurement of the course but believe it lies close to the measurements performed by more experienced measurers (like Norm and myself), I would tend to accept the courses measured by the first six measurers in group A and the first three in group B.

(It is to be noted that each measurer was given 2:30 minutes between each other while measuring to ensure all independent measurements of the 10 Km courses.)

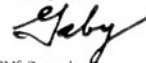
This kind of test also adds importance to the VALIDATION procedure that exists only in the U.S.A.

Validation is not warranted in Canada yet, because there are no official statistics being kept for road performances.

The Canadian Road Race Course Measurement and Certification Sub-Committee did however recommend to the Canadian Track & Field Association that they use good measurers (recognized by the sub-committee) to measure all marathons and championship and international road races.

The End.

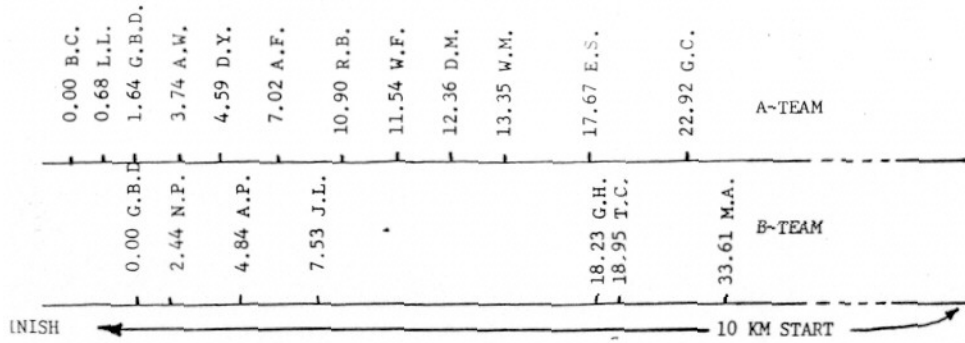
Gabriel B. Duguay
Co-Chairman of the CRCM&C sub-C.
(with Norm Patenaude)



⑥

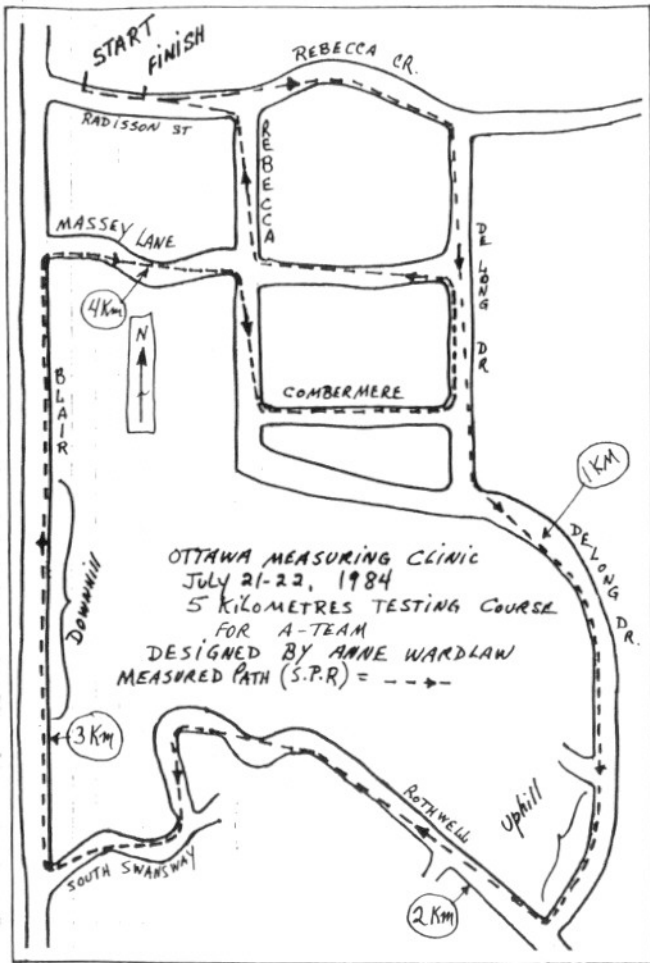
SEE DATA ON P. 7
MAP ON P. 8

JULY 21-22 1984 5 Km and 10 Km measurement test results



	Others compared to mine (GBD)* 10 Km measurement	Difference between 5 km measurements (same rider)	Second column expressed in 10 Km	%
A-TEAM	B.C. + 1.64m	.08m	.16m	.0016
	L.L. + 0.96m	.49m	.98m	.010
	*G.B.D. 0.00m	.38m	.76m	.008
	A.W. - 2.1 m	1.40m	2.80m	.028
	D.Y. - 2.95m	.31m	.62m	.006
	A.F. - 5.38m	.40m	.80m	.008
	R.B. - 9.26m	.52m	1.04m	.010
	W.F. - 9.90m	.10m	.20m	.002
	D.M. -10.72m	.18m	.36m	.004
	W.M. -11.71m	1.55m	3.10m	.031
	E.S. -16.03m	2.25m	4.50m	.045
	G.C. -21.28m	.65	1.30m	.013
B-TEAM	* * * * *			
	G.B.D. 0.00m	1.12m	2.24m	
	N.P. - 2.44m	.25m	.50m	
	A.P. - 4.84m	12.00m	24.00m	
	J.L. - 7.53m	1.35m	2.70m	
	G.H. -18.23m	.30m	.60m	
	T.C. -18.95m	Not recorded		
M.A. -33.61m	Not recorded			
G.W. not rec.	1.85	3.70m		
* * * * *				

Comments: A.W. is the Ottawa Marathon measurer. D.Y. is the Toronto Marathon measurer. L.L. is the lead measurer for the Winnipeg marathon, while A.F. and W.M. were following L.L. when measuring was required. G.C. never cycled but was always in a car behind A.W. while measuring was performed. T.C. and M.A. have cyclists measure their courses under their supervision, they do not ride themselves. W.M. was observed measuring outside the SPR, at one point.



MN OCT '85

TEST TO DETERMINE VALUE OF STARTUP WOBBLE

The effect of "startup wobble" on measurement has been discussed in past MN's. In order to get a better idea of the magnitude of this effect, an experiment is proposed.

Basically it requires 10 successive calibration course rides, with some stops enroute.

If you get time, please fill in the data and send a copy of this page back to Pete Riegel:

Name of Rider _____

Date _____ Temperature _____ Time _____

Length of Calibration Course _____

1) Counts obtained on normal calibration ride (1 stop total):

1st ride _____ 2nd ride _____

2) Counts obtained on ride with one intermediate stop-start (2 stops total):

1st ride _____ 2nd ride _____

3) Counts obtained on ride with three intermediate stop-starts (4 stops total):

1st ride _____ 2nd ride _____

4) Counts obtained on ride with five intermediate stop-starts (6 stops total):

1st ride _____ 2nd ride _____

5) Counts obtained on normal calibration ride (1 stop total):

1st ride _____ 2nd ride _____

This data will be used to generate information regarding how much effect startup wobble has, and how variable it is. It may also show the effect of using shorter-than-standard calibration courses.

When stopping, it doesn't matter exactly where you do it, except on the last stop, where a reading is taken. The main thing is to start, get up to measuring speed, and then slow down and stop. You can use any crack in the pavement as a point for which to aim.

NOTE: Record your counts only at the end of each calibration ride. Don't bother with counts at the intermediate stops. They need not even be in the same place. If you don't have a cal course nearby, guess your constant and ride a half-mile or 1 km. Set the point at the end of the first ride, and use the same two points for all your subsequent rides.

UPHILL AND DOWNHILL CALIBRATIONS

Wayne Nicoll sent a letter on this subject. Those who wish to repeat the experiment need not have a calibration course to do it. Just find a hill and ride what you think is 1/2 mile or 1 km. Then turn around and ride it the other way. Do this a couple of times and the difference, if any, will become apparent. Send me your dope and I'll collect it for future publication here.

Dear Pete,

Received your note on "start up wobble". I will try to duplicate your plan in the very near future. My cal course is less than a mile away so should be able to whip that out. Your note reminded me that I have not briefed you on my "hill wobble" observations. You might like this for MN.

As you have heard me complain in other letters, Atlanta is a hard place to lay a decent calibration course. Any straight street in the city has some real draw back - heavy traffic or hills. I have "de-certified" the old Atlanta Track Club course (hilly and curvy and with no indication given as to how to ride it). The only "official" course is the northern half of the 1984 Peachtree Mile laid on W. Peachtree Street in downtown Atlanta. It, too, is bumpy and dangerous once the traffic picks up.

After studying a city map and driving all over the Northeast part of town (both my kids live on that side of the city) I found a straight, smooth, well-lighted, lightly traveled residential street that had at least a half mile of straightness. It has one drawback. It drops steadily downhill for a 115 foot elevation change. I figured, what the hell, I can live with that. I started riding it - my first round trip I had five counts longer on the uphill than on the down hill trip. I felt I was a little sloppy, so I tried it again. This time I was seven counts off on the uphill trip. I used the figures for calibration for a hilly course measurement. Later I recalibrated and was further off -7545 down and 7556 up for an eleven count difference. Since then I have used the course only for re-calibration on those occasions when I felt secure that it would yield a smaller count than the calibration runs. Those figures are as follows:

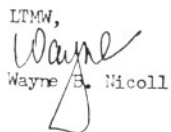
<u>Temp</u>	<u>down</u>	<u>up</u>	<u>difference</u>
60'	7555	7564	9 (counts reflect 1 1/8" tires)
83'	7356	7364	8 (counts reflect 1 3/8" tires)
97'	7354	7364	10 (" " " " " " " ")
86'	7356	7366	10 (" " " " " " " ")

I note from this that when I feel fresh and strong the best I can do is closing the gap to 5 counts. When fatigued from the measurement, the difference is about 10 counts.

It indicates that uphill measurement is probably a significant source of our measurement error. Hilly courses generally may be shorter than flat courses.

If I have a difference of 5 - 10 counts/ half mile and one has a hilly 10 mile course there may be a variance of 10-20 counts/mile. Assuming that 5 miles of it are uphill you could have lost 50 to 100 counts in the hills. I don't think we would improve much by walking the bike up hills because we would wobble when we walk them. I do feel, however, that A.C. Linnerud's technique of measuring hills in a down hill direction only is probably more accurate. I also think it pays to stay in good shape for hill riding and to use a good 10 or 12 speed bike. Unlike the serious cyclist, however, we can't stand up on the pedals and tilt the bike from side to side. It must be a steady, true uphill ride to minimize the wobble.

Have other things on my mind but will wait.

ITMW,

 Wayne A. Nicoll

GRAVEL VS PAVEMENT

Gaby Duguay sent in a letter on this. His question "Can you explain why gravel riding would give less units recorded?" is interesting.

It is easier to weave on a gravel surface, but this would make the count come out larger, not smaller. I don't have a clue why we seem to cover less distance on gravel than on pavement. Anybody have any theories?

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Montreal, September 13, 1985

Pete Riegel
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Subject: Measurement News

Gravel vs Pavement

I had the opportunity to ride a one kilometre calibration course on pavement first and then on the gravel which was on the flat shoulder. Here are the results:

<u>Bicycle A (Gabriel Duguay)</u>		<u>Bicycle B (Pierre Larue)(Not a course measurer but a good cyclist)</u>	
<u>(Jones counter readings)</u>			
<u>On asphalt.</u>			<u>15km/hour wind</u>
38000	-9379.5	33000	-9508 behind us
47379.5	-9378.5	42508	-9507.5 in our faces
56758	-9380.5	52015.5	-9508.5 behind us
66138.5	-9379	61524	-9509 in our faces
75517.5		71033	
<u>On small gravel</u>			
75517.5	-9367	71033	-9501 behind us (6 less than
84884.5	-9365.5	80534	-9503 in our faces above)
94250		90037	

The calibration course is on a straight and flat service road next to a highway. Date of calibration: May 25, 1985. temp.: 19°C . Time 9:15 a.m.-9:47 a.m. Distance between calibration course and gravel riding course 45 centimetres (18 inches). This is truly a parallel cal course on different surfaces. I felt the riding on the asphalt was straighter and that there was more wobble when riding on the fine gravel.

The gravel on the shoulder was crushed stone of 2 to 3 millimeters thick, not the same gravel as they put on gravel roads which have pebbles instead of crushed stones and the pebbles could be as big as 1 centimetre. The gravel I was riding on also gave way under the pressure of the bicycle, but I didn't measure this in millimetres, I estimated it to be 3 to 5 millimetres.

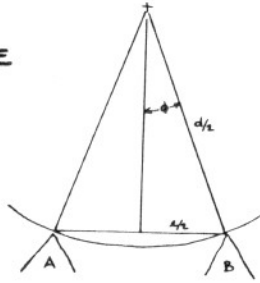
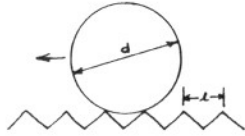
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Dear Pete,

I was in South Wales from June 23 to August 14. I read the report on the 42 kilometres in Nanisivik, and I am thinking of a reply. Can you explain why the gravel riding would give less units recorded?

Sincerely yours,

WHEEL ROLLING ON CORRUGATED SURFACE



$$\tan \phi = \frac{l}{\sqrt{d^2 - l^2}}$$

$$\phi = \tan^{-1} \frac{l}{\sqrt{d^2 - l^2}}$$

$$\text{arc length A-B} = \pi d \left(\frac{\phi}{\pi}\right) = d\phi \quad (\phi \text{ in radians})$$

$$\text{chord length} = l$$

$$\text{Ratio, arc/chord} = R = \frac{d\phi}{l} = \frac{d}{l} \tan^{-1} \frac{l}{\sqrt{d^2 - l^2}}$$

$$R = \frac{d}{l} \tan^{-1} \frac{l/d}{\sqrt{1 - (l/d)^2}}$$

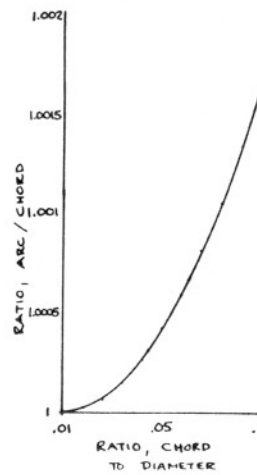
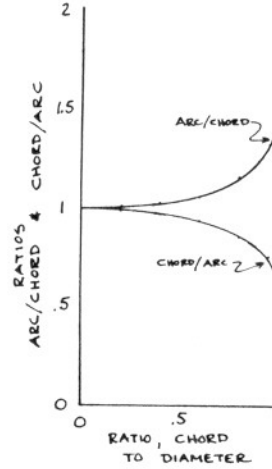
The ratio, R, is the ratio of the amount the wheel will appear to roll to the actual distance covered.

Example: for a 27 inch wheel rolling over regular corrugations 1 inch apart,

$$d = 27 \quad l = 1$$

$$R = 27 \tan^{-1} \frac{1/27}{\sqrt{1 - (1/27)^2}} = 1.000229$$

If this wheel is used to lay out a 10 km course, the wheel will indicate 10,000 m when only 9997.7 m has been covered. Course is short by 2.3 meters.



Here's a thing I did on a similar subject some years ago. Unfortunately it does not answer the question, since gravel is not a "corrugated surface". It yields when ridden over. This covers a condition I recently encountered in measuring a stretch of the Columbus Nationwide/Bank One Marathon. Three miles of Broad Street had been scarified in preparation for repaving, and the road was rough as a cob on my second measurement. I obtained no great difference on the rough ride vs the smooth ride, so I have no evidence to support the analysis. For 3 inch corrugations (as I would estimate the roughness to be) I would be looking for a ratio of of only 1.002, and I didn't find it.

I'll leave this to the rest of you math freaks.