Measurement News

September 1998 Issue #91

Marathon measurers of Maracaibo preparing to wheel off the final 85 meter adjustment to the course of the XVIII Central American and Caribbean Games. Left to right: Tomas Ponce, Olbers Fereira, Trino Hernandez, Jose Marchan and Noel Vidal, who also bike-measured the course.

MEASUREMENT NEWS
#91 - September 1998

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OLYMPIC MARATHON MEASUREMENT

After being on the outside looking in for the past 14 months, it's time to start my contributions from down under.

In addition to my role as IAAF course measurement area coordinator for Asia & Oceania, I am working part-time for the Sydney Organising Committe for the Olympic Games (SOCOG). My position is road events manager, athletics and in that role I'm responsible for the marathon and race walks.

I started with SOCOG last November and inherited a very difficult marathon course that was put forward to the IOC as part of Sydney's successful bid in 1993. It took seven months but by June we were able to launch a much improved course. My main aim was to remove unnecessary hills and corners and to get the race out on to some of Sydney's major roads, rather than in minor suburban streets, as was the case with the bid course.

Given the constraints of Sydney (very hilly terrain), I'm happy with the results. We still get to showcase many of the outstanding features of Sydney (Harbour Bridge, Opera House, Centennial Park, Glebe Bridge) but now have a course where I believe Olympic records are possible. Gelindo Bordin had a look recently and thought it was still a very tough course but agreed that Olympic records are possible.

I had planned to do a preliminary measurement of the course prior to its public launch but things don't always go to plan in big organisations. The course was released to the public in June but the preliminary measurement took place just the weekend before last (23 August). And it was with a great amount of relief that we calculated that it will fit within the parameters agreed with our transport people.

A real bonus on the measurement side was to have the Atlanta Olympic course director and measurer, Jack Grosko, join Fran Seton and myself on the first measurement. Jack just happened to land in Sydney on the previous day on other business so we recruited him into the team. We also had four observers on bicycles and others in cars so a number of people were exposed to the course measurement process for the first time.

The roads leading into the Olympic Stadium are not yet complete and there will be changes in a couple of areas along the course between now and 2000 so this was very much a preliminary measurement. We made estimates of distances where roads will change or don't exist, made a guess for a turn point (a turn at around 18k will be the main adjustment point although there is also some flexibility with the start line) and came up about 100 metres short (the three measurers finished within a 10 metre range). There is sufficient room at the turn and/or start to add this distance.

The course starts about 13k - 14k from the stadium at North Sydney, heads south across the Sydney Harbour Bridge and passes along the edge of the city centre. From about 6k to 25k the course goes out-and-back from the city to the eastern suburbs, incorporating a 4k loop through Centennial Park on the out journey only. After returning to the city centre, athletes have a very testing run to the Olympic Stadium which is west of the city. Broadly the course is reasonably flat for the first 25k, up and down hill from 25 - 37k and reasonably flat from 37k to the finish.

We won't undertake any further measurements until the roads leading into the stadium, and the stadium itself, are opened. I understand that the 115,000 seat stadium will open in March 1999 with a Bee Gees concert.

Fran and I have fond memories of the Atlanta measurement exercise .... I can't promise what we'll do in Sydney but I'm interested in ideas. I don't think the police will accommodate 28 measurers on the course but let's float a few ideas over the next 12-18 months.

For those marathoners out there, you're chance to run the course may come in our test event on 30 April 2000. The Australian Marathon Championships and an Olympic Selection Race will be held on that date. As well as a test event for 150 elite runners, we may open the race to all recreational runners ..... but no final decision has been taken on this.

Dave
cundysm@ozemail.com.au

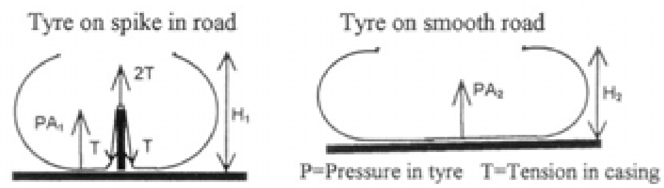
Variation of Calibration Constant with Surface Texture, Part 3: Modelling of the Deformation Pneumatic Tyres on Different Surfaces

By M.C.W.Sandford, 22 Stevenson Dr., Abingdon, OX14 1SN, UK. Email: m.sandford@lineone.net. 17 Aug 98.

Introduction

In part 1 of this series, *MN* 89 p 12, I reviewed the published data on the sensitivity of tyres to the surface texture. In part 2, *MN* 90 p 5, I described experimental results from seven riders and twelve tyres on a 4.5 km course in Abingdon. These data showed that for solid tyres the calibration constant in counts/km increases with increasing road roughness, while most pneumatic tyres have a smaller constant on rougher surfaces.

I offered an explanation based on the idea that the solid tyres closely follow the surface contour, whereas in the pneumatic tyre a membrane (the tyre casing wall), stretched by the pressure from the inner tube, carries a tension which resists the deformation by a pointed stone protruding from the road surface. I offered an intuitive argument that by locally wrapping the tyre round protruding points sufficient upward force might be generated to support part of the weight of the front wheel thus requiring a reduction in the general deformation of the tyre. This would increase the effective rolling radius and thus decrease the calibration constant. What I had in mind is illustrated here.



$PA_1+2T=PA_2$ ∴ A=Area of contact patch, $A_2 > A_1$ & $H_1 > H_2$

The article has prompted some correspondence with Bob Letson. (See *MN* 87 p 3 for a profile of Bob, who performed studies of surface sensitivity 20 years ago for the AAU's standards committee and discovered rules of thumb which we still use today.) Bob was interested in the effect of riders' weights on surface sensitivity. My reply must have seemed superficial since, while warmly encouraging me to continue obtaining *scientific evidence,* he gently chided me for giving an *intuitive* response to his queries.

Initially I smarted slightly under such admonishment. After all, I have ridden up and down calibration courses in Abingdon several thousand times in the last three years in the search for scientific understanding of the measurement process. One way to satisfy Bob would be to do more riding. However, I decided to discontinue for the moment the tedious collection of data. I have plenty. Where progress must be made is in modelling. By modelling, I mean calculation of the effects.

Modelling has been made much more accessible by the availability of cheap spreadsheet programmes on today's powerful yet cheap PCs. My 150 MHz PC with MS Excel 5 is fast enough to obtain results in seconds which would be statistically revealed only after many hours of riding. The negative aspect was that I had to concentrate for two days on understanding the problem and setting up the model, and a further three days to write this article.

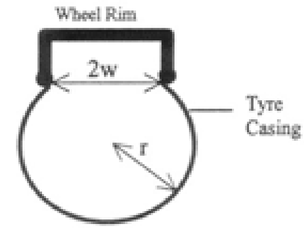
I had two tyre types to model solid and pneumatic. I envisaged working out the effective rolling radius on smooth and rough surfaces and finally trying the effect of changing the rider's weight. I naively thought that modelling the solid tyre might be the easiest since the finite element programmes are used to great effect by engineers for determining the distortions of complex shaped objects. However, reference to text books soon showed that it would be a daunting prospect to understand finite element modelling well enough to set it up anew on my spreadsheet. The principal problem was that I did not immediately see how to use Excel to organise and solve the large number of simultaneous equations needed for the finite element method. Someone with access to commercial finite element software might solve the problem rather easily.

I turned then to the pneumatic tyre. I remembered the seminar in 1991 for beginners when I learnt about measurement. I had then made a foolhardy claim that it would be interesting to model the deformation of a pneumatic tyre in order to understand temperature effects. In fact, the problem defeated me because of the complex geometry. I got the necessary information on temperature effects experimentally by riding my bike up and down calibration courses many times at different temperatures. Now I have succeeded in overcoming the geometric complexity with the aid of Excel. In particular Excel has a tool called SOLVER that enables one to find numerical solutions for transcendental equations such as x=sin(x). In this article, I report the results of modelling the deformation of a pneumatic tyre.

In summary what I have done is use my computer to balance a pneumatic tyre with a range of front wheel weights first on a perfectly smooth road, and then along an extreme surface, a knife edge running along the direction of riding. In each case the deformation of the tyre and the size of the contact patch has been calculated.

I am very surprised by the results which show that my explanation in the second paragraph is probably completely wrong: rolling radius is to the first order independent of the extreme variation in surface form which I modeled. What is even more interesting and important is that the results have focused me sharply on the inadequacies of my intuitive thinking about the role of what I call the effective rolling radius of tyres. I have not yet solved the problem of surface sensitivity but I have obtained new insights which may ultimately provide solutions to this and other problems.

After that grand claim, I am not going to ask the non-technical measurer to read all of the following. Just look at the pictures and then skip to the conclusions. The technical information is provided to enable someone interested to follow the details of my work and check its validity.



Model of a Pneumatic Tyre not in Contact with the Road

This simple model is given by the equations:

$$P = \frac{T}{r}, \quad T = \frac{E(l-l_0)}{l_0}, \quad l = 2\pi r - 2r\sin^{-1}\left(\frac{w}{r}\right)$$

P is the pressure in the inner tube = 0.7 N/mm^2 (104 psi), $2w$ is the rim width = 30 mm, l_0 is the unstretched length of the casing (in cross section direction) = 120 mm., E is the elastic constant of the casing = 100 N/mm (nb this is the modulus of elasticity times the effective casing thickness. I have adjusted E to get a value for the stretching of the tyre casing which is typical for a pneumatic tyre with at pressure of 100 psi). From these values we can deduce the stretched casing length l = 143 mm, the tension in unit width of the casing T = 19.5 N/mm, and the radius of the stretched casing r = 27.9 mm.

Assumptions in Model

I list here the assumptions in the above model:

1. The tyre casing is a thin elastic membrane
2. The tyre casing is anchored at the rim of the wheel by a wire located in the bead and is free to leave the rim at any angle
3. In the radial direction the tyre takes up circular cross-section. I can prove that such a circular cross-section is a shape of stable equilibrium. I have not proved it is the only possible stable shape, but I have never seen another shape in practice.
4. For a wheel radius of 300 mm, the tension in the circumferential direction is ignored since I have calculated that the strain of 0.02 in the circumference when the length of the cross-section of the casing is stretched from 120 mm to 143 mm. This gives a circumferential tension approximately 2 N/mm. A pressure of 0.002 N/mm^2 is sufficient to provided this tension. Thus the internal pressure almost wholly supports the radial tension and the effect on the pressure of the circumferential tension can be ignored.
5. Possible coupling between the radial and the circumferential strain through the cross-ply nylon reinforcing of the casing which runs at approximately 45° between the radial and circumferential direction has been ignored. This could significantly affect the assumption that one can independently model the behaviour in the radial and circumferential directions with coupling only through the overall tyre geometry and the internal pressure. I do not have sufficient information about the behaviour of the reinforced casing or the properties of the nylon and rubber to attempt an exact model.

Model of a Pneumatic Tyre Deformed on a Smooth Road

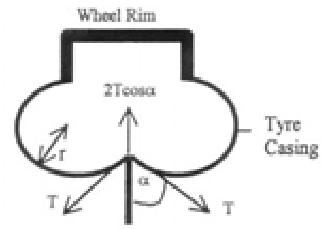
The model of the tyre in contact with a smooth road is obtained by slicing the cross-section of the tyre at intervals of 3 mm. The tyre pressure can then be used to calculate the tyre tension and radius in a similar fashion to that above. The difference is that a portion of the tyre is in contact with the ground. This portion lies flat along the ground and the internal pressure causes a force on the ground. Integrated over the whole area of the contact patch this provides an upward force which will be equal to the weight of the wheel on the ground. The calculation has been done by setting the equations up in a spreadsheet, reproduced on the following page. The total wheel force of 212.9 N (48 lbs) is derived in cell L23. The undeformed tyre has a thickness of 51.3 mm. Immediately beneath the axle at theta = 0, where the thickness is 47.0 mm, the tyre has been squashed by 4.3 mm.

	A	B	C	D	E	F	G	H	I	J	K	L
3	CONSTANTS				Elastic const = 100		rim half width = 15					
4	Rim radius R = 300				Pressure = 0.7							
5	Thickness x = 47				Tyre casing = 60							
6	Theta, angle from vertical in radians	(R+x)/cos(theta)-R	(R+x)tan(theta)		tyre radius, r	l, casing length	Difference in l	l, casing length		Contact Patch width	Force=Area*pressure	Cumulative force
7		'=($B$4+$B$5)/COS(A8)-$B$4	'=($B$4+$B$5)*TAN(A8)			'=$F$5*(1+$F$4*E8/$F$3)	'=(F8-H8)^2	'=$H$3-SQRT(2*B8*E8-B8*B8)+PI()*E8-E8*IF(B8<2*E8,ACOS((B8-E8)/E8),10000)	'=ACOS(B8/E8-1)	'=$H$3-SQRT(2*B8*E8-B8*B8)	'=$F$4*2*J8*(A9-A8)*($B$5+$B$4)	'=SUM(K$8:K8)
8	0.00000	47.00000	0.00000		24.79734	70.41488	9.58198E-10	70.41491	0.46155	3.95691	19.22267	19.22267
9	0.01000	47.01735	3.47012		24.80916	70.41985	1.42005E-09	70.41981	0.46200	3.94148	19.14769	38.37037
10	0.02000	47.06941	6.94093		24.84466	70.43476	4.76653E-08	70.43454	0.46338	3.89516	18.92271	57.29307
11	0.03000	47.15621	10.41312		24.90387	70.45963	8.37131E-08	70.45934	0.46565	3.81804	18.54804	75.84111
12	0.04000	47.27779	13.88741		24.98690	70.49450	1.34633E-09	70.49446	0.46882	3.71011	18.02373	93.86484
13	0.05000	47.43420	17.36447		25.09397	70.53947	8.78728E-08	70.53976	0.47287	3.57102	17.34803	111.21287
14	0.06000	47.62554	20.84502		25.22533	70.59464	4.90513E-07	70.59534	0.47781	3.40052	16.51971	127.73259
15	0.07000	47.85189	24.32975		25.38127	70.66013	1.40212E-06	70.66132	0.48361	3.19830	15.53734	143.26993
16	0.08000	48.11337	27.81937		25.56233	70.73618	3.83909E-07	70.73680	0.49029	2.96324	14.39540	157.66533
17	0.09000	48.41011	31.31460		25.76876	70.82288	1.40019E-10	70.82287	0.49780	2.69559	13.09518	170.76051
18	0.10000	48.74226	34.81613		26.00078	70.92033	3.29577E-07	70.92090	0.50609	2.39581	11.63883	182.39934
19	0.11000	49.10999	38.32470		26.25894	71.02876	4.17605E-06	71.03080	0.51515	2.06316	10.02282	192.42216
20	0.12000	49.51348	41.84103		26.54466	71.14876	1.48893E-08	71.14864	0.52507	1.69389	8.22893	200.65109
21	0.13000	49.95294	45.36585		26.85748	71.28014	2.56341E-08	71.27998	0.53567	1.29148	6.27399	206.92509
22	0.14000	50.42859	48.89990		27.19833	71.42330	1.40526E-07	71.42368	0.54697	0.85417	4.14958	211.07467
23	0.15000	50.94069	52.44392		27.56809	71.57860	6.17991E-07	71.57938	0.55895	0.38080	1.84994	212.92460
24	0.16000	51.48948	55.99867		27.96808	71.74659	2.5437E-06	71.74500		-0.13132	NOT CONTACTING GROUND	
25						Sum (g8:g24)=	1.0348E-05					

SPREADSHEET CALCULATION OF DEFORMATION OF PNEUMATIC TYRE ON SMOOTH ROAD

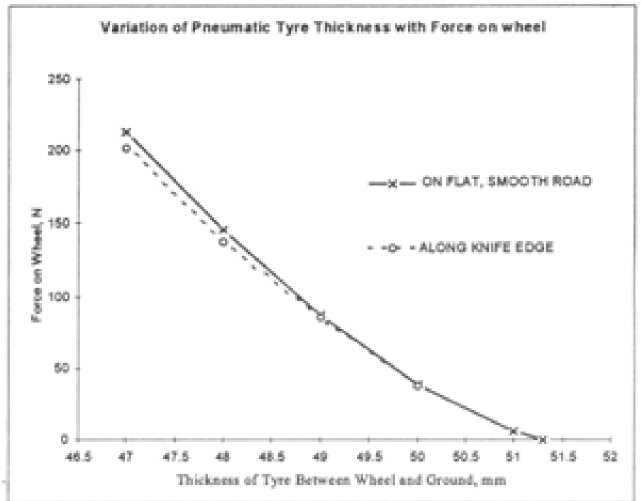
Row 7 shows the spreadsheet formulae which underlie row 8 onwards. A series of angles is entered in column A, and approximate solutions for the radius of the casing are entered in column E. The stretched length of the casing, l, is calculated by two different methods. In column F the tyre pressure is used to derive the casing stress and the length is then calculated using the coefficient of elasticity. In column H the length is calculated from geometrical considerations. The square of the difference of columns F and H appears in column G. To solve the model, the Excel ***SOLVER*** tool is used to minimise the value of cell G25, the sum of column G, by varying the cells in column E, the radius. The calculation is then repeated for different values of the deformed thickness in cell B5. The units are N and mm.

Model of a Pneumatic Tyre on a Knife Edge in the Road



In the calculation for the tyre balanced on a knife the contact patch is a narrow line. The upward force is provided indirectly by the pressure in the tyre. The tension, T, in the casing draped over the knife edge causes the upward reaction which supports the wheel.

As above, I assumed a number of values for the distance between the wheel rim and the knife edge, and for each value calculated the length of the contact strip and the total upward force. I found that for small deformations of the tyre, the upward force was similar in both models. But for large deformations with upward forces over 100N, the flat surface could provide the upward force for a slightly smaller value of tyre deformation than when on the knife edge. This was the opposite to what I would expect if sharp stones in the road were having the effect of increasing the thickness of the tyre, and hence increasing the effective rolling radius.



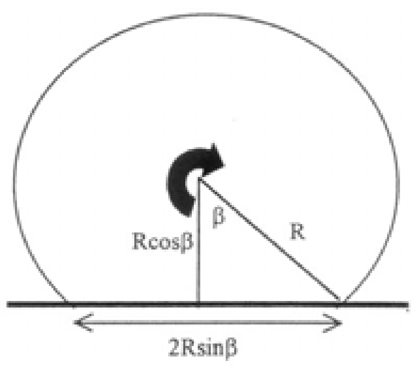
To illustrate the magnitude of the discrepancy with experimental results, my Michelin Tracer pneumatic tyre gives about 0.05% larger effective rolling radius on a rough road with about 250N weight on the wheel. The graph of the results of the modelling, shown here, predicts that the radius will be about 0.2 mm or 0.06 % *smaller* when on the knife edge.

Assumptions in Calculating the Interaction with the Road

I listed above the assumptions I made in my basic model of the tyre not in contact with the road. Here are the additional assumptions which I think have made in the models of interaction with the road. Incorrect assumptions could be the cause of the model failing to give the expected result. Alternatively relevant assumptions may have been overlooked.

1. The tyre meets the flat road tangentially in the direction of the cross-section.
2. The stresses and strains in the circumferential direction have negligible coupling to the cross-section direction, so that the an accurate model can be made by taking cross-sections of the tyre shape.
3. In interpreting the consequences on the calibration constant for measurement purposes, I have made the assumption that the axle to ground distance defines the effective rolling radius. I examine this important assumption in the next section.

A Deformed Rolling Tyre: Effective Radius



Implicit in the discussion so far has been the assumption that the effective rolling radius is given by the distance between the axle and the ground. If there is no slipping between the tyre and the ground and if the axle location remains at the centre of the wheel, then some simple geometry leads me to the conclusion that the assumption is true.

If R_e is the effective rolling radius, then as the bike moves forward a small distance δx, the angle through which the wheel turns is $\delta x/R_e$. Imagine now the small length, $R*\delta x/R_e$ of undeformed tyre at the end of the radius in the adjacent figure, just about to contact the ground, as the wheel moves forward δx. If this piece of tyre is not to skid when it touches the ground, then it must approach the ground with no horizontal component of velocity. This statement would not necessarily be true for a light tyre with no mass which needed acceleration. I assume that the tyre is a heavy membrane having a finite mass per unit area. Thus any area making contact with the ground with a relative horizontal velocity will need an impulse to remove the relative velocity and this will cause at least momentary slipping contrary to my assumption of no slipping. The horizontal component of displacement of the tyre is δx towards the right and $R^*\delta x/R_e \cos\beta$ toward the left. For no relative motion,

$$\delta x = \frac{R}{R_e}\delta x\cos(\beta) \text{ which gives the effective rolling radius, } R_e = R\cos(\beta) \text{ which is the axle - ground separation.}$$

Another interesting aspect of the mechanics of the rolling deformed wheel is that the tyre is placed under circumferential compression. The small element $R^*\delta x/R_e$ considered above is compressed to length δx on making contact with the road. This is a compressive strain of $R/R_e - 1$. The whole length in contact with the road is under an average compressive strain of $R\beta/R_e\sin\beta\text{-}1 = 2\beta/\sin(2\beta)\text{-}1$. The initial strain actually increases as the segment passes beneath the axle. For a typical value of β=0.1, this gives a strain of about 0.7%. Such a small strain gives a negligible additional circumferential force of about 0.7 N per mm of width, which is small compared to the vertical force at the contact point. I conclude that this strain is unlikely to make the tyre slip unless the road is icy. The assumption of no slip is therefore a good one, except possibly very close to the point of first contact.

If it can not be explained by slip then the only other explanations I can suggest for the behaviour of the pneumatic tyre on rough surfaces are

1. The tyre deformation extends beyond the contact point. This may be different for solid and pneumatic tyres.
2. The varying height of the irregularities on the road will certainly modify the assumptions in the above model of the contact point region.

Conclusions

My model takes as inputs: the wheel radius, the rim width, the tyre casing width and the coefficient of elasticity, the inner tube pressure, and the weight on the front wheel. It enables the following to be derived: the distance from the axle to the ground (which is what I had intuitively identified as the rolling radius), the shape and size of the contact patch, the shape of the deformed tyre casing.

The general behaviour on a smooth flat road is broadly consistent with my qualitative observations of pneumatic tyres, so I know I have chosen reasonable values for such unmeasured items as the coefficient of elasticity of the tyre casing. I could make a more detailed verification of the model by comparing the results with detailed measurements of the contact patch on several tyres.

When placed on the knife edge the deformation is very slightly *more* than on the flat surface. This is completely inconsistent with my previous intuitive explanation. I thought that the local deformation of the tyre round a sharp edge would provide an upward force by virtue of the internal tension, which would reduce the amount of weight supported through the general deflection of the tyre. I had guessed that the net result would be to increase the axle to ground separation. The model gives a small reduction in separation, which one would naively expect to give a larger constant. However, the experimental results reported in part 2 show this does not occur with most pneumatic tyres which I have tested. I therefore have to search for another explanation for the pneumatics tyre's surface sensitivity.

I have arrived at a new understanding of the rotating deformed tyre. There are two contributions to the effective rolling radius and hence to the calibration constant. The axle-ground separation is the dominant parameter. In one sense it is determined by the deformation of the tyre as calculated in this article. In another sense it is caused by the circumferential compression of the tyre in contact with the road. There is a circumferential compression as each element of the tyre contacts the road, and there is further compression as it passes under the axle. Without this compression the effective rolling radius would equal the unloaded radius of the tyre. It appears to me that this basic geometrical result is not dependent on the surface roughness.

Surface roughness effects probably arise in the region near the point of first contact between the wheel and the ground where they affect the amount of initial circumferential compression of the tyre. I speculate that there are three possible causes: 1) tyre deformation extending beyond the point of first contact, 2) road height irregularities modifying the geometry of initial contact, 3) varying skidding at the point of first contact.

I think I can now give a more scientifically based answer to Bob Letson's query. Rider weight will change the axle-ground separation, but this is likely to have only a second order effect on the processes at the point of first contact. Therefore, I expect only a small variation of surface sensitivity with rider weight.

OBTAINING COURSE LISTS FROM THE INTERNET

Lists of USATF certified courses can be obtained online. The best place to start is the RRTC web page, maintained by Bob Baumel. This has instructions on how to download the list in various ways. The RRTC web page may be found at:

http://www.hit.net/~bobbau/rrtc/

Pete Riegel maintains lists on his personal area of America Online. The course list is broken into three parts and is available in either Lotus 1-2-3 or Excel, as follows:

0ak-il.wk3	or	0ak-il.xls
0in-ny.wk3	or	0in-ny.xls
0oh-wy.wk3	or	0oh-wy.xls

For speed of downloading the three files are each combined into a ZIP file. Using PKZIP, a program available from the net, the three files can be unzipped from the one ZIP file in which they reside. Each ZIP file is about 1 megabyte in size. PKZIP may be downloaded from:

http://www.pkware.com/download.html

1) To obtain a Lotus course list, go to:

http://members.aol.com/riegelpete

Download the file called list-wk3.ZIP

As time passes, a list called "current" is generated. This list contains all the courses received since the last big list was created. The big list is updated each two months when *Measurement News* is published.

If you want the Lotus "current" file, download the file called "current.wk3". This file is not ZIP compressed.

2) To obtain an Excel course list, go to:

http://members.aol.com/petefiles

Download the file called list-xls.ZIP

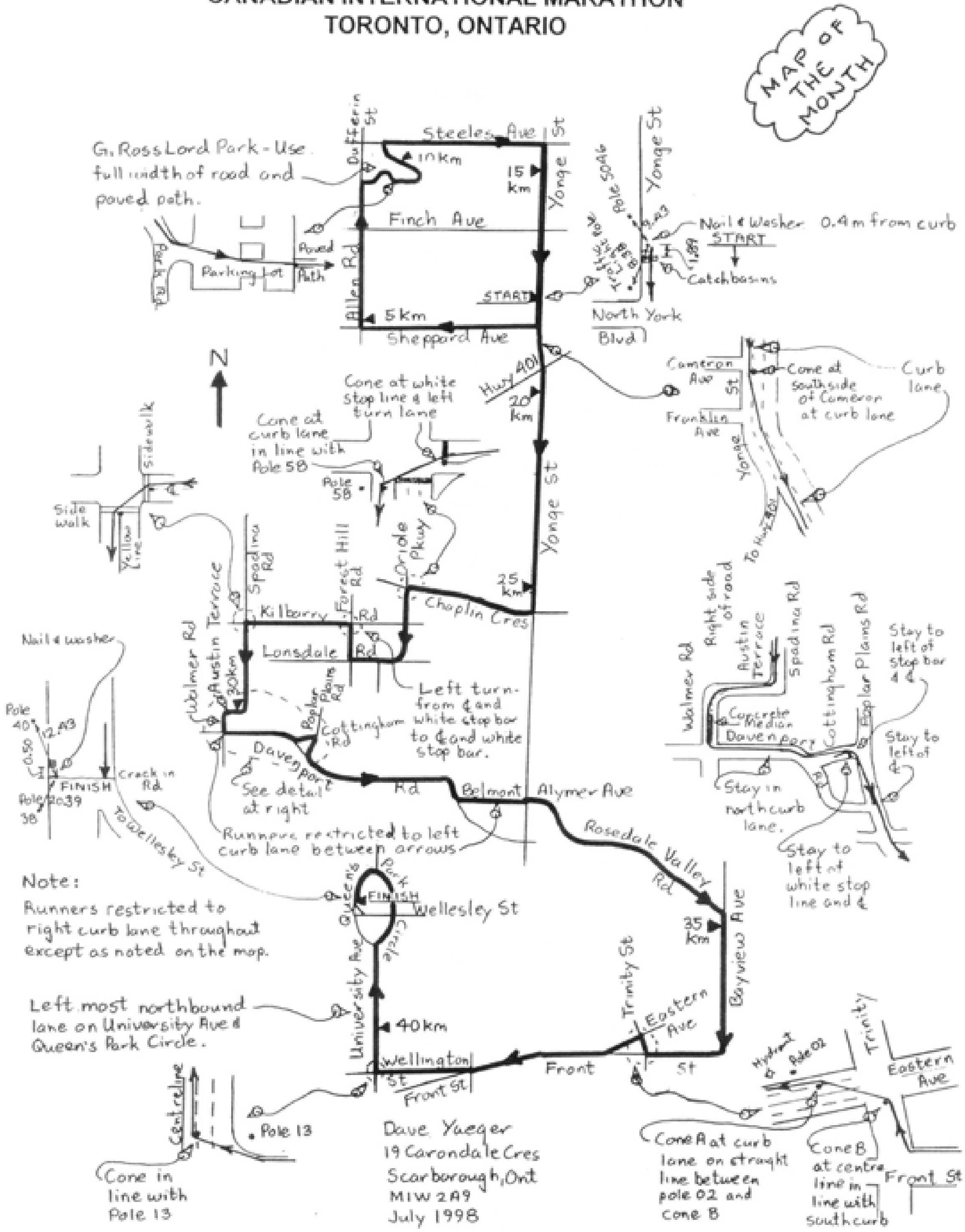
If you want the Excel "current" file, download the file called "current.xls". This file is not ZIP compressed.

If you have any trouble with these operations, send an email to < riegelpete@aol.com > and we will try to work out the bugs until we get it right.

From Road Race Management Online:

Debbie Fetterman of The Dallas Morning News reports that Andy Beach, one of the nation's most prolific course measurers, was attacked and had his bike stolen while he was measuring the course of Dallas' Buddy Run. Beach was riding on the Houston Street Viaduct in Dallas measuring the course when he passed two men. One jumped up on top of him and threw him to the ground. The other grabbed Beach's bike. The Dallas White Rock Marathon and the Cross Country Club of Dallas have combined to donate $500 toward a replacement bike.

CANADIAN INTERNATIONAL MARATHON
TORONTO, ONTARIO



DISAGREEMENT BETWEEN TWO RIDES

In a message dated 8/2/98 10:59:37 PM Eastern Daylight Time, ZGerweck writes:

> Subj: Clock cleaned again
> Date: 8/2/98 10:59:37 PM Eastern Daylight Time
> From: ZGerweck
> To: Riegelpete
>
> File: SHELTON.RPT (3161 bytes)
> DL Time (32000 bps): < 1 minute
>
> Dear Pete,
> Marty did it again - cleaned my clock on a measurement. I've attached the figures.
>
> This time I'm even more puzzled, since he was riding much looser than I, not cutting every tangent or
> hugging the SPR as tightly.
>
> My only explanation is that his cal figures must be the reason. If you notice he had a large pre/post
> difference, perhaps because he was using mountain bike tires that weren't inflated very hard, and the
> temp rose as we were measuring (11 am to noon). Also, I don't think he was that steady on his cal
> rides, since the course was on a slight hill.
>
> But 18 meters? I'm perplexed. Maybe I'm overlooking something obvious, or Marty's letting air out of his
> tires during the measurment ride. The other thing that pisses me off is that his ride is outside the .08%
> agreement range, so now I'll have to go back and do a second ride myself. And even it it wasn't, the
> course would need to be lenghtened, since his ride is the shorter (I expected it would be long if
> anything, due to his riding) and I'm not convinced it needs to be. I guess I will go up before the race and
> do a 2nd ride and make any adjustments then. (Fortunately the map of the Guido Bros Research Rd.
> 1100 foot cal course you emailed was a godsend).
>
> Let me know if you can deduce anything from the attached.
>
> Thanks,
>
> Jim

Dear Jim, *August 3, 1998*

You don't need another ride. The 0.0008 agreement is not reasonable when one of the two riders has a huge calibration change and the other does not. For agreement purposes it makes more sense to use the average constant.

If average constant is used, you measured 10002.4 m and Marty got 9996.7 m. Agreement is 5.7 m, within the 8 m allowed for a 10 km course.

If we look at Marty's calibration figures, he was all over the road. This artificially elevates his constant, making his measured distance even shorter. If we take one count above Marty's lowest count on each series of four we get an average of 3402 on his precal and 3392 on his postcal. These yield a constant of 10141.96 counts/km, which leads to a measured length of 10006.3 m.

I'd be comfortable using your 9999.98 as official, or, if a slightly greater degree of conservatism is desired, use Marty's average-constant 9996.7. Remember, use of the larger constant is recommended, but use of the average is permitted. You are on solid doctrinal ground if you use 9996.7.

At the same time it is apparent that you were not outridden by someone who was riding badly.

Best regards,

Pete

Shelton Sunset 10 km **Measured: 30 July 98**

FILE: SHELTON.RPT

Length of Calibration Course = 335.28 m (1100 feet)
Measurements Computed using LARGER Constants INCLUDING 1.001 factor

	Jim Gerweck			Marty Schaivone		
Pre-Calibration:						
	Start	Finish	Counts	Start	Finish	Counts
	47312	50703.5	3391.5	29383	32787	3404
	50703.5	54094.5	3391	32787	36188	3401
	54094.5	57484.5	3390	36188	39596	3408
	57484.5	60875	3390.5	39596	43004	3408
Working Constant:	10123.3022 counts/km			10166.5928 counts/km		
Post-Calibration:						
	66980	70368.5	3388.5	50190	53587	3397
	70368.5	73759.5	3391	53587	56984	3397
	73759.5	77149	3389.5	56984	60380	3396
	77149	80536.5	3387.5	60380	63771	3391
Finish Constant:	10118.4506 counts/km			10136.7372 counts/km		
Constant for Day:	10123.3022 counts/km			10166.5928 counts/km		

Course Measurement:

	Counter Reading	Interval (counts)	Interval (meters)	Counter Reading	Interval (counts)	Interval (meters)
Start	65733			48972		
5k	15116.5	50616.5	4999.99	98213	50759.0	4992.72
Finish	64500	50616.5	4999.99	47489	50724.0	4989.28
Totals:		101233.0	9999.98		101483	9982.00

Note: Above calculation uses Bob Baumel's Measurement Calculation Computer Program.

MEASUREMENT OF MARATHON AND RACEWALK COURSES
XVIII CENTRAL AMERICAN AND CARIBBEAN GAMES
MARACAIBO, VENEZUELA

Amadeo Francis, IAAF vice president who presides over the Caribbean region, asked me to measure the marathon and racewalk courses for the Games, which start on 8 August 1998.

The Games are more than an Athletics meet. They are actually a mini-Olympics, with 28 different sports represented, and 32 countries coming to compete. It is a huge job to stage such an event. The technical official in charge, Atilio Martinez, was working seven-day weeks.

Atilio introduced me to Trino Hernandez, who is in charge of Athletics and several other sports. We conversed with difficulty, as my Spanish and their English were equally inadequate to the task. However, Olbers Fereira was enlisted as a translator, and with his assistance things went well. I was introduced to Jose Rafael Marchan Montilla, who works with Trino, and who is responsible for the accuracy of the road courses.

After introductions and preliminaries, we toured the courses. Present were Trino, Olbers, Marchan, our driver Tomas Ponce M, and me.

Taking a break during the marathon course tour. Pete holds a bottle of high-octane Venezuelan rum, a gift from Marchan.

Measurement Conditions:
Information provided by the organization revealed the following about the typical weather at the time of the measurement and the games:

Temperature:

Maximum:	99F/35C
Minimum:	78 F/25C (at night)

Humidity:

Maximum:	94%
Minimum:	46%

These seemed to be typical conditions to me. I measured no temperatures.

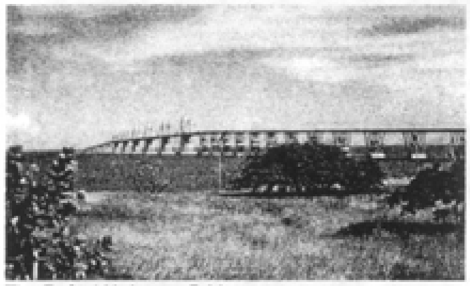
Racewalk Route - Description
The racewalk route was originally conceived to start and finish in Pachencho Romero Stadium, going out to and back from a 5.1 km loop. This circuit was seen to be too large for efficient judging, so it was revised to a circuit which consisted of multiple 2 km loops plus a 2 km walk to the finish line in the stadium. The new route is located on a former airport runway near the stadium.

Racewalk Route - Measurement
As the measurement of the racewalk route seemed straightforward, I saw no need for haste. We began work on Friday, 17 July, at 9:30 AM with a layout of a 300 meter calibration course. The temperature was well above 30C, and the pavement hot to the touch. I reduced the course by 6 cm, as this still, in my opinion, left the calibration course a bit over 300 meters. This done, I began measuring. After several passes, it became apparent that the original start line would not work, so I laid out a new start line. After 10 km and two hours of riding, we had a course.

Painting the north turn-around radius center.

I was greatly affected by the heat and very anxious that we get the marathon route started at first light, so as to avoid the sun as much as possible.

Marathon Route - Description
The marathon route is point-to-point with no elevation change. It starts in Santa Rita, a small town on the east side of the strait which divides Lake Maracaibo from the Gulf of Venezuela.



The Rafael Urdaneta Bridge.

The course goes northward for 5 km and then crosses the Puente General Rafael Urdaneta, a bridge across the strait. It is about 9 km long, in a straight line with a forbidding (to the bike rider) hump in the middle to let the big ships pass through. Once over the bridge, the route takes a short southward loop through a populated neighborhood (San Francisco), then proceeds northward on Autopista #1, a heavily-trafficked motorway.

After 15 km on Autopista #1, Maracaibo city streets are again encountered and the route follows them to the finish at Basilica Chiquinquira, near Plaza Bolivar and a pleasant *parque*. Because Autopista #1 was not on the original plan, its use was thought to lengthen the course by about 2 km. When we were in Santa Rita, the car's odometer was used to move us up the road the required 2 km difference. We found ourselves at a crossroad with a small restaurant "La Gran Cruzada" on the corner. We laid out a calibration course here and another one at the finish.

At the marathon start and calibration course.

I asked whether splits had been established. They said no. I suggested that we measure the course in reverse, against traffic all the way, so we could lay them out. They said the police would protect us; no problem.

Marathon Route - Measurement

We met in Santa Rita at 6:30 AM on Saturday, 18 July, at first light. The police had refused to protect a finish-to-start ride, so we rode from the estimated start to the finish, with plans to correct the length at the end. Splits would be laid down later by Marchan. A second rider, Noel Vidal, had been enlisted. I gave him a quick overview of the plan, and we calibrated. Once done, we started our ride without police escort. As the ride was with traffic all the way, I was not uneasy.

Noel and Pete waiting for permission to cross the bridge.

When we reached the bridge, at 5 km, I started riding across but was halted by shrill blasts of a whistle commanding an immediate stop. I did so, and waited as our permission to cross the bridge was debated at length. I felt like Lawrence of Arabia with the sun creeping higher and higher. I knew that every km of ride not taken cool would have to be taken hot. After 45 minutes the problem was resolved, and we resumed our ride. To my surprise, they shut down the bridge as we rode across, which took 20 to 25 minutes. I suspect the halted drivers may have experienced impatience.

In San Francisco, after crossing the bridge, we took a break at a small store with the word "pool" on it, and took a count. We did the same just before entering Autopista #1. Marchan placed a nail at this point, as it would assist him when he laid out the split points. At each break I gulped down liters of water, as I was sweating heavily.

Taking a break in San Francisco, just before getting onto Autopista #1. Shade was scarce.

Autopista #1 generally curves to the right, which made following the shortest route easy -- just stay to the right, on the apron. However, there was one left-hand curve. When I reached it, I looked at Noel and we grimaced at one another. There was no safe way to move gently left to cross the two lanes of high-speed traffic. I decided on an offset maneuver, which I could tell Noel understood by the look of relief on his face. We locked up our wheels, waited for an opening, and moved to the left. So did the truck that was driving behind us. During the left-hand riding, I remember hearing many uncomplimentary things shouted by passing drivers and seeing some amusing and interesting gestures. Soon we were finished with the bend, and it was time to move back to the right.

Moving back required a 5 minute wait, as our sojourn in the left-hand lane had backed up traffic for miles. Once things thinned out, we were able to get back across the road. We resumed our right-hand riding. As we approached our exit onto Delicias, I saw that the exit was an elevated ramp -- to me a significant hill. By now I was approaching full fatigue. As soon as we got onto the city streets, I called for a halt and some more water. We were only 5 km from the finish, but I had to have a rest. After another 3 km, I called for another halt and rest. Finally we reached the finish.

Noel Vidal at the finish, with the Basilica in the background. Noel was pleased that his electronic odometer showed 42.3 km while our measurement yielded 42.280 km.

The final calculations are done. Time for hydration.

I had intended that we would recalibrate on the calibration course we had laid out there, but it was Saturday and there were people and cars all over the course. I decided that we could recalibrate in Santa Rita, as we had to adjust the start anyway.

We loaded up the bikes, went to Santa Rita, and recalibrated. Then we went to a small open-air restaurant. I drank welcome beer, ran the calculations, and figured that we could safely remove 85 meters from the course. We used Marchan's measuring wheel to do this. Olbers had calibrated it, obtaining 301 meters over the 300 meter calibration course. Close enough.

Paperwork:
At the end of each of the measurements I went through a slow, methodical, step-by-step calculation procedure, pausing to answer questions as I did so. The response to this was enthusiastic. The questions were perceptive, and I think that the Venezuelan measuring team learned a lot about the calibrated bicycle method of measuring. I have sent Marchan and Noel copies of the Spanish measuring book written by Mexico's Rodolfo Martinez. I gave a Jones/Oerth counter to Marchan, and another to Noel.

With the paperwork done, it was time to go home. The plane trip back to home was a horror story, due to storms, but not really part of this narrative.

Conclusion:
The *XVIII Juegos Deportivos Centroamericanos y del Caribe* now have accurate racewalk courses, and an accurate marathon course.

08/12/98

USATF RRTC VALIDATIONS

1998 Activity Report

Validations Completed

Pass/ Fail	Date of Race	Date of Validation	Course Name	Course ID	Measurer	Validator	Type of Race	Advertised Distance	Nominal Distance	Measured Distance	Percent Difference
	Validations Pending										
	12 July97		Pacificare Bastille Day	CA97035RS	Scardera		LDR	8000 m	8000m		
	18 Jan97		Jed Smith Ultra 50 km	CA97004KY	Young	Knight	LDR	50,000 m			
			Wins Racewalk	CA98013RS	D. Scott	Knight	RW	1250 m	1250 m		
	6Apr97		Fifty Plus 8 km	CA97026RS	D.Carpenter		LDR	8000 M	8000 M		
	18Apr98		Ruth Anderson 100km	CA95008CW	Wisser		LDR	100 km	4.475499 mi		
	27Nov97		Run to Feed the Hungry 10km	CA95037CW	Moore		LDR	10000 m	10000 M		
	20 Oct96		Chicago LaSalle Bank	IL95061JW	Pinkowski	Wight	LDR	42195 m	42195 m	unavial. for validation	
	14Sept97		Nat. Heritage Corridor 25K	IL96052JW	Hinde	Wight	LDR	25000 m	25000 m		
	27 Nov97		Hyatt-Southpark Turkey Trot 8K	NC97062PH	White	Hronjak	LDR	8000 m	8000 m		
	18Jan 97		Dallas Five-O	TX97004ETM	Beach		LDR	50 miles	4905.15 m		
	24Jan98		Dallas 5-0	TX97004ETM	Beach		LDR	50 miles	4905.15 m		
	28 Mar 98		Bull Run 2 km	VA97042RT	Thurston		RW	2000 m	2000 m		
	7Sept97		City of Lakes 25km	MN97024RR	R.Recker	Grass	LDR	25 km/1/2 mar	25 km/1/2 mar		
	25Oct97		Tulsa Run 15 km	OK94041BB	Lafarlette		LDR	15000 m	15000 m		
			SUNY Racewalk Loop	NY96003WN	Nicoll		RW	1250 m	1250 m		
	5Apr98		Nortel Cherry Blossom 10 mi	DC98002JS	Sissala		LDR	10 mi	10 mi		
	17May97		Bedford Rotary Memorial 12km	NH89004BT	Teschek		LDR	12000 m	12000 m		
	22Oct94		Juniper Valley Park Ultra	NY94003DB	Brannen		LDR	100 mi	1.1982 mi		
	Courses Reviewed										
P	9May98	14Nov92	Old Kent River Bank 25km	MI95012SH	Dewey	Wickiser	RW	25000 m	25000 m	25021 m	0.084
V	9July 99	8 Jul 85	Utica Boilermaker	NY85001WN	Corbitt	Nicoll	LDR	15,000 m	15,000 m	15,015 m	0.100
V	31 May97	17 Aug 96	Frihoffers	NY96008WN	Nicoll	Wickiser	LDR	5000 m	5000 m	5007.4	0.149
P	2 May 97	29 Mar 98	Indianapolis Life 500	IN94010PR	Riegel	Wickiser	LDR	21097.5 m	21097.5 m	21099.13	0.007
P	27 Sept97	30June90	Park Ridge Charity Classic	IL96062JW	Parson	Wight	LDR	5000 m	5000 m	5004.8	0.098
P	14Feb98	22Aug92	Gasparilla 15km	FL92001WN	Nicoll		LDR	15000 m	15000 m	15010 m	0.066
	15Nov97		Helen Klein Ultra Classic	CA97055RS	Scott	Young	LDR	50 mi	50 mi		

Bob Thurston Calibrations July - August 1998

Pneumatic tire. Pumped to 100 psi before measuring DC calibrations - most on one of two 300 m courses except as noted. Richmond 1/2 mile course measured 1988 by EDM.
Also pumped to 100 psi before VA calibrations.

VA calibration course seemed rougher than DC calibration courses.

DC Calibrations

Date	Temp, F	Counts/km	
07/10/98	83	11089.58	
	100	11085.83	
07/19/98	88	11090.00	
	???	11086.67	
07/22/98	88	11089.17	
	100	11082.92	
07/25/98	78	11096.38	
	91	11094.43	half mile course
	86	11089.17	
07/26/98	98	11094.16	
08/09/98	86	11091.60	
	???	11092.92	wet
08/16/98	80	11095.83	
	???**	11117.10	**(After a flat, tire pumped with small hand pump
	???**	11118.30	**Hard to get high pressure)
08/19/98	76	11099.16	
	???	11095.00	
08/25/98	94	11088.08	

VA Calibrations

Date	Temp, F	Counts/km
08/22/98	70	11087.13
	???	11083.55
	100	11070.88
	92	11075.16
08/23/98	76	11085.57
	84	11083.24
	92	11078.89
	101	11073.77

August 28, 1998
Pete,

I measured a marathon and 5k in Richmond, VA last weekend and I used a half-mile cal course that was measured in 1988 using EDM. We did everything in miles so I never gave much thought to the actual numbers were getting (I usually work and "think" in kilometers). But now, looking at them, I'm a bit puzzled or troubled. So I wrote down some of my recent numbers and wondered if you could look at them. Or maybe I should ask Baumel or (who else??).

Granted I'm using a pneumatic tire so this is not as neat a comparison as solids or non-pneumatics. But I generally pump my front tire up to 100psi, then do my day's measuring work. Occasionally I don't pump them up before-- I'm guessing 7/26 was such a day, but I'm not sure. My little pump that I carry is too tough to pump to 100 so I don't (see 8/16).

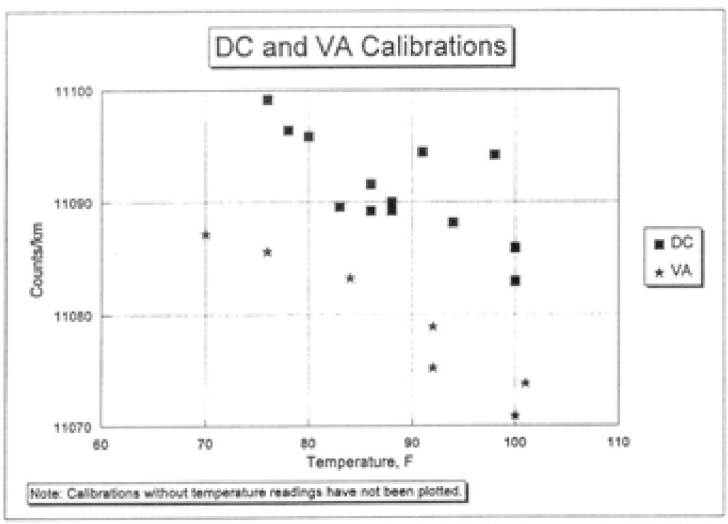
I was biased in the direction of accepting an edm course on face value but now I don't know. We used to have discussions about "start-up wobble", which of course would affect short cal courses more than long ones, but this effect seems to large for that.

I contacted the original surveyor, who said he's so busy he wouldn't have time to check this course until after Thanksgiving-- but I'm thinking we need to find somebody to check it, or else do it myself.

What do you think?

Regards, Bob Thurston
tel 202.726.1518 fx202.726.7711. (someday I'll even get on the internet)

Bob



Ted Corbitt: A True Running Pioneer

By Don Allison

A Hall of Fame for long-distance running? Not a bad idea! In Utica, New York on Saturday, the first five individuals were inducted into this new Hall of Fame. Bill Rodgers and Frank Shorter? Goes without saying. Joan Samuelson? Of course; she defined women's marathon running. Katherine Switzer? Certainly a good choice; she made history as the first official women's finisher in the Boston Marathon and has done a magnificent job of promoting women's running. Ted Corbitt? Ted who?

Well, I'm here to say that Ted Corbitt is as deserving an inductee as any of the other four honorees. Although he may not be a household name, much of what is taken for granted in long distance running today might not have been possible without the effort and vision of Ted Corbitt. On many levels-as an organizer, a course certifier, and an athlete-Corbitt laid the groundwork for the incredible growth that the sport experienced in the 1970s and again during this decade.

All of this would easily been enough to earn a spot in the hall, but incredibly, all that Corbitt accomplished was done as a black man in a white man's sport during America's racially turbulent decades of the 1950s and 60s. If all that were not enough, Corbitt bridged two separate facets of the sport, marathon and ultramarathon running.

A quiet man by nature, Corbitt lets his accomplishments do the talking, and they speak volumes. He earned a berth on the 1952 Olympic Marathon team held in Helsinki, Finland and finished in the top ten in the Boston Marathon. In ultrarunning, Corbitt set standards that took others decades to match, including times of 13:33 for 100 miles and 5:35 for 50 miles after the age of 50. These performances were not the result of an abundance of natural talent. Corbitt was also a pioneer in high-mileage running, racking up 200-mile weeks and more at a time when even running 26.2 miles was considered bizarre behavior.

Corbitt got started running at a young age, competing in track meets while in high school and college. It was there however, that he first ran into the color barrier. Not only was he prohibited from taking part in some meets in the Midwest, but also was not able to participate because he simply could not find a place to eat or a hotel that allow him to stay because of his color. Despite this adversity, Ted ran meets where he could and clocked very decent times of 51 seconds for the quarter-miles, 2:09 for the half, and even 10.1 for 100 yards.

In an interview a few years ago with Tishul Cherns of UltraRunning magazine, he said " I first heard of the marathon in 1936 and realized for the first time that people ran that far. I started running longer distances and it was hard to get used to it, but I did because I was interested to know if I could do it."

In his early years of marathon running, he ran about 100 miles per week. In his first marathon he finished the 1951 Boston in 2:58:42. Not content with the results, he subsequently upped his mileage to 200 per week. The mileage managed to reduce his time at Boston to 2:28:06, good for sixth place. Asked if he regretted punishing his body with high-mileage weeks, Corbitt said, "No. I learned about the body as I went along and at the time it was all right. I was doing a lot of experimenting." All of this training was done while he was working a full-time job as a physical therapist. He often ran the 30 miles from his home to work-each way!

With all of this success with long distances, Corbitt naturally thought of ultras and set his sights on the 55-mile London to Brighton race. For that race, he even logged a 300-mile week. Talk about a time-intensive hobby! Corbitt went on to set American records at 50 and 100 miles and 24 hours, in which he totaled nearly 140 miles. He raced the London to Brighton several times, finishing as high as second. Unfortunately, a bout with bronchial asthma in 1974 led the end of Ted Corbitt's stellar running career. The ailment has continued to plague Corbitt, but he still manages to walk regularly for exercise.

Few know that Corbitt was the first president of the New York Road Runners club. In addition to the NYRRC on course to what is now the biggest running organization in the world, he adopted the practice first used in England of wheel-measuring running courses for accuracy. For the thousand of races that have been accurately measured according to the USATF meticulous standards, you can thank Ted Corbitt.

When the Road Runners Club of America was just getting started in the USA, guess who they looked to as its initial president? That's right-Ted Corbitt. Not bad for a guy who was just looking to be allowed to enter a few track meets as a teenager.

As we reach the end of the century, the work, leadership, and accomplishments of some of the original pioneers in running can easily fade from memory. In the ultimate "What have you done for me lately" sport, yesterday's giants become merely footnotes inside of a dust-collecting record book. To truly appreciate how far the sport has progressed and how good we have it today, with thousands of wonderfully organized events open for all to participate in, learning more about those who laid the foundation for this abundance can offer great insight and perspective.

For that alone, the idea of a distance running Hall of Fame is a good idea. If more of today's runners become aware of and appreciate Ted Corbitt's place in running history, the hall will have been a success. So to one of the all-time greats, we say congratulations Ted. A more deserving individual could not possibly have been chosen.

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See the Cool Running web site at http://www.coolrunning.com

TIDBITS FROM MNFORUM

OVERSIZE COURSES - COMMENTARY ON PETE'S METHOD

June 29, 1998

Peter Riegel
E-mail: Riegelpete@aol.com

Dear Peter Riegel:

I realize this is too late for the July "Measurement News."

On page 35 of the May, 1998, "Measurement News," you invited readers to comment on how you handled two certification applications for courses that had advertised distances considerably shorter than the distances our measuring method would normally declare them to be. The race director apparently didn't want to make any changes to the courses because he had convenient starts and finishes.

I have had at least one similar certification request, and I denied it. I told the race director that I have been telling people for years that a certified course is the shortest course we can say is almost certainly at least the certified distance.

Ted Corbitt listed, in the article reproduced in the May "Measurement News," several reasons for having the certification program. He wrote that certification "makes it possible to compare performances, to a degree." If we allow courses that our measuring method says are different lengths to be advertised and certified as the same length, we have made it more difficult than it has to be to compare performances. If a central purpose of the certification program is to make it possible to compare performances run on different courses, why confuse matters by allowing courses to be advertised, and certified, as the same length when our measuring method indicates they are different lengths?

I also told the man who wanted me to certify a course as being shorter than it was that, if I were running in a race on his course, I would want to know the actual distance, and that I believed other runners would also want to know what the actual distance, as best we can determine it..

I would have told Tom, the race director you dealt with, that he is welcome to have his "convenient" courses certified, but not as a half-marathon and a marathon, but as a 13.1883-mile race and a 26.3072-mile race. I believe that "reasonable accuracy" has always been our goal. To certify a course as being 42,195 meters in length when our measurement method says the certifiable length is 42,337 meters creates a course that is not reasonably accurate.

Sincerely,
David Reik, 26 Griswold Drive, West Hartford, CT 06119
(I still don't have an e-mail box that I am likely to look in regularly.)

PETE'S REPLY

Dear David,

July 2, 1998

I will send this by regular mail as well, since your email is not looked at regularly.

Your letter makes eminent good sense. Actually I had come to the same conclusion myself - certify the courses at the distance they actually are. This is certainly easy to do, and I can only wonder at my obtuseness in not doing so in the first place.

What a pleasure to not be arguing with you. Thanks for the wake-up call!

As a result the Athens Marathon and Athens Half Marathon will have their listings changed to:

42.34 km OH 98011 PR A Athens Athens Marathon
0.6 2 T Wolf
21.23 km OH 98011 PR A Athens Athens Half
Marathon 1.2 5 T Wolf

The certificate will be amended as well. I doubt this information will ever reach the runners, but it is all that I can reasonably do. By the way, both courses have the same number because they are both on the same map. One certificate does for both. Sometimes it is easy and sensible to do this, sometimes not.

As your reply just missed MN, I am going to put your letter and this reply in MNForum, and reprint it in next issue of MN,

Best regards,

Pete

STRANGE CERTIFIED DISTANCES

July 4, 1998

I was very surprised at Pete's willingness, expressed in MNF98-07-02, to certify courses at distances slightly longer than a standard distance, such as 42.34 km for the Athens (Ohio) Marathon, or in Pete's words to "certify the courses at the distance they actually are." Let's remember that all measurements have error, so we never know how long a course "actually" is.

And as Pete has been saying for years, our main goal in certifying a course is to produce a "standard product" rather than exact distance.

This discussion opens a terrible can of worms. We might now expect a rash of certifications at distances slightly longer than standard distances, such as 10.035 km. One result is that runners will insist on having their times

adjusted downward to the hypothetical time for a "real" 10 km distance. Are the measurements accurate enough to permit such adjustment?
Would we accept it for record purposes? Or, at least, runners may insist on having times taken at the "real" 10 km point, 35 m before the end of the race.

Numerous races can be affected--even the Boston Marathon. I recall that when Wayne Nicoll recertified Boston in 1989 (MA 89002 WN), he found their existing course to be oversized by around 50 m (or maybe it was 50 ft, I'm not sure). He offered to shorten the course by this amount, but the BAA was happy with their existing start & finish and chose to leave the course as is. Of course, in that case, the distance written on the certificate was the nominal 42.195 km--but imagine the confusion if the exact result of Wayne's measurement had appeared on the certificate and course list!

Bob Baumel
bobbau@horizon.hit.net

STRANGE CERTIFIED DISTANCES

July 6, 1998

Lighten up, Bob. When a race director comes up with something like the Athens option, with the course a bit longer than its nominal distance, we have limited choices. I see a few:

1) Refuse certification until the race director shortens his course. If he doesn't want to shorten it, make him abandon the use of the word "marathon" in the name of the race.

2) Certify the course at the nominal length and leave its oversize a mystery to those who inquire.

3) Certify the course at the measured length, and get on with life.

I didn't see any of the above as a perfect solution, so I took what I thought to be the best approach, which was (3).

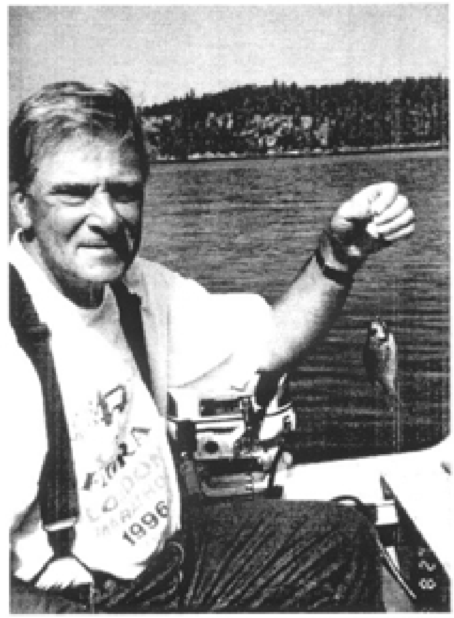
Part of the Athens problem is the use of the word "marathon." Some purists would like to restrict the use of the word to courses of 42.2 km length. As the word has long been used to describe any race course considered as a long distance, I don't share in this passion.

I don't see much of a can of worms here. I run into very few race directors who wish to do ANYTHING that makes times slower. And most runners would avoid a course theys ee to be any longer than necessary. It's an extreme rarity to see something like Athens happen.

If there was a happier solution to the Athens Marathon problem, I don't know what it is. David Reik's letter brought me to my senses. While Bob Baumel has misgivings, he proposes no alternate course of action.

Pete Riegel
riegelpete@aol.com

WHY MN MAY HAVE BEEN LATE



As this is written it is Monday, August 31. This is the day that *Measurement News* would normally go to the printer. It will not go to the printer today. It may not go tomorrow. It all depends on how fast I can shuffle together the various things to put in it.

No excuse sir. I had the opportunity to go fishing with my son Tom and a friend, and took it. As you can see above, your Editor is displaying a typical example of the monstrous catches we experienced on the French River in Ontario during our trip.

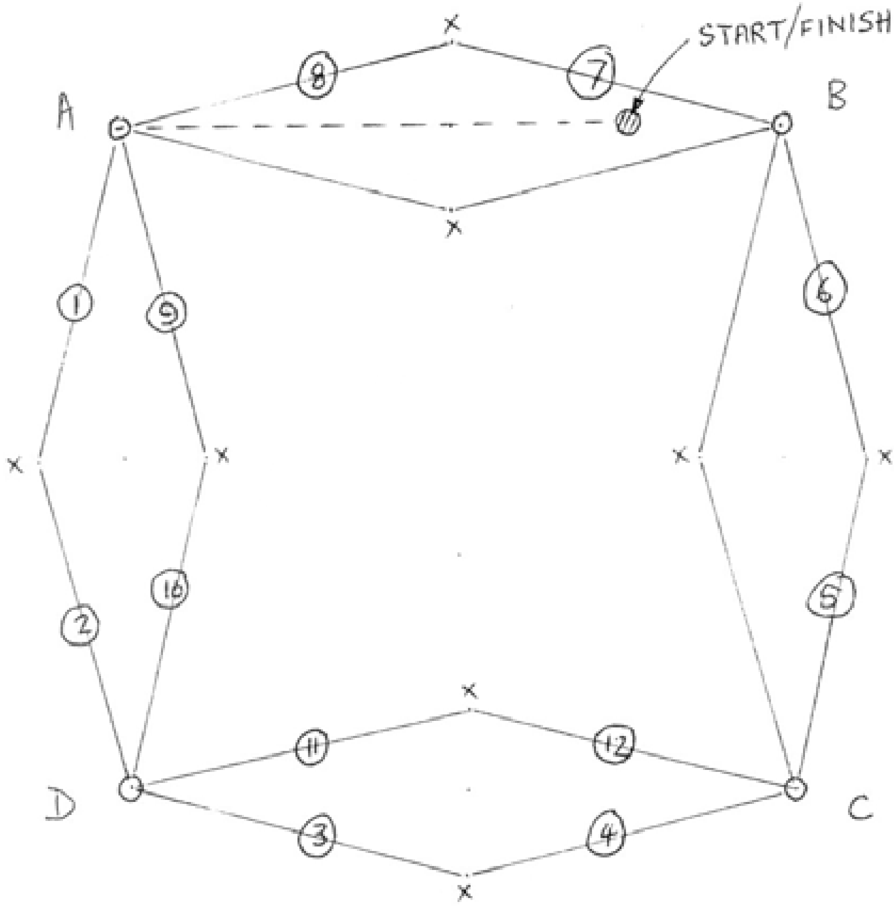
This picture has not been retouched to enhance the size of the fish. It is actually as large as you see!

While the fishing may have been a bit below par, so were the fishermen. We did not work at it. The camp put out a fine breakfast, and late-evening conversations over a good single-malt got us to bed late. As a result, we had a fine time lazing in the sun at noontime (we even found the nude beach!) And spending maybe 4 hours each day actually fishing.

On the first day, we opted for a "shore lunch." This means that the camp would pack us potatoes, canned beans, pickles, lard for frying, and frying pans. It was our job to catch the fish. Fortunately, we did catch three keeping-size smallmouth bass.

As lunchtime approached, son Tom reflected "why go through all the hassle of cooking over an open fire when we have a perfectly fine kitchen in our room back at camp? So we wimpishly took the fish back to the cottage and cooked it there. Masters of the wilderness. It was good to get away for a while.

POSSIBLE SOLUTION TO JULY PUZZLE



Your editor also had a solution but Brian's is far more elegant. On reflection I wonder - does the fact that the corners are rounded more than twice violate the condition that you wish to run the same direction only once? It only happens at the corners.

A B C & D ARE BOX CORNERS, EACH SIDE 1 km LONG

POINTS MARKED X ARE 0.6 km FROM CORNERS, MEASURED WITH 0.6 km STEEL CABLE

START FINISH IS WITHIN THE BOX AND 0.84672 km FROM A

COURSE CAN BE RUN OUT & BACK. ONE OUT SEQUENCE IS NUMBERED

24 .6 km LEGS = 14.4 km + 2 S/F LEGS = 16.09344 km

BRIAN SMITH
SOUTH CAROLINA