

# Measurement News



July 1999

Issue #96

**Online Measurement Book Now Available! See Announcement Within!**



Spectating can be hard work. At the London Marathon, one of the prime vantage points is at the Tower Hotel. Here runners approach from Wapping across a drawbridge spanning St. Katherine's Docks. They make a hard left at the hotel, at 22-23 miles, and go on over and past the cobbles of the Tower of London to the finish. Crowds are huge at the hotel. Here, at 3:30 into the race, well-wishers took advantage of a pile of bricks left laying about by a contractor.

## MEASUREMENT NEWS

#96 - July 1999

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### ROAD RACE COURSE MEASUREMENT BOOK NOW ONLINE

The USATF/RRTC Course Measurement manual is now available electronically on the RRTC website at: <http://www.hit.net/~bobbau/rrtc/>

This has been a six-month project. Bob Baumel edited this version, with help from Jim Gerweck, Bill Grass, Bob Langenbach, and Pete Riegel. This new online book is provided in the form of web pages (i.e., each chapter is a separate web page), except for the application forms which are all in a single downloadable PDF (Adobe Portable Document Format) file.

This online version of the RRTC instruction manual will, hopefully, make course measurement accessible to many more people.

Methods employed in this manual are essentially the same as those used internationally. The instructions and forms are more comprehensive and informative than those used in any measurement book in existence.

### US OLYMPIC TRIALS PREVALIDATION MEASUREMENTS

Team leaders have been selected for the prevalidation measurements of the US Women's and Men's Olympic Trials. The Women's Trials will be held in Columbia, SC. The team leader is Carol McLatchie. She writes:

The USATF Women's Long Distance Running Committee in conjunction with the Road Running Technical Council validated the 1992 and 1996 US Olympic Trials Marathon Courses using a team of female measurers/certifiers.

We are organizing a team for the 2000 Women's Marathon course validation tentatively scheduled August 6-8 in Columbia, SC. If you are interested and are an experienced course measurer, please contact: Carol McLatchie, Chair, Women's Long Distance Running Committee by e-mail: [jimmac@flash.net](mailto:jimmac@flash.net) or phone: 713-777-6840. Please include a brief summary of your measurement experience.

Airfare (supersaver), hotel and meals expenses will be covered for the team.

The Men's Trials will be held in Pittsburgh, and the team leader is Mike Wickiser. He is in contact with the race organization and will soon be seeking measurers.

These are as close to an Olympic experience as a measurer is likely to get. Contact Carol or Mike (see back page) if you have an interest in participating.

## Variation of Calibration Constant with Surface Texture, Part 4: A Simple Experiment to Compare Various Tyres

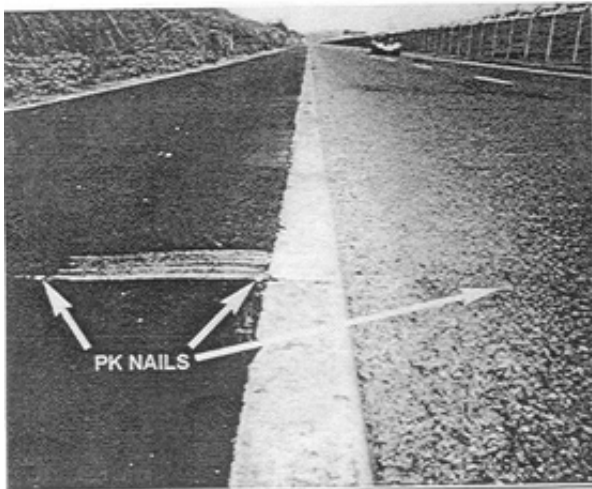
By M.C.W.Sandford, 22 Stevenson Dr., Abingdon, OX14 1SN, UK. Email: m.sandford@lineone.net.

Submitted 24 June 1999.

### Introduction

In part 1 of this series, *MN* 89 p 12, I reviewed the published data on the sensitivity of tyres to 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. In part 3, *MN* 91 p 5, I tried to explain why pneumatics and solids differed in this way. I concluded that 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 speculated that there were three possible causes:

- 1) tyre deformation extending beyond the point of first contact,
- 2) road surface irregularities modifying the geometry of initial contact,
- 3) varying skidding at the point of first contact.



### Didcot – Milton Road.

This view is from the end of the bridge ramp looking West. Brunel's Great Western Railway Line from London to Bristol is behind the hedge on the left, and provides a dead straight boundary beside which the road was built. The new footpath is on the left. The 1 cm diameter heads of the PK nails marking this end of the course are clearly visible. The outer nails were located exactly on the same line perpendicular to the kerb by using a large set square lined up along the straight kerb edge. Using the nail head as a reference one can see that the road surface contains structure (stones) around 1 cm in size.

The other end of the course is near some traffic lights at a junction about 600m away, which is not visible in this picture. The road is quiet at 6 am on a Sunday morning and one can safely ride in both directions along the side of the road beside the footpath. Occasionally a car passes by, and one was deliberately captured in this picture. When riding against the traffic I just pause with my foot on the kerb as it approaches.

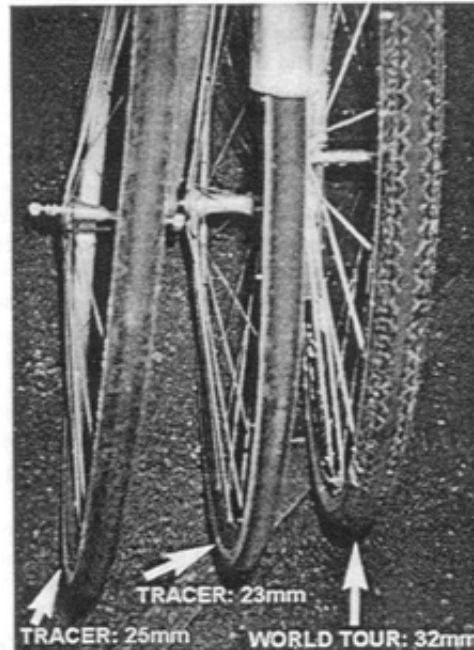
A few months ago when driving along a road which I occasionally use, I noticed that a new footpath was being constructed alongside a long straight stretch, see photo on left. Furthermore, the road had recently been resurfaced leaving a finish with tar-coated small stones partly protruding. My measurer's brain immediately kicked into action. I realised it was very likely that the footpath would be finished with very smooth rolled tar, and there would be a big contrast in surface texture if I laid out two parallel calibration courses, one on the footpath and one about 3 feet away on the road. Furthermore, if I were to use the calibration courses only to compare the calibration constants given by the two surfaces, and not to actually calibrate my bike for a real measurement, I would not even need to go to the trouble of measuring the length of calibration courses with a steel tape. All I would need to do is make sure the parallel courses were of exactly the same length. I could then carry out a very simple measurement of the effects of surface texture on various tyres.

In eager anticipation, I detoured along the road more frequently. After remaining unfinished for some months, the work on the footpath was completed at the end of April. The next Sunday morning I was there to carry out my experiments.

In this article I describe the method and the results. They reinforce my existing data and I shall make some strong *recommendations* about choosing tyres for measurement.

### Data Collection

I tested three pneumatic tyres, see photo on left, and one solid GreenTyre Courier mounted on a 27 x 1.25 inch wheel. For each tyre under test I did the standard calibration on the footpath, followed by one on the road, and finally a repeat on the footpath. The results are shown in the table at the foot of this page. I am satisfied that my riding was very consistent. The least repeatable data were obtained on 2 May when there was a light wind from the east. For the first two tyres which were pneumatic, the average counts for the ride 1 and ride 3 (12 rides in all) was 6744.6 counts and for ride 2 and 4 6743.8 counts. The light head wind for ride 2 and 4 is the probable reason for the counts being 0.8 smaller. With the solid tyre, which is less sensitive to the weight on the front wheel, the wind had no noticeable effect. On the 3 May when I used the Michelin World Tour conditions were perfect, no wind and a stable temperature. This is reflected in the excellent reproducibility of the rides with a total range of 0.5 counts for 8 rides on the footpath.



The three pneumatic tyres used in this experiment were all made by Michelin. The World Tour has a chunky tread whereas the Tracers have a thinner smooth rubber wall with a tread of thin cuts which are not visible in this slightly defocused photo.

### Data Analysis

What is important in these experiments is not the absolute value of the calibration constant, but the fractional difference of the constant on different surfaces. I have defined this fraction as follows:

$$F = (\text{counts on rough surface} / \text{counts on smooth surface} - 1) \times 1000.$$

I have used the multiplying factor of 1000 to give a value that can be expressed in the units of m/km which is easy to compare directly with the SCPF, 1 m/km. A positive value of  $F$  means that, if one were to use the smooth surface to calibrate and then layout a race course on the rough surface, the course would be laid out short by the factor  $F$ . Referring to the values of  $F$  in the table below, it can be seen that this would be the case for a solid tyre. Of the three pneumatic tyres the narrow tyres are the worst, with a danger of a short course if the calibration surface is rough and the race surface is smooth.

	Ride 1	Ride 2	Ride 3	Ride 4	Average	1000*(Rough/Av. Smooth - 1)
<b>Michelin Tracer 23 mm rim width, 2 May 1999 0559 to 0640</b>						
						$F$
Smooth Footpath	6778.4	6779.3	6779.2	6779.6	6779.1	
Rough Road	6773.4	6772.6	6773.6	6771.0	6772.7	-0.99 m/km
Smooth Footpath	6779.9	6778.9	6779.2	6780.4	6779.6	
<b>Michelin Tracer 25 mm rim width, 2 May 1999 0649 to 0727</b>						
Smooth Footpath	6713.9	6712.8	6714.0	6712.5	6713.3	
Rough Road	6709.2	6707.8	6708.0	6707.7	6708.2	-0.69 m/km
Smooth Footpath	6713.1	6711.5	6713.0	6711.5	6712.3	
<b>Green Tyre Courier Solid, 2 May 1999 0733 to 0810</b>						
Smooth Footpath	6601.3	6601.7	6601.3	6601.5	6601.5	
Rough Road	6609.3	6610.0	6610.1	6610.0	6609.9	+1.24 m/km
Smooth Footpath	6601.7	6601.5	6601.9	6602.4	6601.9	
<b>Michelin World Tour, 32 mm rim width 3 May 1999 0544 to 0620</b>						
Smooth Footpath	6510.0	6510.0	6510.2	6509.9	6510.0	
Rough Road	6506.5	6506.3	6506.3	6506.8	6506.5	-0.54 m/km
Smooth Footpath	6510.0	6510.2	6510.1	6509.7	6510.0	

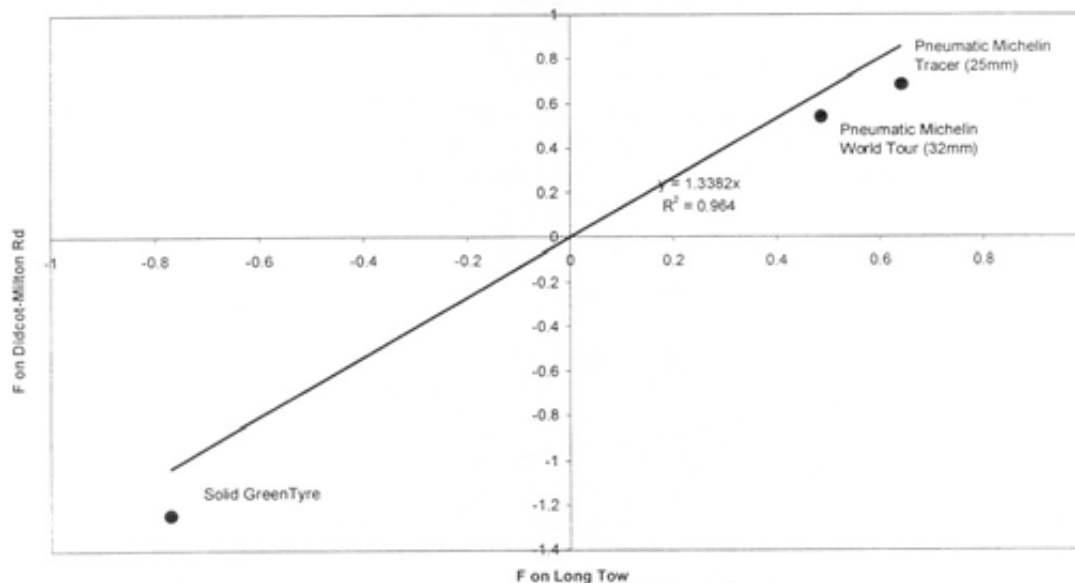
If there was a convenient method of measuring the roughness of a surface, then it might be possible to find a way of calculating the factor  $F$  directly from measurements of roughness of the calibration course and the race course. One could then make a correction to the length of the race course by using the calculated value for  $F$ . However, although I can crudely estimate roughness by eye, I can not think of a practical way to accurately measure it. I have therefore tried another approach to the problem, as follows.

Since all the pneumatic tyres (except a mountain bike tyre), which I have tried in various experiments, have given negative values for  $F$ , and since the two solid tyres I have tried have given positive values, I wanted to investigate whether a weighted average of the results of a measurement with a pneumatic and one with a solid tyre could be used to estimate the result which would be given with a perfect tyre, i.e. one with  $F = 0$ . The use of such a weighted average would only be valid if there was a linear relationship, true for all types of tyre between  $F$  and some unknown function of the roughness difference. Mathematically this assumption would be expressed by the equation,

$F = (\text{a constant, which depends on the tyre}) \times (\text{a function of the difference in roughness of the surfaces, which is independent of the tyre})$

I have no *a priori* reason to expect an exactly linear relationship. However, such a linear relationship can often be used as an approximation for a much more complex relationship. To investigate whether a simple relationship might be a good approximation for the data obtained in this experiment, I have compared in the following graph the values of  $F$  obtained on two pairs of surfaces: the pair of surfaces reported here on the Didcot - Milton Road, and from data previously reported in *MN* 90 p 5 for the pair of surfaces along Long Tow. I have plotted the data for the 3 tyres with which I have made measurements of  $F$  in both locations.

**Correlation of  $F$  for 3 tyres on 2 pairs of Surfaces**



I have fitted a straight line through the points and constrained it to pass through the  $F = 0$  point on both axis. The constraint is equivalent to making the assumption that if a tyre is independent of surface roughness for one pair of surfaces then it will be independent of roughness for the other pair of surfaces. The fit of the points to the straight line is remarkably good. The three points all lie within a value of  $F = 0.2$  distance from the line. If in further experiments such errors were found to be typical of other pairs of surfaces, then one would have confirmed the basis for a simple weighted average method of deriving the true distance which would be accurate to better than 0.2 m/km. This would be a remarkable result and could revolutionise the measurement community's approach to measurement on rough surfaces, or even ordinary road surfaces.

After taking the first measurements on the Didcot-Milton Road on 2 May 1999, I actually had a sufficiently strong expectation that the tyres would behave in this linear fashion that I made a prediction which I published in Jim Gerweck's Measurement News Forum on the internet,

*"Airless tyres – a cautionary tale*

*I used my Green Courier tyre which fits on a 27 x 1.25 inch wheel. It took me about 35 minutes to carry out a measurement sequence including the usual 4 precalcs and 4 post calcs. I actually took 4 rides of the road course and averaged the results. During the sequence the temperature rose by 1.5 degree Celsius which has absolutely negligible effect on my GreenTyre. The rides on each surface were very self-consistent: less than 1 count variation in 6600. Without applying the SCPF to the cal constant, I calculated the road course to be 87 cm or 0.125% LONGER than what I knew it to be based on the offsetting from the cal course end points. If even if I had added 0.1% SCPF in the cal constant, it would still have calculated a length under the true distance.*

*I regard this result as unacceptable: either the equipment or the measurement procedure needs changing. I don't want to suggest changing our standard procedures, so tomorrow I will ditch the solid GreenTyre and repeat the measurement with a Michelin World Tour pneumatic tyre. Based on my previous experience of this tyre (published in MN and elsewhere) I expect the measurement of the road course (without SCPF) to come out about 30 cm SHORTER than the true distance. If it does I shall continue to use the pneumatic for the majority of my measuring."*

The next day, when my prediction was proved right, I wrote as follows,

*"Michelin World Tour pneumatic best for rough surfaces*

*Yesterday I predicted that my MWT tyre would give a result on the rough road 30 cm less than the true distance. I have just returned from the measurement and the result agrees remarkably well with the prediction: The measurement with the MWT gave the course to be 38 cm SHORTER than the true distance. My prediction was good to within 8 cm or less than 1 count in 6500! – nb. I calculated using the wrong value for the course length. With the correct value of 597 m the MWT gives 32 cm short not 38cm.*

*The MWT was 2.3 times less sensitive to this surface than the solid GreenTyre. Since the official measurement procedure takes no quantified account of this effect I shall continue to recommend the MWT over any solid tyre in order to reduce errors to the maximum extent possible.*

*The accuracy of my prediction suggests that a new procedure could be developed involving measuring each course twice - once with a GreenTyre and once with a MWT. The overall result would be determined by a weighted average giving a weight of 2.3 to the MWT and 1 to the GreenTyre. (This was effectively the method I used to make my prediction but with a ratio of 3:1 which I had obtained on another surface.) Alternatively a divergence in results between a solid and a pneumatic could be used to warn of an unrepresentative calibration surface and perhaps in extreme cases this could result in the rejection of the measurement. Measuring twice with different tyres would be too big a load to impose on measurers as a standard procedure, so why not use the MWT for best results?"*

### **Conclusions**

In the last 4 years I have published in *MN* the results of several experiments on the effects of surface roughness. These demonstrate beyond all doubt that significant error can be introduced in a measurement if the calibration surface differs in roughness from the measured race course. I was surprised and disappointed that third edition of the otherwise truly excellent Course Measurement Handbook, published on 14 June 1999, has entirely ignored my work. Although I can not claim that the averaging method, which I have described above, can at present be regarded as more than an experimental method still to be verified on a wider range of surfaces, I would expect at the very least the publication of the following warning to all readers of the handbook,

*"WARNING: It has been shown that the calibration constant can vary with the roughness of the road surface. To be safe measurers are advised to choose a calibration course with a surface roughness which is similar to the race course. If this is not possible, make sure you use a smoother surface for the calibration and a pneumatic tyre, since this combination will give an additional safety margin. Avoid the use of solid tyres unless there is almost no variation of surface roughness. Fatter, thicker pneumatics seem less sensitive than thin racing tyres."*

I know my condemnation of solid tyres will not go down well with those who place a high value in their insensitivity to temperature changes and immunity from punctures. However, temperature changes can be monitored with a thermometer and the effects of extreme changes on a pneumatic can be corrected. Also, I suggest that for the majority of unpaid measures, getting a reliable result is more important than the small risk of having to repeat a measurement due to a puncture in a pneumatic.

## **EXPIRED NOW MEANS EXPIRED!**

Our RRTC policy has long been to assume that a course remains active unless it has been replaced by the state certifier, or has failed a validation remeasurement. This has resulted in our course list getting full of unused courses. This policy has changed. From now on, the course list will be consistent with the wording on the certificate. After ten years, the course will no longer be listed and will be considered decertified.

Those race directors who wish to see their old courses certified have two options:

- 1) If the course has changed, get it remeasured and recertified.
- 2) If the course has not changed, renew it.

### **Here is how things will work:**

- 1) Renewals will go to the state certifier. He or she will pass them on to the vice-chairman, who will send them to the Course Registrar. Just like the flow of new certificates.
- 2) No new certificates need be created unless the certifier wants to do it. This is busy-work leading to no positive benefit.
- 3) There will be two course lists, an "active" list and an "archive" list. Active courses are considered as certified and in good standing. Archived courses are not considered to be in good standing.
- 4) An archived course may be moved to the active list by proper renewal. If the course has been altered or has failed validation, it must be remeasured.

The active list will consist of courses that have been certified within the last ten years. Courses that have been replaced, as noted on some certificates, will be removed from the active list. Courses that fail validation will be removed from the active list.

All course lists will be updated bimonthly. No change here. Currently active courses are 1989-1999. At the end of 1999 the 1989 expired courses will be removed to the archive list.

No certificates will be destroyed, and the historical flow of certification will remain available by use of the archive and active lists. All certificates ever generated will remain available.

Both active and archive lists will be available to the public, but when someone requests "a course list" they will get the active list.

I will work with RRTC Webmaster Bob Baumel on the formatting of the online lists.

## THE GREAT Y2K DEBATE

At the last USATF convention I brought up the approaching Millennium and encouraged discussion on the subject. The course list was identified as a potential problem area. The problems of our present 5 digit numbering system were seen as twofold:

- 1) Because the lists are kept on spreadsheet programs, leading zeroes would disappear from the list for the first decade of the Millennium, showing course numbers with fewer than 5 digits.
- 2) Computer sorting of the list would be hampered to a degree.

A change to a 7 digit numbering system was proposed. It has been debated endlessly on MNForum with no clear resolution. The present format and the proposed format are shown below, as they would appear in *Measurement News* as the Millennium arrives and passes:

Year	COURSE ID
1995	OH 95005 PR
1996	OH 96005 PR
1997	OH 97005 PR
1998	OH 98005 PR
1999	OH 99005 PR
2000	OH 00005 PR
2001	OH 01005 PR
2002	OH 02005 PR
2003	OH 03005 PR
2004	OH 04005 PR
2005	OH 05005 PR
2006	OH 05005 PR
2007	OH 07005 PR
2008	OH 08005 PR
2009	OH 09005 PR
2010	OH 10005 PR
2011	OH 11005 PR
2012	OH 12005 PR

Present format

Year	COURSE ID
1995	OH 1995005 PR
1996	OH 1996005 PR
1997	OH 1997005 PR
1998	OH 1998005 PR
1999	OH 1999005 PR
2000	OH 2000005 PR
2001	OH 2001005 PR
2002	OH 2002005 PR
2003	OH 2003005 PR
2004	OH 2004005 PR
2005	OH 2005005 PR
2006	OH 2006005 PR
2007	OH 2007005 PR
2008	OH 2008005 PR
2009	OH 2009005 PR
2010	OH 2010005 PR
2011	OH 2011005 PR
2012	OH 2012005 PR

Proposed format

**Present Format:** The present format will continue to perform its original intended function - to provide a unique identification for each and every course - and will continue to do this until year 2082. If a change is needed, it can be done at any time until then. There is no technical problem with retaining the present format. Computer sorting of the list is more difficult, but only slightly. Retention of the present format does not require any action on the part of anybody, certifiers or general public.

**Proposed Format:** The proposed format will reduce ambiguity by using the full four digits for the year of certification, resulting in a 7 digit code. The "leading zero" problem is eliminated. Computer sorting is easier. Certifiers and the public would have to adopt and get used to a 7 digit code in place of 5.

**Discussion:** The proposed format adds neatness at a price. The principal function of the course ID is to permit one human to convey accurate information to another human, in verbal or written form. People requesting a copy of a certificate must give us a number. Courses must be clearly identified for validation and record purposes. Certifiers must enter accurate codes on their certificates. The 7 digit code conveys no more information than the 5, and using 7 digits rather than 5 makes communication more difficult and prone to error. Every time a course number is written, typed or spoken it will be 40 percent larger than formerly.

There no need for haste on this.

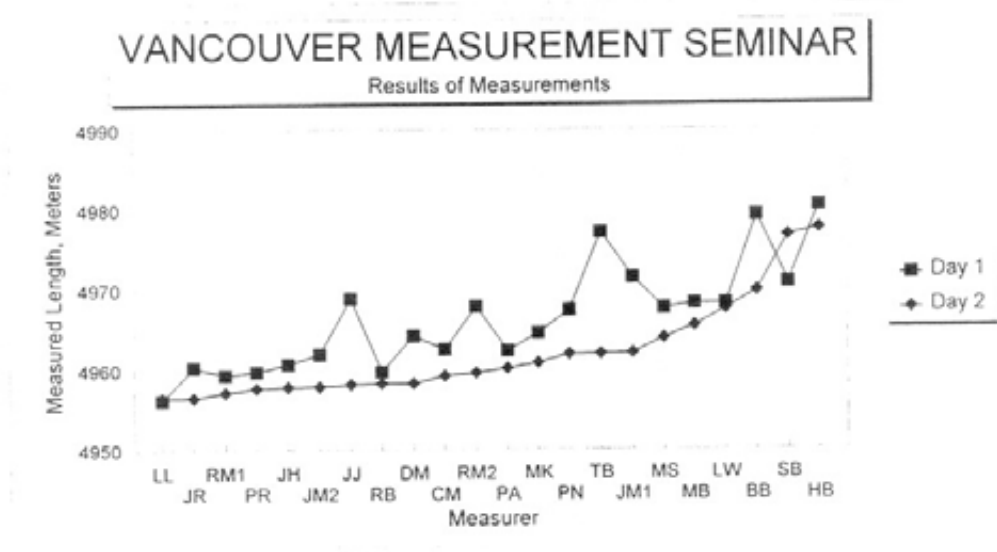
**Readers, Certifiers, and those who may be affected are asked for their input.**





## IT'S BETTER THE SECOND TIME AROUND

Below is a graph showing the improvements the measurers made from one day to the next, at the Vancouver measurement seminar.



## PROLIFIC MEASURERS

The following measurers have measured 25 or more courses:

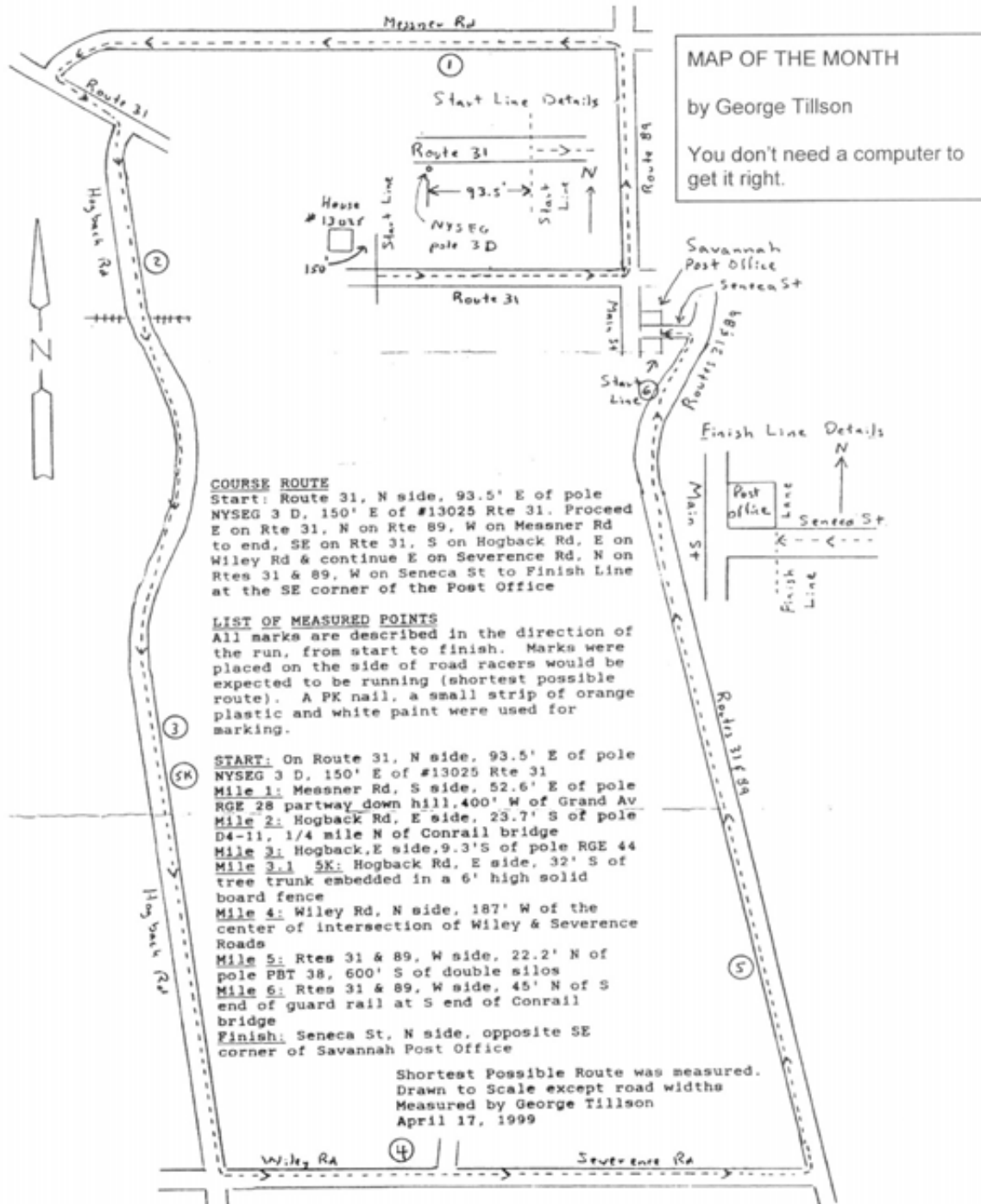
Lafarlette	610	Pierce	105	Poppers	54	Baldasari	32
Linnerud	537	Katz	101	Kuo	53	Mericle	32
Nicoll	510	Belleville	97	George	52	Meyer	32
Scardera	462	GuidoBros	95	Young	52	Kelley	31
Brannen	398	Cichocki	94	Grandits	49	Kelly	31
Thurston	371	LeBlanc	94	Noel	49	Platt	31
White	359	Marable	92	Duranti	48	Anderson	29
McBrayer	316	Melanson	88	Vaitones	48	Hykes	29
Courtney	293	Barrett	83	Morss	47	Renner	29
Hinde	291	Wickiser	82	Tucker	47	Rupe	29
Beach	247	Ferguson	80	Baumel	46	Vanderbrink	29
Hubbard	242	McDowell	80	McGuire	44	Higbee	28
Recker	240	Harrison	79	Brown	43	Scott	28
Riegel	238	Johnson	77	Chodnicki	43	Grosko	27
Knoedel	226	Christensn	73	Franke	43	Lindgren	27
Smith	208	Cornwell	73	DeHaye	42	McDowellJr	27
Witkowski	177	Polansky	73	Rhodes	41	Moore	27
Knight	171	Shields	73	Gerweck	40	Volmer	27
Nelson	166	Hansen	71	Kiser	40	Wilson	27
Sissala	158	Hronjak	71	Reik	40	Bartolini	26
Wight	157	Lewis	71	Morgan	39	Buckley	26
Newman	156	Teschek	71	Barnhill	38	Callanan	26
Wisser	152	Edwards	70	King	37	Eckelman	26
Hickey	142	Tilson	69	Chaney	36	Mitchell	26
Dewey	140	Loeffler	68	Joline	36	Murphy	26
Connolly	133	Richardson	67	Greisz	35	Walker	26
Berglund	129	Glauz	65	Spalding	35	Hesselbart	25
Ensz	127	Ashby	62	dePaulis	34	Oerth	25
Standish	124	Ungurean	60	Hess	34	Potter	25
Letson	122	Prytherch	58	Magera	34	Quinn	25
Lucas	120	Felix	56	Alred	33	Rines	25
Grass	106	Ward	55				

## CERTIFIER ABBREVIATIONS

The following abbreviations have been used by certifiers since 1982

ACL	A. C. LINNERUD	EL	ELIZABETH LONGTON (nee Main)	MW	MIKE WICKISER
AM	AMY MORSS	EM	ELIZABETH MAIN	PC	PAUL CHRISTENSEN
AP	AL PHILLIPS	ETM	TOM MCBRAYER	PH	PAUL HRONJAK
AS	ALLAN STEINFELD	FC	FELIX CICHOCKI	PR	PETE RIEGEL
BB	BOB BAUMEL	FH	FINN HANSEN	PT	PATRICIA THORNTON
BC	BILL CALLANAN	FW	FREDERIC WILSON	RE	BOB EDWARDS
BDC	BERNIE CONWAY (Canada)	GAN	GENE NEWMAN	RH	BOB HARRISON
BG	BILL GLAUZ	GD	GEORGE DELANEY	RL	BOB LETSON
BH	BASIL HONIKMAN	GLD	GORDON DUGAN	RN	RAY NELSON
BH	BEN HABLUTZEL (1 AK course)	GN	GREG NELSON	RR	RICK RECKER
BN	BILL NOEL	GT	GEORGE TUTHILL	RS	RON SCARDERA
BS	BRIAN SMITH	HJ	HUGH JONES (Great Britain)	RT	BOB THURSTON
BT	BOB TESCHEK	HWC	HAL CANFIELD	SH	SCOTT HUBBARD
BU	BEN BUCKNER	JD	JOHN DEHAYE	SV	STEVE VAITONES
CEG	CHARLES GEORGE	JL	JIM LEWIS	TB	TOM BENJAMIN
CJ	CARL JEANSONNE	JMC	JOHN MCGRATH	TC	TED CORBITT
CW	CARL WISSER	JS	JOHN SISSALA	TD	TOM DURANTI
DB	DAN BRANNEN	JW	JAY WIGHT	TF	TOM FERGUSON
DK	DAVID KATZ	KL	KEVIN LUCAS	TK	TOM KNIGHT
DL	DOUG LOEFFLER	KU	KARL UNGUREAN	WB	BILL BELLEVILLE
DLP	DON POTTER	KY	KEN YOUNG	WC	WOODY CORNWELL
DM	DALE MATTY	LB	LEE BARRETT	WG	BILL GRASS
DP	DAVE POPPERS	LE	LEN EVENS	WH	BILL HUGHES
DR	DAVID REIK	MF	MICHAEL FRANKE	WN	WAYNE NICOLL
DS	DON SHEPAN	MR	MIKE RENNER	WS	WADE STOCKMAN

CRUSOE CROC 10K  
SAVANNAH, NEW YORK



MAP OF THE MONTH  
by George Tillson  
You don't need a computer to get it right.

**COURSE ROUTE**

Start: Route 31, N side, 93.5' E of pole NYSEG 3 D, 150' E of #13025 Rte 31. Proceed E on Rte 31, N on Rte 89, W on Messner Rd to end, SE on Rte 31, S on Hogback Rd, E on Wiley Rd & continue E on Severance Rd, N on Rtes 31 & 89, W on Seneca St to Finish Line at the SE corner of the Post Office

**LIST OF MEASURED POINTS**

All marks are described in the direction of the run, from start to finish. Marks were placed on the side of road racers would be expected to be running (shortest possible route). A PK nail, a small strip of orange plastic and white paint were used for marking.

- START:** On Route 31, N side, 93.5' E of pole NYSEG 3 D, 150' E of #13025 Rte 31
- Mile 1:** Messner Rd, S side, 52.6' E of pole RGE 28 partway down hill, 400' W of Grand Av
- Mile 2:** Hogback Rd, E side, 23.7' S of pole D4-11, 1/4 mile N of Conrail bridge
- Mile 3:** Hogback, E side, 9.3' S of pole RGE 44
- Mile 3.1 5K:** Hogback Rd, E side, 32' S of tree trunk embedded in a 6' high solid board fence
- Mile 4:** Wiley Rd, N side, 187' W of the center of intersection of Wiley & Severance Roads
- Mile 5:** Rtes 31 & 89, W side, 22.2' N of pole PBT 38, 600' S of double silos
- Mile 6:** Rtes 31 & 89, W side, 45' N of S end of guard rail at S end of Conrail bridge
- Finish:** Seneca St, N side, opposite SE corner of Savannah Post Office

Shortest Possible Route was measured.  
Drawn to Scale except road widths  
Measured by George Tillson  
April 17, 1999

## PUZZLE OF THE MONTH

The day after a race I downloaded a set of results from the web page, because they used chip timing and I was curious to see what the raw data looked like before it was massaged by the finish line contractor into final form. I noticed what I thought were some inconsistencies. I called the contractor, and a few weeks later they sent the following summary. It agreed with what I had noticed from the raw data. No substantial change. I asked them about the inconsistency, and they stood by their data.

Start/Finish Statistics						
	Registration	Did Not Start	Start	Started DNF	Finish	
Age Group	4646	670	3976	99	3877	
Cly/Ath	255	30	225	4	221	
Relay	270	8	262	2	260	
Wheelchair	20	4	16	0	16	
Walkers	162	8	154	11	143	
<b>TOTAL</b>	<b>5353</b>	<b>720</b>	<b>4633</b>	<b>116</b>	<b>4517</b>	
<b>CHIP TRACKING</b>	<b>Start</b>	<b>10K</b>	<b>Half</b>	<b>30K</b>	<b>Finish</b>	
Age Group	3962	3950	3898	3842	3877	
Cly/Ath	225	225	223	217	221	
Relay	259	261	260	260	260	
Wheelchair	0	9	14	15	16	
Walkers	154	131	147	134	143	
<b>TOTAL</b>	<b>4600</b>	<b>4576</b>	<b>4542</b>	<b>4468</b>	<b>4517</b>	
<b>NOTES</b>						
1- 8 Chips are recorded at all locations but cannot be identified by individual. Wrong Chips were picked up at registration. -- Presumed to be Age Group						
2 - Walkers were not recorded in the group start - they were identified in a special early start chip file and identified as Walkers from that file. Only 92 Pre-Reg participants were noted as Walker, 154 crossed the early start mat. These participants were all re-categorized as Walker						
3 - Wheelchairs were started in front of the mats - speed of chairs or course line caused low capture of Chairs across mats						
4 - Mats at the 30K point were pulled off the course before the slowest of walkers/runners reached them -- finish reads by category are higher than 30K for this reason						
5 - Many walkers reached the 10K point before the mats were turned on for the start of the group start (1 Hour later than the Walkers)						

**The puzzle is - what's wrong here?**

## SOLUTION TO LAST MONTH'S PUZZLE



THE PUZZLE

After reading the recent MNForum discussions of using measuring wheels for off-road measurements, Roger Gibbons send the Editor this photo. Readers are invited to send an explanation of what this man is doing.

territory or Protectorate which might date it to a few decades or longer ago. The device .... probably not for measuring but a type of wheel-barrow to carry sufficient food and water for a long distance attempt .... perhaps a speed or distance record in progress. I'll await the truth with interest. All the best ..... Brian

### From Hugh Jones:

All insider knowledge apart, I'm convinced that the picture shows an even more primitive version of the blue line-painting equipment than we first used in London in 1985. That was a bit like a lawn mower, but relates to the picture like a normal bike does to a Penny-Farthing. As the wheel hub is obscured by the box construction it can't be a measurement device. My guess is that the paint is stored in there. Remember the old phrase of Cecil Rhodes about painting the map pink (the colour of Empire, like those roads in the Royal Parks these days)? This must be the bloke who marked out the edges of Empire. From the look of the picture this particular edge might be either the one separating Kenya from Somalia (Italian Somaliland of old) or else that between Botswana/Bechuanaland and Namibia/South West Africa.

### From Brian Smith:

Pete .... greetings ....the easy part is the location ... the typical thorn bush veld and a native woman with baggage on her head makes Africa most likely but anywhere from Kenya south. The man is a Brit or in a British

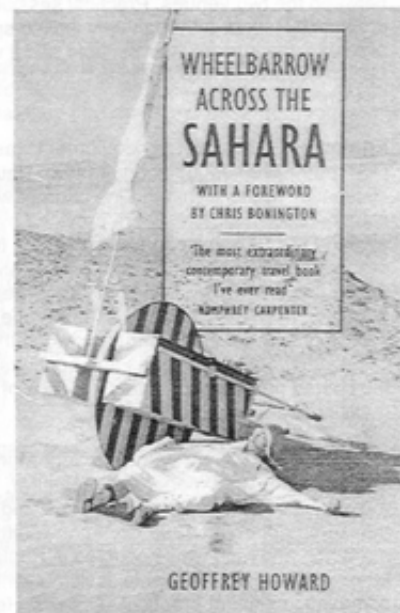
From the back cover of the book at right:

'ON THIS ROAD ALL MEN ARE FRIENDS; ONLY THE DESERT IS THE ENEMY'

On Christmas Eve 1974, Geoffrey Howard, a parish priest from Manchester, left Beni Abbes in Algeria. His destination was Kano in Nigeria. With only the clothes he stood in and a Chinese sailing wheelbarrow to carry his belongings, he aimed to be the first man to cross the Sahara on foot. He was unaided by vehicle or camel and used only natural supply and watering points.

That he achieved it at all is remarkable; that he crossed 2,000 miles of the harshest terrain in the world in only ninety-four days is miraculous. This honest, heart-warming work tells his story. You'll never read a travel book like it again.

Sorry, readers, the puzzle hasn't a thing to do with course measurement!



THE SOLUTION

The picture sent by Roger was taken from this book. Published by Grafton, 1992. First published in Great Britain by Alan Sutton Publishing Ltd, 1990.

## MEASUREMENT SEMINARS

This has been a busy season for seminars. Four recent ones follow:

**From Dave Cundy (exerpts from his report):**

### **IAAF ROAD COURSE MEASUREMENT SEMINAR Jakarta, Indonesia, 11-16 February 1999**

Summary - 19 participants from 15 countries

**Venue:** All attendees were provided with accommodation at the Kinasih Resort some 60 - 90 minutes outside of Jakarta. All theory sessions and some practical sessions were held at the resort. Other practical sessions were held several kilometres away on an almost traffic-free road near the Lido Hotel. Kinasih Resort was a suitable venue for the theory sessions with a dedicated seminar room with all necessary aids, including white board and butchers' paper.

The area set aside for practical sessions near the Lido Hotel had the advantage of being virtually traffic free but the disadvantage of being paved (rough in many places). A significant hill also limited the space for practical measuring with many participants unable to conquer the hill on bicycles with limited, if any, gears. It was necessary to take the bicycles by truck to this venue as the main road between Kinasih and Lido was very narrow with heavy traffic loads. It was unsafe for a large group to cycle between the two venues. Practical sessions were also held at Kinasih Resort. Although very limited space was available, the surface was suitable and it was traffic free. Most measurement techniques could be demonstrated in this limited area.

**Equipment:** All necessary equipment was provided. The IAAF purchased Jones counters from Paul Oerth for distribution at the seminar. One counter was provided per country. Eleven bicycles were provided by the RDC, allowing the 19 participants to break into two groups for practical sessions, with a spare bicycle always available for the course presenter. Two steel tapes were available - a 50m tape from the RDC and a 100m tape provided by the course presenter. Participants provided their own calculators, note pads, pens and pouches. The RDC and the course presenter provided supplies of chalk and masking tape.

**Results:** At least one participant (Mr Murugesu, of Malaysia) was an experienced measurer. He had attended a previous course in Jakarta and assisted in my measurement of the 1998 Commonwealth Games marathon and race walks courses in Kuala Lumpur. Mr Murugesu was an invaluable assistant who helped with communication and practical sessions. He has a good understanding of course measurement techniques which have now been reinforced by a second seminar. Following receipt of some measurement reports, Mr Murugesu will be considered for an upgrade to a Grade B measurer.

Some other participants had limited previous knowledge of

the calibrated bicycle method but, broadly, this was the group's first introduction to these methods.

My aim was for each participant to leave the seminar with a good general understanding of the techniques and a commitment to return to their home countries and practice their skills and spread the word about the calibrated bicycle method of measurement.

The seminar was conducted in English, leading to some language difficulties. However, an emphasis on practical sessions, and assistance from Mr Murugesu, ensured that all participants left the seminar with an acceptable basic understanding of the techniques.

No formal testing procedures were undertaken. Rather, each participant was required to 'write-up' a measurement report after each measurement exercise and I was able to provide continual assessment, correction and encouragement. As the seminar progressed, participants improved both their bicycle and mathematical skills. As a final exercise, participants worked in teams to draw maps of a 'race course' that we had laid out around Kinasih Resort.

I assessed that all participants had a basic knowledge of measurement techniques and, according to IAAF guidelines, each participant is now technically an IAAF Grade C measurer. If any of these new measurers continue to fine-tune their skills and submit adequate measurement reports, they will be future candidates for an upgrade to Grade B measurers.

**Selection of participants:** All participants at this seminar proved that they can learn the necessary techniques. But I am concerned (as is the case at all seminars that I have conducted) that a number of the participants already have busy schedules in other areas of athletics. This being the case, I noted a certain lack of future commitment from some participants.

Again, as with other seminars, I anticipate that a number of the participants will go on to practice and fine-tune their skills and eventually earn an upgrade to a B status while others will rarely measure again.

When selecting participants for a road course measurement seminar, I find people who meet the following criteria are generally the most successful:

- reasonably skilled on a bicycle with adequate fitness levels
- reasonably skilled in the use of a portable calculator
- committed to road running with the time and enthusiasm to become active measurers.

Dave Cundy - 27 April 1999

From Pete Riegel:

### AIMS/IAAF INTERNATIONAL MEASUREMENT SEMINAR

Vancouver, British Columbia, CANADA  
April 30 - May 1, 1999

#### Exerpts from the seminar report:

**Organization of the Seminar** - Last fall I was asked by Gordon Rogers, AIMS Technical Director, whether I would be willing to come to Vancouver to give a measurement seminar. I responded with an enthusiastic "yes." Gordon put me in touch with Jerry Tighe, head of Run Canada, who was responsible for the general organization of the seminar. Jerry advertised, and 21 participants registered for the seminar. Of these, three were from the USA, one from Mexico, and the rest were Canadians.



Vancouver Seminar participants

**The Venue** - The seminar was held in the Community Centre on Denman Street and on a 5 km loop on the eastern roadways of Vancouver's Stanley Park. Jerry supplied me with maps ahead of time so I could plan a test course. I had originally intended to use the bike path, but was talked out of it, as this path is always full of rollerbladers, bikers and dog-walkers who sometimes get resentful when measured.

**Preliminary Preparation** - Before the seminar, a general outline of the work, and a statement of requirements, was sent to Jerry. When I arrived everything was ready. Jerry had arranged with Alley Cat Bicycle Rentals for a fleet of mountain bikes to be made available for the seminar. Jerry mounted Jones/Oerth counters to most of the bikes so that everything would be ready when we were. Some attendees brought their own bikes.

**Conduct of the Seminar** - Participants assembled at the Community Centre on Denman Street, near Stanley Park. I was introduced, made some preliminary remarks, and passed out copies of *Course Measurement Procedures*, the US measurement book, *The Measurement of Road Race Courses*, the IAAF book, and *Measurement News*. I explained briefly what I was going to do, and we left for Alley Cat to pick up our bikes.

We rode to Stanley Park, and proceeding north of the bridge which crosses the stream from Beaver Lake I laid out a 300 meter calibration course. I then asked the group to split up into teams and check the length of what I had laid out. I also asked a team to lay out a parallel calibration course on the other side of the road, so we would have two calibration courses and could use one-way traffic on them while calibrating, a necessity with many riders and short time. Agreement of all measurements was good, and I decided that we would call both calibration courses "300 meters" for instructional purposes. Temperature correction was mentioned. The students were advised to study the book. Complete explanation is very time-consuming, and the time was better spent in practical measurement.

Once the calibration courses had been marked with a PK nail at each end, I asked the students to follow me on their bikes as I rode around the course. I asked them to note carefully the way I was riding - I was following the shortest possible route, from curb to curb. At the end of this ride we rode to the Community Centre for a good lunch.

After lunch we returned to Stanley Park, and we all calibrated our bikes. I laid out splits at 1, 2, 3, 4 and 5 km as well as a 1 mile split. The students followed me on this ride, each stopping at the same points where I had laid down a split. I told them not to do any calculation until they were done gathering data, as calculation slows things down. We had a lot of measuring to do, and little time. When all had completed the ride, we went to the Community Centre, where the measurers did their calculations.

I asked the measurers to try to read, or at least scan through, *Course Measurement Procedures*, so as to better understand what they had done and be better prepared for the next day.

Next day we met briefly at the Community Centre, where we discussed what we were going to do - individual measurements of the test course. The mood this day was much less nervous than on Friday. The measurers were much more sure of themselves, and the measurement results showed a great improvement. The spirit of competitiveness was present, and people appeared to be taking pleasure in the exercise. Once everybody had completed their measurement of the course we returned to the Community Centre for lunch.

After lunch I again asked everybody to record their data and give it to me, and to calculate their measured length of the course. Nearly everybody showed a significant improvement of the first day's measurement, indicating that they had a better understanding of how to follow the shortest possible route.

With that done, free-flowing discussions of various measurement topics followed. Considerable interest was expressed by some of the Canadian measurers in improving their course certification system. With such a large nucleus of measurers present, and the support of Run Canada, I expect they will find a way to improve things.

**Discussion of Results** - On return home, I used the counts obtained by each measurer to correctly calculate each distance, using a computer. Sometimes the computer value did not agree with the value that was calculated by the measurer. In these cases, the measurer (or I) made some sort of mistake. Some common mistakes were:

- Transposing numbers, or incorrect recording. I made this mistake myself in laying out the 5 km split. I correctly calculated a count of 106890 but wrote it down as 106890, and stopped at that count. That caused the general error in the 5 km split.
- Rounding off calibration figures prematurely
- Incorrect calculation of calibration figures
- Incorrect calculation of distances
- Loose riding - failure to follow the shortest possible route.

A small (about 9 meters) error in the placement of the 1 mile split happened because the split would have fallen in the middle of a tangent crossing the road, and I did not wish everybody to stop there. Accordingly, I stopped at the last available curbside position. I also did this at 4 km.

Most of the measurers had numbers in reasonable agreement with this. The rest of the measurers will improve with more practice. **In only one day we saw an enormous improvement - more riding practice will certainly improve each measurer's riding.**

I believe that all participants have now learned the most important part of course measurement - the riding of a tight, correct line. All the calculation in the world cannot correct a bad measurement. The participants are ready for more measurement work. And all are now officially proclaimed as IAAF/AIMS measurers, grade "C."

**Upgrading from "C" to "B"** - Each measurer was given a copy of the US measurement book *Course Measurement Procedures*. In this book are instructions and forms. Students are encouraged to submit measurements to me using these forms, as if applying for USATF certification of their courses. After a student has successfully applied for and been granted 4 or 5 USATF certificates, I will see that they are upgraded from "C" level to "B" level.

**Mike Renner gave a 3 hour seminar at the RRCA convention. Here's his report:**

Thanks for the opportunity of letting me give the course measurement workshop at the RRCA convention in Spokane on April 30. I know I had fun doing it; hopefully the 15 to 20 people who sat in on at least part of it had fun and learned something. We were scheduled at the same time as a few other things, so some people had to leave early. There was a good cross section of backgrounds--runners/cyclers who wanted to find out about measuring, some measurers, as well as a few certifiers from other states. Alan Jones was able to explain about the Jones Counter, and I found that quite enlightening

(How often do you get to talk to the inventor of something?)

Having other measurers and certifiers in attendance was very valuable from an information standpoint, and I am sure that the non-measurers there learned a lot more than they would have just listening to me talk. It was an illustrated, hands-on seminar/workshop; I brought along my trusty Peugeot bicycle loaded with all the measuring gear I normally need. Since we ended up with more audience participation than I had anticipated, we only had time to have one person actually measure our loop course (after we steel tape measured a short cal course in the alley behind the hotel.) However, his two measurements were 0.00077 apart, so we all felt successful.

If I ever do this again, I would hope to have just as much expert help from the audience, but at least half again as much time.

Sincerely,

Mike Renner

**Mike Sandford conducted an SEAA seminar in Abingdon, UK, May 29-30. He wrote beforehand:**

I have been exercised over the last week in preparing for a course measurement training seminar for 5 novices which will be held next weekend in Abingdon.

In my upcoming seminar I shall have a staff pupil ratio of 1:5. It will be a very intense learning period for those who have less background in the underlying principles. For example there will be 80 viewgraphs to go through. Each trainee measurer will have a hand out folder containing these and other material. (just as you did in Vancouver with your US course measurement procedures) But the trainees will also get the following minimum measuring experience. Day 1, two cal sets and two rides of a 2.1km course to establish riding on the SPR. Day 2 - two rides of the Abingdon 4.5k loop to layout a 5k course (with two cal sets). Plus, as a bonus for those who are rapid, a further ride of the loop and final calset to check a course adjusted to 3miles. I hope everyone will get the three loop rides. To ease the way I have prepared sample data recording forms marked up in yellow highlight with the key points they have to record data. This way they dont have to spend quite so much time trying to figure out that they have got a correct measurement plan, and I can be sure they will spend more time measuring than thinking. This will be an improvement on the 1997 Abingdon Seminar when the riders spent too long on this part of the activity and did not get around to the third ride of the 4.5k loop. The advantage I also have in holding it on the Abingdon 4.5k loop, is that I have an excellent record of results now from experienced measurers, so I can tell what range the novices should be trying to get to. At the end of the day I hope I shall be brave enough to be true to the theme I have developed here and not recommend for appointment as a SEAA grade 2 measurer anyone who fails to produce at least one ride which would survive validation.



## COURSE CERTIFICATION IN CANADA

Canada has had a course certification system for almost two decades. Their measurement book has the same title as ours, *Course Measurement Procedures*. The methods of measurement are the same, although the methods of calculation are not. Still, at the end of the day, both books yield the same course length.

Some Canadian measurers have been dissatisfied with the performance of their certification system, finding it to be unresponsive. Some have gone so far as to get their courses certified by USATF, since they can obtain USATF certification but not Canadian certification. This situation may be changing. The Vancouver seminar (read about it in this issue) brought me into contact with two people who may be on the way to improving things in Canada.

Laurent Lacroix of Winnipeg expressed an interest in making things better. He created an informal organization, *The Canadian Road Running Course Measurers Association*, and started a web page similar to our RRTC web page. While unofficial, it was a start.

Laurent's page soon came to the attention of Canadian officials, and Jerry Tighe, one of the organizers of the Vancouver seminar, was enthusiastic about creating a good certification system in Canada. Since Jerry is head of *Run Canada*, Canada's road running federation, he is in a position to do something about the situation. He and Laurent are working together, with the support of some of the Vancouver seminar students, and Bernie Conway, to create a Canadian course certification system that works.

They are not there yet, but progress is visible. Those online viewers can watch Canada grow at:

**<http://www.mbnet.mb.ca/~llacroix/crrcma.html>**

You will be greeted by: "Welcome to the Athletics Canada/Run Canada Committee Road Running Course Measurement Site." It's now official. Check it out and watch them grow.

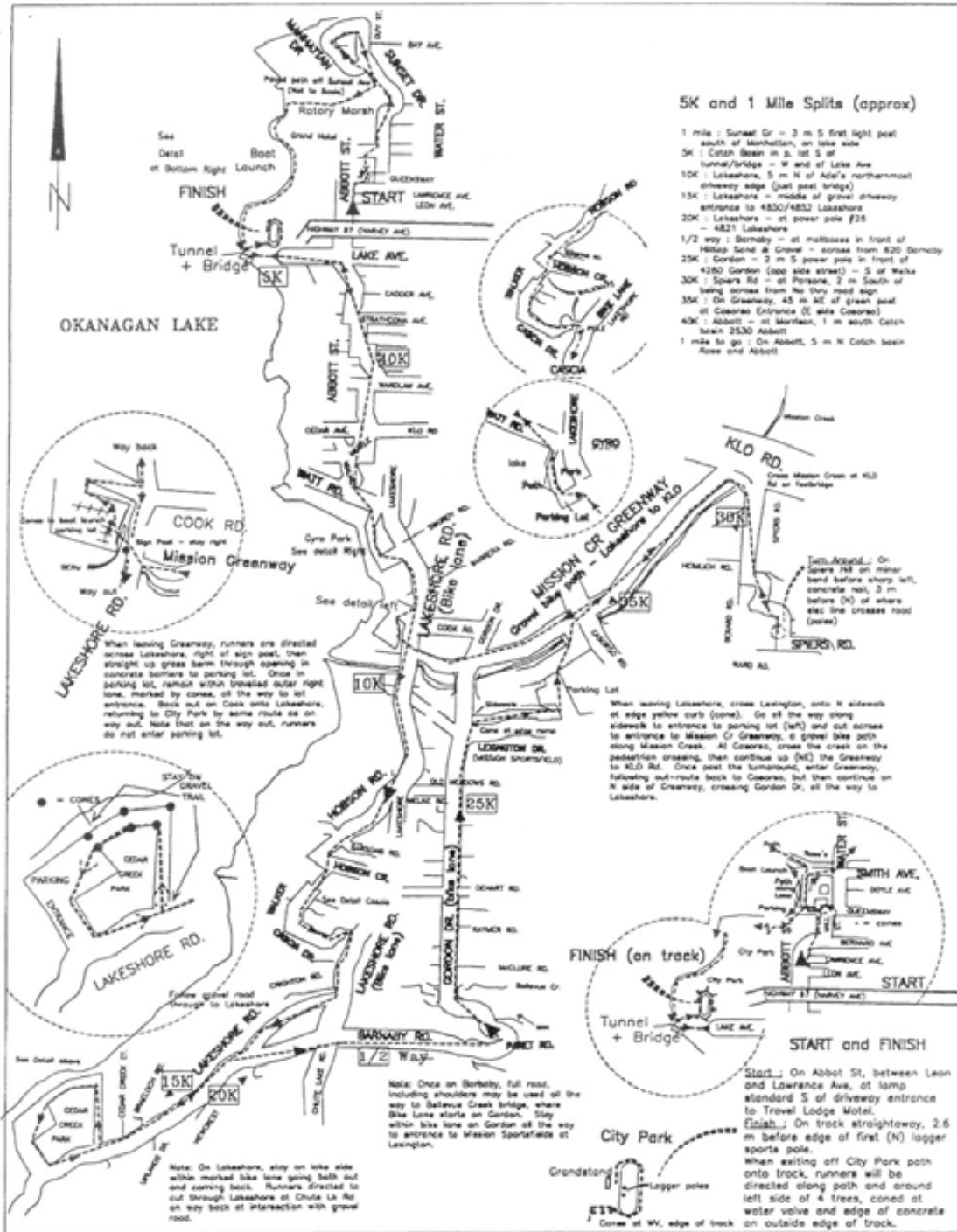
Also, look at the course list and see the six new Canadian courses measured by the Vancouver seminar participants.



Laurent Lacroix at the Vancouver seminar.

## A FINE MAP FROM A FIRST-TIME MEASURER

Catherine Mather of Kelowna, BC, Canada, a Vancouver seminar participant, produced this fine map. It was the first course she's measured.



## HOT SANDS MARATHON - KELOWNA, B.C.



Course Registrar Joan Riegel being honored by Columbus Mayor Greg Lashutka, on the occasion of her retirement as Race Director of the Columbus Marathon. Joan worked with the Marathon for 10 years, the last five as Director.



Allan Steinfeld and Hugh Jones at the 1999 Flora London Marathon.



Hugh Jones and John Disley making a reference mark at the entrance to the Tower of London. Bikes are not permitted within the Tower grounds, so the 400 m distance was later steel-taped.

## MISCELLANY

Pete,

I thought you would be interested in hearing about my motor cycle ride around the streets of Rotterdam.

If you recall there was some dispute last year when Tegla Loroupe set a new "world best" and as the official course measurer I was not present to authenticate the route. No such confusion this year as it was arranged for me to ride pillion on a high powered motor cycle. As you know from our discussions at London I had some reservations about welfare, but my fears were quickly dispelled.

Not being a particular authority on motor cycles all I can say was it was of a very high specification with a padded leather seat, and arm, back and foot rests for added comfort. My driver was an experienced traffic policeman who provided me with a made to measure crash hat, and a leather all in one suit which I declined to wear. Of more importance to me were his words of reassurance, I think he must have sensed my apprehension.

The race itself was quite spectacular, with thousands lining the route and warm spring sunshine added to the carnival atmosphere. We were travelling about 100m ahead of the field for the first 5k at which point a large group broke away, so we tucked in behind them. I had good communication with my driver throughout and asked him to reduce his speed at key points on the course. As I had only laid out the course three weeks earlier I was able to identify the chalk marks I had left on the road.

I found the whole experience very stimulating, it was a tremendously fast and competitive race, and there's no doubting they ran the route I measured. However, it did confirm my long held belief that the lead runners have difficulty adhering to the tight line.

Best Regards

Paul Hodgson

## **JONES/OERTH COUNTER OVERSPEED**

Paul Oerth reported a while back that one should not ride faster than about 10 miles per hour (16 km/hr), or else one will likely damage the Jones/Oerth counter. Some time ago I investigated this, and found a rather low limit, but the intervening years since dimmed my recollection. I just researched it again.

The Veeder-Root counter is presently manufactured by Danaher Controls. A Series 7458 counter has the following characteristics: Direct drive, five figures, adds ten counts for each drive shaft revolution, subtracts for opposite rotation. Count Speed: 500 rpm.

Taking a typical calibration constant of 10,000 counts per kilometer, a riding speed of 18.7 miles per hour (30 km/hr) will produce the count speed of 500 rpm of the counter.

I'm not sure whether "count speed" is the absolute top limit, but it seems to me to be the manufacturer's recommendation.

I have exceeded 18.7 mph on several occasions, mainly when coasting downhill, and have not yet broken a counter. But Paul Oerth has received counters back for repair that had their insides scrambled, he thought by overspeed.

I intend to try to limit my speed in future. If I fail, and my counter gets broken insides, I don't intend to blame Paul and expect him to fix it.

Pete Riegel

### **Comment from the inventor:**

I remember researching this when I first invented the Jones Counter and came up with a number similar to Pete's. However, engineering specifications are usually conservative so I doubt if anyone has scrambled a counter just by riding fast. I expect it was scrambled by over use -- that is, by someone using their bike for commuting to work every day with the Counter on it. Of course, now we'll probably hear from someone who can contradict my claim!

Alan Jones