

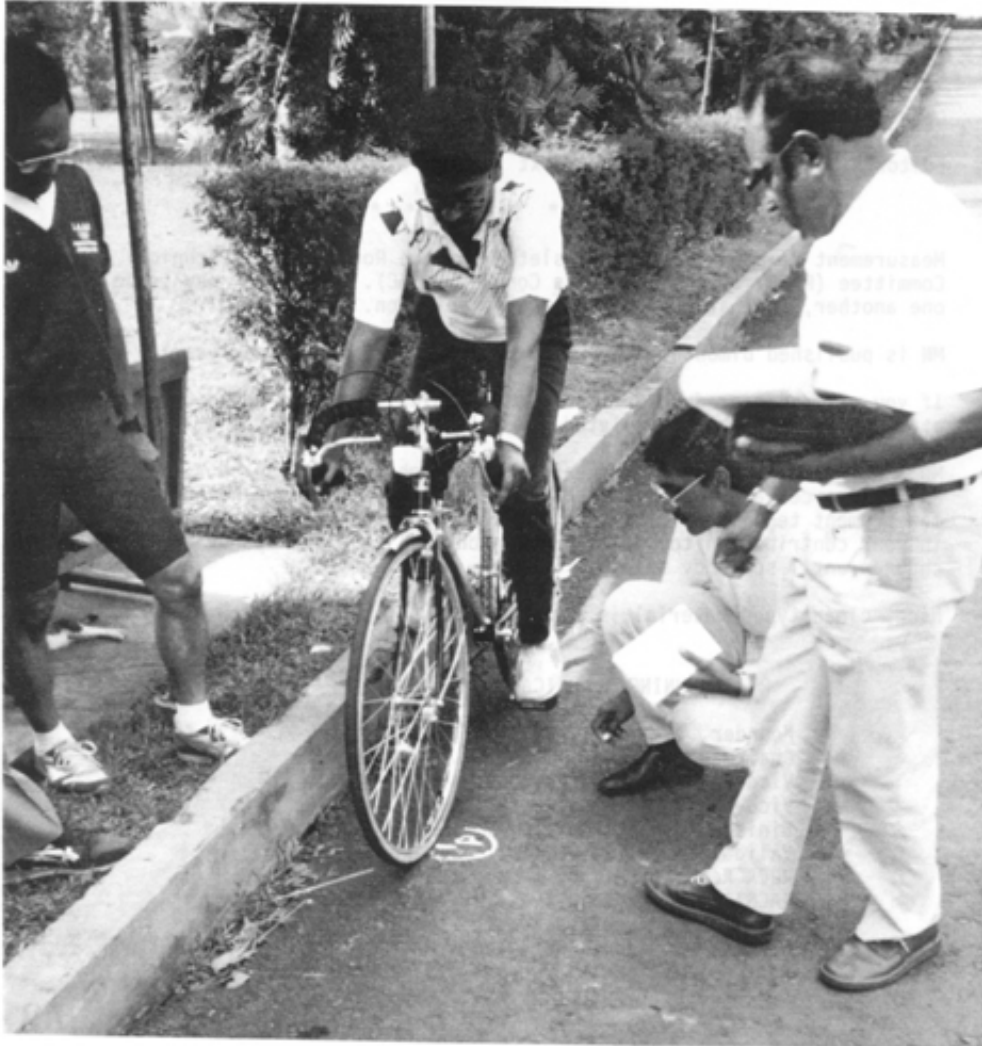
MEASUREMENT NEWS



January

1992

Issue #51



L. Podimhatia attended the IAAF measurement seminar held in Jakarta, Indonesia, in 1990. Here he prepares to resume measuring after his intermediate mark has been chalked on the road. In 1991 Podim helped to put on a similar seminar in his home country of Malaysia.

MEASUREMENT NEWS

#51 - January 1992

* * * * *

SALLY NICOLL RESIGNS

After 5 years of dedicated and efficient service to the sport, Sally Nicoll decided she needed time to get on with other parts of her life, and submitted her resignation as Validations Chairman. She recommended Mike Wickiser as her replacement, and he has now been appointed.

All of us who have worked with Sally know what a pleasant and capable person she is. She has a wonderful knack for making one want to help with any request she makes. This may be because all of us know she worked hard at a job that was not always easy. Hers will be a tough act to follow, and we'll miss her.

JONES/OERTH COUNTER UPDATE

They are available now.

I used my brand-new Jones/Oerth counter to measure a 25 km course in November. Aside from the lack of wires tying it together, it worked just like the familiar Jones counter. The JO counter has one significant difference from the Jones: you will obtain different constants than you are used to. The Jones counter has 20 teeth on the big gear and 10 on the small gear. The Jones/Oerth has 26 on the big and 11 on the small. Because the new gearing gives a better match between the sizes of the gear teeth, operation is much smoother than with the 20 ct/rev Jones counter.

The difference in gear ratio means that your Jones/Oerth constant will be 13/11 times your Jones count. For example, my solid wheel generally gets about 9260 cts/km with the Jones counter. With the JO I get $9260 \times (13/11) = 10943$ counts/km.

This is not a problem - it all comes out in the math - but it is something you should be aware of. It's not exactly a new thing - there were a few Jones counters produced with 26 teeth on the big gear and 10 on the small, and every so often we'll see data from one.

Counters are now available. 5 digit model is \$45, 6 digit model is \$55, US price. See Oerth's letter elsewhere in this issue. To order, write to:

Paul Oerth - 2455 Union St - Apt 412 - San Francisco, CA 94123

THE TAC CONVENTION - WHAT HAPPENED?

You will find the minutes of the RRTC meetings elsewhere in this issue. Most of the things of greatest interest to RRTC happened outside our meetings.

Three weeks before the Convention I was informed that the TAC restructuring would make RRTC a subcommittee of Records, and was asked for an opinion on it. After consulting with several people, I wrote that none of the RRTC people

avored such a thing. We preferred our separate identity. Supported by Master's LDR and the Records Committee (whose Chairman, Basil Honikman, did not favor the RRTC subcommitteeship either) our position held.

We have had one change. We are no longer a committee. The TAC restructuring was intended to reduce the number of committees. The Law & Legislation Committee, who was doing the restructuring, wanted to call us a "board." However, we asked if they could make us something that started with a "c" so we could retain our RRTC identity. "How about 'council?'" said Bob Hersh. And so it happened. We are to be Road Running Technical Council in the future. Otherwise our operations remain the same.

The Tampa Compromise held, and the Rule 185.5 controversy was amicably settled. Drop and separation limits remain at 1 m/km, 30 percent. Flat courses with large separation may gauge wind, but the benefit of the doubt goes to the race. I will not attempt to present a text of the final rule, since it will certainly change a bit on its final lap to the rule book. Keep an eye on TacTimes for the definitive version.

MEASUREMENT VIDEO

Those attending RRTC's second meeting got to see a 15 minute video showing some of the principles of bicycle measurement. The video is the work of Tom and Mary Anne McBrayer. It was presented in unfinished state since the McBrayers wished to get all the commentary they could before finishing the video. It's intended to be used as a companion to the measurement book, not as a stand-alone how-to-measure video. As such it does a very nice job. It shows Tom calibrating, riding diagonals, shooting straight through the esses along the SPR, and is narrated throughout with Tom telling what he's doing as he rides, as scripted by Mary Anne. Very nice piece of work. Watch MN for availability of the video.

RACE TO THE MILLENIUM - PUZZLE WINNERS

The first answer to the puzzle was submitted by Stu Riegel, who sent in a clipping from the Columbus Dispatch. Joel Aschenbach discussed the subject of the date of Christ's birth in his column ("Mister Know-it-All"). The next submissions were received from John Disley and Bob Baumel.

Thanks to Brian Smith for this month's puzzle, which should help those about to paint a house.

RRTC MEETING - TAC NATIONAL CONVENTION - NEW ORLEANS, LA - DEC. 4, 1991

The meeting was called to order by Chairman Pete Riegel at 8:30 pm.

Attending: Bob Baumel, Andy Beach, John Boyle, Selena Brown, Bill Grass, Norm Green, Philip Greenwald, Finn Hansen, Bob Harrison, Basil Honikman, Linda Honikman, Jim Knoedel, Justin Kuo, Bob Langenbach, Carole Langenbach, Robert Leathers, A. C. Linnerud, Mary Anne McBrayer, Tom McBrayer, Jack Moran, Sally Nicoll, Wayne Nicoll, Rick Pasciarella, Thomas Plummer, Marty Post, Rick Recker, Joan Riegel, Pete Riegel, Chuck Shirk, Barb Simon, Mike Wickiser

After welcoming remarks and introductions, Pete called for reports from the Executive Committee:

Course Registrar, Joan Riegel: Approximately 1200 new courses have been added to the course list so far for 1991, bringing the total certified courses to slightly over 9,000. A graph was distributed to the attendees, showing the increase in yearly course additions -- from 20 in 1982 to 1102 in 1991.

Vice Chairman West, Bob Baumel: Volunteers have remained stable, with states maintaining the same certifiers. Karl Ungurean was named Nebraska final signatory. Most of Bob's time was taken up last year with the 185.5 Tampa Compromise. A paper titled "RRTC Estimates of Slope and Wind Aid" was distributed to those present, with the suggestion to refer to Measurement News for additional research. Bob offered his computer program to help calculate measurement data. There is no charge --just send him a floppy disk.

Vice Chairman East, Wayne Nicoll: Wayne reported on the successful pre-validation measurement of the Men's Olympic Marathon Trials course in Columbus, Ohio, on October 5. Also participating were Mike Wickiser, Bill Grass, Karl Ungurean, Bernie Conway (Canadian T&F) -- with Pete Riegel and Columbus Marathon race director Doug Thurston serving as guides. Overall, measurement has stayed brisk, in spite of loss of sponsorship in these hard times. Wayne has just published a paper, "Considerations in Race Walk Course Design."

Validations, Sally Nicoll: Sally reported on the women's team measurement of the Houston Tenneco Marathon for the Women's 1992 Olympic Trials. As leader of the team, Sally invited RRTC certifiers Amy Morss and Elizabeth Longton along with Betsy Hughes, and Carole Langenbach. The team was led by Mary Anne and Tom McBrayer, course measurers, and Pete League, founder of the race. Carol McLatchie, RRTC athlete advisor, also rode the course. Sally distributed her list of 36 official validations performed this year -- the largest number of any year so far, with the largest number of athletes recognized.

Pete thanked Sally Nicoll for all her efforts as Validations Chairman during the past five years, as he read her letter of resignation. After receiving thanks and recognition from the entire committee, Sally's resignation was accepted with regret.

Pete then brought up the proposal by the Law & Legislation Committee to reorganize RRTC into a subcommittee of Records. Basil Honikman cited the efforts of Masters LDR, as well as Records and RRTC, with the outcome of a new L&L proposal that we remain independent and be called the Road Running Technical COUNCIL, thus maintaining the "RRTC" acronym.

The efforts of the Tampa Compromise Committee regarding 185.5 were mentioned. Since there were no new data to discuss and RRTC was in agreement, we could only await the outcome of the voting in the Men's and Women's LDR committees. Masters LDR had met during an earlier session and voted to support the RRTC decision.

In the interest of managing an increasingly unwieldy course list, Pete asked for suggestions for identifying old courses that are no longer active. An expiration date on courses was suggested. Pros and cons followed, with no immediate conclusion.

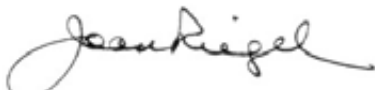
New Jones Counter: As the NYRRC supply of Jones Counters diminishes, Paul Oerth has gone into production of a modified version, and our supply of the course measurer's basic tool is once again assured. A mockup of the new counter was presented for all to evaluate. It uses the same basic design, with a gear made in Columbus, Ohio, and mounted without wires.

AC Linnerud reported an Associations newsletter proposal to attach a fee to all certifications. We were concerned that some associations might not be timely in processing the certificates, since all work must be received by the certifier before race day to qualify for validation of a record. If measurement corrections were required, delays in the process could be a problem. No definite proposals have been made; no further discussion followed.

Finn Hansen was thanked for his efforts in mapping out this year's Measurement Contest. The site is the famous Jackson Square park. Finn recounted his plan to actually have the course a little longer, but a rainstorm interrupted the original measurement and he and Mrs. Hansen decided it was long enough!

AC Linnerud has been gathering data from 35 measurements of a certified course. His goal is 100 measurements. Range of temperature: 73 degrees to 25 degrees F. Range of numbers in cal course: 15991 to 16194. Range of measurement: 10,009.6 to 9994.8. AC uses a 26" mountain bike, with smaller tire in front. He uses the same 300 m cal course for all rides. Variations are caused by high pressure to low pressure tire inflation and temperature differences. Longest course = low pressure and low temperature. More data will follow, with a complete writeup in MN.

The meeting was adjourned at 11 pm.



Acting Secretary

RRTC Meeting - TAC National Convention - New Orleans, LA - Dec. 5, 1991

Chairman Pete Riegel called the meeting to order at 8 pm.

Attendees: Bob Baumel, Marcia Baumel, Andy Beach, Norm Brand, Charles DesJardins, Bill Grass, Norman Green, Frank Greenberg, Finn Hansen, Basil Honikman, Linda Honikman, Bob Langenbach, Carole Langenbach, A.C. Linnerud, Mary Anne McBrayer, Sally Nicoll, Wayne Nicoll, Joan Riegel, Pete Riegel, Barb Simon, Doug Thurston, Mike Wickiser

For the first order of business, Mike Wickiser was appointed Validations Chairman. A smooth transition of files will be arranged between Mike and outgoing validations chair, Sally Nicoll.

Mary Anne McBrayer introduced the video, How To Measure Race Courses that she and Tom have produced. We were all enthralled by the precision of their script, Tom's straightforward presentation, and the excellent camera work provided by a friend from their local access channel. A few very minor changes were suggested, and Mary Anne promised to have the video ready for distribution shortly. It will be a valuable aid in teaching measurement, especially since the principle of the SPR is clearly presented. We were sorry Tom had to miss tonight's presentation, due to a sudden bout of the flu.

Linda and Basil Honikman requested the floor, and in a surprise move, presented Sally Nicoll with a gold travel clock, so she would be sure to have a good TIME wherever she might go. Sally was thanked for working so closely with TACSTATS for the benefit of the sport -- as well as being such a good friend. For Mike Wickiser, the Honikmans provided a supply of his basic tools -- pencils with BIG erasers. RRTC and TACSTATS have a close working relationship, and Mike was off to a good start with smiles all around.

Wayne Nicoll opened discussion of certification of splits. Documenting splits is not the same as certifying splits. For certification, drop and separation must be noted. It was concluded that splits must only be certified when the race director requests it.

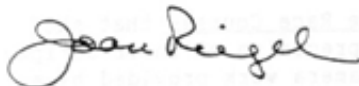
Wayne and Dan Brannen discussed the best system to use to determine distance in a time race. Wayne suggested dropping a popsicle stick with some added weight and rounding down to the nearest meter or measuring to the last footstep before the gun was fired. Baggies marked with a race number and weighted with sand have been used successfully in race walks. Dan recommends giving runners the option of stopping at the lap. No credit is given for partial laps. One could use a Polaroid camera at the instant of the gun and measure the distance with a wheel. The rule book does not require using a steel tape. Also noted was the system of adding shims to board tracks if they are found short. This will add a bit of length where required.

What would be the effect of simplifying the laying out of a 1000 ft cal course? Pete remarked that it's really easy to do, but some people hire a surveyor. Should we leave the co-efficient of expansion out of the formula? Bill Grass told of a race walk committee that relied on the city engineers to lay out the cal course. If the reviewer is satisfied that it was done properly, all is well. We must educate the race directors regarding standards. Bob Baumel remarked that cal courses must be accurate, because a 10k course will be offset

30 times. All agreed that a calibration certificate is automatically expired if the road markings are obliterated.

Finn Hansen was called upon to give the results of the measurement contest. Justin Kuo, measurer from Connecticut, took first place with an answer of 356.41026 meters to the taped measurement of 356.15m. Bob Boal's answer of 355.46218m took second, and Mike Wickiser placed third with 356.925m. Finn provided awards of local character -- large, medium, and small bottles of Tabasco, along with picture books of New Orleans landmarks. Norm Brand filed a formal protest, as he was not able to calculate by his patented "eye in the sky" method, since there were no high buildings nearby. This comment was duly noted, and we promised to provide a more suitable course next year in Louisville. Details of the course layout and data from all the entrants will appear in the next issue of MN.

On that note, Pete thanked Finn for providing us with much needed lighthearted diversion -- and adjourned the meeting at 10:30pm.



Acting Secretary

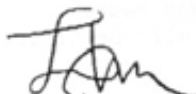
"THE RACE TO THE MILLENNIUM" (JOHN DISLEY)

NOTE:

My answers are based on having access to knowledge gleaned by my daughter Emma (PhD in the history of the Church in the Middle Ages) and her husband Brian (the Revd Canon Hebblethwaite, MA BD, Fellow, Dean of Queens' College, Cambridge and Director in Theology and Religious Studies)

1. The true date of Christ's birthday is entirely unknown. The 25th of December is purely conventional and probably owes its selection to the date of the much older pagan festival to celebrate the date of the midwinter solstice. Taking over the date of an earlier festival was endemic in the early years of Christendom.
2. The year of Christ's birth is highly controversial - some scholars have suggested 4BC but there is no clear evidence.
3. The dates BC and AD are therefore just an ancient convention. There was certainly no year "0", so historians move straight from 1 BC to 1 AD.
4. This means that strictly speaking the third millennium will begin on January 1st 2001. But it is doubtful if any one will wait that long.
5. Convention will have it that Christ was born on 25 December 1 AD, and that the proper date to celebrate will be January 1st 2000. Or December 25th 1999. Just take your pick - there is no historically correct date known.

No help at all to Race Director's!



Race to the Millennium — Solution to November Puzzle

by Bob Baumel

Now that the excitement of the TAC Convention is dying down (with both rule 185.5 and our own "Road Running Technical Council" in reasonably good shape for another year), I can finally relax and turn my attention to more pleasant matters such as the puzzle in *Measurement News*. There is, of course, the possibility that I will generate still more controversy by offending deeply religious readers. But, in any case, here is my answer:

1) When was Christ's birthday, as reckoned by today's calendar?

The answer is **(e) something else**. According to modern Biblical scholars, Jesus was probably born some time between 17 BC and 4 BC. My reference is *Asimov's Guide to the Bible*, Avenel Books, 1981. The upper bound of 4 BC is particularly strong because the gospel of Matthew places Jesus' birth "in the days of Herod the king." And modern historians are quite certain that this particular "Herod" died in 4 BC. Thus, if Jesus was born during Herod's reign, it was clearly *no later* than 4 BC.

The actual numbering of years in our current calendar is based on a calculation of the year of Jesus' birth by one Dionysius Exiguus, a scholarly theologian and astronomer who lived in Rome some five hundred years after the time of Jesus. However, Dionysius didn't have access to all the materials studied by later historians, so it's not surprising that he miscalculated.

Given that we don't know the exact year of Jesus' birth, can we still perhaps say something about what *time of year* it was (for example, summer or winter)? The answer is NO. There is absolutely nothing in the Bible (or any other writings dating anywhere near the time of Jesus) to provide any evidence on this question.

We do know that the celebration of Christmas on December 25 began during the fourth century AD, when the pagan "Saturnalia," or winter solstice festival, was turned into a Christian holiday (celebrating the birth of the Son instead of the Sun!). December 25 was originally the date of the winter solstice in the Julian calendar. In our present Gregorian calendar, the winter solstice (northern hemisphere) is at about December 21. Thus, it might be more accurate to celebrate Christmas on Dec 21. But this would just be a slightly more accurate reconstruction of the pagan Saturnalia. Remember that there's no evidence whatever as to what time of year Jesus was born.

2) At what date and time does the millennium occur?

Given the huge uncertainty as to when Jesus was born, the only way to unambiguously define the term "millennium" is by the year numbers in our present legal calendar. The key factor is that **there was never a year zero**. (The year 1 AD was preceded by 1 BC.) Thus, the first millennium extended from 1 AD to 1000 AD. The 2nd millennium from 1001 AD to 2000 AD. And the 3rd millennium will begin on Jan 1, 2001 (*not* in the year 2000).

Thus, the "race to the millennium" should span the gap from Dec 31, 2000 to Jan 1, 2001. Regarding the exact time of day, it's probably acceptable to hold these races at midnight local time. But if it is desired to hold all the races simultaneously around the world, they should be at midnight Coordinated Universal Time (what was previously known as "Greenwich Mean Time").

December 22, 1991

Peter S. Riegel
3354 Kirkham Road
Columbus, OH 43221

Dear Pete,

Much to my chagrin I found this letter to you unsent in my briefcase. It was dated 12-13-91.

Orders are coming in for the new JONES/OERTH COUNTER; and we are ready to start filling them. It looks like our prediction of being ready by January 1st was very accurate. Stephen is assembling all the units we have on hand right now: 100 six digit counters and 25 five digit counters. I'm placing a new order tomorrow for an additional 100 five digit counters. Steve is going to assemble everything in San Diego and send the finished products to me to send out from here. Its wonderful having your son for a partner.

The cost of the counters will be as follows:

FIVE DIGIT COUNTERS	\$45.00
SIX DIGIT COUNTERS	\$55,00

There will be no handling charge, and if I send them by first class mail there will be no mailing charge. If second day air is requested there will be a charge of \$7.50 which is actual cost.

Checks or money orders (sorry, no plastic) should be made out to:

PAUL OERTH

2455 Union St #412
San Francisco, CA 94123
(415) 346-4165

I will have to determine foreign mailing costs and method of payment. I will do so and have that information as soon as possible.

I will contact Allen Steinfeld again to see if I can work out an arrangement with the New York Road Runner's Club.

Thank you for all your help and encouragement.

Best Regards,


Paul

1991 TAC CONVENTION MEASUREMENT CONTEST

RRTC has no member near New Orleans. Seeing this, and knowing he was to be there on business earlier in the year, Finn Hansen did the necessary measuring and arranged for the contest. Using a fiberglass tape, he and his wife established the 1991 official contest distance as exactly 356.15 meters.

	Contestant	Estimated Meters	Meters Error	Percent Error	
1	Justin Kuo	356.41	0.26	0.07	
2	Bob Boal	355.46	-0.69	-0.19	
3	Mike Wickiser	356.93	0.78	0.22	
4	Mary Anne McBrayer	358.33	2.18	0.61	
5	Carol Kuo	358.70	2.55	0.72	
6	Bill Grass	353.19	-2.96	-0.83	
7	Bob Langenbach	352.84	-3.31	-0.93	
8	Barb Simon	352.21	-3.94	-1.11	
9	Pete Riegel	351.70	-4.45	-1.25	
10	George Vernosky	350.84	-5.31	-1.49	
11	Dave Gwyn	362.77	6.62	1.86	
12	Joan Riegel	364.28	8.13	2.28	
13	Wayne Nicoll	347.06	-9.09	-2.55	
14	Bob Baumel	365.50	9.35	2.63	
15	Tom McBrayer	367.09	10.94	3.07	
16	Marcia Baumel	371.70	15.55	4.37	
17	Andy Beach	337.05	-19.10	-5.36	
18	Norm Brand	390.19	34.04	9.56	*
19	Frances Childs	393.40	37.25	10.46	
20	David Troy	421.60	65.45	18.38	
21	Bill Keesling	435.55	79.40	22.29	
22	Basil Honikman	249.69	-106.46	-29.89	* *

* Norm performed as "Eye Close to the Ground" this year, in the absence of a tall building overlooking Jackson Square. It was suggested that the "Eye in the Sky" could have played Quasimodo on the adjoining cathedral, but he unwisely rejected this suggestion. Too bad. His roommate, Bob Boal, had two estimates of about 200 m and 400 m, which, when averaged by an unexplained technique, produced the second-place finish. Eyewitness accounts had Boal all over the park. Boal and Brand averaged their ages for a bet, so Norm not only had the indignity of having to hand-deliver Bob's prize, but pay him \$0.70 as well. Next time he'll climb the cathedral.

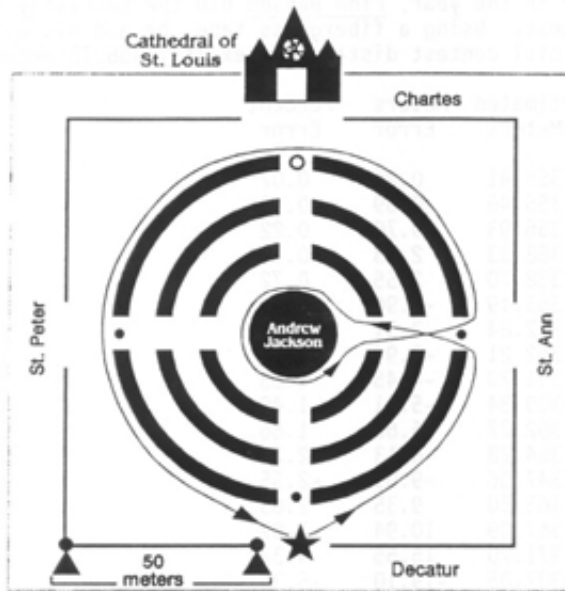
* * Basil's pen slipped. He actually measured 349.69 (good for 11th place), but his entry was read aloud before he noticed the slip. A protest was lodged, and is under consideration by the Appeals Committee.

It was rumored that the Chairman and the two Vice Chairs were mortified by their middle-of-the-pack finishes, and that they later plotted together to discard results by anyone with better measurements than theirs. This is absolutely unfounded and untrue.

Winner Justin Kuo has measured a score of Connecticut courses for certification, and showed he's got the right stuff on Jackson Square. Congratulations, Justin.

5th Annual RRTC Measurement Contest

New Orleans, Louisiana




 - Jackson Square -
 New Orleans

- ★ Start / finish
- Planter
- Fountain
- ▲ Post

The course to be measured is in Jackson Square in the historic French Quarter near the French Market. This is just a short walk from the Sheraton Hotel.

THE RULES: This is a measurement to be made **without** the use of any mechanical device. The measurement can be made by using the calibration course and walking the course. Or you may choose to guesstimate, estimate, or use any other means, i.e. "eye in the sky". The object is to have fun while we work on our measurement skills.

CALIBRATION COURSE: The calibration course is located on the sidewalk on Decatur outside the square. It is 50 meters long. It is **NOT** marked in any way. It is from the outside edge of the corner post of the Square at St. Peter & Decatur to the post at the entrance to the Square from Decatur (far side to far side of each post).

THE COURSE: From the seam in the pavement at the threshold at the entrance to Jackson Square follow the path outline in the above illustration. The finish is the same as the starting point. The measurement is to be along the **shortest possible route (SPR)** not as my unsteady hand has drawn it.

SUGGESTION: Due to the high tourist traffic in this area it is suggested that you try to do your measurement in the morning hours (before 10 AM). When there are a lot of people in the area it will be next to impossible to cover the calibration course unimpeded. After your measurement go across the street to the Cafe Du Monde and enjoy some beignets.

WINNERS: The top 3 winners will be announced and awarded prizes at the Road Running Technical Committee Meeting, Thursday, Dec 5, 8 PM in St. Charles B.

ENTRIES MUST BE SUBMITTED BY 4:00 PM, THURSDAY, DEC. 5, 1991 Deposit in box at Convention Information Desk.

NAME: _____

MEASUREMENT (IN METERS): _____

(carry out to as many decimal places as to be accurate.)

PERCENT ERROR RECORDED AT PAST MEASUREMENT CONTESTS

	1987	1988	1989	1990	1991
Bob Baumel	0.07		-3.03	-0.91	2.63
Marcia Baumel	0.02				4.37
Andy Beach					-5.36
Bob Boal				27.76	-0.19
Haig Bohegian				6.72	
Norm Brand	41.61	8.07	0.80	-0.90	9.56
Dan Brannen		-0.21			
Margaret Brooke	-6.52				
Nick Brooke	-6.61				
Jim Brown			0.36		
Frances Childs					10.46
Felix Cichocki	2.14	0.76	6.51	0.99	
Robert DeCelle				187.61	
John Dunaway			4.58		
Miriam Gomez		-3.86			
Bill Grass					-0.83
Dave Gwyn	-3.33		4.91	0.65	1.86
Ben Hablutzel	-3.05				
Finn Hansen	3.31	4.16	-1.02	4.28	
Basil Honikman			5.67	-1.22	-29.89
Bard Horton				-0.47	
Jim Jacobs				28.14	
Alan Jones			0.01	1.27	
Clain Jones				0.09	
Bill Keesling					22.29
Tom Knight	1.50				
Carol Kuo					0.72
Justin Kuo			17.14	-1.61	0.07
Bob Langenbach	-0.66		3.50		-0.93
Tom Mayda				-0.21	
Mary Anne McBrayer	-2.91	0.14	4.06	-1.69	0.61
Tom McBrayer	-3.66	-2.38	-1.48	-0.90	3.07
Wayne Nicoll	-1.11		-10.34	0.54	-2.55
Ron Pate				-7.62	
Rick Recker	-0.79	-2.22	-0.17	-1.96	
Joan Riegel		1.74	-3.35	-1.40	2.28
Pete Riegel	-1.00	0.95	0.08	-0.52	-1.25
Larry Schloss			2.07		
Barb Simon					-1.11
Jim Smith	0.86				
Stephen Tabb	0.62				
Bob Thurston		0.84			
Peter Torres Jr				33.21	
David Troy					18.38
George Vernosky				27.30	-1.49
Karen Wickiser				-1.53	
Mike Wickjser				2.49	0.22
Median	-0.72	0.76	0.58	-0.06	0.42
Average	1.14	0.73	1.68	11.54	1.50
Standard Deviation	10.16	3.13	5.41	36.84	9.45

Note how close the median comes to the correct value. The average is greatly affected by the "wild" estimates, while the median is not.

11. 4. 91

Pete:

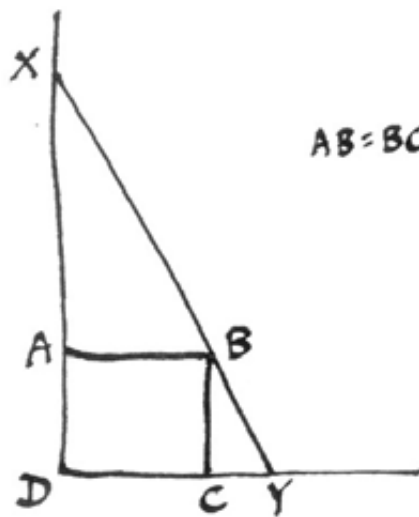
I'm saving your cigar for after the Kiawah marathon. Thanks — but no more — I can't afford another addiction.

Here's a puzzle you may use:

A house on flat level land has a 5' x 5' air conditioner, ABCD, against one wall.

A painter places his 20' ladder XY against this wall so that it just touches the air conditioner at B.

How high is the top of the ladder? i.e. find XD



$$\begin{aligned} AB = BC = CD = DA &= 5 \\ XY &= 20 \end{aligned}$$

Have fun

Brian

SOUTH CAROLINA

THIS
MONTH'S
PUZZLE

Nov 27, 1991

Sally Nicoll
Ragged Mountain Club
Potter Place, NH 03265
(603)735-5721

Dear Sally,

Thank you for the opportunity to Validate the Los Angeles Marathon last weekend. I felt honored to be involved in such a prestigious event. Plus some great measurers were involved in the original measurement - Ron Scardera and Bob Hickey, along with one of my motivating teachers, Bob Letson.

During the planning stages I became quite concerned over my personal safety during the measurement ride. I knew enough about Los Angeles that there were some areas along the course that I would not take my wife for an evening stroll. And these concerns were substantiated by those that I talked with from the area. I may have mentioned that I was a Phoenix Police Officer for 6 years, and in a conversation with retired L.A. Police Officer Bob Hickey, he asked if I "had a Vest". After a short pause, I asked if he was referring to a bullet-proof vest or florescent vest. We had some laughs over that.

The plan was to arrive at the L.A. Airport at 12:20 PM on Saturday 11/23, and meet Ron Scardera for a course preview at 1:30 at the Hotel just yards from the Start Line. Except that the major UCLA / USC hometown rivalry game with a 100,000 sold out Coliseum was at 3:00, across the street. We were able to confirm the exact Start and Finish, in spite of the distractions of the tanned blondes going to the game on an outstanding 75 degree sunny day.

Driving the course with Ron was beneficial. Although the map was certainly accurate and clear, it sure helps when an experienced person points out things that are valuable in planning the ride i.e. you'll need to move to the left side of the road at the crest of that hill and you won't be able to see approaching cars, etc. After the course tour, Ron and I laid out a 300 meter calibration course in front of Hotel on Figueroa, just seconds into the start of the Marathon run. Ron was very cordial, helpful, and an all-around good guy. Thanks Ron.

I met Joe Blackstone, with Marathon Operations, briefly that afternoon on his way to the Big Game, and he left me a 10-speed at the Hotel. We planned to meet again at 4:00 AM to begin the Validation ride. After Calibration, we began at the Finish Line at the curb at the center of the main entrance to the Coliseum. An awesome sight.

The Validation Measurement Ride went very smoothly. Although Joe was very new on the Marathon staff, he was very familiar with the city streets and Marathon course. I brought along "Walkie Talkies" that were a major asset. I took Jones

Counter readings at every 3 or 4 mile mark for a reference - I would call them in to Joe for writing down in his support car. Also Joe could drive ahead when it appeared we may need to move from one curb to the opposite curb over the crest of a hill, to check on the traffic situation and communicate happenings immediately. We did not have a Police escort and this did not prove to be a handicap. Joe's assistance was invaluable, and he also made it fun.

The full width of the street was available to runners over the total length of the course. During my validation, if we needed to move from one side of the street to the opposite side, I would ride the diagonal if the distance was only a couple of blocks. But if the distance was longer (i.e. about 1/3 mile or more), I would lock the wheel at a crosswalk and carry the bike across. The portion on Sunset Blvd (mile 10 to 6) had S-curves plus some hills, but we were able to ride the diagonals. Joe must have several friends in L.A. because several of them were blowing their horns at us. There were no oddities in riding or measuring, and also none in the very few people we saw along the course. Sunday 6AM on Hollywood Blvd bears no resemblance to Saturday night there.

Post-Calibration was done immediately after the measurement along the shaded curb in front of the hotel just yards from the Marathon Start Line. The day was an unusual crystal clear day with only a slight temperature rise in the early daylight hours.

My Validation measurement found the course length to be 42.2928 kilometers, or .23% long. Using the Bob Baumele software program, I also ran as if this was an original measurement. This indicated the course to be 42.239 kilometers or 44 meters long. I feel certain that if I was doing the original measurement and rode the course more than once or had more familiarity with the course, that I would have ridden a tighter ride, but not exceeding 44 meters. I have no hesitation in saying the Los Angeles Marathon is at least 42195 meters.

On this day before Thanksgiving my thoughts are that eleven years ago I missed Thanksgiving Dinner at home as I was awaiting surgery for cancer. And Many Thanks to Joe Blackstone for getting me safely to Thanksgiving Dinner this year. The Marathon has a good new man in Joe.

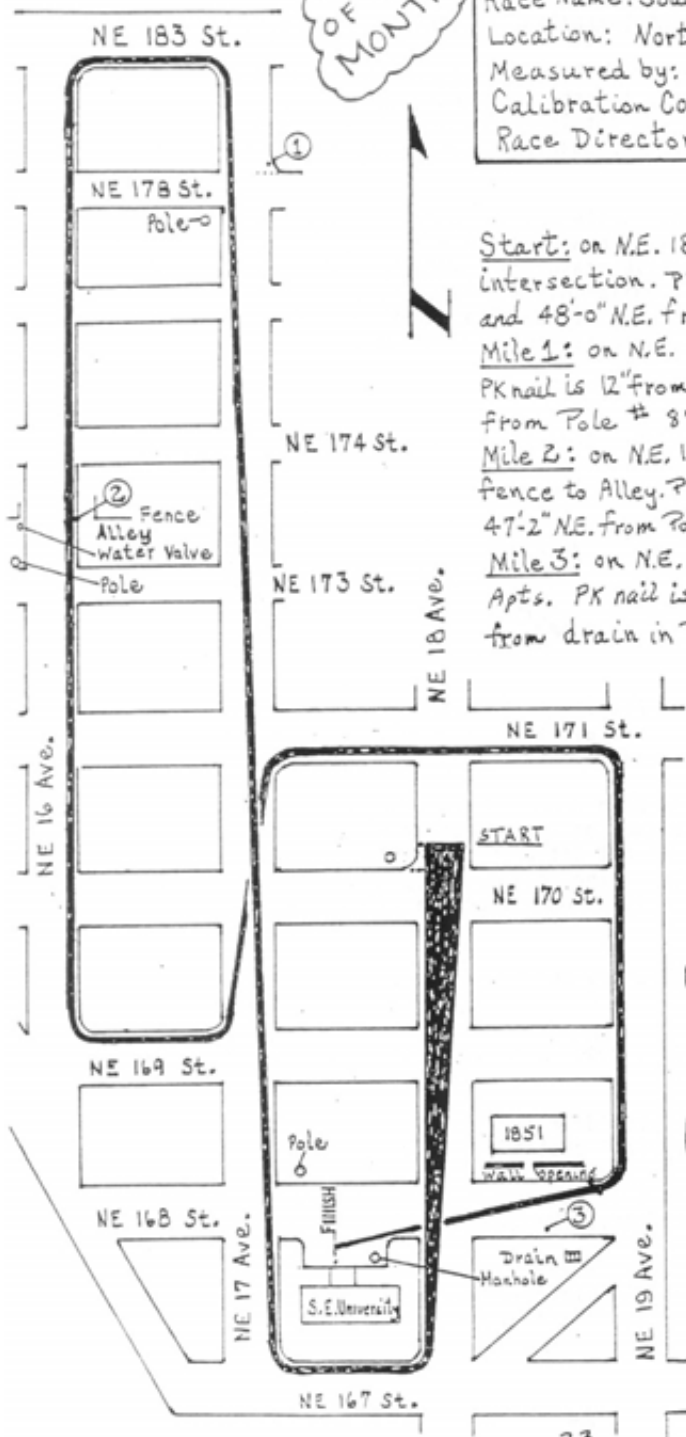
Thanks,



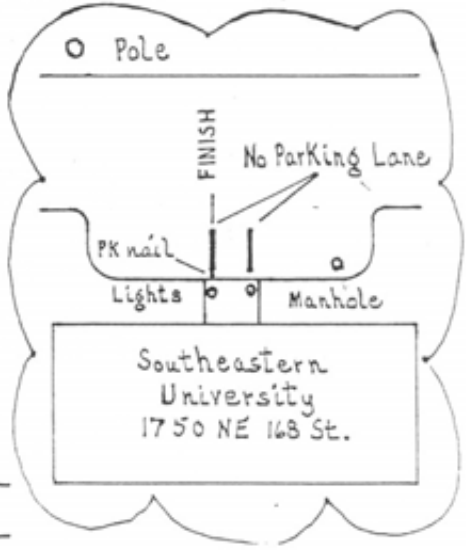
Felix Cichocki, Arizona & New Mexico T.A.C. Course Certifier
P.O. Box 1572
Cave Creek, AZ 85331
(602)488-9614

MAP OF THE MONTH

Race Name: Southeastern University 5K Run/Walk
 Location: North Miami Beach, Florida
 Measured by: Gene Witkowski 771-1060
 Calibration Course: # FL 870123H
 Race Director: Rick Stern 384-7521



Start: on N.E. 18 Ave., 56'-0" N. of N.E. 170 St. intersection. PK nail is 12" from W. edge of pavement and 48'-0" N.E. from Pole # 87466792007.
Mile 1: on N.E. 17 Ave., 10'-0" N. of N.E. 178 St. intersection. PK nail is 12" from E. edge of pavement and 69'-6" N.E. from Pole # 87466647309.
Mile 2: on N.E. 16 Ave. in direct line with corner of fence to Alley. PK nail is 12" from E. edge of pavement, 47'-2" N.E. from Pole and 27'-1" E. from Water Valve.
Mile 3: on N.E. 168 St. in front of 1851 Elegante Apts. PK nail is 24" from S. edge of curb, 40'-3" from drain in Parking Lot and 60'-1" S.E. from R.S. of opening in Wall.
Finish: on N.E. 168 St. in front of Southeastern University. PK nail is 24" N. of Curb of Parking area, 94'-0" W. from manhole and 113'-4" S.E. from Pole # 87466720707.



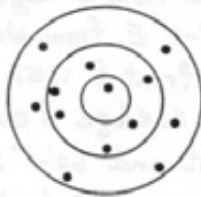
A PROPOSED SCHEME FOR EVALUATING AND RANKING MEASURERS

Whenever measurers get together to work, the measurement takes on the form of a contest. The measurer who gets the shortest measurement "wins" the contest, and gets to lord it over those who got longer measurements. When only two or three people are involved, this is probably as good a way as any to define relative excellence.

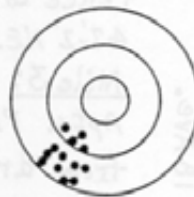
The weakness of the above is that while one measurer will win, we have no way of knowing - on an absolute scale - how good the measurements were. Over the years, as we accumulate comparative measurement information, a sense of who is sharp and who is not develops. While this may be useful, it is neither scientific nor necessarily accurate. Is there a way to test measurers against an absolute standard? I think there is, and I'll throw out the following for discussion:

Accurate and Precise

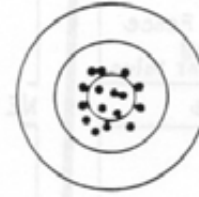
The following targets show accuracy, precision, and both:



Accurate - the measurements are centered around the true value.



Precise - the measurements are all tightly grouped.



Accurate and precise.

A good series of measurements is both accurate and precise. Either alone does not do the job. Our standard method of layout requires a stated degree of precision - two measurements must not differ by more than 0.8 m/km. We hope for, but do not require, accuracy. The only accuracy check we get is when a course is validated, and then it is assumed that the validator gets a reasonably true value.

How can we check the absolute accuracy and precision of a measurer? Here is one way:

- 1) Use enough measurers so that a good estimate of true value can be made, for several measured intervals.
- 2) Measure enough intervals to provide multiple measurements for each measurer, rather than just an overall distance.
- 3) Set up the test course so that it has enough turns to keep it real, but not enough to make it insanely twisty. Be sure the edges of the course are well-defined.

If this is done, we will obtain multiple measurements by multiple measurers of several distances, over a reasonably "fair" course.

Although it was not planned that way, we have several examples of measurements that fulfill the above requirements. I'll use the validation of the Columbus Marathon, the 1992 US Olympic Trials course, as an example. You read about it in November 1991 Measurement News. Five measurers measured 8 course segments, and the measurements came out as you can see below..

True Length - To evaluate accuracy, we must know the "true length" of what we are measuring. Since all of the measurers were experienced, there was no reason to assume that the smallest measurement represented reality. The average could be used, but one outlying mistake by one measurer can affect it. Therefore, I've picked the median measurement as the one that represents true length. This is statistically justifiable. See Chart 1 for the original data.

CHART 1 - MEASUREMENTS OBTAINED AT COLUMBUS VALIDATION, METERS

INTERVAL	WG	WN	BC	KU	MW
0-5	5008.60	5008.01	5009.81	5014.52	5010.00
5-10	5008.39	5007.50	5009.39	5011.92	5007.13
10-15	5005.49	5002.69	5003.01	5005.52	5004.15
15-20	4997.00	4995.16	4992.81	5000.02	4998.41
20-30	10028.98	10025.04	10027.68	10036.93	10027.86
30-35	5003.77	5003.49	5005.35	5007.02	5006.07
35-40	5005.06	5004.19	5007.58	5010.32	5008.30
40-F	2197.25	2196.47	2199.79	2198.37	2198.15

INTERVAL	HIGH	LOW	SPAN	AVERAGE	STD DEV	MEDIAN
0-5	5014.52	5008.01	6.51	5010.19	2.289	5009.81
5-10	5011.92	5007.13	4.79	5008.86	1.713	5008.39
10-15	5005.52	5002.69	2.83	5004.17	1.191	5004.15
15-20	5000.02	4992.81	7.20	4996.68	2.510	4997.00
20-30	10036.93	10025.04	11.90	10029.30	4.031	10027.86
30-35	5007.02	5003.49	3.53	5005.14	1.344	5005.35
35-40	5010.32	5004.19	6.13	5007.09	2.220	5007.58
40-F	2199.79	2196.47	3.32	2198.00	1.120	2198.15

I then normalized the data so that it looks like each interval was 1 km in length. This permits further comparisons to be made on an equal basis. Chart 2 shows the normalized measurements.

CHART 2 - MEASUREMENTS NORMALIZED TO 1 KM

INTERVAL	WG	WN	BC	KU	MW
0-5	999.76	999.64	1000.00	1000.94	1000.04
5-10	1000.00	999.82	1000.20	1000.70	999.75
10-15	1000.27	999.71	999.77	1000.27	1000.00
15-20	1000.00	999.63	999.16	1000.60	1000.28
20-30	1000.11	999.72	999.98	1000.90	1000.00
30-35	999.68	999.63	1000.00	1000.33	1000.14
35-40	999.50	999.32	1000.00	1000.55	1000.14
40-F	999.59	999.23	1000.74	1000.10	1000.00

Then I took the difference between each person's normalized measurement vs the normalized median for the distance, and Chart 3 resulted. It shows the difference between each person's measurements and the true (median) value. The smaller the number, the more accurate the measurement of that segment. The smaller the average of the numbers, the more accurate the overall measurement. The less spread to the numbers, the more precise the series of measurements. For analysis of spread I use standard deviation, a statistical treatment that is an accepted measure of difference.

CHART 3 -
NORMALIZED MEASUREMENT LESS NORMALIZED MEDIAN (NORMALIZED MEDIAN = 1000)

INTERVAL	WG	WN	BC	KU	MW
0-5	-0.24	-0.36	0.00	0.94	0.04
5-10	0.00	-0.18	0.20	0.70	-0.25
10-15	0.27	-0.29	-0.23	0.27	0.00
15-20	0.00	-0.37	-0.84	0.60	0.28
20-30	0.11	-0.28	-0.02	0.90	0.00
30-35	-0.32	-0.37	0.00	0.33	0.14
35-40	-0.50	-0.68	0.00	0.55	0.14
40-F	-0.41	-0.77	0.74	0.10	-0.00
AVG	-0.137	-0.412	-0.018	0.550	0.044
ABS AVG	0.137	0.412	0.018	0.550	0.044
STD DEV	0.254	0.190	0.410	0.281	0.146

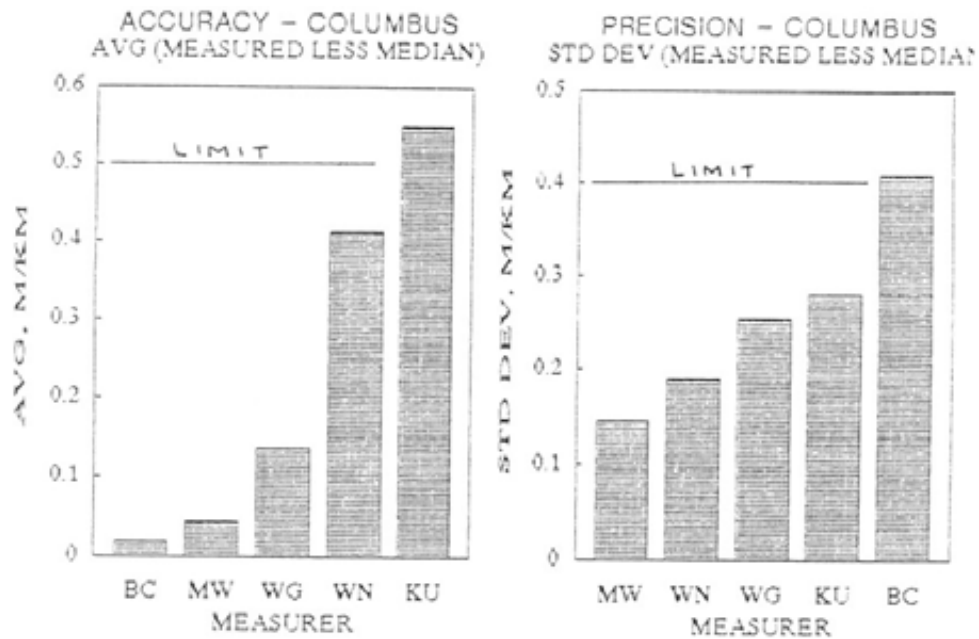
With all this done, I arrived at an average and a standard deviation for each measurer. The measurer's accuracy is measured by the average difference. His precision is measured by the standard deviation of the differences.

Chart 4 shows how the measurers performed. BC was the most accurate measurer. His 8 measured segments missed the true (median) value by only 1.8 cm/km. MW was the most precise - his standard deviation was only 15 cm/km. All the measurers are ranked in order of accuracy and precision. Since we like to have a clear winner, I chose to score it like cross-country, with 1 point for first place, 2 for second etc. On this basis MW is the overall winner.

CHART 4 -
CROSS-COUNTRY SCORING OF ACCURACY (AVERAGE) AND PRECISION (STD DEVIATION)

AVERAGE		SCORE	STD DEV		SCORE	COMBINED SCORE	
BC	0.018	1	MW	0.146	1	MW	3
MW	0.044	2	WN	0.190	2	WN	6
WG	0.137	3	WG	0.254	3	WG	6
WN	0.412	4	KU	0.281	4	BC	6
KU	0.550	5	BC	0.410	5	KU	9

The results can also be seen in the following graph. Can we use the data to say something absolute, rather than just get relative rankings? I think so.



We presently require that two measurements differ by no more than 0.8 m/km, or by no more than 0.4 m/km from their average. This yields a standard deviation of 0.4 m/km. Let's accept for now that this is a reasonable limit for good measurement.

For accuracy we have no firm guide. However, we do have an allowance for measurement error of 0.5 m/km which we apply to validations, implying that a validator's measurement may have an error of that magnitude. Let's accept this as a reasonable limit for now.

If we do the above we have:

- 1) Acceptable average measurements will not exceed 0.5 m/km of the median value, and,
- 2) Standard deviation of acceptable measurements will not exceed 0.4 m/km.

The above example was a validation ride of an existing real race course. Five measurers measured the 5 km splits of the course, with the 25 km split being missed.

Median lengths of intervals were: 5010, 5008, 5004, 4997, 10028, 5005, 5008, 2198 meters.

If the proposed criteria are applied to the Columbus measurements we see that the average KU measurement exceeded 0.5 m/km on the average, and that the BC standard deviation exceeded 0.4, just by a hair. This leaves MW, WN and WG as "passing" the test - 3 out of 5.

Calibration Change - a Potential Problem?

The above measures of accuracy and precision are fairly small compared to the amount of calibration change that may be present in a measurement. The measurers at Columbus experienced the following changes (postcal was larger than precal in all cases):

	WG	WN	BC	KU	MW
Calibration change, counts/km	1.6	9.8	8.2	9.0	1.6
Calibration change, m/km	0.2	1.0	0.9	0.9	0.2

How should these changes be accounted for? Do they matter? When we see BC with an accuracy of 2 cm/km, and a calibration change 50 times as large, does this throw the whole argument out?

To find out I recalculated the entire measurement using a method named "TVC," or time-varying constant. It was devised by Bob Baumel back in 1983 when we were trying every trick we could think of to make the Olympic Marathon course as good as we could get it. To my knowledge it has not been used since.

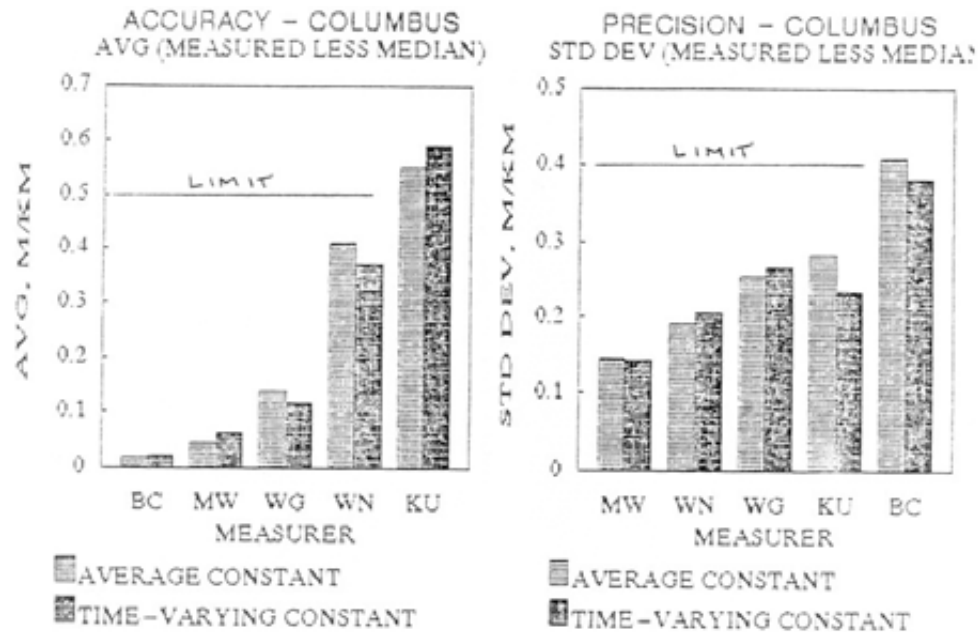
Basically, the constant is the precal value at the start of the ride, and changes gradually as the ride goes on. Halfway through the ride, the constant is halfway between precal and postcal. At the finish of the ride it is the postcal value. In other words, the constant changes in proportion to the distance ridden.

I will not burden the reader with the details. It's complicated but compensates for calibration change. However, I'll show some results. Here is how things came out using TVC:

CROSS-COUNTRY RANKINGS OF THE PLAYERS BY TIME-VARYING CONSTANT

AVERAGE	SCORE	STD DEV	SCORE	COMBINED SCORE
BC 0.021	1	MW 0.143	1	MW 3
MW 0.065	2	WN 0.206	2	BC 6
WG 0.116	3	KU 0.235	3	WN 6
WN 0.370	4	WG 0.265	4	WG 7
KU 0.590	5	BC 0.380	5	KU 8

The graph on the next page shows a comparison of how things came out using average constant (same as in above graph) and time-varying constant. It suggests that calibration change, in this case, did not materially affect the outcome (except that BC snuck under the wire with his slightly lowered precision value, thus "passing.")



OTHER EXAMPLES

West Jefferson - This IAAF seminar allowed US experts to meet and be evaluated for elevation to IAAF status. 14 measurers used a 5 km course with splits at each kilometer, a 1 mile split, and a turnaround. In this analysis only the five 1 km intervals were used.

Median lengths of intervals were: 1008, 1003, 1002, 989, 1016 meters.

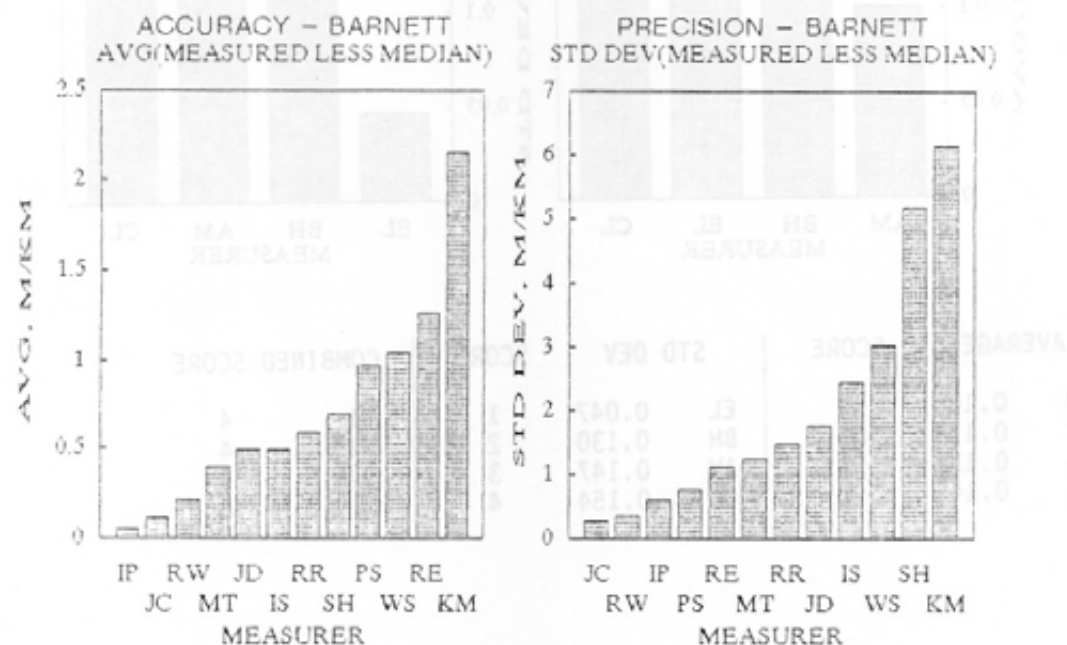
The West Jefferson exercise included measuring across two gates and two turnaround points.

AM, DL and WN exceeded the accuracy limit of 0.5 m/km. AM and WN exceeded the precision (standard deviation) limit of 0.4 m/km. This left all but AM, DL and WN as passing the test - 11 out of 14.

Barnett - This was a group of 12 British measurers who met at a recent educational seminar designed and run by John Disley. It was patterned after the IAAF seminar held at West Jefferson, Ohio. Data from only 11 are presented, since one did not record a split.

Median lengths of intervals were: 980, 989, 1012, 1073, 1036 meters.

The Barnett exercise had its first 2.6 km on a dirt footpath with curbs that were sometimes buried or unclear, thus leaving the measured path largely undefined on this part. Although raw data are not included here, the variation on the first 3 km was 2.5 times greater than that on the last 2 km. In short, Barnett is not a good example of a test as it is defined here. It was intended as an educational exercise, not a test. Therefore no attempt is made to say who "passed" and who did not.

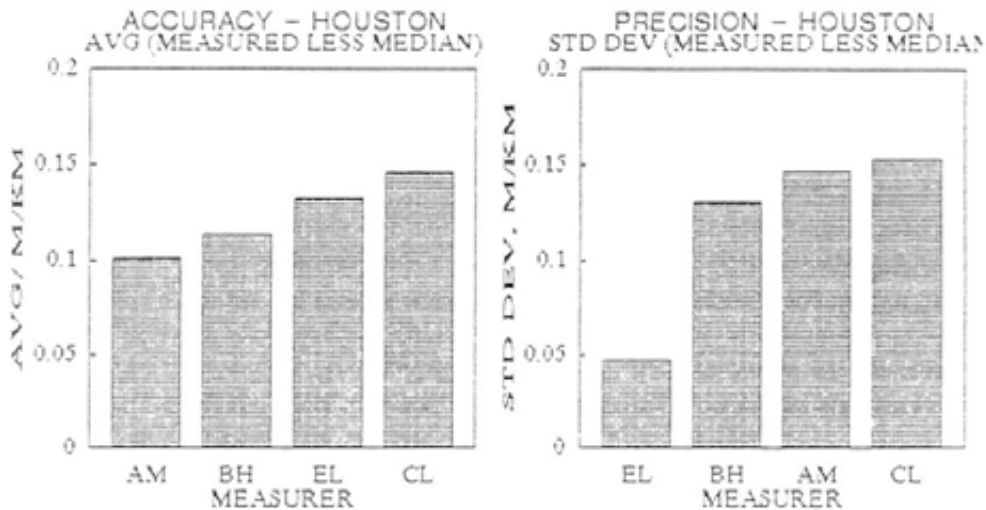


Is this scheme too stringent? Is injustice done? It depends on whether you buy the ranking scheme, and on the limits of acceptability chosen. As it stands, it shows only how well the measurer rode the bike on the test ride. It says nothing at all about the test itself. I can apply the test to a hard-case type.

AVERAGE	SCORE	STD DEV	SCORE	COMBINED SCORE			
IP	0.054	1	JC	0.252	1	JC	3
JC	0.113	2	RW	0.342	2	IP	4
RW	0.204	3	IP	0.589	3	RW	5
MT	0.395	4	PS	0.743	4	MT	10
JD	0.491	5	RE	1.110	5	PS	13
IS	0.495	6	MT	1.238	6	JD	13
RR	0.590	7	RR	1.454	7	RR	14
SH	0.691	8	JD	1.744	8	IS	15
PS	0.967	9	IS	2.435	9	RE	16
WS	1.038	10	WS	3.021	10	SH	19
RE	1.257	11	SH	5.175	11	WS	20
KM	2.146	12	KM	6.134	12	KM	24

Houston

In the validation of the Women's Olympic Trials course in Houston, the four ladies got an excellent grouping of measurements, as shown below. Everybody was well within the proposed guidelines.



AVERAGE		SCORE	STD DEV		SCORE	COMBINED SCORE	
AM	0.100	1	EL	0.047	1	AM	4
BH	0.114	2	BH	0.130	2	BH	4
EL	0.133	3	AM	0.147	3	EL	4
CL	0.146	4	CL	0.154	4	CL	8

Is this scheme too stringent? Is injustice done? It depends on whether you buy the ranking scheme, and on the limits of acceptability chosen. As it stands, it shows only how well the measurer rode the bike on the test ride. It says nothing at all about the other things that a measurer needs to know and do.

This may be the start of a way to test a group of measurers against an absolute standard. Does anybody have an opinion?

I have data in an ASCII file. Anybody wishing to play with the data needs only to ask - I'll send you a disk to play with. Say what kind of disk you need. I can supply 5 1/4 floppies, either 360 KB or 1.2 MB, or 3.5 inch, 1.4 MB hard-case floppy.

The Athletics Congress of the USA

Road Running Technical Committee
Dave Poppers — Colorado Certifier

5938 S. Franklin St.
Littleton, CO 80121
303/795-9743

Pete Riegel
3354 Kirkham Rd. - Columbus, OH 43221

12/21/91

Dear Pete,

Yes, there is a story to the *Colorado 500K*. I really should have thought to offer it before you needed to request it.

In March of this year Marshall Ulrich, an ultra-distance runner living and in business in Fort Morgan, contacted me for information on the laying out of a certified course across Colorado (north to south). I forwarded a measurement manual to him and discussed over the phone what procedures might be best in approaching an endeavor of this magnitude.

After loaning him a couple of Jones Counters, he and some friends attacked the imposing job June 22 and finished August 11.

I received the 28 page package September 12. With trepidation, I dug into it, caught between the conflicting pressures of being a critical analyst looking for errors and inaccuracies and the other of hoping after such an extensive (and first) effort that it would pass with flying colors. Fortunately, after consulting with Bob Baumel over some details, I issued a 6 page certificate.

Three calibration courses were used. One in Raton, NM, another in Colorado Springs, CO and one that I had earlier laid out near my home.

I'll let Marshall's cover letter (enclosed) relate the details.

Best Regards,



COLORADO 500 K COURSE CERTIFICATION INSTRUCTIONS

The desired finish (at the Rose Memorial Garden, Raton, N.M. - Sante Fe Marker Stone S.W. corner of Garden) was established as the desired finished. Since over 80% of the course is run on I-25 facing traffic North Bound lane, east shoulder, the only possible way to accurately measure the Colorado 500K was to ride with traffic, north past the Colorado/Wyoming border.

The course was measured using two new calibrated courses; one in Raton, New Mexico and the other in Colorado Springs, Colorado (see attached taping sheets and applications for certification). These were layed out for one time use, so maps are not attached. The third calibrated course was laid out by Scott and Dave Poppers on 8/1/90, TAC #CO90012DP (see atached map).

The first day consisted of establishing a new calibrated course in Raton, N.M. for use of the morning calibration of the bicycles only. Scott and Kyle then rode the actual course simultaneously approximately 160K. We then drove to Colorado Springs, and established and utilized that new course for post measurement calibration.

Day two started with bicycle calibration on the same course (Colo. Springs) as the previous night. Then the course measurement for day two, 190K approximately, was rode and counted. Scott and Kyle then returned to the Colorado Springs Calibrated Course and did the post days calibration.

Day three, seven weeks later on August 11th, 1991, we picked up where we left off and with a new second rider, Day. We used Dave Poppers established course in Denver. Near the end of the day I calculated exactly how many counts it would take to complete the calibrated course for both riders anticipating the working constant to be the mornings since heat expansion would be a factor in determining length. I was fortunately correct in assuming so and the lenght was so accurate that I determined it need not be adjusted.

The next step was to adjust the splits as they were measured and temporarily marked by using an electronic counter (which we calibrated each day on the calibrated courses) to be used as references only. After each days count was calculated, and all intermediate splits, by using that days working constant only, adding the total meters counted and then computing the measurement comparison, we were then able to get an accurate overall comparison (for rider one and rider number two). I then calculated, starting from the start in Wyoming, the adjustment for each individual split (being careful to add or subtract the accumulamed differences

After adjusting the splits on paper, this proved to be accurate to within $\frac{1}{4}$ " (because I rounded to the .001's) over the entire length of the course.

The metric splits were somewhat accurate and all the adjustments were made by steel tape. The 100, 200 and 300 mile splits were more inaccurate and were adjusted by using a calibrated Jones Counter and using the safety factor.

INTERMEDIATE SPLIT POINTS ADJUSTMENTS

50K	added 152' 2 $\frac{3}{4}$ "
100K	added 1184' 4 $\frac{1}{2}$ "
150K	added 1974' 2 $\frac{3}{4}$ "
100mi.	added 1635' 6 $\frac{3}{4}$ "
200K	added 1717' 11 $\frac{1}{4}$ "
250K	added 1353' 3 $\frac{1}{2}$ "
300K	added 986' 7 $\frac{2}{3}$ "
200mi.	subtracted 2837' 11"
210mi.	N/A Not Adjusted irrelevant distance
350K	added 823' 2"
400K	added 478' 11 $\frac{1}{2}$ "
450K	added 469' 6 $\frac{1}{2}$ "
300mi.	subtracted 3619' 8 $\frac{2}{3}$ "
500K	within $\frac{1}{4}$ "

THE SPLIT LOCATIONS ARE AS FOLLOWS;

Start	921' 8 $\frac{1}{2}$ " no. of mile marker 2.66 (north of CO/WYO Border)
	Take Terry Ranch Road exit. I-25
50K	.44 miles south mile marker 271 I-25
100K	.58 miles south mile marker 240 (across from emergency access road) I-25
150K	Broadway and Center Ave sign 24' 10" south
100mi	On Highway 85, 5' 7" south mile marker 204 e.s. road
	.13 miles north of intersection Bowles Ave. and Sante Fe
200K	.13 miles south mile marker 179 I-25
250K	Between Pikes Peak truck and Van Company & Marathon Motors 5921 Nevada Ave 5913 Nevada Ave
	This is where Nevada exits and I-25 swings right.
300K	.47 miles south of mile marker 118 I-25
200mi	.07 miles south of Pueblo City limit sign (.2 mi. so. mm 104) I-25
350K	.47 miles south mile marker 87 I-25
400K	.56 miles south mile marker 56 I-25
450K	.75 miles south mile marker 25 I-25
300mi.	.4 miles south mile marker 4 I-25
500K	S.W. corner Rose Memorial Garden. Sante Fe Trail Marker stone (5' so on pavement) Corner of 2nd Street and Salvage Avenue, Raton, New Mexico.

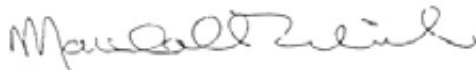
It should be noted that Interstate I-25 (using the north bound lane, east shoulder) is used for the entire course, with the exceptions of going through Denver, Use of Highway 85 to Castle Rock, through Colorado Springs, through Pueblo, and exiting off I-25 at and going into Raton, N.M.

When runners exit I-25 they will use the Northbound entrance ramps (east side of the road). All tangents were cut and no cones will be added to the course. Runners are required to run as pedestrians at all times facing traffic and utilizing sidewalks when applicable. The course is basically straight with very few curves and/or corners.

The entire course was measured with the exception of the $\frac{1}{2}$ block up and $\frac{1}{2}$ block back from the Posada House In Pueblo. This would only serve to increase the safety factor.

see maps for further information.

Respectfully submitted,



Marshall Ulrich

Run Across Colorado

Fort Collins, Colo. Sept 14, 1991
500 km (310 mi) (with 24- & 48-hr splits)

1. Marshall Ulrich(90.3,168.7) 88:14:23
2. Rae Clark,CA(136.5,212.1) 89:17:59
3. Phil Freeland,OH(99.5,154) 104:55:00
4. Don Choi,CA(105,165) 121:06:00
5. Helen Klein,CA(75.6,127.3)131:33:00
6. Steve Siguaw(70,125) 134:47:00
7. Peter Munding,NV(56,115) 148:59:00
8. Scott Weber(63,124) 200:47:00

Rae Clark, holder of the U.S. records for 100 miles, 200 km, and 24 hours, took the early lead, covering 136 miles in the first 24-hour period and 212 miles for 48 hours. Rae developed tendinitis in his ankle and knee and was forced to stop periodically to rest and ice his injuries. Marshall Ulrich was slowed by stomach problems and Achilles tendinitis in the early stage of the race, but he eventually passed Rae at the 220-mile mark. The two front runners pushed each other and with 40 miles to the finish they were separated by just one mile; the margin at the finish was only an hour.

Stan Pedzick (co-race director)

Marshall Ulrich adds:

The Run Across Colorado was conceived as a spin-off from the Run Across Ohio which I ran in 1990 and which was founded by Phil Freeland. The Colorado Coalition for the Homeless approached me early in 1991 with the idea of sponsoring the run to help raise badly needed funds. They agreed to pay travel expenses and provide food-stocked RVs so as to attract national- and world-class athletes to make it a quality event.

Scott Weber and I also set about certifying the 500-km course as well, so everyone would be assured of the accuracy of the course — this took the equivalent of at least ten days of work and \$150 worth of gas alone! The work paid off, and the course is now the longest point-to-point certified road course in North America (and maybe the world?).

The run went well with all invited runners finishing. Scott Weber taught school during weekdays, ran at night and weekends, and finished in good shape. He requested extra time to accomplish this (which was granted in advance). Approximately \$25,000 was raised for the cause and everyone got an extended "view" of the Rocky Mountain Front Range. Next year the run will progress from Raton, N.M., to the Wyoming border — south to north — allowing better communications between RVs and better media coverage.

SOME COMPARISONS OF RECENT GROUP MEASUREMENTS

Since the last MN, I've received a wealth of comparative measurement information. I can't recall when so much has become available in such a short period. First I received Jean-Francois Delasalle's article about his seminar in Salouel. Then came Sally Nicoll's report of the Houston validation. I traveled to Penang and taught 19 novice Malaysian measurers the procedures, and on my return sweated out Wayne Nicoll's team of validators looking over the Columbus Marathon. Finally, I received comparative data from John Disley of a seminar he held near Barnett Stadium in Great Britain.

	HOUSTON	COLUMBUS	PENANG	SALOUEL	SALOUEL	BARNETT
Maximum Measurement, m	42259.8	42284.6	2010.0	19995.7	654.1	5099.0
Minimum Measurement, m	42248.1	42242.5	2000.3	19988.8	653.0	5082.0
Average Measurement, m	42254.2	42259.4	2004.5	19992.2	653.6	5091.7
Standard Deviation, m	5.04	13.86	2.19	2.62	0.36	4.70
Standard Deviation, m/km *	0.12	0.33	1.09	0.13	0.54	0.92
Number of Measurers	4	5	20	8	8	12

* Our TAC disagreement limit of 0.08 percent allows a standard deviation, for two measurements, of 0.4 m/km. We have no standard for more than two.

Houston, Columbus and Salouel 20 km show variation as would be expected from teams of experienced measurers on normal courses, while the Salouel 654 m, and the Barnett and Penang groups show significantly greater variation. Why?

1) The Penang measurers were almost all total novices, most of whom had never measured a course before, and many of whom had not been on a bike in many years. In the Penang data, my own measurement was the low one - the others did their best to follow me along the SPR. This data was from their second day of riding, and improvement was seen in that single day. If they practice they will get better. Our validations from the early 1980's show several courses that missed the mark by more than the Malaysians did.

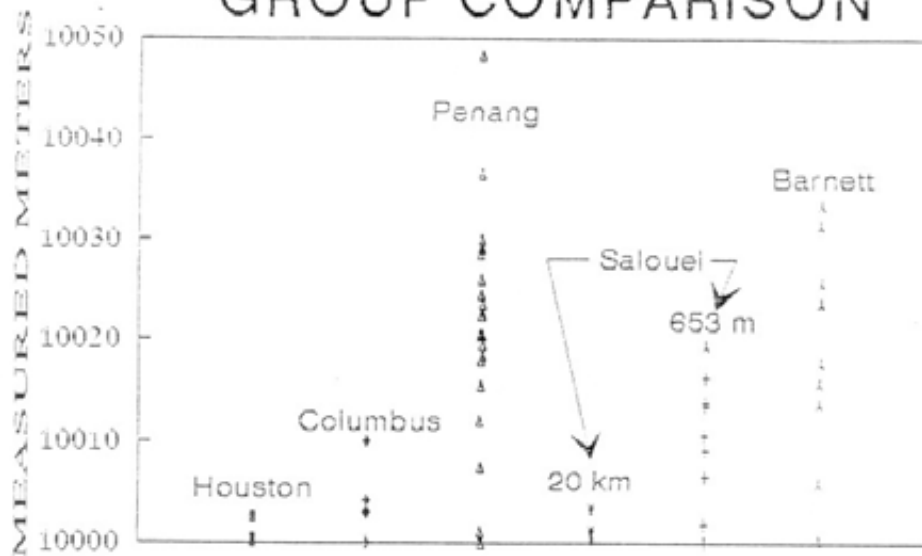
2) The Penang course was only 2 km long, with five 90 degree corners and an s-bend that was ridden twice, while the other courses had lesser numbers of turns for the distance ridden.

3) Although the Salouel 654 m was measured by the same 8 that measured the 20 km, it had 4 corners in the 654 m. The 20 km course had few corners.

4) The Barnett exercise was run along the same lines as our international measurement seminar held in Columbus last year. However, the first 2.6 km of its 5 km length were on badly-defined dirt pathways. With no clear edge guide, the measurers rode to no clear standard in those sections.

If all five courses had been nominally 10 km, and the low measurement exactly 10 km, here is how the measurements would have looked:

GROUP COMPARISON



PUBLICATIONS AVAILABLE FROM RRTC

Course Lists - You can obtain a list of certified courses for any state. Send \$2.00 for any state list. If you're an RRTC member your state list is free. You will receive a list that is current as of the last published Measurement News. If you wish the courses to be sorted in a special way, let us know. Otherwise it will be sorted by distance as the list appears in MN. You can obtain other specially-sorted lists - for instance, you might want to have all the 5k's in IL, IN, and MO. Can be done. Just say what you want. Special orders will be priced at \$0.50 per page for non-RRTC members.

Attention Computer People: You can obtain the entire course list, free, on 5 1/4 inch floppy disk, or 3.5 inch disks, in DOS text file (ASCII) format. List is now about 800 KB. Send a disk of sufficient capacity and a stamped return mailer. Be sure to specify what you want. List will be current up to and including the last published MN.

Individual Certificates - These may be obtained by sending the course number and \$2.00 per course desired. **SEND THE COMPLETE ID, INCLUDING PREFIX AND SUFFIX LETTERS.** Send course name, length and location as well. If you are thinking of hiring a measurer, this is an excellent way to see the sort of work you can expect. In addition, you may wish to check out a course you intend to run. Bring the map to the course and see if the race director got it right!

Above material may be obtained from: Riegel - 3354 Kirkham Rd - Columbus, OH 43221.

Measurement Calculation Computer Program by Bob Baumel, version 1.2 for Macintosh or IBM PC (please indicate choice). No charge. Just send a floppy (3.5" disk preferred, if possible) and return mailer to Bob Baumel, 129 Warwick Road, Ponca City, OK 74601.