MEASUREMENT NEWS

September 1993 Issue #61

The route of the London Marathon passes through Tower Wharf, by the Tower of London, just past 35 km. The grounds of the Tower are Crown property, and measurement must be coordinated with several authorities. Bicycling is not permitted. In 1984 two reference points were established, one at each end of the Wharf, and the 400 m distance between established by steel taping.

Here we see, crouched at left, Allan Steinfeld, holding the tape at the required 30 cm from the curb, and checking the forward alignment. Allan, former RRTC Chairman, is now race director of the New York City Marathon.

MEASUREMENT NEWS

#61 - September 1993

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ALAN JONES RETIRES AS FINISH LINE CHAIRMAN

Alan is stepping down, and we will get to enjoy his perceptive reflections on the art of the finish line only on an occasional basis. See his letter elsewhere in this issue. Alan invented the Jones Counter and the RunScore software that is the mainstay of many finish lines. He is one of the giants, and he'll be missed.

FINISH LINE CHAIRPERSON SOUGHT

We have no candidate at present to replace Alan, and candidates are sought to fill the position. The duties will depend on the talents and desires that a new candidate brings to the office. Final selection may take place at the USATF Convention in late November. Can you help? Get in touch with Pete Riegel if you have ideas.

GUIDANCE TO MEASURERS

In this issue you will see what Dave Poppers sends to people who inquire about how to get a course certified. I prepared similar material which was published in a past MN, and I always encourage an inquirer to learn the process. I can't handle all the measurement in Ohio, nor should I. That would leave my area too greatly dependent on one person.

If, after I am sure they know their options, they still want to hire me, I'll do it. But I take pains to make sure they know that the process is not hard and I will help them if they want to do it themselves. That is my first duty as a certifier.

Dave's approach is correct. When a person has a need for a measurement, they should always be encouraged to learn the process and measure it themselves. Some will choose to hire the certifier to do it, but, if they are properly encouraged, they will learn to do the job themselves. Most will not do the job as well as you, at first. But give them a chance and they will improve.

If, as a certifier, you find that all your certified courses are measured by you, ask yourself if you are really doing all you can to help others learn the trade. It's not healthy to have all the expertise reside in just a few people. Develop new measurers! Encourage them to get a Jones counter and the measurement book. It works.

EARLY ISSUE

This issue is being sent out a week early, because I will be measuring in Mexico City on the weekend of August 28, the original weekend on which MN was to be put together. My apologies to those who were affected by the change in deadline.

3717 Wildwood Drive
Endwell, NY 13870
July 31, 1993
(607) 754-2339

Peter S. Riegel
3354 Kirkham Road
Columbus, OH 43221

Dear Pete,

Thanks for the lastest issue of *Measurement News*. Great issue!

It's been fun being the Finish Line Chairman these past several years but I'm afraid it is time for me to step down. I just haven't been able to come up with ideas for a bi-monthly column. And I've been spending lots of time on other things. Seems I had more time available before "retiring."

One of the things I have been working on since joining the staff in the Geology Department at the State University of New York at Binghamton is a program to display earthquakes on maps of portions of the earth in speeded up time. This program is now part of the earthquake exhibit in the California Museum of Science and Technology in Los Angeles. The museum is across the street from the Coliseum. Stop in and see it in action if you are in that area. If any readers of MN want a copy, contact me. It runs on IBM and compatible PCs.

By the way, the official name of my program for scoring races has been changed to "RunScore" from "Running Score II." It seemed everyone was calling it RunScore so why fight it? You can change this on the inside back cover of future issues of MN.

Like I say, it really has been fun. I can't get over the greatly improved state of measurement from the '70s or, for that matter, even the early '80s.

I would like to keep receiving MN and plan to contribute to future issues on an *ah hoc* basis.

Alan Jones

Alan Jones

USA TRACK & FIELD

Peter S. Riegel
Chairman, Road Running Technical Council
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Columbus, OH 43221

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614-424-4009 (work)
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August 6, 1993

Alan Jones - 3717 Wildwood Dr - Endwell, NY 13760

Dear Alan,

Your resignation is reluctantly accepted. I think you had the hardest job in RRTC, since finish line duties are vastly different from those of course measurers. Measuring is done at leisure, and maybe by somebody totally unrelated to the race staff. But finish lines are done in real time, by people who are the busiest race-day participants in race management.

Although your contributions to MN were irregularly scheduled, they were worthwhile, and as far as I am concerned you were useful and effective in the office.

I have never really figured out just why we had the office of Finish Line Chairman. It's part of our mandate to deal with them, but we have no real gung-ho people with ideas to do it. The Finish Line office was there when I took office, and it did no harm, but it never seemed to be something that the general constituency of RRTC was very much interested in.

I'm not sure how, or if, we will replace you. I think the office was made bigger by you holding it, since you are a recognized leader in the technology of finish lines. I see no reason to put someone in the office if I cannot identify something useful for them to do.

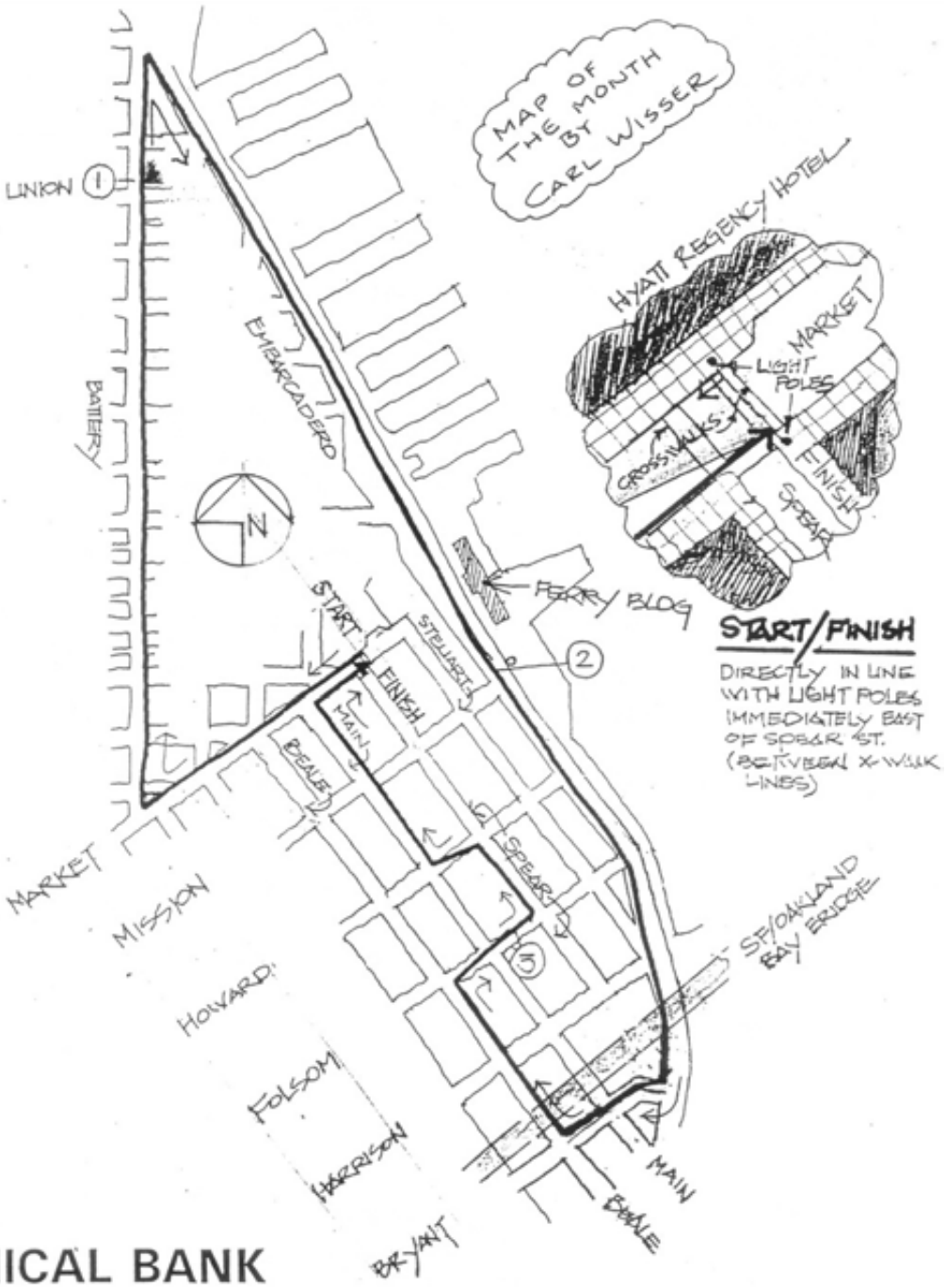
I will keep sending you MN as long as I put it out, and will look forward to any contributions you care to make.

Your earthquake program seems like it might be amusing to play with. If it's user-friendly, send me a copy.

Best regards,

Pete

I obtained a copy of Alan's earthquake program. It is utterly fascinating, and through playing with it I've learned a lot. I'm still having fun with it.



CHEMICAL BANK CORPORATE CHALLENGE

3.5 Miles *San Francisco, California*

CA93016CIV

USA Track & Field
Road Running Technical Council
Dave Poppers – Colorado Certifier

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

New Measurer,

Here are a few guidelines to help you with your race measuring and get you started in the right direction.

The booklet *Course Measurement Procedures* (CMP) is available for $4 from: USATF – Book order Dept. – PO Box 120 – Indianapolis, IN 46206. It's the "bible" for measuring and certification, and is a must. The manual will walk you through the procedures and clarify much of what may at first seem mysterious. It includes the forms that are necessary for certification.

The Jones/Oerth counter for the bicycle front wheel may be obtained from: Paul Oerth – 2455 Union St., Apt. 412 – San Francisco, CA 94123. The cost is $50. If you are only doing one or two measurements in your lifetime, then I can lend you one for $3 for wear and tear.

I have a video for loan that is a good introduction showing the basic procedure for calibrating and course layout.

For USATF certification the paperwork must be postmarked no later than the day before the race, though the earlier the better in case a problem comes up that can be corrected prior to the race. A surprising number of races have failed to receive certification that could have been saved because deadlines were pushed too close. I charge $20 for each certificate ($15 for each of multiple courses such as a 5K and 10K for same race) and $10 for each calibration course certificate. As this is a volunteer position, I have expenses including postage, copying, phone, $2 registration fee for each certificate, supplies and mileage. Please include the check, payable to me with the package.

Pay close attention to the forms as they will systematically lead you step by step between the **Bicycle Cal Data Sheet** and the **Course Msrm't Data Sheet**. Both rides should include the counter readings between all splits, as it is a good check for math errors or transposing of numbers. The map is the most important document of all. It should include all necessary information, yet maintain simplicity and clarity. I construct the map with the idea that a stranger can pick it up a few years later and correctly reconstruct the course in spite of repaving. It is usually best not to draw the map to scale, as exaggeration of road or path width will help in a clearer representation. Keep the information at least 1/4" away from the edge of the paper and include the splits, Start and Finish information on the map if possible. If restrictions to the *shortest possible route* (SPR) are used then they must be specifically detailed for cone or barricade placement. Sometimes it's preferable to measure the SPR even though race day restrictions will be in place. That prevents shorting the stated course distance and adds simplicity to the map.

When riding the calibration course and the race course, ride the bike for a mile or so first to warm up the tire to eliminate change from tire heating. Please include splits for each 5 km, as it helps the runners do comparisons and is another foot in the door for the eventual change to metric. If seeking certification for a calibration course, it must be no shorter than 300 meters, and preferably 500 meters.

Remember that a 5km race is 3.106856 miles and not 3.1. Likewise, the other distances do not convert from kilometers to miles without going at least five places beyond the decimal. The back of the CMP manual contains all the conversions needed.

A race distance is defined as no shorter than the stated distance. To keep from shorting a course, three safety factors are used;

- The **Short Course Prevention** Factor (SCPF). The working constant obtained from the calibration is increased by 1/1000. Merely multiply the constant by 1.001.
- The **Better Measurement**. Adjust the course length from the shortest measured length to the advertised distance. The shortest length would be your best measurement.
- The **Larger Constant**. The larger constant from the pre-calibration or post-calibration will be your "Constant for the Day."

The first ride is called the lay-out, when each split is marked and documented in relation to permanent fixtures. The second ride is referred to as length-finding, where you merely record the counts at each previously marked split. The second ride should go much faster than the first. Do not make additional marks on the second ride, as confusion will tenaciously jump on your back for the rest of the day.

Include the following forms when requesting USATF certification:

- The two page **Application for Certification of a Road Course**.
- The **Bicycle Calibration Data Sheet** for each measurer.
- The **Course Measurement Data Sheet** for each pair of measurements.
- A copy of the **Calibration Course** map and Certificate.
- The **Course Map**.
- A check for the processing fee.

I'm your resource as I want to promote the accuracy of road racing and cultivate race measuring. Please give me a call or a note if I can help.

Sincerely,

USA TRACK & FIELD

Peter S. Riegel
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July 22, 1993

[redacted] - [redacted] - [redacted] - [redacted]

Dear [redacted],

Enclosed is your application for certification of the [redacted] races. It has been sitting in my briefcase for months. I received it upon my return from the London Marathon, and also found messages from you on my answering machine that I should do nothing, since you had sent it on to Ron Scardera, since you were in a hurry and I was unavailable.

Since no action was required of me, I did not look at it. Today I did, and I found your check and thought I should return it, since you got no service from me. I think I can see why the course has not yet appeared in the certificates from Ron. There are deficiencies in the submission that I expect Ron has told you about. The most obvious ones are:

1) A different rider did the calibrating than did the course measuring. This is a fatal flaw, and no amount of paperwork can fix it. The measurer must calibrate the bike he uses, otherwise accuracy is questionable.

2) There is virtually no actual data from the measurement itself.

3) The course was adjusted between the first and second measurements, thus the same thing was not measured twice.

4) The course maps were marginal in quality.

5) No short course prevention factor was used.

All of the above could have been avoided if Course Measurement Procedures had been read and understood by the measurer. I got the feeling that someone obtained the forms and used them, but did not read the book from which they came.

Given the four months that elapsed between measurement and application for cartification, there was time to fix things, but at the last minute little could be done.

I hope you will try again. If you do, please have the measurer get in touch with me before they measure, unless they have read the book and really understand what is needed. I am glad to help, and a timely question can save all sorts of trouble.

Best regards,

Pete

xc: Ron Scardera

July 21, 1993

Dear Peter Riegel:

A situation arises from time to time where people want to change just the first ten percent or so of a race course. People don't want to re-measure the whole course, and the tendency is to use this procedure:

Using an uncalibrated bicycle, people ride from the original start to "Point A", "Point A" being both on the original course and the revised course. They record the number of counts. They may do this twice. I suppose they should use the larger number. To establish where the new start should be, they ride out from "Point A" to the new start stopping at the number they obtained by riding from the old start to "Point A".

When the Guido Bros. did this recently with the Fairfield Half Marathon course, I approved the revision, but expressed my reservations about that procedure. The trouble with the uncalibrated-bicycle method is that, in effect, a portion of the old course is being used as a calibration course. Race courses aren't measured with the same precision as are calibration courses, and the exact paths of race courses are not as definite as the paths of calibration courses. I would guess that the accuracy would no longer be plus or minus 10m per 10km, but maybe plus or minus 20m per 10km. I would prefer that people, when they change a course without re-measuring the entire course, measure, using a calibrated bicycle, from a point on the road that readings were recorded at during the original measurements.

What inspired this letter to you was Wayne Nicoll's response to a note to him about my reservations. Here's what Wayne said in his 15-May-93 letter:

> "Reviewed the certificate on the Fairfield Half Marathon Third Start. I do not agree with your comments on the measurement technique used by the Guido Bros. to establish the location of the third start.
>
> The technique used does not result in any deterioration of the quality of the measurement. We would calibrate the bike if we were determining a specific distance, but in this case we are not seeking the value of the exact distance. We only want to be sure the new start line is the same distance from the merge point as the old start. That they have done. It appears they rode the two paths with care to have achieved such good numbers.
>
> This procedure is not spelled out in the measurement book but is covered in training of new certifiers and is commonly given as appropriate guidance by certifiers to measurers who need to make similar changes. It is the only situation I know of where you can measure with an uncalibrated bike."

I think the belief that "this technique does not result in any deterioration of the quality of the measurement" is a convenient fiction. The deterioration may be acceptable, if the alteration involves only a small percentage of the course, but there is deterioration. If there were no deterioration, we could ride over existing race courses to find out how many counts are needed to produce entirely new race courses.

Do you think this procedure should be "commonly given as appropriate guidance by certifiers"? Should there be any limitations on it? Assuming some variation of this procedure is acceptable, shouldn't the section of the old course that is being used as a calibration course be ridden over four times before, and four times after the course measurements, with the pre-measurement or the post-measurement average being used, which ever is larger?

Sincerely yours,

David Reik, 26 Griswold Dr., West Hartford, CT 06119, (203) 236-9160 (best time to call: 8-9 P.M.)

USA TRACK & FIELD

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July 27, 1993

David Reik - 26 Griswold Dr - W. Hartford, CT 06119

Dear David,

Wayne sent me a copy of his letter to Guido Bros, and I agreed with his assessment of the situation. At the same time, your letter correctly points out that a deterioration in quality occurs each time an adjustment is made.

I think the question here is "how much quality is lost, and is it significant?" Most of the adjustments I have seen are fairly short distances, and I've never worried that the resulting inaccuracy was enough to compromise the course. If a person measures out 9673 counts back from the certified finish, and then turns around and measures 9673 counts by a different route to a new finish, and does it twice, then I'm prepared to believe the distances are essentially the same, and the overall course has not changed its length.

I believe it is appropriate to use the method. It saves work at no appreciable loss of quality. Of course, it can get out of hand if repeated too many times on the same course, in different locations.

Once I got a measurement where they did not want to remeasure the entire 5 mile course, so they calibrated the bike and measured from the 4 mile mark to a new finish. Unfortunately, the location of the 4 mile mark was not documented in the previous measurement (by another person), and they simply assumed the paint mark was correct. I did not accept this as a valid measurement. I would have accepted it if good data existed to show that the 4 mile mark was accurate.

This year the Columbus Marathon will use the same course as last year, except that all marks will move forward about 32 meters. This will give slightly better placement of the finish line. I intend to go downtown to the finish and ride from the old finish to the new finish, and return. This will establish the difference. Then I will ride four blocks to the start, and lay out a new start (twice), using the same number of counts I established at the finish line. When I am done I will not know exactly how much I have moved both marks, but I know that I will not have changed the course length by more than a small fraction of a meter. Then I will ride the course, move all the splits the same distance, repaint them, and document their new locations for use by the race people.

I am comfortable with this. Just how much the procedure can be stretched is a good question. I don't have an answer. Part of the answer may lie with how well you know the measurer. In the case of Guido Bros, their work has always seemed first-rate to me, and I would lose no sleep over their adjustment using this method.

I use the method in almost every course layout, since the first ride often does not come out right. I will add a portion here, remove one there, until I have a series of measurements between reference points that add up to the correct length. Then I make the second ride, laying down the splits and stopping at all the reference points I used while piecing together the course. My double-check against mistakes on the splits is the reading on my Cateye odometer, which reads 0.99 to 1.00 for a mile. Any serious error in reading the counter will show up on the Cateye reading. I also get a series of checks of the various reference intervals. I'm not alone in this - I think many people do the same thing.

If the measurer is an absolute novice, it might be different. Here is a scenario for you: A novice obtains a course map for a certified course, and uses the procedure to remove a portion of it, and substitute a new portion of equal length, as established by comparative measurements. Is this certifiable? I would be uneasy about it, but unless I had strong reservations I would probably certify it, after asking some hard questions of the measurer. Actually, the course might well be better than the novice would produce if he started from scratch, since he would only be able to mess up a small fraction of it, and not the whole thing.

In many cases, I think people are fighting the problem. I have had people ask me if it was OK if they adjusted a 5 km course by this method. I advise them, but don't force them, to remeasure the whole thing, unless they are the original measurer of the course. But I would not ask someone to remeasure a marathon course just to reroute the last mile.

I measured the Athens (Ohio) Marathon course in 1984. Last year the race director made a minor route change and asked if he had to remeasure the entire course. I said he did not, but that responsibility for accuracy of the <u>entire</u> course would reside with him on the new certificate. So if the new course is short, don't look at me (even though I might have screwed it up). The measurer seeking certification becomes the new measurer of record. That's why I would never employ the method on any course I had not originally measured myself.

If this procedure was wide spread, it could become a problem. However, it's pretty rare in my experience, and I'm glad. I prefer to see each course stand on its own. I suggest that certifier judgment is the thing to use here. I've never held that the book must be blindly obeyed, if the method used is a reasonably accurate one. By studying the creative ways that measurers approach their problems we will occasionally get new insight into better ways to do the job.

Best regards,

Pete

xc: Wayne Nicoll

sportscene

The measure of success

Teacher and runner Bernie Conway takes pride in knowing a 10K is 10K

by Reid Maltby

Most physicists count among their heroes Isaac Newton or Stephen Hawking or Albert Einstein.

Bernie Conway, a physics and chemistry teacher at Parkside, has a great deal of respect for such scientific sages and their painstaking measurements.

But Conway also admires someone like marathoner Alberto Salazar.

"A few years ago he was issued his last rites after running a marathon," said Conway. "Here was a guy who was willing to run himself to death."

There's more, though. Salazar was a victim of mismeasurement when he set a world record at the New York Marathon in 1981.

"The course was found to be too short," said Conway, who has run about 30 marathons. "That's depressing. Someone has run so far and so fast and the course turns out to be short. He still would have got the record if the course were a bit longer, but it didn't count."

The next year Conway measured his first race course.

He began with the St. Thomas Early Bird 10-kilometre race. By 1991 he had progressed to the top of his field, co-validating the U.S. Olympic Trials marathon course in Columbus, Ohio.

He is currently the only International Amateur Athletics Federation measurer in Canada and one of only 32 throughout the world. He will likely be involved with the validation of the marathon course for the '96 Olympic Games in Atlanta.

Six times. He takes an average to get the number of counts per kilometre and adds 0.1 per cent as an error factor. "You want to ensure the course is at least the distance advertised."

Finally, he is ready to ride the course, stopping each kilometre to spraypaint a marking.

Sometimes there are inconveniences along the route. "One time there was some construction and a bridge was out," said Conway. "So you have to use steel tape for that section."

A measurer must ride within 30 centimetres of the curb on turns, meaning Conway often has to ride against traffic. "We wear a jacket that says 'Measurer' and a fluorescent vest so we look semi-official," he said.

After finishing the course, he rides the route a second time, confirming each mark.

A post-calibration ride over the 300-metre section may lead to an adjustment of the finish line. Again, to ensure 10K runners are running at least 10K.

"To do a 10-kilometre course takes about six hours of riding and calculations on the road and one evening to fill out the forms," said Conway, who has a personal best marathon time of 2:45:55. "But with a physics and chemistry background, I'm not afraid of the arithmetic involved.

Then there's the trip to the library to find the topographical maps to make sure there's less than a one metre/kilometre drop in elevation for point-to-point races.

"If the distance isn't accurate, the times are meaningless."
— Bernie Conway, road race measurer and marathoner

Conway's hobby, which he does for love and money, is a time-consuming model of precision.

The measurement is done with "an old 10-speed" and a Jones counter, mounted on the front wheel to record the distance.

He begins, however, with a pre-calibration by measuring a 300-metre straight section of the course with steel tape. One has to remember to adjust the distance to compensate for extremes in temperature and its effect on the tape.

Then Conway hops on the bike and rides the 300-metre segment, recording the number of counts.

The science often involves more than verifying the distance. One organizer of an area race wanted to start by going up a steep hill, which did not go over well with the runner in Conway. "I just said 'No!' "

He was thrilled to have the chance to design two different routes for the Price-Waterhouse Marathon in London the last two years.

His highlight, however, may have been doing the Detroit Marathon. "They stopped the traffic and two of us rode through the tunnel by ourselves," he said. "There we were riding a mile underneath the water."

Conway's stamp of approval on a race is not always popular. "There was a 10K in southwestern Ontario that was actually closer to 9K," he recalled. "Oh, it was the fastest race around. Everybody loved it.

"But if the distance isn't accurate," said Conway, "the times are meaningless. And race organizers spend thousands of dollars to get times accurate."

That accuracy, Conway knows, is appreciated by runners. "You run one week and have a good time, then you run the 'same' distance next week and have a bad time. What's going on!"

Ironically, Conway is ambivalent about distance in his personal training regimen when he grabs daily runs out County Road 45.

"I check my watch at the first sideroad," said Conway. "If I'm 19:10, I'm really on. If I'm 20:10, it's a bad day. I don't know what the distance is and I don't care to know."

Some things just don't add up.

Consider it cross-training. Marathoner Bernie Conway spends considerable time on his bike measuring road races in Canada and the U.S. Conway, a physics and chemistry teacher at Parkside for the past 22 years, is the only International Amateur Athletics Federation measurer in Canada and will likely be involved in the validation of the marathon course for the 1996 Olympic Games in Atlanta. *Staff photo*

USATF/RRTC VALIDATIONS REPORT

August 7, 1993

VALIDATIONS CONDUCTED

DATE OF RACE	DATE OF VAL	DIST	DATE	NOM METERS	MEASURED METERS	DIFF M/KM	COURSE ID	RACE NAME/COURSE	MEASURER	VALIDATOR	
5/16/92	11/28/92	10k	92	2000.00	2000.2425	0.12	WI 92002 WG	Petrifying Springs	MOWLES	GRASS	
4/12/92	12/11/92	10k	92	2000.00	2002.5793	1.29	WI 92001 WG	U of W Parkside	MOWLES	GRASS	
4/4/93	3/27/93	10M	93	16093.44	16117.9986	1.53	DC 93001 JS	Cherry Blossom 10 Mile	SISSALA	THURSTON	pre-race
4/25/93	4/24/93	8k	93	8000.00	8008.3930	1.05	OR 93003 LB	Spring Classic	BARRETT	NICOLL	pre-race
3/28/92	5/1/93	5k	92	5000.00	5005.5904	1.12	FL 92022 DL	LaVonne Hottensaith 5k	OST	LOEFFLER	
5/24/92	5/14/93	15k	92	1500.00	1502.6000	1.73	CA 88073 RS	Inland Empire 15k	HICKEY	SCARDERA	
3/21/92	6/29/93	8k	92	8000.0	8010.632	1.33	VA 91006 RT	Shamrock Sportsfest	CORIATT	THURSTON	
6/28/91	7/17/93	5k	91	5000	4961.5	-7.70	MT 84001 TC	Governors Cup 5k	CASSELLS	BARRETT	

Currently pending :

10/20/91	HMAR	91	21097.5			CA 84053 CW	Humbolt Redwoods H-Marathon	WILLIAMS	KNIGHT	
11/30/91	50k	91	50000.0			WI 83005 TC	Vilas 50k	HINTZ	GRASS	
9/21/91	5M	91	8046.7			IL 87052 WG	Good Times Classic	KRAUSS	WIGHT	
8/16/92	10k	92	2500.0			WA 92007 MR	SFCC/Nugogawa 2500 loop	KINNICK	RENNER	
11/17/91	20k	91	2500.0			CA 91020 TK	Arrowhead Marsh 2.5k loop	MATHEWS	KNIGHT	
7/23/89	5k	89	5000.0			CA 89025 RS	Lake Murray 5k	LETSON	SCARDERA	
10/09/92	5k	92	5000.0			CT 92012 DR	Quinnipiac College R/Walk	GUIDO BROS.	NICOLL	
6/05/93	5k	93	5000.0	5004.3	* 0.86	NY 91002 WN	Freihoffer's Run /Women	NICOLL	MORSS	
5/16/93	12k	93	12000.0			CA 92003 TK	Bay to Breakers	KNIGHT	NICOLL	
91/92	20k	91	20000.0			CT 91001 WN	New Haven 20k	GUIDO BROS.	NICOLL	
9/13/92	25k	92	25000.0	25044.9	* 1.80	MN 90015 RR	City of Lakes 25k	RECKER	WICKISER	
9/13/92	HMAR	92	21097.5	21103.4	* 0.28	MN 90015 RR	City of Lakes HMAR split	RECKER	WICKISER	
5/09/92	25k	92	25000.0			MI 92004 SH	Old Kent River Bank	DEWEY	WICKISER	
12/12/92	30k	92	30000.0			TX 90074 ETM	First Colony 30k	MCBRAYER	RIEGEL	
3/28/93	30k	93	30000.0			FOREIGN	Around the Bay 30k	RHODES	CONWAY	
10/17/92	50k	92	4000.0			DC 86041 RT	Del Passatore 50k	THURSTON	NICOLL	
8/22/92	10M	92	16093.4	16108.6	* 0.94	MI 90016 SH	Crim Festival of Races 10M	HUBBARD	WICKISER	

* AWAITING FURTHER DOCUMENTATION

July 27, 1993

Mike Wickiser
Validations
2939 Vincent Road
Silver Lake, OH 44224

Dear Mike,

Enclosed is the paperwork on the 1991 Governor's Cup 5k (MT 84001 TC) validation I performed on July 17, 1993.

As you know there was a great deal of confusion in the initial stages of this validation as some of the paperwork submitted by the race committee was for the 1992 race course and not the 1991 course. However, after several conversations with Douglas Krebs and John Poston, the confusion was cleared up and I became confident that I could conduct a validation ride on the course as it was run in 1991.

I arranged to meet John Poston, who was the starter for the 1991 race, at the start at 6:30 a.m. on the 17th. John showed me the start and finish lines as used for the 1991 race (they are about a block apart) which had been freshly painted by Doug so we could easily find them. John confirmed that the painted points were indeed as used in 1991, in addition the painted points were confirmed by the submitted start/finish detail maps. Having confidence in the S/F points, John and I went over the course map and confirmed that the 1991 race was run as mapped.

John then drove me to the calibration course. The calibration course consisted of two points on the City of Helena's primary and secondary coordinate system. As I understand from discussions with Doug, who is a City Engineer, Helena has completed a detail mapping of the city. These points have been established using an EDM, and Doug is very confident as to the accuracy of the points used for our calibration course.

After calibrating the bicycle (you will note that rides 2 and 4 were shorter I believe this is due to the fact that the course is slightly uphill in that direction) John and I returned to the start line for my ride of the course. John drove his truck along the course in front of me as I rode so that I could have advance notice of the location of the turns. After the ride of the course, we returned to the calibration course for the re-calibration of the bike. As expected the counts were a bit less than the first ride, however the post-measurement calibration was very consistent with each ride just one count short of the pre-measurement calibration rides.

John and I then went to a restaurant for breakfast where I performed the calculations. As the 1991 race course was based on a 1984 measurement, I did have some suspicion that it might be a bit short. John indicated to me that the talk in the local racing community was the course might be long, I believe based on a competitor having measured it with a wheel. In any event, when my calculations showed the course to be almost 40 meters short, John expressed surprise. I went over the calculations with him and he agreed that they had been performed accurately. Being a lawyer by profession and having witnessed all aspects of the validation, John accepted the evidence that the 1991 Governor's Cup 5k course was short. I thanked John for his assistance and told him that I would mail a copy of the report to him.

Sincerely,

Lee Barrett
USATF/RRTC
Certifier for Oregon

The Governing Body for Athletics in the United States including Track and Field, Long Distance Running and Race Walking for men and women and boys and girls at all age levels.

MIKE WICKISER
2939 Vincent Road
Silver Lake, Ohio 44224
(216) 929-1605

VALIDATION REPORT

Name of Race GOVERNOR'S CUP 5KM Location HELENA, MT

Date(s) of Race JUNE 28, 1991 Course ID# MT 84001 TC

Advertised Race Distance 5,000 M measured by M Cassels

Describe how you determined the exact route used by the race in question

USED MAP SUPPLIED BY RACE OFFICIALS + DISCUSSION [ON SITE] WITH JOHN POSTON STARTER FOR 1991 RACE.

Validation Measurement Data (if such measurement is required or necessary)

Calibration Course KNIGHT ST Length 1,828.818'

Is the calibration course a previously certified course? YES (NO)

Did you check the length of the calibration course? YES (NO)

If you did check, please indicate the method used and the results

COURSE IS TWO POINTS ON THE CITY COORDINATE SYSTEM SET UP BY W. DOUGLAS KREBS, P.E.

1. Pre-measurement Calibration:

Time of Day 6:47 A.M. Temperature 46°

	Finish Count	-	Start Count	=	Difference
#1	597530	-	592000	=	5530
#2	603056	-	597530	=	5526
#3	608587	-	603056	=	5531
#4	614112	-	608587	=	5525

Average Pre-Measurement Count 5528

2. Course Measurement: Note that a single ride, following the SPR as available to the runners on race day, is required. You may wish to attach descriptions of deviations from the SPR, uncertainties in the exact route available for the race, or other sources of measurement variability. An analysis of sources of error and findings of concomitant non-validation measurements may also be appended to this report.

Time of Day at Start of Measurement 7:05 A.M. Temperature 46°

Finish Count 664199 (minus) Starting Count 615000

Counts on Course 49199

Time of Day at End of Measurement 7:22 A.M. Temperature 46°

3. Post-Measurement Calibration

Time of Day 7:29 A.M. Temperature 46°

	Finish Count	-	Start Count	=	Difference
#1	670529	-	665000	=	5529
#2	676054	-	670529	=	5525
#3	681584	-	676054	=	5530
#4	687108	-	681584	=	5524

Average Post-Measurement Count 5527

4. Calculation of Length of Course:

a.	Pre-Measurement Count	5528
b.	Post-Measurement Count	5527
c.	Average Count ((a+b)/2)	5527.5
d.	Length of Calibration Course	1,828.818'
e.	Validation Constant (c/d)	9916.1522 COUNTS/KM
	E = 5280 ÷ 1828.818 = 2.88711 × 5527.5 = 15958.5 COUNTS/MILE	
f.	Counts on Course (from #2)	49199
g.	Calculated Course Length (f/e)	4,961.5m
h.	Advertised Course Length	5,000 m
i.	Percent Difference (100(g-h)/h)	0.77%

I, the undersigned, hereby attest that the foregoing report is a fair and unbiased examination of the length of the race or races conducted on the road course in question. All numerical information reported herein was gathered or directly witnessed by me and is a true statement of my findings.

Lee Barrett
(signed)

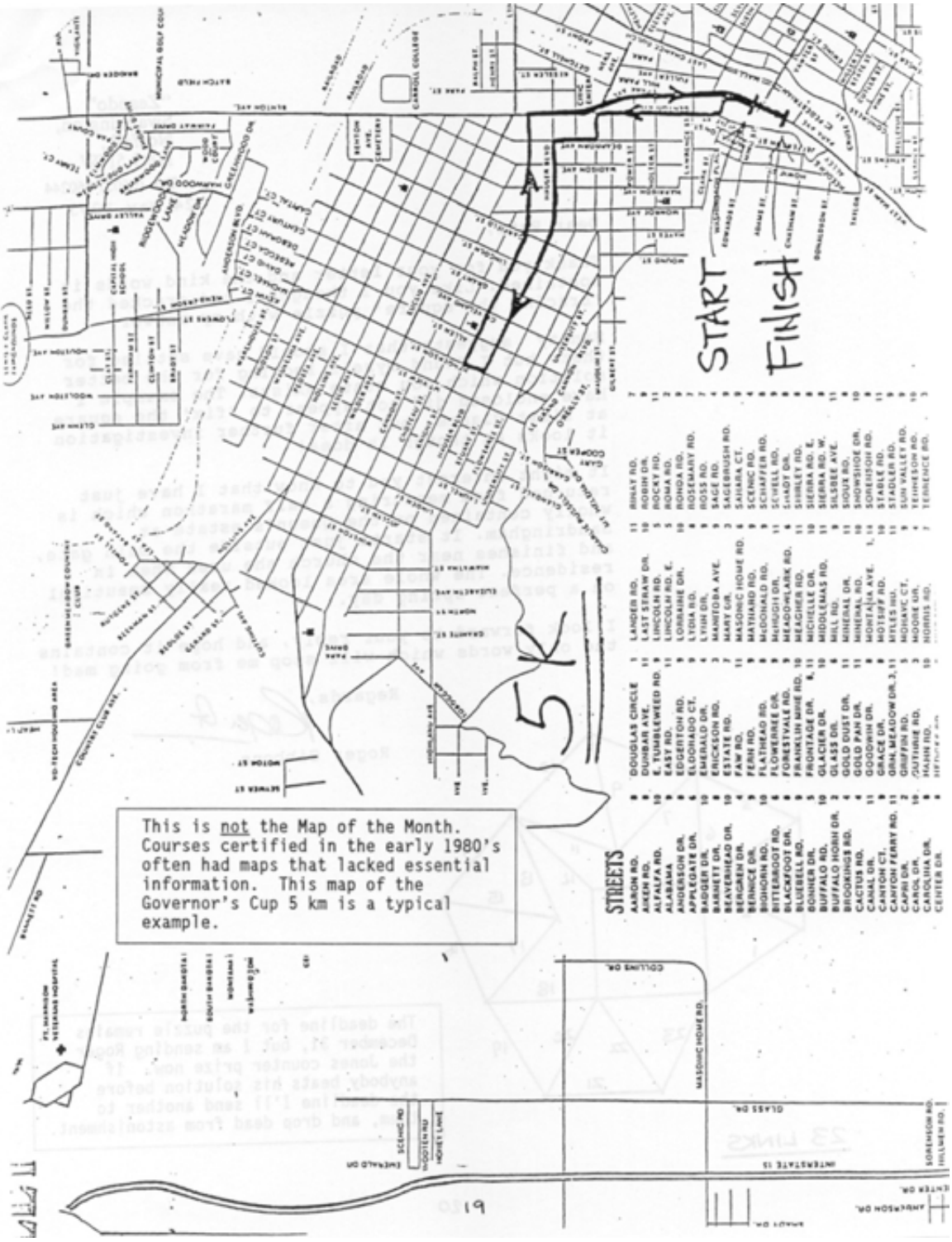
Date of Validation JULY 17, 1993

Social Security # 075-36-1982

Name, Address & Phone of Validator LEE BARRETT
3027 N.E. 20TH AVE
PORTLAND, OR 97212

(day) (503) 823-7107 (evening) (503) 284-2809

Please Attach: Copy of Course Certificate
Copy of Detailed Map of the Course
Narrative Report of Validation Activity


START
FINISH
5K
STREETS
This is not the Map of the Month. Courses certified in the early 1980's often had maps that lacked essential information. This map of the Governor's Cup 5 km is a typical example.

"Zeando"
Swannington,
Norfolk.
NR9 5NW.
Tel: (0603) 860244

24 May 1993

Dear Pete,

Thank you for your letter and the kind words it contained. Like you I thought I had cracked the 'bracing the square' puzzle with my answer.

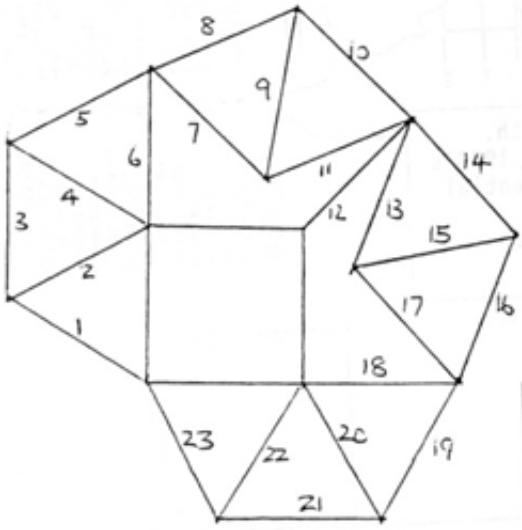
Sanity suggests that I should have settled for that, but I found myself looking for the better solution which you state exists. The example I have enclosed did not appear to 'fix' the square at first glance, but after further investigation it looks as though it does!

It might interest you to know that I have just returned from measuring a half marathon which is wholly contained on the Queen's estate at Sandringham. It starts just outside the main gate, and finishes near the church she uses when in residence. The whole area looked really beautiful on a perfect spring day.

I look forward to your reply, and hope it contains the only words which will stop me from going mad!

Regards,

Roger Gibbons



23 LINKS

The deadline for the puzzle remains December 31, but I am sending Roger the Jones counter prize now. If anybody beats his solution before the deadline I'll send another to them, and drop dead from astonishment.

USA TRACK & FIELD

Peter S. Riegel
Chairman, Road Running Technical Council
3354 Kirkham Road
Columbus, OH 43221

614-451-5617 (home)
614-424-4009 (work)
614-424-5263 (FAX, work)

June 2, 1993

Roger Gibbons - "Zeando", Swannington, Norfolk NR9 5NW - GREAT BRITAIN

Dear Roger,

Well done! You have got the solution using the lowest number I have heard of. This is not to say that there is not a better one, but I have not seen it.

Enclosed you will find a series of Martin Gardner's "Mathematical Games" columns from Scientific American, November 1963 to February 1964. They cover all I know of the puzzle. As I mentioned in my last letter, it fascinated me too.

I will publish your solutions sequentially in MN, drawing out the suspense. No point in giving the readers the whole thing in one shot.

Your half-marathon measurement at Sandringham sounds like a beautiful ride. I have a HMar pending, awaiting completion of some roadworks on one portion of the course. It's out in farm country east of Columbus, in a town called Reynoldsburg. Reynoldsburg, by their account, is the "home of the tomato," that noble vegetable supposedly having been developed there. They have an annual tomato festival there. Most small towns in Ohio have some sort of festival in the summer, to celebrate whatever characteristic the town believes it uniquely possesses. My favorite is the Mount Gilead Gourd Festival. You never saw so many useless things made out of gourds! But it's a pleasant day out in the country.

Last weekend we went to the Utica Ice Cream Festival. Utica is the home of the Velvet Ice Cream Company, and they make it rich and thick - none of your diluted ice-milk or yogurt, but good creamy heart-stopping cholesterol. Food vendors and displays of crafts and stuff were all over the place. I was fascinated by a display of old gas engines that were popping away. The people who own them spend their summers on the festival circuit, sitting in lawn chairs and enjoying displaying their stuff to the public.

We count ourselves lucky to live in a medium-big (about 1,000,000 souls) metropolitan area that is surrounded by agriculture and nothing but small towns scattered here and there. It's easy to get out to the country and see a cow. It's restorative to see a simpler-seeming world.

Best regards,

Pete

"Zeando",
Swannington,
Norfolk.
England.
NR9 5NW

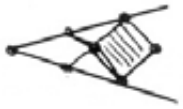
14 June 1993

Dear Pete,

Many thanks for your latest letter, and the good news it contained.

I retired early from teaching mathematics 4 years ago at the age of 52, and the fascination of your challenge was useful in exercising a rusty brain! I too thought I had cracked it with the 25 rod answer and only returned to the problem when you told me that a better answer existed.

I had come up with a potentially simple solution much earlier, but dismissed it because I could not find suitable lengths to fit.



When I returned to it, the 23 rod answer evolved quite quickly.

Joan's guess at the origin of our house name was ingenious and more interesting than the real reason. We live in a tiny village about 10 miles from the county capital of Norwich. It has a population of about 500 and being so small no one has got round to giving out numbers. We had therefore to find a name for identification. At the time we had our 2 young daughters. Their names are Zena and Donna - hence the name!

Actually our locality seems similar to yours, except of course on a much smaller scale. Norfolk is the third biggest county in England and is primarily a fertile, intensly cultivated region, except for the 3 large USAF bases! It is sparsly poulated, flat, and ideal for running. The highest point is only 100m above sea level! Come over and see us some time.

My best wishes to all our American Measuring colleagues.

Best Regards,

Roger

Roger Gibbons

USA TRACK & FIELD

Peter S. Riegel
Chairman, Road Running Technical Council
3354 Kirkham Road
Columbus, OH 43221

614-451-5617 (home)
614-424-4009 (work)
614-424-5263 (FAX, work)

June 4, 1993

Roger D'Errico - 1223 Wilshire Blvd #506 - Santa Monica, CA 90403-5400

Dear Roger,

Thanks for your note, and the copy of your article, which I received yesterday. As you requested this letter contains some corrections to the measurement portion of the article, and I am faxing a copy of this letter to Michael Shermer as you requested.

Comments on the article "Routing Criteria for the 1992 Race Across AMerica"

1) TAC exists no longer. Our organization is now USA Track & Field. This should be changed if you wish the article to be up to date.

2) You have put your finger on the right way to measure. Calibration is the key. NOTE: Minimum calibration distance is now 300 meters, no longer 1/2 mile or 1 mile. We require that the bike be calibrated immediately before and after a measurement.

3) Our procedure requires two measurements of a course, not three.

4) Your statement of our methodology was otherwise, by and large, correct.

Comments on your proposed measurement methodology

1) You will get better accuracy if you do a daily calibration of the car you use, but I suspect this will not be practical, since you'd have to steel-tape a new calibration course each time. You could use 1000 feet, which is only 10 lengths of a standard tape. This takes about ten minutes, and is not too burdensome.

2) Bike tires change their size slightly due to pressure changes in the tire, caused by temperature fluctuations and tire leakage. Because the tires are at high pressure and are small diameter, the change is usually not great - typically less than 1/1000. However, I think you will find that fat auto tires will have wider variability.

3) I doubt you will get accuracy as good as 2.9 miles out of 2900, but since it is doubtful anyone will check, go with the assumption. My guess is that you'll be within 1 percent, which is still not bad. No matter what you do, there will always remain some error. This is unavoidable.

Wind and weather will have a far greater effect on performance than does any measurement error. I applaud your effort to get it right. If I can be of further help, please get in touch. If you want to know in great detail how we do it, here is some stuff that tells you how to get the info.

ULTRA MARATHON
UMCA
CYCLING ASSOCIATION

2761 North Marengo Avenue Altadena, California 91001 (818) 794-3119
Founded by John Marino, Michael Shermer & Lon Haldeman
Michael Shermer Ph.D., Director

1993 RACE ACROSS AMERICA (RAAM)
RAAM FACTS

The Race Across AMerica is a 2900+ mile cross-country bicycle race. First held in 1982, it was featured on ABC Wide World of Sports for five years. The race has three Emmys to it's credit, including the first Emmy in Sports Programming for a cycling event. The 1991 race was featured as a documentary on the Discovery Channel in the spring of 1992. Now in its twelfth year, the race will start July 28 to August 1, in Irvine, California, and travel through nine states to the finish in Savannah, Georgia. Designed to be in the range of from 2900 to 3100 miles long, each race route is scouted and detailed in a Route Book with over 900 entries. RAAM is the world's longest sporting event. Leaders of the race average 360 to 370 miles a day.

Solo competitors must qualify for the race by competing and finishing well in one of several regional events, known as the RAAM Open series. Currently, there is an October 500 mile qualifier in California called the Furnace Creek 508, and an April 550 mile qualifier in Texas called the Tour of North Texas. Qualifiers in the Mid-west and East are pending. A winning time in these events is usually about 30 hours; a rider must finish within 15% of the winning time to qualify for RAAM. Teams may enter by paying an entry fee. In addition to teams on road bikes, this year there is a team division for Police on Mountain Bikes.

This year, approximately 45-50 single riders and 12 multi-rider teams will start the race, each expecting to complete the entire course. Because the clock never stops, the leaders will ride 20 to 22+ hours a day, taking only minimal sleep breaks. They will ride in the afternoon through the desert in heat which can reach 110+ F., over mountain passes at night where the temperature can be subfreezing, through torrential rain, hailstorms, floods, sandstorms, tornadoes, fog, and intense humidity. The race is characterized as the world's toughest sporting event; each rider will burn from 8,000 to 10,000 calories a day for the entire 8 to 12 days it takes to complete the event. After the race, recovery takes at least 4 weeks, with some riders reporting a six month recovery period.

Routing Criteria for the 1992 Race Across AMerica
by Roger D'Errico

Road Selection

After the 1991 Race Across AMerica, the need to reroute the race course on a road other than US Highway 89 north from Flagstaff, Arizona, became necessary because of a complaint by a citizen in 1990 that pace vehicles were not pulling out to let traffic pass, especially in a 10 mile construction zone. Many alternate routes were considered.

Because new routing was dictated, a set of criteria was established for any road replacing an existing section of route. Foremost in route selection is the consideration of safety for the slow moving racer and pace vehicle operating in tandem along a roadway or shoulder. To address this issue, criteria was divided into several categories with the following priorities of objection to a roadway to be taken into consideration.

1) Truck Traffic.
2) Speed and Volume of Traffic.
3) Existing shoulder and number of lanes of eastbound Traffic.
4) Condition of roadway or shoulder surface.

For each of these categories, a higher priority of objection can override the use of a roadway. So, for example, if a roadway had truck traffic, it was not considered unless a lower priority of objection justified it, such as a highway with an eastbound lane of traffic and a full width drivable all weather surface shoulder, or no paved alternate route. All prospective roads were also screened according to a subjective set of criteria while scouting the route; i.e., driving a pace vehicle under any or all of the following conditions:

1) 15 to 20 MPH.
2) At night.
3) In the rain.
4) With an interior dome light on.
5) With foggy windows and mirrors.

If I felt traffic conditions I encountered or projected on a prospective highway permitted operating a pace vehicle under the above conditions in relative safety, I usually considered the highway acceptable for the race route.

Screening criteria other than listed above included talking with local cyclists about roadway suitability, and ATD (Average Daily Traffic) statistics from state departments of transportation.

Concerns of staff also played a role in the selection of roads. Pace vehicle operation by many crews, rookie and seasoned alike, throughout the history of RAAM has been observed to be less than optimal. Pace vehicles not pulling over or driving ahead to allow

following traffic to pass on two lane roadways, and straddling the pace vehicle a foot or two into the roadway traffic lane on interstate highways, are two problems which have been cited as recurring year after year. Also noted are the problems of crew members driving auxiliary vehicles at a speed significantly less than the normal flow of traffic, and failing to dim or extinguish higher intensity roadway lighting systems for traffic oncoming towards or overtaking the pace vehicle. The concern over these issues, and adopting the above criteria tends to lead to the selection of roadways with minimal traffic, where there is a selection.

Tradeoffs between safer conditions for operating the tandem configuration of rider and pace vehicle, and truck traffic with any apparent volume, were generally not considered unless there was no alternate route. In fact, many "back roads" were incorporated into the 1992 route to avoid previous route segments with truck traffic and no lower priority of objection justification for use of the roadway as part of the route. To this extent, roadway condition was only considered if alternate roadways were not of the minimal service category "paved all weather surface". This led to the use of back roads with a wide variety of surface composition and texture, ranging from very smooth asphalt and concrete, to very rough large aggregate chip and seal.

Over 10,600 miles were driven to scout the 1992 route and establish 1,600 new miles of routing. Because about 600 of these miles were on roads with no alternate routes, over 6,800 miles were driven to scout the remaining 1,000 miles, or almost seven miles driven for every one mile of new route. Because of this intensive scrutiny, the resulting RAAM route for 1992 had less truck traffic, and less overall traffic than any previous RAAM route.

Accuracy of Measurement

There are many ways to obtain mileage for route book splits. Sometimes splits can be found printed on maps, or even measured from a map scale. If a map has a large enough scale and the area has been laid out in square mile sections, approximations can be made to the nearest mile or fraction of a mile. If the route is driven before the event, mileage can be taken from the car's odometer by noting cumulative mileage at a checkpoint, or trip odometer by resetting the odometer at each checkpoint. After market odometers can be installed which can have resolutions up to 1/1000 of a mile.

Using map splits, or measuring splits from a map is not an accurate means of obtaining mileage for a route. Map splits might be used to determine the distance of a detour set up after a route has been measured more accurately. Since car odometers installed by the factory typically have an error of 3-4%, and in some cases as high as 9% or more, using a car odometer has the potential of producing a staggering cumulative error; 3% of 2900

miles is 87 miles. Imagine thinking you had ridden 2900 miles, only to be told later that it was really 2813 miles, or 2987 miles. An error of 1% could mean 2 hours difference in final time. Car odometers must be calibrated to a known distance. If the odometer has an error, then each mileage split must be corrected using the calibration factor - easily done with a computer. Even after market odometers must be calibrated, but they have the advantage that once they have been calibrated, the error correction is done internally.

Accurate known distances can be difficult to identify. Using a length of highway with mileage markers can have drawbacks. In some states the standard deviation of the distance between highway mileage markers can be significant, which shows that the markers were not accurately spaced. Even if highway mileage markers are evenly spaced, the means of measurement comes into question. Some states use vehicle odometers to place mileposts, with the disadvantages stated above. Other states use a length of chain, and all the chains are measured against a single surveyed course. But even a surveyed course can be inaccurate, depending on the method of measurement used. Whatever the means, a marked mile of exactly 5280 feet, or an accurate marked distance of any length, may be difficult to find.

The Athletics Congress (TAC) is the sanctioning body in the US for track and field events. They have established an accurate method for measuring longer distances on irregular courses, such as a marathon route. They use a reference of 1/2 mile or 1 mile measured on a calibration course which has been certified. Certification consists of measuring the calibration course with a 100' steel tape which has a known thickness and width. The tape is stretched for each 100' measurement with a spring scale to a known tension. The ground temperature is also measured, and an adjustment factor is computed for expansion or contraction of the tape due to any variance of ground temperature from 70 degrees F. By this method, a relatively accurate mile or 1/2 mile can be established.

The measurement of an actual course by TAC methods involves using a device called a "Jones Counter." The Jones device mounts on the front wheel of a bicycle, and clicks 20 units per wheel revolution (about 4 1/4"). The wheel is inflated to a known pressure and, using the Jones device, the calibration course is ridden three or more times until a consistent count (average count) is obtained with the device. For courses upon which records are anticipated, an error factor may be added to the average count, equal to 1 in 1,000, or 1 in 10,000, depending on the event and anticipated record. With an error factor of 1 in 1,000, a running course of 10,000 meters (10k) would actually be 10,010 meters. This is done so that the officials and organizers of an event can certify without a doubt that the minimum stated distance was completed over the event course.

Once the average count and error factor have been determined, the competition course is ridden with the bicycle at least three

times, using the shortest possible route (SPR). The SPR is measured a given distance from the inside edge of the course on each straightaway or curve, and on a straight-line tangent from curve to curve. The distance measured from the inside edge of a curve or course varies from sport to sport: for the inside running lane on short track events it is 30 centimeters, and 20 centimeters for all other lanes (short courses are measured with a steel tape instead of a bicycle); for roller skating it is 30 centimeters; for cycling it is 40 centimeters. This method was used to measure the bicycle road course for the 1984 Olympics.

After measuring the course, the bicycle is returned to the calibration course, and the course is again ridden at least three times to insure that the original calibration is still accurate. If the bicycle wheel has lost air during a course measurement, the leak must be repaired, and the entire process repeated.

Measuring the RAAM Route

The calibrated bicycle method of measurement, while very accurate and practical for courses and loops of marathon length (26 miles), is not practical for measuring a RAAM course. A similar method using a car, however, can produce accurate results. For scouting the 1992 RAAM route, an after market odometer made by Halda, called the RALLY COMPUTER, was installed in the scout vehicle. The tires of the vehicle were inflated to 36# PSI cold and heated to driving temperature by driving at speed for at least 5 miles, and then the vehicle was driven over a TAC certified 1/2 mile five times, at varying rates of speed, from 20 MPH to 45 MPH. Each pass over the certification course produced a calibration factor of 20.16 counts. To calibrate the odometer, this factor had to be divided into 100, and the result multiplied by the distance measured, yielding a constant calibration number.

$$2.4801587 = \frac{100}{20.16} \times .5 \text{ mile}$$

A calibration number for measuring whole tenths of a mile was also determined.

$$24.80158 = \frac{100}{20.16} \times 5 \text{ whole tenths of a mile}$$

Because the Halda RALLY COMPUTER measures two decimal places, calibrating to whole tenths of a mile will yield measurement increments as small as 1/1000 of a mile (5.280 feet).

The 24.80 calibration number was entered into the RALLY COMPUTER, and the mileage initialized to zero. The calibration course was again driven a number of times, measuring exactly 1/2 mile on the RALLY COMPUTER. This measured distance proved to be consistently about 2.6 feet over the certified course distance. Since this was very close to a 1 in 1,000 error factor added to the certified

half mile, no further correction was made, and a 1 in 1,000 error factor was assumed. This resulted in a calibrated RALLY COMPUTER odometer which, for every actual 1,001 miles, stated the distance as 1,000 miles, or +0.1% accuracy.

When driving the course, the tires of the scout vehicle were checked cold every morning, and adjusted to 36# PSI. Atmospheric pressure due to driving at altitudes up to 8,000 feet was not taken into consideration, but was expected to cause an insignificant difference. After stopping any large length of time, the scout vehicle was driven backwards along the course to bring the tires back up to driving temperature before continuing measurement. While driving the course, the speed of the scout vehicle rarely exceeded 45 MPH. Upon returning to the original calibration course, the initial calibration procedure was repeated, yielding the same results.

Since the course was driven only once, it means that it can only be declared with a great amount of certainty that the stated mileage of 2909.2 miles for the 1992 RAAM course was indeed completed by the competitors who finished that race, and that the actual mileage is closer to 2912.1 miles, or +2.9 miles. Because the calibration numbers for the RALLY COMPUTER were calculated to four significant digits and the remainder truncated, the margin between stated and actual distance could be slightly lower by a couple of hundredths of a mile.

When contingency prizes are offered based on a time difference from a RAAM record on a previous, different course, accuracy of this precision is essential. Precision accuracy is also essential for other types of UMCA records as well.