# Measurement News

AIMS January 1998 Issue #87

Bob Letson (foreground) and Ted Corbitt at the measurement of the 1995 New York City Marathon. Ted needs no introduction. More about Bob inside.

# BOB LETSON

This is an unauthorized recollection of some of what I know of Bob Letson. I suspect if I mentioned that I was going to do this piece I would not get his approval. He's not a glory-hound. Still, I have long admired his positive qualities, and I think it is instructive for us to learn about someone who, in the early days, carried the load, and continues as a measurer to this day.

During the period 1973 to 1982 Bob purchased over 130 Jones Counters from Clain Jones, distributed them to primarily west coast measurers (Bob lives in San Diego), and instructed them in the techniques of accurate course measurement. This period is lost in the mists of time, as there was no newsletter or any other publication to chronicle this activity. Bob simply took the instructions of Ted Corbitt, the sole certifier in the US at that time, and showed people how to comply with them. As a result of his work California had a big head start over the rest of the nation in the production of accurate, well-measured courses.

At that time there was no universal certificate. Older readers may remember that in the early 1970's not everybody had access to copiers, calculators, and computers. Ted's "certificates" were typically hand-typed half-sheets of paper, normally a carbon-copy, attesting to the accuracy of the course. Because Ted was overwhelmed with applications in the late 1970's, and because he typically received applications with many varied pieces of paper, he often got behind, causing delay.

Bob correctly perceived the problem, and reasoned that if Ted got something simple and easy to deal with, approval would be faster. Bob designed a one-sheet-of-paper format (used, with slight modification, today) which simply required Ted to sign his name and mail it back. This did a lot to speed up things in Southern California. Bob greatly admires Ted, as do I.

Bob was most active in his home city of San Diego. I learned of his existence when, in 1978, I was selling a small cardboard race-pace computer which allowed a runner to predict a time at one distance based on a time at another distance. I received a letter from Bob, in which he sent me a similar calculator which he had designed and was selling. Neither of us made much money at our ventures. But the correspondence grew, and with it a prickly friendship.

Bob used to publish a small xerocopied book *Certified Courses in San Diego*, which contained maps of all the (100 or so) San Diego courses. Bob's beautiful map style, which shows the road width with the measured path, is today's preferred format. When USATF (then TAC) changed the layout requirement to include the 1.001 short course prevention factor, all existing courses were decertified. I am sure this was a great discouragement to Bob, as he had invested the better part of a decade in measurement. Others also lost courses, but none so many as Bob.

I began measuring in 1982, and when the 1984 Olympics was to be held in Los Angeles, received an invitation in 1983 to come and help measure it. Although John Brennand was nominally in charge, Bob was the principal point of contact for us measurers. Bob coordinated the production of the measurement report, which took six months of heated discussion with me and Bob Baumel before it was done. He produced a final report which was the first of its kind. Never before had an Olympic Marathon been as well-documented as was ours.

The 1988 Olympics were held in Seoul, and Bob went beforehand as a representative of RRTC, to an IAAF measurement seminar held there to check out the course. While the seminar group, for unclear reasons, was unable to measure the entire course, the Koreans later did it well, and used Bob's report as a model for their own.

Bob attended the 1994 measurement seminar held in Phoenix, and as usual impressed people with his flow of new ideas and his measurement competence. He remains an RRTC Final Signatory.

I like him and admire him for the work he has done and continues to do. If he is embarrassed by this, I'm sorry, but I believe he deserves some recognition. Well done, Bob.

# HOW WELL DO WE MEASURE?

RRTC has had a validation program in effect since the early 1980's. It was instituted by Ken Young when he was keeping our records unofficially as the "National Running Data Center." NRDC was incorporated into TAC (now USATF) in 1982. We continue to check many courses on which record times are run.

The early 1980's was a time of transition. When the requirement for a 1.001 short course prevention factor was instituted in 1981 or 1982, it took a few years for the word to spread. Early validations show a disproportionate number of short courses. By 1986 things had smoothed out.

I took a look at all the courses measured in 1986 or later that we have validated, and by using the course list to determine measurer experience, was able to couple measurement performance with measurer experience. The results of the analysis may be seen on the next page.

Some obvious conclusions:

1) The data looks like a nice bell-shaped curve, beloved of statisticians. We see that courses, on the whole, come out to 1 m/km oversize, just what we would hope for.

2) Measurers get better with experience. Until measurers have done 20 to 30 courses, their failure rate (short courses) climbs fast, leveling out once the 20-30 plateau is reached. Does this have implications for IAAF/AIMS, where many "B" level measurers have less experience? An IAAF/AIMS course is accepted as accurate based on a single measurement.

3) Certifiers, by this measure, have three times the measurement experience of non-certifiers. Certifier-measured courses measure out longer than non-certifier-measured courses by about 0.5 m/km, which explains why the success rate for certifiers is 95 percent as opposed to the non-certifiers' 84 percent.

4) In addition to producing slightly longer courses, certifiers exhibit less variation in their measurements. They are more consistent.

We don't consider a course "shown" to be short unless it remeasures 0.5 m/km less than the advertised distance. By this measure we are 89 percent successful in producing record-quality courses. Is this good? Compared to what? Is there a way to improve? An obvious answer would be to increase the size of the SCPF, but even doubling it would only increase the success rate slightly. Some courses come up short through blunders, not bad riding, and no SCPF can cover all mistakes.

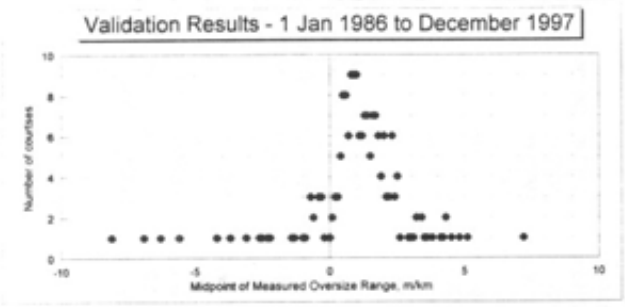
My feeling is that we are OK as we are, but I may be missing something obvious.

There is very little data about remeasurement of courses outside the US. I hope somebody begins a program of checking, as it will be interesting to see how things compare.

I am not a statistician, and I believe what I have done is about as far as I can go. However, the database I used is available to anybody who asks. I can send it by mail, fax, or email. I hope somebody wants to take a shot at doing a better job of this analysis than I have.

Pete

# COURSE MEASUREMENT PERFORMANCE AS MEASURED BY US VALIDATIONS 1986 TO PRESENT



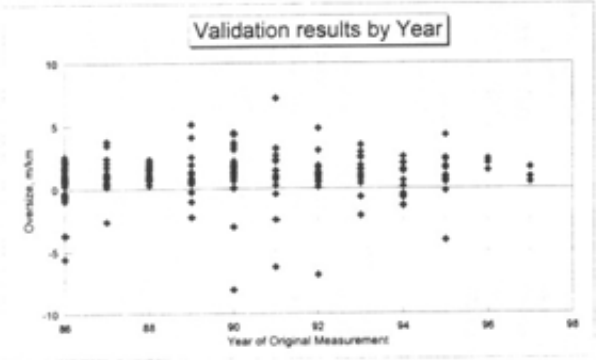

**Overall performance:**

| | Measured by Noncertifier | Measured by Certifier | Combined |
|---|---|---|---|
| number | 102 | 87 | 189 |
| Average over, m/km | 0.77 | 1.35 | 1.04 |
| Standard Dev, m/km | 2.19 | 1.29 | 1.85 |
| **With zero tolerance for shortness:** | | | |
| OK | 81 | 81 | 162 |
| short | 21 | 6 | 27 |
| Percent OK | 79.4 | 93.1 | 85.7 |
| **At the -0.5 m/km level:** | | | |
| OK | 86 | 83 | 169 |
| short | 16 | 4 | 20 |
| Percent OK | 84.3 | 95.4 | 89.4 |



Courses validated = 189
95 measurers, 30 validators
Maximum number validated by one validator = 51
Maximum number measured by one measurer = 10
Average experience level of certifier-measurers = 122 courses measured
Average experience level of non-certifier-measurers = 39 courses measured

| Courses Measured | Total Number | Number OK | Number Short | Percent OK at zero short | Average Over, m/km | Std Dev |
|---|---|---|---|---|---|---|
| 0 to 5 | 36 | 25 | 11 | 69.4 | 0.08 | 2.79 |
| 6 to 20 | 32 | 26 | 6 | 81.3 | 0.63 | 1.51 |
| 21 to 50 | 42 | 37 | 5 | 88.1 | 1.23 | 1.66 |
| 51 to 100 | 25 | 25 | 0 | 100.0 | 1.79 | 1.46 |
| Over 100 | 53 | 48 | 5 | 90.6 | 1.42 | 1.21 |




This summary is based on a database created by Pete Riegel using the list of certified courses, as it existed in December, 1997, and the list of validations performed from 1982 to present. Because the range 1982 to 1986 was a time of transition from zero layout oversize to 1.001, the data from 1986 to present was taken as representative of what we are doing.

The data exists in a Lotus 1-2-3 file, which may be obtained by contacting Pete Riegel, who hopes others will attempt similar analyses.

The data is also available as a text file, or as a printed paper.

Knowledge of what we have done will lead to knowledge of what we ought to do.

Date of this analysis: December, 1997

12/01/97

# USATF RRTC VALIDATIONS
## 1997 Activity Report

**Validations Completed**

| Pass/ Fail | Date of Race | Date of Validation | Course Name | Course ID | Measurer | Validator | Type of Race | Advertised Distance | Nominal Distance | Measured Distance | Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 17 Nov 95 | 31 May97 | Gibson Ranch | CA94032CW | Scott | K. Young | LDR | 0.84734 mi | 0.84734 mi | 0.84945 mi | 0.25 |
| P | 17 Sept95 | 11 Jan97 | Tradewinds Park | FL88001DL | Millspaugh | Loeffler | RW | 2500 m | 2500 m | 2505 m | 0.2 |
| P | 18 Oct 92 | 7 Sept97 | U.W. Parkside | WI90008WG | Grass | Wight | RW | 2000 m | 2000 m | 2004.36 m | 0.22 |
| P | 17Sept95 | 28Sept97 | Phil Distance Run | PA94016RE | Bellville | Hronjak | LDR | 21097.5 m | 21097.5 m | 21127.9 m | 0.14 |
| F | 29 Sept96 | 4 Oct 97 | Monterey Bay Beacon | CA90040CW | Oerth | Young | LDR | 10000 m | 10000 m | 9969.49 m | -0.31 |
| F | 13 Oct96 | 4 Oct 97 | Primo's Run for Education | CA93018CW | Hurd | Young | LDR | 5000 m | 5000 m | course not certified as run | |
| P | 15 Dec96 | 2 Oct 97 | Palm Desert | CA95052RS | Scardera | Young | LDR | 5000 m | 5000 m | 5007.84 m | 0.16 |
| P | 26 March97 | 10 Nov97 | Azalia Trail | AL86007WN | Nicoll | Harrison | LDR | 10000 m | 10000 m | 10021.7 m | 0.21 |
| P | 22Feb97 | 3 Mar97 | Tomball Classic | TX97008ETM | Barnhill | McBrayer | LDR | 12000 m | 12000 m | 12019.7 m | 0.16 |
| P | 18 Oct97 | 23Nov97 | First of America 10 mile | FL97014PR | McDowell | Loeffler | LDR | 10 mi | 10 mi | 10 mi, 145 ft | 0.17 |
| P | 10 May97 | 25Nov97 | Arts Fest River Run 12 km | IN97004MW | Stegemoller | Riegel | LDR | 12000 m | 12000 m | 12006 m | 0.05 |
| P | 16 Nov96 | 14Nov97 | Helen Klein | CA96013CW | Scott | Young | LDR | 50 mi | 50 mi | 50.013 mi | 0.02 |
| | **Validations Pending** | | | | | | | | | | |
| | 12 July97 | | Pacificare Bastille Day | CA97035RS | Scardera | | LDR | 8000 m | 8000m | | |
| | 18 Jan97 | | Jed Smith Ultra 50 km | CA97004KY | Young | | LDR | 50,000 m | | | |
| | 20 Oct96 | | Chicago LaSalle Bank | IL95061JW | Pinkowski | | LDR | 42195 m | 42195 m | Course unavial. until 1998 | |
| | 31 May97 | | Frihoffers | NY96008WN | Nicoll | Wickiser | LDR | 5000 m | 5000 m | | |
| | 8 Mar 97 | | Gate River Run | FL97009DL | Alred | Loeffler | LDR | 15000 m | 15000 m | | |
| | 2 May 97 | | Indianapolis Life 500 | IN94010PR | Riegel | Wickiser | LDR | 21097.5 m | 21097.5 m | | |
| | 3 May97 | | K.U.S.24/48 Hour | KS96008BG | Demaree | Richardson | LDR | 0.5 mi | 0.5 mi | | |
| | 14Sept97 | | Nat. Heritage Corridor 25K | IL96052JW | Hinde | | LDR | 25000 m | 25000 m | | |
| | 27 Sept97 | | Park Ridge Charity Classic | IL96062JW | Parson | | LDR | 5000 m | 5000 m | | |
| | **Courses Reviewed** | | | | | | | | | | |
| P | 1 Sep97 | 6Sept93 | New Haven 20 KM | CT91001WN | Guido Bros. | Nicoll | LDR | 20000 m | 20000 m | 20014 m | 0.07 |
| P | 20 Oct96 | 20 Nov 93 | Humboldt Redwoods Half | CA94001CW | Knight | Wisser | LDR | 42195 m | 21097.5 m | 21118 m | |
| P | 6 Oct 96 | 26Jul 91 | Twin Cities Marathon | MN90017RR | Recker | Wickiser | LDR | 42195 m | 42195 m | 42233 m | |
| P | 13Apr 97 | 9Aug 92 | Carlsbad | CA93001WN | Nicoll | Nicoll | LDR | 5000 m | 5000 m | 5005 m | |
| P | 19 Sept97 | 24 Oct 95 | Chili's Forrest Park Scenic | IL94053JW | Nair | Wickiser | LDR | 10 mi | 10 mi | 10.013 mi | |
| P | 18May 97 | 16Oct93 | Bay to Breakers | CA92003TK | Knight | Nicoll | LDR | 12000 m | 12000 m | 12014 | |
| P | 10May97 | 14Nov93 | Old Kent River Bank 25km | MI95012SH | Dewey | Review | LDR | 25000 m | 25000 m | 25020 | 0.08 |
| P | 26 March97 | 22Mar97 | Azalia Trail | AL86007WN | Nicoll | Harrison | LDR | 10000 m | 10000 m | 10021.7 m | 0.21 |
| P | 26Sep97 | | Sri Chinmoy | NY92005DB | Brannen | Thurston | LDR | 1.0 mi | 1.0 mi | 1 mi 3.1 ft | |
| P | 14Jun97 | 15Nov89 | Crocheron Park | NY88002DB | Brannen | Nicoll | LDR | 1.220325 mi | 1.220325 mi | 1.220325 mi | |
| P | 27 Sept97 | 19Sept93 | Olander Park 24 hr. | OH93054PR | Standish | Wickiser | LDR | 1.124 mi | 1.124 mi | 1.1256 mi | |

# IAAF/AIMS MEASURERS - PLEASE WRITE

Many foreign measurers are new to *Measurement News*. Some of you have been receiving it for years. *Measurement News* is your forum. *Measurement News*, and other measurers, need your opinions. You can help measurement improve if you send something to *Measurement News*.

Please do not worry about using perfect English. Most of us Americans do not use perfect English, yet we understand. We want to know what you think. New ideas can improve what we are doing. The Editor can handle Spanish if the sentences are short and simple.

Please contribute. We want to know your opinion

## A PROBLEM

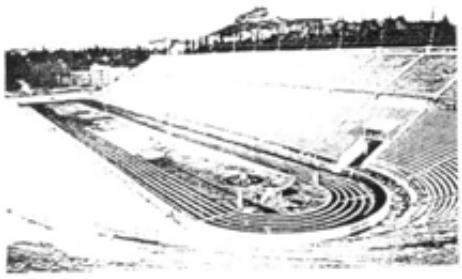
Pete Riegel received an inquiry concerning a person in Bolivia who wished to become an approved IAAF/AIMS course measurer. He was not sure how to begin. Normally a person first attends a seminar, and receives instruction, then goes on to measure. There is no mechanism to handle a new person without ready access to a seminar. Pete told the person to contact Rodolfo Eichler, IAAF/AIMS Measurement Coodinator for South America. With Pete and Rodolfo working to help the Bolivian, perhaps we can find a way to get him started before his enthusiasm wanes.

In the USA, any person can become a measurer, and get his courses certified, by reading a book and following the instructions. A certifier reviews the paperwork and issues a certificate if the paperwork is correct. No person-to-person instruction is required. The new person learns by measuring. This option does not presently exist in IAAF/AIMS measurement. Should it? If it did, it would offer a solution to our Bolivian's problem.

In US experience, new measurers make more mistakes than experienced measurers, yet still get their courses correct most of the time, and serious errors are rare. As they gain experience they improve. By allowing people to teach themselves we have a constant stream of new measurers available to do the work.

No figures are available to assess whether the IAAF/AIMS approach produces better measurement, as very few foreign courses have been formally validated. In the US the measurers are not required to be members of USATF, our federation. It is enough that they can do the work. The measurer gets to measure, and the federation, and the sport, benefit. In most foreign countries the culture is different, and strong federation control is exerted. This works well in some countries. It's not clear whether the US system would work in other countries.

There are many possible approaches to the training of new measurers. **Do you have an opinion?**



Malcolm Heyworth sent a photo, saying "It's of the Athens Olympic stadium used in 1896 and 1906 and shows how sharp the turn was (singular because the turn at the open end of the stadium seems to be squared). The 6th/outer lane pretty much butts up against a three-foot high outer wall! I don't know when the shot was taken but it's clearly not a century old. The Zappeion, another Olympic venue, just outside the open end of the stadium, is missing. The fencing was held there, including the foil for "Masters" (a euphemism for pro's). The gymnastics and wrestling were held in the stadium infield, confined by width as it is. The wrestling began after the mayhem of the marathon finish (the only Greek T&F victory, in the final event!) and, in the gathering gloom (light-wise, not spirit-wise), had to be completed the following day."

# Minutes — Road Running Technical Council
# USATF National Convention — Dallas, TX — Dec 5, 1997

**Attending:** Bob Baumel, Andy Beach, Norman Brand, Sharon Good, Bill Grass, Norm Green, Dave Gwyn, Finn S. Hansen, David Katz, Jim Knoedel, Carol Kuo, Justin Kuo, Bob Langenbach, Tom Light, AC Linnerud, Mary Anne McBrayer, Tom McBrayer, Robert C. Platt, Bob Podkaminer, Joan Riegel, Pete Riegel, Don Shepan, Ric Wilson

The meeting was called to order by Chairman Pete Riegel at 13:05. All present introduced themselves. Considering that many of our officers were not present, Pete decided to dispense with formal officers' reports, but asked Bob Baumel to comment on Internet activities:

**Internet Activity (Bob Baumel, Webmaster):** As decided at last year's Convention, RRTC's world wide web pages, which in 1996 had been part of the Road Running Information Center (RRIC) website, were moved in Dec 1996 to a separate site operated by Bob in order to keep them more current. The present RRTC website at

**http://www.pcok.com/~bobbau/rrtc/**

includes complete downloadable course lists, information on how to measure and certify a course, the current list of Certifiers with contact info, downloadable measurement software, info on RRTC publications & products, late-breaking news from RRTC, and links to related sites. A recently added feature is access to Pete Riegel's "current" list; i.e., the list of courses certified since the last bimonthly update to the full list. In the year since Bob began maintaining this site, we've been averaging about 6.3 hits per day to the RRTC Home Page and 3.05 hits per day to the RRTC Downloading page.

Bob also commented on **MNForum**—the RRTC Email List, begun in June 1997 and operated by **Jim Gerweck** of Norwalk, Connecticut. Participants in this group post messages about course measurement (or any vaguely related topic), which are collected by Jim and broadcast by email to everybody on the list. There is a page describing MNForum on the RRTC website. Shortly before our meeting, Bob and Jim exchanged some correspondence on the idea of creating an archive of past MNForum postings that would be available for browsing through the Internet. Reactions at the meeting suggested that it might be a good idea, but we must take care not to make Jim's task in maintaining MNForum so burdensome that he burns out. Jim will decide if he wishes to create an MNForum archive in addition to the daily MNForum mailings.

**Course Map Requirements:** Western Vice-Chairman **Tom McBrayer** had requested several agenda items relating to course certification requirements. First, he proposed a policy that **Certifiers should always write the certification number on the course map.** All agreed that this is a good idea, to help identify the certification in case the map becomes separated from the certificate. Therefore, it was adopted as RRTC policy.

Tom reminded everyone of existing requirements that the course map must **document all restrictions,** including precise locations relative to permanent landmarks of all required cones/barriers, etc. (And if there are **no** restrictions, this should be stated on the map.)

Tom also raised the subject of **minimum calibration course length**, which according to our manual, should be at least 300 meters for an on-site "throw-away" calibration course, or at least 500 m for a permanent calibration course. Pete Riegel explained, however, that 500 m is only a *recommended* minimum for permanent calibration courses. Our procedures allow any calibration

course, temporary or permanent, to be as short as 300 m.

**Measurement by Pacing Contest:** Awards for the 11th Annual *RRTC Measurement by Pacing Contest* were handed out by **Andy Beach**, who laid out the course, and by Texas Certifier **Tom McBrayer**. In each of the previous ten years, the Convention had included two RRTC meetings, so the contest was announced at the first meeting, and awards presented at the second. Since there was only one RRTC meeting this year, participants had to learn about the contest by word of mouth or by seeing announcements on bulletin boards, prior to our meeting where winners were declared. Even so, 17 contestants paced off, or otherwise estimated, the length of the loop that Andy laid out in front of the Meyerson Symphony Center, four blocks from the Convention hotel. The top five estimators present at the RRTC meeting had their choice of prizes supplied by Tom McBrayer. First place winner **Bill Grass** chose the box of P-K nails; the next four finishers received choice Texas delicacies. In addition, Bill was awarded a special prize by **David Katz**, namely, a piece of the 1996 Atlanta Olympic track.

**Post-Validation Adjustment Policy:** Pete Riegel announced the following policy on post-validation adjustments (printed in the meeting agenda): *On validations, if the course turns out to be 1.001, or more, oversize, leave it alone and note that it may be considered as "prevalidated" for the next race. If it passes, but is less than 1.001 oversize, adjust the course to the full length, void the original certificate, and create a new one with the note that the course is considered prevalidated for future races.* This provoked a great deal of discussion. David Katz asked: If the Short Course Prevention Factor is supposed to prevent the course from being found short in validation, why should an *additional* SCPF be applied after the course has passed validation? Several others expressed concern that courses may get longer and longer as a result of this policy.

In responding, Pete made it clear that the printed statement above failed to completely describe the intended policy. In particular: *If the course passes validation, but is less than 1.001 oversize, then the race director is given a choice: The course can be adjusted as described above and considered prevalidated for future races; or it can be left as is, retaining its previous certification. But in the latter case, if future records are set on this course, it will have to be validated all over again.* (Note: Pete had written an explanation of this policy in Nov 1997 *Measurement News*, pp 5-6.) Bob Baumel tried to clarify this further by explaining that it is purely a statement as to when courses can be considered **prevalidated** for future races, but does not in any way alter current interpretation of post-race validation measurements.

Pete also noted that in the course list, a new "status code" will be added to indicate courses that have been prevalidated for future races.

**Multiple Distance Certificates:** When a measurer has drawn several courses on a single map, should the Certifier issue a single certificate for all of those courses? Some Certifiers always write a separate certificate for each course; others routinely combine multiple courses on the same certificate. According to Pete, this agenda item was prompted by a question about the **fees** charged by Certifiers. If a Certifier charges $25 per certificate, and always writes a separate certificate for each course, the fee might be considered excessive for a group of related courses (from a single measurement), as the effort needed in reviewing these courses may be considerably less than in reviewing the same number of unrelated courses.

In discussion, it was observed that, apart from the current issue of fees, there may be good reasons to write a separate certificate for each course (or at least, assign every course a unique

certification number). For example, it may be difficult to squeeze all the required information for each course (such as drop & separation) onto a single, combined certificate. Bob Baumel noted that, even in a set of related courses from a single measurement, the courses may suffer different fates over time; for example, one course may get destroyed by construction and be decertified, while others remain valid. This can be difficult to keep track of if both are on the same certificate and, especially, if they share the same certification number!

Moreover, the issue of fees isn't necessarily tied to the number of certificates. Ric Wilson observed that even if a certifier issues a separate certificate for each course, this doesn't mean that he/she must charge the full fee for each one! Ultimately, Pete simply urged Certifiers to make sure they aren't perceived as overcharging.

[Note from Minutes scribe, considering policy that Certifiers must always write the certification number on the map: If several courses are combined on a map, and if the Certifier assigns a separate number to each course, then all certification numbers must be written on this map. This applies whether the Certifier writes a single certificate or separate certificates for the courses.]

**Chip Timing Discussion:** An extensive discussion was held about use of "chip" (also known as "transponder") timing systems, with emphasis on the "ChampionChip" system that has been used at many races [Note: If you have Internet access, you can view the ChampionChip home page at http://www.championchip.de/cchome.htm, and you can also read an explanation of how it works at http://www.doitsports.com/running/results/boston/faq.htm]. **Tom** and **Mary Anne McBrayer** described experience using a ChampionChip system, as they had formed a company to time races with it. At the time of this meeting, they had timed only one event using it—a 25 km race. They noted that when you have chip timing, everybody wants their "chip time;" i.e., their own personal elapsed time from starting line to finish line. Currently, the McBrayers have only one chip timing system (set of mats, controllers & computers), so they must set it up at the start and then move it to the finish during the race. Among problems encountered in their 25 km race, the Start was on a metal bridge where electromagnetic interference prevented the chip system from working. This required a last-minute adjustment to the certified course (re-location of start) in order for the chip system to function.

Many questions were raised about resolution, accuracy, and reliability of the ChampionChip system (e.g., David Katz asked many questions; as operator of a finish line company that times about 100 races per year, he wanted to know whether it's time to invest in this technology yet). The mats are 1 meter wide but, apparently, a runner's shoe may be detected several times as it passes over a mat; the system then tries to compute the most likely time when the runner crossed the center of the mat. Each system includes a backup set of mats and controllers which are set out behind the first set, but even so, some runners may be missed entirely. The McBrayers, as well as others who have used this system, reported that some runners were missed and needed to be recorded manually (This even happened at the Olympics, according to Bob Podkaminer). A purported advantage of chip timing is the opportunity for a more open finish area, without big arrays of chutes. Indeed, races that use this system may limit conventional tag-pulling to only the first 50 to 200 finishers (which means that later finishers don't pass through a chute at all). Select timing may be continued throughout the race. Finn Hansen pointed out, however, that if the chip timing fails, select times alone are not a complete backup; without a list of finishers from tag-pulling, you can't interpolate between the select times.

The possibility of recording a "chip time" (i.e., elapsed time) for every runner raises the question

whether these can be accepted as *official* times. Current rules clearly require official times to be measured from the gun. Pete's agenda item suggested that "many age-groupers are agitating to have elapsed time, rather than gun time, be official." Norm Green emphasized that *not all* age-groupers want elapsed times to be official! Most participants in our discussion seemed to prefer traditional running competition based on gun times, and some pointed out seemingly strange scenarios that might occur if elapsed times are used. However, Bob Podkaminer urged people to be aware that the sport is evolving with new technology, and there may come a time when starting guns have disappeared entirely.

**Validation Includes Calibration Course Check:** Pete reminded us that in every validation measurement, the validator must either lay out a new calibration course or check the length of the existing one. Never simply assume that the calibration course used for measuring the original race course was accurate.

**Non-Discussion:** The agenda stated "No serious discussion of the Millennium, date formats, or Greenwich Mean Time is anticipated." We did indeed refrain from discussing these topics.

**New Certified Course Logo for Race Flyers?** Interest has been expressed in designing a new logo that race directors can display on flyers to indicate that the course is certified. Reactions at the meeting suggested that this is unnecessary because we already have a perfectly good method of identifying certified courses, namely, their certification numbers. Also, the existence of such a logo may invite more false advertising by races claiming that their course is certified when it isn't. This raises the question: who will police use of the logo?

[Note from Minutes scribe: Although not suggested at the meeting, a possible solution might be a logo that requires the certification number to be used with it; e.g., the logo might have a big blank space in the middle where the certification number must be filled in.]

We held an informal ballot on the desirability of such a logo. One person voted in favor, two against, and everybody else voted that they "don't give a hoot."

**New Business from Floor:** Bob Podkaminer announced that if anybody needs a wind gauge, he has available Kestrel Pocket Wind Meters (Kestrel 1000), which he sells for $109. Bill Grass asked about the accuracy of electronic sighting distance measuring devices sold at consumer outlets such as Sears. Pete urged Bill to check it out. There was some discussion about the accuracy of GPS (Global Positioning System), which has been used at some races to monitor positions of the leaders. Ric Wilson, who works for the US Geological Survey in Alaska, explained that GPS *can* be accurate to 1 mm if the measurement uses 12 satellites, and base stations, and military codes; however, the accuracy obtainable using available civilian equipment is much less (uncertainty of 10 m or more). Ric also indicated that all USGS maps will soon be available in electronic form, including downloading through the Internet. He noted that current electronic sources of rough street maps, such as the *MapQuest* website (www.mapquest.com) and *Street Atlas USA* CD-ROM, will soon contain much more accurate information, thanks to online geographic data from USGS. For information on USGS projects, check out their website at http://www.usgs.gov/ (You can even find Ric in their online employee phone book!).

The meeting was adjourned at 15:30.

*Minutes prepared by Bob Baumel, RRTC Secretary*

## 1997 Measurement-by-Pacing Contest
## USATF Convention - Dallas, Texas

**Official Distance: 98.989 meters**

| | Estimated Meters | Meters Error | Percent Error | Place |
|---|---|---|---|---|
| Bill Grass | 98.93 | -0.06 | -0.06 | 1 |
| G (Gerardus?) Mercator | 98.30 | -0.69 | -0.70 | 2 |
| Wayne Armbrust | 97.56 | -1.42 | -1.44 | 3 |
| Bob Baumel | 101.59 | 2.60 | 2.63 | 4 |
| Ric Wilson | 96.10 | -2.89 | -2.92 | 5 |
| Carol Kuo | 102.04 | 3.05 | 3.08 | 6 |
| Norman Brand | 102.25 | 3.26 | 3.29 | 7 |
| Pete Riegel | 102.45 | 3.46 | 3.50 | 8 |
| Mary Anne McBrayer | 102.64 | 3.65 | 3.69 | 9 |
| Bob Langenbach | 102.86 | 3.87 | 3.91 | 10 |
| Tom McBrayer | 103.05 | 4.06 | 4.10 | 11 |
| Dave Gwyn | 103.63 | 4.64 | 4.69 | 12 |
| Ken Bernard | 94.22 | -4.77 | -4.82 | 13 |
| Justin Kuo | 104.93 | 5.94 | 6.00 | 14 |
| Joan Riegel | 112.50 | 13.51 | 13.65 | 15 |
| Bob Rauch | 135.00 | 36.01 | 36.38 | 16 |
| Don Shepan | 165.70 | 66.71 | 67.39 | 17 |

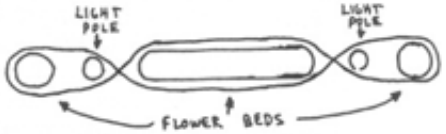
Eye-in-the-Sky (Norm Brand), Pete & Joan Riegel at the pacing course. Norm has retired his elevated instrument and now uses conventional methods.

**Andy Beach**, who laid out the course, says: "The wheel I used was from another local measurer, Ken Ashby It was not a normal track measuring wheel, but was from Home Depot. The wheel is "The Measure Meter" by "Trumeter" and was "Made in the UK." Even though there is lots of "meter" there, this wheel reads in inches. The reading were taken in inches and reset to 0'0" after each segment.

On the morning of Tuesday Dec 2 I did the pacing course. The temperature was in mid 40's. I did the pre-cal. Then I measured several other possible courses before picking the one I used. Then I did the post-cal which was one inch longer than the pre-cal value.

Since I was both curious about the results and not having the data book with me, at lunch today (on Tues Dec 9), I went back downtown to remeasure. The temperature was in the mid 50's.

Pre-cal: 164'3", 164'5", 164'4", 164'5", 164'4" (ave 164' 4.2")
Course: 324'11", 324'9", 324'9", 324'10" (ave 324' 9.75")
Post-cal: 164'4", 164'3", 164'4", 164'3", 164'3" (ave 164' .4")




There are several ways to calculate this, but if the total average cal is used (164'3.8"), the average course length and no rounding this gives: Cal: 50.083717 m & Course: 99.00285 m. Normalized to 50 units for the cal gives a course of 98.837356 units (instead if the 98.989 units used for the contest).

I have no clue for the bias to the long side that the group measured. There were two metal poles in the crossover areas that were passed twice each. But these poles were not in the SPR line. Also, the radius of the light poles was smaller than the outside flower beds. If someone is not very careful they will arc out to line up with the brick pattern. The SPR went diagonally across the brick pattern.

PS. This measurement is over the 0.08% variation to the short side, making things worse."

**Editor Note**: Agreement outside 0.08 percent is quite common when short distances are measured. The absolute difference between original measurement and check was only 15 cm. That's quite good.

## PERCENT ERROR RECORDED IN RRTC PACING CONTESTS

| | | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wayne | Armbrust | | | | | | | | 1.15 | 1.86 | 1.74 | -1.44 |
| Bob | Baumel | 0.07 | | -3.03 | -0.91 | 2.63 | -0.72 | -1.03 | -1.18 | -0.52 | 0.29 | 2.63 |
| Marcia | Baumel | 0.02 | | | | 4.37 | | | | | | |
| Andy | Beach | | | | | -5.36 | -2.42 | | | -4.54 | | |
| Ken | Bernard | | | | | | | | | | | -4.82 |
| Michael | Blanchard | | | | | | 1.14 | | | | | |
| Bob | Boal | | | | 27.76 | -0.19 | -4.33 | 1.72 | 2.75 | | | |
| Haig | Bohegian | | | | 6.72 | | | | | | | |
| Norm | Brand | 41.61 | 8.07 | 0.80 | -0.90 | 9.56 | -24.63 | -4.00 | -6.84 | 1.44 | | 3.29 |
| Dan | Brannen | | -0.21 | | | | | | | | | |
| Margaret | Brooke | -6.52 | | | | | | | | | | |
| Nick | Brooke | -6.61 | | | | | | | | | | |
| Jim | Brown | | | 0.36 | | | | | | -0.48 | | |
| Frances | Childs | | | | | 10.46 | | | | | -27.34 | |
| Felix | Cichocki | 2.14 | 0.76 | 6.51 | 0.99 | | | -1.89 | | | | |
| Sal | Corrallo | | | | | | | | -11.38 | -10.11 | -1.67 | |
| Robert | DeCelle | | | | 187.61 | | | | | | | |
| John | Dunaway | | | 4.58 | | | | | | | | |
| Miriam | Gomez | | -3.86 | | | | | | | | | |
| Sharon | Good | | | | | | | | 3.13 | | 15.90 | |
| Barb | Grass | | | | | -1.11 | 12.17 | -0.60 | | | | |
| Bill | Grass | | | | | -0.83 | -3.73 | -2.57 | | | -3.13 | -0.06 |
| Dave | Gwyn | -3.33 | | 4.91 | 0.65 | 1.86 | -10.20 | | 0.63 | 4.55 | -6.82 | 4.69 |
| Ben | Hablutzel | -3.05 | | | | | | | | | | |
| Finn | Hansen | 3.31 | 4.16 | -1.02 | 4.28 | | -0.07 | -1.04 | 2.05 | 2.75 | 1.46 | |
| Bob | Harrison | | | | | | | | -0.83 | | 1.26 | |
| Walter | High | | | | | | -3.34 | | | | | |
| Basil | Honikman | | | 5.67 | -1.22 | -29.89 | -0.17 | 1.35 | 2.52 | -0.06 | | |
| Linda | Honikman | | | | | | | | 3.28 | | | |
| Bard | Horton | | | | -0.47 | | | | | | | |
| Paul | Hronjak | | | | | | | | | 0.64 | | |
| 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 | | | 0.34 | 0.03 | -0.61 | 3.08 |
| Justin | Kuo | | | 17.14 | -1.61 | 0.07 | -2.85 | 40.21 | -1.09 | 0.16 | 1.43 | 6.00 |
| Bob | Langenbach | -0.66 | | 3.50 | | -0.93 | 0.33 | 0.42 | -0.52 | 13.55 | -3.21 | 3.91 |
| Carole | Langenbach | | | | | | 1.76 | | -2.23 | | 1.06 | |
| Mel | Lemon | | | | | | | | 157.85 | | | |
| Tom | Mayda | | | | -0.21 | | | | | | | |
| Mary Anne | McBrayer | -2.91 | 0.14 | 4.06 | -1.69 | 0.61 | 2.54 | 2.40 | | | | 3.69 |
| Tom | McBrayer | -3.66 | -2.38 | -1.48 | -0.90 | 3.07 | -0.43 | 0.52 | | -1.53 | 1.34 | 4.10 |
| G | Mercator | | | | | | | | | | | -0.70 |
| Dick | Mochrie | | | | | | -6.11 | 2.13 | | | | |
| Wayne | Nicoll | -1.11 | | -10.34 | 0.54 | -2.55 | | 1.32 | -1.26 | 0.10 | | |
| Ron | Pate | | | | -7.62 | | | | | | | |
| Bob | Rauch | | | | | | | | | | | 36.38 |
| Rick | Recker | -0.79 | -2.22 | -0.17 | -1.96 | | | | | | | |
| Joan | Riegel | | 1.74 | -3.35 | -1.40 | 2.28 | | -1.17 | | | | 13.65 |
| Pete | Riegel | -1.00 | 0.95 | 0.08 | -0.52 | -1.25 | -0.39 | 0.13 | -0.99 | 1.16 | -1.03 | 3.50 |
| Bruce | Robinson | | | | | | | | 4.00 | | | |
| Ron | Scardera | | | | | | | | | | -4.52 | |
| Larry | Schloss | | | 2.07 | | | | | | | | |
| Don | Shepan | | | | | | | | -0.82 | | 2.75 | 67.39 |
| Jim | Skelly | | | | | | | | 0.15 | | | |
| Jim | Smith | 0.86 | | | | | | | | | | |
| Christine | Steele | | | | | | -1.83 | | | | | |
| Phil | Stewart | | | | | | | | 6.48 | | | |
| Stephen | Tabb | 0.62 | | | | | | | | | | |
| Bob | Thurston | | 0.84 | | | | | | | | | |
| George | Tillson | | | | | | | | -1.65 | 2.43 | | |
| Peter | Torres, Jr. | | | | 33.21 | | | | | | | |
| David | Troy | | | | | 18.38 | | | | | | |
| Steve | Vaitones | | | | | | | | | | -5.57 | |
| George | Vernosky | | | | 27.30 | -1.49 | -4.68 | 1.31 | 0.50 | | | |
| Karen | Wickiser | | | | -1.53 | | -5.02 | | | 0.19 | | |
| Mike | Wickiser | | | | 2.49 | 0.22 | -0.86 | 2.36 | -0.00 | 0.98 | 2.39 | |
| Ric | Wilson | | | | | | | | | | | -2.92 |
| | Contestants | 18 | 11 | 18 | 26 | 22 | 22 | 18 | 25 | 19 | 19 | 17 |
| | Median | -0.72 | 0.76 | 0.58 | -0.06 | 0.42 | -1.83 | 0.47 | 0.15 | 0.19 | 0.29 | 3.50 |
| | Average | 1.14 | 0.73 | 1.68 | 11.54 | 1.50 | 0.58 | -6.82 | 6.24 | 0.66 | -1.28 | 8.38 |
| | Std Deviation | 10.16 | 3.13 | 5.41 | 36.84 | 9.45 | 1.46 | 3.74 | 31.13 | 4.25 | 7.67 | 17.21 |

13 Kennedy St., NE
Washington, DC 20011
November 10, 1997

Dear Pete,

I should have known something would happen. First of all because it was raining. The last time it rained during the Marine Corps marathon, I discovered about a half hour into the race that they had used the wrong starting line, cutting 80 feet from the course. (We scrambled to find a place to add, and then corrected the correction by changing the spot where finish times were taken.) But that was 1994; last year, every single mile mark was in the right place! That's the second reason I should have expected trouble. Even Mile 25, which had always been wrong-- having a habit of attaching itself to the wrong overpass about half a mile past the right spot-- was actually in the right place. Somehow , instead of recognizing the perfect record as aberrant behavior, as an obviously unstable equilibrium, I lulled myself into thinking that it represented improvement-- we were actually getting things right!

So, as I rode the course, for the moment comfortably ahead of the runners, I was enjoying the whole scene. There was enough to keep me busy without overwhelming me-- unlike 1995, when every mile mark was wrong, up to mile 10. (The others could have been wrong also, but when I stopped to fix mile 10, the map got away from me in a high wind and I never found it again. Without my course map I was just as ignorant as the next guy about the finer points of the course. Ever since that year I've carried 3 or 4 backup maps.) This year there were just a few mistakes-- some cones out of place in North (Pentagon) Parking; timing clocks set up at the wrong Mile 8 and at the wrong halfway mark; mile 14 about 20 yards off; and then - - -

**WHAT??!!** They shortcut an entire block! Instead of north on 1st and west on Independence, they just directed the runners northwest on Washington Ave. I was too late to fix it-- because of stopping to fix those other problems, I was now behind the first 15 or so runners. I told the sentry at the corner that the course was wrong. She was not fazed and assured me that at least 20 or more higher-ups had told her that the course had changed and was supposed to use Washington Ave this year. (OK, next year, I will stipulate that every course marshall have the certified map in his or her possession.)

Not much to do but measure the damage-- which I did: shortfall 837 counts, about 250 feet or 75 meters. I started off to check the rest of the course-- and then it hit me: I might be able to fix this thing! First thing was to check where the leaders were-- and I soon found out that they had just entered East Potomac Park. Maybe I had 15 minutes, maybe 20, before they reached Pentagon South Parking. Next thing-- I'd better get Bob Bieri on the phone. Gunnery Sergeant Bieri is the officer in charge of the course, and he rides a vehicle just ahead of the lead runners. I planned to pull him off that detail and have him help me make a quick course correction. Finding a radio operator at a medical tent, I asked him to get an urgent message through to "Gunny" Bieri. In reply my operator was told that he was using the wrong frequency for this

message, and he'd have to use a different frequency which he'd have to ask someone what it was. At that point I gave up on the radio and made some unprintable but alliterative suggestions concerning their frequencies. Apologizing to my drafted radio operator, I took off across the river for South Parking. I rode as hard as I could, planning as I went. The course comes off the highway ramp, then goes straight down Eades St extended to Route 110. There is one of those mega-water stops there, and it was going to need moving. I started visualizing the distance correction I needed because there wouldn't be time for too many wrong guesses.

Arriving out of breath and screeching to a stop, I found the officer in charge. I told her there was going to be a big change and it would have to happen fast, but first I had to figure it out. Leaving her bewildered (should she believe me, or lock me up?), I took off on my measurement. Two parking lanes over looked about right. We would detour into the lane, run parallel to Eades, then rejoin the course. It was raining really hard at this point, so one of the hardest things was trying to write down numbers. But the good news-- the lane I had chosen was just about right. So now-- grab cones, move them, get help, explain it all on the run, holler until all 15,000 cups of water made their way to lane 24, get a well-meaning security truck driver to understand that he really did have to move his vehicle-- and just as all of this fell into place, the lead runner came off the highway ramp, right behind Bob Bieri in the lead vehicle. Done! We even moved Mile 24 so the runners wouldn't lose that split.

Back at the finish, I once again enjoyed the spectacle. These runners had trained hard and raced hard, and they deserved having a course that is what it is supposed to be. Major Nealis (race director) of course was glad that a course-length disaster had been averted, and Darryl General (winner) appreciated the fact that they wouldn't have to list his time with an asterisk. (He <u>had</u> noticed that after a string of 5:12 miles, mile 15 came in at sub - 5.) As for the aborted radio message, I learned that it ended up as "Mayor Barry is trying to reach Bob Thurston" (!). Nobody knew what to do with that one.

A final thought. I am as awed by high-tech gadgets as the next guy. The day before the marathon I watched a demonstration of the "chip" and was amazed by its precision, its reliability, and the possibilities it opens up. And look how it simplifies the whole finish-line process! But after this race I was just thinking how much the high-priced, high-tech "chip" system depends for its validity on low-tech stuff like having the course measured correctly, and being able to read and follow a map. Not to mention a certain vigilance and common sense in entering runners' data (that's a whole other story, which Steve Nearman has addressed in his column in the <u>Washington Times</u>).

I rode back along the course, watching out for friends, shouting encouragement, enjoying this-- and then I got to mile 25. Runners would glance at their watches, look up, then look down again, look up sort of puzzled. Then it hit me-- by adding distance at mile 24 we had, in effect, put mile 25 in the wrong place again. "Don't worry about your split, the mile sign is wrong!", I shouted at them, and many seemed visibly relieved. I was relieved too. If mile 25 is wrong, we were back to par for this course, and that's something I knew I could live with.

A measuring postscript: I was disappointed to see that my race-day correction was short by about 7.4 meters instead of the 3 meters I thought it was. I'm not sure why this is. Wet pavement, being in a rush, and probably not having access to a tight SPR were factors in the race-day measurement in South Parking. And while the SCPF is not meant for this use (it's there for certainty of measurement, not to cover mistakes in conducting the race), I was glad it was there to cushion this one.

Best Regards,

Bob

Bob Thurston

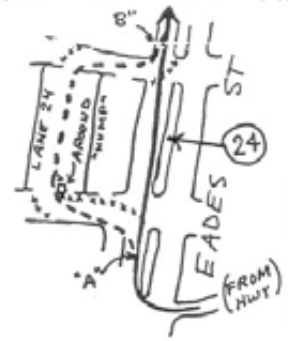
SUPPLEMENT TO DC97034RT (MARINE CORPS MARATHON)
ONE-TIME ONLY RACE-DAY ADJUSTMENT

PROBLEM:
In 15th mile of course, one portion goes like this:


RACE DAY MEASUREMENT (IN RAIN)

| | | | |
|---|---|---|---|
| C St 11526 | | | |
| Indep 15200 | 3674 | Δ = -837 cts | |
| C St 18037 | 2837 | | |

SOLUTION:
PENTAGON SOUTH PARKING




Measured: ——
Changed to: - - - -
Cones shown by: ×××

RACE DAY (RAIN):

| | | | |
|---|---|---|---|
| A 99000 | | | |
| B (1)01038 | 2038 | Δ = +806 cts | |
| A (1)02270 | 1232 | | Net Change -31 cts |

Later measurement (Nov. 2, 1997)
Calibrate 4:35 pm : 11,113.3̄/km
Calibrate 6:00 pm : 11,117.5/km
$\bar{c}$ = 11,115.42/km

① "C" to Indep:

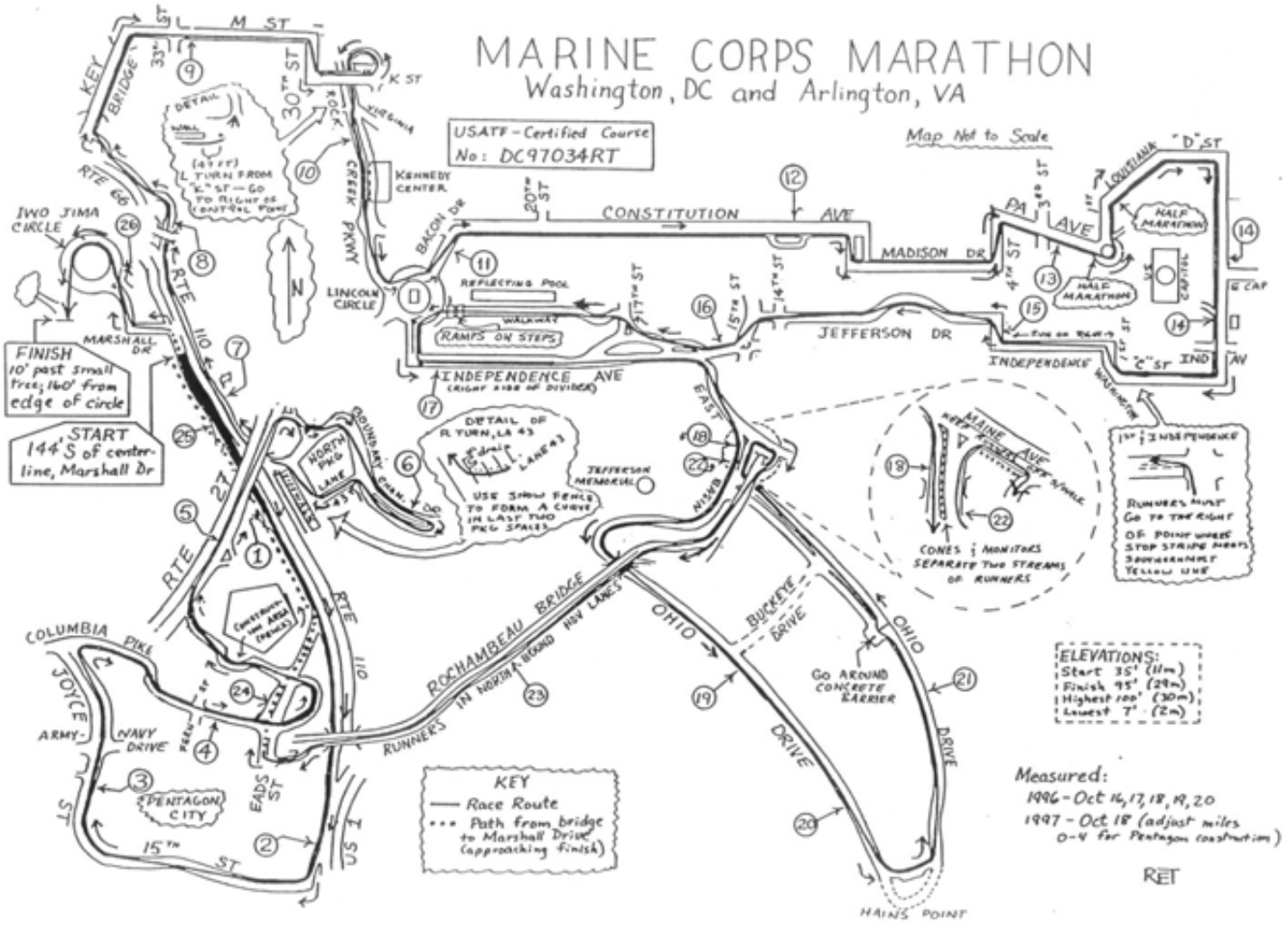
| | | | |
|---|---|---|---|
| C St 87934 | | | |
| 3rd/Ind 92505.5 | 4571.5 | Δ: -845 cts (-76m) | |
| C St 96232 | 3726.5 | | |
| 3rd/Ind 99959 | 3727 | | |
| C St (1)04531.5 | 4572.5 | | |

② South Parking:

| | | | |
|---|---|---|---|
| CP South 05910 | | | |
| CP North 07345.5 | 1435.5 | Δ: +762.5 (+68.6m) | |
| CP South 09543.6 | 2198 | | |
| S 09680 | 2202 | | |
| N 11882 | | | |
| N 11990 | 1438 | | |
| S 13428 | | | |

NET CHANGE
-82.5 cts ≈ -7.4m

CONCLUSION
Hurried race-day measurements in the rain indicated a net change (mistake + correction) of -31 counts or about -3 m. Careful dry-pavement remeasurement shows a shortfall of 82.5 counts, or 7.4 meters. SCPF is >42 m and will "cover" the shortfall. RET




## MAP (BY BOB THURSTON) AND PUZZLE OF THE MONTH

Isn't it pretty? Nothing's perfect. Can you find the error?

# A NEW CODE IN THE COURSE LIST

Readers with keen eyes will see a new code in the course list. The letter "V" indicates that the course has been pre-validated, and if a reccord time should be run the course will not require a validation measurement. The "V" indicates either that the course has been adjusted to the full 1.001 by the validator, and a new certificate issued, or that it measured over that value when validated.

When record times are run, RRTC provides, at no cost to the race organization, a validator to check the course. This is a harrowing experience for the race director, as some courses do come up short in spite of best intentions. To avoid this, some race directors may wish to have their course "pre-validated" after they are certified. This prevalidation should be arranged through Doug Loeffler, Validations Chairman. He will provide a list of validators from which the race director may choose and make his own arrangements.

This will probably involve the race paying a fee to the validator. RRTC does not have the peoplepower to prevalidate every course, thus the procedure will fall into the "free market" category, and the fee will be whatever is mutually agreed upon. We cannot guarantee that every request will be honored.

In most cases a prevalidation is a waste of time, money and effort, since the great majority of courses pass validation, and the probability of a newsworthy record is small.

November 6, 1997

Pete Riegal
3354 Kirkham Road
Columbus, OH 43221-1368

Dear Pete: I have some questions about calibration.

I recently purchased a solid tire from Greentyres after experiencing 2 flats while measuring the Chicago Marathon course. (Of course I had to abort the measurement each time.) Anyway, I find that the solid tire produces a larger post-measurement constant as temperature increases and I have to adjust the course length accordingly. When I measure any course in downtown Chicago I always start at first light when the traffic is light and of course the temperature will be lower than later during the day. In measuring the marathon I may be on the bike for over 3 hours and the temperature may rise 20 degrees or more in the summer.

When I was using a pneumatic tire my post calibration constant was always smaller when the temperature rose during the measurement.

Question 1. Has this been the experience of other measurers? That the solid does get smaller thus producing a larger constant while the pneumatic expands to give a smaller constant with a temperature rise.

Question 2. When measuring a long course such as a marathon where the temperature will rise from 65 degrees to over 80 degrees during the course of the measurement I know my constant will change significantly. If I use the pre-measurement constant the course will be shorter than if I use the post-measurement constant. Which is correct? Wouldn't it be logical to adjust the constant during the course of the measurement according to the temperature change? Of course I would need a chart or data to know how much to adjust the constant. It seems to me that this would produce a more accurate measurement.

Question 3. Has anyone done a study on the effect of temperature on tire expansion or contraction. I would like to have a chart or table of the rate of change. It would seem correct to adjust the constant as I measure according to temperature change.

Now that I have a solid tire which will not be affected by air pressure I intend to conduct a study myself on the effect of temperature on the working constant. When I have something I will pass it along to Measurement News.

Chuck Hinde, Illinois

PS. I HAD TROUBLE GETTING THRU VIA E-MAIL
THUS THE LETTER

November 6, 1997

Pete Riegel
3354 Kirkham Road
Columbus, OH 43221- 1368

Dear Pete:

Re: Solo calibration:

I have read several messages about setting up calibration courses in Measurement News e-mail. Some were about difficulties in laying out the calibration course alone or solo.

I don't have a problem with this. In fact I can lay out a 1000 ft. course and calibrate my bike is 15 minutes. And I know that my calibration will be accurate.

I have a 3/32 woven steel cable with a loop at each end. I find a stretch of straight street near the start or finish line. I drive a nail into the pavement and walk 500 ft. in one direction unwinding the cable, checking back and tugging on it as I go to make sure it is straight. When I get to the end of the cable I hook my scale onto the loop and stretch it to 40 lbs. which is about all I can pull before I myself start sliding. I mark the spot. Then I add 3.5 inches to compensate for the fact that my cable is actually 3.5 inches short of 500 ft.

I then walk back to my nail winding up the cable as I go. Then I unwind it 500 ft. in the opposite direction and repeat the process of adding 3.5 inches to my stretched cable. I mark each end point with a 6 in. strip of duct tape and spray paint on the near side.of the tape in case the tape blows away or gets picked up by a passing car.

About the cable. The loop at each end was created by crimping two ferrules with double holes to secure the cable andthe looped end. These ferrules are mechanically crimped using a steel chisel so they are really tight. I have not experienced any slippage in the 7 years I have been using it.

I check my cable periodically stretching it out with the same 40 lb. pull on a 500 ft. course I laid out on the street in front of my house. That 500 ft. course was measured 3 times. Over the years I have found no significant variation in the length of my cable.

I use a common plastic electrical cord reel to wind up the cable. It is easy to use and I never get a kink in the cable.

Finally, I feel that this is a more accurate method to lay out a calibration course. Before I had the cable I would always try to find a willing helper to hold the end of the 100 ft. steel tape I was using. I was never really confident on how accurately that person held to the mark on the piece of duct tape at each tape length point. When I did it solo I found that the nail I drove at each tape end point did not always go into the pavement where I intended it to go. It would often wander off course. And I found it very difficult in not impossible to drive a nail into a concrete road surface. (When I use my cable on a concrete street I drive it into a joint making sure that it is firm.)

Maybe my experience will benefit some other measurers who need or want to calibrate solo.

Chuck Hinde
e-mail NDFan50.com

9916 Mansfield
Oak Lawn, IL 60543
708-422-4705

P.S. Refer to a letter I send to you on Dec. 10, 1990 where I first reported this cable method.

Dear Chuck,

Your email address is either NDFan@aol.com or, for AOL subscribers, simply NDFan. It's not NDFan.com as you had at the end of your letter. That's bound to confuse folks.

CALIBRATION LETTER

Solid Tires:
Question 1: It's normal for solids to have a bigger postcalibration constant that precal. I don't know why, it's just how it is.

Question 2: The larger constant is the proper one to use, whether it is the precal or postcal constant. With a pneumatic tire you usually won't have to adjust the course much, but with solids you will, because the postcal will usually be the larger constant. You can use the average if you wish. As for adjusting the constant as you go, that's cutting things pretty fine, as with a solid tire the constant doesn't change much anyway. As long as the overall length comes out correct by the proper constant you can diddle with the intermediate splits if you wish to split hairs. The difference is generally trifling.

As for a chart for temperature vs constant, if you take the time at precal and the time at postcal, you can simply do a linear interpolation to see how you think the constant is varying. But be aware it doesn't always come out right. I know of no proven way to do this. Larger constant is best - it's safer against short courses. Average is more accurate. With a solid tire the difference doesn't amount to much.

Question 3: Several people have done studies of temperature on tire expansion, and the results have been been in Measurement News, to which you don't subscribe. Generally one person's study is not applicable to another person, since the tires are rarely identical. I'll be happy to put the results of your study, when you are done, in MN.

SOLO CALIBRATION LETTER:

I remember your long cable, and I put it in MN just after you wrote to me about it. I agree that it is a dandy way to do the job. However, I have two comments:

1) Why pull 40 pounds? 10 or 15 would do as well to straighten out the cable. All that would be affected is the 3.5 inch offset, which would grow to something somewhat larger, but would still be reproducible.

2) I see nothing in your methodology that says you are compensating for temperature in any way. It's certain that your cable will be a bit shorter on cold days and a bit longer on hot days. Have you thought about this? I'll bet if you checked the cable at 20 F and at 90 F you would see a noticeable difference in the offset. Without temperature compensation you are on shaky ground.

Why not send the letters you sent to me, and this answer, to MNForum? You'll get some reaction, I'm sure. Or, take another shot at email to me, sending the two letters, and I'll do it.

I can't figure why you were unable to get to me by email. You are with AOL, so am I. People on AOL send things to "riegelpete" People who are not on AOL send things to "riegelpete@aol.com" AOL works better when members don't go out to the internet, but stay within AOL when both partuies are with AOL.

Best regards,

Pete

# THE PRISONER'S PROBLEM

XXXX is incarcerated in FPC Nellis, a Federal Prison. In late November he wrote to me expressing an interest in getting a track certified, as he had an interest in attempting a marathon on it. His attempt was to happen in two weeks. I sent him the following note. Following this, you can see his reply.

Dear Mr. XXXX, November 21, 1997

The short time between your inquiry and your marathon effort poses a problem, especially as you may be limited as to the tools avaliable to do the measurement. I enclose some information that tells how to get started in course measurement for certification.

In your specific case, your effort is to take place on December 6. I doubt that you will have the time or opportunity to do what is needed to certify the course in the time available. However, there is hope.

If the track is 1/4 mile, somebody measured it during its construction, and they usually leave a certificate of accuracy with the buyer when the job is done. The track owner may have a copy available to you. USATF accepts these at face value, and requires no further work.

If a certificate does not exist, we require a remeasurement. For this you need access to a 100 foot steel tape. Use it as described in the enclosed "How to Tape a Track."

One note: We have NEVER found a 1/4 mile track to be so inaccurate as to make 105 laps less than a marathon. If you do absolutely nothing, your effort is bound to be an honest marathon. Just to be sure, run 106 laps, but time yourself after both the 105th and 106th laps. This will cover the possibility that the track is 400 meters rather than 440 yards. Later, when you have time and access to a 100 foot steel tape, measure the track and get back to me. I will be happy to help with the math and will let you know how things came out.

Regardless of what official stamps may get put on the track, rest assured that 105 laps will certainly get you to the marathon distance.

Best wishes with your marathon effort. I'm sure you will prevail.

If I can be of further help, please get in touch.

Best regards,

Pete

Dear Pete:

I did it! I ran my unofficial, one-man, "Road to Nowhere '97 Marathon," yesterday in 3:46. Nothing spectacular, especially after a promising 1:46 first 13 miles. But, I did it, on an uninspiring quarter mile track, and for that I am proud.

The track here was made by inmates, so there's no type of documentation involved with the track. We do have one of those bicycle wheel contraptions and measured the track several times, and it does come out to a quarter mile. So I ran the 105 laps necessary to complete the 26.2 miles. All the training and diet and all paid off, as I completed the run, non-stop and without any fatalities. Hooray!

I thank you for your response to my inquiry, and maybe we can get my next marathon certified somehow. I'll definitely get a couple more marathons under my belt before I'm released in 2001. You might notify the folks in Boston that I'll be down to a 3 hour time by then and will join them in 2002.

Thanks again!

Sincerely,

[redacted]

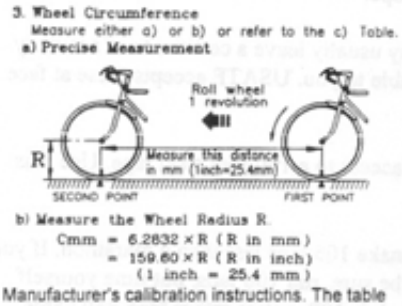
Reg. No. [redacted]
FPC Nellis [redacted]
N Las Vegas, NV 89036-4500

# EVALUATION OF AN ELECTRONIC ODOMETER

I was given an electronic odometer by Len Luchner, who believed it might be a useful tool for measuring road race courses. I agreed to evaluate it. The unit is called "Echo-T3 Cycle Computer" manufactured by Echowell. It has three functions: Total distance, trip distance, and speed. It reads in either metric or English units. Cost is about $20.

The Echo-T3 Cycle Computer

Units of distance read to either 0.01 km (10 meters) or 0.01 miles (52 feet). Trip distance is reset by removing the unit from its mounting clip (very easy) and pushing the reset button on the back. Total distance is reset by removing the battery and replacing it.




Manufacturer's calibration instructions. The table referred to contains a variety of tires, but not mine.

The unit receives distance data by means of a magnet mounted on a spoke, which passes close to a receiving unit mounted on the wheel support fork. A pulse is delivered each time the magnet passes the fork, indicating a full revolution of the wheel.

The unit is calibrated by rolling the bike one complete wheel revolution, measuring the distance covered in millimeters, and programming this four-digit number into the computer using the reset button. As the bike is ridden, the computer will add the revolution distances until the next whole unit (0.01 miles or km) is passed, then display the new distance.

### Calibration comparisons

I laid out two pieces of masking tape on a portion of the 1000 foot calibration course in front of my house. I rolled the bike twice, carefully, each time marking the beginning and end of one complete wheel revolution. I then sat on the bike, and repeated the exercise.

I then calibrated the bike using the calibration course. I rode the calibration course twice. I then walked the calibration course twice, pushing the bike. Here are the results I obtained:

| | | |
|---|---|---|
| Distance obtained for one wheel revolution (no weight on bike): | 2113.5 mm | 2114.5 mm |
| Distance obtained for one wheel revolution (weight on bike): | 2109 mm | 2110 mm |
| Counts obtained riding the calibration course: | 3413 counts | 3414 counts |
| Counts obtained pushing the bike: | 3401.5 counts | 3402.5 counts |

My Jones/Oerth counter makes 23.636363... counts per revolution of the wheel. My tire is a Goodyear foam-filled 27 x 1 1/8 tire. Temperature was 60 F.

Here is a summary of averaged results, converted to counts per kilometer (without 1.001):

| | Weight on Bike | No Weight on Bike |
|---|---|---|
| One revolution calibration: | 11204.72 cts/km | 11180.87 cts/km |
| Standard calibration: | 11199.15 cts/km | 11161.42 cts/km |

**Check of Counting**

I set the computer at 2000 mm per revolution, to yield an even 5 revolutions of the wheel per 0.01 km. I rotated the wheel, observing the computer. Just after each 5 revolutions was completed, the computer recorded another 0.01 km increment. At the end of 100 revolutions, the computer indicated a distance of 0.20 km. From this I concluded that the unit, at least at the 2000 mm setting, indeed records input data correctly.

**Commentary**

The unit is easy to use, and is accurate within the limits claimed by the manufacturer. I have used a Cateye odometer for over a decade, to assist in locating intermediate points, and have found it to be a valuable tool. The Echo unit can be calibrated more accurately than can my Cateye, and I intend to use it, now that it is mounted on my bike. However, I don't believe I will attempt to use it for direct measurement of any courses for the following reasons:

1) The calibration procedure recommended by the manufacturer does not seem to produce the same accuracy as that obtained by using a full-length calibration course. An accurate calibration may be obtained by use of a full-length calibration course, a Jones/Oerth counter, and some arithmetic, but this negates the supposed advantage of the manufacturer's calibration procedure.

2) Calibration data can be input to only four significant figures, in the 2100 range, producing initial uncertainty of about 4 to 5 meters in 10 km. This will also affect recalibration figures, which often change less than this amount.

3) The "least count" of the unit is 10 meters or 52 feet. This is 100 times larger than the present least count of a Jones/Oerth counter, in which a single count amounts to about 0.1 meter or 0.3 feet. At the end of laying out a 5 km course, an uncertainty of 10 meters is unacceptable. Perhaps it might be of use in a marathon measurement, where 10 meters is less significant, presuming the calibration comes out to an exact number of mm per revolution, but this is unlikely.

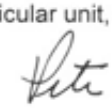
4) The unit records distance as positive when the magnet passes the pickup. This happens when the bike is rolling backwards as well as forwards. The JO counter subtracts distance when the bike is rolling backwards. As we often pass an intended point, and have to roll backwards a short distance, this is a drawback.

5) Unless a sharp eye is used, the magnet may wind up near the pickup when the bike is stopped. Minor movement of the bike, as when we are straddling it and recording data, can result in erroneous distance being recorded as the bike moves back and forth.

6) The starting point is important. An initial distance error of 2 meters can occur if the magnet is in an inappropriate position when the ride is started.

With great care, and a variety of time-consuming and elaborate procedures, I once measured a course accurately (not for certification) using my Cateye odometer, just to see if it could be done. It can be done, and it can be done accurately. However, it is hugely inconvenient, and is not at all the easy process one would assume from the manufacturer's instructions.

It is certainly possible that I may have a prejudice toward the use of the Jones/Oerth counter, having used it for so many years. It would be wonderful to find a low-cost, accurate alternative to the present method, and electronics seems the way to go. However, I don't think this particular unit, nor any electronic odometer I have seen, is the answer. Reader commentary is invited.



# ANOTHER HARD WON COURSE PROFILE

Many readers are familiar with Alan Jones' meticulous recording of the contours of the Boston Marathon. The Dartmoor Discovery 34 miler, in Great Britain, is slightly less well-known, but measured by a man just as curious as Alan. Mike Sandford said:

"I spent some time plotting the profile of the Dartmoor Discovery (Victory from the Jaws of Defeat) 34 miler. I worked from the Ordnance Survey (ed: British equivalent of our USGS) map with a ruler plotting the 10m contours into an excell spreadsheet which I will attach. I know it is not really mountainous as these things go but the plot sure explains why I found the second half so hard to cycle as my strength was sapped by the never ending upward trend."

Mike Sandford with Phil Hampton, former Poly Marathon winner and race director of the Dartmoor Discovery 34 miler. Mike is too tired to raise his arms in triumph, so Phil assists.

Ed note: It may not be mountainous "as these things go" but it sure looks like a toughie to ride.