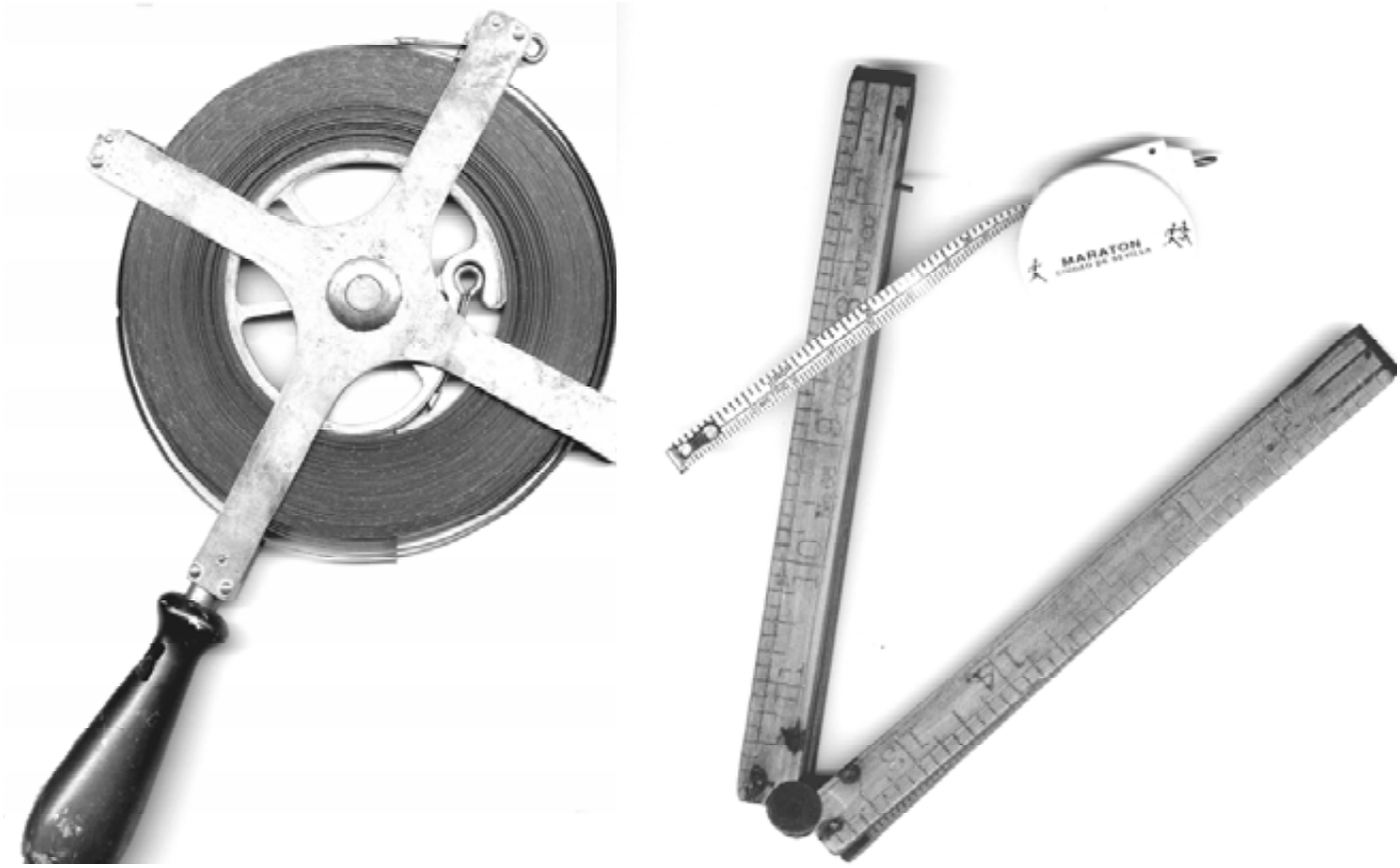
Measurement News

January 2002
Issue #111

The Great Tape Stretch



On November 3, 2001, Mike Wickiser and Pete Riegel compared 33 steel tapes against a standard, calibrated tape. Tapes were provided by 20 measurers, and included tapes made in 4 countries. The raw data appeared in November *Measurement News*. A complete report may be seen in this issue.

Above left is tape PR3 (Lufkin 30 m surveyors' tape), while on the right is shown an old carpenter's rule and a souvenir tiny tape from the Seville Marathon, picked up by Joan Riegel in her travels as Race Administrator for the 1992 US Olympic Trials Marathon. The tiny tape may seem inadequate for course measurement, but a track measurement was once submitted by someone who used a yardstick! The application was sent back for more work.

MEASUREMENT NEWS

#111 – JANUARY 2002

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Subscription cost:

MN is sent free to RRTC officers and certifiers, and AIMS/IAAF measurers. Others may obtain MN by sending $20 (for a one year subscription - six issues) to Pete Riegel.

Course lists for individual states may be obtained via email, free. Contact Pete Riegel at: **Riegelpete@aol.com**

Deadlines
Material intended to be included in the March 2002 issue must be in the Editor's hands by **February 25.** Next issue will be mailed in early March.

ONLINE MEASUREMENT FORUM

All it takes to become a subscriber is access to email. Simply send to **MNForum@aol.com** with "Subscribe MNF" in the subject heading box, and you will be added to the list. Postings on any subject related to measurement are also welcome at the same address.

ROAD RUNNING TECHNICAL COUNCIL

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Regional Certifiers	See list in this issue.

Visit the RRTC website at:

http://www.rrtc.net

A complete list of certified courses may be downloaded from this site.

A complete USATF measurement book can be downloaded from this site.

ABOUT MEASUREMENT NEWS

Measurement News (MN) is the newsletter of the Road Running Technical Council (RRTC) of USA Track & Field (USATF). MN is our way to talk to one another, so that we all know what's going on.

MN is also sent to many foreign measurers associated with AIMS and IAAF, who are also invited to participate in the dialogue.

MN is published bimonthly beginning in January (six issues per year).

If you wish to reproduce or report on anything in MN, go ahead, but an attribution would be appreciated.

MN wants to make road course measurement as good as it can be. All opinions and grievances are solicited. No cows are sacred. If you have a new measurement technique, or if you think things should be done differently, send in your contribution to MN. Your opinion will be given space. Nothing changes until somebody tries!

Electronic copy or clean typed material is most welcome, but send what you can.

MEASUREMENT NEWS

Issue #111 – January 2002

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Chairman's Clatter - From Mike Wickiser

Holiday Greetings to all from Karen and Mike Wickiser.

The last MN was a bit late and this issue is a bit early. Despite this, there is plenty of news to catch up on. Annual reports and meeting minutes provide the story on the annual convention in Mobile, AL.
It has been a busy year and the reports all show increased activity in courses being measured, validated, and renewed. The complete course listing exceeded 21,000 in the blink of an eye. It now contains 21,077 certified courses.

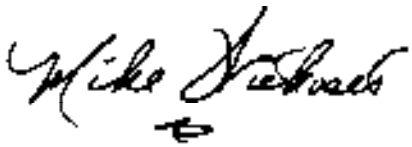
Jim Gerweck has the Finish Line Manual posted on the net. The manual still needs some work but after many hours of effort on Jim's part, the FL manual is once again available. You can download or view it from www.RRTC.net. Many thanks to Jim for all the work on this project. Anyone interested in helping out with the revising the FL manual should contact Jim at MNForum@aol.com

Bob Langenbach has accepted the position of Washington certifier. Mike Renner will remain active as the certifier for Idaho. Welcome Bob! And thanks to Mike Renner for years of handling two states.

I just received word that Ray Nelson, certifier for RI & MA, was injured while measuring a race course Dec. 4th. While crossing a main street, a car made a right turn running head on into him. He has three fractured ribs, a torn lung, and several cuts and bruises. Ray is currently in a great deal of pain as he recuperates. He can be contacted at 705 Lockwood CT, Warwick, RI 02886. His email address is *ride6887@ride.ri.net*

The 'hot' topic at the convention this year is a proposal by David Katz, RRTC Finish Line Chair to consider net (chip) times for age group records. To insure head to head competition this is not meant to have any effect on race placement, only for records consideration. With some of the masters runners staging back from the starting line in larger races this topic was bound to arise. For now 'net' time records is still a concept with much to be worked out. USATF rules would need to be re-written to the satisfaction of several sports and administrative committees before 'net' times can be officially accepted.

I need to ask each certifier to pay close attention to course maps. There have been several lately that lacked proper documentation. Tom McBrayer & Paul Hronjak check every certificate and map they get. It makes their job a lot easier when the map is up to par before they get it in the mail. Restrictions to the path that is to be available to runners must be documented as exactly as Start, Finish and turnarounds. A painted centerline may be OK to keep runners out of oncoming traffic but painted marks, even road centerlines don't provide proper documentation for exactly where runners will be turning. Showing North as well as the names of all streets along the course is necessary. All this information sometimes gets a bit crowded but remember that a certificate and map are often copied several times. Keep them as clear as possible. If you get a map that just can't be reduced to one sheet of paper, usually marathon distance, go ahead and use two sheets adding the less important information to the second sheet.

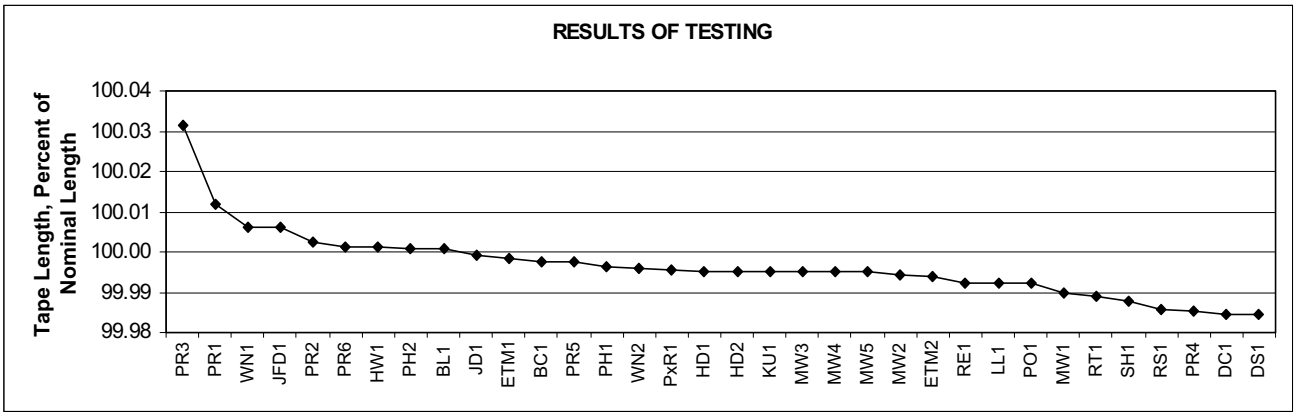


THE GREAT STEEL TAPE COMPARISON

By Pete Riegel and Mike Wickiser

SUMMARY

Thirty-three tapes, obtained from 21 measurers, were checked against a calibrated tape. Tape lengths varied from 99.984 to100.032 percent of nominal length under 50 N (11 lb) tension. Median length was 99.995 percent of nominal. Individual tape lengths are shown in the figure and table below:



Tape Types

The tapes had several lengths and kinds of scales imprinted on them:

- tapes with feet, inches, and 1/8 inch markings
- tapes with feet, tenths of feet, and hundredths of feet markings
- tapes with metres, centimetres and millimetre markings
- Tapes with links and 1/10 link markings. (note: 100 links = 66 feet)

Tapes came in a variety of lengths:

- 100 feet
- 100 feet/30 metres
- 103 feet
- 30 metres
- 50 metres
- 50 metres/164 feet
- 60 metres
- 165 feet
- 200 links
- 200 feet

The zero marks were sometimes offset 30 to 50 cm from the end, or were at the very end of the tape or pull ring.

The full length of the tapes sometimes carried an extra small distance (one 30 m tape had its end at 30.5 m). Tapes were all made of steel, and were either

TEST RESULTS
LENGTHS OF SUBMITTED TAPES
AT 50 N TENSION

Maker	Owner	Code	Tape Length Percent of Nominal	Nominal Length	Test Result Metres	Test Result Feet	Test Result Links
Stanley	Riegel	PR3	100.032	30 m	30.009		
Leitz-Eslon	Riegel	PR1	100.012	103 ft		103.012	
Unknown	Nicoll	WN1	100.006	200 links			200.013
Stanley	Delasalle	JFD1	100.006	50 m	50.003		
Lufkin	Riegel	PR2	100.003	30 m	30.001		
Lufkin	Riegel	PR6	100.001	100 ft		100.001	
Lufkin	Watts	HW1	100.001	100 ft		100.001	
Lufkin	Hronjak	PH2	100.001	100 ft		100.001	
Lufkin	Lang	BL1	100.001	100 ft		100.001	
Rabone Chesterman	Disley	JD1	99.999	50 m	50.000		
Sears Craftsman	McBrayer	ETM1	99.998	100 ft		99.998	
Lufkin	Conway	BC1	99.997	30m/100 ft	29.999	99.997	
Lufkin	Riegel	PR5	99.997	30m/100 ft	29.999	99.997	
Lufkin	Hronjak	PH1	99.996	100 Ft.		99.996	
Keson	Nicoll	WN2	99.996	200 ft.		199.992	
Lufkin	Riddell	PxR1	99.996	50m/164 ft	49.998	163.993	
Lufkin	Hudson	HD1	99.995	100 ft		99.995	
Lufkin	Hudson	HD2	99.995	100 ft		99.995	
Stanley	Ungurean	KU1	99.995	100 ft		99.995	
Lufkin	Wickiser	MW3	99.995	100 Ft.		99.995	
Lufkin	Wickiser	MW4	99.995	100Ft.		99.995	
Lufkin	Wickiser	MW5	99.995	100Ft.		99.995	
Keson	Wickiser	MW2	99.994	165 ft		164.990	
Lufkin	McBrayer	ETM2	99.994	30m/100 ft	29.998	99.994	
Lufkin	Eichler	RE1	99.992	30 m	29.998		
Lufkin	Lacroix	LL1	99.992	50m/164 ft	49.996	163.987	
Lufkin	Oerth	PO1	99.992	50m/164 ft	49.996	163.987	
Stanley	Jones	MW1	99.990	30m	29.997		
Rabone Chesterman	Thurston	RT1	99.989	60 m	59.993		
Stanley	Hubbard	SH1	99.988	100 ft		99.988	
Rabone Chesterman	Scardera	RS1	99.986	100 ft		99.986	
Stanley	Riegel	PR4	99.985	30m/100 ft	29.996	99.985	
Sokkia/Eslon	Connolly	DC1	99.984	100 ft		99.984	
Sears Craftsman	Shepan	DS1	99.984	100 ft		99.984	
		Average	99.997				
		Std Dev	0.009				
		Median	99.995				
		High	100.032				
		Low	99.984				

	Tension as Marked	Marked Tension lb	Percent of Nominal at 50 N (11 lb)	Percent of Nominal As Marked	Nominal Length Feet	Test Result Feet
RS1	15 lbf	15	99.986	99.991	100	99.991
WN2	2kgf	4.4	99.996	99.984	200	199.967

Tapes had marked tension of 50 N, or had no marked tension, or had other tension marked. Two tapes, RS1 and WN2, had other marked tensions. This chart shows the tested length at their marked tensions.

unpainted, painted, or covered with plastic or nylon. Tapes were wound either in open, surveyor-type reels or in closed, hardware-store type reels.

BACKGROUND

The idea for this exercise occurred to the authors in early October. There have been several tape comparisons done in the past, but methodology and/or conditions were such that results were not completely satisfactory. We thought it would be of benefit to check out as many different tapes as we could get, under identical conditions, and see what we found.

We hoped to get an idea of how much variation in tape length we could reasonably expect. As a secondary goal, we wanted to give each person who helped, by supplying a tape, an estimate of the length of his tape.

A call for tapes was posted in *MNForum*, and shortly after that Pete traveled to Bristol, England, for a meeting. John Disley (Great Britain) and Jean-Francois Delasalle (France) had seen the notice, and Pete was able to bring back a steel tape from each of them. Upon his return Pete found that a pile of tapes had arrived, and they continued to come. Mike had also received some tapes. Rodolfo Eichler gave Pete a tape at the Brazil seminar held in October. Canadians (Bernie Conway, Laurent Lacroix, Patrick Riddell) sent tapes. In order to be able to publish the raw data in November *Measurement News*, we decided to do the work on Saturday, November 3, 2001.

Unknown to Pete, Mike had made some inquiries of NIST (National Institute of Standards and Technology, formerly National Bureau of Standards) relating to our exercise. Some of the material is included herein.

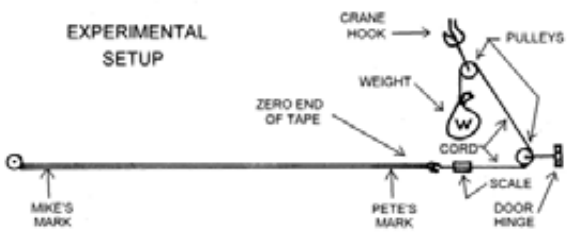
Mike found a suitable building in which to do the work, a vehicle garage in Cuyahoga Falls, Ohio. We wanted to do the work indoors to eliminate the effect of varying temperature and sunlight on the tapes.

EXPERIMENTAL METHOD

The Standard Tape: In 1984 Pete bought a steel tape from Watts Engineering, a surveying firm in Columbus. The owner, Mr. Harley Watts, was kind enough to help Pete check his tape against a tape that had been calibrated by the National Bureau of Standards (NBS). Recalling this event, Pete called Watts Engineering, and they found the standard tape in their showcase containing old measurement tools, unused for many years. Pete rented this tape for the comparison. It is denoted as "HW1" and has a calibrated length of 100.001 feet for its indicated length of 100.00 feet. On the tape box is marked in big black letters "Not for field use under any circumstances!" Before the days of electronic measurement the tape was used to calibrate their working tapes.

In addition, tape PR3 was calibrated at the Stanley factory in 1996. Stanley's calibration indicated a tape length of 30.00987 metres. This compares well with our test result of 30.00948 metres, giving reassurance that tape HW1 may be considered a reliable standard.

Tape Tensioning: We had only two people to do the work. Anybody who has pulled a tape knows what a miserable job it is to try to pull the scale with the proper tension, and read the tape at the same time. Pete worked out a pulley, cord and weight arrangement which permitted constant tension to be maintained. Two sandbags were loaded to 11 pounds each (thus giving a force of 50 N each). One was hooked to the end of the



cord, and the cord led through two pulleys, one for horizontal guidance and the second located on a crane hook, so that the sandbag had room to rise. Mike pulled each tape until the sandbag rose from the floor. Pete checked the scale, and recorded the reading at his end of the tape. Mike relaxed, and the second sandbag was loaded onto the cord, and the process repeated.

Distance Measured: The distance chosen for measuring all the tapes was arrived at by trial and error, after seeing how well the tensioning system worked. The goal was to use a single distance that could be measured by all the tapes. After trying several tapes we found the final distance.

Reading the Tapes: Mike operated the reel end of the tapes, while Pete operated the zero end. Mike would pull until the tensioning sandbag rose, and hold exactly on an even increment. This was either 30 m or 97 feet, except for WN1, which was marked in links. Pete read the tape at the other end. With tapes graduated in millimetres or 1/100 feet it was simple to read to the nearest ½ mm or 1/1000 foot. If the tape was calibrated in 1/8 inches, Pete read to the nearest 1/8 inch, and added a note such as "+.3" indicating that 3/10 of 1/8 inch was to be added. This was found to be easier than trying to figure things to the nearest 1/128 inch.

Uncertainty of Readings: We estimate the uncertainty of reading length at ±0.5 mm. Observed tension varied from 10 to 12 pounds, or 21 to 23 pounds, presumably because of friction in the cord/pulley arrangement.

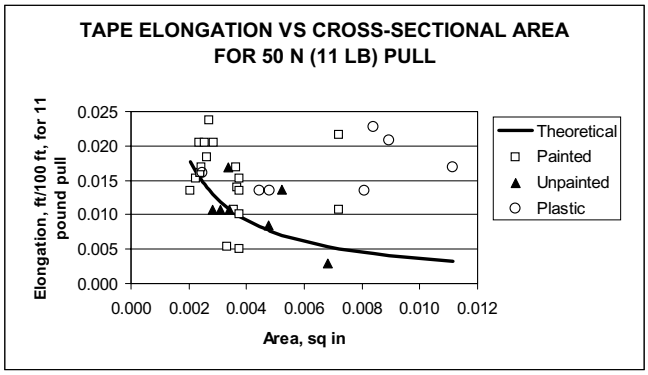
Calculation of tape Lengths: Calculation of lengths was based on the following assumptions:
- HW1 is considered to be the standard of accuracy.
- Other tapes have lengths relative to HW1 in inverse proportion to their measured distance.
- Each tape is evenly divided into its increments.

Little error is likely in the calculation of length of the 100 foot and 30 metre tapes. Slightly more error will be present in extrapolating to the lengths of the longer tapes.

DISCUSSION OF RESULTS

Effect of Tension on Tape Length: Tapes were tested at 50 N (11 lb) and 100 N (22 b). Other tensions, of course, will produce different tape lengths. Because of the small effect of tension on tape length, and the uncertainty of the readings, the authors do not propose any alteration from the 50 N (11 pound) tension by users, nor any reason why a "firm pull" or "tension by hand" should not be adequate. On average, a 100 foot tape stretched about 0.001 feet (0.016 in), per 1 lb tension. Thus small errors in applying tension to the tape do not cause significant error in final readings.

Comparison of tape elongation with elastic theory is shown at right (Assuming the modulus of elasticity to be 30,000,000 psi, typical for steel). The cross-sectional area was calculated from measurements of the thickness and width of each tape. Because we did not wish to damage the tapes, the measurements included the coating, whether paint or plastic. While paint added only a little to overall thickness, plastic was thicker. Thus the unpainted steel tapes showed the best agreement with what theory would predict.



Effect of Length on Measured Distances: If a tape is in error, as all are to some degree, measured lengths will be affected. If a 10 km course is measured using a tape having a length of 99.995 percent of its nominal length, the course will have a final length of 9999.5 metres. If the same tape is used in validation of a course with a true length of 10 km, it will indicate that the course is 10,000.5 metres long. Greater tape errors will produce greater disparities.

Information from NIST: Mike wrote to NIST and received a response from Mr. Charles Fronczek Jr. He sent Mike a copy of NIST's draft specification for tapes.

He also noted "In general, the accuracy of steel measuring tapes that we receive here at NIST for calibration is fairly good. Usually, we see typical accuracies of ¼ inch in 100 ft. In fact, it is seldom that we see one larger than that."

Twenty-four of the 33 tested tapes met the draft standards. Only one, Pete's Brazilian Stanley 30 m tape (PR3), did not fall within the "1/4 inch in 100 feet" limit which Mr. Fronczek considers as fairly good. The rest met this relaxed standard.

Age of the Standard Tape: The standard tape, HW1, was calibrated by NBS (now NIST) in 1954. Has it changed length since then? Pete has made inquiries of surveyors and manufacturers, and nobody has heard of a tape that ever changed its length. In addition, NIST provided the following data of a customer's 100 foot tape that was submitted at several time intervals:

1977	100.0028
1989	100.0027
1990	100.0028
1993	100.0029
1994	100.0028
1996	100.0029
1999	100.0030

Tension of Accuracy for Various Tapes - From NIST

US Customary Unit Tapes	Metric Unit Tapes
0 - 100 ft overall length - 10 lb	0 - 30 m overall length - 50N (5 kg)
Length greater than 100 ft - 20 lb	Length greater than 30 m - 100 N (10 kg)

Fronczek says "As you can see, if treated properly, there is little discernible change in the length of the tape. Of course, if one were to exceed the elastic limit of the tape (~40,000 to 60,000 psi) by over stretching it all bets are off. This could happen if one were to attach a tape to the back end of a car and the tape was snagged on a fireplug or tree. We have had a customer do this."

NIST DRAFT TOLERANCES

Length		NIST Tolerance		Percent of Length
100	ft	0.108	in	0.0090
150	ft	0.156	in	0.0087
200	ft	0.204	in	0.0085
30	m	2.7	mm	0.0090
50	m	4.3	mm	0.0086
100	m	8.3	mm	0.0083

This specification gives a general tolerance of +/- 0.009 percent of nominal length, for the range of lengths tested.

Tapes that range from 99.991 to 100.009 percent of nominal length thus match the draft spec.

Note: A pull of 50 N (11 lb) produced tensile stress of less than 7,200 psi in all tapes tested.

Temperature: Testing was conducted at 71F. Standard temperature is 68F, or 20C. Because all tapes were steel, expanding at the same rate, comparative results are unaffected by the difference.

COMPARISON OF 50 METRE TAPES

As no standard of comparison was available, these tapes were pulled "by hand," with tension estimated at 50N. As the JD1 tape was most accurate at 30 m, it is used here as a substitute standard.

Code	Owner	Tension by feel 50 metre pull Measured Distance metres	Tension by feel 50 metre pull Measured Distance feet	Difference from JD1 mm
JFD1	Jean-Francois Delasalle	48.376	158.714	-3.0
LL1	Laurent Lacroix	48.378	158.720	-1.0
JD1	John Disley	48.379	158.724	0.0
WN2	Wayne Nicoll	48.381	158.730	1.9
MW2	Mike Wickiser	48.384	158.740	4.8
PO1	Paul Oerth	48.385	158.743	6.0
RT1	Bob Thurston	48.387	158.750	8.0

Longer Tapes: Because we did not possess a calibrated tape longer than 100 feet, we did not test the longer tapes in a rigorous manner. Instead we put down a new set of marks and, using tension "by feel" to approximate the proper pull, measured the distance with each of the long tapes. The table at left shows the comparative readings. Because JD1 showed the least error in the 30 m pulls, we use it here as a quasi-standard for the others.

"Surveyor" Tapes vs "Hardware" Tapes: Three "surveyor" type tapes were submitted (WN1, PR2, PxR1). They have open reels and unpainted ribbon. Results of testing these three tapes did not show any marked difference in accuracy between these tapes and the others.

QUALITY OF THE TAPES WE USE

We have seen, in the sample tested, that about ¾ of the tested tapes met the NIST standard. All but one met the expectations of NIST for tapes they are given for test – an accuracy of about ¼ inch in 100 feet, or 2 metres in 10 km. What does this mean for us?

Can we obtain more accurate tapes? Do we need to? In the early days of US course certification, use of a "calibrated" steel tape was recommended. This recommendation, while well-meaning, did not take into account the time (weeks to months) and expense (several hundreds of dollars) of getting a tape calibrated. Few people actually obeyed this recommendation. Instead, people would use the tapes they had, or could obtain, trusting that they were good enough.

The longest tape we tested was Pete's Brazilian Stanley tape, which is 30.01 m in length. This disparity is quite small, and was only discovered by accident when Pete used the Brazilian tape to measure a 300 m calibration course, and a second tape to check it, and found a 10 cm difference which he could not attribute to operator error. Further checking by Pete and the Stanley factory confirmed the length of the tape.

There are certainly a few tapes out there that are beyond what we would like, but without some form of good luck they are unlikely to be discovered.

Unless we can find a practical alternative, we must continue as we are doing. The only mechanism we have to evaluate our method is the validation measurement, and it shows that in the majority of cases the method works. If our small sample is truly representative of the tapes available to us, things are satisfactory.

One thing that can be done is for people to check their tapes against each other when possible. Generally, reasonably good agreement will be found. When disagreement is found, a need for further checking is indicated.

Thanks to all who submitted tapes. We hope that the individual results obtained will be of help to you.

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Original data on which this study was based appeared in *Measurement News*, Issue #110, November 2001. These data, and the calculations supporting this report, are available as a Microsoft Excel or Lotus 1-2-3 file. Contact the authors for an electronic copy.

Minutes — Road Running Technical Council
USATF 2001 National Convention — Mobile, AL

1st Meeting — Thursday, November 29, 2001

Attending: Bob Baumel, Jerry Crockett, Bob Harrison, Basil Honikman, Linda Honikman, Bill Jackson, David Katz, Justin Kuo, Bob Langenbach, AC Linnerud, Mary Anne McBrayer, Tom McBrayer, Ron Pate, Don Shepan, Larry Smithee, Mike Wickiser

The meeting was called to order by Chairman Mike Wickiser at 16:03 and all present introduced themselves.

Officers' Reports

Many of the RRTC officers weren't present but had submitted written reports which will appear in January 2002 *Measurement News* and were summarized by Mike. The only officers who were present to give reports were Bob Baumel, Mike Wickiser and Tom McBrayer.

Webmaster & Secretary, Bob Baumel: Bob commented on three recent additions to our website at **www.rrtc.net**:

1) Mike Wickiser's **clarification of our expiration and renewal policy**, issued July 25, 2001, has been posted on our website in the "Late-Breaking News" section so everybody can easily access it.

2) A few days before this meeting, Bob added an often-requested "**single-download**" version of our **Course Measurement manual**. This file, in Adobe Acrobat PDF format, is just under a megabyte (about 3 min download with 56 kbaud modem, or only a few seconds with high-speed connection) and includes our whole manual except for the application forms which are still in a separate PDF file. This new "single-download" version is optimal for downloading and printing the manual. Our original online version (posted in 1999) is still the one to use if you only wish to view it online.

3) Also a few days before this meeting, Jim Gerweck announced a **preliminary online version** of the **RRTC Finish Line manual**. This preliminary version, which still suffers technical glitches and is very much a work in progress, currently resides in Jim's AOL account but Bob has installed a link to it on the RRTC site. This new online manual contains most of the content of our original (1985) hard-copy Finish Line book, with some added new sections such as a new chapter on computer race scoring.

Chairman, Mike Wickiser (written report provided): Mike discussed activities of the Council as well as his own activities. Implementation of the renewal phase-out approved last year wasn't as simple as it seemed at first, requiring Mike to issue a policy statement distributed to all certifiers and posted on the RRTC website. Pete Riegel and Don Shepan attended the RRCA Convention in Albuquerque and conducted a measurement seminar there. Mike traveled to the New York/New Jersey area and to Chicago to conduct validation measurements.

Pete Riegel and Mike conducted an extensive controlled experiment to compare the accuracy of steel tapes. A full report of this experiment is being prepared but a major result is that steel tapes

don't significantly degrade over time or with use. We can probably trust our steel tapes to within 6 mm at 30 m (i.e., 1 part in 5000).

Mike also commented on the certified course list (still growing at more than 1000 courses per year), Jim Gerweck's preliminary online version of the Finish Line manual, our website, and the RRTC Validations program.

In response to a question about *pre-race validation*, Mike explained that race directors who wish to have their course validated before a race must contact validations chair Doug Loeffler to set it up. The race director may suggest a validator but Doug needs to approve the person. Pre-race validations must be paid for by the race, although USATF pays for post-race validations.

Vice-Chairman West, Tom McBrayer: In providing more details about the seminar conducted at the RRCA meeting, Tom noted that the instructors had prepared for inclement weather by bringing hand wheels made from bicycles in case measuring exercises needed to be conducted indoors (As it happened, the weather was fine).

Tom continues to crusade for better documented turns on course maps when runners aren't free to use the whole road (such as a left turn when runners are expected to be in the right lane before and after the turn). To avoid ambiguity, the map must document exactly how much of the road is available for this turn, describing the exact positions of cones or other required barriers.

Tom has observed a disturbing trend, which he also commented on last year, that interest in certified courses (at least in the West) appears to be decreasing. This suggests that we should launch a campaign to promote course certification.

Vice-Chairman East, Paul Hronjak (not present at meeting, written report provided): Paul's report provides many statistics about numbers of certifications in each state in the Eastern area, as well as a breakdown of courses and measurers for the past 6 years. Overall this year, there were 661 new race courses, 42 new calibration courses, and 26 renewed courses in the East.

Course Registrar, Karen Wickiser (not present at meeting, written report provided): Karen's report of certification activity shows about a 10% increase over last year, with over 1100 new courses expected by the end of 2001.

Validations Chairman, Doug Loeffler (not present at meeting, written report provided): Of 40 courses submitted for validation, measurement checks were made of 18 courses. Of these, three failed validation and one other passed only marginally.

Other Business

Proposal to allow 'Net' times for age-group records: Given the observation that 'Chip' timing systems now provide the technology to determine accurate 'Net' times, David Katz suggested a rule change to allow acceptance of net times as age-group records (although they would not be acceptable for open records or for determining placing in the race). This proposal was motivated largely by safety—to avoid requiring age-group runners to line up with faster runners in the front row if they wish to set records.

As David pointed out, a matching rule change involving placement of transponder mats at the starting line will also be necessary in order for net times to play any official role; in particular, all

mats at the start (including backup mats) must be located **before** the starting line. (Meanwhile, mats at the finish must be located **after** the finish line, according to Rule 135.4 as adopted at the 2000 Convention). In combination, these procedures should ensure that recorded net times are **at least** as great as the time taken to run from starting line to finish line.

These rule changes cannot be introduced formally until the 2002 Convention. It was suggested that David research and draft rules changes to be proposed next year, and that RRTC recommend investigation into feasibility and practicality of such changes.

Should Tracks be exempted from expiration policy? Bob Harrison suggested that the policy adopted last year to phase out certification renewals should not apply to tracks. Claiming that tracks don't lose measurement integrity as easily as roads do, Bob thinks we should continue to allow renewal of track certifications after 10 years, even though we're eliminating renewals of road courses. Bob referred specifically to a track he certified at 401.8 meters which was used for a 1 mile race.

Mike Wickiser stated that we didn't need to settle the question at this meeting but could debate it further in MNForum. Therefore, no opinions for or against Bob's proposal were expressed at this first RRTC meeting (However, the topic was raised again at the 2nd RRTC meeting, where some opinions were indeed expressed. See minutes of 2nd meeting below).

Meanwhile, as a point of information, David Katz observed that, technically, RRTC certification of a track applies only to LDR track events (races longer than 10,000 meters), and only when no surveyor's certificate is available. RRTC has no authority over ordinary track and field events; therefore, an RRTC certificate has no validity in the situation Bob described, involving a 1 mile track race. David is a certified track and field official who actually has credentials to measure tracks for regular track races, so is very aware of the rules in this area.

Multiple Course Certificates: David Reik (not present at this meeting) had suggested by email that it be acceptable for a single certificate to cover several courses with different certification numbers. Mike Wickiser asserted that only one certification number should appear on any certificate although it's allowable to include several related courses which all share the **same** certification number on a single certificate. When this is done, it is still necessary to display the **drop and separation** of each of the courses being certified. Mike passed out copies of two recent certificates, one from Michael Franke, the other from Tom McBrayer, which do combine several courses on a single certificate (with one certification number), clearly displaying the drop and separation of each course.

Bob Baumel suggested that, overall, the best strategy is still to give every course its own certificate and its own certification number. Bob asked what would happen if, after combining several courses on one certificate, there is road construction which alters only *one* of the courses. Mike suggested that this would invalidate the entire certificate. Therefore, you're taking a risk when you combine several courses on a single certificate.

While on the subject of filling out certificates, Ron Pate asked about proper notation and usage for metric and non-metric units. It was pointed out that Bob Baumel has prepared instructions on this topic which he distributes when providing electronic certificate templates to certifiers. It was decided to include those instructions in Measurement News.

The meeting was adjourned at 18:37.

2nd Meeting — Friday, November 30, 2001

Attending: Bob Baumel, Norm Brand, Justin Kuo, Bob Langenbach, AC Linnerud, Mary Anne McBrayer, Tom McBrayer, Ron Pate, Bob Rauch, Jeff Rigdon, Don Shepan, Mike Wickiser

The meeting was called to order at 15:10 by Mike Wickiser. As is customary for our 2nd RRTC meeting, the first item of business was to present results of our Pacing Contest.

Measurement Contest: The big question everybody was asking after this meeting: Who is "The **New** Eye In The Sky?" The contest course, laid out by Leon Mattics, traversed a loop in Cooper Riverfront Park, adjacent to both the Convention Center and Mobile River. Following a trend of recent years, this course was thoroughly documented, so nobody expressed any confusion as to its location. Fifteen people entered the contest. Awards, consisting of attractive "Christmas on the Coast" Collector's Ornaments, were presented by Mike Wickiser. As usual, the rules specified that entrants must be present to win. Andrew Hecker had submitted the best distance estimate but wasn't at this meeting, so the first-place award was presented to Justin Kuo. Similarly, Steve Vaitones had the next best estimate but also wasn't present, and the 2nd place prize went to Bob Baumel. This brings us to "The New Eye In The Sky," who appeared to have won the 3rd place award—which was *almost* given to perennial 'Eye In The Sky' Norm Brand. But Norm admitted that he was only the *ordinary* "Eye In The Sky" who submitted the 11th best entry. Currently, the identity of "**New** Eye In The Sky" remains a mystery. The 3rd place prize was presented to Mary Anne McBrayer.

More on Tracks and Expiration policy: Bob Harrison's proposal to exempt tracks from our expiration policy was raised again. It was pointed out that tracks are often resurfaced, in which case all lane lines and other markings are repainted—invalidating certification of any *uncurbed* track, thus requiring remeasurement. And on most recently constructed *curbed* tracks, the curb consists of removable rails whose positions may shift; thus, they can also lose measurement integrity. [Ed. note: You may still find tracks with apparently 'permanent' concrete curbs, but they're getting obsolete and may likely be rebuilt soon. For example, the high school in my town had an asphalt track with concrete curb but it was replaced a few years ago with an *uncurbed* synthetic surface track.] The consensus seemed to be that tracks should be subject to the same expiration policy as other RRTC certifications.

Track Measuring technique: In the case described by Bob Harrison, the track was measured using an instruction sheet prepared by Bob Baumel some years ago (Sept 1990 *Measurement News*, p 6). That sheet explains how to either tape along the curb face if the track has a suitable curb or else use a geometric method based on length and width measurements; then adjust the measured distance to the hypothetical running line which is either 30 cm from the curb in the case of a curbed track or 20 cm from the inside lane line in the case of an uncurbed track. Norm Brand pointed out that some tracks have "compound curves" (with more than one radius of curvature), in which case the geometrical method described in Bob Baumel's sheet isn't usable. We must conclude that RRTC has no way to certify uncurbed tracks with such geometries. For all other cases (curbed tracks or uncurbed tracks with standard geometry), it was recommended that the instruction sheet originally published in Sept 1990 *Measurement News* be made more available.

Race Course Safety – Measurer's Responsibility: Tom McBrayer reported a situation in which a measurer decided that a proposed course would not be safe for runners; therefore, the measurer refused to measure it. Race organizers then called in another measurer who actually measured the course. This raises the question: How responsible is the measurer for issues of course safety?

Ron Pate pointed out that safety is an important issue in *sanctioning* of the race; therefore, the sanctioning body must assume a large share of the responsibility for any safety issues that arise. Mike Wickiser noted that the race may need to obtain a Parade Permit from the city, in which case the city must also share responsibility for safety. The exact legal situation is murky since, in practice, "anybody can sue anybody." It was generally felt that measurers do have some moral obligation to think about safety of the course. It was suggested that a measurer who thinks the course is unsafe should inform the sanctioning body.

There was also some discussion about *safety of the measurer* in measuring a course. It was suggested that the safest time to measure a congested course is on Sunday morning between around 4 a.m. and 10 a.m. — after the Saturday night partygoers have left the roads, before Sunday morning church traffic picks up.

Changing Course Name in Renewal process: Bob Baumel discussed renewal of an Oklahoma course for which the race name had changed (originally "Challenger 8," now "Hurricane Run"). As decided last year, renewals are being phased out but courses certified prior to 2001 are still renewable. Moreover, according to the policy clarification issued by Mike Wickiser in July, a new certificate is now issued when renewing a course in order to clearly indicate the expiration date of the renewed course. (In the past, when renewing a course, we usually didn't write a new certificate but merely added a note to the existing certificate.) This raises a question whether to use the new race name when writing the new certificate (a question that wouldn't have arisen before this year).

In the particular case discussed, Bob chose to enter the original course name (Challenger 8) on the renewal certificate, figuring that it was best for historical continuity and that RRTC certifies a *course*, not a race. However, when Karen and Mike Wickiser entered the renewal on the RRTC course list, they chose to include both the old and new names; thus, the entry on our list is now "Challenger 8 Out/Back - Hurricane Run."

In discussion, it was considered acceptable to use the new race name on the renewal certificate, although the best strategy would be to enter both names as in Karen and Mike's list entry above. At the same time, we shouldn't accept *premature* renewals (well before a course is 10 years old) whose only purpose is to indicate a change of race name. Sometimes, several different races use the same course, so it isn't always practical for the course name on the certificate to match the race name. Also, remember that the intent of last year's decision is to eliminate renewals entirely, even though we'll be taking 10 years to phase them out, so we shouldn't be using the renewal process to keep track of race name changes.

On a different topic involving filling out certificates, it was stated that when a new course replaces an old one which has been modified by construction, a note such as "*(altered by construction)*" should be written on the certificate beneath the code number of the old course being replaced. This way, Karen and Mike will give the old course a "U" status code, which means that it's Unusable because the course has been physically altered. If you only say that a course has been replaced without providing any such explanation, they give the replaced course a "D" status code. Courses with "D" codes are regarded as still renewable.

The meeting was adjourned at 16:18.

Minutes prepared by Bob Baumel, RRTC Secretary

Tips on Data Entry

By Bob Baumel

I wrote the following when preparing instructions for the original Microsoft Word version of my certificate template, some 6 or 7 years ago. As this advice is still relevant, I have copied it nearly verbatim.

First, always use correct international (SI) symbols for metric units; for example, "m" for meters and "km" for kilometers. (Note that both of these happen to be lower case. It's important to get the case right in SI symbols.) Thus, enter a distance as "10 km" but **NOT** "10 k", "10 K", "10 Km", or "10 KM". (By the way, "10 K" is a valid SI quantity notation, but it denotes a very cold *temperature* of ten kelvins; i.e., ten degrees above absolute zero!)

Some more rules on using SI symbols: The unit symbol is never followed by a period ("10 km" but **NOT** "10 km**.**"). Always include a space between the number and the unit symbol ("5 km" but **NOT** "5km"). The unit symbols do not change in the plural ("1 km" and "3 km" but **NOT** "3 kms"). Always include a zero before the decimal point when writing numbers less than one ("0**.**4 m" but **NOT** "**.**4 m").

If a metric quantity on your certificate was obtained by conversion from English units, be careful not to write so many decimal places as to imply a spurious degree of accuracy not present in the original English figure. Do perform conversions using exact conversion factors, but then round the result to an appropriate number of decimal places according to the assumed accuracy of the original measurement.

For example, if the Straight line distance between start and finish was originally estimated by the measurer as "0.8 mile," do **NOT** write it on the certificate as "1287.48 m" which implies accuracy to the nearest centimeter. (Was it measured by EDM?) A more appropriate conversion for that "0.8 mile" figure is probably "1.3 km".

Altitudes, if converted from feet to meters, should usually be entered in either whole meters or 0.5 m multiples. Use whole meters if the original English figures were all multiples of 10 feet. Multiples of 0.5 m are usually most appropriate when the original English figures were expressed in units finer than 10-foot multiples.

One more comment on altitudes: For **Calibration courses**, the application form asks for only one approximate altitude. Do **NOT** enter this single stated altitude in all four spaces (Start, Finish, High, and Low) as if you knew the course to be perfectly flat. Instead, a reasonable approach is to enter the one known altitude in only *one* of the four fields (probably the "Start" space) and leave the other three fields blank. And enter a question mark (?) in the "Drop" field.

ANNUAL REPORT

Road Running Technical Council

At the annual meeting a year ago, the Technical Council resolved to cease the renewal of certified courses past the 10 year expiration. What seemed to be a straightforward concept required a bit more work than expected. The measurement certificate document was modified to indicate the expiration date and renewal wording was removed. Courses certified prior to this still contain renewal information and renewed courses will be phased out over the next ten years.

A formal renewal procedure was produced and distributed to all certifiers and posted on the RRTC website. This was also posted in *MNForum*. Renewal activity is increased this year and along with it are requests for information and maps prior to renewing courses. This indicates that the running community is aware of the change and becoming more knowledgeable of what is required for a certified course.

Pete Riegel & Don Shepan attended the RRCA annual meeting and conducted a measurement seminar while there. This resulted in increased interest in certifying race courses by several participants.

I was able to travel on two occasions to conduct validations of several courses. One trip to the New York/New Jersey area and another to Chicago resulted in courses being checked in support of pending records.

Due to renewed discussion over steel tapes, a controlled comparison of steel tapes was conducted by Pete Riegel & myself. We did this by soliciting as many different steel tapes as could be made available from measurers. Thirty-three tapes were obtained from measurers around the USA and from Canada, Great Britain, France, and Brazil. A full report of the exercise is being produced and will be available in the very near future.

In summary, the length of steel tapes appears to be within 1/4 inch at 100 feet.

The Certified Course list continues to grow at a rate in excess of 1000 courses per year.

Work continues on the Finish Line manual. Jim Gerweck has recently posted a working version of the manual. Future changes can be made to the online version as necessary.

RRTC.net continues to grow and readily offer information on varied aspects of certified course measurement. Bob Baumel has added the course renewal procedure and continually updates the website with current information.

The Validations program provides a check on the status of certified courses. Doug Loeffler manages the assignment of expert measurers to check course length in support of pending athlete marks for records.

Mike Wickiser - RRTC Chairman

EASTERN VICE CHAIRMAN REPORT

The following are the statistics for the certificates received through November 17, 2001

New race courses	661
New calibration courses	42
Renewed courses	26

The following is a breakdown by state:

STATE	RACE COURSES	CALIBRATION COURSES	RENEWALS
AL	30	1	4
CT	18	4	1
DC	12	0	0
DE	6	0	0
FL	39	2	2
GA	23	4	1
IL	88	2	2
IN	2	1	0
KY	6	1	0
MA	27	4	0
MD	15	0	0
ME	9	0	0
MI	31	2	0
MS	1	1	0
NC	58	4	6
NH	13	1	2
NJ	37	0	0
NY	50	2	2
OH	42	6	0
PA	34	0	1
RI	10	0	0
SC	33	0	0
TN	31	0	3
VA	23	0	0
VT	6	2	0
WI	14	2	3
WV	5	2	0

As for NC, there are actually 60 race courses and 6 cal courses (the above statistics only include those submitted to the Registrar) which is two total courses behind last year at this point. These courses were received from 12 measurers.

The breakdown by year since I took over as State Certifier are as follows:

YEAR	COURSES	MEASURERS
1996	44	8
1997	64	8
1998	41	9
1999	48	6
2000	72	13
2001	66	12

Sorry I can't be there but I have just started a new job and there is no way I can justify taking a week off at this point.

Paul Hronjak **Eastern Vice Chairman**

USATF - RRTC - Course Registrar

ANNUALREPORT

The complete Certified Course list currently contains 21,004 certified courses. This includes 1075 courses for 2001.

This indicates almost a 10% increase in activity over last year. We will certainly exceed 1100 courses by years end.

Breakdown by most common distances:

5 kilometer	=	558 courses	54%
Calibration	=	65 courses	6%
5mi/8km	=	65 courses	6%
10 kilometer	=	112 courses	11%
Half-Marathon	=	45 courses	4%
Marathon	=	49 courses	5%
Remaining various distances			14%

Renewed courses = 42 courses

Karen Wickiser, RRTC Course Registrar
November 26, 2001

2001 Measurement-by-Pacing Contest

Official Distance: 349.377 meters

	Estimated Meters	Error Meters	Error Percent	Place
Andrew Hecker	349	-0.377	-0.11	1
Justin Kuo	346.875	-2.502	-0.72	2
Steve Vaitones	352	2.623	0.75	3
Bob Baumel	352.07	2.693	0.77	4
The New Eye In The Sky	352.7	3.323	0.95	5
Mary Anne McBrayer	353.607	4.23	1.21	6
Tom McBrayer	354.297	4.92	1.41	7
Mike Wickiser	343.719	-5.658	-1.62	8
Bob Langenbach	355.55	6.173	1.77	9
Don Shepan	342.73	-6.647	-1.9	10
Eye In The Sky	342	-7.377	-2.11	11
Dave Gwyn	358.394	9.017	2.58	12
Ron Pate	339.6	-9.777	-2.8	13
Bob Rauch	370	20.623	5.9	14
Bob Harrison	304.54	-44.837	-12.83	15

VALIDATIONS 2001

Validations Pending

Pass/ Fail	Date of Event	Date of Validation	Course Name	Course ID	Measurer	Validator	Type	Advertised Distance	Nominal Distance	Measured Distance	Percent Difference
	1-May-99		Indianapolis Life 500 Half Marathon	IN99004MW	Underwood		LDR	21,.097.5 m	21,.097.5 m		
	27-Mar-99		GNC 50 K	PA99001DB	Brannen		LDR	50 km	5 mi		
	9-Jan-00		California 10 Mile	CA93028CW	Bryan		LDR	10 mi	10 mi		
	9-Sep-01		Buffalo Stampede 10 Mile	CA00036RS	Scott		LDR	10 miles	10 miles		
	30-Sep-01		Syracuse Festival of Races 5K	NY97047AM	Oja		LDR	5,000 m	5,000 m		
	25-Jun-99		Sri Chinmoy 3100 Mile	NY97024PR	Fitch		LDR	883.3 m	883.3 m		
	19-Sep-99		Ft. Monmouth 2K loop 1991	NJ91020DB	Johnson		RW	2,000 m	2,000 m	Status "D"; Temp. Unvalidatable	
Validations Completed											
P	8-Oct-00		Twin Cities Marathon	MN97028RR	Recker		LDR	42,195 m	42,195 m		
F	24-Mar-01	11-Nov-01	Ephrata Canal Caper 10K	WA01001MR	Sweet	Barrett	LDR	10,000 m	10,000 m	9,963.73 m	-0.36
V	26-Apr-98	23-Oct-01	Sallie Mae 10 K	DC09001DK	Katz	B. Thurston	LDR	10,000 m	10,000 m	10,049.4 m	4.9
V	PreVal	10-Mar-01	Shamrock 8K	VA01012RT	Corzatt	Thurston, B.	LDR	8,000 m	8,000 m	8,008 m	0.1
U / P	12-Nov-99		TAMU 24 Hour/48 Hr	TX99105ETM	DeMaree		LDR	2.489 km	2.489 km	un-validatable	
U / P	12-Nov-99		TAMU 24 Hour/48 Hr	TX99106ETM	DeMaree		LDR	751 m	751 m	un-validatable	
V	Pre-val	2-Jun-01	Frihoffer's Run for Women	NY01024AM	Gilmer	Gerweck	LDR	5,000 m	5,000 m	5.007.08 m	0.14
V	16-Jun-98	2-Jun-01	Saddle Brook Ultra Loop	NJ96017DB	Brannen	Wickiser	LDR	50,000 m	5,000 m	5,013.65 m	0.27
V	21-May-99	6-Jul-01	Hiawatha Heron Hustle 8 Km	NY99013AM	Groome	Wickiser	LDR	8,000 m	8,000 m	8011.46 m	0.14
V	8-Aug-98	5-Jul-01	Crocheron Park Loops	NY98001DB	Brannen	Wickiser	LDR	12 hr.	0.9709 mi	0.9729	0.2
			second loop						0.2191 mi	0.2194 mi	0.13
V	22-Oct-97	6-Jul-01	Juniper Valley Park	NY94003DB	Brannen	Wickiser	LDR	100 mi	1.1982 mi	100.2141 mi	0.21
P	18-Sep-95	8-Jul-01	CSU Monterrey Bay 1 km	CA95031CW	Sorrenson	D. Thurston	RW	1,000 m	1,000 m	1,000.79 m	0.079
P	3-May-99	8-Oct-94	Sri Chinmoy Six Day Race	NY92005DB	Brannen	B.Thurston	LDR	1.0 mile	1.0 mile	1 mi. 3.1ft	0.06
V	10-Mar-01	31-Dec-97	Gate River Run 15 K	FL98001DL	Alred	Loeffler	LDR	15,000 m	15,000 m	15,015 m	0.1
V	16-Apr-00	12-Aug-01	National USATF RW Champ.	MI00002SH	Hubbard	Loeffler	RW	30,000 m	)01069.848 m	30,100.4 m	0.33
V	16-Apr-00	12-Aug-01	National USATF RW Champ.	MI00002SH	Hubbard	Loeffler	RW	20,000 m	)01069.848 m	20,066.5 m	0.33
V	16-Apr-00	12-Aug-01	National USATF RW Champ.	MI00002SH	Hubbard	Loeffler	RW	10,000 m	)01069.848 m	10.032.4 m	0.33
V	16-Apr-00	12-Aug-01	National USATF RW Champ.	MI00003SH	Hubbard	Loeffler	RW	20,000 m	)01069.848 m	20,067.0 m	0.33
V	18-Oct-98	12-Aug-01	Detroit Free Press Marathon	MI98019SH	Hubbard	Loeffler	LDR	42,195 m	42,195 m	43299.78 m	2.61
V	11-Dec-99	24-Aug-91	Rocket City Marathon	AL94013JD	DeHaye	Nicoll	LDR	42195 m	42195 m	42237.2 m	0.1
F	7-Apr-01	16-Sep-01	Chicago Lakefront 50 Km	IL01011JW	Schulman	Wickiser	LDR	16,666.67 m	16,666.67 m	16,600.52 m	-0.397
P	15-Sep-01	25-Jun-00	Band on the Run, Run 5K	IL00046JW	Hinde	Wickiser	LDR	5,000 m	5,000 m	4996.1 m	-0.078
P	15-Sep-01	27-Aug-94	Frankfort/Kennedy Torch 12km	IL91039JW	Hinde	Wickiser	LDR	12,000 m	12,000 m	12,001 m	0.0085
V	6-May-01	19-Apr-98	Lilac Bloomsday 12K	WA97006MR	Renner	Barrett	LDR	12,000 m	12,000 m	12,019 m	0.16
V	1-Apr-01	9-Aug-92	Carlsbad 5000	CA93001WN	Nicoll	Nicoll	LDR	5,000 m	5,000 m	5,005 m	0.1
P	5-May-01	18-Oct-94	Sri Chinmoy Six Day Race	NY92005DB	Brannen	B.Thurston	LDR	1.0 mile	1.0 mile	1 mi. 3.1ft	0.06
V	7-Oct-01	2-Sep-01	LaSalle Bank Chicago Marathon	IL01100JW	Hinde	Wight	LDR	42,195 m	42,195 m	42,237 m	0.1
P	8-May-99	25-Nov-97	Arts Fest River Run 12K	IN97004MW	Stegemoller	Riegel	LDR	12,000 m	12,000 m	12005.8 m	0.048
V	12-May-01	7-Sep-97	U W Parkside	WI90008WG	Grass	Wight	RW	2,000 M	2,000 M	2,004 M	0.22
V	31-Mar-01	13-Aug-00	Bull Run 2K	VA97042RT	Thurston	Sisalla	RW	2,000 m	2,000 m	2,004.9 m	0.24
F	5-Aug-00	20-Oct-01	Vineyard Scoops 5K	MA99002RN	Brown	Nicoll	LDR	5000 m	5000 m	4938.6431 m	-1.22
V	6-Apr-97	23-Nov-01	Fifty Plus 8KM	CA97026RS	Carpenter	D. Thurston	LDR	8000 m	8000 m	8018 m	0.225

Measuring is now high-tech

The first tape measure was patented by Arthur J. Fellows in 1868.

More than 130 years later, Fellows would be hard-pressed to recognize his invention because today's retractable wonders have gone digital, electronic and high-tech.

Now as the 25-foot tape is extended, the precise measurement is displayed in an LCD (Liquid Crystal Display) window on top. And at the touch of a button you can convert it from inches and feet to centimeters or fractions or decimals.

Have trouble remembering measurements you've just taken? No problem. It can hold them in its memory chip and even repeat them back to you with its voice chip – then or even days later.

Some have laser beams that read and record distances, too, while others even allow limited voice recording for verbal notes and thoughts.

Maybe it's time for you to go to the hardware store to take a look. You'll be amazed how these new space-age rulers measure up.

–Associated Press

From *Upper Arlington* ***HOME****LIFE* – Nov 7, 2001.
Courtesy of Joan Riegel

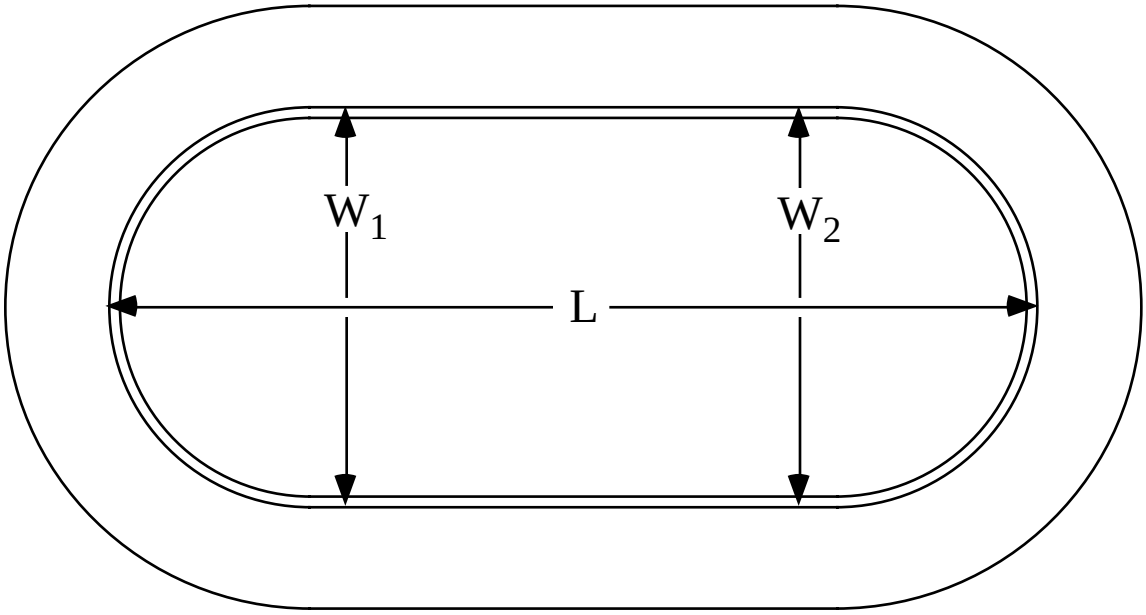
PERCENT ERROR RECORDED IN RRTC PACING CONTESTS

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average
Wayne	Armbrust								1.15	1.86	1.74	-1.44					0.83
Bob	Baumel	0.07		-3.03	-0.91	2.63	-0.72	-1.03	-1.18	-0.52	0.29	2.63	2.26	-0.17	-0.66	0.77	0.03
Marcia	Baumel	0.02				4.37											2.19
Andy	Beach					-5.36	-2.42			-4.54							-4.11
Ken	Bernard											-4.82					-4.82
Michael	Blanchard						1.14										1.14
Bob	Boal				27.76	-0.19	-4.33	1.72	2.75								5.54
Haig	Bohegian				6.72												6.72
Norm	Brand	41.61	8.07	0.80	-0.90	9.56	-24.63	-4.00	-6.84	1.44		3.29				-2.11	2.39
Dan	Brannen		-0.21														-0.21
Margaret	Brooke	-6.52															-6.52
Nick	Brooke	-6.61															-6.61
Jim	Brown			0.36						-0.48							-0.06
Frances	Childs					10.46					-27.34						-8.44
Felix	Cichocki	2.14	0.76	6.51	0.99			-1.89									1.70
Sal	Corrallo								-11.38	-10.11	-1.67						-7.72
David	Coyne													-1.83			-1.83
Robert	DeCelle				187.61												187.61
John	Dunaway			4.58													4.58
Jim	Gerweck												25.95	2.04	2.54		10.18
Karen	Gerweck														-0.61		-0.61
Miriam	Gomez		-3.86														-3.86
Sharon	Good								3.13		15.90			5.57			8.20
Barb	Grass					-1.11	12.17	-0.60									3.49
Bill	Grass					-0.83	-3.73	-2.57			-3.13	-0.06	-0.94				-1.88
Dave	Gwyn	-3.33		4.91	0.65	1.86	-10.20		0.63	4.55	-6.82	4.69	-91.41		7.4	2.58	-7.04
Ben	Hablutzel	-3.05															-3.05
Finn	Hansen	3.31	4.16	-1.02	4.28		-0.07	-1.04	2.05	2.75	1.46						1.77
Bob	Harrison								-0.83		1.26					-12.83	-4.13
Andrew	Hecker															-0.11	-0.11
Walter	High						-3.34										-3.34
Basil	Honikman			5.67	-1.22	-29.89	-0.17	1.35	2.52	-0.06							-3.11
Linda	Honikman								3.28								3.28
Bard	Horton				-0.47												-0.47
Paul	Hronjak									0.64					1.12		0.88
Jim	Jacobs				28.14												28.14
Alan	Jones			0.01	1.27												0.64
Clain	Jones				0.09												0.09
Bill	Keesling					22.29											22.29
Bill	Kehoe												1.10				1.10
Tom	Knight	1.50															1.50
Carol	Kuo					0.72			0.34	0.03	-0.61	3.08					0.71
Justin	Kuo			17.14	-1.61	0.07	-2.85	40.21	-1.09	0.16	1.43	6.00	-0.51	1.75	1.08	-0.72	4.70
Bob	Langenbach	-0.66		3.50		-0.93	0.33	0.42	-0.52	13.55	-3.21	3.91	1.08	3.53	-0.29	1.77	1.73
Carole	Langenbach						1.76		-2.23		1.06		-1.12	-0.18			-0.14
Mel	Lemon								157.85								157.85
Tom	Mayda				-0.21												-0.21
Mary Anne	McBrayer	-2.91	0.14	4.06	-1.69	0.61	2.54	2.40				3.69		-1.58	1.85	1.21	0.94
Tom	McBrayer	-3.66	-2.38	-1.48	-0.90	3.07	-0.43	0.52		-1.53	1.34	4.10	-0.69	-0.20	0.82	1.41	0.00
G	Mercator											-0.70					-0.70
Dick	Mochrie						-6.11	2.13									-1.99
Gilberto	Moreno														-37.3		-37.30
Wayne	Nicoll	-1.11		-10.34	0.54	-2.55		1.32	-1.26	0.10							-1.90
Ron	Pate				-7.62											-2.80	-5.21
Bob	Rauch											36.38				5.90	21.14
Rick	Recker	-0.79	-2.22	-0.17	-1.96												-1.29
Joan	Riegel		1.74	-3.35	-1.40	2.28		-1.17				13.65	-4.38				1.05
Pete	Riegel	-1.00	0.95	0.08	-0.52	-1.25	-0.39	0.13	-0.99	1.16	-1.03	3.50	-0.46	0.60	0.11		0.06
Bruce	Robinson								4.00								4.00
Ron	Scardera										-4.52						-4.52
Larry	Schloss			2.07													2.07
Don	Shepan								-0.82		2.75	67.39	-1.19	-0.86		-1.90	10.89
Jim	Skelly								0.15								0.15
Jim	Smith	0.86															0.86
Christine	Steele						-1.83										-1.83
Phil	Stewart								6.48								6.48
Stephen	Tabb	0.62															0.62
Bob	Thurston		0.84														0.84
George	Tillson								-1.65	2.43							0.39
Peter	Torres, Jr.				33.21												33.21
David	Troy					18.38											18.38
Steve	Vaitones										-5.57				1.22	0.75	-1.20
George	Vernosky				27.30	-1.49	-4.68	1.31	0.50								4.59
Karen	Wickiser				-1.53		-5.02			0.19							-2.12
Mike	Wickiser				2.49	0.22	-0.86	2.36	0.00	0.98	2.39				3.76	-1.62	1.08
Ric	Wilson											-2.92					-2.92
New Eye in the Sky																0.95	0.95

Contestants	18	11	18	26	22	22	18	25	19	19	17	10	11	13	15	
Median	-0.72	0.76	0.58	-0.06	0.42	-1.83	0.47	0.15	0.19	0.29	3.50	-0.49	-1.58	-1.12	-1.62	
Average	1.19	0.71	1.68	10.85	0.83	-2.30	2.37	7.18	0.56	-1.24	9.08	-5.86	0.79	-2.18	-0.45	
Std Deviation	11.13	3.45	5.57	40.42	9.61	7.15	10.24	34.70	4.76	8.23	18.08	28.04	2.26	11.87	4.06	
High	41.61	8.07	17.14	187.61	22.29	12.17	40.21	157.85	13.55	15.90	67.39	25.95	5.57	7.40	5.90	
Low	-6.61	-3.86	-10.34	-7.62	-29.89	-24.63	-4.00	-11.38	-10.11	-27.34	-4.82	-91.41	-1.83	-37.30	-12.83	

How to Tape a Track

by Bob Baumel



If curb is suitable, then tape circumference directly along outer edge of inner curb. If not, then use "Length-Width" method: Measure distances L, W_1, and W_2 as shown above, and calculate circumference by the formula:

$$\text{Circumference} = 2L + \left(\frac{\pi}{2} - 1\right)(W_1 + W_2)$$
$$= 2L + 0.570796\,(W_1 + W_2)$$

Once you have the circumference (by either direct curb taping or Length-Width method), then:

If track is curbed, add 1.885 m (6.18 feet) for path 30 cm from curb, or
If track is uncurbed, add 1.257 m (4.12 feet) for path 20 cm from the line.

Notes:

1. Distances L, W_1, and W_2 in the Length-Width method are measured to the outer edge of inner curb or painted line defining the inside edge of the legal running surface.
2. Widths W_1, and W_2 should have endpoints near ends of straightaways, but **within** straightaways (**do not** waste time trying to locate junction of straight-away and curve).
3. For either direct curb taping or Length-Width method, tape every distance at least twice. (You may average the measurements.)
4. Use careful taping technique as described in the manual (include temperature correction).

USATF/RRTC CERTIFIED COURSE LIST
New Entries - November - December, 2001
Closing Date December 13, 2001

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
15.0 km	AL 01023 JD	A	Huntsville	New York Life Monte Sano 15k	0.0	0	R McFarland	
5.0 km	AL 01026 JD	A	Mobile	GMAC 5k Run	0.0	1	L Mattics	
10.0 km	AZ 01003 ETM	A	Tempe	Avon 10k National Championship	0.0	0	T LaBlonde	
10.0 km	CA 01022 TK	A	Stanford	2001 Theta Breakers 10k Run	0.0	1	T Knight	CA 99012 TK
5.0 km	CA 01023 TK	A	Stanford	2001 Theta Breakers 5k Run	0.0	2	T Knight	CA 99011 TK
5.0 km	CA 01024 TK	A	San Francisco	San Francisco Classic 5k	0.1	13	T Knight	CA 91033 CW
10.0 km	CA 01025 TK	A	San Francisco	San Francisco Classic 10k	0.1	13	T Knight	
1.0 mi	CA 01026 TK	A	San Francisco	Miracle Mile	24.6	99	T Knight	CA 83057 CW
10.0 km	CA 01027 TK	A	San Francisco	Full Road 10k	0.1	13	T Knight	CA 85009 TB
42.2 km	CA 01057 RS	A	Long Beach	2001 Long Beach Int'l Marathon	-0.1	4	R Scardera	CA 00037 RS
21.1 km	CA 01058 RS	A	Long Beach	2001 Long Beach Half Marathon	-0.2	8	R Scardera	
10.0 km	CA 01059 RS	A	Los Angeles	Griffith Park 10km	0.0	1	R Scardera	
5.0 km	CA 01060 RS	A	Los Angeles	Griffith Park 5km	0.0	2	R Scardera	
5.0 km	CA 01067 RS	A	San Diego	Race For The Cure 5km	-0.4	5	G Rahill	
21.1 km	CA 01068 RS	A	Culver City	2001 Western Hemisphere HMAR	0.0	0	R Scardera	CA 00047 RS
42.2 km	CA 01069 RS	A	Culver City	2001 Western Hemisphere MAR	0.0	0	R Scardera	CA 00046 RS
10.0 km	CA 01070 RS	A	Newport Beach	2002 Spirit Run 10km	0.3	1	R Scardera	CA 01004 RS
5.0 km	CA 01071 RS	A	Newport Beach	2002 Spirit Sprint Run 5k	0.6	3	R Scardera	CA 01003 RS
5.0 km	CO 01020 DP	A	Erie	Eerie Erie	0.0	3	B Durden	
10.0 km	CO 01021 DP	A	Erie	Eerie Erie	0.0	2	B Durden	
42.2 km	CO 01022 DP	A	Denver	Mile High City Marathon	0.0	1	L Owings	
42.2 km	CT 01020 DR	A	East Lyme	Mystic Places Marathon (course 2)	0.0	0	Guido bros	
1.0 mi	DC 01018 RT	A	Washington	U H108S Customs 1 Mile	-1.3	9	R Thurston	
1.5 mi	DC 01018 RT	A	Washington	U S Customs 1.5 Mile	-0.6	8	R Thurston	
5.0 km	DC 01020 RT	A	Washington	5K Chaser	0.0	0	R Thurston	
42.2 km	DC 01021 RT	A	Washington	DC Marathon	0.1	5	R Thurston	
10.0 mi	DC 01030 RT	A	Washington	Army Ten Mile 2001	0.1	2	R Thurston	
5.0 km	DC 01033 RT	A	Washington	Run For Recovery 5k	0.0	0	R Thurston	
42.2 km	DC 01034 RT	A	Washington	Marine Corps Marathon	-0.4	1	R Thurston	
10.0 km	DC 01037 RT	A	Washington	United We Stand 10k	0.0	0	R Thurston	
5.0 km	DE 01007 GAN	A	Wilmington	Heart 5k	0.0	2	D White	
5.0 km	FL 01038 DL	A	Ocoee	The Ocoee Founder's Day 5k	0.6	3	T Ward	
5.0 km	FL 01039 DL	A	Jacksonville	Race For the Cure - UNF Campus	0.0	6	D Aldred	
5.0 mi	FL 01040 DL	A	Orlando	U Can Finish 5 Miler	0.0	3	T Ward	
30.0 km	FL 01041 DL	A	Ormond Beach	Paul deBruyn 30k	0.0	0	B Harbuck	
15.0 km	FL 01042 DL	A	Ormond Beach	Paul deBruyn 15k	0.0	0	B Harbuck	
5.0 km	GA 01025 WC	A	Macon	Wesleyan College 5k	0.0	0	E Tyler	GA 00021 WC
10.0 km	GA 01026 WC	A	Pine Mountain	Hughston Sports Med Center	0.3	2	J Grosko	
10.0 km	GA 01027 WC	A	Rome	2001 Chieftains Road Race	-0.2	3	S Daniel	GA 00018 WC
5.0 mi	MA 01029 RN	A	Boston	Boston Police Chase	0.0	0	S Vaitones	
5.0 km	MA 01030 RN	A	Boston	Team With a Vision 5k	0.0	14	J Quintinilla	
5.0 km	MA 01031 RN	A	Salem	Salem YMCA Haunted Happenings 5k	-0.2	2	S Vaitones	
5.0 km	MA 01032 RN	A	Lexington	Battlegreen 5k	-0.6	4	S Vaitones	
10.0 km	MD 01017 RT	A	La Plata	10k Sunrise Run	-0.1	2	R Thurston	
4.0 mi	ME 01009 WN	A	Saco	Kerrymen Pub and Mary's Walk	0.0	1	R Fitzpatrick	

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
42.2 km	MI 01032 SH	A	Detroit	Free Press Marathon	0.2	4	S Hubbard	
5.0 km	MI 01033 SH	A	Detroit	Compuware	1.2	32	S Hubbard	
10.0 km	NC 01058 PH	A	Raleigh	Old Reliable Run	0.0	0	P Hronjak	NC 86082 ACL
5.0 km	NC 01058 PH	A	Raleigh	Old Reliable Run	-1.0	5	P Hronjak	NC 86082 ACL
10.0 km	NC 01059 PH	A	Greenville	East Carolina Road Race	0.0	1	K Sloan	
8.0 km	NC 01062 PH	A	Whiteville	Harvest Festival 8k	0.0	1	T Rhodes	
8.0 km	NC 01063 PH	A	Whiteville	Harvest Festival 8k/5k	0.0	3	T Rhodes	
5.0 mi	NH 01014 WN	A	Raymond	Hugh Holt Memorial Road Race	0.0	1	J Belanger	NH 00014 WN
10.0 km	NJ 01034 GAN	A	Paramus	Paramus 10k	0.0	0	P Hess	
5.0 km	NJ 01035 GAN	A	Paramus	Paramus 5k	0.0	0	P Hess	
5.0 km	NJ 01036 GAN	A	Hackensack	Hackensack 5k	0.0	3	P Hess	
15.0 km	NY 10053 AM	A	Chenango	Forks XV	0.3	2	A Jones	NY 84013 AS
10.0 km	OH 01065 PR	A	Kent	Race for Mental Wellness 10k	0.0	3	J Fisch	
5.0 km	OH 01069 PR	A	Cincinnati	Jingle Bell Run - Cincinnati '01	0.0	2	D Connolly	
15.0 km	OK 01025 BB	A	Ponca City	Groundhog Run 15 km	0.7	2	B Baumel	OK 93046 BB
5.0 km	OK 01026 BB	A	Tulsa	Fergie Five	0.0	0	G LaFarlette	
1.0 km	OK 01027 BB	A	Broken Arrow	Mission Run 1km	0.0	0	G LaFarlette	
5.0 km	OK 01028 BB	A	Broken Arrow	Mission Run 2001 - 5 km	0.0	4	G LaFarlette	OK 00029 BB
5.0 km	OK 01029 BB	A	Tonkawa	Wheat Heart 5 km	0.0	0	G LaFarlette	
5.0 km	OK 01030 BB	A	Oklahoma City	Komen Race for the Cure	0.2	3	K Hardwick	
5.0 km	OK 01031 BB	A	Oklahoma City	Miracle Run	0.2	2	J Smith	
5.0 km	OK 01032 BB	A	Holdenville	Hog Wild Day 2001	0.4	3	G LaFarlette	
8.0 km	OK 01033 BB	A	Oklahoma City	Turkey Trot Classic	0.0	0	K Hardwick	
5.0 km	OR 01002 LB	A	Portland	Jingle Bell Run	0.4	3	L Barrett	
5.0 mi	PA 01030 WB	A	York	York White Rose Five Mile Run	0.0	0	P Barner	PA 09102 WN
42.2 km	PA 01031 WB	A	Philadelphia	Philadelphia Marathon - 2001	0.0	0	B Belleville	PA 99027 WB
10.0 km	PA 01033 WB	A	Erie	Pisp Beach 1 - 10k	0.0	2	M Vieyra	PA 88049 RE
10.0 km	SC 01033 BS	A	Columbia	Extra Mile 10k	0.9	3	E Prytherch	SC 01004 BS
8.0 km	SC 01034 BS	A	Greenville	Run For Hope	0.0	0	D White	SC 98020 BS
5.0 km	SC 01035 BS	A	Charleston	Remember 9-11	0.0	0	M Chodnicki	
5.0 km	TN 01027 RH	A	Maryville	Reindeer 5k	0.6	2	A Morgan	
5.0 km	TN 01028 RH	A	Springfield	Olde Town 5k	1.7	4	J Zeigler	
Trck	TN 01029 RH	A	Kingsport	Sullivan North High Schl. Track	0.0	0	D Rogers	
1.0 mi	TN 01030 RH	A	Kingsport	SFTC North High Schl. Mile Run	0.0	0	D Rogers	
5.0 km	TN 01031 RH	A	Nashville	Rudolf Red Nose 5k Run	0.1	1	J Zeigler	TN 00018 RH
10.0 km	TN 01032 RH	A	Franklin	Habitrot 10k	0.0	0	J Zeigler	
42.2 km	TX 01012 JF	A	Austin	Austin Motorola Marathon	3.2	47	J Ferguson	TX 99098 ETM
5.0 km	TX 01022 JF	A	Bryan	Lucky B Bison Thunder Run	0.0	1	J Ferguson	
5.0 km	TX 01023 JF	A	Bryan	Brazos Valley Museum 5k Run	0.0	1	J Ferguson	
5.0 km	TX 01024 JF	A	Austin	Bagel Fest Fun Run	0.0	16	J Ferguson	
4.9 mi	TX 01025 JF	A	Austin	Thundercloud Sub Turkey Trot	0.0	1	J Ferguson	TX 00011 JF
25.0 km	TX 01026 JF	A	Austin	Run For the Hills 25k	0.0	4	J Ferguson	TX 00010 JF
5.0 km	TX 01028 JF	A	Austin	Running of the Horns 5k	0.0	0	J Ferguson	
5.0 km	TX 01097 ETM	A	Sugar Land	Clements Rhythm Run '02	-0.2	8	E McBrayer	TX 00099 ETM
10.0 km	TX 01098 ETM	A	Plano	Plano Pacers 10k -15k	-0.4	5	K Ashby	
15.0 km	TX 01098 ETM	A	Plano	Plano Pacers 10k -15k	-0.1	1	K Ashby	
12.0 km	TX 01099 ETM	A	Lubbock	MacKenzie Park 12k	0.0	0	G Jury	
21.1 km	TX 01100 ETM	A	Dallas	White Rock Half-Marathon	0.1	1	K Ashby	
Cal	TX 01102 ETM	A	Hidalgo	Pump House 2nd St. 300 metre	0.0	100	R Soler	
10.0 km	TX 01103 ETM	A	Hidalgo	International Friendship Run 10k	-0.3	75	R Soler	

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
5.0 km	TX 01104 ETM	A	Dallas	Freedom Run 5k	0.0	2	K Ashby	
5.0 km	TX 01105 ETM	A	Houston	Houston Press Dome Run '01	1.6	10	E McBrayer	TX 00078 ETM
10.0 km	TX 01106 ETM	A	Houston	Houston Press Dome Run '01	0.8	5	E McBrayer	TX 00079 ETM
5.0 km	TX 01107 ETM	A	Fort Worth	B.G. Squirrel Run 5k	0.2	2	C Clines	
10.0 km	TX 01108 ETM	A	Fort Worth	B.G. Squirrel Run 10k	0.2	2	C Clines	
30.0 km	TX 01109 ETM	A	Dallas	Big D 30k & 5k	0.3	1	K Ashby	TX 99110 ETM
5.0 km	TX 01109 ETM	A	Dallas	Big D 30k & 5k	1.6	3	K Ashby	TX 99111 ETM
10.0 mi	TX 01110 ETM	A	Helotes	San Antonio Road Runners	0.4	3	D Blick	
5.0 km	TX 01111 ETM	A	Fort Worth	Jingle Bell Run	0.0	4	C Clines	
10.0 km	TX 01112 ETM	A	Temple	Rotary Reindeer Run 10k	0.0	0	K Vierxba	
5.0 km	TX 01113 ETM	A	Temple	Rotary Reindeer Run 5k	0.0	0	K Vierxba	
10.0 km	VA 01014 RT	A	Vienna	Toucan 10k	0.0	0	R Thurston	
21.1 km	VA 01016 RT	A	Virginia Beach	Virginia Beach Rock 'N' Roll	0.0	8	M Robinson	
10.0 mi	VA 01019 RT	A	Hartwood	Hartwood II Ten-Miler	-0.2	3	V Culp	
20.0 mi	VA 01022 RT	A	Fort Hunt	National Capitol Twenty Miler	0.0	1	R Thurston	
42.2 km	VA 01023 RT	A	Richmond	Richmond Marathon	0.7	1	R Thurston	
8.0 km	VA 01024 RT	A	Richmond	Richmond 8k	3.5	6	R Thurston	
21.1 km	VA 01026 RT	A	Norfolk	Norfolk Half Marathon	0.0	0	M Robinson	
10.0 mi	VA 01027 RT	A	Clarke County	Stupid Little 10 Miler	0.0	0	N Riemenschneider	
5.0 km	VA 01028 RT	A	Clarke County	Stupid Little 5k	0.0	0	N Riemenschneider	
5.0 km	VA 01029 RT	A	Sterling	Sterlingfest 5k	0.0	0	R Thurston	
1.0 mi	VA 01031 RT	A	Stafford	Park Ridge One Mile	0.6	1	V Culp	
5.0 km	VA 01035 RT	A	Arlington	Special Olympics 5k	-3.6	9	R Thurston	
5.0 km	VA 01036 RT	A	Stafford	Park Ridge II 5k	0.2	1	V Culp	
5.0 km	VA 01038 RT	A	Stephens City	Thanksgiving Day/Sportsfest 5k	0.0	1	N Riemenschneider	
5.0 km	WA 01009 MR	A	Tacoma	Bank to Bay 5k	0.0	1	T Cotner	WA 00009 MR
8.0 km	WA 01010 MR	A	Tacoma	Bank to Bay 8k	0.0	0	T Cotner	
10.0 km	WA 01011 MR	A	Tacoma	Bank to Bay 10k	0.0	0	T Cotner	
5.0 km	WV 01015 RT	A	Benwood	Debbie Green Mem 5k (alt.)	0.0	0	J Corra	
5.0 km	WV 01032 RT	A	Martinsburg	Apple Trample 5k	0.1	48	N Riemenschneider	

Renewed

5.0 km	AL 91001 JD	A01	Wilmer	Turkey Ten - 5k	0.1	4	L Mattics	
Cal	GA 91015 WN	A01	Peachtree City	Dividend Drive 1/2 Mile	0.0	100	D Olson	
5.0 km	TN 89004 WN	A01	Clarksville	Sango Scamper 5k	-1.2	3	E Longton	
10.0 km	TN 89005 WN	A01	Clarksville	Sango Scamper 10k	0.6	2	E Longton	

Copies of these certificates available from:
(Send course name & ID number and $2.00)
Each certificate inclides a course map.

Karen Wickiser - Course Registrar
2939 Vincent Road
Silver Lake, OH 44224-2916
Phone 330-929-1605
FAX 509-351-5383
Mikewickiser@neo.rr.com

A complete listing of USATF Certified courses is available at - www.RRTC.Net

MARINE CORPS MARATHON

Washington, DC and Arlington, VA

USATF- Certified Course
No: DC-01034-RT

MAP NOT TO SCALE

Start: 175 ft south of centerline (C/L) of Marshall Drive; 110 ft south of light pole # 003-089. Start on both sides of Route 110 (not shown).

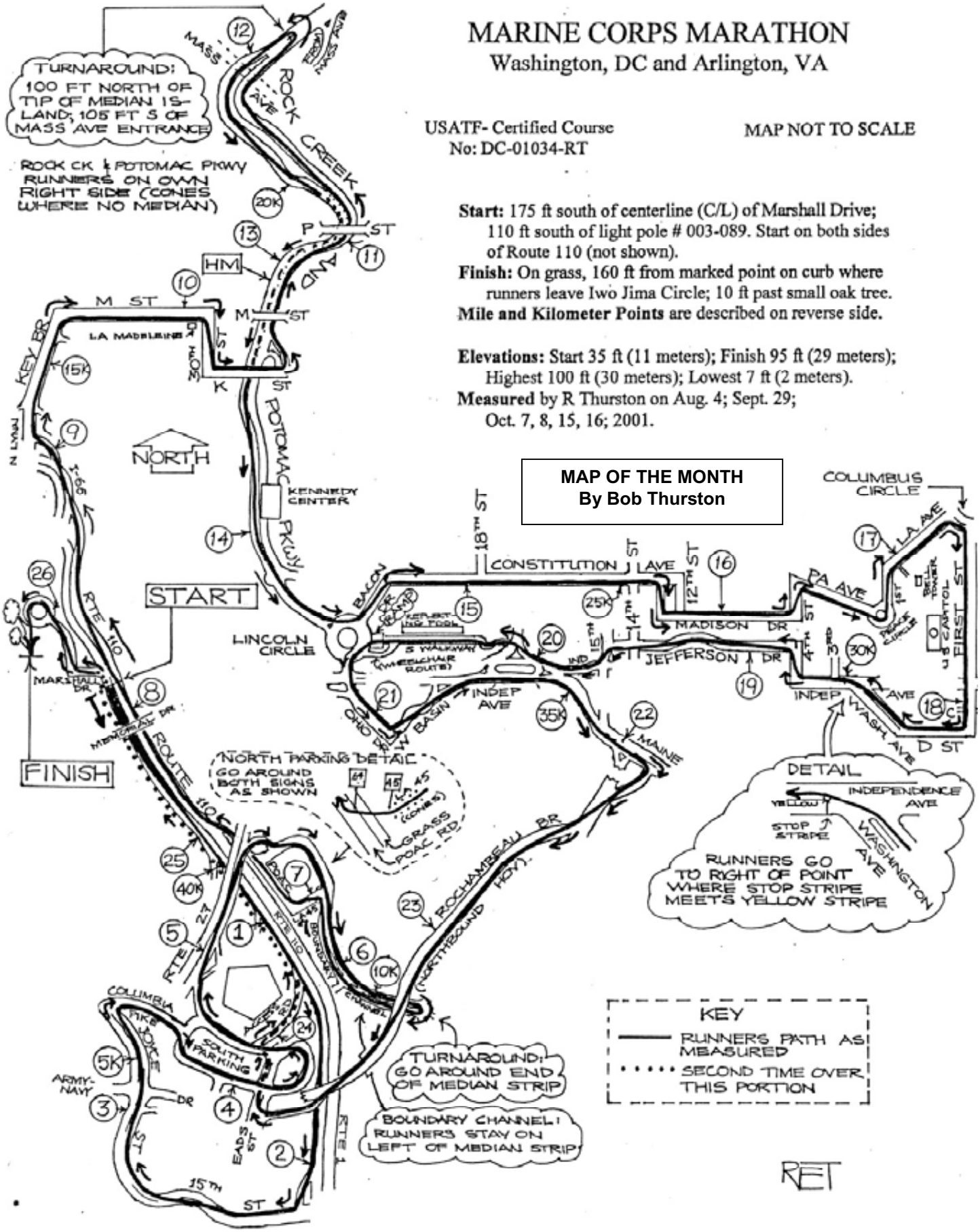
Finish: On grass, 160 ft from marked point on curb where runners leave Iwo Jima Circle; 10 ft past small oak tree.

Mile and Kilometer Points are described on reverse side.

Elevations: Start 35 ft (11 meters); Finish 95 ft (29 meters); Highest 100 ft (30 meters); Lowest 7 ft (2 meters).

Measured by R Thurston on Aug. 4; Sept. 29; Oct. 7, 8, 15, 16; 2001.

MAP OF THE MONTH
By Bob Thurston



A Tale of a few Marathons

Brian Peacock - November 2001

Some time ago Dan Horvath and I wrote an article, in "Marathon and Beyond" on the effect of hills on marathon times. This article presented some pros and cons related to the development and implementation of an "Index of Hilliness." Early in the article we made a long list of individual and environmental factors that are often cited as affecting marathon times:

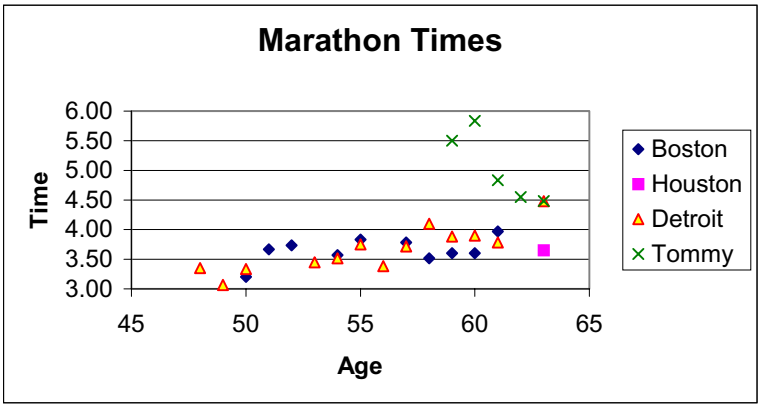
1. "I was or was not motivated"
2. "I am or am not well trained"
3. "I was or was not injured"
4. "I did or did not sprain my ankle while visiting the woods because the port-a-john line was too long"
5. "I am or am not overweight"
6. "I used the right or the wrong strategy"
7. "I did or did not take a wrong turn"
8. "I did or did not listen to my coach or follow advice from a running magazine"
9. "I did or did not choose the right parents"
10. "I am or am not Kenyan"
11. "I am male or female"
12. "I am young or old"
13. "I was or was not dehydrated"
14. "I did or did not eat the right food or sports bar"
15. "I did or did not wear the right shoes"
16. "I did or did not wear the right clothing"
17. "The wind was or was not in my face"
18. "It was or was not raining or snowing"
19. "The temperature was or was not too hot/cold"
20. "The humidity was or was not too high"
21. "The terrain was good or bad"
22. "The course was or was not hilly"

What follows is some evidence related to four major effects on performance - hills, age, training and one other.

Our earlier article was based on a very extensive amount of data from three Boston marathons and the associated qualifying races. We showed that Boston times were generally longer than the qualifying race times and suggested that this was due to the hills. Pete Riegel – the advisor from US Track and Field – was of the opinion that hills were less important than we indicated and that there were alternative explanations of the differences between Boston and qualifying times than simply the hills.

So I took a look at my experiences that span 10 Bostons and 12 Detroit Free Press marathons over the period 1988 to 2000:

	Boston	Detroit
N	10	12
Mean	3.65	3.60
Variance	0.043	0.089
Best	3.2	3.07



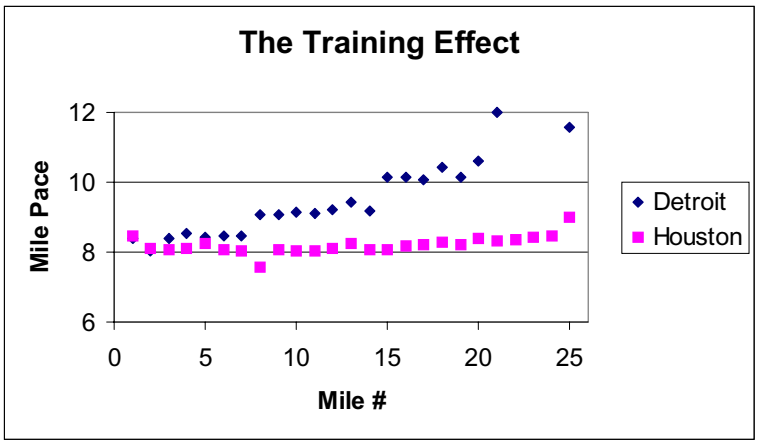
A Student's T test, assuming unequal variances, indicated no significant difference between the Detroit and Boston times. Now I will be the first to admit that one chunk of personal data is not as reliable as the thousands of data points used in the earlier article. But data is data and I certainly did not alter my strategies at Boston and Detroit to purposely confound things.

Now to the effects of Age. Regression analysis of the data between age 48 and 61 produces the following approximate linear relationship:

Time = 1 + 0.05(Age), for those who are interested this has an R-squared value of 0.49

What this means is that for every year over this period I lost about 0.05 hours (3 minutes) or about one and a half percent. Now in the Great Lakes Relays we get 2% for each year over 50, so I am a little ahead. Perhaps they should let me back on the renowned Fox and Hounds team, but read on.

Now to the topic of training. At the right hand end of the graph for the year 2001 there is a fast Houston (January) time – 3 hours 39 minutes and 59 seconds and a slow Detroit (October) time 4 hours 29 minutes and 44 seconds. Both races were on flat courses under good weather conditions. The difference was due to the training effect. Now some years ago I invented the "rest theory" I ran the Columbus marathon in early December after resting from the mid ctober Detroit marathon. It was cold and I was miserable and just kept my pride with a 3 hours 59 minutes showing. My running buddies have still not stopped laughing at my attempts to climb into the Chevy Suburban after the race.



So this year I reinvestigated a moderated version of the "rest theory." Between Houston and Detroit (9 months) I did not run further than about 10 miles. I did keep in good general shape running about 20 miles a week, quite a bit of biking, some swimming and paddling my canoe. I even did the National Senior Olympics 10k (7^{th}) and Triathlon (10^{th}) in Baton Rouge in 100 degrees. I was also dogged by a sore Achilles tendon during this period. Anyway here are the results of non-specific (i.e. no long runs) training on marathon performance.

For the purposes of analysis I have omitted the first and last miles as they have spurious effects due to congestion and the end spurt. I used polynomial regression to analyze the fatigue effect, which I presume had its underpinnings in training strategy.

Houston:	Mile Pace = 8.0 + 0.001 $Mile^2$	R-squared = 0.60
Houston:	Mile Pace = 8.3 - .059 Mile + .003 $Mile^2$	R-squared = 0.65
Detroit:	Mile Pace = 8.33 + 0.0065 $Mile^2$	R-squared = 0.92

(There was no significant linear component in the Detroit analysis)

If you aren't interested in the statistics, just look at the picture. If you don't train appropriately, including some long runs, you will tire more quickly.

But, as in all great stories there is a twist at the end. At mile 24 in the Detroit marathon I heard the dreaded word: "Dad". My 21-year-old son, Tommy, had caught me after 5 attempts – his times for his five Detroit marathons are shown in the first figure. The reader may think that this youth had trained hard to reach this goal of catching his dad. But you would be wrong! Tommy never runs more than 3 miles a couple of times a week and spends most nights in noisy smoke filled bars. He is responsible for the noise – he is a full time rock and roll star (look up: gordonbennettband.com) – but the only smoke he gets is second hand. His improvement every year (1998 was a miserable wet year at Detroit) is due to maturation, not training. Unfortunately as you age, maturation moves in the opposite direction and training is your only salvation.

A Salute to John Christopher Jewell

By Ted Corbitt

Recent issues of *MEASUREMENT NEWS* have introduced its readers to John C. Jewell, of Wokingham, England, the road course measuring pioneer who adapted the bicyclists' Calibrated Bicycle Method of Measuring, to measuring road running courses.

In 1964, Ted Corbitt of New York City urged the Road Runners Club of America (RRCA) to begin a program of promoting more accurate road race course measuring. The RRCA began such a program and the Amateur Athletic Union (AAU--the then governing body for track and field) began a similar program a few months later. The two programs were eventually combined into one committee of operations.

Corbitt was initially taught the rudiments of course measuring by his New York Pioneer Club teammate John Sterner of the Bronx, New York City, who had had some surveying experience, however Corbitt relied mainly on two measurement gurus for support: John C. Jewell of England, and the generous Robert Letson of San Diego, California.

John C. Jewell died August 16, 2001, at age 89, of pneumonia, after dealing with severe after effects of a stroke, suffered some years earlier. He was lucky in his marriage to his lovely wife Joan, in that she was very helpful and supportive as he worked his hobbies, and especially in the final years when he was dealing with the disabling effects of the stroke.

Jewell's hobbies included walking, running, and gardening. The Road Runners Club (of England) and long distance running activities eventually largely dominated his free time. He was a member of the South London Harriers Club.

Jewell was born in London, England June 9, 1912. He graduated from Imperial College with a Bachelor of Science degree in chemistry. He worked as a Research Chemist in the oil industry.

Jewell was a founding member of the RRC (of England) in 1951 He edited the RRC NEWSLETTER, from 1953 to 1991, and he did some work with it after that. He was a member of the RRC Records Committee until his death. He served as an announcer at some ultramarathon races. He was a time keeper at some early post World War II races.

The current course measuring community is indebted to both Jewell and Letson. At a time when there were few individuals (either runners or race directors) around who were interested in doing little more than talk about accurate course measuring, these good men answered the call, and they helped the measuring program to survive, and evolve, producing the means whereby the technical advances that exist today could come alive.

Researcher Andy Milroy of England who has praised Jewell for his publishing of running news from around the world for years, organized a nomination of Jewell for an O.B.E., the Order of the British Empire, a knighthood, which he would receive from the Queen, in recognition of outstanding personal merit. Milroy got support for the effort from the Road Runners Club of England, from Peter Riegel of the USA, and from Great Britain's 2:07 marathon man Hugh Jones. The bid failed, however, being seriously nominated for this honor already points to the individual as someone special.

Jewell did his good deeds in the background, without fanfare, as is the case with most volunteers around the world. Near the end he did get some recognition, such as the establishment of the annual John Jewell Award, given to the British long distance runner who has achieved the best performance of the year.

And so, we salute John C. Jewell who promoted the Calibrated Bicycle Method of measuring road race courses. He lived long enough to see the governing bodies of our sport approve of this measuring method and to see it used around the world.

PUBLICATIONS AVAILABLE FROM RRTC

Printed Course Lists - You can obtain a list of certified courses for any state. Send $2.00 for any state list. You will receive a list that is current as of the last published Measurement News. If you wish the courses to be sorted in a special way, let us know. Otherwise it will be sorted by distance as the list appears in MN. You can obtain other specially-sorted lists - for instance, you might want to have all the 5k's in IL, IN, and MO. It can be done. Just say what you want. If you are online, lists can be sent that way. Contact Mike Wickiser at MikeWickiser@neo.rr.com

Attention RRTC certifiers: Your lists are free. Any time you want one let us know. You can mark up any mistakes and we will correct it and send you a new copy.

Web Page Access to Course Lists: The complete list can be downloaded from the RRTC website at **http://rrtc.net/download/** Also, try the certified course Search Engine at the USA-LDR website **http://www.usaldr.org/**

Individual Certificates - These may be obtained by sending the course number and $2.00 per course desired. **SEND THE COMPLETE ID, INCLUDING PREFIX AND SUFFIX LETTERS, Thus: CA 92057 RS.** Send course name, length and location as well. If you are thinking of hiring a measurer, this is an excellent way to see the sort of work you can expect. In addition, you may wish to check out a course you intend to run. Bring the map to the course and see if the race director got it right!

Above material may be obtained from: Wickiser - 2939 Vincent Rd. - Silver Lake, OH 44224-2906

Measurement Calculation Computer Program by Bob Baumel, version 1.2 for Macintosh or IBM PC. This software can be downloaded for free from the RRTC website at **http://www.rrtc.net/download/** or Bob will distribute it by email attachment (send requests to webmaster@rrtc.net) or on floppy disks (send blank, formatted diskette and stamped return mailer to Bob at: 129 Warwick Road, Ponca City OK 74601-7424). Be sure to specify Mac or PC version.

Electronic Certificate Templates (available to Certifiers only), now in an Adobe Acrobat format which isn't tied to any word processor. Requires Acrobat or Acrobat Reader 4.0 or greater (Current Acrobat Reader may be downloaded for free from www.adobe.com). The template allows you to fill in certificates on the computer and print them. Available in both FS and non-FS version. Distributed by Bob Baumel by email or diskette [same addresses as for Measurement software]. Bob can customize the template with certifier's personal info at the bottom (name, address, phone, etc.) so you can avoid re-typing it every time (Be sure to specify exact ID text desired when requesting a template).

Online course measurement book, edited by Bob Baumel. It's a revision of the one you can buy from USATF, but the basic procedures have not changed. Available at: **http://www.rrtc.net**

Course Measurement Procedures - the Bible of course measurement. Complete instructions for measuring courses for USATF certification. The same procedures are now used for IAAF and AIMS courses. $9.00 postpaid. Available from: USATF - Book Order Dept. - PO Box 120 Indianapolis, IN 46206

Course Measurement Video - a concise 17 minute introduction to course measurement, intended as a supplement *to Course Measurement Procedures*. See how it's done! Version 2 sells for $10 but there are still a few copies of the original version available for $7.50. Send to: Tom McBrayer - 4021 Montrose - Houston, TX 77006-4956.

OTHER PUBLICATIONS AND EQUIPMENT

Road Race Management is a monthly newsletter providing race organizing ideas and news for race directors. $97 per year from: Road Race Management - 4904 Glen Cove Pkwy - Bethesda, MD 20816 Phone: 301-320-6865 Fax: 301-320-9164

Jones/Oerth Counters - Write to: Paul Oerth - 2455 Union St - Apt 412 - San Francisco, CA 94123. Phone: 415-346-4165 Fax 415 346 0621. Email: Poerth@aol.com. US Price is $65 for the 5 digit model, $75 for the 6 digit model, postpaid. Foreign price is $70/$80 plus postage. Foreign orders shipped by airmail. Visa, MasterCard, American Express cards accepted. **Note: Payment in advance is required.**

RunScore - The flagship of IBM-style finish line programs. For information contact: Alan Jones - 3717 Wildwood Dr - Endwell, NY 13760. Or check it out on the internet at: www.runscore.com

Apple Raceberry JaM - Race management software for Macintosh and Windows. Check it out on the Internet at http://www.raceberryjam.com or call Jack Moran at (952) 920-0558.

TOPOGRAPHIC MAPS

USA topographic maps are available from:

U. S. Geological Survey 303-202-4200
USGS Map Sales
PO Box 25286, Bldg 810
Denver Federal Center
Denver, CO 80225

Delivery will be made in approximately 4 weeks. Ask for latest price.

Maps can be located and ordered online at: **http://www.usgs.gov**

Maps can be obtained in just a few days from:

Map Express – PO Box 280445 – Lakewood, CO 80228-0445

1-800-MAP-00EX (1-800-627-0039)

Maps can be located and ordered online at**:**
http://www.mapexp.com

Topo Maps on CD-ROM - 3-D TopoQuads includes authentic USGS 7.5-minute quadrangle maps, assembled into one seamless database

See an interactive online demo at **http://www.delorme.com**

Also - check out Street Atlas USA from the above – it's a seamless street map of the whole USA at a decent price.

USGS TOPOGRAPHIC MAPS ONLINE - FREE

Maps.Com has a section where you can click on to all USGS maps, free. This can be very handy for obtaining accurate elevation information.

Check out**:** **http://www.maps.com**

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December 19, 2001