

# Measurement News



July 2002  
Issue #114



Pete Riegel toggling the wind gauge at the end of a calibration ride. See article about wind measurement inside.

# MEASUREMENT NEWS

#114 – JULY 2002

**Editor:** Pete Riegel - 3354 Kirkham Road -  
Columbus, OH 43221-1368

Telephone: 614-451-5617 (home, not after 10 PM  
Eastern time)  
FAX: 614-451-5610 (home)  
Email: Riegelpete@aol.com

RRTC CHAIRMAN – Mike Wickiser  
2939 Vincent Rd – Silver Lake, OH 44224  
Phone/fax: 330-929-1605  
Email: MikeWickiser@neo.rr.com

## 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](mailto:Riegelpete@aol.com)

## Deadlines

Material intended to be included in the September  
2002 issue must be in the Editor's hands by **August  
24**. Next issue will be mailed in early September.

## ONLINE MEASUREMENT FORUM

All it takes to become a subscriber is access to email.  
Simply send to [MNForum@aol.com](mailto: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

Founder.....	Ted Corbitt
Chairman.....	Mike Wickiser
Vice-Chairman (East).....	Paul Hronjak
Vice-Chairman (West).....	Tom McBrayer
Registrar of Courses.....	Karen Wickiser
Webmaster/Secretary.....	Bob Baumel
MNForum.....	Jim Gerweck
Validations.....	Doug Loeffler
Finish Lines.....	David Katz
Editor, <i>Measurement News</i> .....	Pete Riegel
RRC A Representative.....	Carl Sniffen
Road Running Info Center Rep.....	Basil/Linda Honikman
Athlete Representatives.....	Carol McLatchie, Dan Dillon
National Officer Liaison.....	Bill Roe
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 #114 – July 2002

\* \* \* \* \*

### Chairman's Clatter - From Mike Wickiser

WOW, measurements have taken off! This issue's current listing has 302 new courses. To quote Tom McBayer, "My mail box is never empty." With that level of certification activity, the work on scanning course maps for posting on the Internet has slowed a bit. Never fear, a new scanner is sitting next to my computer. Being able to scan maps without shipping the files off to the national office raises my comfort level. It also puts the workload on Karen and me to get the files scanned. Another project is the search engine for the RRTC web site. The code has been written for this and it is ready to be tested but I have not had opportunity to work with it as yet. Rotator cuff repair will have me sidelined for a few months. During my recuperation I plan on using the time to tackle these two projects.

As RRTC Chairman I sometimes get called upon to check up on a course certification application. This usually happens when a measurer is concerned over the time since he or she sent the application to their certifier. Two such courses are in a lengthy process of getting certified right now. In each case the measurer is concerned about the time it has taken. In each case, the primary reason for the delay is the measurement information and map are incomplete. My reason for bringing this up is to emphasize the importance for all certifiers to maintain a prompt turn around time. Generally a one-week turn on either a completed certificate or on a request for additional information is the acceptable standard. If the measurer drags his feet the hold up is due to his lack of action, not the certifiers. In each of these cases, the certifier made contact and was working with the measurer. The measurer just didn't understand the need for complete accurate measurement information and a good quality map.

My point is to remind certifiers to keep in touch with measurers when there are questions about a measurement. At some point in time, if the measurer doesn't respond consider returning the measurement package with a list of information that is needed to get the course certified.

A handwritten signature in black ink that reads "Mike Wickiser". The signature is written in a cursive style with a small mark below the name.

## A NOTE FROM SOUTH AFRICA

Pete,

Just picked up your recent mailing and perhaps I've got something for you -- Attached is a pic of me measuring the Mkuse Game Park 15km last weekend - in the back ground you can see an elephant - This is run through a sugar cane farm and then into a Game reserve which amongst many other animals, birds, snakes has all of the big five except lions. but it does have ostrich!

When we started measuring (using a mountain bike as it is all on dust roads -- I only issue an off road certificate which states it is measured using the 'principles' of the IAAF measurement) - we were looking at a 15 km and of course started from the finish which is an amazing thatched lodge with swimming pool, bars etc etc in the game park. It's a very scenic course and flat but with a dam and a canal and some great spots along the route As we got to the start it was clear that we were going to be some distance short of the planned start point which was a petrol station in a little 'dorp' (town) called Mkuse.



Enroute ostriches

The problem is that there is nothing either side of this town for about 20 km - so we carried on measuring and stopped at the end of the forecourt entrance - total distance 16.09 km -- So we have a 10 miler - why? Because that is what it is!! And the race is set to be called -- 'the Mkuse big 4 and one dam ostrich 10 miler' -- You see there is one ostrich there that chased one of the rangers and gave such a kick that it's probably one of the most 'dangerous' animals on the game park.

You have previously used photos from Soweto, Durban, a Mountain pass and now (possibly) a game farm -- although we don't get many international opportunities here, the big benefit of Africa is that there is always something new and special ---- Anyone looking for a cheap exciting and warm weather holiday would be hard pressed to find a better location and if they are over on 17 August they should put this race into their diary.

Regards, Norrie Williamson



Norrie checking out the elephant

## New Counters & New Life for Old Counters

After two years of testing and measuring, and thanks largely to the assistance of Paul Oerth who is kindly supporting this endeavour, cable-driven counters are now available for purchase.

Here are the specs:

- 5-digit or 6-digit Veeder-Root counters available
- cable measures 73 cm in length
- axle drive yields 23.6363... counts per revolution
- axle drive can be fastened to spokes by a zip tie or wire
- two Velcro straps included



I will also refurbish Jones Counters and Jones-Oerth Counters for a little more than half the price of a new one (the only requirement is that the Veeder-Root counter must be in good working condition).

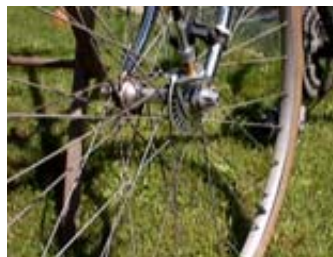
Prices in U.S. dollars are as follows (includes postage for North American orders):

<b>New cable-driven counter</b>	\$110.00 (5-digit counter)	\$120.00 (6-digit counter)
<b>Refurbishing of Jones or Jones-Oerth Counter</b>		\$45.00 (Jones-Oerth model)
<b>Refurbishing of Jones or Jones-Oerth Counter</b>		\$65.00 (cable-driven model)

Please write your name or initials on the bottom of the Veeder-Root counter if you wish to get your counter refurbished and ship to the address below. Cheques or money orders accepted in U.S. funds. Include your phone number, email and shipping address. Please indicate that the contents shipped are a sample to avoid paying the Canadian duty on your own counter. **Note: Payment in advance is required.**

### **Contact:**

Laurent Lacroix  
131 Sunnyside Blvd.  
Winnipeg, Manitoba  
R3J 3M1  
CANADA  
Ph. (204) 832-2301  
Email: llacroix@mb.sympatico.ca



## COMMENTARY RECEIVED ON *MEASURING WIND DURING THE RACE* – MAY MN

### From Norrie Williamson:

MMM interesting - I certainly like the principle - my initial questions / comments would be:

Surely the fan requires to be in free airflow to allow tail and head winds to be 'measured' - this would mean a rig that sat positioned above the rider as the rider would have a 'masking' effect on the tail wind - alternatively since it is the tail wind that we are actually concerned with (no one queries a race into a headwind) position the fan more to the rear on a carrier

I agree with you on the calibration - and am not sure that there is a lot of merit in getting too tangled up in this as I can only hear some of our more mathematical types producing reams of MNF forums on what should in the end become a fairly clear cut situation - (remembering that this only becomes relevant WHEN a 'best / record' is under consideration (what % is that) and one would expect that the co-incidence of that with a border line case to be also a % of probability - So my concern would be over the 'tolerance' allowed on the measurement of wind aid

Do we say as soon as you total length versus your wind length become negative that wind aid was present? Or is there an allowance / SCPF? To be included as well?

How about linking the moving reading with stationary readings at certain points? The question then becomes - should these points be say every 1/6th point on the course (allows for different race lengths) - (of course we need some info in how long such a reading takes and hence how far ahead the bike must be if it must always be ahead of the race leader) or do we say readings must be at change of route direction at beginning (or end or middle) of long stretches in one-direction.

Going back to the masking effect of the rider, - would this be different from the masking / shielding effect of a race pack - IF THERE IS A LEAD GROUP - but then I would say it should always be considered that the runner is a LONE runner and therefore has benefit of full tail wind. (as we develop things we can improve on this)

In track we measure the peak wind as I understand it even although it may gust - are we getting too complicated for the initial set up by doing more than several stationary readings on stretches of long straight running. My point being that even an a to b course that has several turns and twists may not deliver real benefits to the runner because of gusting effects and swirling from the adjacent buildings - the real benefits come from longer straights which I guess need to be about 500m or more.

Also what about other measuring devices - now that they have cat eyes with altitude etc is there nothing with wind speed or wind chill factor that could be used ---

I am not sure that the cost is actually too big a factor - as this will be applied in 'general' only to races where it is worthwhile breaking a record - i.e. incentive money and top athletes (again do age group runners actually get great benefit from tail wind if race numbers are large - perhaps but at [present they already accept that they can not attempt a record on an A to B course - what we are talking about is trying to improve this situation and that might mean gradual steps) - thus to protect or provide such records the cost of say 'flying in' or buying a state or national wind measurement machine may be a nominal amount on the race costs. I feel the first thing is to solve the problem adequately and then to look at the cost implications more closely. If we then find the cost is too much we can look for alternatives bearing in mind all the information we will find from trying to get an 'acceptable method of measurement'

These are literally 'off the top of my head' thoughts and sorry they are not in a more structured format - I look forward to your comments and responses Kind regards norrie

### Pete's response to Norrie:

I have not worried about shielding from a tailwind as my riding speed on all runs is 12 mph, or 5.4 m/s. Thus, except on horrendously windy days, I will always be riding into the apparent wind. For real accuracy an anemometer is supposed to have an unimpeded air path both entering and exiting the instrument. I have a clear path up front, but I am behind it, and I am sure there is some effect from the air "piling up" against me. The magnitude of this is uncertain.

I don't have much interest in arguing about how much wind should be allowed for. At present, the Road Running Information Center (RRIC) has, to my knowledge, dealt with wind readings from only a very few races - principally New York City Marathon and the Crescent City Classic (10 km). Crescent City has supplied photos taken from the lead car that show wind direction against balloons or flags. I think, with NYC, that RRIC has used weather reports. While RRIC was principally responsible for the wind-aid escape clause in our rule, the rule makes RRTC the one to decide how the wind aid is to be determined. I'd prefer to see the clause eliminated.

I am interested in seeing whether we can do a decent job of measuring wind, and what sort of accuracy we can expect. I am attaching my data file so far. My methodology is simple - I take 4 rides back and forth over a 1000 foot calibration course. I start a few hundred feet back from the end, get up to 12 mph speed, and toggle the meter as I pass the end mark. Continue at 12 mph and toggle again at the other end. Record the reading and do it three more times.

It would be better if I had an exact time for each run, but I have only two hands, so the 12 mph approach will have to do.

As you will see from the graph at the end of the file, the average readings are reasonably consistent.

Although the length of the calibration course is 1000 feet the average wind reading is at present 760. Maybe this is an effect of body shielding behind the instrument, maybe it's just the way the instrument works in this setup. In any case, I scale up the readings by 1000/760 (or whatever the average for the run is) and call that the measured wind speed. Subtract the bike speed and you have the wind.

I don't expect the readings to change much as I go on with the experiment, and I am beginning to rough out the writeup. Yesterday was very windy, and I went out all set to get a whopping result, but the main wind component was crosswise from my direction of riding, so the results didn't show any great net effect.

Variability of readings is due to both errors in maintaining 12 mph and to the wind changing speed over the 5 minute measuring period. I think I do a good job at 12 mph. All runs are 12 mph for 80 percent of the time, with acceleration or deceleration if speed hits 11 or 13. I have a feel for the speed now, and the results show reasonable consistency. I picked 12 mph because it's 5 minute miles, close to top racing speed.

Anybody who rides ahead of a real race will not maintain perfectly consistent speed, and this will have to be factored in to whatever results they get.

Have fun with the data. I am tossing in a picture as well.

Best regards, Pete

#### **From Roger Gibbons:**

An Interesting article on the miner's anemometer.

Unless I am missing the point, could not calibration be done in an indoors shopping mall or similar. Here the air would be either still or constantly moving in both speed and direction. Carried over a measured distance in both directions in this environment would surely give the accurate readings you require.

Without spending a long time considering the pros and cons, it would appear to be the perfect solution in overcoming the 'funneling' effects in streets with high buildings. In such conditions the wind direction appears to change around every corner!

I would think that the cost would not necessarily be prohibitive. Certainly in UK where we work through County committees, we have purchased clocks in the past, to be used by all affiliated clubs on their race day. A similar arrangement could be adopted for the anemometer.

I happen to think that official World Records are neither desirable or necessary, but if they are to exist then certainly

wind direction and speed must be measured and taken into account.

Regards,  
Roger Gibbons

#### **Pete's response to Roger:**

I agree with you as far as calibration goes. A windless indoor venue would be nice, if available. It may not be necessary unless we are looking for great precision. So far I have done 14 trials over a 1000 foot calibration course, riding at 12 mph. Each trial is two rides each way within a 5 minute period. The average reading is 763 feet, with maximum of 797 and minimum of 745. This is not too bad for some degree of accuracy. On my 14 trials I have not yet found a wind in excess of 2 m/s. Highest I've found is 1.5.

I have been out on some very windy days, but my street runs north/south, and that component has never been large. One day it will be. In the meanwhile I'll keep riding. I have all I need to produce an article for next MN, but will continue to fill the graph.

I believe our US rule which leaves a loophole for wind measurement on courses with great separation is not good. I'd prefer to see no loophole, just firm limits on drop and separation. Still, until the loophole is closed, there may be some use in wind metering. And it's fun to take a look.

Our rule does not set any particular limit on wind aid. Instead it refers to "significant" wind. This is weak, but as we don't have an ironclad way to determine wind it may have to do. I think it tempts the record-keepers into accepting marginal performances, but cannot back up this statement.

I've also heard that certain stadia, at certain times, can contain swirling winds which could create a head-or-tail wind all the way around the track. I don't think this wind, if it exists, would be anywhere near 2 m/s. On my windiest bike rides, I have noticed a large difference in riding effort between headwind and tailwind at 12 mph, which is close to road running speeds.

As for official world records, the media are going to call them that anyway, and if standards are applied the media may twig to the proper ones. Over 20 years we have educated ours to winnow out the nonstarters (i.e. Boston). Track & Field has records - why not road running? People enjoy them. The 1 m/km, 30% limit does not mean all record courses are equal, but it does mean none are aided in any significant way by wind or slope.

Where this study may lead I don't know, but I will kick it off and see.

If you would like to see my Excel file to date, let me know and I will send it.

**From Ken Young:**

Your article in the latest Measurement News was of considerable interest. What you propose would certainly make a lot more sense from a meteorological standpoint than observing flags or balloons at points along the course. Really what would be most relevant would be the sum of the squares of the wind speed since this is proportional to the force experienced by a runner but such a device is probably not available at all.

You talk about calibrating this device. I think in practice that you will find any noticeable breeze at all will have enough variability to make it virtually impossible to calibrate the instrument in the manner you propose. If you have a day that is dead calm, then you might have a chance but I think you will find these instruments are fairly reliable and good enough for the proposed use without calibration. In addition, the goal is not a highly precise measurement of the wind but rather simply an assessment as to whether there was a net tail wind. The instrument without calibration should be good enough to provide this.

Best wishes,

Ken

**Pete's response to Ken:**

I have done 20 trials of four rides each (2 in each direction) over a 1000 foot calibration course. I begin riding a few hundred feet back from the end of the cal course, get up to 12 mph (close to top running speed), and toggle the meter as I pass the mark. I am able to maintain between 11 and 13 mph, speeding up or coasting as the speedometer dictates. I am in the "12" range over at least 80 percent of each ride. This gives me an approximate idea of the riding time over 1000 feet.

It would be better to punch a watch as I hit the mark, but with only two hands I have not figured out how to do this. I believe what I am doing is sufficient to demonstrate the method.

So far my average reading over the 1000 feet is 762 feet, with a low of 733 and high of 797. From the four readings gained, I can calculate a wind speed for each ride. I subtract out the average and wind up with a net wind speed. There is certainly error associated with the method, but I think I can count on being within 1 m/s of the correct value.

Roger Gibbons has suggested that calibration could be done in a shopping center or the like, thus getting no-wind conditions a bit better. I agree, but have no venue handy.

Why doesn't the meter read 1000 feet? In the coal mine, the user extends the meter at arm's length, normal to flow. Flow is unimpeded as it enters and leaves the meter. On the bike, the entering flow is clear, but the rider is just behind the meter. This is bound to have an effect on the air flow. I won't attempt any quantification here, but there is certainly an effect. Incoming flow may be affected by the presence of the rider as well. In any case, I got what I got.

I am not sure what standard RRIC uses in evaluation of wind. The balloon method, while not quantifiable, does give a clearly understood visual presentation of the circumstances. It helps if all the balloons blow the same way, but usually they don't. Crescent City has used balloons and banners, with submitted photos. The Arts Fest 15k, in Evansville, IN, has had fast times, and I think RRIC may have used weather reports, but don't really know.

I don't believe RRIC uses a zero tolerance on tailwind. I think "significant" enters the mix somewhere, but don't know.

So far I have not encountered a measured wind greater than 1.5 m/s. At my riding speed, I notice a fairly large difference in effort depending on which way I am going. A 2 m/s tailwind is, to my way of thinking, an enormous boost. I wonder how the trackies came up with their limit. I suspect they did not want to shoot down an inordinate number of fast runs, so compromised.

I view the "wind codicil" to Rule 185 as being unfortunate. I'd rather see drop and separation limits, with no exceptions. The rule was written as a compromise, and it puts responsibility for wind determination on RRTC. Thus far we don't really have a good handle on how to do it. While what I am trying is better than balloons, I think it may require a bit more care and understanding than do balloons.

In case you are interested, I am attaching the Excel file containing my data so far. I think it shows promise, but it's early days.

Best regards, Pete



## Recreation/Outdoors

# Texas leads certified check

In a year that saw the number of certified road race courses across the nation hit the highest level since 1985, Texas was the leader of the pack. Texas led California and Illinois in 2001 with 159 certified courses — more than doubling its figures from just a decade ago.

"That's a tremendous number of races," said Houston's Tom McBrayer, Texas state certifier and vice chairman for the Western Division of the USA Track and Field Road Running Technical Council. McBrayer was the most active certifier in the country last year, reviewing and approving 136 road race courses. He also measured 23 courses, including the Dome Run 5K and 10K, the Terry Fox 5K and, in 2002, Houston's new marathon, half-marathon and four-mile race courses.



### Running Notebook

Patti Muck

McBrayer attributes the healthy race stats, which will be published in a magazine called Measurement News in May, to those of us who enter them.

"I think the whole thing has to start with runners," said McBrayer. "They do want accuracy in a course. Nothing gets a runner's goat more than thinking you've just set a PR (personal record), but sorry, it's a short course.

"The race directors recognize this, and having a certified course is one of the things you do to have a quality race."

Of the 1,242 race courses certified in the United States last year, more than half of them were 5K races. Coming in second in the most popular distance was the 10K race.

**Spring Challenge winds down** — The Houston Area Road Runners Association has two more races in this year's 2002 Spring Challenge. Coming April 6 is the Bellaire Trolley Run 5K, the fourth race in the series and the 5K Championship Race. The race starts at Bellaire Boulevard and Third Street at 8 a.m.

For information, call 713-662-8280 or register online at [www.alrcusa.org/trolleyrun.htm](http://www.alrcusa.org/trolleyrun.htm).

The last race in the series is the Bayou Bash Relay on April 27 at Fluor-Lake Pointe in Sugar Land, near U.S. 59 South and Highway 6. This race always brings out the best in team competition, with four-member relay teams. Each runner follows a 2.8-mile course out and back. Categories include Open Men, Open Women, Masters Men, Masters Women, Seniors 60 plus, Mixed Open, Mixed Masters, and a new Junior Division. For more information, call 713-861-1139 or register online at [www.alrcusa.org](http://www.alrcusa.org).

**Triathlon season cranking up** — The season for triathlons is nearly here, and if you're trying the swimming, cycling and running trio for the first time, check out the Speedo Women's Tri First-Timers' Clinic on Saturday. The free hour-long seminar, featuring advice from experienced triathletes and coaches, is held at Andy Stewart's Finish Line Sports at U.S. 59 South and Sugar Creek Boulevard (Gerland's Center). Space is limited to the first 150, but some openings remain for the 7:30 a.m. session. Bone density screening will be offered. The clinic is in preparation for the April 28 Aunt Jean's Lucky Seventh Annual Speedo Women's Triathlon, a 300-meter swim, 10-mile bike and 3-mile running event in Sugar Land.

**Do your best** — A 5,000-meter Personal Best Night is on tap this evening at the Rice University Track Stadium. Hosted by the Rice University Track and Field Team and RunSport, the third such event gives runners a chance to run a personal best with other runners of similar abilities. The slower runners (with 5K times of 27 minutes or more) start at 6:30 p.m. Runners should show up at least a half hour before their seeded race time. For information, call RunSport at 713-524-6662.

*Patti Muck covers running for the Chronicle. Her notebook appears on Thursdays. Leave a message or fax her at 281-344-8978 or send e-mails to [runningnotes@aol.com](mailto:runningnotes@aol.com).*

From Tom McBrayer

# EXPERIMENTAL RESULTS IN WIND MEASUREMENT

By Pete Riegel

In the May issue of MN I described an anemometer that might be useful in measuring wind during a race, and promised some experimental results in future issues. I have now completed a series of experiments, and I believe they show promise.

Why measure wind during a road race? It's a problem faced only by the United States. USATF's Rule 185 applies to long distance running events. Rule 185.5 (b) says:

“The start and finish of the race must lie no more than 30% of the race distance apart as measured along the straight line between them, except when it can be shown that the average component of the wind direction at the head of the race (the lead runner) did not constitute a significant tailwind.

**NOTE:** *A tailwind shall be deemed to be significant if it prevails consistently throughout more than 50% of the course during the race.”*

Responsibility for establishing the wind condition is RRTC's (Road Running Technical Council), although RRIC (Road Running Information Center) has evaluated some races based on submitted data.

When the rule was adopted, RRTC realized that some way was needed to measure wind, to some degree. Early efforts involved photographing balloons and/or banners from the lead car. While not quantitative, these photos did at least provide a sense of which way the wind was blowing. John Disley also tried this. He said:

*“The problem of limiting the advantage of a 'tailwind' to a runner is important, Other means of measuring the strength of a following wind on a road course have been tried. I myself set-up wind gauges around the London Marathon course in the early 1980's. Predictably, they failed to measure correctly in the wind tunnel environment created by buildings on each side of the road. They were so badly affected by the 'traffic' - lead car, press truck, TV, vehicles, etc, that preceded the lead runners.*

*We then tried putting-out 'streamers' around the course, but although these would show direction of the wind, they too were pulled around by traffic and the wind-tunnel effect of buildings.*

*Others have duplicated these efforts with equally poor returns.*

*Actually, our couple of efforts with wind-gauges were farces. We borrowed eight from the AAA's, apart from giving spurious readings - one was stolen, one was run over by the press truck and two others were badly damaged when knocked over by enthusiastic spectators one of which was trampled to death by the runners (the machine not a spectator).*

*The 'ribbons' were equally subject to unenvisioned problems. When they got wet in the rain they stopped fluttering and just hung, or when working well proceeded to wrap themselves around the pole they were hung from. Happy days!”*

The imprecision of existing methods of wind measurement led to this trial of the integrating anemometer.

The anemometer in question is a rotary-vane anemometer manufactured by Taylor – Sybron Corporation. It once had specifications printed on an attached label, but these have worn off and are not legible. It was acquired and used during the the author's work in a West Virginia coal mine in the late 1970's, and has been sitting idle since then.

The anemometer is calibrated in feet. The idea behind it is that if air passes through the instrument at a speed of 1000 feet/min (5.08 m/s), a column of air 1000 feet long will pass through the meter in one minute, rotating the vanes, and at the end of the minute the meter will read 1000 feet.

The first job was to rig the anemometer to the bike. I wanted a mounting that would have some shock-absorbing capability, as the anemometer mechanism is delicate. Also, the anemometer had to be accessible to me as I rode, so that I could toggle it on and off. I came up with an arrangement of duct tape and dowels. It's far from a long-term mounting, but it lasted long enough to do the job.



I have a 1000 foot calibration course in the street in front of my house. Over the period of a month I performed a more-or-less daily series of four rides over this course.

In doing the rides, I initially chose 12 mph as a riding speed, since 5 minute miles is quite close to top-class speed, and I thought that it would mimic the probable riding speed in front of a race. I used the speedometer function on my bicycle odometer as a riding guide. It is calibrated for the size of my wheel.



To obtain a reading, I would ride beyond the end of the calibration course, turn around, and get up to 12 mph riding speed. As I passed the end mark of the calibration course I would reach forward and toggle the meter to the "on" position, and watch as the dials spun. When I reached the other end, I toggled the meter to "off" and recorded the feet of air that the meter indicated. The procedure was repeated 3 more times to get a group of 4 readings.

After a few weeks of data collection a clear trend had developed at 12 mph. Out of curiosity I did another series of rides, this time at a speed of 9 mph. I wanted to see whether meter performance was greatly affected by riding speed.

Each trial produced 4 readings, two in each direction. I took the average of the four to indicate the reading under no-wind conditions. This I considered to be the proper calibration figure for the trial. Here is an example of the resulting wind calculation. On May 6, the following readings were obtained:

Direction	Meter Reading	Average Reading
N to S	856	749.25
S to N	636	
N to S	857	749.25
S to N	648	

Since the calibration course was 1000 feet, and the average calibration reading was 749.25, I multiplied all readings by (1000/749.25) to obtain "true" readings, as follows:

Direction	Adjusted Meter Reading	Adjusted Average Reading
N to S	1142	1000
S to N	849	
N to S	1144	1000
S to N	865	

Now, 12 mph is a speed of 17.6 ft/sec (5.36 m/s), resulting in a riding time of 56.8 second per ride. Wind speeds may be calculated as, for example, 1142 feet in 56.8 sec = 20.1 ft/sec or 6.13 m/s. From this must be subtracted the speed of the bike, or,  $6.13 - 5.36 = 0.76$  m/s.

Thus the measured wind on the four rides becomes:

Direction	m/s
N to S	0.76
S to N	-0.81
N to S	0.77
S to N	-0.72

From this we see that we had a wind from the south. Averaging the four absolute values, ignoring sign, we obtain a net wind from the south of 0.77 m/s.

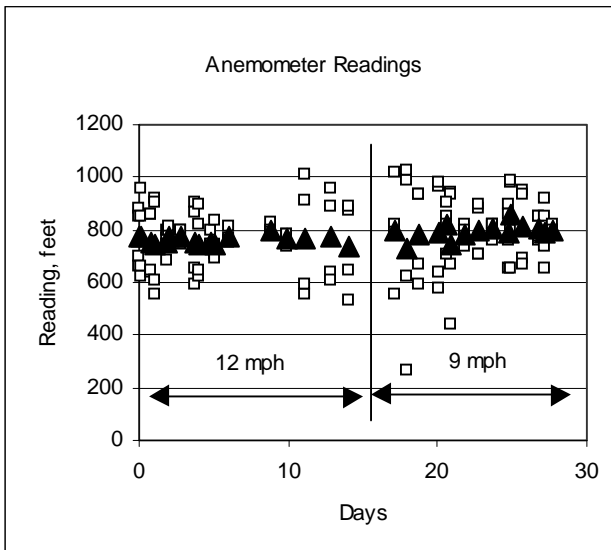


Chart of anemometer readings. The black triangles show the average of the four rides for each trial.

DATA SUMMARY – READINGS IN FEET – AVERAGE OF FOUR RIDES

	12 MPH	9 MPH
Average	762	793
Std Dev	16	30
High	797	855
Low	733	726
Number	17	15

Suppose we wanted to use this instrument during a race. Because access to the start and finish may not be possible, measurement would have to take place between a point just ahead of the start and just before the finish. The distance

between the points will need to be known. Time of measurement is needed.

Our hypothetical race is 10 km. We mount the anemometer to the lead car, in a way that allows good airflow. We establish an initial point which lies 200 m after the start, and a final point 200 m before the finish. The car is initially about 70 m ahead of the start line.

The gun goes off, and the racers and lead car begin to move. As the car passes the initial point, the anemometer is started, and timing is begun. Note is kept of the operation of the anemometer, and each time it “rolls over” (indicating 10,000 feet of air measured) the time is recorded. As the final point is reached, the anemometer is switched off and the time recorded.

At right is the hypothetical data:

Metered distance =	9600 m	
Time to first turnover =	10 minutes	(10000 feet)
Time to second turnover =	21 minutes	(20000 feet)
Time to finish =	27 minutes	1620 sec
Final reading = (10000*2+5580) =	25580 feet	
Calibration on 1000 foot calibration course:		304.8 meters
	Meter Reading	Average Reading
Direction	Feet	
N to S	856	749.25
S to N	636	
N to S	857	
S to N	648	
Calibration constant = 749.25/304.8 =		2.458169 feet per meter
25580/2.458169 =	10406 meters observed by anemometer	9600 meters actually covered by anemometer
10406/1620 =	6.424 m/s observed by anemometer	
9600/1620 =	5.926 m/s actually covered by anemometer	
6.424-5.926 =	0.498 m/s headwind	

## **Observations and Conclusions**

This exercise, culminating in an observed 0.5 m/s wind against the runner, exemplifies one way to measure wind during a footrace. How reliable is the final 0.5 m/s figure? I do not have a solid grip on this. Perhaps others may care to comment. I will be happy to share my calibration data, but since it is specific to my body on my bike, it does not have universal application.

There exists no way to absolutely establish wind conditions during a road race. The best that can be done is to establish a fixed standard which is employed by all. This is what is done on the track, with a wind gauge set up at mid-track and read for a portion of the event. This may not establish the truth of the wind, but it is accepted as being good enough. If wind is to be measured in road races, a similar standard is needed. What should this standard be? There are several options:

- 1) Hanging banners and balloons, photographed from the lead vehicle – With proper banner design, this can give a clear picture of wind direction at a series of points along the race course. It does not quantify wind force. It is simple and easy to do, and the results may be seen and understood by everybody.
- 2) A series of track-type wind gauges can be set up at intervals along the course, and read as the lead vehicle passes by, and at set time intervals as the race progresses. This method covers the lead runners as well as those farther back in the pack.
- 3) Weather reports may be collected and wind direction established. This is weak and unreliable. It does not measure the conditions at the time and place of the race.
- 3) The integrating anemometer can be used. The author believes that this is the most accurate approach found to date. However, it does require skill, practice and experience to get things right.

Complications arise because different conclusions will be reached depending on the method used. All will not necessarily give the same result.

Gauging wind does require preparation on the part of the race organization, and it is almost always a waste of time, as records are rare, and when a fast time is set on a point-to-point course the wind is generally a factor. Still I have heard of three races that have employed various means of measuring wind, with records resulting.

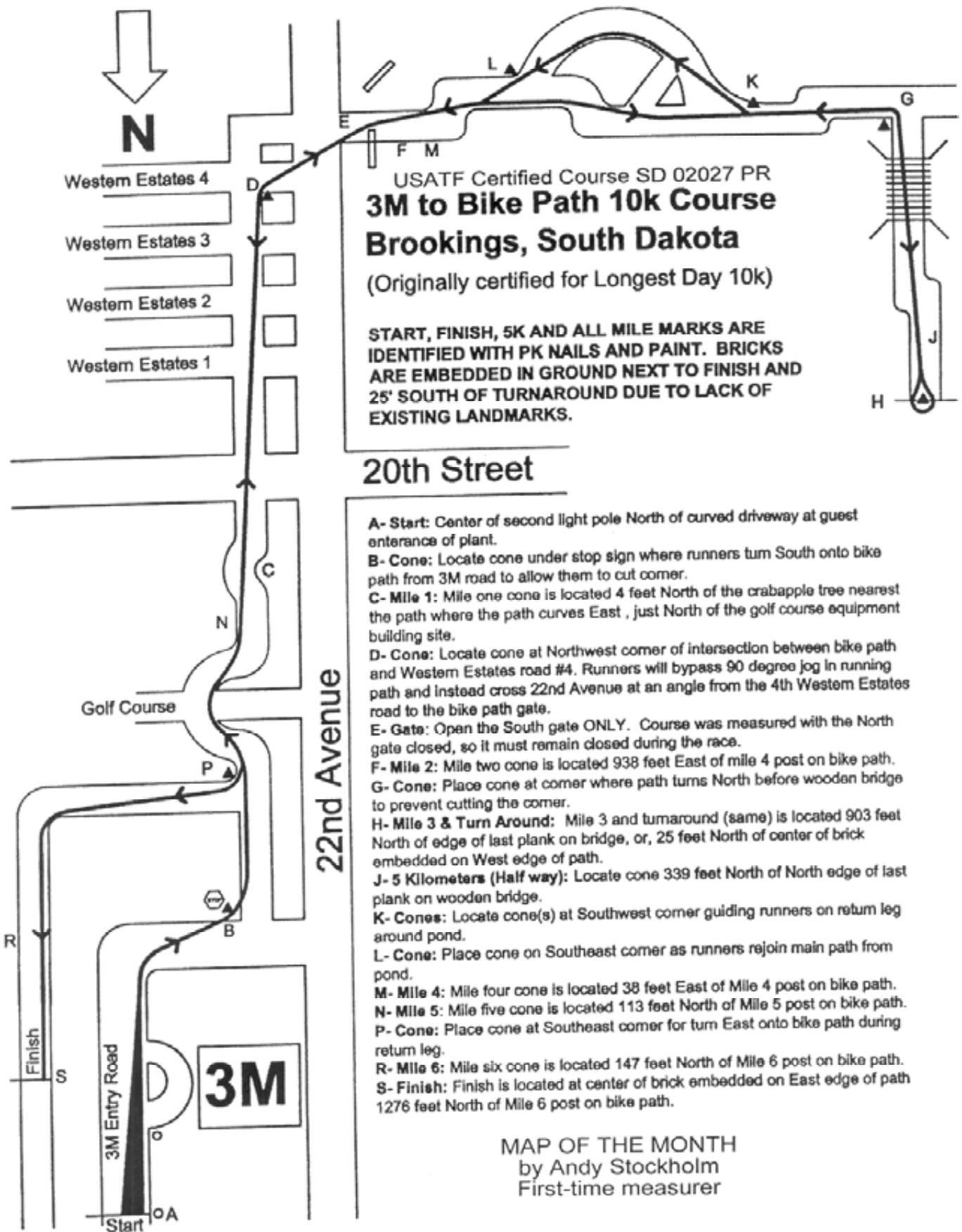
RRIC has had to evaluate some performances based on submitted wind data. Perhaps they may be induced to share their experience.

## **Personal Observations**

During the course of the exercise, I noticed, as I had never noticed before, the effect of wind on my riding-at-race-speed effort. In the 32 trials I never encountered a wind of 2 m/s, the limit used in athletics. However, I did experience a few 1.5 m/s winds, and found a very noticeable difference between riding into that wind and away from it. It is not a small effect. A runner getting a 2 m/s tailwind is getting an enormous boost. Why is the limit set so high? My guess is that a lower limit would result in an unacceptable number of fast runs being thrown out.

As I rode down my suburban street I was also struck by the way the wind changed from place to place as I rode. It was rarely a constant force opposing my motion. It varied all the time. It's easy to notice this when it is wind alone that you are thinking about while riding.

I hope others may be encouraged to contribute on this subject. I will be happy to loan the anemometer to anyone who will return it to me whole.



# Kamehameha complex on track; field has some woes

By Dennis Anderson  
ADVERTISER STAFF WRITER

The new \$14.5-million outdoor athletic complex at the Kamehameha Schools was the original site of this weekend's state high school track and field championships.

But the meet was moved to Mililani High School be-

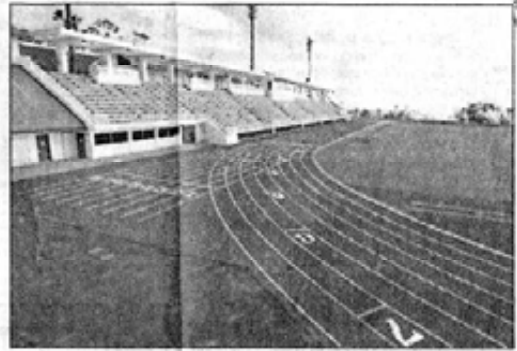
cause the finish line of the track at Kamehameha was a fraction of an inch short and the new field's drainage did not work.

Though the track was fixed in time for the state meet and a "remediation" program is under way to improve drainage of the field, the event will still take place at Mililani.

The Kamehameha complex is expected to be acceptable for use in August, more than six months after the original date of expected completion.

When it is finished, the Kamehameha facility will be "the No. 1 high school track and field/football/soccer

See COMPLEX, C3



CORY LUM • The Honolulu Advertiser

The track was found to be a bit short after an eyeball inspection by consultant Don Paige.

## Complex: Facility draws praise

FROM PAGE C1

complex in the country," said Don Paige, consultant on the Kamehameha track and 150 others in the U.S., including the Olympic Training Center in San Diego.

"You never see a high school facility like this," Paige said. "Lots of facilities have really nice grass fields, lots have nice tracks, some have nice stadiums, some have nice lights, some have nice scoreboards, some have good press boxes, some have nice architectural features.

"But you won't find another facility in the U.S. that has all those elements, as the Kamehameha complex does."

It was Paige, a member of the 1980 U.S. Olympic track team, who discovered the error in measurement at Kamehameha.

"There is no tolerance in track and field for things to be shorter than the distance. A 100-meter course cannot be 99.999 meters," Paige said. "Dr. Chun (Michael Chun, the schools' president) said that 'if any world records are set here, we want to be certain they will be approved.'"

Because of the error in striping the track, the contractor, Southwest Recreational Industries of Texas, had to lay down an additional half-inch layer of

Rekortan polyurethane surface, then measure and paint it again, Paige said.

"You can't paint red over the white lines or grind them off, you have to resurface it," Paige said. "It's like when you find a flaw in a new sofa; you have it recovered."

"Line striping is a true art," Paige said. "There are only a dozen people in the U.S. who can do it ... It was very windy when the track was striped."

One of the Kamehameha managers closest to the project said the track appeared to be less than a quarter of an inch short.

"It looked like the paint bled over; the edge wasn't sharp enough. It was like when you tape a wall and paint, then pull the tape off and find the paint has bled under the tape a little bit and the edge is fuzzy. Don Paige said it was unacceptable," said the official, who spoke on condition of anonymity.

Fixing the drainage has been a bigger project.

"It is a process of aeration and amending the existing soil mixture with additional sand to improve the drainage of the field," Kamehameha spokesman Kekoa Paulsen said.

When it's done, Paige said, "it could pour rain at 2 p.m. and you could start a football or soccer

game at 3 p.m. with no water on the field."

Fixing the track and field will not cost Kamehameha any additional money, Paulsen said. All the work was and is being done at the contractors' expense.

Tons of earth were moved around and part of a mountain carved away to make room for the complex, half of which is on the site of Mawaena Field. There will be seating for 3,000 people, which is not sufficient for a major Interscholastic League of Honolulu football game but adequate for most crowds.

"The ewa view will be so good it will be hard to concentrate on the football game," said Walter Thoemmes, manager of facility design and management for the Kamehameha Schools.

**15% Off**  
Entire Store  
With Ad  
EXP. 5/31

**GRAND**  
Beginni  
Ma

- Rackets: Prince, Wilson,
- Apparel, Shoes & Access
- String, Repair & Service

**Pearl Kai Ten**  
Pearl Kai Center 98-199

SECTION C • honoluluadvertiser.com/sports ★☆

THURSDAY • MAY 9, 2002

10 May 2002

Dear Pete,

Here is an article from our local newspaper that I thought you might enjoy.

When I read the words: "The track was found to be a bit short after an eyeball inspection by Don Paige," I immediately thought, "Eureka! No more laborious and sweaty efforts to go through the procedures to measure a running course."

Maybe you can run down this Don Paige and add him to the ERRC committee.

Hope all goes well with you and the family. Enjoyed your last piece about measuring wind during a race.

Aloha,

*Tom*  
Tom

(Tom Ferguson, former Hawaii certifier)

Don Paige ran for Villanova in the early 1980's. *Track & Field News* ranked him second US runner at 800 meters in 1979 and first in 1980.

**USATF/RRTC CERTIFIED COURSE LIST**  
**New Entries, May - June 2002**  
**Closing Date June 25, 2002**

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
5 km	AL 02004 JD	A	Huntsville	Cotton Row 5k Run	0.0	3 J	DeHaye	
10 km	AL 02005 JD	A	Huntsville	Cotton Row Run	0.0	1 J	DeHaye	AL 98021&98023 JD
5 km	AL 02006 JD	A	Birmingham	Fireman's 5k For MDA	23.8	45 R	Melanson	
5 km	AL 02007 JD	A	Mobile	Crime Prevention 5k	0.0	5 L	Mattics	
5 km	AL 02003 RH	A	Tuscaloosa	Sugar Chase 5k	0.0	3 R	Melanson	
5 km	AR 02005 DLP	A	Vilonia	Viloniafest 5k	0.1	1 D	Potter	
10 km	AZ 02005 ETM	A	Tucson	Cinco de Mayo 10k	0.6	1 T	LaBlonde	
Cal	CA 02001 KY	A	Weott	Weott Ave of Giants 301.515m	0.0	100 K	Young	
42.2 km	CA 02002 KY	A	Weott	Avenue of the Giants	0.0	0 K	Young	CA 84040 CW
21.1 km	CA 02003 KY	A	Weott	Avenue of the Giants	0.0	1 K	Young	
10 km	CA 02004 KY	A	Weott	Avenue of the Giants	0.0	1 K	Young	CA 92005 CW
5 km	CA 02019 RS	A	Sacramento	Sacramento Race for the Cure	0.2	12 D	Thurston	CA 01030 RS
5 km	CA 02001 TK	A	Redwood Shores	5k Foot Pursuit	0.0	3 T	Knight	
5 km	CA 02002 TK	A	Mountain View	Race For Literacy 5k	0.0	0 T	Knight	CA 01008 TK
5 km	CO 02002 DP	A	Denver	Race to Stop Global Warming	0.0	1 D	Poppers	CO 01003 DP
8 km	CO 02003 DP	A	Denver	Race to Stop Global Warming	0.0	1 D	Poppers	
5 mi	CO 02004 DP	A	Denver	Cherry Creek Sneak	0.5	10 D	Poppers	CO 00011 DP
5 km	CO 02005 DP	A	Denver	Cherry Creek Sneak	0.5	16 D	Poppers	CO 00012 DP
42.2 km	CO 02006 DP	A	Fort Collins	Old Town Marathon	8.2	69 B	Durden	
21.1 km	CO 02007 DP	A	Fort Collins	Old Town Half Marathon	3.9	76 B	Durden	
Cal	CO 02008 DP	A	Georgetown	Argentine Road 1000 ft.	0.0	100 G	Markle	
5 km	CO 02010 DP	A	Highlands Ranch	Race Against Time	0.0	3 D	Poppers	
42.2 km	CO 02011 DP	A	Denver	Jesus Run	0.0	0 A	Stephenson	CO 01012 DP
5 km	CO 02011 DP	A	Fort Collins	Coopersmith's Father's Day	0.0	3 J	Lonsdale	
21.1 km	CO 02012 DP	A	Denver	Jesus Run	0.0	0 A	Stephenson	CO 01013 DP
5 km	CO 02013 DP	A	Denver	Jesus Run	0.0	1 A	Stephenson	CO 01014 DP
5 km	CO 02014 DP	A	Denver	Stadium Stampede	0.0	4 D	Poppers	
2.7 mi	CO 02015 DP	A	Denver	Run the Rapids	0.0	2 D	Poppers	
5 km	CT 02005 DR	A	Newton	HVS 5k Road Run	2.4	5 K	Platt	
5 km	CT 02006 DR	A	West Hartford	Ryka 5-K	0.0	5 D	Reik	
10 km	CT 02006 DR	A	West Hartford	Ryka 10-K	0.0	2 D	Reik	
5 km	CT 02007 DR	A	New Britain	CT Race for the Cure	-0.6	1 T	Buckley	CT 94001 DR
5 km	CT 02008 DR	A	Goshen	Miles Conquer Myeloma 5k	0.0	0 W	Graustein	
21.1 km	CT 02009 DR	A	Barkhamsted	People's Forest Half Marathon	0.0	4 D	Bolt	
5 km	CT 02010 DR	A	Norwich	Rose City 5 km	2.0	1	GuidoBros	
Cal	CT 02501 DR	A	Norwich	Lawler Lane 1000 FT Calibration	0.0	100	GuidoBros	
5 km	DC 02001 RT	A	Washington	Anacostia Park 5k	0.0	0 R	Thurston	
5 km	DC 02010 RT	A	Washington	Signs of Spring 5k	0.0	0 R	Thurston	
10 km	DC 02012 RT	A	Washington	Sallie Mae 10k	0.0	0 R	Thurston	
42.2 km	GA 02003 WC	A	Macon	Cherry Blossom Marathon	0.0	0 H	Squires	
5 km	GA 02004 WC	A	Savannah	Isle of Hope	0.0	0 C	Stratton	
10 km	GA 02005 WC	A	Columbus	Celebrity Classic	0.0	64 D	Koepfer	
10 km	GA 02006 WC	A	Augusta	Fort Gordon SCRA	0.0	0 T	Crute	
5 km	HI 02023 PR	A	Honolulu	Race for the Cure	0.0	7 R	Pate	
3.909 mi	IA 02002 KU	A	Eldridge	Moonlight Chase	0.0	2 K	Ungurean	
5 km	IA 02002 MF	A	Des Moines	Evening Glow	-0.1	0 C	Voss	
8 km	IA 02003 MF	A	Des Moines	Loop the Lake 8 km	0.0	0 C	Voss	IA 01002 MF
5 km	IL 02009 JW	A	Oakwood Terrace	Fitness Center 5k	0.0	5 C	Hinde	IL 01015 JW
5 km	IL 02010 JW	A	Chicago	Y-Me 5k	0.0	8 C	Hinde	IL 97027 JW
5 km	IL 02011 JW	A	Chicago	Bastille Day 5k	0.0	4 C	Hinde	IL 95045 JW
5 km	IL 02012 JW	A	Naperville	Spring Ahead 5k	0.0	1 J	Wight	IL 00003 JW
5 km	IL 02013 JW	A	South Barrington	South Barrington Foundation Run	0.0	0 C	Hinde	
5 km	IL 02014 JW	A	Des Plaines	Maryville 5k	0.0	4 C	Hinde	
5 km	IL 02015 JW	A	Chicago	Run For The Zoo 5k	0.0	4 C	Hinde	IL 90030 JW
10 km	IL 02016 JW	A	Chicago	Run For The Zoo 10k	0.0	2 C	Hinde	IL 90032 JW
10 km	IL 02017 JW	A	Woodstock	Woodstock Challenge 10k	0.0	1 C	Hinde	IL 98030 JW
5 km	IL 02018 JW	A	Warrenville	D.A.R.E. Family Challenge	0.0	0 C	Hinde	IL 01013 JW
8 km	IL 02019 JW	A	Chicago	Running with the Bulls	0.0	2 J	Knoedel	



DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
5 km	IL 02020 JW	A	Lisle	Run For Education	-0.3	5	C Hinde	IL 01027 JW
10 km	IL 02022 JW	A	Rockford	OSF Heritage Run	0.0	2	N Yarger	IL 00018 JW
42.2 km	IL 02023 JW	A	Chicago	Lakeshore Marathon	0.0	0	J Wight	
10 mi	IL 02024 JW	A	Chicago	Lakefront 10k	0.0	1	J Knoedel	
21.1 km	IL 02025 JW	A	Saint Charles	Fifth Third Bank Half Marathon	1.3	38	J Knoedel	
20 km	IL 02026 JW	A	Chicago	Chicago Distance Classic	0.0	0	J Knoedel	IL 01077 JW
4 mi	IL 02027 JW	A	Palos Park	Turkey Trot	0.0	2	C Hinde	
5 km	IL 02028 JW	A	Orland Park	Band On The Run Run	0.0	2	C Hinde	
5 km	IL 02029 JW	A	Naperville	Run For Reading	0.0	3	C Hinde	
5 km	IL 02030 JW	A	Riverside	Riverside Independence 5k	0.0	1	J Wight	IL 91020 JW
8 km	IL 02031 JW	A	Evanston	Race To The Finish	0.0	2	J Knoedel	
5 km	IL 02032 JW	A	River Forest	Dominican Dash	0.0	8	C Hinde	
10 km	IL 02033 JW	A	Lake Forest	Running With Angels	0.0	3	C Hinde	IL 97010 JW
5 km	IL 02034 JW	A	Springfield	Scholastic Challenge 5k	0.0	0	R Ginter	
5 km	IL 02035 JW	A	Morris	Cornfest 5k Fun Run	0.0	2	C Hinde	
5 km	IL 02036 JW	A	Oak Park	Turtles Run	0.0	6	C Hinde	
5 km	IL 02038 JW	A	Hoffman Estates	Unity Day 5k	0.0	0	J Knoedel	
10 km	IL 02039 JW	A	Chicago	Run For The Zoo 10k	0.0	2	C Hinde	IL 02016 JW
8 km	IL 02040 JW	A	Chicago	All American 8k	0.0	0	J Knoedel	
5 km	IL 02041 JW	A	Crystal Lake	Lippold Park 5k	0.0	0	J Knoedel	
10 km	IL 02042 JW	A	DeKalb	DeKalb Cornfest 10k	0.0	1	J Wight	IL 94042 JW
5 km	IL 02046 JW	A	Palos Heights	George's Jog	0.0	2	C Hinde	IL 01028 JW
1.195 km	IN 02005 MW	A	Evansville	Wesselman Park RW Loop	0.0	0	D Swonder	IN 99015 MW
20 km	IN 02005 MW	A	Evansville	Wesselman Park 20k RW	0.0	1	D Swonder	IN 00004 MW
5 km	IN 02006 MW	A	Evansville	Wesselman Park 5k RW	0.0	4	D Swonder	IN 99013 MW
10 km	IN 02007 MW	A	Evansville	Wesselman Park 10k RW	0.0	3	D Swonder	IN 99014 MW
15 km	IN 02008 MW	A	Evansville	Wesselman Park15k RW	0.0	1	D Swonder	IN 00003 MW
5 km	KS 02009 BG	A	Olathe	Heart and Sole Classic	0.0	1	C Pearson	
10 km	KS 02010 BG	A	Olathe	Heart and Sole Classic	0.0	1	C Pearson	
42.2 km	KS 02016 BG	A	Olathe	NAIA Marathon	-0.1	1	L Joline	
5 km	KS 02017 BG	A	Overland Park	Beat the Heat	0.0	1	L Joline	
Cal	KY 02021 PR	A	Owensboro	Sutherland Road 3663 ft.	0.0	100	H Roberts	
21.1 km	MA 02004 RN	A	Westfield	Oleksak Lumber Spring H-MAR	0.0	1	R Arsenault	
5 km	MA 02005 RN	A	Wakefield	Massachusetts Law Enforcement	0.2	7	J Kuo	
21.1 km	MA 02006 RN	A	Wakefield	Massachusetts Law Enforcement	0.1	2	J Kuo	MA 01005 RN
10 km	MA 02007 RN	A	Westford	Westford 10k Road Race	-0.8	8	R Nelson	
5 km	MA 02008 RN	A	Westford	Westford 5k Road Race	-1.7	15	R Nelson	
10 km	MD 02001 JS	A	Bethesda	W.J. Booster 10k	0.0	0	J Sissala	MD 00003 JS
10 km	MD 02002 JS	A	Columbia	Clyde's 10k	0.0	2	R Lake	MD 93004 JS
5 km	MD 02003 JS	A	Patuxent	NPC - 50 Relay Race	0.0	0	J Sissala	
10 km	MD 02004 JS	A	Ellicott City	Columbia Triathlon 10k Run	-0.3	3	R Lake	
5 km	MD 02005 JS	A	Gaithersburg	Friends of Ian 5k	0.0	3	P Quinn	
5 km	MD 02005 RT	A	Bethesda	Mark's Azalea Festival 5k Run	1.0	5	R Thurston	
10 km	ME 02001 WN	A	Biddeford	La Kermesse Franco-Americaine	-0.2	34	R Fitzpatrick	
5 km	ME 02002 WN	A	Biddeford	La Kermesse Franco-Americaine	0.2	3	Fitzpatrick	
5 mi	ME 02003 WN	A	Gardiner	Gardiner Common 5 Miler	0.4	3	G Roy	ME 85046 GN
5 km	MI 02003 SH	A	Detroit	Race For The Cure	0.2	11	S Hubbard	MI 01004 SH
8 km	MI 02004 SH	A	Lake Orion	Dragon Dash	0.0	0	R Yeacker	
Cal	MI 02005 SH	A	Ortonville	Groveland Road 1000 ft.	0.0	100	R Yeacker	
8 km	MI 02006 SH	A	Jackson	Orthopedic Rehab	0.0	1	S Hubbard	MI 91003 SH
21.1 km	MI 02007 SH	A	Dexter	Dexter-Ann Arbor Run	0.7	60	S Hubbard	MI 90006 SH
5 km	MI 02008 SH	A	Ann Arbor	Dexter-Ann Arbor Run	-0.6	71	S Hubbard	MI 92005 SH
25 km	MI 02009 SH	A	Grand Rapids	Fifth-Third Riverbank Run	-0.1	1	R Dewey	
5 km	MI 02010 SH	A	Grand Rapids	Fifth-Third Riverbank Run	-0.6	7	R Dewey	
21.1 km	MI 02011 SH	A	Kalamazoo	National City	0.0	0	R Dewey	MI 00007 SH
5 km	MI 02012 SH	A	Jenison	Ambucs Memorial Day	0.0	0	R Dewey	
10 km	MI 02013 SH	A	East Grand Rapids	Reeds Lake	0.8	2	R Dewey	
5 km	MI 02014 SH	A	East Grand Rapids	Reeds Lake	1.6	4	R Dewey	
1 mi	MI 02015 SH	A	Traverse City	Meijer Golden Mile	0.0	73	R Dewey	
5 km	MI 02016 SH	A	Northville	Eagle Run	0.0	2	S Hubbard	
8 km	MI 02017 SH	A	Lincoln Park	Lincoln Park Police Foot Pursuit	0.0	4	S Hubbard	
5 mi	MI 02018 SH	A	Grandville	Gaylons Buck Creek	0.0	4	R Dewey	
10 km	MI 02019 SH	A	Traverse City	Bayshore	0.0	1	R Dewey	MI 83004 TC
42.2 km	MI 02020 SH	A	Traverse City	Bayshore	0.0	1	R Dewey	MI 83001 TC
5 km	MI 02021 SH	A	Holland	Tulip City	0.0	0	R Dewey	
5 km	MI 02023 SH	A	Flint	CRIM	-1.2	3	S Hubbard	MI 99015 SH

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
10 km	MI 02024 SH	A	Lansing	Standard Federal	0.0	3	S Hubbard	
20 km	MN 02001 RR	A	Rochester	Fetzer	0.0	1	M Bjoraker	MN 98000 RR
8 km	MN 02002 RR	A	Twin Cities	Minnehaha	0.0	0	R Recker	
21.1 km	MN 02003 RR	A	Moorhead/Fargo	Run For The Children	0.0	0	D Summers	
10 km	MN 02004 RR	A	Minneapolis	Lifetime	0.0	1	R Recker	MN 01007 RR
5 mi	MN 02005 RR	A	Hitterdal	Hitterfest Run	0.0	0	D Summers	
10 km	MN 02006 RR	A	Hitterdal	Hitterfest Run	0.0	0	D Summers	
5 km	MN 02007 RR	A	Bloomington	Normandale	0.8	5	R Recker	
5 km	MN 02008 RR	A	Minneapolis	Plymouth	0.0	0	R Recker	
5 km	MN 02009 RR	A	Plymouth	Plymouth Creek	-0.4	2	R Recker	
12 km	MO 02007 BG	A	Kansas City	Hospital Hill Run	-0.5	2	B Glauz	
21.1 km	MO 02008 BG	A	Kansas City	Hospital Hill Run	-0.3	1	B Glauz	
5 km	MO 02012 BG	A	Lakewood	Run for the Dogs	0.0	5	L Joline	
5 km	MO 02013 BG	A	Kansas City	Home Run	0.0	0	L Joline	
10 mi	MO 02014 BG	A	Kansas City	Home Run	0.0	0	L Joline	
5 km	MO 02015 BG	A	Kansas City	Hospital Hill Run	-2.0	5	L Joline	
5 km	MS 02003 RH	A	Southaven	DAC to DAC 5k	0.0	1	R McCrarey	
15 km	MS 02004 RH	A	Southaven	DAC to DAC 15k	0.5	86	R McCrarey	
5 km	NC 02012 PH	A	Chapel Hill	KKG Tar Heel Trot	0.0	4	D Forbis	
5 km	NC 02013 PH	A	Wilson	Wilson Family YMCA Run	0.0	0	P Hronjak	
15 km	NC 02014 PH	A	Durham	City of Medicine 15k	-0.2	2	D Forbis	NC 01022 PH
10 km	NC 02015 PH	A	Charlotte	South End Race Fest 10k	-0.2	1	D White	
5 km	NC 02016 PH	A	Raleigh	Run For The Records	0.6	18	N Wood	
8 km	NC 02016 PH	A	Raleigh	Run For The Records	0.8	11	N Wood	
10 km	NC 02016 PH	A	Raleigh	Run For The Records	0.3	9	N Wood	
12 km	NC 02016 PH	A	Raleigh	Run For The Records	0.0	0	N Wood	
15 km	NC 02016 PH	A	Raleigh	Run For The Records	0.0	0	N Wood	
10 mi	NC 02016 PH	A	Raleigh	Run For The Records	0.2	6	N Wood	
20 km	NC 02016 PH	A	Raleigh	Run For The Records	0.3	5	N Wood	
21.1 km	NC 02016 PH	A	Raleigh	Run For The Records	0.0	1	N Wood	
42.2 km	NC 02016 PH	A	Raleigh	Run For The Records	0.1	1	N Wood	
5 km	NC 02017 PH	A	Wake Forest	Rotary of Wake Forest 5k	0.0	3	P Hronjak	
5 km	NC 02018 PH	A	Raleigh	Quail Corners 5k	0.0	0	P Hronjak	
10 km	NC 02019 PH	A	Wilson	Cherry Blossom Classic 10k	0.0	0	P Hronjak	
5 km	NC 02023 PH	A	Charlotte	Twilight 5k	0.0	0	T Rhodes	NC 99028 PH
42.2 km	ND 02011 BG	A	Minot	Trestle Valley Marathon	0.0	3	R Mazurek	ND 00050 BG
21.1 km	NH 02002 WN	A	Alton	Big Lake Half Marathon ( #2)	0.1	4	R Fitzpatrick	
5 km	NH 02003 WN	A	Wakefield	Wakefield Way Cool 5k	0.6	8	R Fitzpatrick	
5 km	NH 02004 WN	A	Portsmouth	Redhook Brewery/Runner's Alley	0.0	6	R Fitzpatrick	NH 00003 WN
5 km	NH 02005 WN	A	Barnstead	Barnstead Old Home Days (#2)	5.3	68	R Fitzpatrick	
8 km	NH 02006 WN	A	Francestown	Francestown Road Race	-0.8	5	J Belanger	
10 km	NH 02007 WN	A	Rochester	Rochester Runners Free Fall	0.0	1	R Fitzpatrick	NH 01003 WN
5 km	NH 02008 WN	A	Derry	Arch 5k	0.0	2	J Belanger	
42.2 km	NJ 02001 DB	A	Long Branch	NJ Shore Marathon 2002	0.0	47	D Brannen	NJ 01001 DB
10 mi	NJ 02007 GAN	A	Fort Dix	Air Force 10 Miler	0.0	5	G Newman	
5 km	NJ 02008 GAN	A	Wayne	Wayne YMHA 5k	1.3	7	P Hess	
5 km	NJ 02009 GAN	A	Newark	Portugal Day 5k	-0.4	4	P Hess	
5 km	NJ 02010 GAN	A	Willingboro	Mill Creek 5k	0.0	2	L Baldasari	
5 km	NJ 02011 GAN	A	Medford	Precious Gems 5k	0.0	1	L Schreiber	
5 km	NJ 02012 GAN	A	Hasbrook Heights	Hasbrook Heights 5km	0.7	3	P Hess	
5 km	NJ 02013 GAN	A	Metuchen	Beringer House 5km	0.3	5	L Baldasari	
5 km	NJ 02014 GAN	A	Trenton	Heritage Days River Run	0.0	2	L Baldasari	
10 km	NJ 02017 GAN	A	Woodcliff Lake	Woodcliff Lake 10km	0.0	0	P Hess	
1 mi	NJ 02018 GAN	A	Ridgewood	Ridgewood Mile	0.0	2	P Hess	
5 km	NJ 02019 GAN	A	Plainfield	Cedarbrook 5km	-0.2	2	P Hess	
5 km	NJ 02020 GAN	A	Cranford	Girl Scout 5km	0.1	2	P Hess	
5 km	NJ 02021 GAN	A	Dover Township	Ocean Count College 5km	0.3	1	P Hess	
5 km	NJ 02022 GAN	A	Montville	Montville 5km	0.0	0	P Hess	
5 km	NJ 02023 GAN	A	Livingston	Livingston 5k	0.0	2	P Hess	NJ 02004 GAN
5 km	NJ 02024 GAN	A	Leonardo	Fear the Pier 5k	2.4	100	P Hess	
5 km	NM 02001 DS	A	Albuquerque	Stride For Pride Elite (Sandia)	0.0	9	K Coonrod	
8 km	NY 02004 AM	A	New York	NYRR 8k Championship	0.2	3	P Hess	
5 km	NY 02008 AM	A	Hamburg	Young Life 5k Run/Fun Walk	-0.1	3	B Laskowski	
5 km	NY 02009 AM	A	Buffalo	Susan Komen Western NY Race	0.0	2	B Laskowski	NY 01019 AM
Cal	NY 02010 AM	A	Amherst	Erie Community College 480m	0.0	100	J Grandits	

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
5 km	NY 02011 AM	A	Williamsville	Sneaker Advantage Keiffer Mem.	0.0	0	J Grandits	NY 97029 AM
5 km	NY 02012 AM	A	Bronx	United We Run Pezzulo Mem. 5k	-0.1	2	D Blomquist	
5 mi	NY 02013 AM	A	Avon	Avon Run for Sight	0.0	2	W Kehoe	
10 km	NY 02014 AM	A	Kingston	Kingston Classic 10k	-0.2	7	J Gilmer	NY 00004 AM
2.2 mi	NY 02017 AM	A	Buffalo	St. Teresa's Comeback Run	-1.7	30	B Laskowski	
42.2 km	NY 02018 AM	A	Brooklyn	Prospect Park Marathon	-0.1	1	P Hess	NY 01004 AM
5 km	NY 02020 AM	A	Fairport	Fairport Village 5k	0.0	1	W Kehoe	
5 mi	NY 02022 AM	A	New York	NYRRC 5 Mile - 99th ST. Finish	0.2	2	P Hess	
10 km	NY 02023 AM	A	Bronx	Bronx Community College 10k	0.0	1	P Hess	
10 mi	NY 02024 AM	A	Greece	Run for the Hospice 10 Miler	-0.2	4	G Tillson	
5 km	NY 02025 AM	A	Canandaigua	Crosswinds 5k	0.0	2	G Tillson	
10 km	NY 02026 AM	A	Middletown	Orange Classic 10k	-0.6	3	B Cavanagh	
5 km	NY 02027 AM	A	Binghamton	Sgt. Larry Peters Memorial 5k	0.0	0	R Nichols	
5 km	NY 02028 AM	A	Sodus	Jason Buyak Memorial 5k	0.0	1	G Tillson	
5 km	NY 02029 AM	A	Clarence	Clarence Rotary Run- Remember	0.3	9	J Grandits	
10 km	NY 02030 AM	A	Oswego	Harborfest 10k West	0.2	2	D Oja	
2 km	NY 02031 AM	A	Hauppauge	W. Hawrys 2k Racewalk Course	0.0	0	G Westerfield	NY 01049 AM
4 mi	OH 02003 MW	A	Hudson	Run for Your Life	0.0	3	M Wickiser	
5 mi	OH 02004 MW	A	Avon	Eagle Run	0.9	4	M Wickiser	
5 km	OH 02012 PR	A	Cincinnati	Race for the Cure	1.1	9	S Prescott	OH 01004 PR
5 km	OH 02015 PR	A	Dayton	Derby Day Dash	0.0	2	F LaBlanc	OH 01028 PR
5 km	OH 02016 PR	A	Cuyahoga Falls	Ohio Run for Rett 5k	0.6	4	J Fisch	
5 km	OH 02018 PR	A	Bexley	Bexley July 4th - 5k	0.0	0	J Glaze	
5 km	OH 02019 PR	A	Toledo	Race for the Cure 5km	-0.1	12	D Standish	OH 01049 PR
1 mi	OH 02020 PR	A	Toledo	Race for the Cure 1 Mile	-0.4	24	D Standish	OH 00023 PR
4 mi	OH 02001 SH	A	Fremont	Camelback	0.0	0	S Hubbard	
5 km	OR 02001 LB	A	Portland	Bridge to Bridge 5k	0.0	0	J Atherton	
10 km	OR 02002 LB	A	Portland	Bridge to Bridge 10k	0.0	0	J Atherton	
5 km	PA 02003 WB	A	Philadelphia	Race for the Cure - 2002	0.1	6	B Belleville	PA 01011 WB
5 km	PA 02004 WB	A	Rosemont	Rosemont School 5km	0.0	0	B Belleville	PA 00013 WB
5 mi	PA 02006 WB	A	Hershey	Ava's Friends 5 Mile	-0.2	8	P Barner	
42.2 km	PA 02007 WB	A	Pittsburgh	UPMC Pittsburgh Marathon '02	0.0	0	M Courtney	
5 km	PA 02008 WB	A	Pittsburgh	UPMC Heinz Field 5km	0.0	3	M Courtney	
5 km	PA 02009 WB	A	Pittsburgh	Race for the Cure Walk - 5km	4.3	17	R Yurick	PA 01013 WB
5 km	PA 02010 WB	A	Pittsburgh	Race for the Cure Run - 5km	0.6	7	R Yurick	PA 00002 WB
5 km	RI 02002 RN	A	Barrington	On Eagles Wings	0.0	3	R Nelson	
5 km	RI 02003 RN	A	Providence	Richmond Square 5k	0.5	2	R Nelson	RI 01006 RN
5 km	RI 02005 RN	A	Lincoln Park	Rhody 5k - alternate course	0.0	0	R Nelson	
5 km	RI 02006 RN	A	Jamestown	Ali Dunn Packer Memorial 5k	2.3	10	R Nelson	
5 km	SC 02011 BS	A	Greenville	Steeplechase Road Race	0.0	1	D White	
4 mi	SC 02012 BS	A	Piedmont	Spearman School Road Race	0.0	1	D White	
10 km	SC 02013 BS	A	Columbia	USMC Challenge 10k	0.0	0	E Prytherch	
5 km	SC 02014 BS	A	Summerville	Legend Oaks 5k Run/Walk	0.0	8	M Chodnicki	
8 km	SC 02015 BS	A	Greenville	Safe Harbor 8k	1.6	3	D White	
42.2 km	SD 02024 PR	A	Deadwood	Mickelson Trail Marathon	4.3	65	J Meyer	
Cal	SD 02026 PR	A	Brookings	Hwy 14 Bypass 1/2 Mile	0.0	100	D Englund	
10 km	SD 02027 PR	A	Brookings	3M to Bike Path 10k Course	0.0	2	A Stockholm	
4 mi	TN 02004 RH	A	Oak Ridge	Mayfest 4 Miler	0.0	0	D Waters	TN 00008 RH
8 km	TN 02005 RH	A	Unicoi	Run for Richard	0.7	3	D Rogers	
5 km	TN 02006 RH	A	Bristol	YMCA 5k	-0.2	1	D Rogers	
5 km	TN 02007 RH	A	Powell	Race for Victims	0.0	6	A Morgan	
5 km	TN 02008 RH	A	Gatlinburg	Gatlinburg Senior Olympics	0.6	8	A Morgan	
Cal	TN 02009 RH	A	Knoxville	Kenilworth dr. 1000 ft. Calibration	0.0	100	A Morgan	
5 km	TN 02010 RH	A	Memphis	Run For The Records	-0.1	5	R Hunter	
5 km	TN 02011 RH	A	Elizabethton	Covered Bridge 5k	0.3	8	D Rogers	
10 km	TN 02012 RH	A	Knoxville	EXPO 10k	1.7	2	A Morgan	
5 km	TN 02013 RH	A	Knoxville	EXPO 5K	3.4	4	A Morgan	
5 km	TN 02014 RH	A	Ripley	Ripley Tomato Festival 5k	0.0	0	B Saffel	
5 km	TN 02015 RH	A	Surgoinville	Run for Technology 5k	-0.3	1	D Rogers	
5 km	TN 02016 RH	A	Brentwood	Firecracker 5k	0.0	0	J Zeigler	
5 km	TX 02033 ETM	A	Houston	Run Wild Sports V.2	0.0	0	E McBrayer	TX 00064 ETM
8 km	TX 02035 ETM	A	Coppell	Coppell Classic 8k & 1 Mile	0.0	2	K Ashby	
1 mi	TX 02035 ETM	A	Coppell	Coppell Classic 8k & 1 Mile	0.0	0	K Ashby	
5 km	TX 02036 ETM	A	Pasadena	American Legion Post 521 - 5km	-0.1	2	W Vanderbrink	
5 km	TX 02037 ETM	A	Houston	Southbelt-Ellington Chamber SE	-0.1	7	R Barnhill	TX 00029 ETM

DISTANCE	COURSE ID	ST	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
5 km	TX 02038 ETM	A	Lake Jackson	Hospital Run 5k	0.0	9	D Beatty	TX 96019 ETM
21.1 km	TX 02039 ETM	A	Dallas	Runaway Train Half-Marathon	0.0	0	K Ashby	
5 km	TX 02040 ETM	A	Fort Worth	Monticello Mad Dash	0.4	3	C Clines	
5 km	TX 02041 ETM	A	Fort Worth	Fit The Bricks	8.2	96	C Clines	TX 96032 ETM
5 km	TX 02042 ETM	A	Dallas	Katy Trail 5k	-0.6	8	C Clines	TX 99081 ETM
5 km	TX 02043 ETM	A	Ingleside	Palomas 5k	0.0	0	C Mericle	
21.1 km	TX 02044 ETM	A	Dallas	North Trail Half-Marathon	0.0	1	K Ashby	
5 km	TX 02045 ETM	A	Keller	Run in the Dark	0.6	5	D Conniff	
5 km	TX 02046 ETM	A	Dallas	ARTFEST Run for the Arts	0.4	6	C Clines	
Cal	TX 02047 ETM	A	San Antonio	Fort Sam Houston 304.8 meter	0.0	100	M Johnson	
5 km	TX 02048 ETM	A	Carrollton	Carrollton Runners 5k, 1k, 1 Mile	0.0	2	K Ashby	
10 km	TX 02048 ETM	A	Carrollton	Carrollton Runners 5k, 1k, 1 Mile	0.0	0	K Ashby	
1 mi	TX 02048 ETM	A	Carrollton	Carrollton Runners 5k, 1k, 1 Mile	0.0	0	K Ashby	
20 km	TX 02049 ETM	A	Dallas	Memorial Day 20k	0.1	0	K Ashby	
5 km	TX 02051 ETM	A	Sugar Land	River Pointe	0.0	0	E McBryer	
5 km	TX 02052 ETM	A	Westlake	Run to the Ranch	-0.4	3	D Conniff	
5 km	TX 02004 JF	A	Austin	Chuy's 5k	0.0	0	J Ferguson	TX 01001 JF
5 km	TX 02005 JF	D	Austin	Bun Run 5k	-2.0	20	J Ferguson	TX 01006 JF
5 km	TX 02006 JF	A	Austin	Bun Run II	-2.0	20	J Ferguson	TX 02005 JF
10 km	TX 02007 JF	A	Dublin	Dublin Dr. Pepper 10k	0.0	0	J Ferguson	
Cal	UT 02001 DP	A	Salt Lake City	Liberty Park 400 metre	0.0	100	L Smithee	
42.2 km	UT 02002 DP	A	Utah Hill	Mesquite Tri-State Marathon	25.2	78	L Smithee	
10 km	VA 02001 RH	A	Abington	Animal Chase 10k	0.3	3	D Rogers	
10 km	VA 02002 RT	A	Alexandria	Run vs. Row 10k Challenge	0.0	0	R Thurston	
Cal	VA 02003 RT	A	Bristol	North Pinecrest 1056 ft.	0.0	100	P Young	
10 km	VA 02004 RT	A	Alexandria	George Washington Birthday	0.7	8	R Thurston	
10 km	VA 02006 RT	A	Richmond	Ukrop's Monument Ave. 10k	0.1	3	M George	VA 00005 RT
10 km	VA 02007 RT	A	Ashland	Ashland Railroad Run 10k	0.0	1	M George	VA 99011 RT
10 km	VA 02008 RT	A	Norfolk	Elizabeth River Run 10k	0.0	80	M Robinson	
2 km	VA 02009 RT	A	Manassas	Bull Run 2km Racewalk Course	0.0	0	R Thurston	
5 km	VA 02011 RT	A	Richmond	Race for the Cure 5k	0.0	0	M George	
5 km	VA 02013 RT	A	Alexandria	May Day 5k	0.0	1	R Thurston	
3 km	VA 02014 RT	A	Alexandria	Colin Casey 3k	0.0	0	R Thurston	
5 km	VA 02015 RT	A	Chantilly	WHS 5k Run for Scholarships	0.6	2	R Thurston	
5 km	VA 02016 RT	A	Berryville	Barn Again 5k	0.0	0	N Riemenschneider	VA 00011 RT
5 km	WA 02001 BL	A	Seattle	Seattle Race for the Cure	0.0	0	T Cotner	WA 00011 MR
10 km	WA 02001 LB	AV	Ephrata	Ephrata Canal Caper	0.9	2	L Barrett	WA 90003 MR
Cal	WI 02007 JW	A	Nashotah	Nashota - Mission Ave. 1000 ft.	0.0	100	K Gilgenbach	
10 km	WI 02008 JW	A	Oconomowoc	Rogers Mem. Hospital 10k	0.0	1	K Gilgenbach	
5 km	WI 02021 JW	A	La Crosse	Eagle 5k	0.0	1	P Plinske	
5 km	WI 02037 JW	A	Theinsville	Freedom Run	0.0	2	K Gilgenbach	
Cal	WI 02043 JW	A	Madison	Madison SW Bike Path 1000 ft.	0.0	100	T Aten	
5 km	WI 02044 JW	A	Madison	Madison Race for the Cure	0.0	5	T Aten	WI 01041 JW
5 km	WV 02010 PR	A	Fairmont	Run to Read 5k	0.0	2	J Glaze	
15 km	WV 02011 PR	A	Fairmont	Run to Read 15k	0.6	1	J Glaze	

#### Foreign

10 km	PUR 02022 PR	A	Toa Baja	Abraham Rosa 10k	0.3	6	P Zapata	PUR 01035 PR
28.8 km	PUR 02028 PR	A	San German	Contra el Reloj (bicycle course)	0.0	11	P Zapata	
48.9 km	PUR 02028 PR	A	San German	Contra el Reloj (bicycle course)	0.0	0	P Zapata	

#### Renewed

12 km	CA 92003 TK	AV02	San Francisco	San Francisco Bay to Breakers	-0.1	94	T Knight	
Cal	GA 91022 WN	A02	Columbus	Front Ave. 1525' 9 3/4" Cal.	0.0	100	D Koepfer	
10 mi	IA 89008 MF	A00	Des Moines	Capital Pursuit 10 Mile	0.0	3	M Movic	
10 km	KY 87039 KY	A02	Ashland	Ashland Summer Motion 10k	0.0	1	K Bowling	
10 km	ME 86005 GN	A02	Freeport	LL Bean 4th of July 10k	-0.9	3	G Nelson	
5 km	OH 90001 PR	A02	Worthington	Spring Challenge	0.0	3	P Riegel	
5 km	TX 86015 ETM	A02	Houston	Heights 5k Fun Run	0.0	0	J May	
5 km	TX 92042 ETM	A02	Deer Park	Independence Run	0.0	0	E McBryer	

Copies of these certificates available from:  
(Send course name & ID number and \$2.00)  
Each certificate includes 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](http://www.RRTC.Net)

## Measurement News Subscriptions

George Pollock inquired about how to obtain printed, mailed copies of Measurement News. MN can be obtained by mail in the US by sending \$20 to:

Pete Riegel  
3354 Kirkham Rd  
Columbus, OH 43221

A faster way is to download the current issue from the RRTC web page. [www.rrtc.net](http://www.rrtc.net)

It's free, and I'd much prefer people to do this rather than send me their money. In addition, the online version is available about a week ahead of the printed version.

All of the 114 issues of MN published since 1982 exist on a set of 3 CD's, with an index, in .pdf (Adobe Acrobat) format. Around 3200 pages in all. Anybody wanting a set can have one for \$30. It will be current up to the last issue published.

While I accept paid subscriptions I am not anxious to do so. When I started MN, it was simply a round-robin letter to others in the game, and the idea was that people would contribute their ideas, in order to further accurate measurement. MN existed, unfunded, on its own before it became the RRTC newsletter.

When it became the RRTC newsletter, funding became available from USATF, and MN began to pick up the publication of the lists of newly-certified courses which NRDC used to publish in their newsletter, "NRDC News," before NRDC was incorporated into TACSTATS, now Road Running Information Center.

As the editor became more internationally involved, MN was sent to selected foreign measurers, and when IAAF and AIMS set up their system of international measurement administration, Measurement News began to be sent to all of the "A" and "B" level measurers. The foreign distribution is funded by IAAF, domestic by USATF.

When I was RRTC Chairman, I was often buttonholed by people at the USATF Annual Meeting and asked to send them Measurement News. I almost always did this. In addition, I added some people to the list who, I was informed, were politically important.

Every so often I look at the mailing list, and if the recipient has not sent me something lately, I just drop them from the list without notification. Exceptions are US certifiers, IAAF/AIMS measurers, and paid subscribers.

I view thoughtful articles about measurement as being worth far more than money.

At bottom, I view MN as an interactive tool to improve measurement. From all the people who receive it, I receive very little in return. This is not satisfying to me, as I never intended it to be a monologue. Over the years we have been very fortunate to receive submissions from a variety of people, and I have been immensely grateful for this, as these submissions have advanced our science. A look at the index will identify these valued contributors.

Lately, however, submissions to Measurement News have begun to decrease, and sometimes I am hard-pressed to find material. Part of the reason is that MNForum has replaced MN as the forum of choice. This is good, as discussion is timely and immediate. Still, it does leave me in a quandary. Without material, the printed version may become simply a list of certified courses, a map of the month, and assorted boilerplate. If this is all it is to be, I'd just as soon save myself the effort. Perhaps the time has come to fold the tent.

Pete Riegel

## PUZZLE OF THE MONTH

Music is much about mathematics. A perfect octave, for example, is two notes (say C and the lower C) whose frequencies are precisely in a ratio of 2:1. When played together they sound pure. If they are very slightly out of tune, however, the two frequencies do not stay together but drift in and out of phase, causing the sound level to increase and decrease accordingly. To the ear this causes "beats" to be heard. A musical perfect fifth, say G and the C below it, consists of two notes whose frequencies are in the ratio of 3:2. Note, you don't need to be a musician to solve this puzzle, but it might help if you have a keyboard or a picture of one if you are not. A fifth such as the C-G combination spans five white notes. More generally, a fifth always goes up 7 half steps, spanning eight.

One might attempt to tune a piano or a rank of organ pipes by starting with a tuning fork, set at middle C for example, then tuning the G above it by removing any beats. One could continue this tuning by fifths, going from G to D, then D to A, etc. Finally one would come back to a C. (Actually you would run out of keys on the keyboard first, so you periodically drop down a perfect octave, and stay in the middle of the keyboard. This doesn't materially affect the mathematics.)

The question is, would the final C be in tune with the starting C, that is, within one or more perfect octaves? If not, would the frequency of the final C be sharp (higher) or flat (lower), and by what percentage relative to the perfect octave frequency.



Keyboard courtesy of your Editor, who has not yet figured out the answer.



At left we see Jean-Francois Delasalle (France, at left) with Pier Luigi Omodeo (Italy) at the measurement of "Stramilano 2002" half marathon. Expected are 50 elite runners, 3000 others, and 50,000 runners in the 15 km fun race.

## 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: Mike 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](http://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 \$70 for the 5 digit model, \$80 for the 6 digit model, postpaid. Foreign price is \$75/\$85 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](http://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>



## ROAD RUNNING TECHNICAL COUNCIL

Chairman: Mike Wickiser – 2939 Vincent Rd – Silver Lake, OH 44224  
Phone/fax: 330-929-1605 email: MikeWickiser@neo.rr.com

### REGIONAL CERTIFIERS - CONTACT THESE PEOPLE FOR CERTIFICATION INFORMATION

	Telephone	Email address
AK - Frederic Wilson - 2420 Glenwood - Anchorage, AK 99508	907-279-2773	uphere@alaska.net
AL - John DeHaye - 824 Annlau Ave - Huntsville, AL 35802	256 881-9326	jjdehaye@yahoo.com
AR - Don Potter - #7 Kali Court - Conway, AR 72032	501-796-4081	donp@tcworks.net
AZ - E. T. McBrayer - 4021 Montrose - Houston, TX 77006-4956	713-523-5679	mametm@aol.com
CA - Ron Scardera - 5660 Valley Oak Dr - Los Angeles, CA 90068	323-467-7750	rscar@pacbell.net
CO - Dave Poppers - 5938 S Franklin St - Centennial, CO 80121	303-795-9743	dpoppers@earthlink.net
CT - David Reik - 87 Wood Pond Road, West Hartford, CT 06107	860-677-2724	Davidreik@aol.com
DC - Robert Thurston - 13 Kennedy St NE - Washington, DC 20011	202-726-1518	Thurret@aol.com
DE - Gene Newman - 232 Heather Croft - Egg Harbor Twp, NJ 08234	609-641-0645	newmangc@comcast.net
FL - Doug Loeffler - 1399 W. Royal Palm Rd - Boca Raton, FL 33486	561-391-2880	DougLoeffler@aol.com
GA - Woody Cornwell - 1701 Violet Way - Dalton, GA 30720	706-226-5207	ewcornwell@cs.com
HI - Peter Riegel - 3354 Kirkham Rd - Columbus, OH 43221-1368	614-451-5617	Riegelpete@aol.com
IA - Michael Franke - 3824 51st St - Des Moines, IA 50310	515-276-3140	Mfranke@worldnet.att.net
ID - Michael Renner - East 1606 19 <sup>th</sup> Ave - Spokane, WA 99203	509-535-2822	
IL - Jay Wight - 4556 Opal Drive - Hoffman Estates, IL 60195-1185	847-359-4598	Jaywight@earthlink.net
IN - Jim Gerweck - 156 Fallow St - Norwalk, CT 06850	203-838-2748	zgerweck@aol.com
KS - Bill Glauz - 2704 W. 137th St. - Leawood, KS 66224-4529	913-402-1501	wglauz@kcnet.com
KY - Peter Riegel - 3354 Kirkham Rd - Columbus, OH 43221-1368	614-451-5617	Riegelpete@aol.com
LA - John Ferguson - 3026 Sesbania - Austin, TX 78748-1912	512-282-4175	fergusonj@hayscisd.net
MA - Ray Nelson - 3524 West Shore Road - Apt. 705 - Warwick, RI 02886	401-737-2416	ride9336@ride.ri.net
MD - John Sissala - 120 Evans St - Rockville, MD 20850	301-340-8107	sissala@starpower.net
ME - Wayne Nicoll - 31 Kilcare Rd - Andover, NH 03216	603-735-5721	nicoll57@webtv.net
MI - Scott Hubbard - 1453 W. Hill Rd. - Flint, MI 48507	810-234-8993	Runningshorts@aol.com
MN - Rick Recker - 19 South 1st Street #2203 - Minneapolis, MN 55401	612-375-0805	rick_recker@hotmail.com
MO - Bill Glauz - 2704 W. 137th St. - Leawood, KS 66224-4529	913-402-1501	wglauz@kcnet.com
MS - Bob Harrison - 1736 Meadow Oak Court - Montgomery, AL 36117-6830	334-279-5517	rnharrison@knology.net
MT - George Tuthill - 810 S 7th Ave - Bozeman, MT 59715	406-587-2289	tuthill@physics.montana.edu
NC - Paul Hronjak - 4413 Pinehurst Drive, Wilson, NC 27896	252-237-8218	hronjak@simflex.com
ND - Tom Benjamin - PO Box 280715 - San Francisco, CA 94128	415-382-6451	benjtr@slip.net
NE - Karl Ungurean - 203 E. Denison - Davenport, IA 52803	563-324-2250	UngureanK@aol.com
NH - Wayne Nicoll - 31 Kilcare Rd - Andover, NH 03216	603-735-5721	nicoll57@webtv.net
NJ - Gene Newman - 232 Heather Croft - Egg Harbor Twp, NJ 08234	609-641-0645	newmangc@comcast.net
NM - Don Shepan - 3007 Ronna Dr - Las Cruces, NM 88001	505-524-7824	DShshepan@aol.com
NV - Bill Callanan - 5209 Copper River Ave - Las Vegas, NV 89130	702 656-3741	Callan@lvcm.com
NY - Amy Morss - 248 Spring Hill Rd., Sharon, NH 03458	603-924-4164	Amorss@koko.mv.com
OH - Peter Riegel - 3354 Kirkham Rd - Columbus, OH 43221-1368	614-451-5617	Riegelpete@aol.com
OK - Bob Baumel - 129 Warwick Road - Ponca City, OK 74601-7424	580-765-0050	bobbau@earthlink.net
OR - Lee Barrett - 3027 NE 20th Ave - Portland, OR 97212	503-284-2809	cudapdx@attbi.com
PA - Bill Belleville - 2902 Morris Road - Ardmore, PA 19003	610-649-4278	Wjbellevil@aol.com
RI - Ray Nelson - 3524 West Shore Road - Apt. 705 - Warwick, RI 02886	401-737-2416	ride6887@ride.ri.net
SC - Brian N. Smith - 1465 Winton Rd - Mount Pleasant, SC 29464-3921	843 881 5566	Bnewbatt@awod.com
SD - Peter Riegel - 3354 Kirkham Rd - Columbus, OH 43221-1368	614-451-5617	Riegelpete@aol.com
TN - Bob Harrison - 1736 Meadow Oak Court - Montgomery, AL 36117-6830	334-279-5517	rnharrison@knology.net
TX - E. T. McBrayer - 4021 Montrose - Houston, TX 77006-4956	713-523-5679	mametm@aol.com
UT - Dave Poppers - 5938 S Franklin St - Centennial, CO 80121	303-795-9743	dpoppers@earthlink.net
VA - Robert Thurston - 13 Kennedy St NE - Washington, DC 20011	202-726-1518	Thurret@aol.com
VT - Wayne Nicoll - 31 Kilcare Rd - Andover, NH 03216	603-735-5721	nicoll57@webtv.net
WA - Bob Langenbach - 4261 South 184 <sup>th</sup> St - SeaTac, WA 98188	206-433-8868	boblang@wolfenet.com
WI - Jay Wight - 4556 Opal Drive - Hoffman Estates, IL 60195-1185	847-359-4598	Jaywight@earthlink.net
WV - Robert Thurston - 13 Kennedy St NE - Washington, DC 20011	202-726-1518	Thurret@aol.com
WY - Tom Knight - 307 Dartmouth Ave - San Carlos, CA 94070	650-594-9406	Tdk@stanford.edu
FOREIGN - Peter Riegel - 3354 Kirkham Rd - Columbus, OH 43221-1368	614-451-5617	Riegelpete@aol.com

CERTIFIERS - Please check this listing to be sure we have your data correct.

June 25, 2002