Measurement News

Autumn 2005 • Number 130

Past, present - and future? Shown next to the familiar Jones/Oerth counter is a Protegé Model 9 electronic cyclometer. Neville Woods has done extensive research and developed a method of using this and similar devices for measuring course for certification. An in-depth article appears in this issue.

MEASUREMENT NEWS

#130 – AUTUMN 2005

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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 quarterly beginning in spring (four issues per year). MN is sent free to RRTC officers and certifiers, and AIMS/IAAF measurers.

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.

Deadlines: Material intended to be included in the Summer 2005 issue must be in the Editor's hands by May 20. Next issue will be mailed in early summer 2005.

ROAD RUNNING TECHNICAL COUNCIL

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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.

ONLINE MEASUREMENT FORUM

All it takes to become a subscriber is access to email. Simply send to **mnforum-request@rrtc.net** with “subscribe” as the subject (to unsubscribe, use “unsubscribe” as the subject).

To post messages to the list, send email to **mnforum@rrtc.net**. Please keep your comments in the body of the email (no attachments please). Also, please send only plain text; i.e., avoid formatted (HTML) messages (If you use HTML formatting, the formatting will be removed).

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Chairman's Clatter - From Mike Wickiser

What Measurement News??? The summer hss ended and there has been precious little activity on the MNForum. This is not to say that course measurement and certification has died off. Course certification is booming with my mailbox regularly filled. Current activities have been a bit slow from my office due to the high activity of late. The scanner I have been using for the past few years to scan the 15,000 plus maps that are available on the USATF website is getting tired. It began acting up this Spring and continually worsened to the point where it spent over a month in the repair shop only to find that the only authorized repair facility any where near me was continually needing more and more time. Eventually it became apparent that they weren't getting the thing repaired while the pile of certificate maps continued to grow. I finally retrieved the scanner and with the help of a friend got the thing working well enough to begin working on a huge backlog of certificate maps. The darned thing still skips about 3 of every 10 maps, which must be rescanned, but all maps submitted to date have been scanned and uploaded to the USATF host site. Any and all maps should be available by the time this newsletter is printed or posted.
On a personal note, my time has also been occupied this summer with getting out and enjoying summer activities. It has been an active summer, going to the beach, working out, and enjoying an active social life. This is a turnaround from previous years and it has been enjoyable in several ways.

RRTC Annual Meeting: For the past couple years the RRTC met as a group over the Labor Day holiday. This worked quite well for getting together and discussing measurement and certification issues. These meetings were beneficial but it is also very necessary for the RRTC to conduct annual meetings at the USATF convention. Maintaining a presence at the convention is the only appropriate way of making the entire USATF organization aware of our activities. For budget purposes it is costly to have one meeting away from the convention and another meeting at the USATF convention. This of course means that the RRTC will be meeting at the USATF convention in Jacksonville but separate meetings aside from the convention will not be scheduled.
Last year due to personal family issues I was unable to attend the convention much to the concern of all. As a result I let the organization down and wish to apologize for any problems but my attendance was simply not possible.
I will be at the convention and the RRTC will conduct its annual meeting at that time.
Please feel free to send me any agenda items for discussion.
There is currently one agenda item submitted. Kevin Lucas has proposed an amendment change that would restructure the RRTC and incorporate the Council into each association. I feel this would be a huge mistake as the RRTC is technical by nature. Each State Certifier has earned that position by exhibiting a high degree of skill in the measurement and certification of race courses and each state certifier has shown a high degree of interest in course certification, evidenced by the prompt and timely handling of certificates. This expertise and dedication is not only extremely valuable to the Certification program, it is vital to the integrity of Course Certification in the USA. I do not believe transferring the responsibilities of the RRTC to the Association level would be of any benefit to the sport.
I am asking each recipient of Measurement News to review the proposed change and make their opinions known to their respective USATF Associations. A copy of the proposed change is included for your review.

Address change: Mikewickiser@neo.rr.com is closed out. Please make note of the change and send any email messages to Mike Wickiser at Chairman@rrtc.net

TO: Hon. James Murphy, USATF Law & Legislation Committee

FROM: Kevin P. Lucas, Secretary, USATF Niagara Association

As signed _____ and Dated _____

RECOMMENDED BY: George P. Regan, President, USATF Adirondack Association

As signed _____ and Dated _____

RE: Proposed Amendment to USATF Bylaws

DATE: August 29, 2005

To keep up with the ongoing growth of the sport, especially in Long Distance Running, it is our recommendation that the USATF adopt an amendment to our Bylaws, Section II, Article 15 – Long Distance Running Division, D – Councils: 3 – Road Running Technical Council.

Over the last 40 plus years, the Road Running Technical Council (RRTC) has moved road race course measurement and certification to an acceptable level - there are now an average of 1187 courses USATF certified each year for the last 20 years. Yet the RRTC has not kept pace with the necessary evolving demands of the sport in meeting its duties and responsibilities set forward in our Bylaws. Across the country there is a vast shortage of local measurers to serve the demand for USATF certified courses. A widening disconnect exists between local USATF Associations and RRTC certifiers.

In most Associations, less than 20% of all USATF Sanctioned road races are run on certified courses. Road course certification is a natural complement to race sanctioning and the growth of "chip" timed events. Many more events want their run courses certified, but most courses go uncertified. Many additional events would have their courses certified if local associations were empowered to promote road course certification program along with race sanctioning?

The RRTC has been ineffective in keeping up with the demand of the Records Committee in validating courses with pending records. Because there is a shortage of qualified local measurers to perform these tasks. Many pending records linger for years after the events are staged. There isn't a plan in place to regularly develop and train new measurers. With the limited budget monies available to validate courses, having to bring in an out of state course measurer restricts the number of courses that can be validated. Having a pool of certified measurers within each association is the answer. Associations are required for accreditation to maintain a pool of certified officials; they could equally have a number of available certified measurers.

Twenty-one current RRTC Regional State Certifiers live out of the state they hold jurisdiction over. Four certifiers hold jurisdiction over multiple states. Out of state certifiers only add to the lack of regular and meaningful communication with local running communities. Associations could better further the local understanding and effective promotion of road course certification. Road course certification is a much underdeveloped benefit for running events and to our athlete members. Associations must add road course certification as another service and program to execute locally.

Fees to certify a road course have remained flat for 25 years or more, ranging from $25 per course to

a maximum of $30. Certified courses receive a 10-year certification. These certification monies are going to a network of individuals loosely connected to the USATF. Regional Certifiers are not required to be USATF members. Additionally, there is no policy on what fees course measures charge for the actual course measurements. The out come of these practices leaves the associations disconnected from events.

USATF national list of certified courses is poorly updated and maintained. Despite having a respectable budget, which comes from a $3.00 fee to list each road course, some courses take several months to finally be included on the USATF Certified Course search web site. Other courses finally make it to the list, yet their course maps take additional months to be uploaded. Newly certified courses take 3-6 months to be included on the web site. This listing process could be expedited similarly to what association's sanctioning chairs currently do to upload event-sanctioning data to the USATF Events Calendar, which is generally completed within a week of receipt.

RRTC's Measurement News newsletter was regularly published six times year. The newsletter was last published in April 2005 and the prior publication was November 2004. Communications within the RRTC and with outside interested parties has equally dwindled over the last few years. Adding to this disconnect, the RRTC meets independently from the USATF's Annual Meeting, while other committees consistently and openly meet.

Therefore, it is our contention that the RRTC's duties and responsibilities are given to individual associations to manage and direct at the local level.

CURRENT:
Section II – By-Laws
Article 15 – Long Distance Running Division
D – Councils: 3 – Road Running Technical Council:

A – Duties and responsibilities: The council shall:

i – Manage a national program of accurate road course measurement and certification;

ii – Establish and maintain a national list of certified courses;

iii – Select, train, and supervise road course certifiers;

iv – Provide technical information and advice to assure that rules relating to course measurement and certification can realistically be enforced;

v – Provide a pool of qualified expert measurers for special situations as determined by the council;

vi – Assist the Records Committee and RRIC by providing current information as to race course certification status;

vii – Assist the RRIC by providing validation measurers as necessary for record purposes; and

viii – Maintain communications with all interested parties nationally and with technical counterparts in foreign federations; and

B – Make-up: The Council shall consist of a chair and members named by the President. At least twenty percent (20%) of the members shall be active athletes selected by the active athlete delegates to USATF.

PROPOSED:
Section II – By-Laws
Article 15 – Long Distance Running Division
D – Councils: 3 – Road Running Technical Council:

A – Implementation: Individual Associations shall implement all aspects of the Road Running Technical Council and the USATF Course Certification Program:

B – Makeup: The Council shall consist of members nominated by each Association and selected by Sports and Associations Committees;

i – Elected Chair: The person elected from and by the nominees made by each Association; and

ii – Elected Vice-Chairs: Two persons elected from and by the nominees made by each Association; and

iii – Sport Committee Members: One representative each from the Women's LDR, Men's LDR, and Masters LDR; and

iv – Associations Committee Members: Three representatives each from the Associations; and

v – Athletes: At least twenty percent (20%) of the council shall be active athletes selected by active athlete delegates to USATF; and

C - Duties and responsibilities: Thru each USATF Association the council shall:

i – Manage the national program of accurate road course measurements and certification; and

ii – Maintain the national list of "active" and "archived" certified courses, both online thru the USATF Certified Course Search Engine and a hard copy library; and

iii – Adopt and implement a system to Grade and Certify road course certifiers and measurers; and

iv – Train and supervise individual association road course certifiers and measurers; and

iv – Provide technical information and advice to assure that rules relating to course measure ment and certification are enforced; and

v – Assist the Records Committee and RRIC by providing current information as to race course certification status; and

vi – Assist the RRIC by providing validation measurers as necessary for record purposes; and

vii – Maintain regular communications with all interested parties nationally and with techni cal counterparts in foreign federations.

Unwitting marathon runners go extra mile
Lakeshore race turns out to be too long

By Julie Deardorff

Chicago Tribune - Published June 3, 2005

All 529 runners who finished Chicago's Lakeshore Marathon set a personal record for the distance.

The problem was the race--27.2 miles--was a full mile longer than a traditional marathon. But participants didn't know about the mistake until the event was over Monday.

This gaffe, along with other organizational disasters, including missing mile markers and unstaffed aid stations, unleashed a firestorm of criticism from Chicago's running community over Illinois' only spring marathon. Some runners are so livid they are urging the city to stop issuing permits for the Lakeshore Marathon until it's under new management.

On Thursday, after nearly a week of mounting fury on Web sites among many of the marathon's entrants, race founder and organizer Mark Cihlar issued an apology on www.marathonguide.com.

"[Last-minute changes] caused us to miscalculate and we foolishly added an extra mile--how terrible!" he wrote in the memo to Lakeshore participants.

For the first time in four years, Cihlar plans to relinquish control over event coordination--he has had sole responsibility for 90 percent of the marathon's planning--and is seeking qualified directors and coordinators to help on the 2006 race.

But some participants, who first suspected the race was too long when they checked their GPS watches during and after the event, were not immediately mollified. Though there is good support for a spring marathon to serve as a smaller alternative to the LaSalle Bank Chicago Marathon, Chicago's marquee 26.2-mile race held each fall, participants like Hugh Mainard of Chicago want Cihlar run out of town.

Mainard, an attorney, was so furious that he complained about Cihlar to the officials at Chicago Area Runners Association, the Chicago Department of Special Events, the Chicago Park District and the Boston Athletic Association.

Dozens of participants from as far away as Seattle were running the Lakeshore Marathon, hoping to qualify for the Boston Marathon. Though the Lakeshore course was too long, Boston officials have made exceptions in the past.

"It's hard for me to fathom how someone can get the most basic element of a race wrong," said Mainard.

The competition, which filled a gap in the running calendar when the Lake County Marathon folded in 2000, was not registered with the Chicago Area Runners Association this year. But CARA officials

are concerned that its poor reputation could hurt the running community. Leesa Drake, CARA's immediate past president and a member of the board, said it's possible that CARA could offer technical support if Cihlar asked.

"It does reflect on CARA if there is a bad race that isn't getting any better," said Drake, who ran the Lakeshore Marathon but vowed she'll never do it again. "[Cihlar] has good ideas but trouble executing. He really doesn't have an infrastructure in place."

Cihlar said the 27th mile came from last-minute second-guessing and adjustments, such as the inclusion of Navy Pier and Park District construction at Diversey Harbor. That extra mile -- a mental and physical blow to some runners -- showed up near Montrose Harbor. Ultimately, Aurora's Dan Martin, 46, won the men's race in 2:50:24. The top woman was Chicago's Megan Smiley, 30, who clocked a 3:12:53.

More defibrillators ordered

Paramedic Hector Contreras, the director of security for the race, said he was so unnerved by the death of a 28-year-old runner in the Soldier Field 10 Mile race the day before that he reassessed the medical situation. He ordered more defibrillators, more water stations and more medical tents. "We started adding things and got all screwed up," Contreras said.

Adding to the chaos was the half-marathon, which also turned out to be too long and poorly marked. Some participants were so befuddled, they were running in circles.

Bridget Sullivan was the lead woman for the first part of the half-marathon when she was directed off the course at Fullerton Avenue and the lakefront. Course marshals sent her to the Lincoln Park Zoo.

"I started to pass the marathoners, and a few of them tried to save me by telling me the half turned `way back there.' I was so confused at this point that I wanted to cry," said Sullivan, who was trying to obtain a competitive starting time for the Chicago Marathon. She eventually ran into another misguided half-marathoner and the two rejoined the race after running a mile out of their way. "I lost a lot of momentum due to the drama," said Sullivan, who finished third among the women and said she never saw a mile marker after mile 6.

Cihlar, who has run 25 marathons himself, says he understands why runners are frustrated. "We've been undercapitalized and under-resourced, but it looks like we're rounding the bend," he said. "Sponsors are taking a legitimate interest for 2006. There are lots of things we can improve on, but we're starting to make some headway."

Some runners were able to enjoy the race, simply because of the beautiful Memorial Day weekend weather. "Obviously, there were organizational problems but I'm not angry about them," said Danielle Coffman, who ran the half-marathon. "I personally would like to see this race succeed and continue, but I think it probably needs to be handed over to new management."

PROTEGE CYLCOCOMPUTERS AS REVOLUTION COUNTERS IN THE RRTC METHOD FOR COURSE MEASUREMENT

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Revised 30 June 2005

ABSTRACT

I describe the operation of Protege electronic cyclocomputers that allows them to be used as precise revolution counters for bicycle wheels in the RRTC method for the measurement of running courses. A slightly simplified description of the operation is as follows. A wheel circumference of 10 meters is set into computer memory, so that for every revolution it senses that the wheel has traveled 10 meters and it therefore increments the displayed trip distance correspondingly by 10 meters or one digit. Thus the trip distance display can be taken as showing the number of whole revolutions, and precise synchronization with a graduated wheel rim allows measurement to within 0.01 rev.

Protege counters offer many advantages over the Jones, a non-zeroing mechanical counter, recommended in the current RRTC method:

1. Clarity of readings -- The standard Jones is mounted on the wheel axel with the display at right angles to the normal direction of eye scan. In contrast, the Protege is mounted on the handlebars and has a display that is 50% larger, so that it can be read comfortably while riding. Road safety, the ability to do night measurements, and error rate are all improved.

2. Instant zeroing capability -- Far fewer readings and calculations are necessary, so that efficiency is improved and error rate reduced.

3. Permanent installation -- Many measurers will want to remove the Jones after use because of noise, drag, and wear. The Proteges can stay in place and be instantly converted to normal bicycle computers.

4. Availability -- The Jones is available from only one supplier whereas the Proteges are available at many bicycle stores and on-line sites.

5. Cheapness -- The Jones costs $80-120 whereas a Protege can be had for as little as $15.

6. No wrap-around -- With the Protege counters the meter display never returns to zero before the end of the measurement, whereas this is always a possibility with the Jones.

CONTENTS

I. Introduction

In recent years I have described the operation of bicycle cyclocomputers as precise revolution counters with fractions of a revolution read from synchronized wheel-rim markings. These are advantageous replacements for the mechanical Jones meter in the RRTC Method for race-course measurement.

Unfortunately many of the suitable cyclocomputers are no longer available, and there has been a proliferation of wireless models which do not work because they do not register trip distance at slow speeds. However production of the Protege cyclocomputers by Planet Bike will continue indefinitely, and happily these are by far the best as revolution counters. They are unique in suitable cyclocomputers in that wheel circumference can be set as high as 9.999 meters, so that they can be operated as single-revolution counters with only a single magnet on the wheel .

In view of the importance of the Proteges I decided to devote this report exclusively to a detailed description of their operation for course measurement

II. Models and Availability

The Protege is available in three very similar models: 5, 8, and 9.

Shown is the Protege 9 which has the following functions:

1. Current speed

2. Ride time

3. **Trip distance (can be used to display revolutions)**

4. Dual odometers for two wheel sizes

5. Odometer for total of dual odometers

6. Average speed

7. Maximum speed

8. Clock

9. Speed comparator (speed compared with average speed)

10.Temperature

The first three functions are continuously displayed on the first three lines and the others are selected for the fourth by momentarily pushing the body of the computer forward.

The Protege 8 has the same functions as the 9 except that it does not display temperature.

The Protege 5 does not display temperature, average and maximum speed, and a speed comparator. It has only a single wheel size setting for a single odometer and therefore cannot be instantly converted to a normal bicycle computer. Also it cannot be used to make secondary measurements while suspending the primary one. Although it works as well as a revolution counter and may be simpler to program, the slightly smaller price does not justify its purchase over the other models.

The above models can be purchased at many bicycle stores and on-line sites such as planetbike.com. Jensonusa sells model 5 for $15 and 9 for $20 at their Ontario, CA, store and also on-line for the same price with an additional cost for shipping of $5.95 for one and $6.95 for two computers.

III. Computer Programming

1. Complete reset

Rear of Protege 9

1. Select "ODO" or "AVE" on fourth line of computer by pressing mode button.

2. Hold set button using a hairpin or large paper clip for 4 seconds.

3. Use mode button to select KM/H between KM/H and M/H. Press set button.

4. First digit of wheel circumference 1 will be flashing and change to 9 by pressing mode button. Press set button.

5. Repeat 4 until all four digits of circumference have been set to 9.

6. First digit of odometer for circumference 1 will be flashing, and all digits are changed to 0 or desired values as for the circumference above. (Confusingly this screen is labeled "ODO" whereas on the normal screen it is labeled "BIKE ODO".)

7. First digit of circumference 2 will be flashing. Repeat 4 to 6.

8. First (hour) digit of clock will be flashing. Set time to complete programming.

2. Reset of clock only

1. Select clock on fourth line.

2. Hold set button using a hairpin or large paper clip for 4 seconds.

3. First (hour) digit of clock will be flashing. Set time as above.

3. Instant conversion to normal bicycle computer mode

It is very useful to have both circumferences to set to 9999 mm as above because it allows the measurer to freeze primary measurement while he makes secondary measurements (eg overshoot correction).

However the second circumference can be set with the real value in mm so that if this is selected by pressing the circumference switch, conversion to normal metric computer mode can be made instantly. The mm value can be derived from the calibration data by dividing the course length in mm by the revolutions found. For instance I typically get 191.21 rev over a 400-meter calibration course for tire of 700 x 23 and this corresponds to a circumference setting of 400 x 1000 mm /191.21rev = 2092 mm/rev.

The best way to convert to normal mile mode is not as obvious. One can go through a complete reset and select M/H, but this is very tedious as it means operating the awkward rubber set button many times. Also one as to go through this all over again on conversion back to KM/H. A slightly better way is to set the computer aside for five minutes immediately after selecting M/H until it goes into sleep mode. One can then start using it in mile mode. The best way though is to calibrate circumference 2 in millionths of a mile. Then one can switch back and forth between revolution counter mode and normal mile mode by simply pressing the circumference button. With the tire mentioned above one has to set circumference 2 to 400 m x 1,000,000/(1609.344 m per ml x 191.21 rev) = 1300 millionths of mile/rev. Although the computer will then operate in mile mode, the screen displays in km/h.

IV. Wheel-Rim Marking

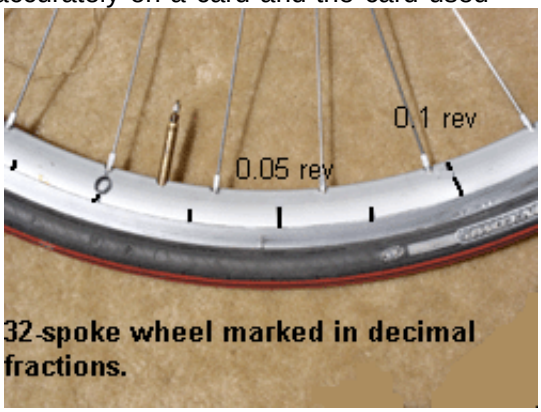
1. General instructions

Use a black Sanford Sharpie Permanent Marker to create very permanent marks on the rim. Red can be used to designate smaller divisions. Designate a zero spoke on the same side of the wheel as is desired for the computer sensor. (With some mountain bikes do the opposite.) Assign increasing values in an anticlockwise direction as viewed from the right-hand side of the wheel and clockwise from the left-hand side. (If it is found that the wheel has been marked in the wrong direction, simply turn it around in the forks.)

Time to mark a rim in decimal fractions of a revolution is less than 25 min. Time to mark in spoke intervals is 5 min.

2. Marking in decimal fractions of a revolution

Marking the rim requires estimation of 1.6 and 0.8 of a spoke interval for a 32-spoke wheel and 0.5, 0.6, 0.7, 0.8, and 0.9 for a 36-spoke. These can be measured accurately on a card and the card used repeatedly or simply eye-balled.



32-spoke wheel marked in decimal fractions.

(i) 32-spoke wheel

Mark the first divisions using the following precise correlations:

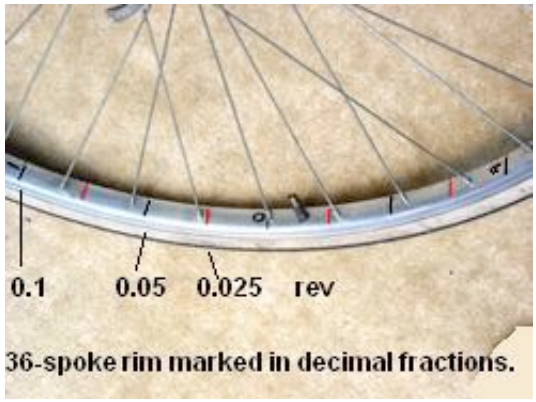
Spoke	0	4	8	12	16	20	24	28
Rev	0	0.125	0.250	0.375	0.500	0.625	0.750	0.875

Finally, using the fact that 0.8 spoke intervals equals 0.025 rev and 1.6 spoke intervals equals 0.050 rev, work on either side of the first marks until the whole rim is marked in divisions

(ii) 36-spoke wheel

Mark the first divisions using the following precise correlations:

Spoke	0	9	18	27
Rev	0.00	0.25	0.50	0.75



36-spoke rim marked in decimal fractions.

Finally, work on either side of the first marks until the whole rim is marked in divisions of 0.025 rev using the following correlations:

Spoke interval	4.5	3.6	2.7	1.8	0.9
Rev interval	0.125	0.100	0.075	0.050	0.025

3. Marking in spoke intervals

Marking a rim in spoke intervals is very fast and subsequent readings are very fast and accurate. Rotation can be read down to 0.003 rev equivalent to 0.06 of a count on the Jones, but the downside is that in order to correlate with meter readings in revolutions, the measurer has to divide rim readings by the number of spokes. Obviously though, this would be the method of choice when using a rented bicycle or a wheel that is only going to be used temporarily.

VI. Basic Measurement

Align the zero graduation on the rim accurately with the starting point on the ground, **roll the wheel backward about 20 degrees**, and zero the trip distance on the third line of the meter by pushing the body of the meter forward in the bracket for about three seconds. Ride continuously until the desired revolutions are registered on the third line of the meter (ignore the decimal point) or until about one revolution before the desired finish. Stop the bicycle immediately and roll forward slowly until the desired fraction of a revolution is indicated on the wheel rim or until the wheel is aligned with the desired finish line. If there is a need to go backward through the zero point on the rim, note the meter reading at the stop and decrement this by one for every passage through the zero point. Repeat the whole process for measurements beyond the first finish point.

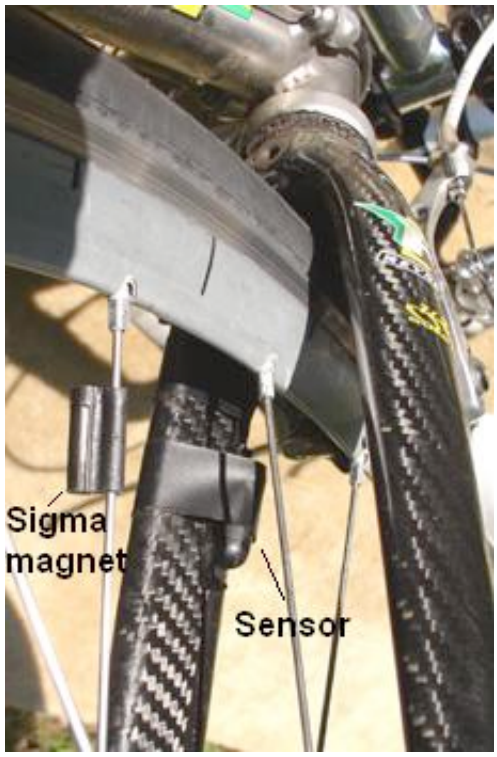
Do not roll backward through the rim zero point unintentionally as this can generate one or two spurious revolutions. Avoid stopping the bicycle during measurement, but if this is necessary do so immediately after the meter increments or glance down at the rim reading and stop remote from the zero point. The wheel can then be allowed to rock backward and forward moderately without affecting the revolutions displayed on the meter.

V. Installation

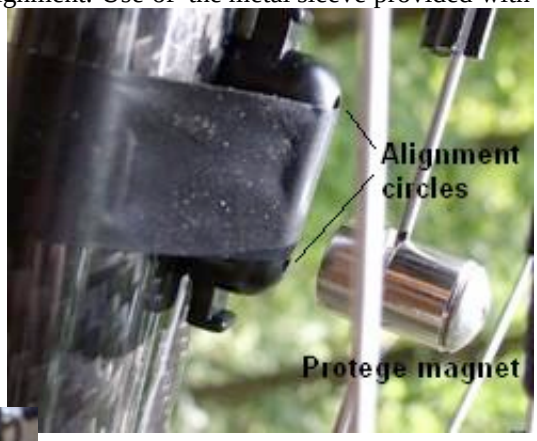
1. Install the computer bracket on the handlebars and insert the computer by pushing it forward into the bracket.

2. With electrical tape mount the sensor on the upper inside of the forks. Use the same side of the bicycle as was used to designate the zero spoke in rim marking. The foam backing may be discarded as it tends to squirm later.

3. Mount a magnet on spoke 20 of a 36-spoke wheel or 18 of a 32-spoke wheel. (Spoke numbers increase in the forward direction of rotation.)

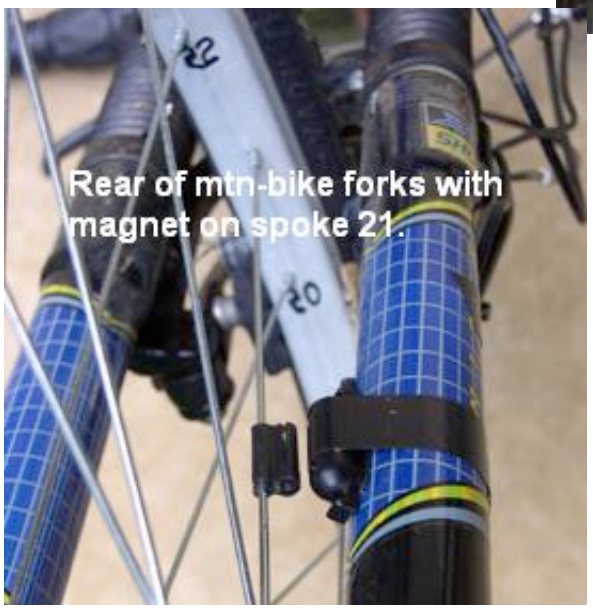


4. Adjust the sensor - magnet clearance to about 1mm. The Protege magnet is nonadjustable for this clearance and to achieve this it may be necessary to move the magnet and the sensor downwards to a point where the spokes come closer to the forks. I prefer the much lighter Sigma Sport magnet that can be instantly snapped onto the spoke and easily twisted to adjust clearance very accurately. (This magnet is available from Nashbar for $0.99.) The only downside to the design is that by rough manhandling of the wheel the magnet can be knocked out of alignment. Use of the metal sleeve provided with the magnet protects the alignment slightly, but I usually do not use it. The sleeve slightly reduces the response of the sensor. Note that clearance is not critical as both magnets will operate up to a clearance of 8 mm.



5. Adjust the alignment of the magnet with the sensor. The center of the Protege magnet has to be aligned with one of the two circles marked on the sensor. The Sigma Sport magnet has to be centered on the sensor with each end of the magnet aligned with the center of a circle. Neither alignment is critical since both magnets will continue to operate up to 5 mm from these positions.

6. With mountain bicycles, mount the sensor low down on the forks on the opposite side to that of the zero spoke. Put the magnet on spoke 21 of a 36-spoke wheel.



7. Test the installation as follows. Roll the wheel to a ground reading of about 0.9 rev on the rim and zero the trip display by pushing the meter forward in its bracket for about three seconds. Roll the wheel forward for over a revolution until the trip distance increments by one. This should occur precisely at a rim reading of 0.00 rev. If this reading is off by a few hundredths of a revolution, correct by moving the sensor forward or backward on the forks. Note that the closeness of synchronization of the rim zero with that of the meter does not affect the accuracy of reading fractions of a revolution.

VII. Advanced Measurement Procedures

1. Suspending measurement

To suspend measurement, push the computer partially out of its mount to break contact with the sensor and freeze the display. Mark the wheel contact with the ground and note the rim reading. To resume measurement, reestablish the rim reading at the mark and push the computer all the way into its mount.

To avoid the requirement of noting the rim reading proceed as follows. Push the computer partially out of its mount and roll back the wheel to the zero point and mark it. To resume, establish the rim on the zero point at the mark, roll forward a partial revolution, and push the computer all the way into its mount.

Suspending measurement has many useful applications many of which will be described in detail later:

1. Miscellaneous functions such as eating and recovering dropped objects.

2. Marking splits with paint and nails while retaining overall measurement.

3. Overshoot correction while retaining overall measurement.

4. Making secondary measurements using the second-wheel setting to correct for overshoot and to explore alternative routes.

5. Offset correction to avoid temporary obstructions.

6. Measurements close to the zero point while ensuring overall measurement is retained.

2. Recovering from sleep mode

If the sensor receives no impulses for five minutes the computer enters sleep mode in which only the clock is displayed. The computer can be awakened on receiving a impulse by simply riding off, but this impulse will not be recorded . Therefore to resume measurement, first awaken the computer by briefly pushing it forward in its mount.

3. Readings within a few hundredths of a revolution from the rim zero

Measurers can get confused as to what meter reading of whole revolutions to combine with rim readings within a few hundredths of a revolution of the rim zero especially if the meter is not precisely synchronized with the rim zero. To avoid this confusion note the meter reading long before the rim reading is at the zero point, Take the rim reading at the desired measurement point, and if this is before the rim zero, combined it with the previously noted meter reading. If it is after the rim zero combined it with the previously noted reading plus one.

To retain the overall measurement be careful to avoid rolling back when near the rim zero point. Alternatively, freeze the meter reading before reaching the region by pushing the computer back slightly in its mount. After making the rim measurement near the zero, move the wheel well back from the zero and reconnect the computer.

The simplest method of taking readings close to the zero point is to stop the bicycle with a rim reading of say 0.025 rev before or after and estimate what the rim reading is for the desired point. Combined this with the meter reading.

4. Obstacles

To correct for an obstacle, suspend measurement as described in 1 above and move the bicycle at right angles to the side of the road to clear the obstacle. Resume measurement until past the obstacle and then reverse the procedure back to the side of the road.

A cruder method is to lock the font wheel with the brake while dragging the bicycle out and into the side of the road at right angles.

5. Calibration simplification

On the first two rides of the calibration course make measurements as usual. However on the last two rides do not use the meter but assume the same number of whole revolutions as previously found. Simply start the wheel on the rim zero and note the rim reading at the end of the ride.

6. Secondary measurements

Sometimes in the middle of primary measurements it is useful to suspend these as described in 1 above and make secondary measurements. For instance different possible routes can be explored or a missed split can be located.

Suspend primary measurement as above and select the second wheel size by pressing the switch at the top right-hand side of the back of the computer. Since the circumference should also have been set to 9999, the computer is now ready to function as a secondary revolution counter.

VIII. Methods for Splits

Two methods are used for splits the first of which involves using a table of revolution values calculated from the start or finish and the second involves simply the repeated use of the revolution value calculated for the length of each split.

The first method is more suitable when both km and mile splits are being measured on the same ride, and when determining all the mile splits during the ride of one leg of an out-and-back course with identical legs. After determining the working constant, a table of revolution values is prepared giving the location of the splits from the start or the finish. Since the meter is zeroed before the start of each measurement, this table is valid for the whole day and might possibly be printed from a computer at home. A similar table for the Jones usually has to be prepared by hand in the field at the start of each run. The suspension-of-measurement method should be used while marking the splits with nails and paint.

The second method is ideal where only one type of split is determined on the ride. The revolution value for each split is measured repeatedly along the course with zeroing of the meter and rim before each measurement. (With mile splits on a 5-km course, the distance of 0.171968 km between the 3-mile split and the finish also has to be measured.) Where both km and mile splits are desired on the course, km splits can be done on one ride and mile splits on another.

IX. Correction for Overshoot Errors

1. Introduction

The use of the Protege counter as compared with the Jones will greatly reduce the error of overshoot. The Protege can be read comfortably while riding and the marking of splits with rezeroing involves only being alert for the same three-digit number on the meter repeatedly. In contrast the Jones can only be read after stopping the bicycle and the finish estimated from the last stop while riding. Moreover a different five-digit number must be used for each split.

Notwithstanding the advantages of the Protege, correction of overshoot sometimes has to be made. With this type of correction, the Protege is sometimes at a disadvantage as compared with the Jones in that unlike the Jones it cannot be run backwards. When overshoot is short and there is a parallel reference such as a curbstone, correction can be made by simply backing-up the bicycle and the Jones is at an advantage. However, when overshoot is long there is no parallel reference, the bicycle must be ridden back and the advantage lies with the Protege.

Presented below are some correction methods. The precise method selected will depend on whether overshoot is short or long, whether correction is being made for a specific measurement value or a marked point, and whether retention of overall measurement is desired.

2. Return to last point measured

Returning to the last point measured is one of the simplest corrections for overshoot. Usually it involves only rezeroing and no calculation before remaking the measurement. This is in contrast with the Jones where a new table of values has to be calculated.

3. Specific measurement value

(i) Back-up

1. Note the excess number of revolutions.

2. Roll back through the zero point on the rim for the same number of times as the excess number and on to desired fraction of a revolution..

3. The meter can be used to count the number of times through zero. First roll forward through zero and rezero the meter.

(ii) Ride-back

1. Adjust wheel position to get reading for desired fraction of a revolution and mark on ground.

2. Note excess number of revolutions.

3. Turn bicycle around, place rim zero on the mark, back-up slightly, rezero meter, and ride for the excess number of revolutions.

4. Specific mark or point

(i) Back-up

1. Note the meter reading at stop.

2. Roll back to the mark or point counting the number of times passing through zero.

3. The meter can be used to count the number of times through zero. First roll forward through zero and rezero the meter.

4. Desired measurement = reading at stop - number of times through zero + rim reading at mark

(ii) Ride-back

1. Note the meter reading at stop, back-up to the rim zero, and mark ground.

2. Turn bicycle around, place rim zero on the mark, back-up slightly, rezero the meter, and ride to mark or point.

3. Desired measurement = reading at stop - final meter reading + rim reading at mark

5. Retention of overall reading

If retention of overall measurement is desired during correction in the methods described in 3 and 4, use the suspension-of-measurement method described in Section VII. If necessary use the meter in the second-circumference mode.

X. Half-Marathon and Longer Distances

This section need only concern the rare measurer who plans to measure a distance of 10,000 revolutions or more (approximately equivalent to a half-marathon or more) through a continuous ride. For this measurement the meter will display 9999 revolutions for two revolutions and the measurer should add one to all displays after the first one. Similarly, the meter will display 19998 revolutions for two revolutions and the measurer should add two to all displays after the first one.

What happens is that although through the basic mode of operating in this report the computer seems to increment trip distance by 10 meters for every revolution, it actually only increments 9.999 meters. The following table for the first nine revolutions makes clear what happens:

Rev from start	Meters sensed by computer	Trip dist
Rezeroing	0	0.00
0	9.999	0.00
1	19.998	0.01
2	29.997	0.02
3	39.996	0.03
4	49.995	0.04
5	59.994	0.05
6	69.993	0.06
7	79.992	0.07
8	89.991	0.08
9	99.990	0.09

After 9999 revolutions nothing remains in trip memory that is undisplayed, and at 10,000 revolutions the computer does not change the display but simply puts 9.999 meters into memory. At 10,001 the computer resumes incrementing with a display of 100.00.

The above correction to the display can be avoided if the circumference in computer memory is set to 5000 and a second magnet is placed diametrically opposite the first on the same side of the wheel. Note that in this mode of operation after aligning with the start, the wheel must be rolled forward not backward before zeroing the meter. Care will have to be taken to avoid rolling back unintentionally near a rim reading of 0.5 as well as 0, but no correction to the display need be made no matter how long the continuous ride.

XI. Advantages

1. Clarity of readings

The standard Jones is mounted on the wheel axel with the display at right angles to the normal direction of eye scan and is impossible to read while riding. Measurement finish has to be estimated from the reading at the last stop. Even after stopping digits cannot always be read if they are in the middle of a transition. In contrast, the Protege is mounted on the handlebars and has a display that is 50% larger, so that it can be read comfortably while riding.

Road safety is somewhat improved because the measurer does not have to take his eyes off traffic as much.

With the Jones I occasionally made errors in reading the meter such as omitting a digit. I have found that this never happens with the Protege where numbers are much smaller in value on the meter and fractions of a revolution on the rim are distinctly separate.

Although I have never done any, I imagine that night measurements would be greatly facilitated as compared with the Jones. Sigma Sport sell a light that can illuminate cyclocomputers.

2. Instant zeroing capability

The instant zeroing capability of the Protege means that far fewer readings and calculations are necessary than with the Jones. Obviously, efficiency is improved and error rate reduced.

It often allows particularly easy laying out of a course complete with splits. For instance after determining the working constant in rev/km, this value can be used repeatedly to mark km splits and complete a metric course by zeroing before measuring each split. Should anything go wrong in any one measurement, all that need be done is to return to the last split and rezero. To do this with a Jones would require calculation of a new table of values for the remaining splits.

3. Permanent installation

Many measurers will want to remove the Jones after use because of noise, drag, and wear. The Proteges can stay in place and be instantly converted to normal bicycle computers.

4. Availability

The Jones is available from only one supplier whereas the Proteges are available at many bicycle stores and on-line sites.

5. Cheapness

The Jones costs $80-120 whereas a Protege can be had for as little as $15.

6. No wrap-around

With the Protege counters the meter display never returns to zero before the end of the measurement, whereas this is always a possibility with the Jones.

7. No skip

In contrast with the Jones, the Protege never skips impulses without indication. In fact a measurer recently checked a Jones counter for skipping by using a Protege. If both counters are run simultaneously, counts shown by a new model Jones should be exactly 23.6363 times the revolutions found by the Protege. Those from an original Jones should be 20 times.

XII. Example of Actual Course Certification

1. Introduction

During the last two years I have certified over thirty courses of all types using the Protege counter. The example described here is that of a simple loop.

2. Course identification

Tiger Trot 5K, Fuquay-Varina, NC (NC04034PH)

3. Calibration

Tire: 700 x 20C at 105 psi

Length: 400 meters

Pre-measurement rides (69.7 degrees): 192.312, .31, .29, .29; ave, 192.30 rev .

Post-measurement rides (89 degrees): 192.09, .07, .05, .065; ave, 192.069 rev .

Constant for the day: 192.30 x 1.001 x 1000/400 = 481.23 rev/km = 774.466 rev/ml = 2406.15 rev/5km

4. Course measurement

Ride 1 (73-74 degrees): From the chosen start to a reading of 2406.15 rev, where a temporary finish was marked.

Ride 2 (76 degrees): Permanent marks were made at mile intervals of 774.47 rev. The distance from the 3-mile mark to the temporary finish was measured as 82.875 rev.

Total rev = 3 x 774.47 + 82.875 = 2406.285

The second ride gave 0.135 rev more than the first, so the temporary finish was made the permanent one.

USATF/RRTC CERTIFIED COURSE LIST
New Entries, July - August 2005

DISTANCE	COURSE ID		STA	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
Cal	AK	05001	FW	A Homer	Homer Spirit Rd. 475.129 meter	0.0	100	K Bloom	
5 km	AK	05002	FW	A Homer	Homer Shorebird Festival	-0.2	97	R Weist	
5 km	AL	05023	JD	A Hanceville	Wallace State Alumni 5k	0.2	3	R Melanson	
21.1 km	AZ	05007	GAN	A Tucson	Everyone Runs Half Marathon	0.0	0	G Newman	
5 km	AZ	05008	GAN	A Tucson	Everyone Runs 5k	0.0	0	G Newman	
5 km	CA	05001	KY	A Weott	Humboldt Redwoods	0.0	2	K Young	
8 km	CA	05002	KY	A Weott	Humboldt Redwoods	0.0	2	K Young	
21.1 km	CA	05009	TK	A San Ramon	Primo's Run for Education	-1.3	33	T Knight	
5 km	CA	05010	TK	A San Ramon	Primo's Run for Education 5k	0.0	4	T Knight	
42.2 km	CA	05011	TK	A San Francisco	San Francisco Marathon	0.0	0	T Knight	CA 04006 TK
3.5 mi	CA	05015	TK	A San Francisco	JPMorgan Chase Corp.Challenge	0.0	3	T Knight	
10 km	CA	05031	RS	A Los Angeles	Nike Run Hit Wonder 10km	1.2	5	R Scardera	CA 04010 RS
5 km	CA	05032	RS	A Los Angeles	2005 Nike Run Hit Wonder 5km	2.4	11	R Scardera	CA 04011 RS
5 km	CA	05033	RS	A Sacramento	Pace Race Sacramento - Alt.	0.0	2	D Thurston	CA 04028 RS
0.408 mi	CA	05034	RS	A Coronado	Stroop Track	0.0	31	G Rahill	
5 km	CA	05035	RS	A Sacramento	Race for the Arts 5km	0.5	1	D Thurston	CA 04029 RS
5 km	CO	05021	DP	A Littleton	Littleton YMCA	0.0	0	D Russell	
10 km	CO	05022	DP	A Littleton	Littleton YMCA	0.0	0	D Russell	
5 km	CO	05023	DP	A Douglas County	Kid's Cure for Cancer	0.0	0	D Poppers	CO 03026 DP
5 km	CO	05024	DP	A Jefferson County	Josh & Gus's Run for A Reason	0.0	2	D Poppers	
5 mi	DC	05004	JS	A Washington	Navy 5 Miler	0.0	0	J Sissala	
5 km	IN	05009	MW	A Spencer	Doughboy Freedom Run	0.0	1	J Sauer	
21.1 km	IN	05010	MW	A Bloomington	Circle of Life Mini Marathon	0.0	1	J Sauer	
5 km	IN	05011	MW	A Spencer	Run to the Creek	-0.4	1	J Sauer	
5 km	IN	05012	MW	A Valparaiso	Run for Shelter	0.0	8	T Konieczney	
5 km	IN	05013	MW	A Columbus	Tour de Trails 2	0.0	0	R Stafford	
5 km	IN	05014	MW	A Columbus	Mill Race Race 5k	0.2	10	R Stafford	IN 97010 MW
15 km	IN	05015	MW	A Columbus	Mill Race Race 15k	0.2	3	R Stafford	
5 km	KS	05023	BG	A Topeka	Fiesta Mexicana	0.0	0	L Joline	
4 mi	KS	05028	BG	A Leawood	Stroke, Stroll and Run	0.0	0	L Joline	
Cal	KY	05038	PR	A Louisville	Roanoke Avenue 500 meters	0.0	100	C Estes	
5 mi	MA	05011	RN	A Chelmsford	Grace Race	0.0	2	R Nelson	
5 km	MA	05012	RN	A Walpole	Camy 5k Run & David 5k Walk	0.0	5	R Nelson	
5 mi	MA	05013	RN	A Boston	Suddy 5 Miler	0.0	0	R Nelson	
10 km	MD	05015	JS	A College Park	College Park 10k	0.0	0	J Sissala	
8 km	MD	05016	JS	A Rockville	Rockville Twilight 8km	0.0	0	J Sissala	MD 05014 JS
5 km	MD	05017	JS	A Potomac	Page's Run 5km	1.8	4	P Quinn	
8 km	MD	05018	JS	A Baltimore	Druid Hill YMCA 8k	0.0	0	J Sissala	
8 km	MI	05019	SH	A Allen Park	Street Fair	0.0	1	S Hubbard	MI 99020 SH
5 km	MN	05016	RR	A Atwater	Atwater	0.2	8	T Reagan	
1 mi	MN	05017	RR	A Atwater	Atwater	-1.2	13	T Reagan	
10 km	MN	05018	RR	A Minneapolis	Harriet	0.0	1	T Reagan	
5 km	MN	05019	RR	A Minneapolis	Nokomis	0.0	8	R Recker	
10 km	MN	05020	RR	A Minneapolis	Nokomis	0.0	6	R Recker	
10 km	MN	05021	RR	A Nevis	Muskie	0.0	0	D Summers	
5 km	MN	05022	RR	A Robbinsdale	Whiz Bang	0.0	0	R Recker	
10 km	MN	05023	RR	A Robbinsdale	Whiz Bang	0.0	0	R Recker	
5 km	MN	05024	RR	A Minneapolis	Otter Trotter	0.0	0	B Leininger	
10 mi	MN	05025	RR	A Stillwater	Lumberjack	2.9	68	R Recker	
5 km	MN	05026	RR	A Stillwater	Lumberjack	4.0	64	R Recker	
5 km	MN	05027	RR	A Minneapolis	Torchlight	1.0	36	D Wright	
42.2 km	MN	05028	RR	A St. Paul	Inline	-0.5	2	D Wright	

DISTANCE	COURSE ID			STA	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER		REPLACES	
5 km	MN	05030	RR	A	St. Paul	Como Lake Loop	0.2	4	B Leasure			
2.604 km	MN	05031	RR	A	St. Paul	Como Lake Loop	0.0	0	B Leasure			
5 km	MN	05032	RR	A	Lino Lakes	Rice Creek	0.0	24	R Recker			
5 km	MN	05033	RR	A	Edina	Heart Institute	-4.0	6	B Leininger			
15 km	MN	05034	RR	A	Edina	Masters	0.0	1	B Leininger			
21.1 km	MN	05035	RR	A	Stillwater	Gopher-Badger	2.0	57	R Recker			
5 km	MN	05036	RR	A	Clara City	Prairie Fest	0.0	3	T Reagan			
21.1 km	MO	05024	BG	A	Kansas City	Kansas City Half Marathon	0.3	3	L Joline			
5 mi	MO	05025	BG	A	St. Charles	Flat Five	0.1	1	J Neuschwar	MO	01036	BG
42.2 km	MO	05026	BG	A	Kansas City	Kansas City Marathon	0.1	1	L Joline			
5 km	MO	05027	BG	A	St. Joseph	Moonlight Run/Walk	0.0	0	L Joline	MO	03032	BG
5 km	MO	05029	BG	A	Earth City	St. Louis PACE Race	0.0	0	J Neuschwar	MO	04029	BG
5 km	MO	05030	BG	A	Eureka	Eureka Run for Sight	-0.2	2	J Neuschwander			
21.1 km	MO	05031	BG	A	St. Charles	Lewis & Clark	0.0	0	J Neuschwar	MO	03034&03033	BG
10 km	MT	05012	MF	A	Bozeman	Bozeman Classic 10k	0.0	2	C Day	MT	90003	GT
42.2 km	ND	05101	RR	A	Fargo	Fargo	0.0	2	R Recker			
5 km	NJ	05001	WB	A	Burlington	Burlington River Run 5km	0.0	1	B Belleville			
5 km	NJ	05038	LMB	A	Verona	Verona Labor Day Classic	1.8	11	J Parks			
5 km	NJ	05039	LMB	A	West Orange	Downtown West Orange 5k	0.0	2	L Baldasari			
5 km	NJ	05040	LMB	A	Jackson Township	Jackson Township 5k	0.0	1	L Baldasari			
5 km	NJ	05041	LMB	A	Jersey City	Ed's Energy 5k	0.0	3	L Baldasari			
10 km	NJ	05042	LMB	A	Wayne	Brian's Run 10k	0.0	1	J Parks			
5 km	NJ	05043	LMB	A	Jersey City	Liberty State Park 5k	0.0	0	J Parks			
5 km	NJ	05044	LMB	A	Clinton	Sprintin' Clinton	4.6	6	J Parks			
5 km	NY	05025	AM	A	Clarence	Clarence Rotary Run	0.7	4	J Grandits			
5 mi	NY	05026	AM	A	Skaneateles	Skaneateles Five Mile	0.4	12	P Davis			
42.2 km	NY	05027	AM	A	Rochester	Rochester Marathon	0.1	1	G Brooks			
3.5 mi	NY	05028	AM	A	New York	NYRRC Chase Corp. Challenge	0.0	18	P Hess			
5 mi	NY	05029	AM	A	New York	NYRRC Run Hit Wonder 5 Mile	-0.2	2	P Hess			
5 km	NY	05030	AM	A	Altamont	Altamont 5k	-0.6	5	J Gilmer	NY	00033	AM
5 km	NY	05031	AM	A	Palmyra	Canal Town Days 5k	-2.4	5	G Tillson	NY	04025	AM
5 km	OH	05033	PR	A	Cincinnati	Jazz in July 5k	0.0	0	S Prescott			
5 km	OH	05034	PR	A	Cincinnati	Drop Inn Center 5k	0.0	7	S Prescott			
Cal	OH	05035	PR	A	Tipp City	N. 3rd. St. 1094.48 ft.	0.0	100	E Miller			
5 km	OH	05036	PR	A	Tipp City	Run for the Mums 5k	0.6	4	E Miller			
5 mi	OH	05037	PR	A	Brookville	The Picnic Run	0.0	3	F LeBlanc	OH	91001	PR
5 km	OH	05039	PR	A	Marysville	Marysville Honda 5k Race	0.0	1	P Riegel			
42.2 km	OH	05040	PR	A	Columbus	Columbus Marathon	0.1	2	J Glaze	OH	04068	PR
10 km	OH	05041	PR	A	Columbus	Buckeye Classic 10 km	0.0	0	P Riegel	OH	04043	PR
5 mi	OH	05043	PR	A	Dayton	Stillwater 5 Mile Classic II	0.0	0	F LeBlanc			
21.1 km	OK	05020	BB	A	Oklahoma City	Oklahoma City Memorial HMAR	0.1	1	D Garrett			
5 km	OK	05021	BB	A	Tulsa	Race for the Cure	0.0	4	G Lafarlette	OK	00008	BB
5 km	PA	05009	WB	A	Manayunk	Jingle Bell Run for Arthritis 5km	0.0	0	B Belleville	PA	01022	WB
21.1 km	PA	05010	WB	A	Erie	Erie Half Marathon	0.0	0	M Vieyra			
42.2 km	PA	05011	WB	A	Erie	Erie Marathon at Presque Isle	0.0	0	M Vieyra			
5 km	RI	05004	RN	A	Charleston	Charleston Police Dept. 5k	0.0	5	R Nelson			
5 km	SC	05022	BS	a	Darlington	Darlington 5000	0.2	1	D White			
8 km	SC	05023	BS	A	Little Mountain	Little Mountain Reunion	-4.3	6	W Terry			
42.2 km	SD	05042	PR	A	Spearfish	Leading Ladies Marathon	15.9	76	J Meyer			
21.1 km	SD	05044	PR	A	Sioux Falls	Sioux Falls Half Marathon	0.2	27	W Klawiter	SD	99051	PR
Cal	SD	05045	PR	A	Bismarck	Divide Ave. 1000 ft.	0.0	100	D Nash			
5 km	TX	05015	JF	A	Austin	Keep Austin Weird 5k	0.0	0	J Ferguson	TX	04022	JF
5 km	TX	05016	JF	A	Austin	Race for the Cure	0.0	2	J Ferguson	TX	03016	JF
5 km	TX	05017	JF	A	New Braunfels	Afoot for Fitness	0.0	0	J Ferguson			
5 km	TX	05050	ETM	A	Fort Worth	Ryan Run 4th of July 5k	0.0	0	M Polansky			
5 km	TX	05052	ETM	A	Houston	Houston Pride	0.0	0	E McBrayer	TX	02030	ETM

DISTANCE	COURSE ID	STA	LOCATION	COURSE NAME/RACE	m/km DROP	pct SEP	MEASURER	REPLACES
42.2 km	TX 05053 ETM	A	Waco	Miracle Match Marathon III	0.0	0	K Vierzba	TX 04083 ETM
5 km	TX 05055 ETM	A	Pasadena	Pasadena VFD 5km	0.0	0	W Vanderbrink	
5 km	TX 05056 ETM	A	Irving	Pumpkin Dash 5k	0.2	1	C Clines	TX 04085 ETM
5 km	TX 05057 ETM	A	Dallas	Dallas Race for the Cure	1.6	9	C Clines	TX 00060 ETM
5 km	TX 05058 ETM	A	Spring	Bearcat Bash 5k	0.0	2	R Barnhill	TX 02082 ETM
10 km	TX 05059 ETM	A	Spring	Bearcat Bash 10k	0.0	3	R Barnhill	
5 km	TX 05060 ETM	A	Houston	Runway Race for Life 2005	0.0	0	R Barnhill	
5 km	TX 05061 ETM	A	Alvin	Beneeezy Purple Monkey	0.0	0	E McBrayer	
5 km	TX 05062 ETM	A	Lewisville	Race for the Children	-0.4	6	C Clines	
10 km	TX 05063 ETM	A	Alvin	Beneeezy Purple Monkey	0.0	0	E McBrayer	
5 km	TX 05064 ETM	A	Houston	Lazy-Hazy-Crazy Days	0.0	0	E McBrayer	TX 05051 ETM
1 km	TX 05065 ETM	A	Houston	Lazy-Hazy-Crazy Days	0.0	0	E McBrayer	TX 05051 ETM
5 km	TX 05066 ETM	A	Wylie	Christian Care 2005 5k	0.0	1	K Ashby	TX 05054 ETM
1 mi	TX 05067 ETM	A	Wylie	Christian Care 2005 Mile	0.0	0	K Ashby	TX 05054 ETM
5 km	VA 05011 RT	A	Richmond	Wachovia Securities Canal Walk	0.0	5	M Powell	
5 km	VA 05012 RT	A	Locust Grove	Sweetbriar Park 5km	0.0	1	V Culp	
5 km	VA 05014 RT	A	Alexandria	Run With the Eagles 5k	0.0	3	R Schoen	
21.1 km	VA 05016 RT	A	Danville	Danville Half Marathon	1.5	15	T Riegel	

Renewed

8 km	OK 92042 BB	A05	Bethany	Bethany Classic 8000meter Run	0.0	2	J Kiser	
3 km	OK 92043 BB	A05	Bethany	Bethany Classic 3000meter Run	0.0	4	J Kiser	
5 km	OK 94035 BB	A05	Ponca City	Ristorante Bravo Cherokee Strip	0.0	2	B Baumel	

PUBLICATIONS AVAILABLE FROM RRTC

Printed Course Lists - A list of certified courses for any state is $2.00. (Free to RRTC certifiers). You will receive a list that is current as of the last published Measurement News. Courses can be sorted in a special way; otherwise it will be sorted by distance as it appears in MN. Other specially-sorted lists can be done - for instance, you might want to have all the 5k's in IL, IN, and MO. If you are online, lists can be sent that way. Contact Mike Wickiser at MikeWickiser@neo.rr.com

Web Page Access to Course Lists:The complete list can be downloaded from the RRTC website at **www.rrtc.net/download/** Also, try the new USATF Search Engine linked from **www.rrtc.net** or directly at **www.usatf.org/events/courses/search/**

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**, i.e: 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 **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), in Adobe Acrobat forma. 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 to 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: **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.

Historical/Technical Material Available on CD

Measurement News Archive - Every issue of Measurement News from #1 (1982) to #115 (2002). Full of material describing measurement techniques, technical articles, and history, written by numerous people worldwide. Set of 2 CD's in pdf (Adobe Acrobat 5.0) format. Cost $10.00, postpaid.

Historical Archive - A collection of technical articles, measurement reports, seminars spanning the period 1963 to present. Includes detailed full reports of several group rides of Olympic Marathon courses. All on one CD in pdf format. Cost $5.00, postpaid.

The above two items are available from:
Pete Riegel, 3354 Kirkham Road, Columbus, OH 43221
email: riegelpete@aol.com

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 - 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. Advance payment is required.

RunScore - The flagship of IBM-style finish line programs. For information contact: Alan Jones - 3717 Wildwood Dr - Endwell, NY 13760. Online at: **www.runscore.com**

Apple Raceberry JaM - Race management software for Macintosh and Windows. Online at **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 approx. 4 weeks. Ask for latest price.
Maps can be located and ordered online at: **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: **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 **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: **www.maps.com**

ROAD RUNNING TECHNICAL COUNCIL

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