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MEASUREMENT NEWS

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He may not toe the line, but he still measures up

By A.J. CARR
Staff Writer

If you see somebody weaving and bobbing on a bicycle through the streets of Raleigh early Sunday morning, don't call the cops.

It could be A.C. Linnerud measuring the 6.2-mile route that about 2,000 runners will travel Sunday afternoon in the Old Reliable Run.

Linnerud officially validates racing courses, but sometimes he bumps into unexpected trouble along the way.

"I was nearly arrested one time in Cary for drunken bicycle riding," said Linnerud. "I was turned in by a lady there. The police stopped me and wanted to give me a 'breathalyzer' test.

"I was riding all over the road. I try to ride the shortest path runners can take. But I was hired by the city of Cary to measure their course and here I was about to be arrested. The escort who was with me was sitting in a car laughing his head off."

For the record, Linnerud, an associate professor of statistics at N.C. State, wasn't drunk. But he frequently gets honked and hollered at as he pedals along.

"The worst problem I have is with Sunday drivers," he said.

Some motorists also thought one of Linnerud's scenes was comical.

While measuring a course in Danville, Va., he was escorted on the wrong side of a four-lane highway by a patrol car with flashing lights.

He got word later that several observers thought it was a "crazy parade" with a man chasing a police car.

Linnerud also cycled into problems in Richmond, Va. A bridge that was part of the race course bore a sign that read: "Absolutely no bicycle riding on bridge."

So Linnerud had to get a police car to follow him.

"I took off across the bridge with the blue lights flashing behind me," he said. "And somebody yelled: 'You're gonna get arrested!'"

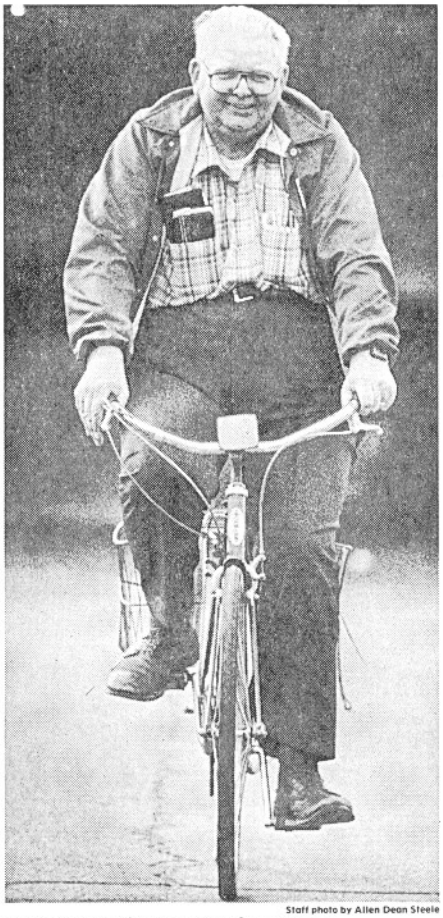
It's all old hat to Linnerud, who has been measuring courses since 1970. And since '83 he has averaged validating about 100 courses per year, mostly in North Carolina.

He uses a 100-meter tape for about one-half mile, makes adjustments, does a mathematical calibration, and rides the course twice on his bicycle.

"A course could be slightly long, but it will not be short," Linnerud said. "So the records are good."

The process for a 5K or 10K race usually takes between three and four hours, and when Linnerud measures it, runners know a road race is an "official" distance road race.

But not all motorists understand the method to Linnerud's measuring madness.



Staff photo by Allen Dean Steele

A.C. Linnerud takes measure of race course

MEASUREMENT NEWS

#20 — December, 1986

THE TAC CONVENTION - WHAT HAPPENED

For those of you who were unable to get to Tampa for the TAC Convention, here's a summary of what happened in RRTC:

Appointments

1) Basil/Linda Honikman - TACSTATS Representatives to RRTC
2) Alan Jones - Finish Line Chairman
3) David Katz - Measurement Coordinator - Men's Olympic Marathon Trials (New Jersey Waterfront Marathon)
4) Sally Nicoll - Validations Chairperson - also - Measurement Coordinator - Women's Olympic Marathon Trials (Pittsburgh Marathon)
5) John White - RRTC Registrar of Courses

Things That Were Talked About - Two meetings were held. In the first - the "Executive Session" - supposedly a closed session - the doors were open and everyone was welcome. At this meeting we brought up subjects that required discussion, intending to discuss them at the next, open, session.

Some of the subjects brought up were:

1) Several rule changes involving the measurement of tracks were brought up. They were discussed by those who have been conducting correspondence on the subject, and a recommendation was made to the Rules Committee.

2) The new arrangement involving TACSTATS (Basil & Linda Honikman), Validations (Sally Nicoll) and Course List (John White) was talked about. With good will everything should go smoothly.

3) It was concluded that putting on a decent finish line is a task beyond the powers of most people, and Alan Jones is beginning to attack this problem. At the meeting he obtained names of several people who expressed an interest in upgrading the quality of finish lines.

4) The opinion was expressed that most race directors do not understand the concept of validations and it was suggested that information regarding them might appear in the various books that RRTC has written and publishes (course list, measurement book, finish line book). Specifically, the concept of photographic evidence is one that would help a validator when there is doubt as to the conduct of a race.

5) "Grading" of measurers and finish line companies was discussed. It was agreed that there were pitfalls but that the task was not impossible.

6) The treatment of calibration courses was discussed. It was agreed that it might be helpful if a measurer could easily obtain information concerning a calibration course in an area where he or she has to travel. It was tentatively agreed that we would sound out John White (who had left the meeting) to see whether keeping a calibration course list would strain him. The need here is not great, since most regionals can provide calibration course locations and documents already. The national list would not create a new capability.

7) A new certificate was designed and discussed. A copy of it will be sent to all regional certifiers as soon as Sally Nicoll has finished having it typeset.

8) Some big-time races involving prize money are held on trail courses that are hard to measure. Sanctioning may require certification for these races. If measurement is impossible (or very hard) the requirement for certification may be waived. The decision as to whether a course is measurable is in the hands of the regional certifiers. If desired, they can buck the problem upstairs and Wayne Nicoll, Bob Baumel or I will take care of it. But only if asked. The only course this applies to now is the Western States 100. That was decently measured last year - see MN some issues back - but description of what was measured was not attempted. That task boggles the mind.

9) A.C. Linnerud brought up a problem in his area. There's a person who runs a measuring wheel over the course, and then pronounces it "Certified by American Athletics". Naturally this causes some confusion and not a few angry feelings when the runners learn that all is not what it seems. We asked Alvin Chriss whether we had any legal options and he replied that we did. But the general consensus was that it would be better to see whether pressure could be brought to bear some other way. A.C. says "The man has no shame" so the pressure may have to be pretty blunt and forceful. But we saw legal means as potentially troublesome, and a giant hassle - maybe more hassle than the original problem. A place for benign neglect?

10) Copies of the measurement book are dwindling at TAC/ Indianapolis. We must amend the book based on recent experience before it is reprinted (such as removing the wrong price on the Jones counter). If you have an idea of something that should be changed, xerox the page to be changed, mark the changes, and send to Pete Riegel. Once we get all the suggestions we will go ahead and amend. We see no major changes to the book or forms coming.

11) John White, RRTC's new Registrar of courses (course keeper?) presented a sample of the new course list format. It occupies one line of printed text per course and condenses things more than did the formermethod of listing by NRDC. You'll see how it looks in the next MN when the first new listing of courses appears.

OLYMPIC MARATHON MEASUREMENT

While most of the members of RRTC were beavering away in Tampa, Bob Letson and Bob Thurston were on the other side of the world, in Seoul. John Disley, in his role of IAAF measurement coordinator, had set up an international measurement symposium at the site of the Seoul marathon course, which will be used for next year's World Cup and for the 1988 Olympic Marathon. Measurers were there from Sweden, England, USA, South Korea, Japan, New Zealand at least. Thurston said it was a pretty productive session. A report will be coming out soon on the results.

FINISH LINE SUB-COMMITTEE

by Alan Jones

Pete Riegel has appointed me chairman of the Finish Line sub-committee of the Road Running Technical Committee of the Athletics Congress. This puts me in the position of standing on the shoulders of giants when one considers the monumental job that Ken Young and others did on the Road Race and Finish Line Management handbook.

The Finish Line committee has to be concerned with such issues as:

1. Accuracy of timing

2. Having proper times assigned to the proper runners.

3. Overall improvement of finish line techniques. These techniques are already well documented in the handbook. We have to find ways of getting meet directors to use them.

4. Now that Ken Young will not scanning all results considered for records, how can be ensure that the state record keepers will provide uniform diligence in examining the results sent to them.

5. Also, with this new level of bureaucracy, what can Basil and Linda Honikman do when they question results sent to them?

I gave a talk at the RRCA meeting in Portland, Maine in May on systems for race management. I said that I have two rules: (1) plenty of redundancy and (2) use intelligent helpers. The handbook gives you many ways to provide the redundancy and often points out how to train helpers. The redundancy is important because Murphy never sleeps and the intelligent helpers are necessary because there are always new surprises. Good helpers can adjust and provide the proper coverage when the unexpected happens.

At the RRTC meeting in Tampa, I passed a list around for people to sign who were willing to serve on the Finish Line committee. I was pleased with the response. Those signing up were Christopher English, Philip Lockwood, Rick Staback, John Boyle, Walt Jorgensen, Jack Dowling, Jack Moran, Basil Honikman, Sally and Wayne Nicoll, Allan Steinfeld, A. C. Linnerud, Bill Grass, and Fred McCormick. This list is a "who's who" in the measurement community. It shows that people who measure courses aren't interested just in getting accurate courses but are interested in all aspects of good race management. I hope we can keep a dialogue going in MN on issues concerning finish line management.

At the RRTC meeting there was some discussion about how to improve the results obtained by finish line companies and others. The only practical way presented to check on the accuracy of results was to have an independent person record select times and compare them with the results board and final printed results. That's the easy part. How do we get the word around about who does good work and who doesn't without getting sued? Also, we know that the best people sometimes have disasters.

So, with this preamble, let me encourage readers of MN to send ideas to MN about how to improve results gathering. It doesn't make much sense to measure a course to an accuracy of better than a meter per kilometer if the finish line results give you a time which is minutes off from what you ran due to mix-ups at the finish line.

Dear RRTC members:

I'm confused. What do we certifiers do when we get a certification application for a course that includes stretches where the runners are restricted to one part of the road?

Historically, this problem has been a source of confusion for many. In the good old days, you could submit an application for certification stating that you measured only on the right side of the road, and that the runners would be restricted to that side of the road by instructions at the start, and the probable presence of on-coming traffic on the other side, and the application would be accepted. But then, it was found that some runners are matador-like, and run right at on-coming cars if it means shaving a few meters off the course. And once one runner crosses the center line, those behind him tend to do so also. When courses that were originally measured using one side of the road were checked by validators, the validators noted that an aggressive runner could use the whole road and not be disqualified, so the validators measured using the whole road, and the courses were deemed short, times run on them not recognizable. We decided to require re-measurement of all courses certified before a certain date, even if 1/1000 of the advertized distance was added to them, largely because so many of them were measured using only one part of the road when the runners really weren't restricted to part of the road. We got together and wrote a book about course measurement. On page 14, it says:

> "Unless portions of the road will be closed to runners by cones and/or barricades and will be monitored, measure the straightest and shortest path possible, moving from one side of the road to the other as necessary to follow the route."

Question 23 on the certification application enclosed in the measurement book asks:

> "Are the runners to be restricted to a route longer than the shortest possible route for any portion of the race course? If yes, attach a description of how you plan to insure that the runners follow the measured route."

In the light of the quote from page 14, I assume the requested desciption of planned-on restricting procedures would detail some sort of coning/barricading intentions for each stretch where runners are restricted from running the shortest possible route within the roadway. On page 15, the book says:

> "The locations of barriers must be marked on the road, and their exact locations put on the map. You should be prepared to document [How?] every such marker that you put in place. If this seems like to much trouble, you should assume that runners will short-cut all they can and measure that way, even if runners are instructed to run a longer route."

However, it seems not all people involved in our program agree with the book in regards to what sort of restrction mechanism must be promised on the course map to make a less-than-whole-road measurement certifiable. I was asked to validate the Lynfield Pioneer Classic 10 miler. The map on the certificate states:

> "Runners are restricted to right side of road only. The shortest possible route was ridden only on that side. Runners will be monitored by volunteers and police. Disqualifications will be made if violations occur."

No mention of any cones, barricades, or method of documentation. No cones or barricades are marke on the map, although the certification was approved by John McGrath and Peter Riegel. After Fordie Madeira ran a time faster than the women's 40+ 10 mile record, Jennifer Hesketh Young wrote a letter to the race director indicating that he should have had cones/barricades, and should have documented them. Jennifer even specifies the method (although the book doesn't indicate one) of documentation required. Jennifer wrote:

> "Photographs of the exact location of the start on race day including runners lined up to begin and of the finish and of any of the race course where cones and barricades were set up will need to be available..."

The race director had no cones/barricades, let alone photographs of them in place during the race. How could he have been expected to have had them? All he knew about what was required was stated on certificate where there was no mention of cones/ barricades or photographs. Further evidence that current practice differs from that described in the book is found on page 8 of the October '86 "Measurement News". Peter Riegel writes to a measurer:

> "Can you safely measure the SPR using the whole right side or should you restrict the runners to 1 or 2 meters from the road edge? Any restriction you choose to impose is certifiable, just so the route is reproducible. Enforcement can be a problem, but I doubt any serious questions would arise unless an open record was involved."

We've got to answer several questions so we're all playing by the same rules. Are we going to have two kinds of certified courses, those that could have an open record run on them and those good only for "less important" age group records and rankings? As certifiers, is the method of restriction to one side of the road, and the method of documentation that the certified course was run, any of our business? If it's not our business, whose is it? If we are to concern ourselves with them, what sort of requirements must coning/ barricading, monitoring, and documentation for one-side-of-the-road-only stretches, meet? Can documentation consist only of signed statements, or is some sort of photographic evidence required? Must there be pictures showing runners back in the pack obeying the restrictions, or are pictures of the leaders alone sufficient? Or maybe just of the back-of-the-packers?

My personal opinion is that it is our business as members of the Road Running Technical Committee (not the "Measurement Committee") to give runners the opportunity to run times that the world can be reasonably certain represent performances in which the runners ran at least as fast as the times indicate, on courses at least as long as advertized. The map on the course certificate should at least specify how the course has to be set up, including the exact location of any objects and monitors

needed to enforce one-side-of-the-road-only stretches. In order to help insure that the presence of any one-side-of-the-road-only stretches is known, so that the problem of how to deal with them can be addressed, the certificate map has to show, at least approximately, where the measured route was in relation to the sides of the road. One of the virtues of the certification program should be that, to get an inaccurate course approved, you have to lie repeatedly, unambiguously, on paper. History has proven the statement, "I measured the shortest possible route within the roadway." to be unclear; "The shortest possible route if you want to avoid being mowed down by semis." thinks the measurer to himself.The certificate should specify to anyone looking at it what sort of system to document that the runners ran at least as far as the measured route needs to be put in place race day. Because some runners try to avoid one-side-of-the-road restrictions, while many in the same race do not, documentation procedures for such stretches have to be more rigorous than for whole-road stretches. If the certificate doesn't specify timing requirements, it should at least mention their existence, and specify where a description of them can be found. Where results should be sent, no longer the NRJC, should be listed. Without the NRJC, we are lacking a force to pull together the effort of gathering recognizable times. We have to replace, and, in fact, improve upon, the coordinating efforts of Jennifer and Ken.

Sincerely yours,

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Dear Pete, Ken, and Jen,

I have been meaning to write this letter for some time and Ken and Jen's last NRDC News finally got me off my butt. There are two topics that I want to discuss and neither one has received much attention from the RRTC. These are the issues of (1) using computers for timing and (2) using computers to assist in reconciling times based on select times. I guess I shouldn't say the issue of timing hasn't received any attention since the RRTC considered the question when writing the Road Race and Finish Line Management handbook but felt there was too little known at that time.

Since the RRTC has done such a good job on course measurement, maybe some of the members would like to take on some new issues.

BACKGROUND

I market a program called Running Score which uses a personal computer to process results. Within Running Score I have methods of timing races and using select times to correct errors. In addition, Running Score can receive times from Chronomix 727, 731, 737, the Star Systems Epson, and the TimeTech PR 1000 timers.

COMPUTER TIMING

The October issue of NRDC News had a short article by Mike Copeland on "Computer Timing Systems -- A Warning". This warning is particularly appropriate for me since my program can use the internal clock for timing the race. Mike has done some research on the accuracy of the internal timer and states that an accuracy of only ± 3% might be specified. Before I began using a computer for timing, I checked my two IBM PC's for long periods of time and found them within the accuracy of "normal" electronic timing devices. This accuracy is usually stated as ± 15 seconds in a month or ± 0.5 seconds in 24 hours which is the same.

I will try to find out how IBM specifies these timer circuits (I am an IBM employee). However, if Mike is right, then I have to provide a means of calibrating a user's timer. Mike states that a given timer might be stable. That is, it will always be off by the same percentage. If we can measure that percentage, we could provide a correction factor.

Also, as Mike states, the speed of the crystal is usually stated as 4.77 Khz. The IBM PC is driven by a crystal at the rate of 14.31818 Mhz. This is divided by three to get 4.772727 Mhz which is the frequency which drives the PC's processor.

(In the PC AT there is a separate, faster crystal for the processor.) The 14.31818 Mhz is also divided by 4 to generate the 3.58 Mhz for the color burst signal when driving a color TV. As if that isn't enough, they divide the 14.31818 by 12 to generate 1.193180 Mhz which is the input to the timer. That is, the timer gets a 1193180 pulses a second. It is programmed by the PC to generate one interrupt for every 65536 pulses. If you divide 1193180 by 65,636 you get 18.20648 pulses a second. This is the normally quoted "18.2" pulses per second.

Now we have the information to accurately compute time. If we determine the number of timer ticks, multiply by 65636 and divide by 1193180, we will have elapsed time accurate to the accuracy of the quartz crystal.

Now, computers love to work with smaller numbers than 1193180 so some clever people have found another quotient just about as accurate. This is 1080 divided by 19663. By using this quotient, the program can work with 16 bit numbers. To show the accuracy of this approximation, consider the two quotients:

65636/1193180 = 0.0549254932

1080/19663 = 0.0549254945 ← THIS IS WHAT MY PROGRAM USES

or an error of 0.000002 % which translates to about 2 milliseconds in 24 hours!

So much for computational inaccuracies.

However, there are other more subtle problems. For example, if the software runs for longer than two timer ticks (about a tenth of a second) with interrupts disabled, timer ticks could be lost without any knowledge of the user. I have written a resident piece of software that "steals" the timer interrupt and I have gone to great pains to make sure no timer ticks are lost. I am not sure everyone else is so careful.

Of course, the real test is to compare computer timing results with a accepted method of time. I now have some such evidence.

I scored the Road Runners Club of America 10K National Championship at their annual convention in Portland May this past May 18. I used a push button attached to the PC's asynchronous (RS-232-C) port. Every time the button was pushed, the program was interrupted, the time recorded, and the interrupt mode was left. As a back-up we had two Chronomix 731's running. I have been able to obtain the two Chronomix tapes. Much to my horror, I found that my times were too fast by about a second. I checked my program and found that I had not ~~been~~ rounded up like I thought I was. (Another feature of my program allows one to use the Scroll Lock key for timing. In this case I was doing the round-up properly and thought I was using the same code.) I discovered this problem after I had sent the times to the NRDC and I have been remiss in not correcting my error. The winning time was not a record but there was a 78 year old, Ed Behnam, who ran 44:46 but we credited him with 44:45. The Chronomix' got him in 44:45.80 and 44:45.72. Good agreement! (Ken, I'm afraid you'll have to correct this. Sorry.)

To really do a check, I typed all the Chronomix times into the computer and printed out the differences. The person running the button was experienced at running a Chronomix. He did a very good job. At the end, as my son Clain bar coded the last runners' numbers into the computer we all stood around to see if the number of bib numbers would match the 494 times recorded. It matched exactly! (One bandit was later culled.) We checked against the Chronomix 731 select times, which all matched, and printed the results.

My program correctly handle whole seconds so when I typed them in, I rounded them up according the usual practice. I used a capability of my program for doing splits. Since I was working with whole seconds, all errors are in integral numbers of seconds. I found I had a consistent error which averaged out to about 0.2 seconds with my times being a bit fast. With Chronomix 1 I was slower on 8 times and he was slower on 107 (out of 493 finishers). With Chronomix 2 I was slower on 10 times and he was slower on 122 When comparing the two Chronomix with each other, number 1 was slower 36 times and number 2 was slower 41 times. All errors were one second except for a few. When comparing with Chronomix 1, there were two, two-second errors and were in the last 11 finishers. One was two seconds too slow and one two seconds too fast. I think one, or both, operators were getting tired. Compared with Chronomix 2, there was only one two-second error. When comparing Chronomix 1 and Chronomix 2, there were three two-second errors.

There was no evidence of drift in these experiments. Therefore, I believe my timing technique was accurate -- the only problem is that I must have been a bit slow on hitting the ENTER key at the beginning of the race. (I should point out that all three timers were started at the beginning of the race. However, the start was a blast from a horn -- not a gun.)

I have copies of the data if anyone cares to look at it.

I am satisfied with my technique as long as it is run on a computer that I have checked. However, I feel that now I must provide a method of calibrating the internal timer for those computers that are not accurate.

I would appreciate any comments. Now on to the other issue.

COMPUTER ASSISTED SELECT TIME HANDLING

The other item I'd like the RRTC to consider is the use of a computer to help find timing errors. My program allows the user to enter select times. The program looks for descrepancies and helps the operator adjust. I'm attaching here the section of my manual that describes the method. Any comments?

SELECT TIMES

When recording the order of a race you will typically record the times as the runners cross the finish line and record the competition numbers as the runners emerge from the chute. Usually there will be missing or extra runners recorded at one station or another. To keep the times and places synchronized you can record "select times". There are a number of ways to do this. The simplest is to have one or more people record times of randomly selected runners as they cross the line. By comparing these select times with the other results, errors can be spotted and corrected.

NOTE:
Since the reconciling of select times is a potentially destructive process, it is important to save your results before beginning. That is, press F10 from the results menu. Then if you mess up the job of aligning the results with the select times, you can start over again by pressing F9 and the data will be reloaded from the disk. If you introduce errors and forget to reload the original data by

pressing F9 and leave Running Score, the incorrect data will be stored since Running Score always stores results when leaving.

Running Score allows you to use the select times to edit the results. In fact, it gives you three ways to do this:

1. Manual

2. Computer-Aided

3. Semi-Automatic

In both the manual and computer-aided methods, you use the select times to decide if you must insert or delete times. The difference between the manual and the computer-aided methods is that in the manual method you work off sheets of paper or print-outs from a printing timer which can handle select times. In the computer-aided method these select times are entered into the computer and can be displayed next to the list of places, competition numbers, and times so that you can decide where to add and delete times.

In the semi-automatic method you enter the select times and competition numbers into the computer exactly as you do with the computer-aided method. The difference is that the computer finds the places to add and delete times. Each time it finds such a place, you are asked if you want the computer to do the actual adding or deleting.

I think you'll find the semi-automatic method extremely helpful when you are getting results out right after a race. I have found for myself that my brain does not work too quickly under the pressure of getting results out and I am likely to delete the wrong time.

Manual Editing using Select Times

After some times and numbers have been entered into the computer, check some of the select times by searching for a select competition number and comparing the select time. That is, enter on the command line a slash (/) followed by the competition number you want to search for, and press ENTER. If that number is found it will be highlighted. If the time is reasonably close, go on to the next select time. If it seems that the number is aligned with the wrong time, examine the times and numbers in the vicinity to see if you can find where an extra time has occurred. When you find it, insert a time (F4) by entering it on the command line and pressing ENTER. If an extra time is found, get the extra one in the highlighted area by using F7 (move up one entrant) and F8 (move down one entrant) and F4 (edit times) and then press F2 to delete it.

The rule to follow is that if there is an error and there are extra times or missing times, you cannot give a person a time faster than that initially given. That is, if there is an extra time, you must assume it was entered in such a place between the last correct select time and the one you are checking that you don't give anyone a faster time. See the section on semi-automatic timing for examples of what is meant by this.

Computer-Aided Editing

To have the computer assist you with editing times and places through the use of select times, you must enter the select times into the computer. This is done by adding an "event" for the select times and places. That this new event is a select event is indicated to the program by putting the word "select" after the name of the event in the EVENTS file. Go to the Edit menu (M and then E from the Master Menu) and create or change the EVENTS file to look like this for a single chute race:

```
TIME
TIMESEL SELECT
```

The "event" TIME is for recording all of the finishers. The "event" TIMESEL is used for recording the select times and competition numbers.

If you have a multiple chute race and one set of select numbers/times, you would create the EVENTS file as (for a three-chute finish line):

```
CHUTE1
CHUTE2
CHUTE3
SELECT SELECT
```

If you have one team recording select number/times for each chute you would create the following EVENTS file (again, for a three-chute finish line);

```
CHUTE1
CHUTE2
CHUTE3
CHUTE1S SELECT
CHUTE2S SELECT
CHUTE3S SELECT
```

When you go to the panel that allows you enter and edit results (R from Master Menu), you will be asked which event and presented with a screen such as follows (for the above case):

```
                    1  CHUTE1
                    2  CHUTE2
                    3  CHUTE3
Select Event ->     4  CHUTE1S
Select Event ->     5  CHUTE2S
Select Event ->     6  CHUTE3S
```

Select the event and enter as you normally would. For the results that have come in from chute1, chute2, and chute2, you enter into events 1, 2, and 3. The select numbers and times for chute 1 are entered in event4 (CHUTE1S) and so on. If you only have one "select" event you put all the select times in that event.

Now, to check to see if the select times and numbers agree with the results from the chutes (they rarely do agree due to bandits and missed persons), select the appropriate event and, when you see it displayed, press F6 (Select). You will then see the times for each select number/time which is in the respective select event. That is, for CHUTE1 you will be shown the times in event CHUTE1S. If you have a

select time for a competition number that is not in the results, no error message is given. It is just assumed that this time applies to another chute.

Here is an example of what the screen might look like:

```
1:   45   0:30:13   0:30:13
2:   14   0:30:59
3:  123   0:31:01   0:31:01
4:    9   0:31:06
5:    2   0:31:13
6:    8   0:31:45   0:31:13
7:  378   0:32:19
```

Notice that number 8's select time of 31:13 does not agree with the time recorded as he/she entered the chute. Apparently, five people crossed the line between 30:59 and 31:13 but the person manning the printing timer only recorded four times in this range. All you know is that there is a time missing between 3rd place in 31:01 (which we know is correct from the select time) and 6th place. Where should we slip it in? If we put it between 31:01 and 31:06 we might be giving number 9 a faster time than deserved since the actual missing time might be between 31:06 and 31:13. If we slip in a time of 31:13 we do not give any finisher a time faster than he/she could have. This is the way it must be done according to National Running Data Center or TACStats rules. Otherwise, you might give someone a time faster than they actually earned and it might be affect possible age-group record.

Let's consider the case of an extra time (such as results from bandits) instead of a missing time. Here is an example:

```
1:   45   0:30:13   0:30:13
2:   14   0:30:30
3:  123   0:31:32   0:31:01
4:    9   0:31:01
5:    2   0:31:13
6:    8   0:31:45   0:32:19
7:  378   0:32:19
```

In this case there is obviously an extra time between 30:13 and 31:01. You must eliminate the 30:30 and give number 14 a time of 31:32. Then the other times will line up. This is due to the fact that the extra time could be the 30:30 OR 31:32. If you deleted the 31:32 when the 30:30 was the extra person, again you would be giving a person too fast of a time.

See the section below on semi-automatic timing for more examples.

Semi-Automatic Select Time Editing

The reason this is called "semi-automatic" is that at each step of the way, you are given a chance to override the program to prevent the inserting or deletion of times. This is necessary since one or more of your select times might be in error.

Remember, be sure to save your results (F10) before invoking the semi-automatic time alignment. If you want to start over, press F9 to reload the data.

You invoke the semi-automatic editing from the Enter/Edit Results screen with results by pressing Alt-A (stands for "automatic"). That is, when you have the

places, numbers, and times on the screen (R from the Master Menu), press F6 to see the select times (this step is not necessary but it gives you a warm feeling that things are okay) and then hold the Alt key down while you press the "A" key. If all of your select times are okay, you will be shown the last 24 places and told to press any key to return to the screen where you edit results.

If there are errors, you will be shown a screen with the results and select times displayed as above and instructions on the right of the screen for what the program is going to do and what you should do. For example, take the first case from above.

Let us take the above examples to show how the semi-automatic editing works. In the following example, the times that are hi-lighted on the screen are indicated by an underscore.

You will be shown:

```
1:   45   0:30:13   0:30:13        Going to insert a time of 0:31:13
2:   14   0:30:59                  just past the highlighted time.
3:  123   0:31:01   0:31:01
4:    9   0:31:06                  Okay? (Y/N)
5:    2   0:31:13
6:    8   0:31:45   0:31:13
7:  378   0:32:19
```

This looks like a reasonable thing to do based on the above discussion so you press "Y". You will then be shown the screen:

```
1:   45   0:30:13   0:30:13        Done with automatic alignment
2:   14   0:30:59
3:  123   0:31:01   0:31:01
4:    9   0:31:06
5:    2   0:31:13                  Press any key
6:    8   0:31:13   0:31:13
7:  378   0:31:45
          0:32:19
```

When you press a key, you'll be taken back to the screen of results and the times and places should be okay. Press F6 to verify.

In the case of extra times, you will see a screen such as:

```
1:   45   0:30:13   0:30:13        Going to delete highlighted times
2:   14   0:30:30
3:  123   0:31:32   0:31:01        Okay? (Y/N)
4:    9   0:31:01
5:    2   0:31:13
6:    8   0:31:45   0:32:19
7:  378   0:32:19
```

When you press "Y" you will see the following screen:

1:	45	0:30:13	0:30:13	Done with automatic alignment
2:	14	0:31:32		
3:	123	0:31:01	0:31:31	
4:	9	0:31:13		
5:	2	0:31:45		Press any key
6:	8	0:32:19	0:32:19	
7:	378			

In this case there was no a time below the 32:19 but normally you would have times there to move up.

Of course, the select times will not always agree exactly to the second unless they were entered with a printing time such as the TimeTech. The Running Score program checks for times within two seconds of the select time.

Thanks for reading all of this. I don't expect either of you to publish all of this but I would appreciate you making the issues know to the road race management community.

Sincerely,

Alan Jones

10 November 1986

Pete Riegel
3354 Kirkland Road
Columbus, OH 43221

Dear Pete,

This is a letter which we believe could raise an issue of some importance to TAC/RTTC. The issue:

> What exactly does the issuance of a TAC/RRC Technical Committee Certificate for a road running course mean, both technically and legally for the Course Certifier and the Race Promoter/Director?

As our running course certificate now reads, we, as course certifiers, state the course fulfills the national standards for accurate measurement. No misunderstanding that statement. Obviously, in certifying the course, we not only have to examine the measurement data, but also a look at the route over which the runners will run. Yet, nowhere in our current procedures or policies are there any references to SAFETY considerations. The course is more than the sum of revolutions on a Jones counter - it is a "race course." Gordon and I now believe it is appropriate to look at the entire course when granting RRTC approval for certification. While it is obvious many RRTC certifiers would not be familar with the proposed race route for certification, we believe those submitting the forms should include evidence the road course has been approved by the local community authorities. (Assuming a Race Director is required to obtain a street usage permit, the practice here in Hawaii)

Why? A bit of history. A few years ago our Valley Isle Road Runners Club (on the Island of Maui) sponsored a club race (non-sanctioned by AAU/TAC) in which the course crossed a major highway. While police protection and a club course marshal was at the crossing, they left prior to the crossing of the last few slow runners. One runner was hit by a passing automobile, and you know the rest of the story. A law suit, one which is still tied up in court. However, it just so happens this race was covered the old RRCA insurance policy. And, for RRCA Clubs all over America this has proven to have been a disaster, for as you are aware the Insurance Company did not renew the rather generous blanket policy for the small club races. This has forced many runs to now become certified in order to quality for the TAC insurance.

The RRCA was not too concerned with legal matters in course layout for the type runs long associated with their running programs, as the races were small and the runners were knowledgeable as to

their individual responsibilities regarding safety. However, TAC, with the sanctioning and certifying requirements, faces a different situation. The races are larger with many runners totally unaware of the personal hazards involved. While I hope it never happens, TAC could find itself involved in all sorts litigation in the event of a similar accident we had on Maui.

A number of years ago while in the military service, I was called as a witness in a civil suit, and I became aware of the lengths an adversial lawyer will go to to raise secondary issues in raising doubt in a jury's mind as to credibilty and individual responsiblity. (I was testifying for the US Government against an employee who alledgely misused technical information for contractor kickbacks). In our present hypothetical situation, assume a Course Certifier is required to appear in court in a case in which a runner was injured by a vehicle on the course. The lawyer for the insured motorist (defendant) asks the course certifier as to the meaning and "legality" of the TAC/RRTC approved road running course certificate. The answer which immediately comes to mind is: "it fufilled the national standards for accurate measurement." We submit no civil suit adversial lawyer would let the certifier "off the hook" with that statement! He would no doubt follow up with "did you go over the map, and if so did you notice the crossing of X and Y Streets could constitute a hazard?" Before you could properly answer he would fire off another question: " was there a statement to the effect the crossing would be guarded?" More of these, and then finally, "in your opinion, if you knew the crossing was potentially unsafe would you have run the race?" The answer? See Catch-22.

Now why all this in a long letter? This past week we have been asked to certify a course, mainly on the basis so the organizers can qualify for TAC insurance, that crosses an extremely busy set of intersections, not once, but twice in two fairly close locations. Even though the race may be run at a "safe time" (Sunday morning at 0700 hours), there is doubt in our minds as to the SAFETY of the course. Technically the measurements are accurate, so we can hardly deny certification of the course from that standpoint. But, the safety aspects finds the recurring theme of Catch-22, and this is disturbing with Gordon and me.

If, by some small chance, the issue of TAC certification and sanctioning, and the insurance question comes up at the Tampa Convention next month, do you think the problem we have outlined might be a fitting topic? Maybe even a word or two in a coffee break might stimulate discussion - if you think we have a problem!

Hope the Convention is a big success and you enjoy some that good Florida weather - some year, once again, the AAU/TAC committee on Convention may decide to return to Honolulu. Then, you all could enjoy some outstanding weather, and Aloha hospitality.

Alohas
Gordon & Tom

Thomas J. Ferguson
4191 Halupa Street
Honolulu, HI 96818

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November 20, 1986

Thomas J. Ferguson - 4191 Halupa St - Honolulu, HI 96818

Dear Tom,

Your letter of 10 November does provoke some thought. As certifiers we can be open to all sorts of crazy legal things if some person chooses to take us to court. Of course we are not alone in this - anybody can be sued. The trick is not to lose.

What does a certificate mean? To me it means "TAC/RRTC thinks this course is as long as it is advertised to be, but we reserve the right to check". No more, no less.

The certificate does not warrant any characteristic of the course except its length, and perhaps its elevation characteristics.

It is not RRTC's intent to warrant the inherent safety of a course, nor of the conduct of any race on a course. None of the questions we ask are designed to elicit information relating to course safety.

The safe conduct of a race is the responsibility of its organizers, and a TAC certificate implies nothing regarding safety. It is not intended to.

This does not mean that we are exempt from being sued. But it would be stretching things to believe that the suitor would win from RRTC if course safety was the issue. If the Bureau of Standards certified the length of a yardstick, would they be liable if somebody got poked in the eye with it? Granted, a jury can do anything, and I only hope they don't do it to us.

As for a course you think may be dangerous, I'd say go ahead and certify it. You are not certifying anything about it except its length. It may be death-defying and absolutely unrunnable, but those are qualities outside our area of concern.

The only area where you might be vulnerable would be if you had made final decisions regarding the route. If the route was specified by others, however, and you only measure it, I can't see any moral responsibility at all.

* * * * *

I will bring your letter up at the TAC meeting and publish it in MN. I think you raised a good question, and I am not certain that my simplistic answer is really the best one.

Next year the TAC convention is in Hawaii. See you then if I haven't burned out.

Best regards,

ON CHANGES IN THE ENGLISH/METRIC LENGTH CONVERSIONS

by Bob Baumel

If you check Appendix E of the Course Measurement book, you'll find the "exact" conversions between English and Metric units of length. But if you check enough other references, you're sure to find some OTHER values for the "exact" conversions. What is going on here? The explanation involves some interesting history. It is also worthwhile to understand, since at least one of those "other" values may still be getting considerable use.

Conversion factors have changed, but the main fact to remember is this: There is ONLY ONE METER, and it has stayed the same size since about the year 1800 (although a number of different units called "feet" have existed during that time). If you need to interpret some high precision data recorded before the last change in conversion factors, you should have no trouble if you just remember that the meter is the same size now as it was then. Here, now, are the three most important "foot" units in recent history:

Type of Foot	Year Adopted	Definition	Decimal in Meters
pre-1959 US[1]	1893[3]	1200/3937 meter	0.3048006096 m[5]
pre-1959 UK	1878	platinum yardstick	0.30479947 m[6]
post-1959[2]	1959[4]	0.3048 meter	0.3048 m (exact)

Notes:

1) The pre-1959 US foot is also known as the US Survey Foot because surveyors continued using it past 1959. They may have changed to the newer (slightly smaller) foot in 1983, but many are probably still using the old-size foot.

2) The post-1959 foot (of exactly 0.3048 m) is known as the "international" foot, or sometimes the "Canadian" foot (see note 4). It was adopted in 1959 by agreement of the national standards laboratories of all the major English-speaking countries.

3) The conversion factor "1 meter = 39.37 inches" first appeared in the 1866 law legalizing use of the metric system in the United States. But it was in 1893, after receiving copies of the International Prototype Meter and Kilogram, that the US defined all its Customary units in terms of metric units.

4) While the agreement of the standards bureaus took place in 1959, one English-speaking country, namely Canada, had adopted the 1959 definitions somewhat earlier -- in 1951.

5) The value in meters of the pre-1959 US foot has a decimal expansion that can be worked out to as many digits as desired, but never terminates. (But since 1200/3937 is a RATIONAL number, the expansion must start repeating after some number of digits.)

6) The value in meters of the pre-1959 British foot is subject to experimental uncertainty. I've seen several slightly different values for it, in addition to the figure listed above. The figure given here is from: H.G. Jerrard and D.B McNeill, A Dictionary of Scientific Units, (London, Chapman and Hall, 1972).

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October 7, 1986

Dan Brannen - 3533 Stevens Road - Wallington, NJ 07057

Dear Dan,

Just thought I'd fill you in on last weekend, which was an arduous one. Got a panic call from Noel Nequin, whose AMJA course was under Lake Michigan, and could I come and help? I could, and I arranged to borrow a bike from Chris English of Chicago Area Runners Association (CARA) and do the ride Saturday morning. Race is on the 12th. So:

Friday, 6 PM. Arrived at O'Hare and went to the CARA office downtown, where Noel was having a meeting of AMJA folks. Had a slice of pizza. That was my dinner. After the meeting, talked with Noel and Chris English about what options were open. We needed to find two miles to replace the lower two lost to flooding. Chris and I drove out to Lincoln Park in the dark and scouted out some likely places (Note: when I accepted I had been assured that this had already been done). At 10:15 PM Chris drove me and the bike to the motel, halfway between the race course and the calibration course.

Saturday, 4 AM - Rose and showered and scouted around to find a city map so I could find the cal course. Rode my bike to it and calibrated. Met CARA's Carol Garsee (she measured too) at the cal course at 6 AM. She had a car but no room for my bike, so I rode it the 4 miles to the race course. In the rain.

7 AM - Waiting with Carol at the Lincoln Park fieldhouse for Noel, who finally showed up 40 minutes late.

8AM - Established an arbitrary start and rode the length of the course, getting counts at landmarks on the way. Once we established the location of Mile 5, at the north end of the course, I laid out miles on the return ride.

9:30 AM - Fell off the bike while negotiating a piece of rough pavement on the southbound ride between Mile 3 and Mile 2. Returned to Mile 3 and recalculated the necessary counts, but made a mistake and was off by 450 counts and didn't know it. Established a new start along the route that Chris and I had scouted. Also laid out an alternate start on a route that Noel liked. Carol rode with me and got data as good as my own. Rained throughout the measurement, from 6 until 11, when it started to clear up. Miserable note-taking.

11AM - Finished measuring and rode the 4 miles back to the cal course to recalibrate. Met Carol there. Got a <u>flat tire</u> on my first recal ride. Arrgh! Fortunately the race course was out-back and Carol's data was good. My data showed that my calibration had not changed, so my ride served as a good check to Carol's.

NOON - Finished up, put the crippled bike in Carol's car and rode her bike back to CARA while she drove. Met her there. We put the bikes inside and she drove me to the motel and left, since she was due at a Cubs double-header. I showered, had a good lunch, and went to the airport. Figured out all the numbers (I had done a preliminary check at the course that showed that agreement was OK). At that time found the 450 count mistake but since everybody had gone away I had to write to Noel and Carol and tell them to shorten up all the marks below mile 3 by 153 feet.

Things I learned:

1) Do not expect things to be organized when you go to a strange town to measure, even if they say everything is ready for you. Be prepared. The situation I encountered was normal. Chaos is the rule, not the exception. Fortunately for me I was prepared for rain, with a nylon jacket over a sweatshirt. More rain would have made me miserable, but so far I've not got Goretex.

2) Try to get a support vehicle. I wasted time and energy riding through Loop traffic on the 4 miles between cal course and race course. That may also be where I got my flat.

3) Have a backup measurer, or be sure your equipment is reliable. Mine was not. I will not measure without a solid tire again, unless pressed to it. If Carol had not measured, I would have had to choose between fudging my data (nobody the wiser!) or staying on into the late evening and missing my plane.

4) Try to get somebody dedicated to the measurement for the entire day of measuring. Both Noel and Carol had other things to do, and were not available for afternoon support. I had time, but I had no help or support, so I had no option but to leave. Since they paid a bundle to have me come, it was really an unwise way of them to use me. They treated me very well, I thought, but they had other priorities on their time.

5) Take time to eat. I allowed myself to get caught up in a schedule that left no time for food. Aside from a slice of pizza and some peanut-butter crackers I had nothing to eat from Friday noon until Saturday at 2 PM. I could have used the fuel.

I think much of the grumpiness I suffered was because of lack of food. I get nasty when I'm hungry. I could have put up with no support vehicle - after all, four miles is not so far, but that damn flat tire finally frosted the cake. Of course I was paid for my work, so should I complain? Anyway, now they have some alternate courses to use in case the water does not recede before race day.

One thing about out-of-town measurements. You do them when you are there, not necessarily when things are right or optimum. You cope with what you find, because you are on a tight schedule and have to get the work done. The last thing you need is to arrive and find an indecisive race director. That will run you up the wall, I guarantee. But you try to be cool and professional, even when things are coming unglued around you and you want to scream. Fortunately for me, Noel knew what he wanted.

Best regards, Pete

Carl E. Wisser
TAC/Road Running Technical Committee
4899 Shafter Ave
Oakland, CA 94609
(415) 652 7996

Ken and Jennifer Young c/o
NRDC
P.O. Box 42888
Tucson, AZ 85733

Nov. 5 1986

Dear Ken and Jennifer,

This letter serves a double purpose the first of which is to explain as best I can the discrepancy I have discovered (uncovered?) in the Lake Merritt "A" course (first driving lane only) 5k, 10k, 15k length. Early in 1983 Pete Shandera and I measured the course (without the scpf) and came up with a 5k overlap distance of 97 feet. This means that every time you run around the lake you add on 97 feet to reach the 5 kilometer finish line , and another 97 feet for the 10 kilometer finish line etc. and so on like that. Recently I realized that the course closest to home for me I had treated like a step child. As a result, I've remeasured it on two different occasions and driven the course with Pete just to make sure I rode the same course as 1983. We found no divergence with the exception of parked cars on Bellevue. Several days later I rode this section with and without the parked cars ...total difference: 14 digits! (4'9"). To make a long story short I'm now sure that the loop overlap for 5k is 143 ft. This means that the Rum Runs of '85 and'86 are 29.7 ft. short per 5k (59.3 ft. short for the 10k)!

I'm sincerely sorry for this turn of events as I know that there are some records on the line. Pete Shandera is one of the best measurers around and neither of us can figure what happened except that possibly back in 1983 we didn't challenge the early morning traffic sufficiently to ride out to the driving lane tangents as tightly as we do now...but 30 feet????

My other reason for writing this letter is say what a pleasure it has been working with the two of you all these years. You have set such high standards that all of us have been inspired to achieve the kind of integrity in our work crucial to maintain those standards. We will miss you but we take heart in the knowledge that the system will always bear your personal trademarks of thoroughness and integrity.

Yours truly,

c.c Barry Spitz
Pete Shandera
Tom Benjamin
Tom Knight
Pete Reigel

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OF THE USA

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November 10, 1986

Carl Wisser - 4899 Shafter - Oakland, CA 94609

Dear Carl,

Thanks for sending the copy of your letter of November 5 to Ken & Jen. I intend to publish it in the next MN because:

1) I agree with your sentiments about how nice it's been working with NRDC.

2) Your report of finding an expertly-measured course short is the first one I've ever heard of.

3) Your honesty in reporting it brings you great credit, and I would like others to see what a proper attitude toward measurement looks like.

I would particularly like the international people to see that unjustified pride and chauvinism have no place in measurement.

I have often wondered what would happen if a record was set at, say, the Columbus Marathon - and I later discovered a gross error in my technique. Hopefully I would do the right thing, but pressures to stay quiet would still be there. Of course, the validation would catch it - but I could save them the ride if I knew it was short.

On the Lake Merritt course you could have just moved the overlap point and said nothing. Nobody would have noticed. But you chose to act with class. Nice going.

As for why the course got shorter, I suppose if you measured Lake Merritt before riding on the Olympic course and getting branded with super-respect for the SPR, that might partially explain it. I know I learned a lot on that ride.

I have my own course, right near my house, that I use for recreational measurement. I have now measured it four times (it's a 5 miler) using different equipment. My estimates of its length range from 5.005 to 5.007 miles. I originally laid it out in 1983. I hoped that my riding technique had improved, but my subsequent riding does not seem to be any better. If anything, I've lost a tiny bit - but hopefully not enough to matter. Within that small measurement span it's hard to tell anything definitive.

Got to go. Thanks again for sending along the dope.

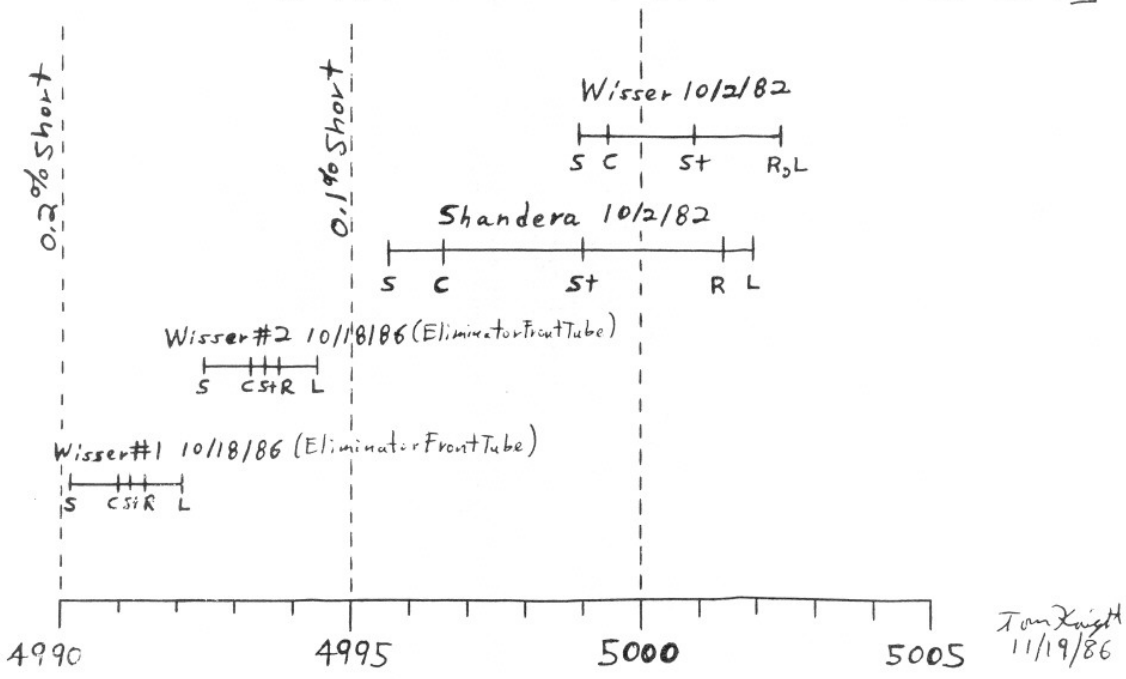
Best regards,

Pete

xc: NRDC - PO Box 42888 - Tucson, AZ 85733

LAKE MERRITT A COURSE LOOP

[COMPLETE LOOP + 97 Feet 5KM COURSE]



Tom Knight
11/19/86

St. = ½ (PreCal$_{Av.}$ + PostCal$_{Av.}$) R = PostCal$_{Av.}$ S = Shortest (using largest individual precal or postcal)

C = PreCal$_{Av.}$ L = Longest (using smallest individual precal or postcal)