

# MEASUREMENT NEWS



May

1992

Issue #53



Here we see the Oerth Family (Paul & Sons), busy assembling Jones/Oerth counters. Left to right are Karl, Paul and Steve (no moustache). Paul reports that orders are coming in fast, and that he is learning valuable lessons - some hard won - about doing business by mail. He has bought a turret lathe to help with the machining. Orders are coming in at such a rate that they are working hard just to stay even. Paul hopes that soon he will get breathing space enough to build up an inventory for immediate shipment. In the meantime, expect a delivery delay of 1 to 2 weeks. It's a quality product, worth waiting for.

## MEASUREMENT NEWS

#53 - May 1992

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### HOW WE DID IN 1991

All but the final dribbles of the 1991 courses are in by now, so it's time to see how we did last year:

Most active certifier: Wayne Nicoll - 149 courses certified (135 last year)

Most active measurer: Glen Lafarlette - 62 courses measured (34 last year)

Most active state: California, with 138 courses certified (79 last year)

Measurers active in 1991: 321 (333 last year)

State with most active measurers: Florida, with 27 (17 last year)

Courses certified in 1991: 1208 (1181 last year)

24 people measured 10 or more courses, accounting for 41 percent of the courses certified last year.

\* \* \* \* \*

Of 1991's 1118 race courses (eliminating calibration courses and tracks):

1013 (91 percent, same as last year) are standard courses, with drop less than 1 m/km and separation less than 30 percent. These courses conform to TAC Rule 185.5. This once again demonstrates how US courses are overwhelmingly standard.

66 (6 percent) have drop greater than 1 m/km. Records cannot be set on these courses because their overall downhill grade is over the acceptable limit.

39 (3 percent) have OK drop (less than 1 m/km), but excess separation, and thus potential wind aid. These courses, if standard distances, would be eligible for records if no tailwind was present.

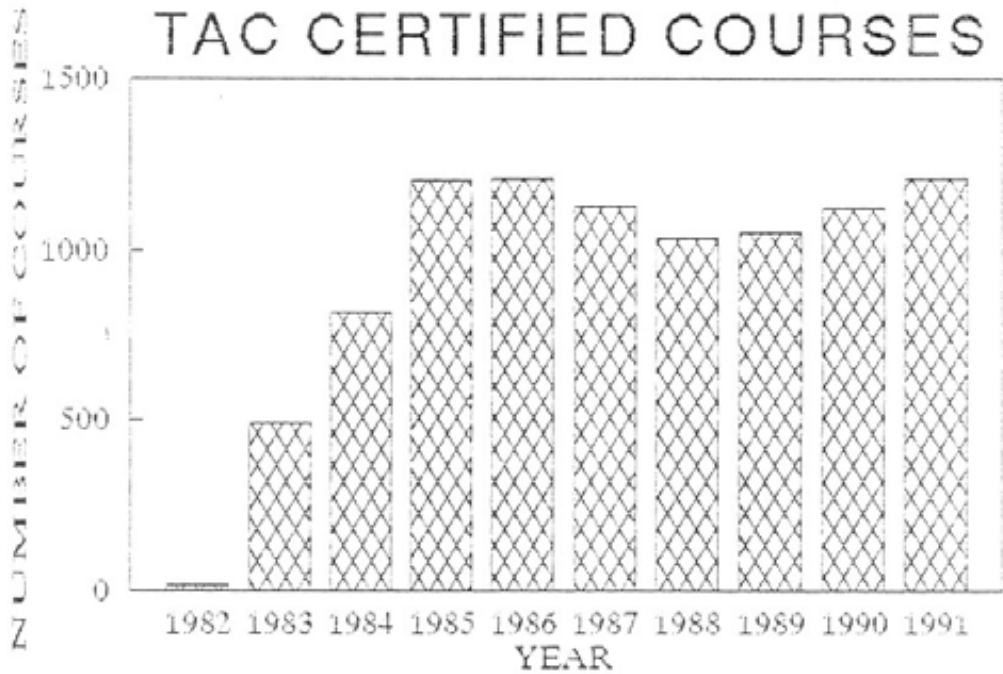
### MEASURER IDENTIFIED

Last month's cover featured an unidentified British measurer. Andy Milroy writes "The measurer on the front of MN is John Walker - an ultra race director (among other activities.) He is organising the WAVA world road races in the UK in August."

COURSES CERTIFIED IN STATE IN 1991	ACTIVE MEASURERS IN STATE IN 1991	COURSES CERTIFIED BY CERTIFIERS IN 91	MEASURERS WITH 10 OR MORE
CA 138	FL 27	WN 149	G Lafarlette 62
FL 82	CA 25	RS 82	A Linnerud 46
OK 74	TX 20	DL 75	R Scardera 38
IL 70	NY 17	BB 74	W Nicoll 25
TX 70	OH 14	ETM 71	C Hinde 23
NV 67	AL 13	JW 65	D Brannen 21
OH 60	NJ 12	PR 62	R Hickey 21
NC 57	MA 12	ACL 55	E McBrayer 21
AL 39	GA 12	AM 50	M Chodnicki 21
NJ 39	IL 11	DB 45	D White(DE) 20
MA 36	CO 11	BG 36	J Knoedel 20
GA 35	TN 9	CW 36	R Thurston 17
CO 34	ME 8	DP 34	M Courtney 17
PA 31	MO 8	RE 32	A Beach 16
VA 26	SC 8	RT 31	W Cornwell 16
TN 26	PA 7	FC 29	P Riegel 15
SC 25	VA 7	JD 28	R Recker 14
KS 23	OR 6	BS 27	R Letson 14
DE 23	AK 6	TK 19	D Standish 13
MD 21	NC 6	EL 17	- GuidoBros 13
CT 17	IA 6	SH 17	B Harrison 13
MI 17	KS 5	MR 16	G Witkowski 12
AZ 16	OK 5	RR 16	F Shields 11
NM 15	NM 5	DR 16	D White(SC) 10
MN 15	IN 5	MW 15	
MO 15	WI 4	KU 15	
WA 14	WV 4	GN 14	
IA 14	MD 4	RH 14	
OR 13	MI 4	LB 12	
NH 12	CT 4	FW 10	
IN 10	NH 3	MF 10	
AK 10	WA 3	WG 9	
WI 9	DE 3	JS 6	
KY 7	VT 3	FH 4	
DC 7	MT 3	DLP 4	
VT 7	AR 3	KY 3	
NE 6	KY 3	TB 3	
RI 5	AZ 3	GT 3	
UT 4	ND 2	BC 2	
WV 4	MN 2	BT 2	
AR 4	DC 2		
MT 3	NE 1		
ND 2	UT 1		
LA 2	RI 1		
ID 2	LA 1		
SD 1	NV 1		
MS 1	MS 1		
		1208	499
1208	321		

### STANDARD DISTANCE TAC CERTIFIED COURSES

	1983	1984	1985	1986	1987	1988	1989	1990	1991
5k	59	91	185	270	324	330	338	425	473
10k	198	303	392	363	327	325	299	240	255
Ca1	0	1	14	5	28	20	43	60	80
8k	42	101	137	95	83	72	70	74	67
5m	31	48	89	68	91	65	66	57	62
Mar	47	61	82	61	53	55	54	49	47
HMar	17	34	60	51	44	32	26	41	32
ALL	492	816	1204	1211	1129	1036	1050	1121	1208



### HOW SOME 1991 COURSES WERE DISTRIBUTED

01mi	21	12km	7	100km	1
2.5km	5	15km	12	500km	1
05km	473	20km	10	Ca1	80
05mi	62	25km	7	HMar	32
08km	67	30km	10	Mar	47
10km	255	50km	3	Trck	8
10mi	14	50mi	1		

## OLYMPIC TRIALS IN DEEP DOO-DOO ?

Your Editor was working out of town at the time of the US Men's Olympic Marathon Trials, and on his return home was treated to a recounting of the event by Joan Riegel, who was everywhere doing everything during the event. Most of the stories were about the organizational work, and how everything got done. One story, however, related to the condition of the course:

A few minutes before the race began, Joan noticed that an enormous, widespread mess had been made, directly in the path of the runners, by what was probably a grossly overfed horse. Accurate identification was impossible, since she did not actually witness the deposition of the material. She approached the Franklin County police officer, who was sitting on his horse, pointed out the extensive and slippery impediment to running, and asked him to have it cleared away. The officer told her they had no equipment to do the job.

In increasing panic, Joan contacted a City of Columbus policeman, and asked for help. He told her "Sorry, Ma'am, but that's a County horse."

He did, however, get on the radio and the mess was cleared before the runners started. It could have been worse. Wayne Nicoll sent the clipping below:

### Ripe Mile Marks Manure Mishap

**JAFFREY (AP)** — The prediction is the grass along a mile of Route 137 will be very green this summer.

That's because the tailgate on a tractor trailer hauling chicken manure opened accidentally Monday and the truck spread a mile-long trail of manure, some of it piling up eight inches deep.

Crews cleaned up the mess with tractors and shovels, and the fire department hosed off the road, but it still was pungent yesterday.

"This was seasoned, believe me," Assistant Jaffrey Fire Chief Jack White said.

Police caught up to the driver when he pulled over after noticing his truck getting light. By then, nearly the whole load was spread on the road.

The driver's company, Masonwest Inc. of Westminster, was ticketed for the manure mishap.

# Race official goes the distance

Arlington woman has designs on Olympic Marathon Trials

By KATHY WOODARD  
Upper Arlington ThisWeek  
Contributor

Putting on a world-class event under the watchful eyes of the nation is no small task. For Joan Riegel, race administrator of the Columbus Marathon and the 1992 U.S. Men's Olympic Marathon Trials, it's a non-stop job.

For the past several months, her immediate focus has been on the U.S. Men's Olympic Marathon Trials that takes place on April 11 in Columbus. From a field of approximately 125 elite marathoners will emerge the top three finishers who will comprise the U.S. Men's Olympic marathon team. In August, this team will travel to Barcelona, Spain where they will compete in the 1992 Summer Olympics.

Riegel, an Upper Arlington resident, coordinates, administers and soothes the worries of the entire volunteer hierarchy, runners and race director. Her responsibilities are many and varied, requiring creativity, stamina, diplomacy and long hours to ensure a successful race experience for all.

"All these wonderful runners have had Columbus (and the Olympic trials race) as their goal for the last few years. They're coming here to run the race of their lives. We want them to not just think of this as another race, but one of the most wonderful experiences they've had," Riegel asserted.

Riegel's creative bent and ingenuity are put to task for the up-

coming trial's race. In addition to designing the memorabilia and souvenirs for the race — panda bears, coffee mugs, lapel pins and such — she designed the medals each Olympic trials finisher will receive. Most recently, she has been hard at work finding laurel wreathes to crown the top three finishers as they earn their spot on the Olympic team.

The hard work and dedication has its rewards. Riegel and Race Director Doug Thurston recently accompanied the top men's and women's finisher from Central Ohio in the 1991 Columbus Marathon to Sevilla, Spain, where the runners participated in the City of Sevilla Marathon.

"Spain was very exciting," Riegel declared. "Neither of the runners had ever been over to a foreign marathon. They were thrilled with the attention and support of the foreign race director and foreign runners. It made them want to be top notch run-



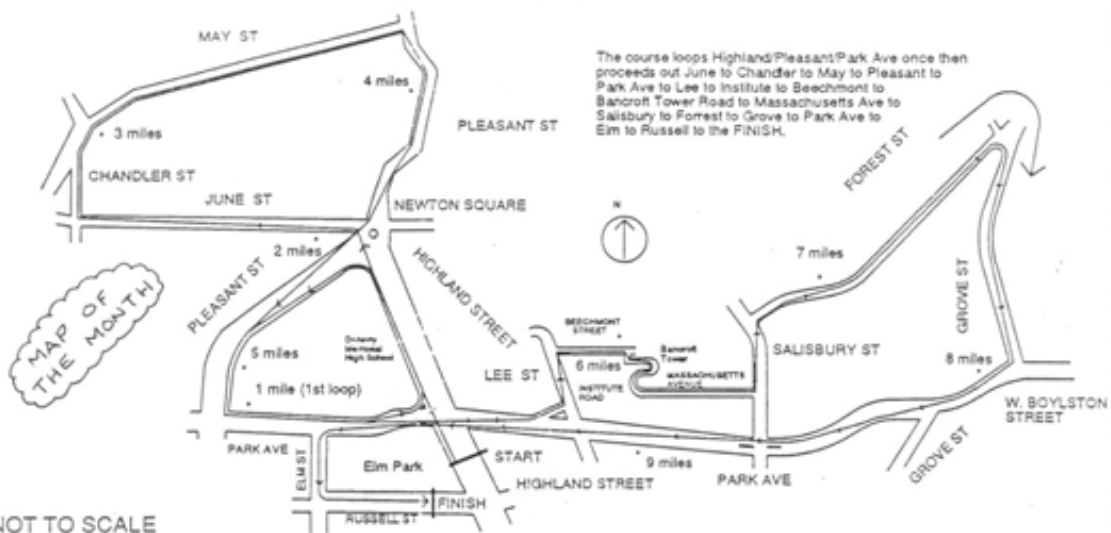
Joan Riegel displays the panda bears, coffee mugs and lapel pins she designed for the 1992 U.S. Men's Olympic Marathon Trials.

ners — it was really a strong incentive to do their best."

This show of support is what drives Riegel, "Columbus has opened its arms to these runners. They don't just tolerate them, they welcome the runners. The spectators really see the runners as individuals-not just a herd of people running through the streets of Columbus. We're lucky that we have a mayor who is so interested in supporting sports in the community." ♦

# CENTRAL MASS HEALTH CLASSIC COURSE 'B'

Richard A. Rudman 2/23/92  
Race Course Measurement



NOT TO SCALE

<p><b>START</b></p> <p>The <b>START</b> is located on Highland Street adjacent to Elm Park at a point exactly 14 feet 1 inch NW of the storm drain located NW of Light Pole #27.</p>	<p><b>4.0 Mile</b></p> <p>The 4 Mile Mark is located on Pleasant Street opposite the SE corner of the intersection with Beeching Court exactly 15 feet 5 inches NW of Pole #100.</p>	<p><b>8.0 Miles</b></p> <p>The 8 Mile mark is located on Grove Street at a point exactly 3 feet SE of the fence separating the Caldwell Banker and Trust of New England buildings.</p>
<p><b>1.0 Mile</b></p> <p>The 1 Mile mark is located on Park Avenue near the intersection with Pleasant Street at a point exactly 12 feet 8 inches SSW of Light Pole #27.</p>	<p><b>5.0 Miles</b></p> <p>The 5 Mile mark is located on Pleasant Street opposite the SE corner of the intersection with Abbott Street at a point exactly 19 feet N of the fire hydrant.</p>	<p><b>9.0 Miles</b></p> <p>The 9 Mile mark is located on Park Ave at the intersection with Massachusetts Ave exactly 20' 8" W of the fire hydrant.</p>
<p><b>2.0 Miles</b></p> <p>The 2 Mile mark is located on June Street directly in front of #28 June Street at a point exactly 6 inches W of the sewer cover.</p>	<p><b>6.0 Miles</b></p> <p>The 6 Mile Mark is located on Beechmont Street directly in front of #15 Beechmont at a point exactly 37' 6" E of Light Pole #4.</p>	<p><b>FINISH</b></p> <p>The <b>FINISH</b> is located on Russell Street approximately 90 yards from the intersection with Highland Street and exactly 71 feet 11 inches E of the storm drain.</p>
<p><b>3.0 Miles</b></p> <p>The 3 Mile mark is located at the Northernmost intersection of May and Chandler, directly opposite Worcester State College at a point exactly 15 feet 6 inches N of Light Pole #64.</p>	<p><b>7.0 Miles</b></p> <p>The 7 Mile Mark is located on Forest Street at a point exactly 25 feet 3 inches NE of Light Pole #8.</p>	<p><b>Course Restrictions:</b></p> <p>No course restrictions are required. Runners have full use of the entire roadway.</p>

THE ATHLETICS CONGRESS OF THE USA

MEMORANDUM

DATE: March 9, 1992

TO: Julie Emmons, Chair, Women's LDR Committee  
Don Kardong, Chair, Men's LDR Committee  
Chuck DesJardins, Chair, Masters' LDR Committee  
Dan Brannen, Chair, Ultra Subcommittee  
Basil Honikman, Chair, Records Committee  
Pete Riegel, Chair, RRTC

FROM: Bob Hersh, Chair, Rules Committee

SUBJECT: Heart Rate Monitors

I am hoping by this memorandum to clarify some of the confusion that has arisen over the use of heart rate monitors by distance runners during races. My purpose is not to comment on whether such use is a good or bad idea. I will leave that to those who have a more direct and personal interest in the subject. Rather, I want to go on record as to the impact of the current TAC rules on this practice.

It is quite clear to me that under current rules, the use of heart rate monitors worn by athletes on the wrist (or otherwise carried by them) during a race is perfectly legal. There is, to be sure, a reference to a "technical device" in the second sentence of Rule 66.1, but that reference must be taken in its proper context. The only relevant prohibition in the rules against "assistance" is that set forth in the first sentence of Rule 66.1, which subjects to disqualification "a competitor who shall receive any assistance whatsoever **from any person.**" The second sentence defines assistance as **conveying** advice, information or help. We have never thought to disqualify a runner for wearing a chronograph on the wrist, although such things are clearly technical devices, because the assistance is not received **from any person** and nobody **conveys** anything to an athlete who wears a chronograph. The same is true of heart rate monitors. As long as they are borne by the runner and do not require the involvement of others, they are absolutely legal.

Having said that, I must go on to make two important points. The first is that the organizers of the Houston Ultra-Marathon are entirely within their rights to ban heart rate monitors. They are very much mistaken if they think that the rules require that they ban them, but there is nothing that I know of that prevents a non-championship invitational event from setting arbitrary entry standards. Thus, the Millrose Games this year banned high jumpers who approach from the left side, the Boston Marathon each recent year has



barred athletes unable to make a certain standard (which the organizers have exercised the discretion to determine), and the Houston UltraMarathon can similarly ban athletes who wear heart rate monitors (or, if they choose to do so, athletes who wear Reeboks, athletes who wear sunglasses or athletes named George). It's their event, and they can make rules applicable only to that event. They should not, however, pretend that these are the rules of competition of The Athletics Congress when they are not.

The second point is, as I mentioned before, that the position of the current rules is not necessarily correct philosophically when applied to heart rate monitors. I have suggested to Dan Brannen (who told me a month ago that as best he could tell then, the Ultra community seemed divided on the question) that somebody who opposes the use of these devices ought to propose a rule amendment this year that would specifically ban them. Not being personally involved in LDR, I have no strong feelings on the subject, one way or the other. It would be consistent with the normal approach of the Rules Committee to defer to any consensus that might be brought to us by the LDR committees, and we would certainly hope that such a consensus might be reached.

The only observation I would offer on the substance of the issue is that one of the important arguments against these devices seems to be that they are costly and therefore not, as a practical matter, available to all competitors. Let me suggest that if heart rate monitors are like every other electronic device introduced in the past two decades, their cost will rapidly decline after their introductory pricing. If they are indeed helpful to runners (and particularly ultra runners), our explicitly permitting them in competition could actually accelerate the price decline by expanding the market for them and thus lowering the unit cost to the manufacturers. Either way, though, I would like to see this resolved, preferably by a unanimous recommendation of the LDR committees, at this year's convention.

Best personal regards to all.

Sincerely,



P.S. The letterhead of the Houston race lacks a return address. That alone accounts for the omission of Messrs. Fred and Gwyn from my list of addressees of this memo.

THE ATHLETICS CONGRESS  
OF THE USA

3354 Kirkham Road  
Columbus, OH 43221

Road Running Technical Council  
Peter S. Riegel, Chairman

614-451-5617 (home)  
614-424-4009 (office)  
FAX 614-424-5263

March 13, 1992

To: Julia Emmons, Don Kardong, Chuck DesJardins, Dan Brannen, Basil Honikman,  
Bob Hersh

Subject: Heart Rate Monitors

I fully agree with Bob Hersh's interpretation of TAC Rule 66, and that any action on heart monitors should appropriately be tackled by the LDR Committees. Although my personal position on the subject is that they should not be permitted in competition, it's not a terribly strong feeling.

The sticking point, in my view, is the phrase "by any person" in our rule 66. Here is the relevant text of our rule, as well as that of the corresponding IAAF Rule 143. The IAAF Rule makes no mention of "any person" and appears to forbid the use of technical devices.

TAC RULE 66

IAAF RULE 143

1. Except as provided in road races (Rule 132) and in long distance walking events (Rule 150), during the progress of an event a competitor who shall receive any assistance whatsoever from any person may be disqualified by the Referee. "Assistance" is the conveying of advice, information or direct help to an athlete by any means, including a technical device. It also includes pacing in running or walking events by persons not participating in the event, by lapped competitors, or by any kind of technical device. It does not mean participation of an officially designated pacesetter in the race. Men and women shall not be considered to be in the same event.

- 2.—Except as provided in Rules 165 and 191, no competitor shall receive assistance during the progress of an event. Assistance is the conveying, by any means, of advice, information or direct help and includes pacing in races by persons not participating in the race, by runners or walkers lapped or about to be lapped or by any kind of technical device.

As things presently stand, it seems to me that the IAAF rule forbids the use of monitors while ours permits it.

In practice, it's a pretty difficult thing to properly get the benefit out of a heart rate monitor. One must first do the homework needed to establish one's useful heart rate threshold for the race distance, be it in the laboratory or on the road. Then one must be able to read and respond to the monitor while on the run. Monitors seem most practical in long-duration events with varying terrain. I doubt we'd see anybody getting much use out of one in a 10k, but use in a hilly or windy marathon could give some benefit.

It's up to you to decide whether the cure is worse than the disease. This will not become the RRTC crusade-of-the-year.

Best regards,



xc: Baumel, Nicoll

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## The rundown

By Wayne Nicoll



# Records and Reservations Is a heart rate monitor an unfair race aid?

This past December race director Chip Marz of New Orleans again conducted his ultra event known as the Mardi Gras Classic. The events were a 50K, a 100K, and a 100-miler. In response to the requests of previous competitors not happy running on concrete, he staged the events on the levee of the Mississippi River.

A short time before the races, Andy Jones, a Canadian world-class ultra runner, announced he was planning to run the 100K. Realizing that Andy might set a new record for the distance, Chip Marz and Chuck George scrambled to measure for certification a 50K stretch of the levee. Although the submission was close to race time, it appears the paperwork is acceptable for TAC certification.

Andy Jones had a great race and indeed surpassed the "North American 100K record" by three minutes. Following the race, Andy wrote an excellent article for the January-February issue of *Ultrarunning* magazine titled "Using a Heart Monitor in Ultra Training and Racing."

It is a very well-written account of how he experimented with a heart monitor until he was confident he could use it effectively to control his pace during a race by consistently monitoring his heart rate. He described how he learned to identify his "energy limit" for long aerobic events by experimenting on a treadmill.

Andy defines energy limit as "the fastest pace at which there is no anaerobic contribution whatsoever." His established limit for his heart rate was 154 beats per minute, which from his training calculations figures to be 15.5 kilometers per hour. His target goal for the New Orleans race became 6 hours, 27 minutes.

He checked his monitor about every five minutes during the race, keeping within a range of 151 to 157 beats. He passed the halfway mark slightly under pace at 3:11:05. Despite a 15K stretch in which he admits mental fatigue played a part, he still managed to finish in 6:33:57, well under the current "North American record."

If the course survives a validation measurement, the mark will be put before the Records Committee at the TAC Convention next December. If it is approved, it will be a new U.S. All Comers 100K record.

The course, however, may not be the only hurdle this performance may face in the quest for ratification. The article immediately raised among some observers the question of the fairness of using a heart monitor. It is commonly bantered among officials at road races that "technical devices" are prohibited.

I know as a referee at a National Championship Racewalk, I required a competitor to remove headphones, arguing that the headphones (soft music, pace beep) could allow an unfair advantage to that athlete. The question has been raised before regarding runners with watches that produce a pace beep that might enhance their performance.

This discussion probably has little relevance to whether the performance will be "accepted" as a "North American record." I suspect this record category is a creation of the ultra community to reflect the best performances in North America.

To consider this as a new U.S. All Comers Record, one has to look closely at Rule 66 in the current TAC/USA Rules of Competition to assess the situation. The pertinent part of the rule reads as follows: "During the progress of an event a competitor who shall receive any assistance whatsoever from any person may be disqualified by the Referee. 'Assistance' is the conveying of advice, information, or direct help to an athlete by any means, including a technical device. It also includes pacing in running or walking events by persons not participating in the event, by lapped competitors, or by any kind of technical device."

This section of the rule is being interpreted by interested observers according to how they lean on this matter. Some are saying the assistance must be rendered by another person. Those opposing the use of the heart monitor interpret the final sentence of my extraction from the rule to mean pacing assistance cannot be derived from a technical device.

To come up with an informed opinion on assistance from technical devices, I went in search of a TAC person who was involved in the writing of Rule 66. It is important to sense what was intended when the rule was written.

I discussed the issue with Nina Kuscsik, who you probably know as a pioneer woman marathoner. As a former chairman of the TAC Women's LDR committee and a long-time active TAC official, Nina was closely involved with the development of rules and guidelines on assistance to athletes in competition.

She states that the rule was written with the intent of discouraging *other people* from rendering assistance that could provide an unfair advantage to the athlete receiving the assistance. The framers of the guidelines refrained from consideration of devices worn by the athlete.

It was felt that because there are so many wrist devices that monitor pulses and beep out a pace cadence, it would be very difficult to enforce. Even an ordinary wrist chronograph might be considered as a form of assistance since it provides elapsed time during the competition.

Pete Riegel, chairman of the TAC/USA Road Running Technical Council, is himself an ultra runner and clearly opposes the use of the heart monitor in competition.

In a recent letter Pete stated, "Heart monitors do not belong in competition. . . they are different from a watch. A watch conveys information concerning things outside the athlete, while a heart monitor tells the athlete what is going on inside his own body."

There should be an interesting discussion at the next TAC convention. Pete sits as a voting member on the TAC/USA Records Committee. My guess is the All Comers Record will be approved, but there could be some changes in what devices are acceptable for the athlete to wear in future competition.



# The Athletics Congress of the USA

200 South Capitol Avenue, Suite 140, Indianapolis, Indiana 46225 (317) 261-0500  
Cable Address: ATHCONGRASS IND • Telex 27-332 • FAX (317) 261-0481  
28 March 1992

Pete Riegel  
3354 Kirkham Road  
Columbus, Ohio 43221

Please reply to:  
DAVID E. MARTIN, Ph.D., Chairman  
Sports Sciences Subcommittee  
College of Health Sciences  
Georgia State University  
Atlanta, GA 30303  
(404) 851-3037 - Office  
(404) 378-2605 - Home

Dear Pete:

You published in MN # 52 your views concerning the acceptability of heart rate monitors worn by athletes during a race. You also reprinted the text of Rule 66.1, which comes closest to any of our TAC rules in addressing the matter.

As a coach and sport scientist, I would be in favor of permitting heart rate monitors. As a coach, I find it difficult to believe that an athlete running a race would benefit by intentionally quickening or slowing pace to match a given preselected heart rate value. The collective set of our bodily sensations that sets our pace is based upon far more than heart rate alone. Also, in long races, heart rate at any particular pace changes; as blood volume depletes, heart rate must gradually increase to maintain cardiac output. Running to a given heart rate in a race is a quite different concept from running to a beat during training. The real value in using heart rate monitors comes not in helping an athlete run a faster race at that moment, but in learning about the kind of cardiac dynamics that characterized the race, so that these could be simulated during training. I believe we would be doing a disservice to the development of athletes by preventing this kind of information from being obtained by athlete and coach. I do not believe we would be providing a means for measurably helping the athlete run a faster race during the actual event in question by permitting their use. Just as Delasalle reports of at least one elite athlete who used a heart rate monitor during a race, giving priceless information about her performance to her coach, I also have had some of my athletes wear such monitors during races. We've been very much the wiser in the long term for acquiring this information, but I can't imagine that it helped my athletes run faster during that race. They are too focused on the myriad total details of the developing race scenario than their beating heart.

There's also the health aspect. Most runners are aware of the unfortunate story of Glenn Ewing, and his collapse at the recent Houston marathon. Wouldn't it have been nice if he had been wearing a heart monitor, with a storage mode, so that it could be replayed, in fashion similar to a flight data recorder, after his demise? I have coached at least runner, who had a previously unknown heart problem, and who developed a cardiac crisis during a competition. This was in the days before such monitors were technically as good as at present. We would have learned so much had we had that technology.


In my opinion, the potential medical value, and the actual coaching value, of information gained from using heart rate monitors

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outweighs their possible influence in enhancing performance during a particular race.

The rule as written ought to be modified to permit the use of heart rate monitors. I would admit that this may be difficult. We all know essentially what we are trying to prevent (radio head sets between coach and athlete, for example, and other forms of technical and nontechnical assistance that are unfair). We need the rule written to prevent what we desire not to have occur, and yet permit that which we see nothing wrong with occurring. I'd be glad to help if needed.

With best regards,

  
David E. Martin, Ph D, Chair  
Sports Science Subcommittee

Dear Dave,

April 3, 1992

Thanks for your thoughtful views on heart monitors. As you are probably aware by now, TAC Rule 66.1 does not prohibit their use, so long as they are carried and read by the athlete, and the heart information is not conveyed to the athlete by someone else.

IAAF Rule 143, as I read it, appears to forbid "any kind of technical device." Thus there may be some conflict between the rules. I have not heard of anyone actually disqualified for use of a heart monitor, or even a wrist chronograph. In theory, I suppose one could simply use his wristwatch to assist him in taking his own pulse, achieving with difficulty what the monitor directly reads out for him.

The undeniable medical and coaching benefits that come from knowledge of the heart's behavior during competition can be gained from a monitor with a data-storage mode, but without a direct readout. This would make the information available later, but would not assist the athlete.

I tip my hat to Andy Jones for the intelligent way he did the research necessary for him to gain the optimum benefit from his monitor. I suspect most athletes have not done their homework to such an extent. Those that do, and have the talent to exploit it, can avoid over-revving themselves when they encounter a headwind or an upgrade, and can fearlessly increase their speed with a tailwind or a downhill. Thus they can fine-tune so they run out of gas right at the finish line, but not before, and run optimum pace throughout the race.

It's a fundamental part of road racing that the athlete must adapt to more variable conditions than are found on the track. If technological gizmos replace the need for self-awareness, I see it as a bad thing.

RRTC has not got a great stake in this question. It is most appropriately dealt with by the LDR Committees, and they are aware of it. They will take such action as they deem appropriate. The material I have put in MN is simply a collection of opinions and facts, to make people aware of the situation.

Thanks for writing.



To: Peter Riegel  
3354 Kirkham Road  
Columbus, Ohio 43221

From: Harold J. Tucker  
4200 S. A 1 A Hwy.  
Melbourne Beach, FL 32951

Date: 10 March 1992

Subject: Heart Rate Monitors

Dear Pete:

There is but little justification to outlaw the use of heart rate monitors. They may be used, as in my case, to monitor the heart rate to preclude attacks of Ventricular Tachycardia. I do not need another one of these, due to going all out, after the viral heart infection of September of 1989. I am just now improving so that I am within three minutes per mile of what I was before the infection. ANYONE WHO TELLS ME I CAN'T USE ONE IN A RACE IS IN FOR A HARD TIME!

I agree with the letter from Dr. J.F. DELASALLE. Even going further than banning a watch on your wrist for pacing, which he mentions, how about non-mechanical/electronic passive aids. The following comes to mind:

Head bands in warm weather keep the sweat out of your eyes so that it allows better vision and removes the sting in the eyes.

Singlets in warm weather are lighter, especially when sweat soaked, and allow free movement.

Shorts have an advantage over warm-up pants.

Lightweight racing flats are very much faster than some of these ARMY BOOTS that pass for running shoes. We already have some poor dears that complain because someone runs barefoot and they can't, or will not. (All of my many 50Km beach runs were barefoot running. Don't try running barefoot until your body is trained to do so. The soles and calf muscles especially must adjust.)

By all means, wear a monitor for your health at least if you have a problem. It is not that much over today's price of a couple of pairs of shoes.

Sincerely,



Harold J. Tucker

THE ATHLETICS CONGRESS  
OF THE USA

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April 21, 1992

Ultrarunning - P.O. Box 481 - Sunderland, MA 01375      Att: Peter Gagarin

Dear Peter,

The last issue of Ultrarunning contained a letter from David Michael requesting a TAC opinion concerning the status of heart monitors. I have begun to investigate the subject, and here is what I have found out:

Heart monitors appear to be perfectly legal at present. TAC Rule 66 prohibits information being transferred by another person but does not prohibit runner-carried assistance sources (such as watches).

The subject may be discussed at the TAC Convention this winter, but there appears to be no present great groundswell against heart monitors. Thus I'd guess that they will remain legal.

On a purely personal level, I don't believe they belong in serious competition, and I don't think a fast time should be recognized as a record if a heart monitor was used by the athlete. I would not wish to dictate to any race what it will or will not allow, but if the resulting performance is a record time, it would, in my book, be a course or event record only.

Consider this scenario: A year or two from now Daddy Warbucks puts up \$100,000 for the winner of a 100 km race. The highly motivated runners go to the lab and get themselves tested. Each runner learns what heart rate he can maintain over the time of the run. Everybody shows up wearing a heart monitor, which by now are highly sensitive and contain beepers which tell the runner to go faster or slower, to maintain the optimum heart rate. This, they know, will likely lead them to their fastest time. Even effort is the most effective way to run.

The runners begin the race, each regulated only by his or her own personal monitor. Nobody surges, nobody duels, nobody does anything tactical beyond obeying the signals from his own beeper, like a horse with an electronic jockey. Each runner mindlessly bores ahead, working on his own personal time-trial, oblivious of the others, because this is the smartest tactic to achieve his own absolute best time. In the final stages of the race there may be some competition, but not before. At the end somebody goes home \$100,000 richer.

Reporters on the scene write of the fastest, yet most boring, race in history. There was no question that each runner worked to his utmost, but the competitive element was completely missing. Daddy Warbucks decides next year to simply put the runners on treadmills to determine the winner, and save the hassle of actually putting on the race.

Having established the scenario, let's shoot it down: An ultradistance racer will usually encounter a wider range of race conditions than will the runner of a 10k. Suppose the race turns hot after three hours? The runner will need to slow down - it is not the day for a best performance. Is it likely that he will have sufficient test results to know what to do if the temperature rises 20 degrees? Perhaps, but probably not. Thus the runner may be forced to resort to pace judgment in many cases. Does this shoot down the idea that the heart monitor aids the runner? I think it partially does, but not completely. At indoor venues, such as Milton Keynes, conditions stay uniform forever, and not all outdoor races have widely-varying conditions.

The athlete can be tested to see how long he can exercise at several heart rates. From these, he can find the speed he ought to run in order to last out the time interval, and can calculate his minimum finish time for a given distance. Still, when he goes to the line, he must make a judgment based on what kind of a day it is. Should he try to run at 154 beats per minute? 156? How often will he be right? His performance will be greatly affected by his initial choice.

I have seen paraplegics, on TV news programs, equipped with electrical devices, which are hooked up to computers. The computer shoots the correctly timed impulses to the muscles, which allows the paraplegic to "walk." This, while encouraging, still has a long way to go. It is not difficult to visualize miniature rigs of this sort designed for perfectly healthy athletes, which might overcome fatigue, much as a shot of a stimulant might do. It seems farfetched, but so did many things we have today. A rig like this would not violate any present TAC rule that I know of.

Competitive running is as much mental as physical. Heart rate monitors remove the mental element, reducing the runners to mere robots, executing predetermined programs. By all means, use heart monitors all you want in practice. Anything goes in training. Know thyself. However, in competition the runner should have to exercise his pace sense as well as his body, or the sport is gone from the sport. Who cares who wins a race between laboratory rats? A champion runner is smart as well as fast, and both elements are essential to real competition. Competition should compare whole runners, not just their muscles and lungs.

Some runners are famous for their blazing starts and fiery crashes, having spent whole careers at failing to utilize an undeniable physical potential. These people can benefit from heart monitors, because they may give them something all good racers have, but they do not - a sense of proper pace. They can go fast, but are not good racers.

Whether heart monitors will be prohibited in the TAC rules is not a technical question. There is enough evidence to suggest that they give the athlete some extra edge. It will be up to the TAC Long Distance Running Committees, who represent the athletes themselves, to decide what, if anything, they want to do about this bit of new technology.

Best regards,

A handwritten signature in cursive script, appearing to read "Pete".



## *The Athletics Congress of the USA*

Road Running Technical Council  
Dave Poppers — Colorado Certifier

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Littleton, CO 80121  
303/795-9743

Pete Riegel — 3354 Kirkham Rd.  
Columbus, OH 43221

3/29/92

Dear Pete,

I was reminded, while reading the March '92 newsletter, that I have some shortcuts and techniques acquired over my relatively short involvement with measuring that I want to share, as others have so often shared theirs.

The letter from Bob Harrison about the map measuring wheel is a technique that I too have been using. The map measuring wheel has proved a labor saver for me in planning most measurements and can give a quick solution to a sponsor needing answers quickly on various route options. I purchase large scale maps (usually 1" to 500' or 1" to 200') from city or county planning offices and do my work on them and sometimes submit a number of alternatives on simplified maps to the sponsor, race director or race management company needing the visual presentation for their decision.

I stuck my neck out a couple of years ago and guaranteed that the Cherry Creek Sneak start (5 miles, 7000 runners) would fit within about a 30 meter tolerance for the start. Months later, with warmer weather and a Sunday morning coinciding, it proved extremely accurate, allowing me to continue to live here and not budget for body guards. The map measuring wheel that I use was purchased at a stationery store some time ago. I have since found it in The Boundary Waters Catalog, 105 N. Central Ave., Ely, MN 55731, (800-223-6565). It is a K&R which has three scales on one side and inches and cm on the other and is available for \$12.95 + S&H. Not as well built as the Alvin and Kartenmesser, but just as accurate.

I noticed on the cover of the March newsletter, that the measurer is using a clip board of some type on his bicycle. When I began measuring in 1982, I bought a 6" x 9" clip board and added three metal clips that are meant for broom and mop handles to be held vertically on the wall. The clips very conveniently fit over the bike handle bar and stem. The advantages are that the information that has been precomputed is

always right in front of you, the clip board is easily snapped in place or removed and a hard surface is handy for making notes for documenting a map. I later installed aero bars on my bike which necessitated another clip board that fit sideways. I constructed that one out of plexiglass and four clips that fit perfectly over the aero bars allowing me to maintain the bike computer in place, which helps me anticipate the next split. I also taped on the clip board a check list to make sure that I have all the necessary paraphernalia needed for the measurement before I leave the house.

Another device that helps me is a lumber crayon (just checked and found it mentioned in the Measurement Manual for equipment needed) to initially mark the road. I can eyeball directly below the front axle, mark, then put the bike aside and follow with the whisk broom and spray paint. It's easy to do with one hand still on the bike and doesn't overkill the road with paint or lets you mark the road where the SPR is yet mark with paint at the road edge.

A nice touch in marking the course and splits is using stencils with an abbreviation of the race name (and distance if it can be confused with another race) above the line and the split, start or finish below. I use a couple of pieces of plywood as the stencil for a line. Of course this is done from my vehicle a little before race day. It adds some class and aids in race day layout. I use a surveyor's measuring wheel to measure from landmarks for documentation. It allows me to accurately layout the splits without assistance.

I have not yet tried one of the airless tires, but have had good luck with touring tires with a Kevlar belt. Thorn pullers (a.k.a. thorn resistors), a light weight wire attached to the brake caliper bolt, that rides at the surface of the tire seems to kick off the thorns prior to the next revolution quite efficiently, too.

Wayne Nicoll's letter reminded me of how wrong I was, when years ago I was the lead bike in an all womens' race, and thought I was being helpful in telling the leader to follow my path so she would be sure to run the SPR. I realize now that any one behind her was not gaining the same assist.

Best Regards,



## MORE ON HEART RATE MONITORS

Sally Nicoll escorted the US Women's team to China for the Great Wall Ekiden. On the way, she was given an article by Carol McLatchie. The article mentioned that there have been other competitions where athletes have used heart rate monitors without objection by anybody. The clips below appeared in City Sports March 1992:

**CYCLING:** In the Tour de France, Andy Hampsten and Greg LeMond have used monitors in time trials to ride at their physiological threshold without worrying about speed, wind, hills or what gear they were in.

During races a heart rate monitor can be used to determine if you are going into (or about to go into) anaerobic debt. They are also extremely useful during hot weather days when it's especially important to keep careful eye on your exertion level. Several years ago Ingrid Kristiansen used her monitor in a 10K race when she wanted to break 33 minutes. Because of the heat on that day, her monitor alerted her to the fact that she could not hold record pace. She was able to adjust her pace, winning the race and saving herself from "blowing up" in the last few miles.

## LONDON MARATHON ON ONE PIECE OF PAPER?

It can be done, but there is no room for the splits. Since England is not subject to TAC, John Disley is bound by no RRTC procedure to get it on one piece of paper. He uses large, legible city maps, and they give an overall picture of the course with all the streets clearly shown.

On race day, every mile and 5 km split has its own clock tower. These are large, attractive yellow pillars, clearly identified with the distance. They are put into place during the week before the race. Because John wants to make absolutely sure the erectors get them in their proper place, he prepares sheets of sketches, one for each split point.

Sometimes a split point falls in an inconvenient place (such as the middle of an intersection) and the clock tower cannot be placed at the exact point. To take care of this, the accurate split point is marked with a 1 meter long yellow stripe in the road, extending out from the curb. The location of the clock tower is marked on the sidewalk, exactly where John wants it, with a white circle with a cross in it.

On race day, a flagperson raises a large sign as the runners approach. When the lead runner reaches the yellow line, he quickly lowers the sign. This enables the timers on the lead car to get the split, in case they cannot see it directly.

On the next page of this MN you will see one page from the numerous pages John prepares to get the course ready:

ADT LONDON MARATHON - 12th APRIL 1992

JD

POSITION OF THE MILE AND 5km KILOMETRE SITES

JOHN DISLEY  
COURSE MEASURER

ON THE GROUND:

April 5th 1992

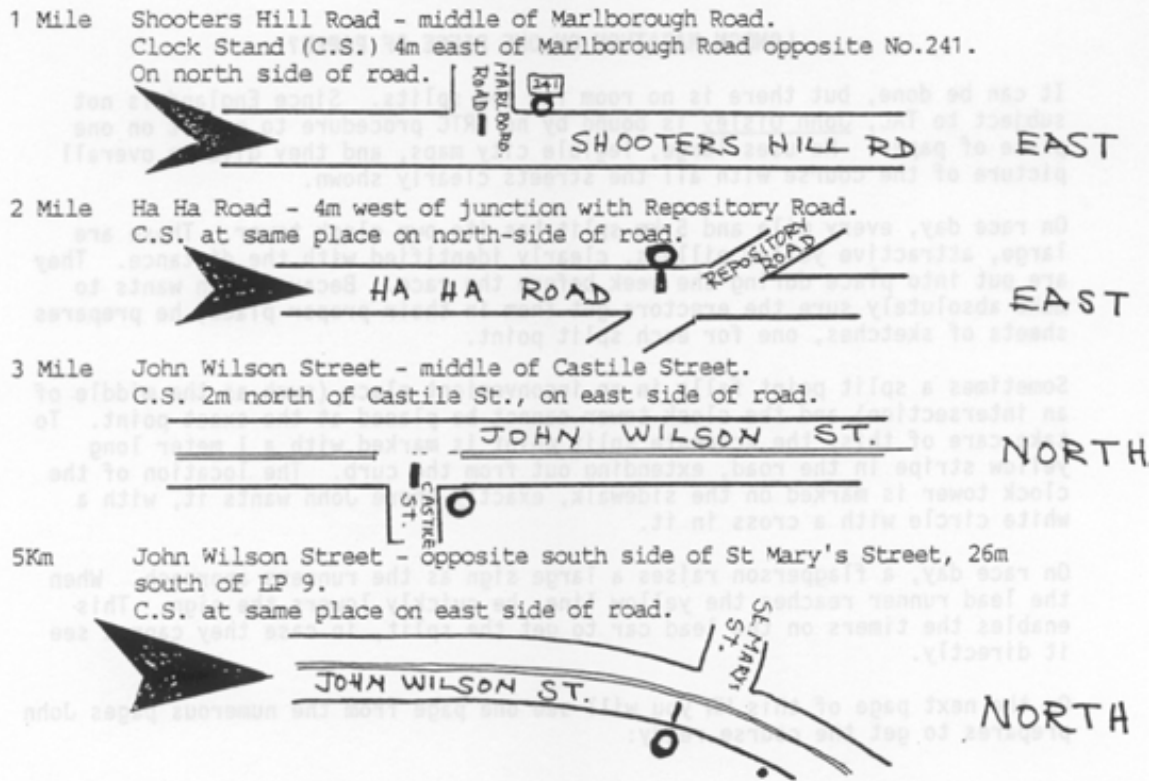
Actual site of the distance is denoted by a 1 metre YELLOW line.  
Site of the CLOCK TOWER is marked by a WHITE circle with a cross inside  
[ The 1992 marks are all freshly painted - ignore faded 1991 marks]

ON THE DIAGRAMS:

The Mile and Kilometre marks are denoted by a thick black line —

The Clock Tower Stand is marked by a black dot ●

DIRECTION OF RACE:



from Doug Loeffler

March 23, 1992

Dear Pete,

I'm writing in regard to your article "A Proposed Scheme for Evaluating and Ranking Measurers" that appeared in the January MN. My interest stems mainly from the fact that I'm one of the IAAF "failures."

Although I don't like it I guess someone has to be on the outskirts of your bell curves.

It seems to me I read somewhere (perhaps on page 17 of Course Measurement Procedures) that the objective here was to measure the SPR. Allow me for a minute to consider the SPR a finite number "X." Anyone measuring less than "X" has left the defined boundaries of the course. Anyone who measures more than "X" has deviated from the SPR. It seems to me that your method of evaluation says the best measurer is the one who had the average deviation. I would suggest that the measurer who did the best job of following the SPR would have the shortest measurement and the real proof would be her ability to duplicate the results.

When we measured in West Jefferson I considered it to be a contest; one between me and the course. I view any measurement in this way. The more sloppy my measurement the greater chance there is for it to be overturned upon validation.

*Best regards*  
*Doug*

March 31, 1992

Dear Doug,

Thanks for your letter. I will try to address your points:

Obviously you are mistaken in referring to yourself as "one of the IAAF failures" since you became an IAAF measurer partially as a result of your work at the seminar. It's true that you were out on the end of the bell curve, but on the tight side. Wayne Nicoll felt worse than you did, yet I would hardly presume to impeach his qualifications.

As a pure test of riding, the West Jefferson exercise was flawed. The flaw consisted in not telling people beforehand exactly what the criteria were. I could not do this because we learn from each seminar, and at the time we did it I had not thought through the entire process, never having dealt with the problem before. As a test of the entire measurement process, it wasn't too bad. The calculation was far beyond what a novice could have handled. John Disley used the same procedure at his Barnett seminar, and again last weekend in Dublin, and reported that, like West Jeff, the adjustment to the 4 km split gave people fits.

The objective of any measurement is to measure the exactly-defined SPR. That line lies 30 cm from corners. The usual thing is for the novice to swing wide while the expert hews to the line. In a comparison of experts, it's easy for any of us to ride tighter than 30 cm on curves and corners. While this is safe, it is not accurate. It is possible to ride shorter than the SPR and still be within the legal boundaries of the course.

The offset of 30 cm, or one foot, was used as a practical limit because it matched the track definition, and also because it represented what was thought to be a reasonably achievable limit for a person on a bike. I have seen measurers, in their zeal to "win" a measurement, run the wheel practically in contact with corner curbs. This is the safe thing to do, but the 1.001 makes it unnecessary if the 30 cm offset is maintained.

The West Jefferson course was not representative of any real race course. It had a high ratio of turns to straightaways. It was a safe and convenient venue for measurement, but unsuited for racing. It might be representative of say, a 10k, if one stuck in some straightaways between the curves. If this had existed, everyone would have "passed," since nobody had really ridiculous data.

The ideal venue for a measurement exercise would be one where the distance of the SPR is very closely known. The course could be surveyed carefully beforehand, although a course like West Jeff would be tough to tape, with all the curves. We typically do not know the true distance, and must use the results of what we get to get a value we accept. Thus there is always a potential for error. I don't believe the error was very large at West Jeff. The median (not the average) is probably our best estimate.

To provide a better exercise next time, it should be made clear that the goal is to ride the exactly-defined SPR, and that the shortest measurement does not necessarily "win." Part of the West Jeff exercise was to determine what people knew coming in, without coaching. Wayne admitted he brought a certain bias to his approach, giving the course a bit of a break as if he was validating it. You took the opposite approach, opting for a good, safe course. Both approaches have merit, and both are unnecessary. The 1.001 covers errors and provides adequate safety.

A twisty 5k is the riskiest of all courses to lay out, because of the absence of long portions to offset the errors that creep in on turns. I have, on occasion, arbitrarily thrown in an extra 3 meters onto a 5k course when I lacked total confidence in my ride. I like to sleep nights.

A solution would be to use "3 meters plus 1.001" as a safety factor, but I don't think it would be wise to change the game at this point. What we have is working well.

Thanks for writing. If you think I'm off base, let me know. Kicking things back and forth is the only way we get anywhere.

Best regards,





YADENEL Warszawa  
ul. Chrobrego 41a-3  
00-001 Warszawa 142  
15-051 Białystok  
POLAND

Dear Pete,

Last month I received the "IAAF Measurement of Road Race Courses".

I have a question regarding two points:

page 15 - "The constant may be adjusted to account for unusual conditions if it is felt that such conditions exist",

page 19 - "To increase accuracy, multiple baselines may be used along the course".

Do you have any examples of this adjustment for unusual conditions ? And explain it.

Was each portion of the Los Angeles Olympic Games course measured using pre- and post-calibrations or were those baselines only used to register a mid-way calibrations as a check ?

I enclose an example of 20K measurement with applying two versions/a and b/ of the second measurement. Please comment the final adjustment regarding all 5K splits. The question is: should the measurer move all splits or not ? I think yes, because final adjustment does lengthen or shorten only the last 5K/or 2,195K in marathon/ portion of the distance.

I prefer two measurements because the second measurement is more precise. During my experience each split always were differ by no more than 1 m/km between two measurements and the second measurement split data always were less than the first measurement - due to fact that the 2nd is more precise /but if the temperature is almost constant/. For example: 5K split point - 4.999,85 m/1st/ and 4.999 m/2nd/.

Also I enclose the report of Wrocław/Poland marathon course measurement for AIMS. As I wrote, I noticed a 0,07 % difference of the pre- and post-calibration data, more than in the past, using the solid tire. I applied a 6-7 minutes warm-up for tires and I think it is to little.

With the best wishes

Białystok/Pol, March 30, 1992 29

## 20 K MEASUREMENT

### 1ST MEASUREMENT

PRE-CAL - 9.367,600 ~ 9.367,5 (ROUGH)

POST-CAL - 9.368,620

CONSTANT - 9.368,110

$$9.367,5 \times 20 = 187.350$$

START	-	0	-	4.999,674
5KM	-	46.832,5	-	4.999,674
10KM	-	93.675	-	4.999,674
15KM	-	140.512,5	-	4.999,674
FINISH	-	187.350	-	<u>4.999,674</u>

$$187.350 : 9.368,110 = 19 \text{ KM } 998,697 \text{ M} \\ + 1,303 \text{ M}$$

### 2ND MEASUREMENT

#### VERSION-A

START	-	0
5KM	-	46.839 - 4.999,437
10KM	-	93.697 - 5.001,463
15KM	-	140.542,5 - 5.000,129
FINISH	-	187.349 - <u>4.995,966</u>

$$187.349 : 9.368,859 = 19 \text{ KM } 996,992 \text{ M} \\ + 3,008 \text{ M}$$

#### VERSION-B

START	-	0
5KM	-	46.839 - 4.999,435
10KM	-	93.697 - 5.001,463
15KM	-	140.542,5 - 5.000,129
FINISH	-	187.410 - <u>5.002,477</u>

$$187.410 : 9.368,859 = 20 \text{ KM } 3,503 \text{ M} \\ - 3,503 \text{ M}$$

### FINAL ADJUSTMENT

	<u>VERSION-A</u>	<u>VERSION-B</u>
5KM	+ 0,565 M	+ 0,326 M
10KM	- 0,898 M	+ 0,652 M
15KM	- 1,027 M	+ 0,978 M
FINISH	+ 3,008 M	+ 1,303 M

### SUM OF SHORTER SPLITS

$$(1) 4.999,435 + (2) 4.999,674 + (3) 4.999,674 + (4) 4.995,966 = 19 \text{ KM } 994,749 \text{ M} \\ + 5,251 \text{ M}$$



TADEUSZ DZIEKONSKI  
ul. Chrobrego 4 m. 8  
(skrzynka pocztowa 14)  
15-057 Bielystok  
POLAND



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April 15, 1992

Dear Tadeusz,

Here is how I would organize your three measurements to determine the final adjustments. This method works well for me. The first thing is to decide how long is each measured interval. Once you have done this, the rest is simple. I use SOSS (Sum of Shortest Splits) most of the time. Using SOSS, I see I must add 5.25 metres to the course. I decide to add it at the start. This makes the start-to-5 km interval 5.25 metres longer, and makes the course 20 km exactly. Then I figure how far each split is from the start, and how far it ought to be. The difference is the final adjustment.

	Ride 1	Ride 2	Ride 3	SHORTEST
START				
5 KM	4999.67	4999.44	4999.44	4999.44
10 KM	4999.67	5001.46	5001.46	4999.67
15 KM	4999.67	5000.13	5000.13	4999.67
FINISH	4999.67	4995.97	5002.48	4995.97
TOTAL	19998.68	19997	20003.51	19994.75
TO ADD:	1.32	3	-3.51	5.25

I decided to use the shortest intervals as official, and to add 5.25 metres at the start. You could decide that you would use ride #2 - it is the shortest total. In that case you would add 3 metres, but the following method would be the same.

	DISTANCE BEFORE ADJUST	ADJUST- MENT	DISTANCE AFTER ADJUST	DISTANCE FROM START	DESIRED DISTANCE	REQUIRED ADJUST
START				0	0	0
5 KM	4999.44	5.25	5004.69	5004.69	5000	-4.69
10 KM	4999.67		4999.67	10004.36	10000	-4.36
15 KM	4999.67		4999.67	15004.03	15000	-4.03
FINISH	4995.97		4995.97	20000	20000	0

The adjustments to the 10 and 15 km points are probably not necessary, but I might adjust the 5. It is a matter of personal judgment, since we certify only the overall distance. Nothing here is seriously in error. Even if we made no adjustment, no runner or timer would notice the difference.

As for "the constant may be adjusted for unusual conditions" I am not sure what this means. I think it gives you permission to use your brain. Suppose you have traveled to Omsk and your plane leaves for home in 2 hours. You get postcalibration rides of 9990, 9989, 9980, 9950, because you ran over a broken vodka bottle. This is an unusual condition, and I would use 9990 as my

postal value. I would not average the four rides in this case. Other situations require other adjustments. The procedures are not forged from iron - they are supposed to let you think, not be a robot.

Here is how your Version A and Version B would come out:

<u>VERSION A</u>						
	DISTANCE BEFORE ADJUST	ADJUST- MENT	DISTANCE AFTER ADJUST	DISTANCE FROM START	DESIRED DISTANCE	REQUIRED ADJUST
START						
5 KM	4999.44		4999.44	4999.44	5000	0.56
10 KM	5001.46		5001.46	10000.9	10000	-0.9
15 KM	5000.13		5000.13	15001.03	15000	-1.03
FINISH	4995.97	3	4998.97	20000	20000	0
TOTAL	19997					

<u>VERSION B</u>						
	DISTANCE BEFORE ADJUST	ADJUST- MENT	DISTANCE AFTER ADJUST	DISTANCE FROM START	DESIRED DISTANCE	REQUIRED ADJUST
START						
5 KM	4999.44		4999.44	4999.44	5000	0.56
10 KM	5001.46		5001.46	10000.9	10000	-0.9
15 KM	5000.13		5000.13	15001.03	15000	-1.03
FINISH	5002.48	-3.51	4998.97	20000	20000	0
TOTAL	20003.51					

I think you made a mistake in your version B.

Multiple baselines add a small amount of accuracy, but in my opinion are rarely necessary. With a solid tire, a flat tire is not possible. With a pneumatic tire, I like to calibrate frequently, and enroute baselines are good for this. At Los Angeles we rode the first baseline 4 times, and the last baseline 2 times. The intermediate baselines were ridden only once each. At that time there was no one accepted method of measurement. We used the data from that ride to learn many things.

I also get calibration changes as great as 8 counts per kilometer, but usually it is only 1 or 2. I do not think of it as a serious problem.

I do not think tire warmup is needed with solid tires, unless you have been carrying the tire in a warm car on a freezing day. It is easy to see if this is true. Start riding the calibration course immediately. If warmup is a factor, there will be a uniform change in the four calibration rides. If the pattern is random, as I usually experience, then warmup is not a factor.

I have put the Wroclaw marathon course on the list of courses.

Best regards,



FLEA FLICKERS or FLICKER FLEAS are tiny plaster mites noted for their long distance foot races. Their most famous race is held on Patriot's Day each year in a plastered room 30' long, 12' wide and 12' high.

The START is in the middle of one end wall, one foot below the ceiling.

The FINISH is in the middle of the opposite wall, one foot above the floor.

The course is the shortest distance on the surface of the walls, ceiling or floor from S to F. These creatures cannot fly.

N.B. Both the DROP and the SEPARATION make this a non-record course. This has led to heated debates in mite circles.

### FIND

- ① The course
- ② The distance in feet

### PUZZLE OF THE MONTH

This month's puzzle comes from Brian Smith.

Note - Last month's puzzle, "Bracing the Square," appears to have been too tough for the minds of the readers. One ingenious reply was received, but it was not a rigid structure.

Honor and glory await any successful entry.

