IAAF-USATF/RRTC
Course Measurement Seminar
Cuyahoga Falls, Ohio
August 20, 2016

The seminar participants (left to right): David Heithaus, Dave Rogers, Jim Wilhelm, Don Standish, David Harriman, Bernie Conway, Brandon Wilson, Winston Rasmussen, Jim Gilmer, Bill Grass, Jeff John, Pam Garrett, Lynwood Wagner, Bob Thurston, Mike Wickiser, Pete Riegel

INTRODUCTION by Pete Riegel

In May I was contacted by Mike Wickiser. He asked me if I was willing to summarize the bicycle measurements from the IAAF-USATF Course Measurement Seminar. I said yes, I was, and the following is my summary report. It covers the bicycle measurements, but does not cover the steel-taping exercise held after the bicycle measurements.

I arrived in Cuyahoga Falls on Friday, August 19, the day before the seminar. Mike had arranged evening reservations at a nearby restaurant and most of the group enjoyed their beer and meals. It was quite festive to meet and greet each other. Most of us were previously just names to each other.

Mike and Jim Gilmer had spent some time designing the course and deciding what the participants would be asked to do. They worked together to create the material given to the participants.

The following instructions were presented in a PowerPoint presentation by Mike Wickiser.

"Welcome to the IAAF/RRTC Course Measurement Seminar

The course you are about measure is a 2 loop 5 kilometer course.

All the data required to determine the total course length as well as the

1km, 2km, 1 mile, and 2 mile splits can be achieved with a single ride around the course plus a short section (R3 to R4 on the map and data sheet).

The calibration courses are exactly equal length and stated as 300 meters in length. **USE 300 meters** for all course and intermediate split calculations. You will be working in groups to steel tape and temperature correct in order to determine the actual length of the Calibration courses.

Only 2 calibration rides are to be done before and after the measurement in an effort to avoid congestion on the calibration courses.

Once calibrated, return to Start/Finish and ride the course taking data at all the points shown on the data sheet.

BE SURE TO TAKE DATA IN PROPER ORDER shown on the data sheet. Taking data in proper order will allow for statistical analysis. Anything not following this format will screw things up.

Your completed data sheets will be copied for Pete Riegel to analyze."

An artificial segment defined as a "construction zone" was inserted into the test course. Measurers were instructed to use this as the official, exactly accurate 50 meter length of this segment, and to ignore their bike-measured length.

DATA SHEET

Name _____

Address _____

_____

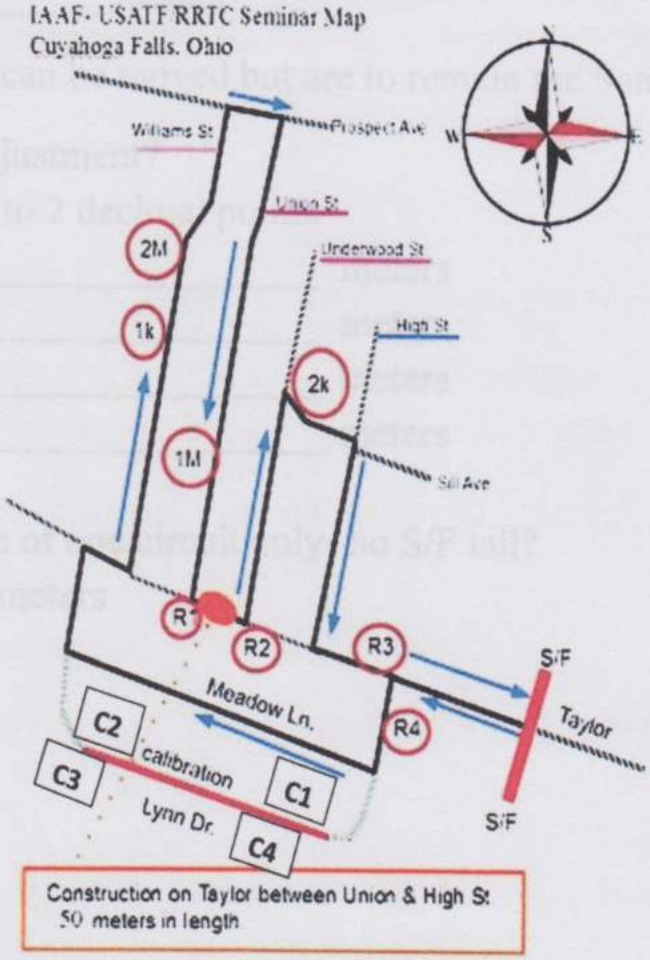
_____

Email _____

Phone _____

Counts to be recorded	
in the order shown	
Point	Counts
C1	
C2	
C3	
C4	

S/F	
R4	
1 km	
2 Mi	
1 Mi	
Const R1	
R1 to R2 = 50.00 m	
Const R2	
2 km	
R3	
R4	
R3	
S/F	
C1	
C2	
C3	
C4	



IAAF – USATF/RRTC Course Calculations Data sheet

1) Pre-calibration constant counts/meter _____
2) Post-calibration constant counts/meter _____
3) Day's Constant (avg.) counts/meter
4) Day's Constant (avg.) counts/ mile _____

For a 5k course going from S/F around circuit 2 times to S/F

5) What adjustment is necessary at S/F for 5km?

_____ meters

Note Start & Finish can be moved but are to remain the Same Point

6) Required Split adjustment?

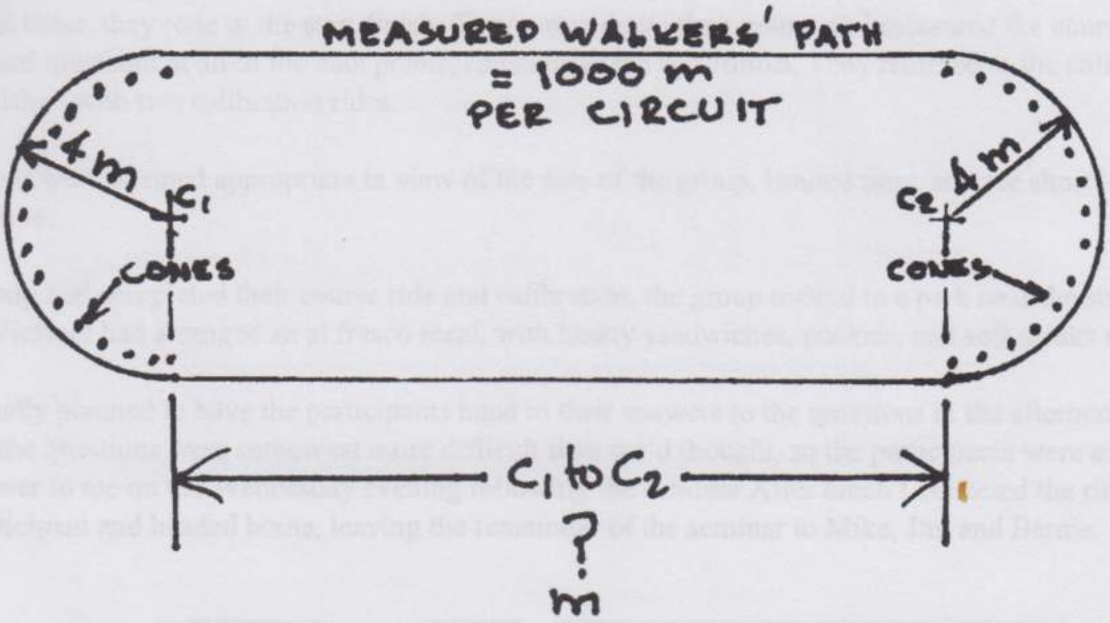
Round all meters to 2 decimal points

1 Kilometer _____ meters
1 Mile _____ meters
2 kilometers _____ meters
2 Miles _____ meters

7) What is the length of one circuit only- no S/F tail?

_____meters

Everybody answered these questions correctly with the answers (30 cm, 487.43m). Not included in the summary.



You are to lay out an oval racewalk course as shown above.

The walkers' path consists of a semicircular arc at each end of the oval, separated by straightaway sections between the ends of the arcs.

Each arc measures 4.00 m radius from its center. This length is Steel taped and SCPF is Not generally required.

The two arc centers are labeled above as C1 and C2

8) How far inside the walkers path should cones be placed?
_____ cm.

9) What should be the straight-line distance between C1 and C2 to produce a course of 1000.00 meters? Do not include SCPF. It is assumed to be included in the working constant.
_____ meters

MEASUREMENT OF THE TEST COURSE

Upon conclusion of the PowerPoint presentation Bernie Conway spoke about calibration courses and the afternoon's activities, followed by a question and answer time with the group. The group then moved to the site of the measurement. An orientation ride was led by Mike Wickiser and Jim Gilmer.

After the orientation the group moved to the calibration courses, and performed their two pre-calibration rides. As they completed these, they rode to the start/finish. They wrote down their count, and measured the course, stopping enroute to record the count at all of the data points, finishing at the start/finish. They returned to the calibration course and finished with two calibration rides.

Two calibrations were deemed appropriate in view of the size of the group, limited time, and the short length of the measurement ride.

When everybody had completed their course ride and calibration, the group moved to a park near the starting line, where Mike Wickiser had arranged an al fresco meal, with hearty sandwiches, cookies, and soft drinks on ice.

We had originally planned to have the participants hand in their answers to the questions in the afternoon, but it was seen that the questions were somewhat more difficult than we'd thought, so the participants were asked to send their answer to me on the Wednesday evening following the seminar.After lunch I collected the riding data from each participant and headed home, leaving the remainder of the seminar to Mike, Jim and Bernie.

Participants beginning pre-calibration

Looking west on the calibration course

Lunch in the park

Gathering at Mike's home for Saturday evening post-seminar decompression

Calculations for IAAF Seminar at Cuyahoga Falls

1	2	3	4	5	6	7	8	9	10	11	12	13
Length of cal course =		300 m				Measurer = Bill Grass						
	Recorded Count	Interval Counts					Interval meters	Adjusted Interval Meters	Unadjusted Cumulative meters	Adjusted Cumulative meters	Required Split Adjustment meters	
C1	42000											
C2	45321	3321	Ride 1			Final S/F				0		
C3	45900					S/F		111.99	0	111.99		
C4	49224	3324	Ride 2			R4	272.73	272.73	272.73	384.71		
C1	4000					km1	725.70	725.70	998.43	1110.42	-110.42	-112.42
C2	7321	3321	Ride 3			M2	57.20	57.20	1055.63	1167.61		
C3	7321					M1	559.34	559.34	1614.97	1726.96	-117.61	-117.61
C4	10643	3322	Ride 4			Const R1	131.99	131.99	1746.96	1858.94		
						Const R2	50.00	50.00	1796.96	1908.94		
Precal Counts/km=		11086.08	11086.08			km2	222.20	222.20	2019.16	2131.15	-131.15	-131.15
Postcal Counts/km=		11082.74	11082.74			R3	350.58	350.58	2369.75	2481.73		
agreement =		-0.0003				R4	81.20	81.20	2450.94	2562.93		
						km1	725.70	725.70	3176.64	3288.63		
Day's constant (avg)=		11084.41	Cts/km	11084.41		M2	57.20	57.20	3233.84	3345.83	-127.14	-127.13
		17838.62	Cts/mile	17838.82		M1	559.34	559.34	3793.19	3905.17		
	Recorded Count	Interval Count	Interval Meters			Const R1	131.99	131.99	3925.17	4037.16		
						Const R2	50.00	50.00	3975.17	4087.16		
S/F	54960					km2	222.20	222.20	4197.38	4309.36		
R4	57983	3023	272.73			R3	350.58	350.58	4547.96	4659.95		
km1	66027	8044	725.70			S/F	228.07	228.07	4776.03	4888.01		
M2	66661	634	57.20			Final S/F		111.99		5000.00		
M1	72861	6200	559.34									
Const R1	74324	1463	131.99			Total Intervals	4776.03					
R1 to R2=50						Desired Length	5000.00 m					
Const R2	74650		50.00			Need to add	223.97					
km2	77113	2463	222.20			S/F adjustment	111.99 m		111.99			
R3	80999	3886	350.58									
R4	81899	900	81.20			Length of one loop, m = (R4 to R4) =			2178.21	2178.21		
R3	83020											
S/F	85548	2528	228.07			Racewalk center -to-center length = 487.434 m				487.43		
						Racewalk path cone offset = 30 cm				30		
						Note: outlined cells contain values submitted by the measurer						
						Boldfaced text is the answer calculated by this program						

To compute the correct answers, first enter calibration and measurement data in column2. Everything in the spreadsheet will change to show the correct answers for the data entered. In column 4, the correct length for each interval will appear. Now, all the bits are arranged in order – S/F to R3 plus R3 to S/F as shown in columns 7 and 8. Calculate the total intervals. In this case we have 4776.03 m, but we need 5000 m. Therefore we must add 223.97 m. But since we are to keep Start and Finish coincident, we add (223.97/2) or 111.99 m at each end of the course, and we show this addition in column 9. In column 10 we summarize the cumulative length of all the intervals.

In column 11 we calculate the answers to the split adjustment questions. For example, our adjusted course has a length of 1110.42 m at km1, so we must move km1 back 110.32 m. At Mile 1 we have a length of 1726.96 m. But one mile contains 1609.34 m, so we must move Mile 1 back 117.62 m. Similarly for km2 and M2.

After the seminar, when I received the measurer's answers to questions 1 through 9, I sent a copy of the above in pdf format, but without the above clarification.

SUMMARY OF CALCULATIONS

After the submission deadline, and a short extension, had elapsed, I had 11 responses to the test questions. They are summarized below. The measurer's answers are compared to mine, and the difference calculated. When a difference seemed too large I indicated this by placing it in a box. I ignored small errors due to rounding, preferring to focus only on differences that seemed to me to be significant.

		Precal Question 1	Postcal Question 2	Day C/km Question 3	Day C/mi Question 4	S/f Adjust Question 5	1k split Question 6a	1Mi split Question 6b	2k split Question 6c	2Mi split Question 6d	Circuit Question 7
Bob Thurston	Pete's answer	10543.03	10545.54	10544.28	16969.38	112.86	-111.6	-118.32	-132.36	-127.74	2177.55
	As submitted	10543.03	10545.54	10544.28	16969.38	113.01	-111.68	-118.36	-132.38	-127.68	2177.41
	Difference	0	0	0	0	-0.15	0.08	0.04	0.02	-0.06	0.14
Bill Grass	Pete's answer	11086.08	11082.74	11084.41	17838.62	111.99	-110.42	-117.61	-131.15	-127.14	2178.21
	As submitted	11086.08	11082.74	11084.41	17838.62	111.99	-112.42	-117.61	-131.15	-127.13	2178.21
	Difference	0	0	0	0	0	2.00	0	0	-0.01	0
Brandon Wilson	Pete's answer	10632.29	10640.63	10636.46	17117.72	110.83	-110.6	-116.87	-131.79	-128.35	2179.37
	As submitted	10633	10641	10637	17119	111.03	0.28	-5.79	-50	-65.98	2179.19
	Difference	-0.71	-0.37	-0.54	-1.28	-0.2	-110.88	-111.08	-81.79	-62.37	0.18
Lynwood Wagner	Pete's answer	10935.09	10936.76	10935.93	17599.67	108.63	-109.01	-116.35	-131.31	-128.98	2181.51
	As submitted	10936	10937	10936.34	17600.34	108.72	-109.06	-116.37	-131.32	-128.94	2181.43
	Difference	-0.91	-0.24	-0.41	-0.67	-0.09	0.05	0.02	0.01	-0.04	0.08
Dave Rogers	Pete's answer	10638.96	10630.62	10634.79	17115.04	112.39	-111.84	-118.22	-132.43	-128.16	2178.2
	As submitted	10638.96	10630.62	10634.79	17115.04	111.97	-111.42	-117.79	-132.01	-127.73	2178.2
	Difference	0	0	0	0	0.42	-0.42	-0.43	-0.42	-0.43	0
Jeff John	Pete's answer	10520.51	10520.51	10520.51	16931.12	109.33	-109.1	-115.6	-131.1	-128.32	2180.89
	As submitted	10521	10521	10521	16932	91.19	-91.19	-91.19	-91.19	-91.19	2180.79
	Difference	-0.49	-0.49	-0.49	-0.88	18.14	-17.91	-24.41	-39.91	-37.13	0.1
Bernie Conway	Pete's answer	14087.41	14092.41	14089.91	22675.51	110.45	-110.25	-117.3	-131.72	-128.23	2179.54
	As submitted	14087.41	14092.41	14089.91	22675.51	110.45	-110.4	-117.3	-131.72	-128.23	2179.54
	Difference	0	0	0	0	0	0.15	0	0	0	0
Winston Rasmussen	Pete's answer	10405.48	10603.93	10544.7	16970.05	100.76	-105.25	-115.08	-131	-132.17	2188.14
	As submitted	10602.26	10603.93	10603.09	17063	227.03	-113.52	-113.52	-56.76	-56.76	2176.53
	Difference	-196.78	0	-58.39	-92.95	-126.27	8.27	-1.56	-74.24	-75.41	11.61
Pam Garrett	Pete's answer	10700.69	10707.36	10704.03	17226.46	115.69	-105.88	-112.85	-127.57	-123.57	2179.2
	As submitted	10701	10707	10707	17232	86.81	-76.79	-83.47	-127.69	-123.31	2076.61
	Difference	-0.31	0.36	-2.97	-5.54	28.88	-29.09	-29.38	0.12	-0.26	102.59
David Heithaus	Pete's answer	10693.18	10698.19	10695.69	17213.04	113.4	-111.56	-117.89	-132.14	-127.31	2177.31
	As submitted	10693.18	10698.19	10698.19	17217.06	113.95	-111.88	-118.06	-134.75	-127.11	2176.81
	Difference	0	0	-2.5	-4.02	-0.55	0.32	0.17	2.61	-0.2	0.5
Don Standish	Pete's answer	8788.78	8785.443	8787.112	14141.49	108.73	-108.83	-116.87	-131.51	-129.03	2181.87
	As submitted	8789	8785	8787	14141	16.01	-16.12	-38.81	-24.2	-36.42	2181.9
	Difference	-0.22	0.443	0.112	0.49	92.72	-92.71	-78.06	-107.31	-92.61	-0.03
Jim Wilhelm	Pete's answer	10440.43	10438.76	10439.6	16800.9	112.03	-111.11	-117.69	-132.12	-127.75	2178.24
David Harriman	Pete's answer	10795.79	10795.79	10795.79	17374.13	471.26	-528.07	-478.01	-491.94	-320.42	1451.75

A note on corners: We instruct people to ride 30 cm (1 foot) from the curb on turns. A bit of geometry calculation shows that an increase of one centimeter on a single turn radius will add 0.016 m (1.6 cm) to the measurement. As we have 24 turns in our course, a rider riding 31 cm out will add 0.377 m to the course

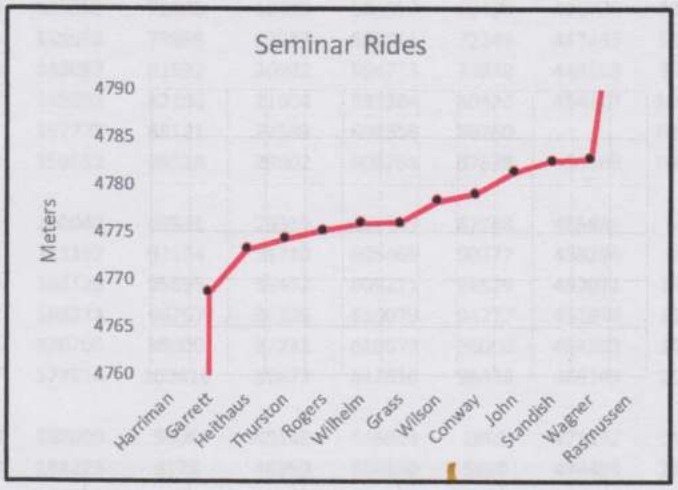
Riding 40 cm out will add 3.8 meters to the course.

We don't have a good way to measure corner-riding, but on this exercise we have a 5km course with 24 turns, or a turn every 200 m or so.This is food for thought.

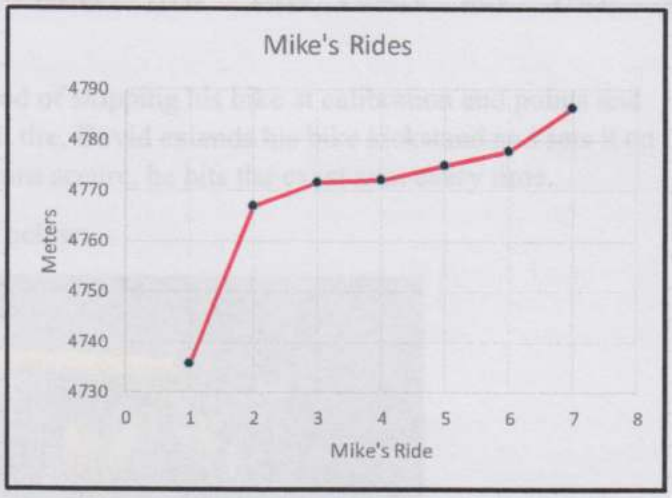
COMPARISON OF GROUP MEASUREMENTS

When a large group conducts a measurement the standard methods usually do not apply. One such way to compare group results is to ignore outliers and use themedian, or central value. If an even number of values exist, the average of the central two may be used. This is what I have chosen to do below:

Meas	Length		
Harriman	4057.47		
Garrett	4768.617		
Heithaus	4773.193		
Thurston	4774.286		
Rogers	4775.221		
Wilhelm	4775.947	Avg Med	4775.988
Grass	4776.028		
Wilson	4778.343		
Conway	4779.09		
John	4781.332		
Standish	4782.54		
Wagner	4782.731		
Rasmusser	4811.52		



	Measurer	Length, m		
1	MW5	4735.683		
2	MW6	4766.948		
3	MW3	4771.726		
4	MW4	4772.026	Median =	4772.026
5	MW2	4774.96		
6	MW1	4777.792		
7	MW7	4786.541		



Mike performed the above measurements in the months before the seminar. He deliberately rode too loose, too tight and just right in order to get an idea of how things might go.

One way to look at the result is to consider that the group measurement was used to create an actual race course on which a record was set. Mike then arrived and checked the length of the course.

As a validation, using Mike's measurement to check the course laid out by the group:

Mike's measurement using SCPF	4772.03 m
Mike's measurement without SCPF	4776.80 m
Group measurement using SCPF	4775.99 m
difference	0.81 m

Validation measurements do not include SCPF

The course "passed validation" as Mike did not find it short

RECORDED COUNTS OF ALL MEASURERS

	Thurston	Grass	Wilson	Wagner	Rogers	John	Conway	Rasmussen	Garrett	Heithaus	Wilhelm	Harriman	Standish
C1	70600	42000	182740	481625	511000	279310	119000	59000	95015	571577	57734	413200	80770
C2	73759.5	45321	185928	484902	514189	282465	123222	62108	98223	574783.5	60865	416437	83404
C3	73759.5	45900	185928	485335	514410	282670	123222	62108	100570	574783.5	60865	416500	83404
C4	76919.5	49224	189113	488612.5	517598	285821	127444	65285	103776	577986.5	63992	419734	86038
S/F	82340	54960	195085	494700	523489	291500	135000	71000	10393	584097	69400	436700	91067
R4	85215.5	57983	197988	497688	526393	294374	138852	73898	13217	587011	72249	447493	93464
km1	92871	66027	205719	505640	534118	302018	149087	81592	20992	594773	79830	448109	99855
M2	93475	66661	206326	506265	534722	302618	149892	82198	21604	595384	80426	454147	100356
M1	99367	72861	212267	512384	540666	308497	157772	88121	27589	601358	86260		105280
Const R1	100757	74324	213672	513831	542069	309890	159632	89518	29002	602768	87638	455568	106438
R1 to R2=50													
Const R2	1069	74650	213985	514200	542388	309890	160049	89831	29319	603083	87948	455889	6697
km2	3419	77113	216362	516642	544759	312244	163192	92194	31710	605469	90277	458296	8661
R3	7102	80999	220083	520475	548470	315933	168126	95895	35452	609211	93929	462071	11738
R4	7961	81899	220950	521367	549345	316792	169274	96757	36325	610079	94777	462947	12456
R3	9061	83020	222265	522600	550679	317658	170700	98000	37232	610079	96060	464202	13367
S/F	11464.5	85548	224692	525094	553104	320057	173914	100416	39672	612510	98438	466743	15368
C1	15860	4000	229097	529600	557500	324410	180000	5000	45149	616944	2800	471172	19800
C2	19020.5	7321	232287	532877.5	560688	327565	184223	8178	48359	620150	5930	474409	22432
C3	19020.5	7321	232370	533100	560688	327600	184223	8000	48361	620150	5930	474409	22432
C4	22181	10643	235558	536378	563872	330751	188447	11178	51569	623356.5	9057	477643	25066

One item of note: David Heithaus uses a different method of stopping his bike at calibration end points and measurement points. Rather than sighting down the front tire, David extends his bike kickstand and sets it on the cal course nail or other points. As long as the stand remains secure, he hits the exact spot every time.

See below:

PARTICIPANT FEEDBACK

We asked for, and received, some thoughtful feedback that will help us in future exercises of this kind.

From Brandon Wilson–

First I want to thank everyone for putting the seminar together. I love measuring and meeting measurers and it was great to put faces and names together and meet so many people, especially masters of this trade who put on this seminar.

Measuring requires some bike riding skill, ability to understand and follow process, common sense and some math. Our ability to "evaluate" a measurer should encompass all of these and while the seminar in Cuyahoga Falls did do so there were pieces of the data I struggled with personally because I had a hard time relating to the format. Normally I don't have the opportunity to measure a course that's already been laid out for me. As practice I lay out the course in sections that make sense to me, measure and adjust as-needed. In Cuyahoga Falls I had to try and relate to sections and data already there and I had a hard time getting my hear around that in a short time. Going into the exercise where we just record the counts and do the math was a challenge for me personally, perhaps it shouldn't have been but it was. The more I looked at the data the more I over complicated it. That said I ended up learning a lot from the process and with each day that passes appreciate the approach used in Cuyahoga Falls more and more.

In my opinion there is a need to have some method of training, mentoring and evaluating measurers in USATF/IAAF and it's missing today. It's left to the regional certifier to do that and I suspect most are so busy with life the ability to train & mentor is difficult to do with competing priorities.

In the scope of bringing a lot of measurers together and quickly evaluating and assessing measurers the method in this seminar DOES work, however I feel measurers would benefit from a smaller more 1:1 or 1:2 hand's on approach to evaluating like what is employed by an A measurer who is evaluating a prospective B measurer.

What we do really comes down to:
Can you follow the process, pull an accurate cal course, adjust it for temp, layout the course, accurately measure it and adjust splits as needed, oh, and draw a quality map of course.

Doing that is more than do the math, it's an interactive process. Often times we just get a sketch of a map, or street names and we have to figure out the rest of the puzzle and get very interactive with an RD and ask questions. "what are the lane restrictions, where do you want the start finish etc". A lot can be gained from observing a measurer work through that process in "real-life" type scenario. Special Operations Marines get good at doing what they do by using live ammunition & explosives in training and doing it again, and again. They also learn to get good at adjusting on the fly from being challenged by their training to do so. The reason they're good at what they do is because live combat or "real world" has been effectively simulated again, and again. A lot of understanding of a measurers ability could be gained from a realistic evaluation of "the process of measuring".

In application that's what the curriculum was in Cuyahoga Falls, in application it felt more like just do the math and I had a hard time with that personally. Measuring is more than just math and I feel a final curriculum should include more process and be interactive, "how would you", "why would you" etc..

For the level and number of measurers at this seminar the process was effective and impactful. It did allow for evaluation of a volume of people over a short time. If we were to do this in each regional area I feel it's more practical to treat an evaluation like you would a real-life measuring scenario where you give someone the map and let them ask clarifying questions. Determine where their head is regarding the process and ability to layout the course and determine if section measurement is needed, and where those section boundaries make sense to that measurer etc. Let them ask questions like we ask RD's and evaluate their approach and riding ability and math.

When I did my IAAF B evaluation with Bob Thurston we did the course layout together with the RD on-site of an actual marathon Bob was hired to measure. I realize that's not a common opportunity but he would ask me "Brandon how would you handle this" or "How would you do that" "why would you do it this way" "what would you do over there" and it was clear he wanted to see what I knew and what my approach to the process was. That process put me at ease, it felt like just another day of measuring.

He then rode behind me and let me measure and he observed handling skill and compared what he measured to what I measured. I realize that is a "perfect 1:1 approach" to the process but I feel a final regional curriculum should try to blend those ideals with some of the cornerstones of the seminar from last weekend.

I want to sincerely thank everyone for putting this together. I recognize the effort that went into this seminar and am grateful for the opportunity to attend. I'm so thankful to Mike & his wife for inviting strangers into their home, preparing food for us and being very gracious hosts.

With the opportunity to do it again I'd do it again in a second and I'd suggest more people also do it. I would like to suggest this be rolled out on a larger scale, across a larger section of measurers and perhaps to a more intimate setting over 2-3 days that will allow for an evaluation of "the measuring process".

TO sum all this up I did find the course challenging, I did find it met all of the objectives of evaluating a measurer and I did learn from it. I am a better measurer and better person because of it.Thanks for the opportunity guys, I hope our paths cross again soon.

From Jeff John:

Great experience! Thanks to all for facilitating this wonderful workshop. You navigated a lot of details and created a very worthwhile weekend for our measurers. I learned a lot and got to meet with and talk measurement with some of the best measurers in the world. Very constructive!

The road exercise was a splendid and practical learning experience. You managed to cleverly throw in some "curves" that we would not have expected -- just like we always get in real life.

My concern is that although this was great for our purposes, I feel it would be less than ideal for an official measurer evaluation. Maybe I missed it, but I felt a tighter structure on group measuring etiquette or group riding procedures on the crowded course was needed.

Toward that end Mike did wisely admonish us to resist the temptation to compete for the lowest counts -- Mike said: "... and please do not ride closer than 30 cm to the road curb or edge", but I did not hear any advice or instruction on how we must ride on this very short course to cooperate with, and not be affected by, or influenced (aided or hindered), by the many other skilled riders on the very short course at the same time. (If I did miss it, then I must apologize and would suggest it be put in writing for the participants somewhere...)

When I measure in real life I am very concerned about the passage of time. Time passage means temperature change and temperature change means increased risk of a possibly unnecessarily long course. Also, slow speed tends to increase both wobble and meandering which does the opposite. Hence, I tend to not dawdle when I measure. Ideal speed through a course will vary by bike and rider. Hence, the best evaluative methodology would probably be one where we "effectively" have only one rider and one observer on any section of the course at any one time.

In a crowd, we must either dawdle or overtake the slower riders. To control and standardize that potential interaction I feel we needed a tighter set of co-existence rules or procedures so nobody is forced, out of politeness, or simple distraction, to wander off the SPR.

AN interesting observation: more than once while riding we were on a road that had an obvious SPR that is the diagonal along the length of that road, i.e. we turned right, onto a straight road, intending to turn left at the next target road. The SPR is probably very close to the hypotenuse of the implied triangles, or the diagonal, from opposite lengthwise corner to corner.

I was alarmed to notice ahead of me, rider or riders, intentionally hugging the near curb for the entire length of the road. I thought, "Oh no, he must think its a right turn up ahead then when he checks his map he'll have to go left and he will be adding extra counts". But no! I guessed wrong:

These curb huggers were effectively abusing the practice of off-setting. At the end of the road they locked their wheel and off-set to the opposite corner! That effectively shortens the measured course and would give them an artificially lower Jones count for that stretch. All other things being equal, they now will have falsely lower counts and will be making a needlessly long course.

I don't know if they were aware of the error they were committing. If not, then perhaps we'd all benefit from a technical review of good measure technique on things like off-setting and gate negotiation etc. Even if its review, it's never boring to us!

I did agonize over how to get the correct SPR counts for 2 loops when only measuring once. I recall Mike saying some words about this location -- but I did not grasp his meaning at the time. The puzzle is at R3 -- the SPR will not be the same

on that stretch for each of the two loops. I still do not know how we would properly do it with Saturday's 1-loop restriction and specified target points. ON the course, I was alarmed to see that there were actually two R3 points indicated by paint, one on the north side, one on the south side. That suggested to me that Mike had figured out a way to do it.

But, ironically, there were not 2 finish points (north edge and south edge) indicated on the road on this course with no restrictions. I frequently must remind measurers that when we say "finish point" it is just a euphemism. It is not technically correct and can be misleading. Out terminus points and splits are actually line segments with infinite points. The line (be it START, FINISH, or SPLIT) runs perpendicular to the runners direction of travel. Its true that the actual SPR will usually fall on only one of those theoretical points -- but that is not necessarily the best spot to nail or paint. Hence, its a "finish LINE" not a finish POINT. I want the map to tell me where that line should be placed, not where your nail is (or was). For example, unless we have indicated a restriction, I would assume that the SPR Saturday dictated a measurement to the finish on the north side of the road - but I only observed one rider end up there.

That's the short story of my observations. I've made some technical assertions above. Please do not hesitate to slap me down if I am harboring misconceptions that we should discuss or am making a mountain out of a mole hill. I am already indebted to Bernie -- As a consequence of the unique exercise this weekend (with a rare sloped cal course). He has helped me to better understand the major causes and effects of slope on our measurement counts and what we must do to counteract that influence (always measure in both directions to hopefully negate the slope's impact on counts -- both on the cal course -- and road course).

This was the coolest thing I've gotten to do all summer! Thanks to all for making this invaluable experience possible.

Best regards, Jeff John, Buffalo, New York

End of this report - Thanks to all who came. It was my great pleasure to work with all of you.

What follows is supplementary material from Mike Wickiser, Bernie Conway and Jim Gilmer.

Best regards, Pete Riegel (riegelpeter1@gmail.com)

STEEL TAPE CAL COURSE PROJECT

Two overlapping calibration courses were set at 20' offset to aid in team checking of the course length. Teams used different length steel tapes, tensioning scales, and thermometers.

		Dave Rogers Oscar Wagner David Harriman	Brandon Wilson Bob Thurston	Winston Rasmussen Jeff John	Bill Grass Pam Garrett Jim Wilhelm	David Heithaus Don Standish
	Raw length, m	284.8	284.84	284.83	284.8	233.97
	Temp, F	96	88.25	86	87	108.00
Adjusted length	Calc by Team	284.753	284.877	284.863	285.025	234.03
Adjusted length	Calc by Pete	284.851	284.877	284.863	284.835	234.03
Adjusted length	Difference	0.098	0.000	0.000	-0.190	0.000
Comments		Adjusted wrong direction			Wrong adjustment value	Missing one tape length of 50.88 meters

from Bernie Conway:

You may recall at the beginning of my part of the workshop I suggested that it is easier to do the calculations if you use the accumulated counts. Below I have shown how I calculated.

My Constant of the Day 14089.90917 counts/km

Measured Point	Recorded Counts	Elapsed Counts	Distance (km)	
S/F	135000	0	0	
R4	138852	3852	0.273387142	
1 km	149087	14087	0.999793528	
2 mile	149892	14892	1.056926615 + Closed Loop (R4 to R4)	
1 mile	157772	22772	1.616192108	1 mile = 1.609344 km
R1	159632	24632	1.748201476	
Construction 50 m			1.798201476	
R2	160049	0	1.798201476* to be added to subsequent calculated distances	
2 km	163192	3143	2.021268918	
R3	168126	8077	2.371448606** use when return to R3	
R4	169274	9227	2.599555116***use when calculating Lap (R4 to R4)	
R3	170700	0	2.371448606	
S/F	173914	3214	2.599555116	This is the loop plus the tail

Loop (without the tail) is R4 to R4 2.599555116 – 0.273387142 = 2.179538214 km

2 mile 1.056926615 + 2.179538214 (R4 to R4) = 3.336464829 km

Add the Loop to the Loop plus the tail to get the overall distance

2.179538214 + 2.599555116 = 4.77909333 km

Therefore course is short 5.00000 – 4.77909333 = 0.22090667 km or 220.90667 m
Move S/F half that distance +110.453335 m
Add this distance to the km & mile points to find their new positions/distances

Measured Point	Old Distance	New Distance (km)	Adjustment Needed (m)
New Start	-110.453335 m	0	
Old Start	0	0,110453335	
1 km	0.999793528	1.1102468164	Remove 110.25 m
2 mile	3.336464829	3.346918164	Remove 128.23 m****
	Recall that 2 miles is 2 x 1.609344 km		
1 mile	1.616192108	1.726645443 km	Remove 117.30 m****
	Recall that 1 mile is 1.609344 km		
2 km	2.021268918	2.131722253	Remove 131.72

IAAF-AIMS Involvement

In early 2016 (February or March) I received a phone call from Mike Wickiser. Mike is the Validations Chair for the RRTC/USATF as well as the State Certifier for Ohio and Certifier of Foreign races. Mike suggested that the RRTC/USATF and the IAAF-AIMS host a Course Measurement Workshop for experienced Measurers. This Workshop would be for experienced Measurers who may or may not yet be IAAF-AIMS Measurers. Mike had run this idea past Gene Newman, Chairman of the RRTC (Road Running Technical Committee), and had Gene's approval as well as some funding for the Workshop. The reason for the Workshop was to set up a procedure to evaluate the measuring ability of a Measurer.

Normally Gene Newman would contact me when he had recommendations for USA Measurers he thought were ready to either become an IAAF-AIMS Grade B Measurer or to be upgraded to an IAAF-AIMS Grade A Measurer. This was appreciated by me since Gene, or his Vice-Chairs or State Certifiers know which Measurers have mastered the manipulation of measurement data and making of maps. I would then contact those individuals and ask if they were interested in becoming IAAF-AIMS Measurers and if they were I would ask them to send me 5-6 examples of their measurement data and maps. I would then review this measurement data and the maps. If I found their measurement data and maps of good enough quality I would then check the number of courses that they would have had certified. This was easily done since all USA certified road courses are available on-line on the RRTC website. If the number of races certified for that Measurer was sufficiently large and over several years I would then contact the Measurer again and make arrangements for him/her to ride with an IAAF-AIMS Grade A Measurer who would view his/her practical measuring ability. I thought this Workshop would be a way to facilitate this last step. At the IAAF-USATF/RRTC Course Measurement Seminar in Cayahoga Falls, Ohio myself and 3 other IAAF-AIMS Grade A Measurers (Mike Wichiser (Ohio), Jim Gilmer (NY) and Bob Thurston (Washington, DC) were able to view the practical measuring ability of 3 or 4 Measurers each. Should any of these be suggested by Gene Newman as IAAF-AIMS Measurers then this practical measurement requirement would be already complete. Pete Riegel, retired IAAF-AIMS Grade A Measurer, and former International Measurement Administrator for the Americas was also there and set up a spreadsheet to deal with the measurement data given by the Measurers at the Workshop to calculate information about adjustments to the start/finish line plus for various km splits. Those measuring at the Workshop had to calculate these values and Pete's spreadsheet would tell us how close they came to those answers. I therefore accepted with pleasure the invitation to attend this joint IAAF/AIMS-USATF/RRTC Workshop.

Not only did the Workshop attract several experienced but non IAAF-AIMS Measurers but also several IAAF-AIMS Grade A (see above) and Grade B Measurers. I was pleased to see Bill Grass (IAAF/AIMS Grade B) who drove from Texas and Dave Rogers (IAAF/AIMS Grade B) who drove from Tennessee). I had met and measured with Bill Grass in 1990 at the IAAF/AIMS-RRTC/USATF Workshop that had been held in Columbus, Ohio and I had met and measured with Dave Rogers at the USATF/RRTC Measurement of the Olympic Marathon and Race Walk courses in Atlanta in 1996. Other IAAF-AIMS Grade B Measurers attending the Cuyahoga Falls Workshop were Don Standish (Ohio), David Harriman (Indiana), Winston Rasmussen (Illinois) andBrandon Wilson (North Carolina), all recently appointed.

It was a pleasure to see so many dedicated Measurers who showed up for this Workshop. I believe this is a Workshop that should be replicated for not only other parts of the USA but could be used as a template for Workshops in other countries around the world.

Bernard Conway
IAAF-AIMS International Measurement Administrator for the Americas
IAAF-AIMS Grade A Measurer
RRTC/USATF – Final Signatory

IAAF-USATF/RRTC Measurement Seminar Report

This Measurement Seminar of came about with the approval of Gene Newman, USATF/RRTC Chairman and it is with thanks that this endeavor came to fruition. At inception, the goal was to gather a group of IAAF "B" approved measurers as well as veteran active measurers together with Bernard Conway, IAAF Administrator for the Americas. In that way several quality measurers could meet and measure with IAAF "A" measurers and the IAAF Administrator. Hopes were for increasing the number recognized IAAF approved measures.

Secondary to that was the opportunity for a group of committed measurers to gather, share ideas and experiences, techniques, problems, and network together. One of the key aspects of any gathering of likeminded individuals is the opportunity to share ideas and experiences and get to know one another.

It was pointed out by Jim Gilmer that such a gathering provided an opportunity to enhance the current method of evaluation for IAAF measurer recognition.

A standardized test procedure could be developed that would test the riding skill and calculation abilities of participants. The "test" consisted of team measurements of a calibration course, bike calibration and course measurement. The course was set as a 5km double loop with a common Start/Finish section away from the repeated loop. This provided an opportunity for several turns, a "construction" section not measurable by bike method, and both metric and mile splits on each of the two loops.

A method was developed for all data from a single ride of the course to calculate splits and total distance. The test questionnaire is included in the Power Point section of this report. The questions required measurers to build the total course from several segments with predetermined data points. This was intentionally made somewhat tricky in that an the evaluation could reveal a measurer's ability to ride properly but also calculate a difficult course accurately. There have been comments regarding the complexity of the calculations and methodology of the course. Those comments are a key part of the development process and will weigh heavily on any future evaluation driven seminars.

The goals of this seminar were achieved in that a group of 16 experienced course measurers came together for the expressed intent of improving Certified Course Measurement. The actual measurement and "testing" method will be reviewed, evaluated, and modified to improve effectiveness.

In conclusion, I would like to thank Pete Riegel, Jim Gilmer, and Bernie Conway for their ideas, work and assistance in the development of this IAAF-USATF/RRTC Measurement Seminar.

Mike Wickiser

IAAF-USATF/RRTC Measurement Seminar Report — Cuyahoga Falls

By: Jim Gilmer

This seminar was designed and offered to veteran measurers as an exercise in in-service training for the purpose of demonstrating one's measurement skill as pre-condition of being considered for elevation in IAAF grade status. My report on the seminar is offered from the perspective of its validity as a tool in assessing measurer proficiency and its reproducibility in other settings. That is, I'm less concerned with experienced measurers undoing "bad habits" or learning "new tricks" than I am with having participants demonstrate a high level of consistency in measurement skill in a practical, "on demand" problem-solving in a test-like environment. My review is also concerned with the "portability" of this kind of exercise in other locations by a different set of instructors.

Measuring measurers: getting the balance right. IAAF's current practice of assessing measurers for the purpose of assigning a "grade" status is largely based on journeyman-style method of direct observation in an active measurement situation where a higher grade measurer observes the methods and actions of the aspiring candidate measuring. An "A" measurer who has worked on measuring a course or courses with a "B" measurer, for instance, is asked to provide his/her subjective assessment of the quality of the "B" measurer's work. No doubt, this is an important and valid way to assess another's skill level — and should not be discarded — but it does have its limitations. For one, these assessments usually result from "real life" working measurements where the higher grade measurer assumes a mentor role in what often turns into a team effort to complete the work. As such, there is little room to provide an objective or critical quality of the candidate measurers' assessment.

In contrast, this training seminar was designed to simulate a "field test" situation in which the prospective candidates were required to "prove their mettle" under some degree of situational stress — whether in correctly measuring a calibration course, accurately completing the calculations of the test course measurement, or independently solving problems *in situ* during the measurement. This seminar was an initial attempt at devising a set of valid test standards around which a "best practices" curriculum could be developed. As a first step toward this end, the seminar should be considered a success, but as the insightful comments of the participants revealed, there is much room for improvement.

Consequently, I think that in further developing this concept, we should focus our efforts on answering the following questions:

1. ***What core skills <u>need</u> to be tested in a simulated measurement?*** Basic course measurement skills should be reviewed, certainly, but perhaps a greater emphasis should to be placed on gauging the participant's understanding of the logic or rationale that underlies a procedure or technique.
2. ***What skill can be <u>reasonably</u> assessed in a one-day field test setting?*** Map rendering, for instance, cannot fit within this time frame, nor should it. Mapping skills can be adequately assessed as part of a portfolio review in considering the upgrading of a candidate measurer's grade status. What needs to be delineated in responding to this question, however, are the <u>specific skills</u> of field measurement – whether cal course or road/race walk course – that "A" or "B" grade measures must master. Then field testing objective can be designed around these required skills.
3. ***How can reproducibility of the test setting be ensured across different venues, environments, and instructors?*** A significant amount of preparation time for this field seminar went into setting up anappropriate course. Any reproduction of this seminar would likely have to address similar problems, such as the proximity of the "classroom" to the "field site" (course), ability of the field site to handle multiple participants, etc. In addition, in order to enhance the "objectivity" of a test setting, different instructors would have to be provided with a relative stable set of requirements from which little deviation would be allowed. Preferably, instructors would have experience in participating in this kind of test setting or at least would have access to an "instructor's manual" which would offer a practical guide for setting up and carrying out this style of seminar.

Obviously, the Cuyahoga Falls "experiment" is a first step toward articulating a workable curriculum that embodies a set of standards for demonstrating one's mastery of the craft of course measurement. Hopefully, the RRTC will be able to build upon this foundation so that the transmission of "best practices" can be normalized as part of a larger operation of succession planning as a new measurers comes into their own so that the "measurement wheel" – pardon the pun – will not have to be reinvented with every generation.