INTERNATIONAL AMATEUR ATHLETIC FEDERATION

# INTERNATIONAL ROAD COURSE MEASUREMENT SEMINAR

**Manaus, Amazonas - BRASIL**

## I CURSO TELEBRÁS DE MEDIÇÂO DE CORRIDAS DE RUA

**03 e 04 de junho de 1995**

**Manaus - Amazonas - Brasil**

CONFEDERACION SUDAMERICANA DE ATLETISMO

INTERNATIONAL
AMATEUR
ATHLETIC
FEDERATION

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June 14, 1995

Roberto Gesta de Melo
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BRASIL

Dear Roberto,

Attached is the report of the Manaus measurement seminar.

It was a very satisfying seminar for me. The delegates showed great interest in learning the techniques, and I am certain that they will continue to show the same improvement they showed at the seminar.

I was particularly pleased to see the change in mood from day 1 to Day 2. On the first day, the measurers were nervous and uncertain. On the second day, they were more confident, and their spirits were high. There was laughter and camaraderie. This is the way measurement should be. Measurers should enjoy the process. There is no need to be afraid of it. I am very happy that the class was able to achieve this degree of relaxation.

The improvement from Day 1 to Day 2 was very noticeable. Almost every measurer did better on the second day. If they continue to measure, they will continue to improve. Practice makes perfect.

I made a mistake on the first day, and I have included it in the report, so that the measurers can see that everybody makes mistakes, not just beginners. Making a mistake is not serious, but it must be found and corrected.

My sincere thanks to you for the opportunity to enjoy your hospitality once again. If I may be of further assistance, please contact me again.

Warmest regards,

Pete Riegel

# I CURSO TELEBRÁS DE MEDIÇÂO DE CORRIDAS DE RUA
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# IAAF MEASUREMENT SEMINAR

## Organization of the Seminar

The seminar was organized by Roberto Gesta de Melo, President of *Confederacion Sudamericana de Atletismo*, and also President of *Confederaçâo Brasileira de Atletismo*. He contacted me early this year, and we worked together to create a plan and a schedule. When I arrived I saw that he had prepared a dossier for each participant, explaining the schedule and what was to be done on the weekend.

## The Venue

The seminar was held at *Vila Olimpica* in Manaus for classroom instruction. For the bicycle measurements, a course of approximately 2.5 km was established in *Jardim das Americas*, a quiet residential area of Manaus with little traffic. The course was a loop, with start and finish in front of the residence of Roberto Gesta de Melo. The driveway of the residence was used for setup of the Jones Counters on the bicycles, and for calculations, where the shade was appreciated by the participants. The course is shown on the sample data sheets contained elsewhere in this report.

## Preliminary Preparation

Before the seminar, a general outline of the work, and a statement of requirements, was sent to Mr. Gesta de Melo. It may be seen in the appendix to this report.

Upon arriving in Manaus, I was taken to *Jardim das Americas* to inspect the venue. It was well-suited to the needs of the seminar. I prepared a map of the course, so that students would have something to follow as they measured, to assure that they would not get lost. I prepared calculation sheets to guide the students in the proper calculation of their figures. Copies of maps and forms were made for distribution to the students.

## Conduct of the Seminar

**Saturday, June 3** - Participants assembled in the auditorium of *Vila Olimpica*. The group was greeted by Roberto Gesta de Melo. I was introduced, and made some preliminary remarks. I was assisted in this by Carlos Cavalheiro and Gabriel Monteiro, who both speak English. Upon completion of the introduction, we moved outside to the roadway outside the *Vila Olimpica* hotel.

On a straight portion of the roadway I put two nails in the road and asked the participants to use 30 m steel tapes, and to measure the distance between the nails. Results of the measurements were:

| | | |
|---|---|---|
| 101.37 | 101.43 | 101.37 |
| 101.39 | 101.40 | 101.42 |

From these results, and observations of the techniques used by the participants, I concluded that they were well-grounded in taping technique, and needed no further instruction. I briefly discussed temperature correction, and told them it could be safely ignored if the temperature was above 20C. I told them if the temperature was less, to use the table in the IAAF book **The Measurement of Road Race Courses**. I gave each participant a copy of this book, in English.

After lunch all participants were taken to the home of Roberto Gesta de Melo, where the bicycles awaited. As requested, there was a bicycle for each two participants, giving 6 bicycles, and one for me, as instructor. However, two of the bicycles had front forks which were unable to accept a Jones Counter. Therefore we had four bicycles to measure with. Later in the afternoon two more bicycles were brought to the site, and counters mounted.

I asked the participants to establish two calibration courses, so that one-way calibration could be done, to eliminate interference. Results of these measurements may be seen at the end of this report. One of the courses had bad agreement between the two measurements. For the sake of saving time I was willing to accept the measurement, but the participants wished to check again. This I saw as a very good sign - they had the correct attitude - when in doubt, check your work.

Four participants took bicycles with counters, and I led them on a tour of the course, demonstrating a correct measurement line. The participants then did four calibration rides, measured the course from start to finish (including two intermediate points) and did four more calibration rides. Then the measurers did their calculations. A new set of measurers then took the bicycles, and repeated the procedure until everybody had measured the course. The work concluded at 17:30, just before dark.

I asked the measurers to give me their results. I made copies for use in this report, and made a summary graph of the results of the day's work. I returned their sheets to them, and I gave them a copy of my own sheet. This is fair - if I am to see their work, they are entitled to see mine.

Although I did not know it at the time, I had made a mistake on my calculation sheet. I had correctly recorded my counts in my notes, but when I transcribed the notes to my data sheet I transposed a number incorrectly - the correct 34584 became 34854. This had no effect on my overall measurement, but affected the calculated lengths of two intermediate distances. None of the participants mentioned that they noticed the error - perhaps out of politeness.

On Saturday night we all met at Roberto's home for a Brasilian barbecue - delicious.

**Sunday, June 4**

On Sunday morning we met in the auditorium, where I discussed the results of Saturday's work. I stated that some of the measurements could be improved, and emphasized the importance of the 30 cm offset from corners, and tangents between. Gabriel Monteiro, a highly experienced measurer, explained this in Portuguese. We then went again to *Jardim das Americas*. This time we had no calibration course to lay out, as they had already been established. The mood this day was much less nervous than on Saturday. The measurers were much more sure of themselves, and the measurement results showed a great improvement. The spirit of competitiveness was present, and people appeared to be taking pleasure in the exercise.

I collected the data sheets, made copies for this report, and returned the sheets to the measurers, again giving them a copy of my own sheet. This time I made no mistakes.

After lunch we met in the auditorium, where I congratulated the measurers on their good results. Roberto Gesta de Melo then awarded each measurer a certificate creating them IAAF Course Measurer, Grade C, authorized to measure race courses in Brasil.

After the ceremony, the measurers remained to discuss various aspects of measurement, such as how to calculate split points, purpose of the 1.001 safety factor, and other miscellaneous matters.

Several measurers left for their homes. The remaining measurers came again to Roberto's home for dinner and animated discussion. My impression was that the people felt they had a worthwhile experience.

## Discussion of Results

Results of the measurements are shown following this report. Included are:

1) List of Measurers
2) Summary of Measurements
3) Results from Day 1
4) Results from Day 2
5) Pete Riegel's data sheets from Day 1, showing the map of the course
6) Sample Certificate

On return home, I used the counts obtained by each measurer to correctly calculate each distance, using a computer. Sometimes the computer value does not agree with the value that was calculated by the measurer. In these cases, the measurer made some sort of mistake. Some common mistakes were:

1) Transposing numbers (this was my mistake on day 1)
2) Rounding off calibration figures prematurely
3) Incorrect calculation of calibration figures
4) Incorrect calculation of distances

Each measurer should study his numbers, and compare them to the computer calculations. Where there is a difference, checking the calculations will discover the reason for the difference.

**What is the length of the course?** No one can say with certainty, but my estimate is 2750 metres. Measurers PR, GM, HM, CC, WM, AR and FJ had numbers in reasonable agreement with this. The rest of the measurers will improve with more practice. In only one day we saw an enormous improvement - more riding practive will certainly improve each measurer's riding.

I believe that all participants have now learned the most important part of course measurement - the riding of a tight, correct line. All the calculation in the world cannot correct a bad measurement. The participants are ready for more measurement work.

**A Personal Note**

I had a wonderful time conducting this seminar. All of the measurers were enthusiastic and eager to learn, and many perceptive questions were asked. This is a good sign - an inquiring mind will learn quickly. The improvement between Day 1 and Day 2 was impressive. I was very happy to see it. I am confident that as the measurers work in Brasil they will do good work.

My thanks to Carlos Cavalheiro, who did most of the preliminary organizing in Manaus, and to Gabriel Monteiro, whose experience was of great benefit in explaining things to the measurers which I was unable to do, because I do not speak Portuguese.

Special thanks to my hosts, Roberto Gesta de Melo and his wife Conceicâo, whose generosity and hospitality made the seminar a great success.

Respectfully submitted,

Peter S. Riegel
IAAF Road Course Measurement Area Administrator
Western Hemisphere

Copies of this report sent to:

Roberto Gesta de Melo
All seminar participants
Pierre Weiss, General Director, IAAF
Area Measurement Administrators
Jean-Francois Delasalle
John Disley
Ted Paulin

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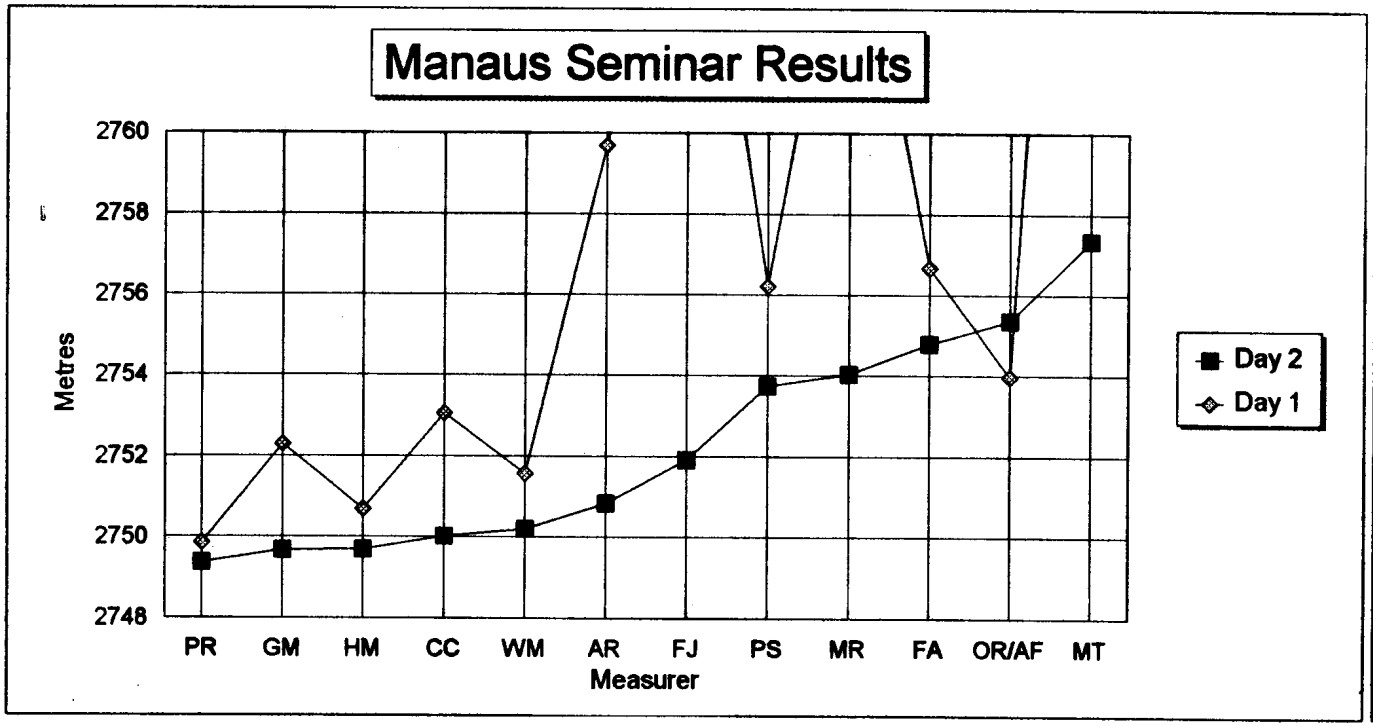
| | S/F - R1 Day 1 | S/F - R1 Day 2 | R1 - R2 Day 1 | R1 - R2 Day 2 | R2 - S/F Day 1 | R2 - S/F Day 2 | S/F- S/F Day 1 | S/F- S/F Day 2 |
|---|---|---|---|---|---|---|---|---|
| PR | 757.02 | 757.16 | 694.81 | 694.76 | 1298.02 | 1297.45 | 2749.85 | 2749.37 |
| GM | 757.36 | 756.90 | 695.54 | 694.86 | 1299.38 | 1297.93 | 2752.29 | 2749.69 |
| HM | 757.53 | 757.14 | 694.93 | 694.47 | 1298.23 | 1298.08 | 2750.69 | 2749.70 |
| CC | 758.16 | 757.48 | 695.65 | 694.55 | 1299.26 | 1298.00 | 2753.07 | 2750.03 |
| WM | 757.93 | 756.86 | 694.84 | 695.06 | 1298.79 | 1298.28 | 2751.57 | 2750.20 |
| AR | 757.63 | 757.79 | 699.13 | 697.12 | 1302.93 | 1295.93 | 2759.69 | 2750.84 |
| FJ | 761.11 | 759.03 | 691.64 | 715.20 | 1316.19 | 1277.70 | 2768.93 | 2751.92 |
| PS | 758.93 | 757.54 | 695.74 | 695.54 | 1301.55 | 1300.67 | 2756.22 | 2753.75 |
| MR | 759.49 | 755.10 | 702.45 | 740.58 | 1304.99 | 1258.37 | 2766.93 | 2754.05 |
| FA | 758.81 | 759.09 | 697.07 | 696.06 | 1300.79 | 1299.64 | 2756.67 | 2754.80 |
| OR/AF | 759.17 | 758.37 | 696.87 | 697.38 | 1297.95 | 1299.61 | 2753.98 | 2755.36 |
| MT | 762.33 | 760.87 | 712.06 | 696.28 | 1309.17 | 1300.19 | 2783.56 | 2757.34 |




**Calibration Variation**

Each measurer takes 4 rides to complete a calibration. In the ideal, there will be no variation. With experience, a measurer will approach the ideal. Here is the average variation for each measurer:

| | Day 1 | Day 2 |
|---|---|---|
| GM | 2.5 | 0 |
| OR/AF | 1.5 | 1 |
| PS | 2.5 | 1.5 |
| FJ | 4.5 | 2.5 |
| PR | 2.5 | 2.5 |
| AR | 5 | 2.75 |
| CC | 5 | 3 |
| HM | 3.5 | 3.75 |
| WM | 3 | 3.75 |
| MT | 1.5 | 4 |
| FA | 4.5 | 4.5 |
| MR | 8 | 6.5 |

**Note the large improvement from Day 1 to Day 2!**

## Measurements performed at Manaus, AM, Brasil on 3 June 1995 - Day 1

**Calibration Course Layout:**

One course was laid out at 300 m. A check measurement showed a length of 299.96 m. This was acceptable.
A nail was set at the average point. No correction was made for temperature.

The second course was laid out at 300 m. A check measurement showed 300.17 m. The difference was too large, so another check was performed.
It showed 300.03 m, which was acceptable.
A nail was set at the average point between 300 and 300.03. No temperature correction was made.

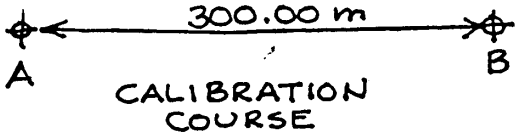
Note: If the temperature of the tape is assumed to be 35C, the temperature correction would be 5.2 cm. The calibration courses could be shortened by this amount.

| | PR | WM | GM | FJ | OR/AF | CC | AR | PS | MR | MT | FA | HM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cal 1 | 3527 | 3524.5 | 3510 | 3527 | 3526 | 3496 | 3536 | 3487 | 3508 | 3531 | 3546 | 3521 |
| Cal 2 | 3525.5 | 3523.5 | 3510 | 3525 | 3525 | 3491 | 3532 | 3486 | 3506 | 3529 | 3543 | 3516 |
| Cal 3 | 3527.5 | 3523 | 3510 | 3524 | 3526 | 3491 | 3532 | 3484 | 3510 | 3530 | 3544 | 3519 |
| Cal 4 | 3524.5 | 3524.5 | 3510 | 3524 | 3525 | 3489 | 3530 | 3486 | 3505 | 3529 | 3542 | 3516 |
| Constant Calculated by Student | 11.76550 | 11.75841 | 11.71170 | 11.76175 | 11.76342 | 11.65080 | 11.78900 | 11.63079 | 11.70252 | 11.77677 | 11.82431 | 11.73839 |
| Constant Calculated by Computer | 11.76550 | 11.75800 | 11.71170 | 11.76175 | 11.76342 | 11.65081 | 11.78678 | 11.63079 | 11.70252 | 11.77760 | 11.82431 | 11.73839 |
| Cal 5 | 3528 | 3528 | 3511 | 3523 | 3528 | 3490 | 3527 | 3487 | 3509 | 3531 | 3547 | 3521 |
| Cal 6 | 3526 | 3524 | 3508 | 3526 | 3526 | 3490 | 3528 | 3486 | 3510 | 3530 | 3542 | 3520 |
| Cal 7 | 3528 | 3527 | 3513 | 3521 | 3527 | 3490 | 3530 | 3485 | 3520 | 3530 | 3545 | 3521 |
| Cal 8 | 3526.5 | 3523.5 | 3508 | 3527 | 3526 | 3487 | 3526 | 3485 | 3509 | 3530 | 3543 | 3519 |
| AverageCalibration Variation for 4 Rides | 2.5 | 3 | 2.5 | 4.5 | 1.5 | 5 | 5 | 2.5 | 8 | 1.5 | 4.5 | 3.5 |
| Constant Calculated by Student | 11.76884 | 11.75175 | 11.71170 | 11.76175 | 11.76759 | 11.64240 | 11.77200 | 11.63079 | 11.71839 | 11.77927 | 11.82598 | 11.74590 |
| Constant Calculated by Computer | 11.76884 | 11.76384 | 11.71170 | 11.75925 | 11.76759 | 11.64246 | 11.77093 | 11.63079 | 11.71837 | 11.77927 | 11.82598 | 11.74590 |
| Constant for Day - by Student | 11.76717 | 11.77008 | 11.71170 | 11.76175 | 11.76550 | 11.64600 | 11.78100 | 11.63079 | 11.71044 | 11.77802 | 11.82515 | 11.74214 |
| Constant for Day - by Computer | 11.76717 | 11.76092 | 11.71170 | 11.76050 | 11.76550 | 11.64664 | 11.77885 | 11.63079 | 11.71045 | 11.77843 | 11.82515 | 11.74215 |
| S/F | 17500 | 54171 | 66300 | 70578 | 64022 | 8378 | 20000 | 41473 | 58150 | 72185 | 84081 | 19031 |
| R1 | 26408 | 63085 | 75170 | 79529 | 72954 | 17208 | 28924 | 50300 | 67044 | 81164 | 93054 | 27926 |
| R2 | 34584 | 71257 | 83316 | 87663 | 81153 | 25310 | 37159 | 58392 | 75270 | 89551 | 101297 | 36086 |
| S/F | 49858 | 86532 | 98534 | 103142 | 96424 | 40442 | 52506 | 73530 | 90552 | 104971 | 116679 | 51330 |
| S/F to R1 - by Student | 757.02 | 757.35 | 757.36 | 761.02 | 759.17 | 758.20 | 757.49 | 758.93 | 759.49 | 762.35 | 758.80 | 757.53 |
| S/F to R1 - by Computer | 757.02 | 757.93 | 757.36 | 761.11 | 759.17 | 758.16 | 757.63 | 758.93 | 759.49 | 762.33 | 758.81 | 757.53 |
| R1 to R2 - by Student | 717.76 | 694.30 | 695.54 | 691.56 | 696.87 | 695.69 | 699.00 | 695.74 | 702.45 | 715.09 | 697.07 | 694.93 |
| R1 to R2 - by Computer | 694.81 | 694.84 | 695.54 | 691.64 | 696.87 | 695.65 | 699.13 | 695.74 | 702.45 | 712.06 | 697.07 | 694.93 |
| R2 to S/F - by Student | 1275.07 | 1297.79 | 1299.38 | 1316.04 | 1297.95 | 1299.33 | 1302.69 | 1301.55 | 1304.98 | 1309.22 | 1300.78 | 1298.23 |
| R2 to S/F - by Computer | 1298.02 | 1298.79 | 1299.38 | 1316.19 | 1297.95 | 1299.26 | 1302.93 | 1301.55 | 1304.99 | 1309.17 | 1300.79 | 1298.23 |
| S/F to S/F - by Student | 2749.85 | 2749.44 | 2752.28 | 2768.62 | 2753.98 | 2753.19 | 2759.18 | 2756.22 | 2766.92 | 2783.66 | 2756.65 | 2750.69 |
| S/F to S/F - by Computer | 2749.85 | 2751.57 | 2752.29 | 2768.93 | 2753.98 | 2753.07 | 2759.69 | 2756.22 | 2766.93 | 2783.56 | 2756.67 | 2750.69 |

Note the mistake made by the instructor, PR. In his original notes, he recorded 34584 counts at R2.
When he filled out his calculation sheet, he wrote 34854 counts at R2. This caused errors in the calculated distance between R1 to R2 and R2 to S/F. It did not affect the S/F to S/F distance. This is a common mistake.

**Measurements performed at Manaus, AM, Brasil on 4 June 1995 - Day 2**

| | PR | WM | GM | FJ | OR/AF | CC | AR | PS | MR | MT | FA | HM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cal 1 | 3517.5 | 3520.5 | 3507 | 3523 | 3518 | 3521 | 3530 | 3514.5 | 3508 | 3529 | 3502 | 3519.5 |
| Cal 2 | 3515 | 3518.5 | 3507 | 3519 | 3518 | 3517 | 3528 | 3515.5 | 3507 | 3525 | 3497 | 3515.5 |
| Cal 3 | 3517.5 | 3521.5 | 3507 | 3523 | 3518 | 3521 | 3527 | 3514.5 | 3510 | 3527 | 3498 | 3519 |
| Cal 4 | 3515 | 3519.5 | 3507 | 3523 | 3518 | 3520 | 3526 | 3514.5 | 3508 | 3525 | 3500 | 3515.5 |
| Constant Calculated by Student | 11.73255 | 11.74507 | 11.70169 | 11.74674 | 11.73839 | 11.74423 | 11.77092 | 11.72755 | 11.69417 | 11.76676 | 11.67583 | 11.73629 |
| Constant Calculated by Computer | 11.73255 | 11.74507 | 11.70169 | 11.75174 | 11.73839 | 11.74423 | 11.77093 | 11.72755 | 11.70586 | 11.76676 | 11.67583 | 11.73631 |
| Cal 5 | 3516.5 | 3524.5 | 3507 | 3521 | 3518 | 3521 | 3525.5 | 3513 | 3506 | 3528 | 3502 | 3519.5 |
| Cal 6 | 3514 | 3521.5 | 3507 | 3520 | 3518 | 3519 | 3526.5 | 3513 | 3505 | 3524 | 3499 | 3516 |
| Cal 7 | 3515.5 | 3522.5 | 3507 | 3520 | 3519 | 3520 | 3527 | 3513 | 3501 | 3528 | 3501 | 3519.5 |
| Cal 8 | 3514.5 | 3520 | 3507 | 3521 | 3520 | 3519 | 3526 | 3515 | 3511 | 3526 | 3498 | 3516 |
| AverageCalibration Variation for 4 Rides | 2.5 | 3.75 | 0 | 2.5 | 1 | 3 | 2.75 | 1.5 | 6.5 | 4 | 4.5 | 3.75 |
| Constant Calculated by Student | 11.72880 | 11.75174 | 11.70169 | 11.75174 | 11.74090 | 11.74423 | 11.76592 | 11.72338 | 11.69752 | 11.76676 | 11.67833 | 11.73756 |
| Constant Calculated by Computer | 11.72880 | 11.75216 | 11.70169 | 11.74674 | 11.74090 | 11.74423 | 11.76592 | 11.72338 | 11.69752 | 11.76676 | 11.67833 | 11.73756 |
| Constant for Day - by Student | 11.73068 | 11.74840 | 11.70169 | 11.74924 | 11.73964 | 11.74423 | 11.76842 | 11.72546 | 11.69584 | 11.76676 | 11.67708 | 11.73693 |
| Constant for Day - by Computer | 11.73068 | 11.74861 | 11.70169 | 11.74924 | 11.73964 | 11.74423 | 11.76842 | 11.72546 | 11.70169 | 11.76676 | 11.67708 | 11.73693 |
| S/F | 7000 | 41459 | 45000 | 35560 | 72648 | 51130 | 74000 | 3624 | 40352 | 65957 | 82309 | 66165 |
| R1 | 15882 | 50351 | 53857 | 44478 | 81551 | 60026 | 82918 | 12506.5 | 49188 | 74910 | 91173 | 75051.5 |
| R2 | 24032 | 58517 | 61988 | 52881 | 89738 | 68183 | 91122 | 20662 | 57854 | 83103 | 99301 | 83202.5 |
| S/F | 39252 | 73770 | 77176 | 67893 | 104995 | 83427 | 106373 | 35913 | 72579 | 98402 | 114477 | 98438 |
| S/F to R1 - by Student | 757.16 | 756.87 | 756.90 | 759.00 | 758.37 | 757.43 | 757.79 | 757.54 | 755.48 | 760.87 | 759.09 | 757.14 |
| S/F to R1 - by Computer | 757.16 | 756.86 | 756.90 | 759.03 | 758.37 | 757.48 | 757.79 | 757.54 | 755.10 | 760.87 | 759.09 | 757.14 |
| R1 to R2 - by Student | 694.76 | 695.07 | 694.86 | 715.10 | 697.38 | 694.55 | 697.12 | 695.54 | 740.94 | 696.29 | 696.06 | 694.47 |
| R1 to R2 - by Computer | 694.76 | 695.06 | 694.86 | 715.20 | 697.38 | 694.55 | 697.12 | 695.54 | 740.58 | 696.28 | 696.06 | 694.47 |
| R2 to S/F - by Student | 1297.45 | 1298.30 | 1297.93 | 1277.60 | 1299.61 | 1297.99 | 1295.92 | 1300.67 | 1258.99 | 1300.19 | 1299.64 | 1298.08 |
| R2 to S/F - by Computer | 1297.45 | 1298.28 | 1297.93 | 1277.70 | 1299.61 | 1298.00 | 1295.93 | 1300.67 | 1258.37 | 1300.19 | 1299.64 | 1298.08 |
| S/F to S/F - by Student | 2749.37 | 2750.24 | 2749.69 | 2751.70 | 2755.36 | 2750.00 | 2750.83 | 2753.75 | 2755.41 | 2757.35 | 2754.80 | 2749.69 |
| S/F to S/F - by Computer | 2749.37 | 2750.20 | 2749.69 | 2751.92 | 2755.36 | 2750.03 | 2750.84 | 2753.75 | 2754.05 | 2757.34 | 2754.80 | 2749.70 |




NAME
PETE RIEGEL
DAY 1

| | | B-A |
|---|---|---|
| A | 01630 | 3527 |
| B | 05157 | |
| A | | 3525.5 |
| B | 08682.6 | |
| A | | 3527.5 |
| B | 12210 | |
| A | | 3524.5 |
| B | 15734.5 | |

AVERAGE
3526.125 | C

CONSTANT = $1.001 \times \frac{C}{300}$

= 11.7655 | $C_1$ COUNTS/m

$C_1$ = LAYOUT CONSTANT

| | | B-A |
|---|---|---|
| A | 51500 | 3528 |
| B | 55028 | |
| A | | 3526 |
| B | 58554 | |
| A | | 3528 |
| B | 62082 | |
| A | | 3526.5 |
| B | 65608.5 | |

AVERAGE
3527.125 | C

CONSTANT = $1.001 \times \frac{C}{300}$

= 11.76884 | $C_2$ COUNTS/m

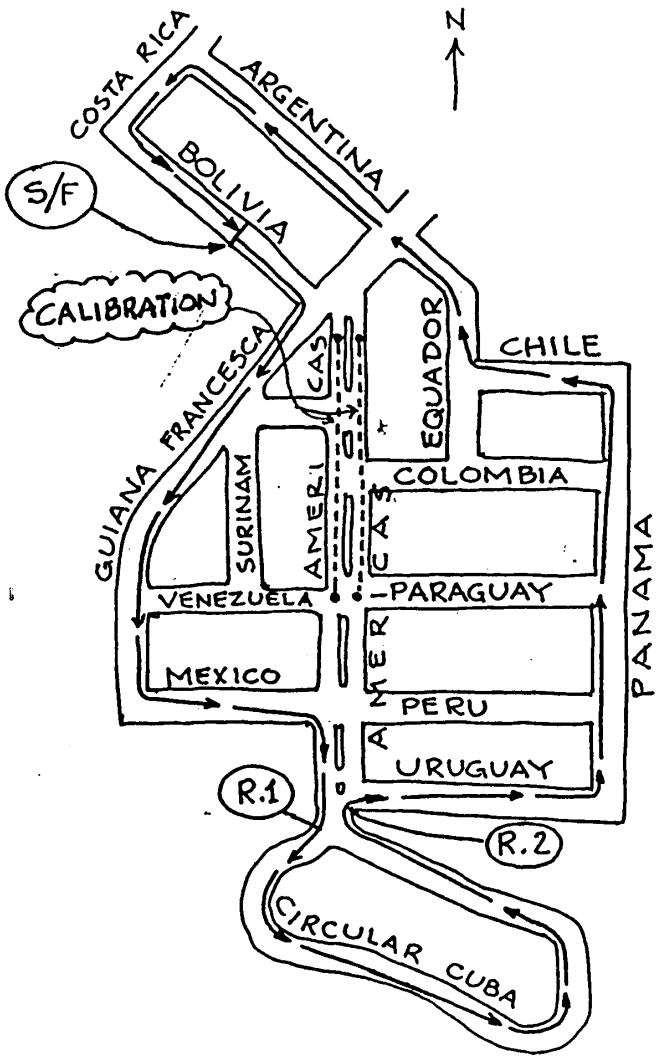
$C_2$ = FINISH CONSTANT

DAY'S CONSTANT = $\frac{C_1 + C_2}{2}$

= 11.76717 | $C_3$

National Brand
42-382 100 SHEETS EYE-EASE® 5 SQUARE
42-389 200 SHEETS EYE-EASE® 5 SQUARE
42-392 100 RECYCLED WHITE 5 SQUARE
42-399 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.

# MEASUREMENT DATA




| | COUNTER READING | INTERVAL COUNTS | INTERVAL METRES |
|---|---|---|---|
| S/F | 17500 | | |
| | | 8908 | 757.02 |
| R.1 | 26408 | | |
| | | 8446 | 717.76 |
| R.2 | 34854 | | |
| | | 15004 | 1275.07 |
| S/F | 49858 | | |

LENGTH OF COURSE, m = 2749.85

ERROR

01630
05157
09682.5
12210
15734.5

Day 1

S/F 17500
R1 26408
R2 34584
S/F 49858

51500
55028
58554
62082
65608.5

3526.625 11.76717

2749.85

ORIGINAL NOTES

NAME
PETE RIEGEL
DAY 1

INTERNATIONAL
AMATEUR
ATHLETIC
FEDERATION

**INTERNATIONAL ROAD COURSE**

**MEASUREMENT SEMINAR**

**Manaus - Amazonas - Brasil**

# THIS IS TO CERTIFY

The following delegate, having successfully completed the basic practical sessions, and also mastered the fundamental techniques relating to calibration using the bicycle/Jones Counter method approved by the IAAF, is hereby appointed

## IAAF COURSE MEASURER, GRADE C

Name: _____

Country: _____

**SAMPLE CERTIFICATE**

The above named measurer has authority to measure road race courses within the above named country.

Signed: Peter S. Riegel Date: 04/06/95

PETER S. RIEGEL
IAAF Road Race Course Measurement Administrator
Western Hemisphere

Renato Altos de Melo

ROBERTO GESTA DE MELO
President of the South American Athletic Confederation

INTERNATIONAL
AMATEUR
ATHLETIC
FEDERATION

Peter S. Riegel
3354 Kirkham Road 614-451-5617 (Telephone)
Columbus, OH 43221-1368 614-451-5610 (FAX)
USA

Road Race Course Measurement Administrator
Western Hemisphere

January 20, 1995

Mr. Roberto Gesta de Melo - Confederación Sudamericana de Atletismo
Av. 7 de Setembro, 874 - Manaus 69005-140 - Amazonas - BRASIL

Dear Roberto, by FAX: 55 92 656 5345

**PROPOSED ORGANIZATION FOR MEASUREMENT SEMINAR**

**First Session - 4 Hours**
Mutual introduction of participants - general principles of measurement - simple calculation exercises - layout of a calibration course.

**Second Session - 4 Hours**
Introduction to the Jones Counter - mount counters to bicycles - demonstration of riding by instructor - layout of test course by instructor - measurements by some students - instructor demonstrates the calculations.

**Third Session - 4 Hours**
Participants measure the test course and do calculations. Instructor helps with calculations when needed. Discussion of things to be covered in last session.

**Fourth Session - 4 Hours**
This session will cover topics of interest that were raised in the three previous sessions, and will summarize what was taught in the first three sessions.

The above outline is only approximate, since I do not know anything about where I will be teaching nor what is available there.

On the enclosed page are some things the students should study, so that they arrive at the seminar ready to learn. Please see that each student receives a copy well before the seminar. If you can provide a translation, so much the better. If they can master these simple calculations, they will be ready for the course of instruction. I will mail to you enough copies of the IAAF book **The Measurement of Road Race Courses** before the seminar. Each student should receive the book before the seminar. They should study the book **before** they arrive. Let me know how many books will be needed.

Here are things that the organizer must provide:

- **1) The venue** The seminar should have 5 km of traffic-free roads for use by the students. If 5 km is not avaliable, we can do with less. Consult with me on this if you have questions. Near to the seminar should be shelter from the weather, with tables. The students will use the tables for paper work and calculations. I will use the shelter as a place to instruct the students. The students should be prepared to ride bicycles even if it is raining.

- **2) Two steel tapes** of at least 30 metres length.

- **3) Bicycles** for students (and instructor) to use. There should be at least one bicycle for each two students, plus one for the instructor. If you have 16 students, you will need nine bicycles at a minimum. Be sure the front forks can accommodate a Jones Counter. Some mountain bikes have fat front forks. It is difficult to mount a counter on such forks.

- **4) A Jones Counter for every student.** After the seminar they will take their counters home and use them for measuring.

- **5) Chalk for marking pavement.** Several colors would be desirable.

- **6) Plenty of paper and pencils** for the students.

- **7) A calculator for each student** (have them each bring one).

- **8) A hammer and some nails** for making a calibration course.

- **9) Paint** for marking the pavement.

- **10) A classroom area with a blackboard**. This may be outside - it may be more pleasant than inside - I do not know.

I am hoping we can use a short (5 km is a good size) piece of traffic-free road for the instructional riding. If 5 km is not available, we can do multiple laps within a smaller venue. If you are not sure whether your venue will be suitable, consult with me. Most important is that it be traffic-free. The length is of lesser importance. It need not be measured ahead of time - I can do that as part of the instruction, while the people watch me.

While one group rides, I can instruct the other group. When everybody has recorded their own data, I will go through the calculation of my own data. They can then use it as an example of how to calculate their data.

I intend to be brief in my introductory remarks, and to get everybody on their bikes getting data as soon as possible, after we lay down two calibration courses. After they have ridden and calculated, they will better understand what I will say to them. Of course, a question will be welcome at any time.

If you have any questions, please get in touch. I look forward to working with you again.

Best regards, Pete

## STUDY FOR PROSPECTIVE MEASURING STUDENTS

Most important - road course measurement is done using a bicycle with a calibrated front wheel. The bicycle must be skillfully ridden over the proper line, or the data will be without value. **If you do not know how to ride a bicycle, practice until you do.**

The front wheel is calibrated by riding it along a straight piece of road on which an accurate distance has been laid out. Wheel revolutions are counted over the known distance, and these values are used in laying out new courses and checking unknown distances. The device that counts the wheel revolutions is called a Jones Counter. Jones counters record 20to 26 counts for every complete revolution of the wheel.

Study these examples, and become familiar with these calculation procedures:

Example 1

You have laid out a 400 m calibration course. You ride the bicycle over its entire length. The counter reads 37000 at the start and 40681 at the finish.

1) How many counts did you record during the ride of 400 metres?
   **Answer:** 40681 - 37000 = 3681 counts for 400 metres

2) How many counts will you accumulate if you ride 1 km?
   **Answer:** 3681 / 400 = 9.2025 counts per metre = 9202.5 counts per kilometre.

3) How many counts in 5 km? **Answer:** 5 x 9202.5 = 46012.5

Example 2

1) Your counter reads 76300. What will it read after you have ridden 5 km?
   **Answer:** 76300 + 46012 = 122312. However, the counter has only 5 digits. Therefore it will read 22312. It behaves like an automobile odometer that has reached its limit, and begins again at zero.

2) You begin riding at a count of 86530. 15 minutes later you stop at a point to be measured. The counter now reads 12563. How many counts have elapsed?
   **Answer:** Your counter has "rolled over" and begun again. You must mentally add 100000 to the new counter reading, by adding a "1" before the new reading.
   (1)12563 - 86530 = 26033 counts.

Example 3

You begin a ride at 36100 counts and ride approximately 4 km. When you reach the end of the ride your counter reads 72811.

1) How many counts did you use to complete the ride?
   **Answer:** 72811 - 36100 = 36711 counts.

2) What distance was covered?
   **Answer:** 36711 counts / 9202.5 counts per km = 3.9892 km
   or: 36711 counts / 9.2025 counts per metre = 3989.2 metres

— END —