

APPLICATION FOR CERTIFICATION OF A ROAD COURSE
The Calibrated Bicycle Method

1. Name this Course will be Known By Mass Law Enforcement Half Marathon
2. Advertised Race Distance Half Marathon Race Date March 9, 2003
3. Location of Start Wakefield, MA Finish (if different) _____
city, state city, state
4. Person in Charge of Measurement:
Justin Kuo 39 Oakland Rd, Brookline MA 02445 (617) 731-9889
(name) (address) (zip) (telephone)
5. Race Director (if course is measured for a specific race):
Tony Pallota 401 Main St, Melrose MA 02176 (781) 608-7069
(name) (address) (zip) (telephone)
6. Should this course replace a previously-certified course? If so, give name/number of course to be replaced.
YES MAOZOOGRN (SAME NAME)

CALIBRATION OF BICYCLE

7. Did you calibrate the bicycle on a calibration course previously certified by the Road Running Technical Council?
 yes (YES or NO)
If YES, enclose a copy of the certificate and map verifying RRTC certification of the calibration course.
If NO, you must enclose an Application for Certification of Calibration Course.
8. Is your **bicycle calibration data sheet** attached? yes (YES or NO)
9. Did you include the factor of 1.001 in your calibration constant? yes (YES or NO)

SUMMARY OF MEASUREMENTS

10. Date(s) of measurements Feb 27, Mar 5, 2003
11. How many measurements of the course were made? two
12. Name(s) of measurer(s) Justin Kuo
13. Exact length of course 21095.5 meters
14. Difference between longest and shortest measurements 7.36 meters
15. Which measurement was used to establish the final race course and WHY? ride one was shorter and was used
16. Is your **course measurement data sheet** attached? yes (YES or NO)

COURSE LAYOUT AND MARKING

17. Is your **course map** attached? yes (YES or NO)
NOTE: The course map need not be to scale but must indicate direction of north. It must be black & white and fit on 8.5x11 paper. Descriptions of the **exact** positions of the **start, finish,** and all **turn-arounds** relative to permanent landmarks must be included on the map. Details of any restricted portions where cones and monitors are required must be detailed. Include a line representing the actual measured path.
18. List all intermediate **splits** (attach list describing the position of each relative to permanent landmarks).
19. How far from the curb (edge of pavement) did you measure on curves? 30cm
20. If your course contains pairs of opposite turns (right-to-left or left-to-right) did you follow the shortest diagonal path?
 yes (YES or NO)
Be sure your map shows the exact measured path.

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The Calibrated Bicycle Method (continued)

21. Does your course contain any turn-around (double-back) points? no (YES or NO)
 If YES, show them on course map, located exactly.

22. Does your course include any winding or "S" curved sections? yes (YES or NO)
 If YES, be sure your map makes it clear how you measured.

23. Did you measure an **unrestricted** route? Do the runners have use of the entire road, from curb to curb?
no (YES or NO)
 If your course requires cones or barriers to keep runners on the proper route, be sure your map shows their exact locations, just as you would locate the start and finish.

24. Type of courses (check one):

- | | |
|--|---|
| <u> </u> one loop <u> </u> time(s) | <u> 1 </u> same out/back <u> 1 </u> time(s) |
| <u> </u> figure-8 <u> </u> time(s) | <u> </u> several out/back sections |
| <u> </u> partial loop | <u> </u> keyhole (out/loop/back) |
| <u> </u> complex of different loops | <u> </u> point-to-point |

25. Straight-Line Distance (as the crow flies) between Start and Finish 350 meter

26. Altitude of Race Course above mean sea level (meters or feet – please specify which!):
 start 26m finish 25m highest 48m lowest 12m

27. Type of surface (give percentages):

- | | |
|--|--|
| <u> 25 </u> curbed streets | <u> </u> graded dirt road |
| <u> 65 </u> uncurbed streets/roads | <u> </u> ungraded dirt road |
| <u> </u> concrete sidewalk | <u> </u> gravel road |
| <u> </u> concrete/brick streets/roads | <u> 1 </u> undefined paved surface |
| <u> 9 </u> paved bike path | <u> </u> undefined dirt surface |
| <u> </u> unpaved bike path | <u> </u> undefined grass surface |
| <u> </u> trail (single file) | <u> </u> track (curbed or uncurbed) |

If your course includes any unpaved sections, please attach a detail of the method(s) used to measure such sections.

28. Have you included your start, finish and turn-around (if applicable) diagrams on your map?
yes (YES or NO)

29. How did you mark the start and finish points (and turn-around points)?
 paint

30. Did the same person ride the bicycle on both the calibration course and the race course for any given measurement?
yes (YES or NO)

31. Describe weather conditions during the calibration and measurement rides:
 sunny; dry AND OVERCAST; DAMP

32. Did you perform both the pre-measurement and post-measurement calibrations and the measurement of the race course on the same day?
 yes (YES or NO)

BICYCLE CALIBRATION DATA SHEET

Date of Measurement FEB 27 2003

Name of Measurer JUSTIN KUO

Length of calibration course 1000' (MEASURED ON QUANNAPOWITT BEACH WAKEFIELD)

1. Ride the calibration course 4 times, recording data as follows:

Ride	Start Count	Finish Count	Difference
	9017		
	10522		
	14031		
	17539		
	21049		

Pre-measurement Average Count _____
 Time of Day 1130 AM
 Temperature 38°F

WORKING CONSTANT = Number of counts in one kilometer or one mile, calculated from Pre-measurement average count, and multiplied by 1.001 "safety factor."

Working Constant = 18541 CTS/MILE
11521 CTS/KM

2. Now, measure the course, including all intermediate distances, using the working constant. Enter data on the "Course Measurement Data Sheet."

3. Recalibrate the bicycle by riding the calibration course 4 times, recording data as follows:

Ride	Start Count	Finish Count	Difference
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Post-measurement Average Count _____
 Time of Day _____
 Temperature _____

SKIPPED SECOND RIDE AS MEASUREMENT WAS VERY SHORT. ONLY THE COUNTS WERE NECESSARY; MILES OR KILOMETERS WERE NOT USED

FINISH CONSTANT = Number of counts in one kilometer or one mile, calculated from Post-measurement average count, and multiplied by 1.001 "safety factor."

Finish Constant = _____

CONSTANT FOR THE DAY = Either the Working Constant or the Finish Constant, whichever is the larger*.

Constant for the Day = 18541 CTS/MILE

Remember, each day's measurement must be preceded and followed by a calibration run. You may measure as much as you want in a day, just so calibration precedes and follows it in the same 24 hour period. This is done to minimize error due to changes in tire pressure from thermal expansion and slow leakage. Frequent calibration "protects" the previous measurement. A smart measurer will recalibrate frequently—you never know when a flat tire is coming!

CONVERSION FACTOR: 1 mile = 1.609344 kilometers

* You may, if you wish, define your "Constant for the Day" as the average of Working and Finish constant instead of the larger. However, if you use the average, you will produce a shorter race course, which will face a greater risk of being found short if it ever needs to be validated. Therefore, use of the larger constant is strongly recommended.

BICYCLE CALIBRATION DATA SHEET

Date of Measurement MARCH 5, 2003

Name of Measurer JUSTIN KUO

Length of calibration course 1000' (measured on QUANWAPWITT Hwy, WAKEFIELD)

1. Ride the calibration course 4 times, recording data as follows:

Ride	Start Count	Finish Count	Difference
	54220		
	57728		
	61234		
	64743		
	68252		

Pre-measurement
Average Count _____
Time of Day 11:30 AM
Temperature 38° F

WORKING CONSTANT = Number of counts in one kilometer or one mile, calculated from Pre-measurement average count, and multiplied by 1.001 "safety factor."

Working Constant = 18541 cts/mile
11521 cts/km

2. Now, measure the course, including all intermediate distances, using the working constant. Enter data on the "Course Measurement Data Sheet."

3. Recalibrate the bicycle by riding the calibration course 4 times, recording data as follows:

Ride	Start Count	Finish Count	Difference
SKIPPED SECOND RIDE AS RIDE WAS SHORT AND DISTANCE WAS MEASURED IN COUNTS RATHER THAN MILES or METERS			

Post-measurement
Average Count _____
Time of Day _____
Temperature _____

FINISH CONSTANT = Number of counts in one kilometer or one mile, calculated from Post-measurement average count, and multiplied by 1.001 "safety factor."

Finish Constant = _____

CONSTANT FOR THE DAY = **Either** the Working Constant **or** the Finish Constant, whichever is the larger*.

Constant for the Day = 18541 cts/mile

Remember, each day's measurement must be preceded and followed by a calibration run. You may measure as much as you want in a day, just so calibration precedes and follows it in the same 24 hour period. This is done to minimize error due to changes in tire pressure from thermal expansion and slow leakage. Frequent calibration "protects" the previous measurement. A smart measurer will recalibrate frequently—you never know when a flat tire is coming!

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