

## **Tiberias Marathon Measurement**

**Stephen Jackson**

**14-16 November 2002**

[sjackson@bigpond.net.au](mailto:sjackson@bigpond.net.au)

### **Overview**

The Tiberias International Marathon has been run for 25 years and incorporates the Israeli national championships. The course starts in the centre of Tiberias, is a flat to undulating out and back course around the southern shores of the Sea of Galilee, with a short tail to place the finish at a hotel which is the major sponsor of the event.

The course is entirely below sea level, averaging minus 200m. The surface is good tarmac, with the entire road width being used at all times during the race.

### **Measure in brief**

The course from 2001 has not changed. The 2002 measure showed the 2001 course to be 21m short which was likely a result of road resurfacing and realignment and minor differences in calibration course setup.

The start is at pole 122 in HaGalil St at Gan Shimon park. The turn around is 6.45m before Ein Gev sign on north side Ein Gev holiday camp entrance, and the finish is at the centre line of the Sheraton Moriah Hotel in Tiberias.

### **Attached forms:**

- ***Application for Certification of a Road Course***
- ***Summary of Measurements***
- ***Overview of the Measurement Procedure***
- ***Detail of the Calibration Course***
- ***Steel Taping Data Sheet***
- ***Bicycle Calibration Data Sheet***
- ***Course Measurement Data Sheet***
- ***Course Maps***
- ***Photos***
- ***Description of kilometre points***

## APPLICATION FOR CERTIFICATION OF A ROAD COURSE

**Name of event:** Tiberias International Marathon, Tiberias Israel.

**URL of event:** <http://www.shvoong.co.il/bike/MarathonT/indexE1.asp>

**Advertised race distance:** 42.195km **Race date:** 9<sup>th</sup> January 2003

**Race director:** David Saidi, IAA Member.

**Address:** 10 Shitrit St., Tel Aviv 69482 ISRAEL

**Phone:** +972 3 648 6256 **Fax:** +972 3 648 6255

**Name of measurement team leader:** Stephen Jackson

**Address:** 156 Francis St, Lilyfield, NSW, AUSTRALIA 2040

**Phone:** +61 418 464 297 **Fax:** +61 2 9568 4848

**Email:** [sjackson@bigpond.net.au](mailto:sjackson@bigpond.net.au)

**Location of start:** HaGalil St. Tiberias, ISRAEL, between HaYarden and HaYarkon Sts, opposite Gan Shimon park. Exactly in line with Light Pole 122 located on western side of HaGalil St. (See Start line picture)

**Location of finish:** Sheraton Moriah Plaza Hotel, lower access rd off HaKishon St, central Tiberias, directly in line with centre of hotel. See (Finish line picture.)

**Type of terrain:** Flat to undulating

**Type of course:** Out & back (with 530m tail)

**Altitude:** NOTE: entire race is below sea level  
**Start** MINUS 195m **Finish** MINUS 200m

**Distance, in a straight line, between start and finish:** 300m

## **SUMMARY OF MEASUREMENTS**

**Date(s) of measurement:** 14<sup>th</sup> – 16<sup>th</sup> November 2002

**How many measurements of the course were made?** 2 (out and back)

**Names of measurers:** Stephen Jackson

**How much of the road width is available to runners throughout the length of the road race course?**

All of the road width is used for the entire course.

**If the route at turns cannot be described as the 'shortest possible route', explain what restrictions will apply, and how these will be enforced?**

The entire course is by the shortest possible route.

**Length of course after any adjustment:** 42.195km

**Difference between longest and shortest measurement:** 5m

**Which measurement was used to establish the final course length and WHY?**

The initial (shorter) measure was used. The second measure was affected by the measurer being unable to ride the shortest possible route in the final km on the return journey prior to reaching the start line. This was due to the disappearance of the Police escort at that point and the unwillingness of the measurer to take the shortest possible route unprotected against oncoming traffic. This explains the 5m longer second measure.

## OVERVIEW OF THE MEASUREMENT PROCEDURE

Provide an overview below of the processes and procedures you followed when undertaking this measurement.

### **14<sup>th</sup> November 2002**

I was picked up from Jerusalem for the drive to Tiberias by Gabby Yannay, Results and Course Director for the Tiberias Marathon. We arrived in Tiberias and checked into the Moriah Sheraton Hotel on the shores of the Sea of Galilee. The Moriah is the major sponsor, race headquarters, and the site of the finish of the marathon. We then proceeded to a bicycle hire centre to collect the bicycles for the measure. After some mechanical work a bicycle was deemed suitable (see bicycle photo) and plans for next 2 days made.

All equipment was checked and previous measurement data reviewed and discussed. All was in order for the measurement to proceed.

### **15<sup>th</sup> November 2002**

We were joined by David Saidi, Race Director for the marathon. We drove the course in David's car, identifying the start, finish, turn, and general conditions.

The start is located in HaGalil St, at Gan Shimon park (See start line photo). The race goes south along the shores of the Sea of Galilee turning north around the bottom of the sea, continuing to a turn point at the entrance to Ein Gev holiday camp (See Turn point photo). It then returns by exactly the same route to the start line. On reaching the start line the course continues along HaGalil St, turning first right into HaYardon St, then first right into HaBanim St.. Angling across the road, the second left into HaKishon is taken, then first right into the lower access road in front of the Moriah hotel where the finish line is located directly opposite the centre line of the hotel. (See finish line photo). At all times the entire width of the road is used.

During the tour of the course the kilometre marks from the previous year were identified for reference. A number were no longer visible due to resurfacing and other road works.

A calibration course was established 4km from the Ein Gev turn point on the western side of the road. It is 500m long, is marked by large stainless steel pins at both ends, and contains the 25km mark of the marathon. This course was set up using a steel tape, spring balance for tension, masking tape, and thermometer. An adjustment was made for temperature variation during the measure.

A second calibration course was established later in the day at the 6km mark of the marathon near Tiberias. It was originally planned to measure from the Ein Gev turn to Tiberias and therefore use the Ein Gev calibration course, but on review of the turns in the road and the direction of traffic, a start in Tiberias was more appropriate and therefore a second calibration course was established closer to Tiberias. It was established by the same method, with the added advantage of being done at dusk with a constant temperature of 20C negating any temperature effects on the measure.

Both courses were double checked by rotating the team of 3 between roles, independent counting of 100m sections, numbering of masking tape pieces, and subsequent bike calibration against each other and previous year km marks.

Police and vehicles were confirmed and checked that evening.

### **16<sup>th</sup> November 2002**

Gabby, David, and I met in the lobby of the hotel at 5:45am. It was just daylight, clear, and 16C. We proceeded to the Tiberias calibration course where I rode the bike for 5 minutes to warm up the tyres. Four passes of the calibration course were made, with temperature of 16C being noted. A working constant was established by averaging the 4 passes, dividing by 2 to give uncorrected counts per kilometre, and then applying the short course factor of 1.001.

We returned to the start line where I cycled the "tail" from the start to the finish at the hotel, recording the counts. The nominated finish line was 6.4m past the centre line of the hotel as result of the previous measure. Using the Working Constant, this established the "tail" as being 552.2m long. Taking the desired length of the course, 42195m, I subtracted the 552m of the tail, giving 41643m required from the out and back section of the course. Dividing by 2, the turn point would be at 20821.5m, which is 230473 counts based on the Working Constant of 11069. The Jones counter was spun to 720000 counts (a convenient number on the 6 digit Jones counter) and the kilometre and turn counts were calculated. These calculations were repeated independently by Gabby Yannay to verify my own calculations.

The Police escort then joined us and we returned to the Start line to commence the out and back measures of the course. The Police escort vehicle led, I followed on the bicycle, with David, Gabby, and Ron in a following car.

The full width of the road was used. As I cycled the course I watched for the kilometre markers from the previous year as an indication of where my kilometre marks would be. I found I was consistently a few metres past the old marks. As I rolled to a halt at each kilometre mark, Ron left the following vehicle and sprayed a small mark at the front wheel to indicate the tentative location, and Gabby noted the physical location in terms of light poles or other landmarks. David drove. I then proceeded to the next km mark.

At the 6km mark the Tiberias calibration course was reached. I took a reading at the start and end of the calibration course and this was slightly less than the original calibration. This is explained by the rise in temperature to 18C.

Nearly all kilometres were marked and noted, as was halfway and the Zemach Junction at 10.6k as a major landmark in the course. Those missed were 12, 13, 22, and 36k. These were missed either through traffic issues which precluded a stop at that precise point. However, due to the consistent nature of the new km points in relation to the old km points, there will be no issue in location the km signs appropriately.

The Ein Gev calibration course was reached, and as for the Tiberias calibration course, readings were taken. Once again, a slight decrease in counts was noted and again, the temperature had risen to 22C at this point.

The turn point was reached at the green Ein Gev directional sign pointing into the Ein Gev holiday camp. (Refer Ein Gev turn point photo).

A break was taken at this point for 15 minutes. The return journey was over exactly the same course with the same process being followed in terms of km marking and landmark recording. The second ride over the Ein Gev calibration course gave yet another slightly lower count, as did the Tiberias calibration course on approach to Tiberias. The temperature had risen to 30C.

With 3km to go to the Start line, the Police seemed to disappear into the distance and the measurer, after some close calls, declined to ride the shortest line over the last 3km. This therefore lengthened the return measure fractionally.

On reaching the Start line, readings were taken and it was noted that the IN measure was some 5m longer than the OUT measure based on the working constant. This was explained by the slightly longer IN ride offset by the rise in temperature.

The measure was then completed by riding the tail of the course to the hotel finish line, some 6.4m past the centre line of the hotel.

Applying the Daily Constant of 11062.5515 to the counts of 466998 for the full 42.195k ride, the result showed a distance of 42,214.3m. Therefore an adjustment of minus 19.3m was required. This was achieved by bringing the finish line back to the centre line of the hotel, its preferred location, and by shortening the turn by 6.45m (half of 12.9m). This put the turn point in the middle of the intersection at the Ein Gev holiday camp entrance. (See Ein Gev turn point photo). Both these adjustments were done with a steel tape.

The calculations were double checked by Yannay and the outcome was agreed upon. As the resulting adjustments to the km marks was minor, it was decided that Yannay and David would be responsible for those adjustments when the new km marks were painted on the roadway before the January 2003 race.

Some discussion occurred regarding the fact that this measure gave a 21m longer course than last year. The key factors that would explain the difference were the road works, road alignment, and resurfacing that had occurred in the intervening time, and the method used to set up the calibration course for the previous measure. The method of setting up the calibration course was discussed in great detail and I am now confident that both Yannay and David are capable of setting a calibration course incorporating the requirements of AIMS.

## DETAIL OF THE CALIBRATION COURSE

1 **Name of event:** Tiberias International Marathon

2 **City/town:** Tiberias, ISRAEL

3 **Location of calibration course:**

(1) At the 6km mark of the course (south of Tiberias).

(2) At the 25km mark of the course (south of Ein Gev turn).

4 **Length of calibration course:** 500m

5 **Date(s) measured:**

Tiberias course 15<sup>th</sup> November 2002, Ein Gev 14<sup>th</sup> November 2002.

6 **Method used to measure calibration course:** 100m steel tape by hand

7 **How many times did you measure the calibration course?** twice (both). The second measure of both was carried out at a 10cm offset.

8 **Measurement team leader:** Stephen Jackson

9 **Address of team leader:** 156 Francis St, Lilyfield, NSW, AUSTRALIA 2040

10 **Phone contact of team leader:** +61 418 464 297

11 **Email address of team leader:** sjackson@bigpond.net.au

12 **List names and duties of team members:**

(1) Stephen Jackson – tape tensioner and marker

(2) Gabby Yannay – zero end of tape.

(3) David Saidi – masking tape.

13 **Is the calibration course: STRAIGHT?** Yes **PAVED?** Yes

14 **How are the start and finish points marked?** Large stainless steel nails

15 **Are the start and finish points located in the road where a bicycle wheel can touch them, or elsewhere?**

Where a bike wheel can touch them

16 **Bicycle check.** This is a check against miscounting the number of tape lengths. (if you use a gross measurement check other than a bicycle, please explain.)

Bike check not carried out. No bike was available when setting up calibration courses. Three checks made:

- 1) All three measurers independently counting 100m segments,
- 2) each piece of masking tape being numbered, and
- 3) both courses are on the actual marathon route and were checked by the bike during the measure of the course, thereby checking each course against the other, as well as the existing marks for the marathon.

The Tiberias calibration course is located outside of Zinabberay on the shores of the Sea of Galilee, At the 6km mark of the marathon, it is south of the Tiberias at light post numbered 12/2/1. It is on the sea side of the road on the shoulder of newly resurfaced wide main roadway. It is 500m long, straight and smooth.



**STEEL TAPING DATA SHEET (1 of 2)**  
**For measuring a calibration course**

**Name of calibration course:** Tiberias (at 6km mark of marathon)  
**City/town and State:** Tiberias, ISRAEL  
**Date:** 15<sup>th</sup> November 2002  
**Start time:** 6pm                    **Finish time:** 7pm  
**Pavement temperature:**    **Start 20C**    **Finish 20C**                    **Average 20C**  
 (Thermometer shaded from direct sun)

**Measurements and calculations:**

1 **First measurement.** This establishes tentative start and finish marks which should not be changed until the final adjustment on line 6 below.

$$\frac{\underline{5}}{\text{\# tape lengths}} \times \frac{\underline{100m}}{\text{distance per tape length}} + \frac{\underline{0m}}{\text{partial tape length}} = \frac{\underline{500m}}{\text{measured distance}}$$

2 **Second measurement.** This checks the distance between the SAME tentative start and finish points marked in the first measurement, but use new intermediate taping points.

NOTE: second measure was offset by 10cm.

$$\frac{\underline{5}}{\text{\# tape lengths}} \times \frac{\underline{100m}}{\text{distance per tape length}} + \frac{\underline{0m}}{\text{partial tape length}} = \frac{\underline{500m}}{\text{measured distance}}$$

3 **Average** raw (uncorrected) measurement of course 500m

4 **Temperature correction.** Use the average pavement temperature during measurement. Work out answer to at least seven digits beyond the decimal point.

$$\text{Correction factor} = 1.0000000 + (.0000116 \times [\text{Celsius temperature} - 20])$$

Correction factor =

NOTE:            For temperatures below 20C, factor is less than one  
                       For temperatures above 20C, factor is greater than one

**NO TEMPERATURE CORRECTION REQUIRED DUE TO CONSTANT 20C**

5 Multiply the temperature correction factor by the average raw measurement of the course (line 3)

$$\frac{\text{_____}}{\text{correction factor}} \times \frac{\text{_____}}{\text{avg. raw measurement}} = \frac{\text{_____}}{\text{corrected measurement}}$$

6 If you wish, you may now adjust the course to obtain an even distance, such as one kilometre. This is not necessary as you may choose instead to use an odd-distance calibration course whose endpoints are pre-existing permanent objects in the road to guard against hazards such as repaving. If you adjusted the course, explain why you did it.

**Final (adjusted) length of calibration course**                    500m

**STEEL TAPING DATA SHEET (2 of 2)**  
**For measuring a calibration course**

**Name of calibration course:** Ein Gev (at 25km mark of marathon)

**City/town and State:** Tiberias, Israel

**Date:** 14<sup>th</sup> November 2002

**Start time:** 5pm                      **Finish time:** 6pm

**Pavement temperature:**    **Start 25C**    **Finish 23C**                      **Average 24C**  
 (thermometer shaded from direct sun)

**Measurements and calculations:**

**1 First measurement.** This establishes tentative start and finish marks which should not be changed until the final adjustment on line 6 below.

$$\frac{\underline{5}}{\# \text{ tape lengths}} \times \frac{\underline{100m}}{\text{distance per tape length}} + \frac{\underline{0m}}{\text{partial tape length}} = \frac{\underline{500m}}{\text{measured distance}}$$

**2 Second measurement.** This checks the distance between the SAME tentative start and finish points marked in the first measurement, but use new intermediate taping points.

NOTE: Second measure was offset by 10cm.

$$\frac{\underline{5}}{\# \text{ tape lengths}} \times \frac{\underline{100m}}{\text{distance per tape length}} + \frac{\underline{0m}}{\text{partial tape length}} = \frac{\underline{500m}}{\text{measured distance}}$$

**3 Average raw (uncorrected) measurement of course** 500m

**4 Temperature correction.** Use the average pavement temperature during measurement. Work out answer to at least seven digits beyond the decimal point.

$$\text{Correction factor} = 1.0000000 + (.0000116 \times [\text{Celsius temperature} - 20])$$

Correction factor =

NOTE:            For temperatures below 20C, factor is less than one  
                       For temperatures above 20C, factor is greater than one

**7 Multiply** the temperature correction factor by the average raw measurement of the course (line 3)

$$\frac{1.0000348}{\text{correction factor}} \times \frac{500m}{\text{avg. raw measurement}} = \frac{500.0174m}{\text{corrected measurement}}$$

**8** If you adjusted the course, explain why you did it.

Course shortened by 1.74cm using steel tape to make course 500m.

**Final (adjusted) length of calibration course**      500m

## BICYCLE CALIBRATION DATA SHEET

**Name of event:** Tiberias International Marathon

**Date of measurement:** 16<sup>th</sup> November 2002

**Name of measurer:** Stephen Jackson

Length of calibration course: 500m (Tiberias Calibration Course)

PRE-CALIBRATION - ride the calibration course four times, recording data as follows:

Ride	Start count	Finish count	Difference
1	690244	695773	5529
2	695773	701302	5529
3	701302	706830	5528
4	706830	712359	5529

**Time of day:** 6:00am **Temperature:** 16C **Weather:** Dry, clear, still

### WORKING CONSTANT

**Pre-measurement average count:** 5528.75

**Counts per km:** 11057.5

**Working Constant (CPK x 1.001)** 11068.5575

POST-CALIBRATION - ride the calibration course four times, recording data as follows:

Ride	Start count	Finish count	Difference
1	190222	195745	5523
2	195745	201268	5523
3	201268	206791	5523
4	206791	212313	5522

**Time of day:** 11:00am **Temperature:** 32C **Weather:** Dry, clear, windy

### FINISH CONSTANT

**Post-measurement average count:** 5522.75

**Counts per km:** 11045.5

**Finish Constant (CPK x 1.001):** 11056.5455

### CONSTANT FOR THE DAY

**Working Constant** 11068.5575

**Finish Constant** 11056.5455

**Daily Constant** **11062.5515 (average)**

## COURSE MEASUREMENT DATA SHEET

**Name of event:** Tiberias International Marathon

**Name of measurer:** Stephen Jackson

**Date of measurement:** 16<sup>th</sup> November 2002

Start time: 7:00am                      Temperature: 16C

Finish time: 10:30am                      Temperature: 32C

Constant for the Day: **11062.5515** counts/km

### MEASUREMENT DATA

Measured point	Counter reading	Cumulative counts	Cumulative dist in m (DC)
<i>Measure Tail (out)</i>			
Start line	713458	0	0
Finish line	719570	6112	552.2
<i>Measure Course (out)</i>			
Start line	720000	0	0
5k	775345	55345	5002.9
10k	830690	110690	10005.8
Bet She'An Junction	840219	120219	10867.2
15k	886035	166035	15008.7
20k	941380	221380	20011.7
Turn at Ein Gev	950490	230473	20835.2
<i>Measure Course (in)</i>			
Turn at Ein Gev	950490	230473	20835.2
21.1k	953556	233556	21112.3
25k	996725	276725	25014.6
30k	052070	332070	30017.5
Bet She'An Junction	060760	340760	30803.2
35k	107415	387415	35020.4
40k	162760	442760	40023.3
Start line	180888	460888	41662.0
<i>Measure Tail (in)</i>			
Start Line	180888	460888	41662.0

Finish line	186998	466998	42214.3
-------------	--------	--------	---------

**Desired length of course:** 42.195 km

**Length of course as measured:** 42.214313 km

**Note any adjustments made to the course after measurement:**

Course reduced by 19.3m to match desired 42.195 km. This was achieved by shortening the finish line by 6.4 m to exactly align with the centre of the Moriah Sheraton Hotel, and by shortening the turn point at Ein Gev by 6.45m to achieve a further 18.2m saving. Total shortening of measure:  $(6.45\text{m} \times 2) + 6.4\text{m} = 19.3\text{m}$ .

**Final length of course:** 42.195 km

**Main OUT Measure:** 230473 counts

**Main IN Measure:** 230415 counts

**Difference:** OUT measure 58 counts more than IN measure. This is explained by the rise in temperature from start (16C) to finish (32C) (counts reduced) and the measurer not taking the shortest possible route in the final few km on the IN measure (counts increased).

**Tail OUT Measure:** 6112 counts

**Tail IN Measure:** 6110 counts

**Difference:** OUT measure 2 counts more than IN measure. This is explained as per above.

**Confirmational Constant**

As both calibration courses are on the actually marathon route, readings were taken during measurement ride for validation of calibration and a study of variations caused by temperature during the measure.

Tiberias calibration on OUT measure: 5527 counts

Ein Gev calibration on OUT measure: 5525 counts

Ein Gev calibration on IN measure: 5524 counts

Tiberias calibration on IN measure: 5524 counts

Using these 4 readings as a comparative calibration gives a Confirmational constant of 11061.050 counts.

Working Constant: 11068.5575

End Constant: 11056.5455

Daily Constant: 11062.5515 (Average of Working and End)

Confirmational Constant: 11061.0500

The finding of the additional conformational constant of 11060.549 falls into the appropriate range for a measure that sees the temperature generally rise from start to finish of the measure and confirms the decision of the measurer to use the average of Working and End constants for the Daily Constant rather than the End Constant.

## Kilometre locations

“SS” indicates sea side of the road, “LS” indicates land side of the road.

0k	LS	at	Light pole 122 in Hagalil St between Hayardon and HaYakon Sts
1k	SS	at	Gai Beach Hotel
2k	LS	8m before	blue sign for “Holiday Inn” hotel
3k	SS	at	light pole 35/4/2
4k	LS	8m before	light pole 17/4/1
5k	SS	at	3 flag poles perpendicular to road
6k	SS	10m before	light pole 26/2/2 (light pole is start of Tiberias Calibration course)
7k	SS	at	light pole 33/1/2
8k	LS	8m after	light pole 14/1/1 (in front of LS Restaurant)
9k	LS	7m before	brown location sign “Achozat Ohalo”
10k	SS	2m before	light pole 12/1 at Degania Junction

10.867k SS at light pole 984

11k LS at Bendell Sports Hall  
12k not marked

turn north towards Ein Gev

13k			not marked
14k	LS	at	location sign “Tel Katzir”
15k	SS	at	water pipes after high water tank
16k	SS	9m after	green sign
17k	LS	15m before	zebra sign
18k	SS	at	no swimming sign set back off road
19k	SS	at	white sign (off road)
20k	SS	at	no swimming sign set back off road

U-turn SS 6.45m before Ein Gev sign on north side of T junction

21k SS 3m before “slippery road” sign

Half LS 10m after memorial for Maor Azar 30/3

22k			not marked
23k	SS	at	brown location sign “Shizaf Beach” mini mart
24k	LS	at	yellow 80kph reminder sign
25k	LS	25m after	old wrought iron gate in calibration course
26k	SS	8m before	“Ha On Kibbutz” bus station
27k	LS	40m after	brown location sign “Ha On Village Camping”
28k	SS	30m after	access road

turn right towards Tiberias

29k SS at location sign “to Poriya”

30k	SS	25m before	sign 1/2 k to Zemach
31k	LS	at	"Emak h Yardon" bus station
32k	SS	10m after	light pole 44/1/1
33k	SS	10m before	yellow dangerous curve sign
34k	LS	at	light pole 311 (garden stone sign "Welcome to Kinneret")
35k	SS	10m after	light pole 16/2/1
36k			not marked
37k	SS	at	light pole 27/3/2
38k	SS	at	light pole 5/4/1
39k	SS	12m before	light pole 49/4/2
40k	LS	5m after	3 ancient stone pillars
41k	SS	15m before	fire hydrant

cross Start Line

Turn right into HaYarden

Turn right into HaBanim

42k SS 12m before HaYakon St

Turn left into HaKishon

Turn right into lower access road of Moriah Hotel

Finish directly in line with centre of hotel.



The Start line is marked by the pole at the front of the white car.



The Turn point at Ein Gev is 6.45m this side of the sign in the centre of the picture pointing to the left into Ein Gev holiday camp





The Finish line at hotel is shown here by the steel tape on the roadway aligned with the centre of the hotel



This is the end of Ein Gev Calibration course with Gaby Yanay and David Saidi.



This is the bicycle used for the measure. On the left is Gabby, and the right David. The white building in the background is the Moriah hotel at the finish line.



Team for measure at the Ein Gev turn point with the Golan Heights in the background.



# TIBERIAS MARATHON









