

Development of Strength Endurance: The Key to Improvement in the Middle and Long Distance Events

Renato Canova, ITA

The training process represents a combined action of different stimuli, designed to build and modify the qualities of an individual. This is what happens for every individual. If we are talking about an athlete, the stimuli have the task to build a stronger specialist in specified events. This process starts from the first day of life and persists all through life. Every situation of life is able to develop conditional qualities; in a 'right' or 'wrong' way. Taking this into account, the habitat of the individual and the social and cultural education play a very important role in building a future champion.

When we speak about African runners we must think that, normally, the best athletes are able to start their official athletic careers from a level of 90% of their final performance because they are already well prepared, without official coaches, using at home the most important type of training for a distance runner: long runs (from 5 to 12-15 km), very fast.

Through this type of training the most talented runners are able to greatly improve their **ANAEROBIC THRESHOLD**, building a special **MAX LASS**, that is very difficult to reach with Caucasian runners from western countries. This is due to a lack of natural power – endurance for the natural training done during the first 12 – 15 years of life.

MAX LASS (MAXIMUM LACTATE STEADY STATE) is the capacity to work at a special level of Steady – State, very much higher than the conventional Threshold of 4 mmol. This is a specific quality for the top specialists of 3000 / 5000 / 10000m, and depends not only on the level of AnT (Anaerobic Threshold), but especially on the type of training that we use for building this quality.

Personally, during the last 6 years, I have chosen the 'road' to work on developing the **STRENGTH ENDURANCE** of the athlete, after working for 3 months developing the AnT, because I think that there is a very strong connection between **MAX LASS** and **STRENGTH ENDURANCE**.

It may be that my terms are different from the official scientific terms. I apologise for this problem that may be connected to the fact that English is not my first language but also with the fact that, normally, Physiologists speak about research undertaken with normal, average athletes and not with elite runners.

I shall try to explain my point of view.

- a) In the middle and long distances, **THE SPECIFICITY IS A SPECIFICITY OF EXTENSION**. So, the philosophy of training for every event of this sector is **TO EXTEND THE CAPACITY TO LAST AT A FIXED SPEED**, specific for the performance that you want to build.
- b) In this type of philosophy, **EVERY EVENT IS AN EVENT OF SPEED** (because always the winner is the athlete who is 'FASTER' at the end of the competition), but most of the training is **TRAINING OF POWER – ENDURANCE** (*where 'Power' is the speed that every athlete is able to maintain for about ¾ of the distance, and 'Endurance' is the training to maintain, at the same speed, the full competition distance*).
- c) *As 'SPEED' is strictly connected with 'STRENGTH', we must develop 'Strength' to provide a better biomechanical support.*
- d) *As 'ENDURANCE' is strictly connected with 'ENZYMATIC DEVELOPMENT', we must develop 'Aerobic Power and Aerobic Capacity' to have a better enzymatic support.*
- e) And, during the specific period of training, we must have the goal to develop the '**STRENGTH ENDURANCE**', *using a 'Strength' like base of intensity during workouts of Endurance, and an 'Endurance' like base of quantity during workouts of quality.*

Speaking about Lactate, for example, we can see, using a test derived from the classic **FARAGGIANA – GIGLIOTTI TEST**, that the same athlete can build his **MAX LASS** during a period of 5 months. This is the experience that I have had with 3 different athletes.

1. SAAEED SAIF SHAHEEN (FORMER STEPHEN CHERONO),
WORLD CHAMPION AND WORLD RECORD 3000s/C
2. NICHOLAS KEMBOI,
4TH ALL TIME, 10000M (26:30.03)
3. JAMES KWALIA,
2ND IN THE WORLD 2004, 3000M (7:28.28)

The Faraggiana-Gigliotti Test consists in running a distance of 1000m, 1200m, or 2000m at competition pace, taking blood to investigate the lactate level after every test run. The runs are repeated over the same distance 4-5 times, with very short recovery. Sometimes we finish the work with a last test at maximum speed over a shorter distance to understand the ‘Power’ of the ‘engine’.

We use this test normally once every 4-6 weeks, in order to control the improvement in **SPECIFIC ENDURANCE**.

The goal of this test is to identify the **MAX LASS** at the moment.

We will present data regarding the 3 athletes above, explaining their different tests.

SAAEED SAIF SHAHEEN

Test: 5 x 1000m (13:10 pace - 2:38)[1:00 / 1:15]

28-04-2004 (KEN)		26-05-2004 (KEN)		29-06-2004 (KEN)		13-08-2004 (SWI)	
6.8 mmol		6.6 mmol		6.8 mmol		6.5 mmol	
9.4 mmol	+ 38.23 %	9.0 mmol	+ 36.36 %	8.6 mmol	+ 26.47 %	8.0 mmol	+ 23.07 %
11.8 mmol	+ 25.53 %	10.6 mmol	+ 17.77 %	9.6 mmol	+ 11.62 %	8.3 mmol	+ 3.75 %
13.9 mmol	+ 17.80 %	12.4 mmol	+ 16.98 %	11.2 mmol	+ 16.66 %	8.8 mmol	+ 6.02 %
15.8 mmol	+ 13.67 %	14.4 mmol	+ 16.13 %	13.8 mmol	+ 23.21 %	10.2 mmol	+ 15.91 %

The first 3 tests were at the Kamarin track, near Iten, at about 2300m Altitude. The last was in St. Moritz, one week after winning the Zurich IAAF meeting in 8:00.06.

We carried out the first check after a period of interrupted training due to sickness (two weeks) and only one week of easy running. Shaheen, after 2 weeks, ran a 3000m in Doha in 7:34, losing to Kipchoge.

The 2nd check was only 12 days after the race in Doha. The shape of Shaheen was better, but it was not possible to identify an area of Steady State. *This fact told me that the SPECIFIC ENDURANCE was not enough, as at that speed the Lactate levels continued to rise very quickly.*

The 3rd check was after another full month of training, a few days before the Crete meeting, where he won with 8:01.97. The situation was a little bit better, but not yet really good. In that period, I chose to

develop general resistance and strength, without using Specific Workouts, as the goal was to win the Olympic Games (if possible), or to beat the World Record in September (very late in the season).

During July, we used some Specific Workouts to improve SPECIFIC ENDURANCE and STRENGTH ENDURANCE.

The 4th check clearly shows that, with specific training, Shaheen was able to build his **MAX LASS**, that allowed him to remain longer at the same speed (and is the best control regarding Specific Endurance).

After this period Shaheen increased his training knowing that it was not possible to run the Olympic Games, with the goal of a new World Record in Bruxelles.

We didn't do any other test in September when the shape was at the top but, using data from the normal control of the training process, I think that he would have at that time a MAX LASS lasting some minute longer.

The grey area (from 8.0 and 8.8 mmol) can be considered an area of Steady State, because the increase of Lactate is 10% in about 8 minutes.

This can also be a representation of what happens during a race of 5000m at even pace, with the central part of the race run in Steady State (or with a very little increase of Lactate levels). This is after an initial increase of the Lactate levels in the first 3-4 minutes of competition and before a final peak, during the last 2 laps of the race.

NICHOLAS KEMBOI

Test: 5 x 2000m (27:00 pace - 5:24 + only last time, 1200m free in 3:01.6) [1:00 / 1:15]

5-07-2003 (Davos)		28-07-2003 (St. Moritz)		29-08-2003 (St. Moritz)	
7.4 mmol		6.6 mmol		5.4 mmol	
8.8 mmol	+ 18.92 %	7.4 mmol	+ 12.12 %	7.4 mmol	+ 37.03 %
10.4 mmol	+ 18.18 %	9.6 mmol	+ 29.73 %	7.7 mmol	+ 4.05 %
12.8 mmol	+ 23.08 %	11.8 mmol	+ 22.92 %	8.4 mmol	+ 9.09 %
14.6 mmol	+ 14.06 %	14.0 mmol	+ 18.64 %	9.7mmol	+ 15.47 %
				16.6 mmol	+ 71.13 %

The 1st check was after a race of 5000m, with a final result of 13:42 and 5th position. The athlete was not well trained.

I chose to increase the volume of kilometres during each week, and the volume of some single runs too (up to 25 km). At the same time, seeing a lack of strength, I put in his programme a lot of short sprints uphill (60-80-100m) and some circuits, uphill, with sprint and technical exercises.

Nicholas carried out the 2nd check some days before the meeting at Heusden, where he ran 13:14 after pacing, finishing in 3rd position.

After that period, I put in his training programme some workouts for **STRENGTH ENDURANCE** and **SPEED ENDURANCE** without, of course, reducing training of **LONG ENDURANCE**.

On 15th of August, Nicholas ran in Zurich, finishing in 13:01.14 in 2nd place, 20cm behind Kibowen. After this, he focussed on specific preparation for the 10000m in Bruxelles, and the 3rd check was one week before this meeting.

It is also, in this example, possible to see an area of Steady State lasting about 16 minutes that is demonstration of a major improvement in Specific Endurance.

During the last test I wanted also to understand how much power Nicholas would still have after running for long time at a good race pace, and that's the reason for the last 1200m to be 'free'.

Nicholas ran the 'free' 1200m in 3:01.6, in laps of 63.6, 60.2, 57.8, and I knew that he was ready for a great competition.

In Bruxelles, one week later, Nicholas ran 26:30.03, with the last km. in 2:29 and the last 600m in 1:25.3.

JAMES KWALIA

*Test: 4 x 1200m (3:09 + 1 x 800m max. speed) [1:00]
(the 800m during the 3 tests were: 2:05.6 – 1:58.4 – 1:54.2)*

26-05-2004 (KEN)		13-08-2004 (St. Moritz)		9-09-2004 (St. Moritz)	
8.4 mmol		8.3 mmol		8.7 mmol	
9.8 mmol	+ 16.66 %	9.3 mmol	+ 12.05 %	9.0 mmol	+ 3.45 %
11.8 mmol	+ 20.41 %	10.1 mmol	+ 8.60 %	9.3 mmol	+ 3.33 %
14.6 mmol	+ 23.73 %	13.3 mmol	+ 31.68 %	10.8 mmol	+ 16.13 %
14.8 mmol	+ 1.37 %	16.6 mmol	+ 24.81 %	20.6 mmol	+ 90.74 %

James had some problems during the winter due to an old injury in the biceps, that didn't allow him to run fast. So, for 5 months from December to the beginning of May, he ran a high volume of km developing his **GENERAL RESISTANCE**, but not Specific Endurance and Strength Endurance.

From the beginning of June he would have good support from the Qatar organisation, providing a physiotherapist and a masseur 3 times a week.

His 1st check clearly shows a lack of specific endurance and also some difficulty in recovering. This is possible to identify by looking at the last test over 800m, which he ran in 2:05.6 (same pace as 1200m). In this case the lack of spade-work doesn't permit him to reach high Lactate levels, limiting the power of the 'engine'.

In June, James carried out some long intervals, a little bit faster but not yet speed. At the same time, 2 or 3 times per week, he used short sprints uphill to increase strength and speed.

In July, I put into James' training programme some specific workouts for **STRENGTH ENDURANCE**, mixing short hills and long intervals.

During the 2nd test, it is still not possible to identify a MAX LASS but his Lactic Capacity grew, as evidenced at the last test repetition, 800m in 1:58.4.

When the general level is good, a top runner can improve in a specific direction very quickly.

So, with only 3 weeks of specific training, James could run the Bruxelles meeting in 7:28.28 (2nd behind Kipchoge) and was also 2nd in a tactical race, the IAAF Final in Monaco, running 7:39.40 (4:01.0 then 3:38.4).

The last test, carried out in St. Moritz, shows us that at 63.0 400m pace, James was able to run for almost 10 minutes at the same Lactate level, and that he was able to reach very high levels of Lactate during the final test (58.5 + 55.7 = 1:54.2).

The Basic Training of Strength Endurance during the General Period: How to Use Modified Circuits

It is always very difficult to interpret the real relationship between *STRENGTH* and *ENDURANCE*. Many coaches and scientists have tried to investigate this point but normally using a partial vision of the problem.

In fact, if it's true that **THE SPEED OF AN ATHLETE IS DIRECTLY CONNECTED WITH HIS STRENGTH**, it's also true that using a high percentage of strength for long time depends on bioenergetic and metabolic factors: the factors determining *SPECIFIC ENDURANCE*.

Following this reasoning, **we cannot think of STRENGTH as a decisive factor regarding the various events of middle and long distance**: nobody is stronger, for instance, than a thrower but at the same time nobody is weaker when considering the aerobic point of view.

Over many years, I worked in the Italian Centre for middle and long distances in Tirrenia, with **LUCIANO GIGLIOTTI** and **DR. PIERLUIGI FIORELLA**, and we performed countless tests. These were with middle and top level, male and female athletes using the **BOSCO test** for checking '*Reactive Strength*' and the **FARAGGIANA-GIGLIOTTI TEST** for checking *Lactate levels*.

Our goal was to control **THE EFFECTS OF AEROBIC TRAINING ON STRENGTH, and THE EFFECTS OF STRENGTH TRAINING ON THE AEROBIC LEVELS**. Practically, after a period devoted mostly to Aerobic Training, we checked the Strength levels and after a period devoted mostly to the development of Strength and Technique, we checked the Aerobic levels.

We could see that using Aerobic Training with some special exercises for stimulating the use of Strength, such as running on hilly courses, our athletes improved their values for Strength, identified through the previous BOSCO test. On the contrary, *using more specific training for strengthening, the Aerobic Level decreased and the AnT went down*.

We think that **SPECIFIC SPEED ENDURANCE** is not connected with the peak of speed or with the strength of an athlete but with a high level of AnT, so that muscles are allowed to work at higher intensity starting from a better Aerobic Base and having less lactate within the muscle fibres for the same speed.

Therefore, we tried to find some solution in training to synchronously increase both Strength and Aerobic Power. Specifically, the objective was to train the nervous system and the muscles to recruit the greatest number of fibres under conditions of strong acidification.

In order to reach this goal we started from the well known **MODIFIED CIRCUITS** that have been used in training for a long time in different methodologies, changing the intensity and duration according to the event and the seasonal period of training.

Modified Circuits comprise a sequence of exercises for strength and/or technique, connected together with runs carried out at different speeds and over different distances, depending on the final goal of the Circuit.

Concerning this we distinguish for each event three different applications, depending on the period of preparation, that have different goals:

- 1) Extensive strength - resistance circuits
- 2) High intensity strength - endurance circuits
- 3) Specific strength - endurance circuits

Extensive Strength - Resistance Circuits

In this type of Circuit, which we can consider as a '*Basic General Circuit*', we have the goal of increasing **MUSCLE EXTENSIVE RESISTANCE**, carrying out exercises at middle intensity connected one another with runs at Aerobic Threshold pace.

We use this type of Circuit during the Preliminary and Fundamental Periods with, of course, some differences depending on the event to improve the capability of working longer using the same percentage of maximum strength.

This Circuit is quite Aerobic and builds up the base of Endurance that later we have to develop into Strength-Endurance.

High Intensity Strength - Endurance Circuits

In this type of Circuit, *which we use during the last part of the Fundamental Period and during the Special Period*, the main goal is the development of Strength.

For this goal we use exercises carried out at a very high intensity, taking particular care with technical execution.

The duration of every Circuit and the duration of a full training session too must not be very long.

In this type of Circuit we must use a high percentage of maximum strength. The speed of the runs connecting the exercises is low and the distance is short so we use running only for regeneration and recovery. On the contrary, the intensity of the exercises is very high.

This Circuit is very much Lactic and builds up the base of Strength that later we have to develop into Strength-Endurance.

Specific Strength – Endurance Circuits

In this type of Circuit, the main goal is to develop the ability to recruit the highest possible number of muscle fibres, while the state of fatigue and the lactate levels in the muscles are rising.

In order to reach this goal, ***THE EXECUTION HAS TO BE CARRIED OUT AT HIGH INTENSITY BOTH REGARDING STRENGTH EXERCISES AND THE SPEED/DISTANCE OF RUNNING.***

The duration is similar to intervals for Aerobic Power carried out on the track (for instance, 2-3 min in the case of a specialist of 800-1500m, from 3 to 8-10 min for a specialist of 5000m – HM).

The interpretation must be very aggressive because, to reach quickly, a 'lactic state' very much higher than the AnT is an irremissible condition in order to reach the prefixed goals.

Taking this into account there is, therefore, a great difference between the interpretation of a test on the track and of a circuit.

For instance, when we propose a training session of 5 x 2000m in 5:40, we teach our athlete to distribute in an even way his energies, running 5 laps in 68.0.

Instead, when we propose a circuit lasting the same time, we require everything from the start to be carried out at maximum intensity, in order to quickly reach a high lactate level.

AS OUR GOAL IS TO USE THE REMAINING STRENGTH IN THE WORST CONDITIONS, as can happen during the final part of a race. THROUGH THIS TYPE OF TRAINING WE WANT TO BUILD THE CAPABILITY TO RECRUIT A LARGE NUMBER OF FIBRES WHEN THE SATURATION LEVEL IS VERY HIGH.

This training, from our experience, is one of the most important for improving the final sprint in a race. Being a very hard training we can use it only few times during the final part of the Special Period and during the period of main competitions. With this type of training we can assemble Endurance and Strength, previously trained.

Examples of Modified Circuits During the Fundamental Period

Extensive Strength – Resistance Circuit (1500 / 5000m)

(900m uphill, gradient 7-10 %, + 700m flat)

- **300m fast running uphill** (duration 55.0 >< 60.0)
- **10 squatjumps** (duration 15.0 >< 18.0)
- **60m sprint uphill** (duration 10.0 >< 12.0)
- **20m skipping with strides 50cm long** (duration 30.0 >< 40.0)
- **200m moderate running uphill** (duration 45.0 >< 50.0)
- **20m heels-to-buttocks** (duration 30.0 >< 40.0)
- **300m fast running uphill** (duration 55.0 >< 60.0)
- **20 sagittal – splits** (duration 20.0 >< 25.0)
- **200m moderate running on flat land** (duration 45.0 >< 50.0)
- **30 even hops with blocked knees** (duration 20.0 >< 30.0)
- **500m fast running at 85% of max. speed** (duration 1:25 >< 1:40)

Duration: 7:00 >< 8:00

Recovery: 5:00 >< 6:00

Repetitions: 4 – 6 times

The Use of Combined Elements of Strength and Endurance in Building Specific Endurance

With my athletes, I use a lot of general training during the months of November, December and January. The two main goals of training during this period are the improvement of General Resistance and of Strength. This is the best period for increasing the volume of training, reaching a higher mileage and developing muscle strength.

After having built a better base during the Winter athletes have to develop their **SPECIFIC ENDURANCE**, with the final goal to run faster.

The key of specific training, in my philosophy, is to combine exercises carried out using a high level of strength with training of speed endurance, sometimes putting these stimuli during a session of intervals.

Here I show some example of this type of training, carried out with the athletes named above:

Saaeed Saif SHAHEEN

21 Feb 04 (earth Track in Kamarin, near Iten)

3 sets of 3 x 600m [1:30] among tests, in :

- 1:35.5 – 1:33.2 – 1:30.6
- 1:34.9 – 1:32.3 – 1:30.2
- 1:35.8 – 1:34.2 – 1:29.8

After recovering 2:00 after every set, 6 x 80m sprint uphill with a gradient 15-20 % .
The full workout is: 9 times 600m + 18 times 80m sprint climbing

22 Jun 04 (earth Track in Chepkoilel)

8 x 800m with 4 x 60m sprint uphill between each test
(2:00 rec. after test, the same after sprints)

- 2:03.0 – 2:00.9 – 2:00.3 – 2:01.4 – 2:01.3 – 2:02.1 – 2:00.2 – 2:00.5

13 Jul 04 (Road from Iten to Kamarin, 1200m climbing)

6 x 1200m hard uphill, finishing with 400m fast on the track with 10 hurdles
(1600m), [8-9 min] (jogging downhill to return to the start)

- 5:04.6 (3:54.0 + 68.6)
- 5:07.4 (3:57.2 + 70.2)
- 5:08.8 (4:00.4 + 68.4)
- 5:11.2 (4:03.8 + 67.4)
- 5:08.2 (3:58.2 + 70.0)
- 4:58.8 (3:52.8 + 66.0)

24 Aug 04 (earth Track in Kamarin)

3 x 2000m (alternating 400m hard / 400m moderate) [5 min]

- 5:14.4 (58.2 + 1:10.4 + 58.8 + 1:09.6 + 57.6)
- 5:10.6 (57.6 + 1:08.2 + 58.0 + 1:09.0 + 57.8)
- 5:14.6 (57.8 + 1:09.4 + 60.4 + 1:10.2 + 56.8)

28 Aug 04 (On a big area of grass, with 50m flat + 50m climbing)

- 20 x 100m sprint (50m flat + 50m uphill) with 4 hurdles of 91cm in the last 50m

James KWALIA

22 Jun 04 (earth Track in Chepkoilel)

4 x 800m with 4 x 60m sprint uphill between each test [2 min] +
5 x 500m [4 min] with 200m running + 100m bounding + 200m running

- 2:02.8 – 2:01.0 – 2:00.0 – 2:02.6
- 1:09.6 (26.2 + 16.8 + 26.6)
- 1:10.4 (26.0 + 17.6 + 26.8)
- 1:10.5 (27.2 + 16.6 + 26.7)
- 1:09.8 (25.9 + 18.2 + 26.7)
- 1:07.8 (26.2 + 15.4 + 26.2)

10 Jul 04 (St. Moritz)

2 sets of 6 x 1000m [1:30] After every set, 12 x 60m sprint uphill.

- 2:50.0 – 2:51.0 – 2:47.4 – 2:46.3 – 2:45.0 – 2:41.8
- 2:47.6 – 2:46.0 – 2:46.6 – 2:47.0 – 2:43.8 – 2:40.8

11 Jul 04 (St. Moritz)

- 25 km in 1:34:18 (last 5 km in 16:32, last km in 2:58)

Note : This is an example of how I use a long run the day after some specific workout for strength-endurance, also in the competition period.

15 Jul 04 (St. Moritz)

- 45:00 moderate speed + 12 x 80m sprint uphill + 3000m (Track) in 8:35 + 12 x 200m uphill fast (38.0 >> 40.0) [2 min] + 1 lap of the Lake (4.270m) at 2:56 pace in 12:36

17 Jul 04 (St. Moritz)

3 x 2000m + 1 x 1000m with 6 x 60m sprint uphill after every test

- 5:36.4 – 5:39.2 – 5:37.2 – 2:27.8

20 Jul 04 (St. Moritz)

(Morning)

- 2 x 1 lap of the Lake [4 min] in: 12:31 (2:55 pace) – 12:34 (2:56 pace)

(Afternoon)

- 10 x 300m [40 sec): 43.4 – 42.9 – 43.4 – 42.8 – 41.8 – 42.2 – 42.0 – 41.8 – 41.5 – 41.6

23 Jul 04 (St. Moritz)

10 x 600m [1 :30] in:

- 1 :31.1 – 1 :32.5 – 1 :30.8 – 1 :31.1 – 1 :29.4 – 1 :30.4 – 1 :31.0 – 1 :31.6 – 1 :31.6 – 1 :26.6

Note : Kwalia competed in Stockholm on the 27th, with a poor result: 13 :26, running the last km in 3 :06, showing lack of recovery after lactic workouts. After 3 days of easy running, in Heusden (31st of July) he ran 13:06.19, with better sensations.

3 Aug 04 (St. Moritz)

10 x 1000m [1 :30] in:

- 2 :46.0 – 2 :49.2 – 2 :43.1 – 2 :38.0 – 2 :45.0 – 2 :44.5 – 2 :46.6 – 2 :45.0 – 2 :44.8 – 2 :37.6

8 Aug 04 (St. Moritz)

4 sets of {1000m + 600m + 400m + 200m} [1:30], rec. between sets 4 min

- 2:41.3 – 1:28.6 – 58.0 – 26.1
- 2:40.8 – 1:30.0 – 58.8 – 26.6
- 2:42.8 – 1:29.6 – 58.4 – 26.8
- 2:42.3 – 1:30.6 – 59.5 – 27.0

After 8 min: 4 min maximum speed uphill (gradient 10-15 %)

13 Aug 04 (St. Moritz)

TEST : 4 x 1200m [1:00] in 3:09 + 1 x 800m in 1:58.4

16 Aug 04 (St. Moritz)

4 sets of 4 x 400 [40 sec], recovery between sets : 4 min

- 56.2 – 59.5 – 59.7 – 58.4
- 59.4 – 58.0 – 58.1 – 58.7
- 59.8 – 58.4 – 59.0 – 56.5
- 58.5 – 59.3 – 60.1 – 58.8

20 Aug 04 (St. Moritz)

2 x 3000m + 2 x 2000m + 1 x 600m with 6 x 60m sprint uphill between each test

- 8:23.6 – 8:20.4 – 5:32.6 – 5:30.4 – 1:23.2

23 Aug 04 (St. Moritz)

- 5000m in 14:14 [6:00]
- 5 x 100m bounding [2:00] in 14.8 – 16.2 – 15.6 – 16.3 – 15.9 [6:00]
- 3000m in 8:16.6 [6:00]

- 5 x 100m running with very high frequency (51 – 52 steps) in 13.6 – 13.7 – 14.0 – 13.8 – 14.2 [6:00]
- 1000m progressively accelerating in 2:28.6 (34.2 + 32.6 + 29.2 + 27.0 + 25.6)

27 Aug 04 (St. Moritz)

(Morning)

6 x 1:30 uphill very hard [5 min]

(Afternoon)

3 x 1200m (alternating 150m fast / 50m slow) [6 min]

- 3:05.2 (18.4 / 12.2 – 18.8 / 12.8 – 18.8 / 12.0 – 19.2 / 11.3 – 19.4 / 12.2 – 19.0 / 11.1)
- 3:08.2 (17.7 / 13.2 – 17.9 / 13.6 – 18.3 / 12.9 – 18.7 / 13.1 – 19.0 / 12.8 – 19.2 / 11.8)
- 3:03.6 (17.7 / 11.8 – 18.2 / 12.2 – 18.8 / 12.0 – 18.6 / 12.8 – 18.3 / 13.4 – 18.7 / 11.1)

Note: From 28th of August till 3rd of September (day of Bruxelles meeting) only easy regeneration. In Bruxelles, James Kwalia improved (behind Kipchoge) the Asian 3000m Record to 7:28.28, a time which is second on the 2004 World Lists.