

# NSA PHOTOSEQUENCE #15 - 200 METRES START: CARL LEWIS

Sequence by Helmar Hommel (© Hommel AVS 1990)

The commentaries on this sequence have been supplied by Carlo Vittori (ITA) and Dan Pfaff (USA)

*Translated from the original Italian by Alessandra Lombardi*

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## Carl Lewis (USA)

The sequence shows Carl Lewis at the start in the first round of the 200 metres at the Games of the XXIVth Olympiad, Seoul, 1988. He finished second in a time of 20.72.

- Born: 1 July 1961
- Height: 1.88m
- Weight: 80 kg
- Best marks:
  - 100 meters - 9.92 sec.
  - 200 meters - 19.75 sec.
  - Long Jump - 8.79m
  
- World Champion 100 meters 1983,
- Olympic Champion 100 meters 1984 and 1988.
- Olympic Champion 200 meters 1984.
- Olympic Champion Long Jump 1984 and 1988.

## Commentary by Carlo Vittori

*Carlo Vittori was Head Coach of the Italian sprints team until 1986.*

The first consideration suggested by this photosequence is that Carl Lewis' actions appear remarkably fluent and orderly, technically so orthodox as to be nearly scholastic. This is probably in part a consequence of the fact that in a 200 meters race the acceleration dynamics are necessarily less extreme than in a 100 meters race. A second consideration concerns the technique adopted in two very important positions which determine the efficiency of all subsequent actions - 'on your marks' and 'set'. The choice is definitely dictated by the athlete's somatotype.

Photo 1 shows that Lewis is in no way constrained in the crouch position, although he is distinctly long-limbed. The starting blocks are sufficiently spaced so that the knee touches the ground only slightly ahead of the front block. The distance between the front block and the starting line appears to be nearly equal to the length of the lower leg, since the knee brushes the plane formed by the arms. This is undoubtedly the most comfortable position the athlete could choose. It is consistent with his physique and his strength capacities, among which reflex elastic strength is probably the greatest since it is trained for the Long Jump as well as for developing speed in the full-speed run.

Photo 2 shows the 'set' position. Here again, Lewis' posture is adapted to suit his somatic characteristics: the pelvis is rather high compared to the shoulders, so that the legs are not excessively bent at the knee. In fact, we can see that the angle at the knee of the front leg is well over  $90^\circ$ . This position favors a swift extension and straightening of the leg, especially in the case of an athlete whose maximum dynamic and explosive strength are not particularly high. My only minor criticism concerns the position of the shoulders. These could be slightly more forward, beyond the perpendicular of the hands, bringing forward the centre of gravity so that the response to the starting signal would be prompter and the drive of the front leg more penetrating.

Photos 4 to 12 show the succession of movements concurring to produce the propulsion. Co-ordination and amplitude of the movements are near-perfect. The front leg straightens out on the block and the foot leaves the ground when the knee of the rear leg is well flexed towards the chest, so that the lower leg is brought forward, nearly parallel to the other leg (Photo 11). The alignment support-leg to trunk is the best that can be achieved to create an efficient dynamic balance and avoid a forward rotation. As a consequence of such an orderly succession of perfectly synchronized movements, touchdown after the first drive occurs at about 60cm from the starting line. The foot is flat, ready for a second thrust forward. The arm action is well coordinated, although the left arm shows a tendency to open out instead of moving forward.

The outstanding feature of the following 3 or 4 strides is that, after the drive phase, the free leg is brought forward along an almost straight line because this is the shortest route. As speed increases, the movement becomes 'circular' and the trunk progressively straightens up to favor a further increase in speed.

To conclude, I believe Lewis' movement pattern is the result of a conscious choice of starting strategy, aimed not at gaining the lead as quickly as possible, but at favoring an efficient progression of speed and making the most of his somatic characteristics.

## **Commentary by Dan Pfaff**

*Dan Pfaff is an Assistant Coach at Louisiana State University, Baton Rouge, Louisiana, USA. He is also a Lead Instructor in the Central American and Caribbean Athletic Confederation Coaches Education Programme.*

The sequence exhibits not only the obvious physical skills of Carl Lewis but also an excellent observance of technical requirements. The sequences analyzed are limited by lack of exact scientific data but can be quite informative from a spatial landmark standpoint.

In photo 1, Lewis assumes an 'On Your Marks' position which appears to be of medium spacing. The wrists fall directly under the shoulders with the head in a neutral position, in terms of spinal alignment. The front knee (left) positioning is behind the starting line with a vertical elevation to a point just below the left elbow. The thigh of the rear leg is in a near vertical position with the knee resting on the track quite some distance in front of the front block pedal. The front foot shows pronounced forefoot flexion, with a good bit of the spike plate in contact with the track. The rear foot (right) is noticeably in less surface contact with the rear block. In fact the long axis of the right foot appears to be several degrees removed from vertical. Hand spacing appears to be somewhat wider than shoulder width, although starting on a curve and/or photo parallax may contribute to this visual effect.

In photo 2, Lewis has come to the set position via primarily a vertical elevation of his hips. The amount of forward movement during this elevation is limited, as evidenced when one compares hip to front block horizontal movement and wrist to shoulder horizontal changes. The hip axis rests at a point several centimeters in front of the front block pedal and well above the shoulder axis. Angles of this 'Set' position to note are those of the left knee and right knee, and that between the trunk and left thigh. Leg positions have undergone major changes during the set phase. The ankles both exhibit marked dorsi-flexion and the soles of the shoes are planted firmly against both block pedals, allowing for tremendous elastic energy generation. A review of the angles formed between the lower legs and the track helps to explain the excellent line of force and degree of total body extension produced in photo 11. The visual focus does not appear to change from photo 1 to photo 2. This results in a radical change of cervical flexion.

Photos 3 and 4 illustrate the level of muscle recruitment during the reaction phase. Initial hand movement appears to be simultaneous and nearly vertical in displacement. Photo 5 continues this phase with the rear foot beginning to drive off the block. The front foot remains in a very dorsi-flexed state. Photos 6, 7 and 8 show, for the first time, the arms separating in the characteristic sprint action. The visual focus during all these photos has remained quite constant.

Photo 9 exhibits three points of interest. The right arm drive finds the forearm above parallel and with quite an open angle at the elbow. The left arm drive appears to be less vigorous with the forearm almost parallel to the track and the elbow joint held at a right angle. The ankle of the rear leg is passing the support leg at slightly above knee height and a good distance below the hips.

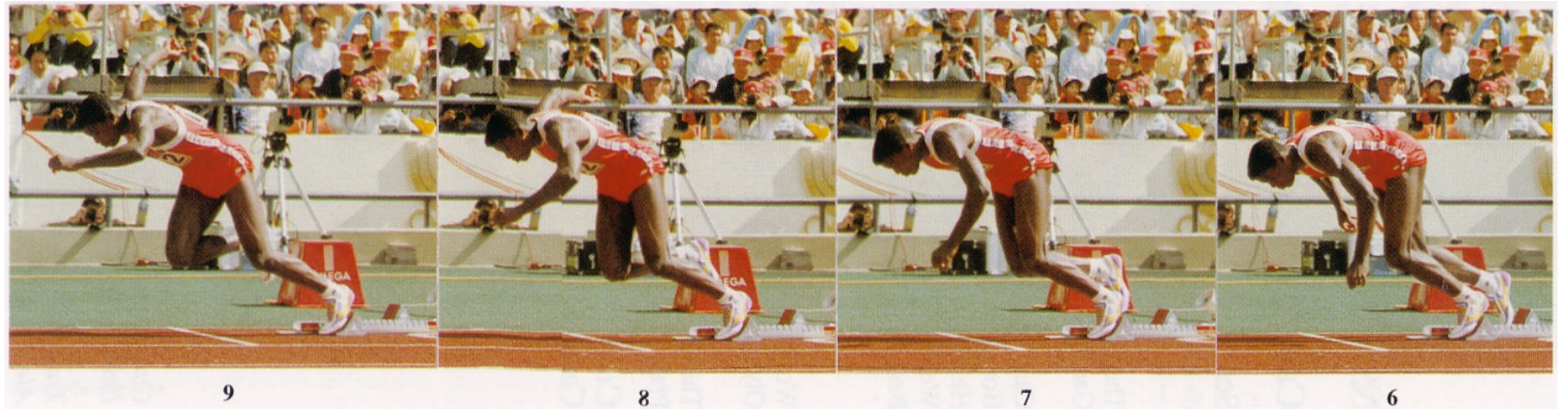
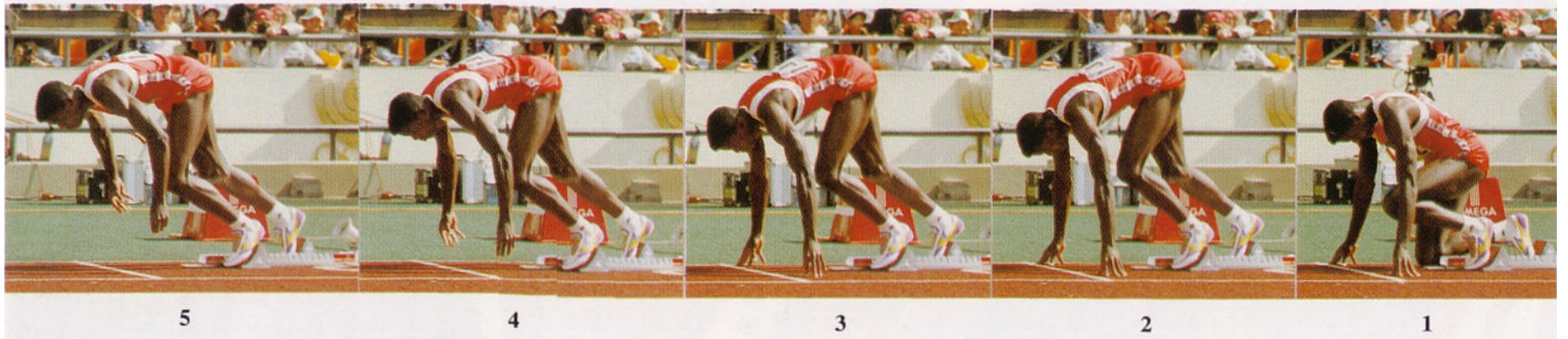
Photos 10 and 11 highlight the extensor qualities and technical discipline of Lewis. Focal alignment and the angle between trunk and right thigh should be noted. Photo 12 denotes the power and control of the athlete as exemplified by the well balanced flight phase.

Photo 14 shows the foot of the support leg below or slightly behind the athlete's centre of gravity. The forefoot is highly flexed as in the ankle joint. Photos 16, 17 and 18 find the left leg recovery phase occurring at slightly higher elevation level with the ankle above the knee of the support leg. Forefoot flexion is still pronounced and the elbow angles appear to be rather closed. The angle between the trunk and the thigh of the recovery leg also appears to have increased when compared to the previous support movement. Note the degree of left ankle dorsi-flexion evident in photo 18. As was the case in photo 11 the total body extension (right side) is of very high quality. The line from the rear ankle joint connecting through the knee, hip and shoulder joints is outstanding.

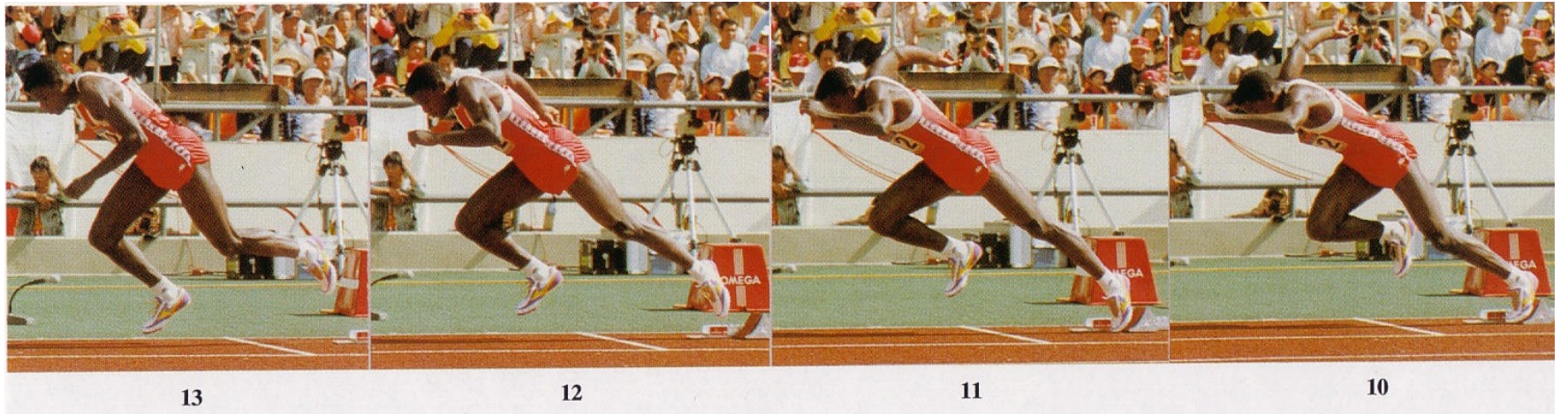
Photo 21 finds the athlete's centre of gravity still somewhat ahead of the base of support as is the left knee joint. Visual focus integrity is intact. Photos 22-24 show the recovery leg being pulled through with the ankle slightly above the knee of the support leg while heel to hip distance remains quite large. It should also be noted that, during the past two strides, lower free leg swing forward has been almost negligible. Arm positioning in photo 24 finds the rear upper arm checked at a position almost parallel to the track while the front arm blocking has the hand at shoulder height with an elbow angle near ninety degrees.

In photos 25-27 the right lower leg continues its piston-like action down and back. Foot strike on this third contact is finally in front of the centre of gravity. The ankle of the support leg is, however, still somewhat to the rear of the corresponding knee joint as in the other two previous contacts. While reviewing photos 25-30 it is noteworthy to see the timing and degree of dorsi-flexion presented by the left ankle. Photo 31 reveals arm deceleration positions previously discussed. Photos 30-33 exhibit a greater amount of lower leg swing forward (left leg). In photo 34, the shank of the support leg has also advanced to a more vertical position. Photos 35-36 find the recovery leg's cycle radius shortening. The heel of this limb is much closer to the buttock and the ankle clearance is well above the support leg's knee joint. Photos 38-44 find a free leg recovery pattern approximating a more symmetrical cycle pathway. Photos 45-46 reveal excellent elastic preparation at the left ankle joint. Note the degree of dorsi-flexion still held prior to contact in photo 46.

Two additional technical themes continue throughout the series. The first is the quality of the ankle joint during the entire support phase durations. Very little amortization occurs. The second centers around the uniform change of ground-total body angles during each subsequent driving extension. In conclusion, the style exhibited by Lewis is consistent with the philosophy espoused by his coach Tom Tellez. A polished and poised uniform acceleration pattern is quite evident.





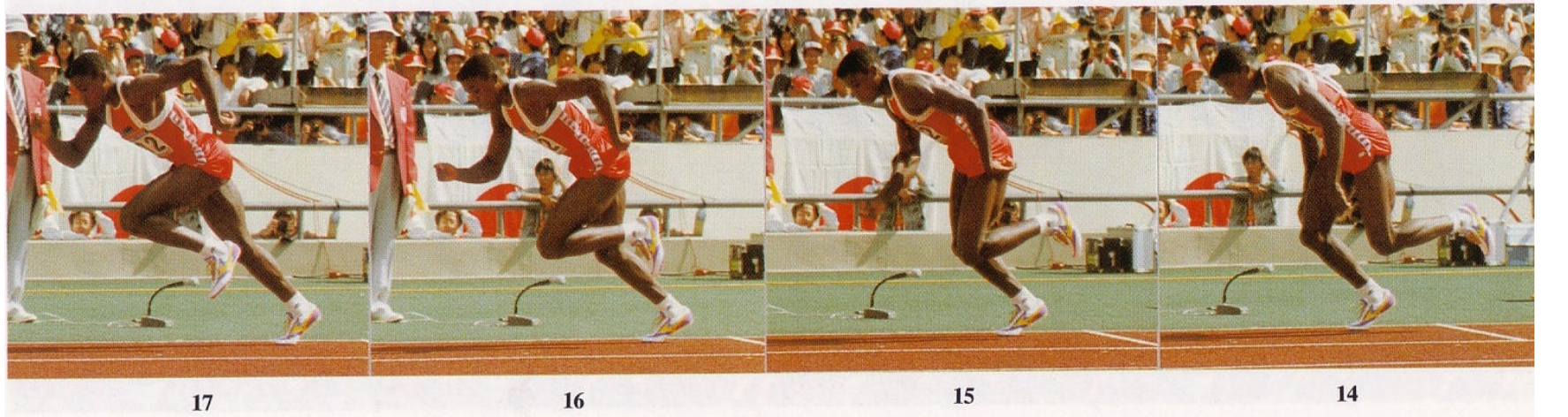


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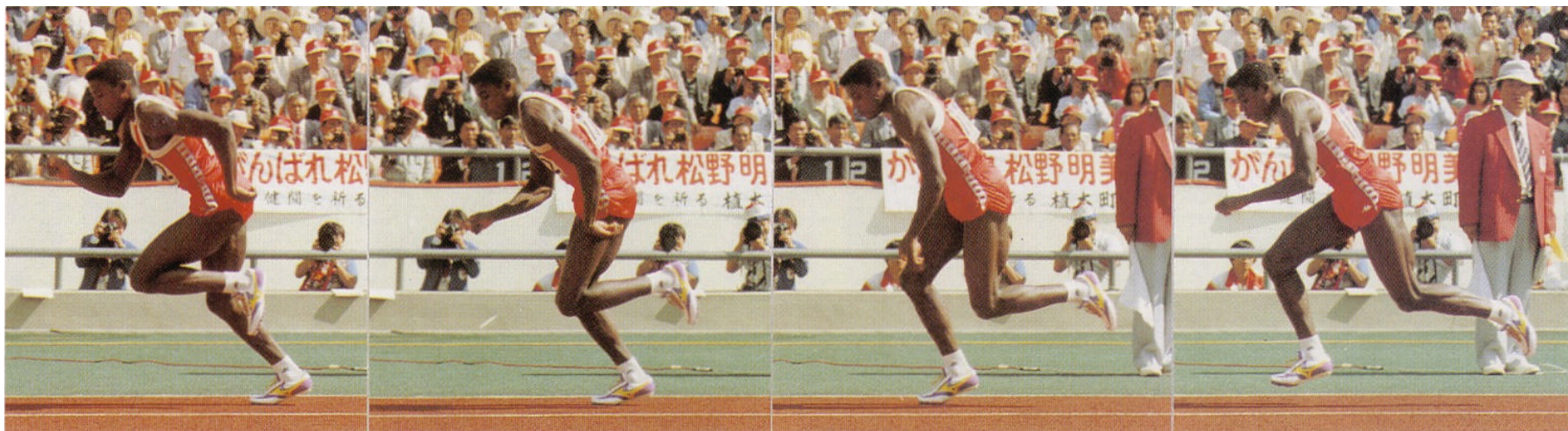
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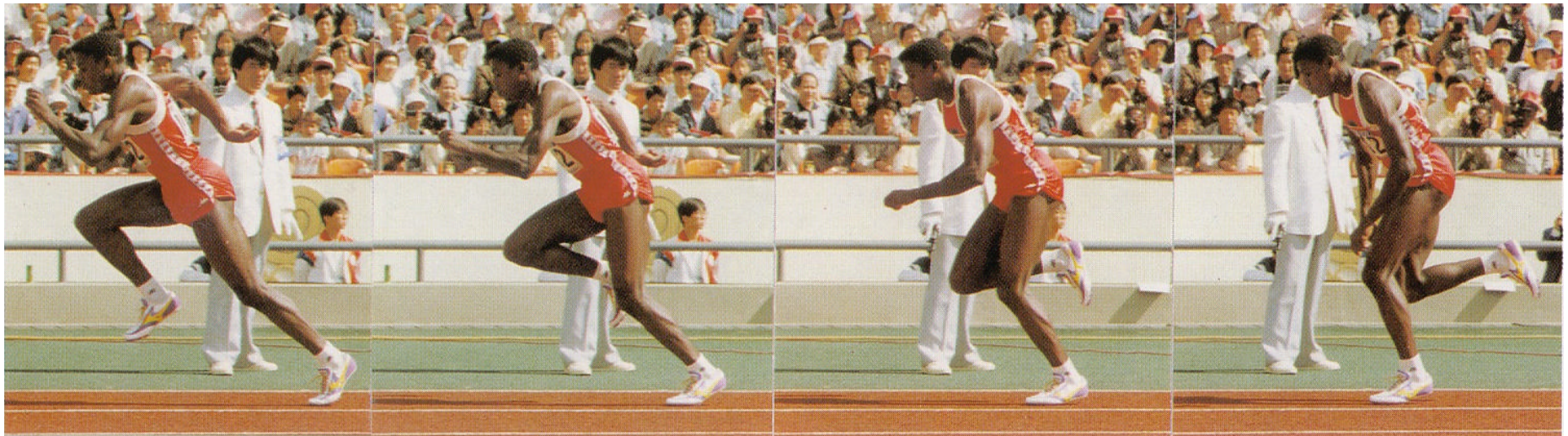
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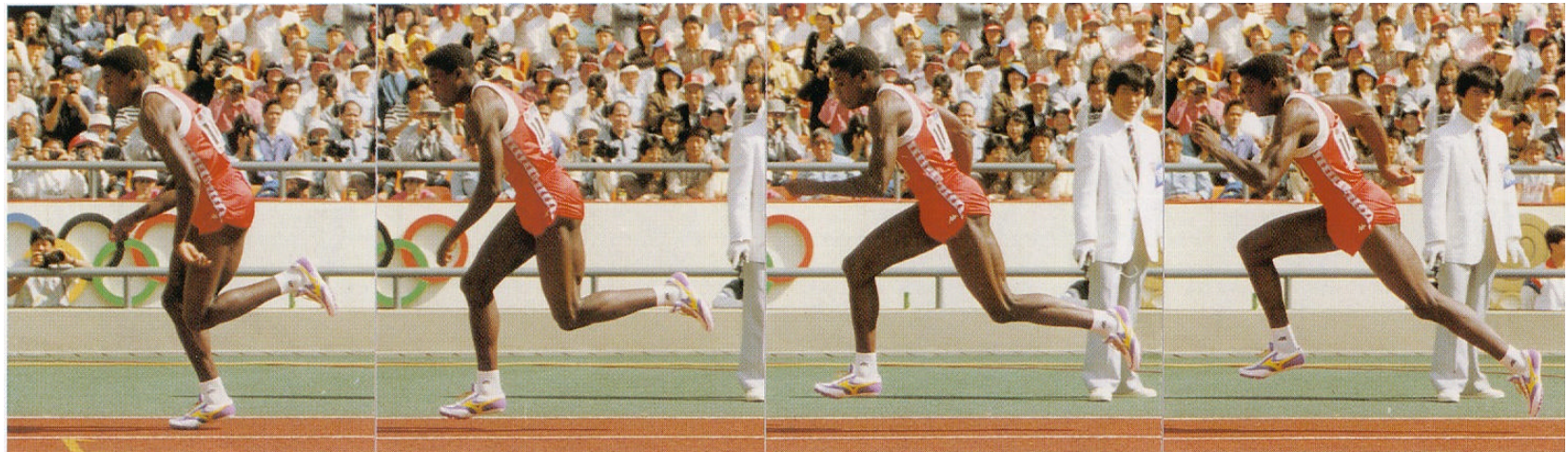


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