

TIMING

Introduction

IAAF Rule 165 allows for hand timing and Fully Automatic Photo-finish timing. However, Rule 165.11 states that the latter equipment approved by the IAAF should be used at all competitions.

For races up to and including 400m, only performances timed by an approved fully automatic photo finish device shall be accepted for World Records (Rule 260(c)). This means that for longer races can be hand timed for record purposes.

The IAAF to date has not provided information on how watches or fully automatic photo finish equipment shall be calibrated.

There has been continuous development in timing technology from the common stopwatch up to more accurate electronic timing devices since our Rules were formulated.

Timing Scales

International Atomic Time (TAI) is realised from commercially available caesium clocks with an accuracy of 1 part in 10^{12} .

Universal Time (UT1) is a dynamic time scale based on observations of the Earth's rotation about its axis. It was the reference time scale until it was replaced by TAI in 1972.

Coordinated Universal Time (UTC) represents a combination of the two time scales TAI and UT1. UTC forms the basis of time around the world and all local times are derived from it. By definition UTC has the same metrological properties as the atomic time TAI

Stopwatches

No longer are watches mechanical marvels. The common timing device is a quartz crystal oscillator that can be made to oscillate electronically at a required frequency. A good quality quartz oscillator should be

thermocompensated. Quartz crystals are subject to ageing and can be affected by shocks, vibrations, continued accelerations or thermal noises.

The IAAF Rule 165.3 recognises that there are stopwatches and manually operated electronic timers with digital printouts. The latter watches are particularly effective for timing out of stadia events.

A high precision wrist watch (chronometer) tested by Controle Officiel Suisse Chronometres (COSC) must be within the range of minus 4 seconds and plus six seconds per day i.e. the error could be as much as 1 in 14,400. Thus a manual time of say 30 minutes for a women's 10000 metre event on the track could be out in the range minus 0.08 seconds or plus 0.125 seconds for such limits. Of course as we would be considering the time from three watches the error would not be as great as indicated above.

It would appear that at this stage the experts have not decided on the standard means of determining the accuracy of quartz watches. In its Technical Report ISO TR 10553 :1995 (E) "Indication of accuracy of quartz watches", the ISO has stated the technical problems on which consensus has not been reached. However, that said I am sure that it is possible to gain an appreciation of the achievable accuracy of manual type timing devices used for athletic events.

Electronic Timing

The Swiss Federation classifies electronic timing in three classes A, B, and C.

Class A is full automatic timing with a CCD camera recording at least 500 vertical lines a second.

Class B is video camera recording at least 50 images per second.

Class C is an optical light beam-timing array. This class of timing is not recognised by the IAAF as official timing arrangement.

Omega has indicated in a private communication that it calibrates its photo-finish timing equipment as follows:

- The camera is aligned on a photographic flash with the image being recorded when the flash is generated.
- An atomic clock generates start impulse and then some "finish" impulses at a known and very accurate interval.
- The start and finish impulses are connected to the equipment-timing device. The finish impulses are also connected to the photographic flash.
- The impulse of the atomic clock is compared with the equipment timer but also with the image so as to prove that the image is synchronised to the timer.

Recommendations

1. That the IAAF Rules be amended so that only track events performances timed by an approved fully automatic photofinish device shall be accepted for World records.
2. That fully automatic photofinish systems be graded according to performance and only the highest quality systems be used for major international events.
3. Meetings be held with photofinish system manufacturers and appropriate calibration tests be determined.
4. Meetings be held with hand held timer manufacturers and appropriate calibration tests and limitations be determined.

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