The Process for obtaining IOF Approval for the use of an Electronic Punching System at IOF Events
Version 2018-04-07

Changes	
13/02/2018	Only long range is acceptable for IOF MTBO High Level Events
21/04/2015	Range shortened for SkiO. Long or short range acceptable for MTBO
16/01/2015	Approval process clarified for IOF High Level Events

This document was developed within the IOF Punching System Approval project.

0. Preface

Approval for usage at WRE
This document defines the process by which the supplier of an Electronic Punching System may obtain approval to use the system at IOF Events. The approval will initially be provisional and for World Ranking Events only. Following a period of minimum one year, during which documented evidence of performance and reliability shall be collected, a vendor can apply for final approval for the system.

Usage at IOF World Events
A system which is finally approved may be used for IOF World Events. For the initial period after final approval, the IOF IT Commission will be prepared to advise and assist the Organiser and SEA of any IOF World Events which wish to use the newly approved system. The IOF IT Commission will aim to ensure proper handling and use of the system and they will work in cooperation with the system vendor.

What does an approval mean?
The granting of IOF Approval signifies only that the IOF considers that the system, when properly functioning, appears to be a suitable one for use in Elite Orienteering events. The Organiser and Event Adviser must nevertheless ensure that the particular version of the system to be used has been properly tested and debugged.

1. Definition

A punching system consists of several key components:

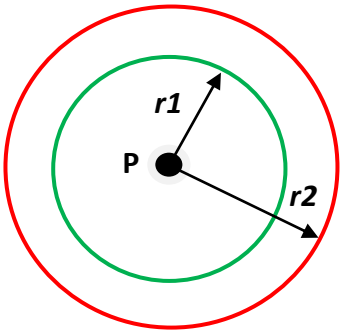
- A ‘card’ that the runner carries to record the punches
- A control unit that writes data to the competitor’s card
- The firmware in the control unit (and in the card if it is ‘active’)

Only IOF approved electronic punching systems may be used in IOF Orienteering Events.
An “approved electronic punching system” is a combination of hardware and firmware which does not significantly deviate from the product specification in the original application.

2. Essential criteria

A new punching system will be approved providing an application has been properly submitted and the system meets the following criteria:

a. The system must be able to show clearly that competitors have visited the control points and the order in which they were visited.
b. It must be easy for the competitor to check that their card is in working order before they start, and that it will continue to work for the duration of the race.
c. It must be easy and quick for the competitors to record a 'punch'. The data transfer time shall be a maximum of 150 ms.
d. It must be possible for an athlete to be confident that a punch has been successful, for example by a confirmation signal in the control unit or the card, a physical back-up or other means.
e. For "regular" punching stations, physical contact between the card and unit shall be required.
f. For "touch-free" punching stations, a valid punch shall be guaranteed if the e-card is within a radius of *r1*. from the unit. No punch should be recorded if the e-card is more than *r2* from the unit. The active area shall not be significantly dependent on the direction of the approach.



The following recommended measures are given (but absolute maximum distances are also given)

Discipline	***r1* (m)**	***r2* (m)**	**Comment**
Foot orienteering	0,3 (max 0.3)	0,6 (max 0.6)	
Ski orienteering	0,3 (max 0.3)	0,6 (max 0.6)	
MTB orienteering	0,3 (max 0,3) **or** 1,8 (max 2.5)	0,6 (max 0,6) 4,0 (max 5)	Only long range is acceptable for IOF MTBO High Level Events

Please note that though the sketch is two-dimensional, the actual situation is three-dimensional, in reality spheres, not circles.

g. The system must successfully manage all abnormal events such as:
   i. Two or more competitors try to punch simultaneously
   ii. A competitor punches unsuccessfully and then tries again
   iii. A competitor punches multiple times at the same control
h. The control units must be easy to maintain and it must be simple for the organiser to determine whether control units have sufficient battery life for the duration of the competition.

i. It must be quick and easy for the organiser to extract the punching records and determine whether the competitor has correctly completed the course. As an example, it must be possible for an organiser to establish if an athlete has completed the course correctly, within 10 s. after finishing the race.
j. The number of disqualified competitors who failed to record one or more electronic 'punches', despite visiting the controls, must be less than 0.1% (fewer than 1 in 1000), measured at the test events referred to in section 3 below.
k. The equipment must be very reliable in a wide range of weather conditions; the cards and control units must be unaffected by prolonged submersion in water and must be able to operate in temperatures from -25 degrees centigrade to +65 degrees centigrade.
l. The equipment must be sufficiently shielded to prevent malfunctioning due to electronic interference from other equipment.
m. The manufacturer shall maintain and publish a list of software and hardware versions, any incompatibilities, any known outstanding bugs and what bugs have been fixed.

3. Other criteria

a. The system should provide split times for competitors to an accuracy of about a second.
b. The system should be capable of providing overall running times to an absolute accuracy of 0.5 seconds or better if a punching finish is used (or if both a punching start and finish are used) in a normal competition spanning up to 5 hours.
c. The card should be easy for the competitor to carry.
d. It should be easy for the organiser to manage the punching system.
e. The control units should be light and compact enough to carry into the terrain.
f. Software should exist to help the organiser download and evaluate the punching information.
g. The equipment should be robust enough to withstand rough usage by competitors and officials.
h. There should be a back-up method so that a punch record can be made in the case of the failure of an item of punching equipment. The backup solution should preferably be integrated with the punching system.

4. Application

Suppliers who wish to obtain approval for a new system must notify the IOF that they wish to commence the approval process.

An application for IOF approval should be sent to the IOF office and must include:

- A brief history of the development of the system.
- Description of the main components.
- The operating principles.
- For each of the criteria in sections 2 and 3 above, brief details of how the system satisfies the criterion.
- For which disciplines (FootO, SkiO, MTBO, TrailO) approval is sought.
- An overview of the number and type of competitions at which the system has been used
- Full reports from competitions involving altogether a minimum of 1500 competitors in at least two significant competitions, including a detailed analysis of all mispunches. These reports should use the standard IOF punching report form.

A “significant competition” means one that is important at a national or regional level and includes elite competitors.

- Independent reports on the system for the above competitions e.g. from the Event Adviser/Controller. The Event Adviser/Controller must be impartial and not associated in any way with the supplier of the system.

All reports and documentation must be in English.

5. Evaluation Process

The IOF Rules Commission will co-ordinate the evaluation process.

If the application is incomplete the applicant may be asked for extra information. If some of the criteria are not met, the applicant may be asked to resubmit the application when the criteria have been satisfied.

The Rules Commission will obtain the opinions of the IT Commission, the relevant Discipline Commissions and the relevant Athletes Commissions.

To properly evaluate the system, it may be necessary for representatives from the IOF to visit a further competition where the system is being used.

Punching systems may be approved for use in one or more disciplines (FootO, SkiO, MTBO and TrailO).

The IOF will attempt to respond to applications rapidly, but in some cases a full response may take 6 months or more.

6. Provisional Approval for IOF World Ranking Events

If the IOF agrees that the system meets the criteria, then the system will receive provisional approval. A provisionally approved system may be used at IOF World Ranking Events (WREs) but not at higher-level IOF events. Full punching reports must be submitted to the IOF for each WRE at which the system is used.

There is currently no fee for provisional approval.

7. Final Approval for IOF Events

There is currently no fee for approval.

Provisional Approval will expire after two years. After a minimum of one year, Final Approval may be requested.

Final Approval is requested by a simple e-mail to the IOF Secretariat listing at least four WREs (which must not all have been in the same Federation) where the system was successfully used and the Punching Reports were submitted. In addition, detailed documentation must be available giving instructions to athletes and to organisers on the correct way to use and manage the system. Such documentation can either be attached to the email or given as links to the published material.

The Rules Commission will again obtain the opinions of the IT Commission, the relevant Discipline Commissions and the relevant Athletes Commissions.

If the IOF agrees that the system still meets the criteria, then a recommendation will be put to IOF Council to approve the system.

If IOF Council approves the system, then the rules will be amended appropriately to include the new system as an IOF Approved Punching System along with any special rules applicable to its use.

Final Approval and Provisional Approval may be withdrawn by the IOF at any time if it is determined that the punching system is no longer suitable for use in IOF competitions.