

# Criteria for Homologation of Timing Systems



**FEI<sup>TM</sup>**  
**JUMPING**

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**Information for Manufacturers of Timing Equipment:**

In order to facilitate the testing procedure for the homologation of timing systems for use at FEI Jumping events, manufacturers are asked to take note of the following.

Requests for homologation of timing equipment are coordinated through the FEI Jumping Department and should be addressed to [jumping@fei.org](mailto:jumping@fei.org).

Timing equipment homologated by the FIS (International Ski Federation) will be considered as having completed the criteria for homologation of the FEI except for C. Wireless Transmission Systems provided the homologation report is sent to the FEI.

All material sent for testing must include the following:

1. A brief operating manual in English or French with clear instructions for all components sent for testing.
2. A new set of batteries as well as all necessary chargers or cables.
3. Two rolls of paper for the printer.
4. "Banana-type" outlets on outputs of all devices to be tested.
5. Photocells sent to the testing laboratory for homologation must be equipped on the emitter with two outputs (banana type or other) which when short-circuited will immediately stop emission of the infra-red beam (directly cut the current to the LED that creates the signal) in order to make precise tests. The aim of the test is to measure the delay between the moment the infra-red beam is cut and the moment the impulse is generated by the photocell receptor.
6. The lock-out function in the timer must be activated.
7. Information on whether the device respects the EMC requirements of the country in which the device is sold.
8. Information on the ageing of the quartz.
9. Re-usable packaging material.

Examples of information to be included for timing equipment:

• Power on	Chrono Timer Version 1.3 e N° 7253
• Clearing of the memory	Clear Memory
• Choice of timing mode and precision	Chrono: Net Time Precision: 1/100 <sup>th</sup> of second

Printed examples must be provided for each function to be tested except for C. Wireless Transmission Systems.

Time of day and synchronisation:

• Set to time of day and synchronisation	Synchro at 11:34:00
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Verification of start times, memorisation and print-out in chronological order:

	Seq	Input	Time
• Print-out and verification of time on 4 channels in sequential mode (brut times entered into computer and processed by software) to the 1/1000 <sup>th</sup> second	1	1	11:34:30.218
	2	1	11:35:52.684
	3	1	11:36:45.972
	1	2	11:37:05.666
• Name and version of software used:	1	3	11:37:07.522

	1	4	11:37:15.108
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Verification of time and calculation of time for timers with time management:

	N°	Input	Time
<ul style="list-style-type: none"> <li>Verification of time with start number</li> </ul>	10	1	11:45:37.533
Ex: Start – Finish for N° 10		3	11:47:16.800
Channel 1 = Start, Channel 3 = Finish	10	NT	99.26
		(1:39.26)	
<ul style="list-style-type: none"> <li>Include an example with a <b>Stop</b> and <b>Restart</b></li> </ul>	<b>Stop at Restart at Stop time</b>		11:47:12.625 11:48:12.850 60.225

Indication of manual intervention:

	Symbol	N°	Input	Time
<ul style="list-style-type: none"> <li>Special symbols</li> </ul>				
Include examples of symbols used to indicate modification or manual input of a time (Ex: N° 3 with input of start time)	+	3	1	11:39:26.975
		N°	Input	Time
<ul style="list-style-type: none"> <li>External impulses (photocell)</li> </ul>		10	1	12:51:05.396
<ul style="list-style-type: none"> <li>Manual impulses (on keyboard)</li> </ul>		10	M1	12:54:13.005

Verification of memorisation of recorded times

Include an example of the downloading of the memory
<ul style="list-style-type: none"> <li>On the printer with history of the timed round</li> <li>If not possible, describe the process using the computer</li> </ul>

## Criteria for homologation

NB: All references to specific temperatures in the criteria below are to be considered within a range of +/- 1° C.

### A. Timekeeping device

#### A.1 Timer

- The timer must be able to operate and measure in Time-of-Day mode in hours, minutes, seconds, and to the 1/1,000<sup>th</sup> of a second at least.
- The truncation to 1/100<sup>th</sup> second must be made after the calculation of the run time. The digits of the run time after the 1/100<sup>th</sup> second are discarded.
- All outputs of the time (e.g. printer, display and interface) must always have the same precision.
- The timer must work without power supply from the mains for at least four hours at 0° C with one impulse per minute.
- It must be possible to synchronise the main and back-up timers to the same time of day (a back-up timer is required for Games and Championships).
- The timer must have a minimum of four independent channels:  
Start, Stop, multi-timing purposes and the judge's interference button (manual start/stop).

- The timer must meet the standards of the IEC (International Electronic Commission). This means the timer must function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

## **A.2 Printer**

- Printing only through a computer is not allowed.
- The timer must have an internal (integrated) or directly attached external printer. The start and finish times in time of day must be printed directly and immediately through the timer's printer and stored in the timer's memory with a resolution of 1/100<sup>th</sup> second. It must be possible to download or reprint this data at a later stage.
- This printer must print at least in a chronological order the time of day.
- For each printed time of day there must be an indication of the timing channel (start/finish/Judge button).
- If it is possible to correct the time in the timer, printed times must specify which input was used and if the time was manually corrected (a special character, e.g. an asterisk), must be used to indicate that manual intervention has been applied.

## **A3 Accuracy**

- With adjusted quartz frequency the time drift must be better than +/- 1 PPM at a constant temperature of 23° C.
- The aging of the quartz must be below +/- 3 PPM per year.
- The delay of impulses as treated by each timer channel input may not exceed 1/100<sup>th</sup> second. The maximal jitter (delay dispersion) allowed between impulses is 1/1,000<sup>th</sup> second. If two channels are triggered at the same time their times must be within 1/100<sup>th</sup> second.
- Timer accuracy must be below +/- 2 PPM with an impulse every 60 seconds for at least four hours at 0° C and at 60° C. Timer accuracy must be below +/- 2 PPM at 23° C with an impulse every 10 minutes during 24 hours.

## **B. Photocells**

The technical concept of the photocell is not restricted by the FEI, although it must be assured that the photocell cannot be influenced by external light sources, such as the sun and its reflections, or radio systems (EMI) used in proximity. The photocell must meet the standards for electronic devices in the country that it is sold.

### **B.1 Accuracy**

- Sensing Time - the time delay from the instant the photocell is triggered to the moment an output impulse is generated may not exceed 0.01 sec. The time delay must be a fixed rate and equal for all photocells in use. The precision must be better than 0.001 second.

### **B.2 Operating Distance**

- The photocell must work over a minimal distance of 20 m (between the photocell and the reflector or between the separate transmitter and receptor).
- If used, the maximum size of the reflector must fit within a square of 10 cm by 10 cm (in all directions).

**B.3 Triggering Object**

- An 8 mm object moving with a speed of 10 km/h must not trigger the photocell (measured at a distance of 10 m from the lens of the receiver).
- A 100 mm object moving with a speed of 60 km/h must trigger the photocell (measured at a distance of 2 m from the lens of the receiver).

**B.4 Environment**

- The photocells must switch on and work at ambient temperatures; at 0° C for at least two hours and at 60° C for at least two hours. They must be switched off and on after the 2 hour testing period.

**B.5 Power Supply**

- If the photocell is supplied power from the timing device (within the same cable as the impulses) it needs no external power supply.
- If a battery is used as the power supply (external or internal) the Photocell must work for at least four hours at 0° C under battery power.

**C. Wireless Transmission Systems**

The wireless radio device must meet the standards for electronic devices in the country that it is sold.

**C.1 Accuracy**

- Sensing Time - the time delay from the instant the radio device is triggered to the moment an output impulse is generated by the receiver device may not exceed one second. The time delay must be the same for all radio channels in use within an accuracy of 0.001. The delay of impulses must be constant; the range must be less than 0.001 second.

**C.2 Operating Distance**

- The wireless device must work over a minimal distance of 200 m in open terrain.

**C.3 Environment**

- The wireless device must switch on and work at ambient temperatures; at 0° C for at least two hours and at 60° C for at least two hours. It must be switched off and on after the 2 hour testing period.

**D. Downstream Processing System**

- Correction of the time must be possible.
- Minutes are to be converted into seconds before the total time is displayed.
- The type of competition (Table A or C) is to be programmed into the system.
- For Table C competitions, faults are to be converted into seconds and added to the running time. The time limit (2 minutes for courses less than 600 m; 3 min for courses more than 600 m) is to be programmed into the system.
- For Table A competitions, the program needs to calculate penalties for faults and for exceeding the time allowed.
- The time correction of six seconds for rebuilding an obstacle must be added to the running time as soon as the clock is restarted.
- The program needs to allow for the introduction of special competitions.