Characteristics of Scoring Apparatus

A. FOIL

1. THE CENTRAL JUDGING APPARATUS (cf. m.51)

(a) Principles

1. The apparatus registers when a break occurs in the circuit of the foil, that is to say that the electrical current which is circulating permanently in the foil circuit is broken when a hit is made.

2. The apparatus will show a red signal on one side and a green signal on the other when a hit is registered on target; white signals will indicate hits off the target on either side. If an apparatus equipped with yellow lights is being used, it must also show a yellow signal when an uninsulated part of the weapon of the fencer who is hit is in contact with his conductive jacket. The second part of the above paragraph is not enforced in the case of anti-blocking apparatus.

3. The audible signals will consist either of a short ring, or of a continuous note which will be automatically limited to two seconds. Either sort of sound will occur whenever a visual signal appears. The sound signal must be identical for both sides of the apparatus.

4. After registering a hit off target, the apparatus must no longer be able to register a subsequent hit on target on the same side of the apparatus.

5. Conversely, after a hit has been registered on target, the apparatus must not register any subsequent hit which arrives off target on the same side of the apparatus.

6. No priority must be indicated between a hit registered against one competitor and a hit registered against his opponent.

7. Conversely, after a lapse of a period of time X (which bears no relationship to ‘fencing time’ which is the basis of judging according to the conventions governing foil fencing) after the first signal given by the apparatus, the latter must ignore all signals for subsequent hits. The central apparatus must be capable of being regulated for the period of time between 700 and 800 milliseconds.

(b) Sensitivity and regularity

1. Any hit must cause a signal whatever the resistance of the circuits external to the apparatus. The duration of the break of contact which must always ensure that a signal is registered must be 5 milliseconds.

   Depending on the increase in the resistance, the apparatus may register:
   (1) a valid hit only;
   (2) a valid hit and a non-valid hit simultaneously;
   (3) a non-valid hit only.

   The resistance must always be less than 500 ohms for (1) and (2).

2. The following are the conditions for the registering of a valid hit.
   — The duration of the break of contact which causes a valid hit to be signalled must never be less than one millisecond.
   — The maximum limit for the duration of the break in contact which must cause the signal ‘valid hit’ depends on the resistance of the return circuit by the opponent’s conductive jacket as follows:
     — 0–250 ohms, 5 milliseconds;
     — > 250 ohms, 500 milliseconds.

   An apparatus will be rejected if it is possible for a valid hit to be registered as a result of a break in contact of less than one millisecond.

   On the other hand it must always register a valid hit with a break of under 5 milliseconds even with an external resistance of up to 250 ohms.

3. A non-valid hit must be signalled for a break of contact of 2–10 milliseconds when the exterior resistance is between 0 and 200 ohms.

4. The apparatus must be capable of supporting an increase in the resistance in the closed circuit of the foils of up to 200 ohms, without causing a ‘non-valid’ signal to register.

5. Even if the resistance of the foil earth circuit is increased up to 100 ohms, none of the following irregular phenomena must occur:
   — that hits are registered on the guard or on the piste;
   — that it is possible to obtain the registration of a hit merely by contact of the blade or the pointe d’arrêt (without depressing it) on the conductive jacket of either competitor.

6. If faulty insulation of one of the competitors causes a leakage of current between his conductive jacket on the one hand and his weapon or the conductive piste on the other, corresponding to a resistance which could go down to 250 ohms, even so the apparatus must continue normally to register the hits exchanged, valid or non-valid.

7. When the blades are in contact, irrespective of the resistance in ohms between them, the apparatus must be capable of registering normally the hits exchanged, valid and non-valid.

8. A specification for tests of apparatus under different conditions will be supplied on request by the SEMI Committee of the FIE.

9. A specification for tests also includes the control of functioning of the yellow lamps.

10. The Congress of the FIE has authorised this Committee to modify or complete the above requirements whenever technical improvements allow the construction of apparatus which can ensure the better operation of the electrical foil judging apparatus.
2. ANTI-BLOCKING TYPE CENTRAL JUDGING APPARATUS

This apparatus must conform to the requirements of the rules set out in Articles m.44–m.51 inclusive, as well as paragraphs (a) ‘Principles’ and (b) ‘Sensitivity and regularity’ above, with the exception of point 6 of paragraph (b).

Even if a fault in the insulation in a fencer’s equipment causes a short between his conductive jacket and his weapon, the apparatus should still be capable of registering both valid and non-valid hits.

In the case specified in the paragraph above the apparatus must register hits on the earth circuit of the foil of the fencer whose equipment has the insulation defect if the resistance of this current leakage is between 0 and 100 ohms, but if the resistance of the return circuit of the opponent’s foil increases to 200 ohms, the apparatus must register hits.

The apparatus must be equipped with two yellow lamps regulated as follows. The yellow lamp on the side of either fencer must automatically light up and remain alight as soon as the resistance between the conductive jacket of that fencer and his weapon is less than 450 ohms. When this resistance is in excess of 475 ohms, the yellow lamp should never light up.

These yellow lamps serve only to indicate insulation faults.

If one or both of the yellow lamps remain lit up, the Referee must stop the bout and call the technical experts on duty to eliminate the fault.

The yellow lamps must not indicate any contact between the fencer’s conductive jacket and the conductive piste.

There must be no signal from hits made on the conductive piste if the resistance in series between the apparatus and the conductive piste does not exceed 150 ohms.

If both fencers hit the conductive piste at the same moment and if one of them has a leakage of current between his foil and his own conductive jacket, no signal is permitted.

B. EPEE

(a) Principle
The apparatus registers when contact is established between the wires forming the circuit in the épée, thus completing the circuit.

(b) Timing
The apparatus must register only the first hit which is made. If the interval of time between two hits is less than 40 milliseconds (1/25th of a second), the apparatus must register a double hit (both signal lamps must light up simultaneously). When the interval is greater than 50 milliseconds (1/20 of a second) the apparatus must register only one hit (only one signal lamp is lit). The tolerance allowed for timing the apparatus is that between these two limits (1/25th and 1/20th of a second).

(c) Sensitivity
When the external resistance is normal, that is 10 ohms, the apparatus must register hits when these are made with a duration of contact of 2–10 milliseconds. With an exceptional external resistance of 100 ohms the apparatus must still register a hit, but without any specific duration of contact.

The apparatus must not register signals of less than 2 milliseconds duration.

(d) Non-registration
The apparatus must not register hits which are made on the earthed material (on the guard or on the conductive piste), even when there is a resistance of 100 ohms in the earth circuit.

(e) Visual signals
1. Visual signals include at least two signal lamps on each side of the apparatus, so designed that if one lamp does not function it does not prevent the other from lighting up nor cause an excessive current through the latter.
2. The signal lamps should give a red signal on one side of the apparatus and a green signal on the other.
3. The apparatus should have a pilot light to show that it is switched on. This light should be dim and not coloured.
4. The apparatus may include lights which indicate shorts. These should be orange in colour.
5. The light-bulbs which show when hits are registered are usually covered with translucent shades. It must, however, be possible to remove these shades and use naked lights, when the light conditions in the locality make it desirable to do so (strong sunlight or, exceptionally, in the open air).

(f) Audible signals
The apparatus must have a loud sound signal. The apparatus may include a device which allows the sound signal to be stopped before the apparatus is reset.

C. SABRE

(a) Principles
1. The apparatus works by contact between the body of the sabre and the conductive surface of the opposing fencer’s jacket, glove and mask.
2. For hits made on these valid conductive surfaces, the apparatus shows a red light on one side and a green light on the other.

If the guard or blade of a fencer’s sabre is in contact with the conductive surface of his own equipment (signalled by a yellow light), a valid hit made by that fencer must still register.
3. The audible signal will consist of either one short ring or a continuous note lasting 1–2 seconds, concurrent with the light signals. The sound will be the same for both sides of the apparatus.

4. Hits made on the non-conductive surfaces must not be signalled.

5. The apparatus must be equipped with two yellow lamps, one on each side, which will indicate a contact between the guard or blade of a fencer’s sabre and the conductive surface of his own equipment.

6. The apparatus must be equipped with two white lamps, identical to those on a foil apparatus, which by their constant illumination, accompanied by a sound signal, indicate any abnormal electrical change in circuits B and C of the fencer at fault.

7. The apparatus must not signal a hit made by the blade whipping over to hit the opponent while in contact with his blade or guard.

8. After a hit has been registered, a subsequent hit made by the other fencer will only be registered if it occurs within a maximum delay of 300–350 milliseconds. The fact that a hit arrived on one fencer before a hit arrived on the other will not be indicated.

9. When the two blades touch, all the other rules should be strictly applied.

10. The SEMI Committee of the FIE reserves the right to change the rules governing the apparatus, either to simplify or to improve its performance.

(b) Sensitivity and regularity

1. The duration of contact during which a signal should be ensured should be 0.1–1 milliseconds. These times may be varied in the light of experience and of laboratory tests carried out by the SEMI Committee. An apparatus will be rejected if a hit can be registered with a duration of contact of less than 0.1 milliseconds (time subject to modification).

2. The apparatus should allow an increase in the exterior resistance of the connections up to 100 ohms without any drawbacks.

3. Should a fault in the insulation, down to 0 ohms, cause a leakage of current between a fencer’s valid conductive surface and his weapon, the apparatus should still be capable of registering all hits exchanged. The insulation fault will be signalled by the illumination of the yellow lamp on the side of the fencer whose equipment is at fault when the resistance is 0–450 ohms. The registering of a valid hit on the guard or blade of the fencer at fault will be allowed provided that the electrical resistance between the guard or the blade and the valid surface is less than 250 ohms.

4. The apparatus should still function when the blades are in contact, or if there is contact between the blades and the guards, or between the two guards.

5. If the contact between the blade and the opponent’s target takes place ‘through the blade’, the apparatus:
   — will register the hit between 0 and 4 ms (+ 1 ms);
   — will prevent the hit being registered between 4 and 15 ms (+ 5 ms), on condition that the contact between the two blades is not interrupted more than a maximum of 10 times in the interval.

6. Should there be a hit made by the whipping over of the blade which has not been signalled, whatever method has been used to prevent the signalling, after 15 ms (± 5 ms) from the contact of the blade with the valid target (the time for the registering of the whip) and unless there has been another hit, the apparatus should allow the normal registering of any subsequent hits.

7. A break in the control circuit (defined as more than 250 ohms) for 3 ms ± 2 ms will be signalled by the illumination of the white lamp on the side of the fencer at fault.