
Edinburgh University Fencing Club

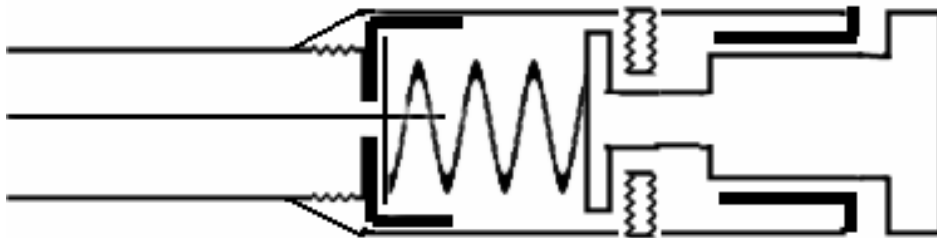
Armouring Course 2004

Basic Principles

Foil

An electric foil is made up of two conductors, the blade itself and a wire; and a pressure switch, the tip. In electrical terms the pressure switch is a push-to-break switch: it maintains an electrical connection between the wire and blade until the tip is pressed with sufficient force, i.e. 500g.

The tip, clearly, is the interesting (complicated) part of the foil, containing 4 components: the tip itself; a barrel; a spring; and screws (grub-screws). The barrel attaches to the end of the blade, with the wire's end-cap mounted in the base of the barrel. The spring sits on the end-cap, and the tip is pressed onto the other end of the spring. The grub-screws are inserted at the sides of the barrel, thus holding the tip in place against the spring, as shown in diagram 1.

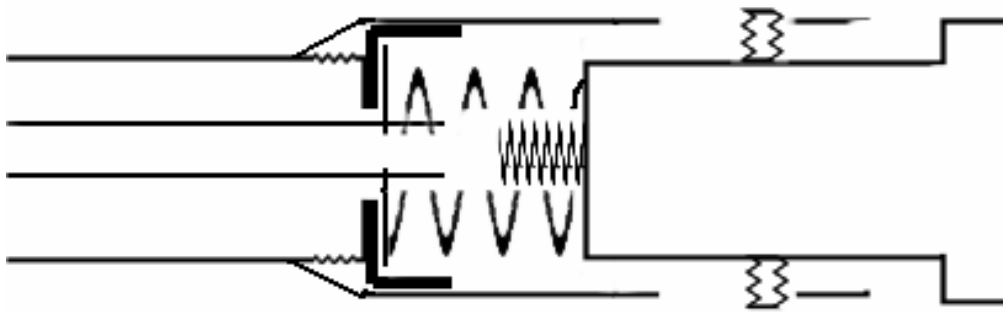


On applying the necessary 500g to the tip, the spring will compress allowing the tip to travel down the barrel; this breaks the contact with the grub-screws, and thus the barrel and blade hence separating the wire, spring and tip from the barrel and blade. This separation causes the scoring equipment to register a hit. The hit is shown as valid if a signal is received from the opponent's jacket through the tip, spring and wire (which remain connected) otherwise an off-target hit is registered.

Epée

By contrast to the foil, an épée has two wires mounted in the blade which end in a single end-cap. The pressure switch at the tip is a push-to-make switch: applying the required 750g will connect the two wires.

The tip is of an entirely different construction to that of a foil and contains an extra component in addition to the tip, barrel, spring and grub-screws: a contact-spring. The contact spring is mounted on the end of the tip, which is held clear of the wires' end-cap by the main spring. The tip is held in place by the grub-screws which pass through the channels cut into the sides of the barrel.



When the tip is depressed, the contact spring is pushed into the end-cap, contacting the ends of both wires, thus connecting them together. This connection is detected by the scoring equipment, and is shown as a valid hit unless there is also a connection between the wires and the blade of the other weapon, in which case the hit is ignored.

The contact spring determines the 'travel distance' of the tip: how far it has to be depressed before triggering a hit. A longer contact spring results in a shorter the travel distance. The minimum travel distance is dictated by the FIE regulations, and is measured by a gauge (see competition regulations).

Sabre

The sabre is a considerably simpler weapon: the complete sabre is a single, solid conductor. The two terminals in the guard-socket are simple connected together by a short piece of wire. No other electrical connections or mechanisms are required.

Hits are detected by the scoring equipment when there is a contact between a sabre and the opposing jacket. However there is also an error detection system which shows an off-target hit if the connection between the guard-socket terminals is broken.

Maintenance

Maintaining Tip performance

Maintaining foil tips

There are two simple areas in which a foil tip needs care and maintenance:

1. Keeping the tip dust free
 - a. If the tip is dirty the electrical contacts inside will not be made properly and so the foil will register spurious off-target hits.
 - b. In more rare cases a tip can be so clogged with dirt that it doesn't depress properly, preventing good hits from registering.
2. Keeping the spring in good order
 - a. The spring may be bent, causing it to contact the barrel when the tip is pressed. This prevents hits from registering as the connection is not broken.
 - b. In some extreme cases the spring can be so shortened that it fails to maintain a contact with the tip, causing false off-targets.

In order to maintain a foil tip in good working order it should be regularly stripped down, by removing the grub-screws, tip and spring from the barrel. The barrel can then be cleaned out with a cotton-bud. The spring and the tip itself should be wiped cleaned with a cloth, and the grub-screws should be replaced. The replacement of grub-screws is not essential; however the screws are easily damaged and can become difficult to remove rendering the

tip entirely useless once it becomes dirty or the spring is weakened. The spring should be checked for straightness by rolling it down a flat surface. If the spring is good it will roll in a straight line, a bent spring will roll in a curve and needs to be replaced.

Maintaining épée tips

Although there are many ways in which an épée tip can fail to comply with competition regulations there are only two aspects of an épée tip that requires maintenance.

1. Keeping the tip clean
 - a. As with a foil tip, dirt can interfere with the quality of the electrical connections. With an épée this results in some hits being erroneously ignored.
2. Maintaining the contact-spring
 - a. During normal use the contact-spring will eventually become compressed, making it too short to reliably contact the end-cap. This will result in some hits being ignored.

Maintaining an épée tip is a similar process to tip maintenance for foils. However the main spring will not usually need replacing unless it is severely damaged. However the contact-spring may need to be extended. This is achieved by unscrewing it slightly from the tip. Eventually it cannot be extended by this means as it is too far compressed, at which point it will need replacing.

Blade maintenance

Straightening blades

No matter with which weapon, the blade will occasionally get bent which can increase the risk of the blade breaking, with potentially dangerous and certainly expensive consequences. To prevent this, the blade should be gently straightened, as rough treatment will increase the chance of it breaking.

To straighten a blade it should be held as flat as possible against the floor and the bent part rubbed under-foot until it is warm. After a short while the blade will be warm and the handle can be lifted while maintaining the rubbing to gently work the bend out.

Blade storage and care

Modern blades don't really need much care to keep them in good condition, certainly nothing that common sense wouldn't suggest. Naturally, being steel, it is a good idea to store blades in a dry place as excessive moisture will make it rust. It is not usually necessary to oil blades, however sometimes cheaper blades could benefit from being rubbed down with a very light coating of WD40 or some other very light oil.

An often overlooked aspect of blade maintenance is warming them up before use. When a blade is very cold (i.e. in Scotland!) the metal is brittle and can snap easily. Even if it doesn't actually break the metal develops stress points which will shorten its life considerably. Blades can be warmed up simply by rubbing them vigorously with a cloth just before use.

Fault Finding

Foils

- Fails to register hits
 - Registers off-targets but fails to register valid hits
 - A bare tip is shorting on the lamé
 - Registers no hits at all
 - There is a short circuit caused by a bent spring.
 - The wire is pinched by the handle, guard or socket causing a short circuit.
 - The wire is broken and contacting the blade

- Registers spurious off-target hits
 - Continuous off-target hits are detected
 - The wire is broken.
 - The tip is missing.
 - The barrel is not contacting the blade.
 - This can be caused by applying too much glue when attaching the barrel.
 - Alternatively too little glue could be used allowing the barrel to loosen.
 - The wire is disconnected from the socket.
 - The wire can sometimes be pulled loose from the socket terminal.
 - Sometimes the enamel insulation is not removed properly from the wire while assembling the foil.
 - The tip is exceedingly dirty.
 - Off-target hits register when the blade is struck.
 - The barrel is loose.
 - As described above, the barrel can work itself loose resulting in an unreliable connection to the blade.
 - The spring is shortened.
 - The tip is dirty.
 - The socket is making a bad contact with the body wire
 - This can sometimes happen if the socket is very dirty, or badly worn so that the body wire is not firmly held in place.

Epées

- Hits fail to register.
 - No hits register at all
 - One or more of the wires are broken
 - One or more wires are disconnected from the socket.
 - Occasionally the wires can work loose from the socket terminals. If either wire is unconnected the épée won't work.
 - The enamel insulation may not have been properly removed from the wires when the épée was assembled.
 - The contact-spring is far too short.
 - On assembly the contact-spring may have been set up far too short to make a contact with the end-cap.
 - Hits sometimes register.
 - The contact-spring is compressed.
 - Throughout normal use the contact spring has been shortened and only makes a contact on very strong hits.
 - The tip is dirty.
 - Dust and grime can get in the way of the contact-spring producing a good connection.
- Hits register on the épée's guard.
 - The socket is faulty:
 - The sockets are designed to make a good contact with the guard and the appropriate socket terminal. However this connection can sometimes fail. The socket should be replaced.
 - The socket is insulated from the guard.
 - An unlikely scenario, some foreign body, such as dirt; paint; or tape can prevent the socket from cleanly contacting the guard. The affected part should be cleaned or replaced.
 - The guard is faulty:
 - Through aging and the battering of general use a guard can sometimes develop patches that conduct poorly. Occasionally this can become so poor that hits can register. The guard needs to be replaced.

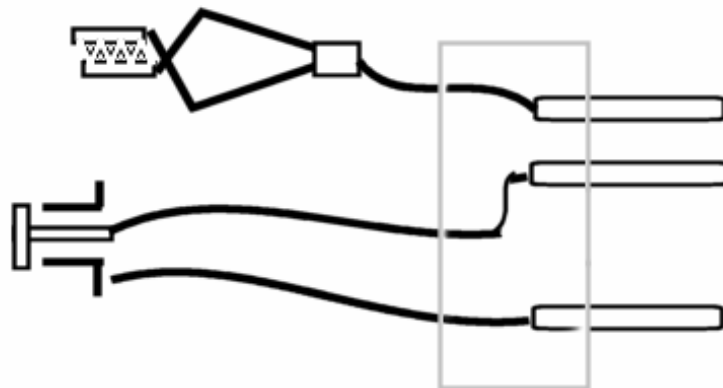
Sabres

- The error indicator shows (and stops when the weapon is changed)
 - The error is continuous:
 - The socket's wire is disconnected.
 - This can occur at either the socket's terminal or at the other end of the wire.
 - The socket is isolated from the guard.
 - Some foreign body is inserted between the guard and the socket, preventing an electrical connection.
 - The error happens when the weapon is moved or struck:
 - The socket is making a bad contact with the body wire.
 - The socket can become worn or dirty, resulting in a physically loose connection or a bad contact with the wire. Although the socket can be cleaned a little it should be replaced.
 - The socket is making a bad contact with the guard.
 - This is a common fault when the guard and handle are loose. Occasionally the guard and socket may need cleaning to prevent dust or corrosion from causing a problem.
- Hits register on the sabre's guard:
 - There is exposed metal at the bottom of the guard
 - This exposed metal contacts with the fencer's lamé, occasionally through sweat. In effect this makes the weapon an extension of the jacket. It can be remedied by ensuring that the guard is properly insulated from the jacket.

Body wires

Any fault with a body wire is either a broken wire or an incorrect connection. In general it is fair to assume that the connections are all correct so repairing a body wire is usually a matter of finding and fixing the broken wire. However care must then be taken to ensure the correct connections:

- Foil and Sabre
 - The centre pin must connect to the tip of the bayonet terminal. For two pin wires, ensure that the centre pin connects to the socket terminal attached to the weapon's wire (for foils).
 - The near pin (see diagram) must be connected to the jacket clip.
 - The remaining pin should connect to the other socket terminal.
- Epée
 - Epée body wires have a simple one to one correspondence between pins at each end.



Customising for comfort and performance

Modifying blades

The most common and important customisation to any blade is 'setting'. This is where a bend is made at the meeting point of the blade and the tang (the part of the blade inserted into the handle).

The purpose of setting the blade is to allow the hand to maintain a position advantageous for defence and comfort while allowing the blade a position advantageous for accurate hitting.

In all cases, with the weapon held directly forward with the blade parallel to the floor, the tang should be bent in (toward the unarmed side) and down. The degree of this bend depends entirely on fencer's preference, and initially some degree of experimentation is probably necessary. As repeated bending can weaken metal it is, obviously, advised that cheap blades are used for this experimentation phase.

Selecting handles

Orthopaedic

This is the most common type of grip and is so named because of the various 'limbs' protruding from the main body. In general orthopaedic handles afford a better grip on the weapon allowing stronger blade work, however not all orthopaedic handles are created equal.

There are now a variety of different handles available, many of which are well designed to afford the best possible comfort, strength and precision. As a general rule of thumb in selecting good handles some thought should be given to the other name for these handles - pistol grips. If it doesn't allow you to hold a weapon roughly in the manner of a pistol then it's probably a really bad design - don't buy it!

French

The French grip is the main alternative to orthopaedics and is the more conventional looking straight (roughly) handle. Although it offers a demonstrably weaker grip on the weapon its proponents claim that it affords a far greater subtlety of movement and precision. This may be true, or not: it is mostly a matter of personal preference and practise in either case, however the design of a French handle does move the balance point of the weapon closer to the fencer's hand making the blade genuinely easier to move. On the flip side French handles, being simpler, is more readily held and used incorrectly and can often lead to a vast reduction in performance unless handled with care.

There are now variations on the classic French handle specifically designed for épéists. These are far wider handles allowing a stronger grip further away from the blade: so designed to facilitate pommeling.