

# Safety Briefing



## Is Your Glider Fit for Flight?

This leaflet:

- highlights the importance of preparing gliders correctly for flight
- offers guidance on how to do so
- indicates some of the glider types and mechanisms that are especially vulnerable to rigging errors.



# Is Your Glider Fit for Flight?

## Accidents and Incidents

### Rigging Accidents and Consequences

Rigging accidents are rare but, in the course of about a million riggings over the last 41 years, there have been 125 instances of an insecure or unconnected wing, tail or flying control. These led to 10 fatalities and 8 serious injuries. Many of the other pilots who flew with unconnected controls were lucky to survive.

A further fatality and 5 serious injuries resulted from the 102 cases of flying with the airbrakes unintentionally open, the pilot or ballast unsecured, loose articles, or the tail dolly still attached. 189 canopies opened in flight.

Rigging errors do not happen to most of us. But they can happen to ANY ONE OF US, and one error can be lethal.

Despite a higher proportion of gliders with automatic control connections, the annual number of rigging errors has increased. In 2014 alone, 3 gliders were flown with an insecure or unconnected elevator; one flew with insecure wings both of which, lacking the main pin, detached from the glider during landing. In slightly different circumstances, these pilots could have been killed. One glider flew with an unconnected airbrake. Seven canopies opened in flight.

These accidents were completely avoidable.

### Causes and Mitigation

A few accidents arose because the rigger was not aware of the correct procedure, or was caught out by subtleties. Most resulted from an omission following interruption or distraction during the rigging process. Many could have been spotted during a daily inspection or pre-flight checks. These aspects are considered further in the following pages.

To avoid flying with an incompletely prepared glider:

- Rigging should be directed by a person experienced on the type, in accordance with the flight manual, without interruption or distraction
- A newly rigged glider should always have a daily inspection (DI)
- The DI should be conducted by a person experienced on the type, without interruption or distraction
- Positive control checks should be carried out every time for every rigging of a glider without automatic control connection
- The pilot should carry out proper pre-flight checks, again without interruption or distraction.

**SHORTCOMINGS IN PREPARING A GLIDER FOR FLIGHT CAN BE LETHAL AND ARE COMPLETELY AVOIDABLE.**

## Helpful Procedures

### Interruption and Distraction

Rigging errors, and other errors and omissions in preparing a glider for flight, are frequently caused by interruption, distraction, forgetfulness, and making unwarranted assumptions. The BGA has repeatedly drawn attention to these hazards and stressed the importance of rigging, and performing DIs and pre-flight checks, without interruption or distraction.

Gliding fields are interesting places, with friends and distractions. But, even if you are in a holiday mood doing the thing that you love, be professional until the glider is safely rigged and checked.

- As a bystander, do not interrupt people who are rigging, carrying out a DI, or conducting their pre-flight checks.
- If you are engaged in these activities and someone speaks to you, send them away.
- As an instructor or club official, try to develop a culture that ensures that everyone is aware of the crucial importance of conscientious rigging, DIs and pre-flight checks.

If you are rigging as a team, make sure that a single person is responsible for directing operations and ensuring that the rigging, loose article and positive control checks are undertaken.

### Rigging and Loose Article Checks

When you have rigged your glider, ensure that it is checked. This should ideally be done with fresh eyes by another, qualified, person, but at least by someone with a fresh frame of mind: some pilots walk briefly away from the glider so that they approach the checks with a clear new focus.

Rigging checks should include the wing and tailplane fittings, control connections, locking pins, total energy probes and rigging hatches. A loose article check should ensure that nothing can interfere with the control circuits or move unrestrained around the cockpit.

### Positive Control Checks

It is essential for positive control checks to be carried out every time for every rigging of a glider without automatic control connection.

Taking care not to apply excessive force, each control surface should be restrained while an attempt is made to move the control, and the direction of motion checked. It only takes a couple of minutes for a helper to advise the rigger whether movement of the cockpit controls generates the correct responses at the control surface.

A positive control check can reveal connections that have only partially been engaged.

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## Vulnerable Glider Types

Modern gliders are often sufficiently similar that differences and rigging idiosyncrasies are a surprise. Older glider mechanisms can be very unintuitive. Manufacturers rarely draw attention to potential rigging pitfalls. Sadly, several pilots have died from not understanding a rigging mechanism or the errors to which it is susceptible. It is important that rigging be carried out or directed by someone experienced on the type and in accordance with the flight manual.

### Unconnected Elevators

Nearly one glider in ten of the UK fleet of ASW 19/20/Pegase and Pik 20B/D gliders has launched with an unconnected elevator. There have been two fatalities and four serious injuries. If you fly one of these gliders, how long will it be before it happens to yours? Will you survive?

ASW 19/20/Pegase and Pik 20B/D use standard l'Hotellier connectors (see opposite) that are straightforward to connect and easy to forget. Even with the elevator unconnected, the pushrod can still lift the elevator.

The Standard Cirrus accounts for 3 cases of unconnected elevators. The unusual connection mechanism is clearly described in the glider's flight manual, and is easily visible if the inspection window is clear and clean. With the elevator unconnected, the pushrod can again lift the elevator.

If you fly one of the many other types that have never or hardly ever suffered an elevator disconnection, do not become complacent. Few mechanisms are completely foolproof.

In all cases, check the connection carefully, and perform a positive control check to ensure there is more linking the elevator to the control mechanism than just gravity. If the neutral position or range of travel looks strange, it could be the sign of an unconnected elevator.

### Unconnected Ailerons

The Libelle and Kestrel are the most vulnerable to being launched with unconnected ailerons, but several other types have also been shown to be susceptible. Any glider without automatic connections can in principle be launched with a control left unconnected.

Libelle and Kestrel gliders use pip-pins through clevis joints for the aileron connections. As well as leaving them disconnected, it is possible to connect them with left and right controls reversed: the range of control movement may be an indication.

### Expanding Main Pins

The wing rigging pins for most gliders are smooth cylinders but those for the Foka, Cobra, Bocian, Jaskolka, Schempp-Hirth SHK and Austria consist of expanding pins/cones which must be fitted exactly in accordance with the directions in the flight manual. If the pin/cone is not correctly located, the wings can fold up and detach from the fuselage. Unless inspection holes have been cut for the purpose, it can be very difficult in some gliders to see whether the fitting has been assembled correctly.

If you fly one of these gliders you should carry out practice rigging under the supervision of someone who is familiar with the aircraft.

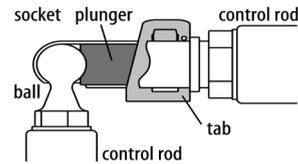
## L'Hotellier Connections

A number of rigging accidents have involved the L'Hotellier quick connections found in many popular fibreglass gliders. While in many cases the connections had simply been forgotten, in others the pilot had connected them incorrectly.

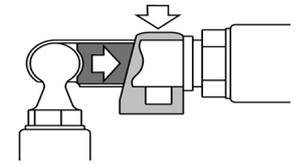
L'Hotellier connections rely upon proper engagement of a ball and socket, which are secured by a spring-loaded tab that must be pressed out of the way to make the connection. With the tab in position, a witness hole is exposed, allowing a locking pin/clip to be fitted to secure the connection. The controls can become disconnected in flight if the pin is not fitted.

Unfortunately, the tab adopts a similar position when the ball and socket are completely disconnected and, although the ball is then locked out of the socket, it may in some cases engage sufficiently for the controls to seem connected. Being able to insert the locking pin does not guarantee that the connection has been properly made.

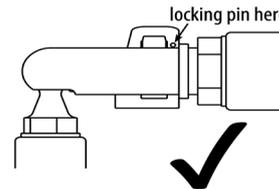
It is crucial to check that the ball and socket are correctly engaged. This can be difficult if access is tight or illumination poor: a torch and mirror, or even an endoscope or phone camera, can help.



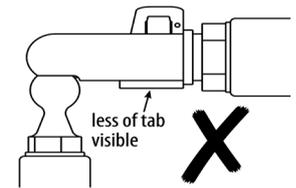
(a) Correct: cut-away shows how tab holds plunger in place



(b) Open: with tab depressed, plunger allows ball to be inserted or removed



(c) Correct: ball engaged, locking pin may be inserted



(d) Incorrect: ball not engaged, but locking pin may still be inserted

## Modified L'Hotellier Connections

There are several common modifications to dispense with the locking pin. These are described overleaf.

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## Modified l'Hotellier Connections



Standard L'Hotellier connection with locking pin



The Wedekind locking sleeve slides outside the l'Hotellier fitting to secure the tab, but doesn't necessarily prevent partial engagement.



The Uerlings sleeve and similar threaded sleeve used on LS gliders rotate or unscrew over the coupling and cannot be moved into position if the ball and socket are only partially engaged

LBA Airworthiness Directive LTA 93-001/3 gives further details.

## Appendix: Rigging Accidents 1974-2014

### All Rigging Accidents

| Glider Type     | Accidents  |
|-----------------|------------|
| ASW19/20/Pegase | 27         |
| Libelle         | 10         |
| Kestrel         | 9          |
| Standard Cirrus | 8          |
| Skylark 2/3/4   | 6          |
| Pik 20 B/D      | 6          |
| LS4             | 4          |
| K6              | 4          |
| Astir           | 4          |
| Olympia 460/463 | 3          |
| LS6             | 3          |
| K13             | 3          |
| Junior          | 3          |
| Jantar          | 3          |
| RF5B            | 2          |
| Olympia 2       | 2          |
| Capstan         | 2          |
| 26 Other Types  | 26         |
| <b>Total</b>    | <b>125</b> |

### Aileron Rigging Accidents

| Glider Type     | Accidents |
|-----------------|-----------|
| Libelle         | 9         |
| Kestrel         | 6         |
| LS6             | 3         |
| Skylark 2/3/4   | 3         |
| LS4             | 2         |
| Standard Cirrus | 2         |
| ASW 20          | 2         |
| SZD 59          | 1         |
| Pirat           | 1         |
| Astir           | 1         |
| K13             | 1         |
| Cobra           | 1         |
| T 31            | 1         |
| Olympia 2       | 1         |
| K2              | 1         |
| Unknown         | 1         |
| <b>Total</b>    | <b>36</b> |

### Elevator Rigging Accidents

| Glider Type     | Accidents |
|-----------------|-----------|
| ASW19/20/Pegase | 16        |
| Pik 20B/D       | 5         |
| Standard Cirrus | 3         |
| Junior          | 2         |
| K8              | 1         |
| LO 100          | 1         |
| DG 200          | 1         |
| Phoebus         | 1         |
| Skylark 3       | 1         |
| Capstan         | 1         |
| T21             | 1         |
| Olympia 2B      | 1         |
| <b>Total</b>    | <b>34</b> |

In the 41 years from 1974 to 2014 there were 125 instances of mis-rigging of wings, tail-planes, elevators, ailerons, airbrakes and flaps resulting in 10 fatalities and 8 serious injuries.

Please try not to add to these.



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