

# NAFLIC

*National Association For Leisure Industry Certification*

## **Standards & Related Documents Committee**

### **TECHNICAL BULLETIN - OCTOBER 2002**

#### **252. Fabbri Booster Accidents**

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We report on two accidents this year which have occurred on Fabbri Booster rides. The first of these, in Denmark, resulted in the death of a man who was ejected from a height of about 30 metres. Since then, a young girl suffered serious injuries at Hull Fair when she was ejected from a Booster. On this occasion the ejection is thought to have occurred from a comparatively low height and at slow speed. In each of these accidents it is believed that the passenger's over shoulder restraint was not locked when the ride started up.

We have not been involved in investigation of either accident and have not received any "official" investigation findings, so the following descriptions are tentative.

The Booster design includes limit switches associated with each individual over-shoulder restraint. These are components in a safety-related part of a control system intended to prevent start up of the ride if any restraint is not in a sufficiently closed position to be capable of engaging the mechanical locking pawls in their ratchets. We have here a very common arrangement for the supposed auto-detection of restraint locks - i.e. when working correctly many designs only indicate something about the position of the restraint, but don't confirm whether or not it is correctly locked. Furthermore, since the restraint position at which switching occurs has to be set for the largest passengers, the restraint is not necessarily safely positioned for a small passenger. For these reasons, such interlocking systems, even when they have adequate integrity in their own right, generally always have to be associated with a manual check, by a ride attendant push / pulling on it, that each restraint has actually successfully locked and is in a position which fits the passenger closely enough.

The Booster design is such that, if the restraint limit switch has failed or (in some cases) is not correctly located, there is no detection in normal use that the restraint has travelled a sufficient distance to confirm that the ratchet pawls could be correctly engaged. It has been suggested that, in the Hull accident, the relevant limit switch indicated that the restraint was closed when the locking ratchets were not actually engaged.

The Booster control system is intended to achieve another safety function associated with the limited reliability of components. The designer wishes the ride to be able to operate when the restraint detection system for a particular seat has failed, provided that the seat is taken out of use. To achieve this, it is possible to switch off the restraint detection system for individual

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seats, but this brings into play a “seat occupancy” detection system. This is intended to prevent start up of the ride if anybody occupies one of the faulty seat positions.

Although we have no official explanation, it is rumoured that the Danish fatality followed from a passenger sitting in a seat which was supposed to have been taken out of service. The restraint detection system had been switched out and, for whatever reason, the seat occupancy detection did not correctly function. The passenger was a large man and the restraint had not been closed far enough to engage the locking pawls. It is presumed that the manual check by an attendant was not carried out. We understand that the Danish authorities are likely to bring one or more prosecutions.

Following the Hull accident, the Health & Safety Executive have circulated some interim advice to controllers of Fabbri Booster rides to “ensure the following measures are taken as a matter of urgency :-

1. Ensure that the top limit switches are functioning correctly on all cars (the switch that detects that the ratchet rod has travelled far enough in order for ratchet pawls to have engaged).
2. Confirm that the top limit switches are set so that they do not signal a correct locking position until the relevant ratchets have passed at least three detents.
3. Ensure that attendants are made aware that they must check before every ride cycle that the restraints are correctly locked for each passenger by both pushing down and then pulling upwards to confirm that the restraint is locked.”

These instructions are quoted directly from the HSE advice and, in the absence of more detail, this NAFLIC committee should not be seen as endorsing the advice or otherwise.