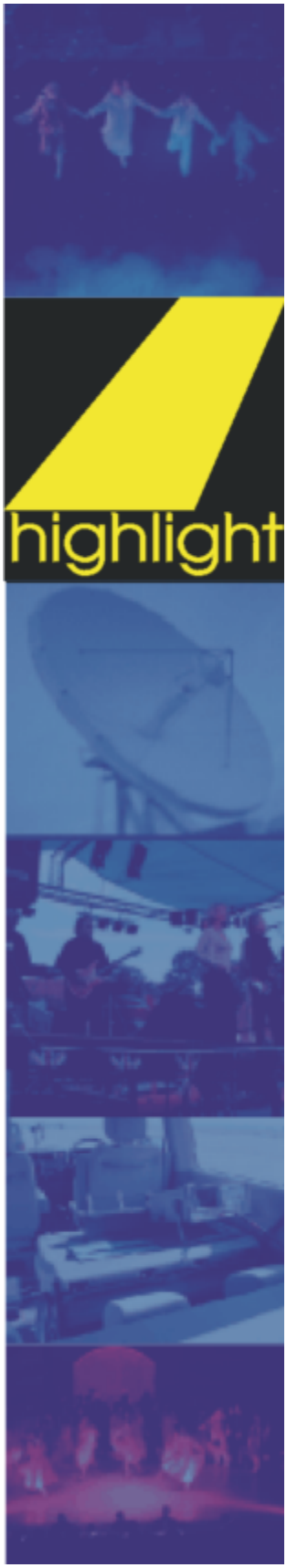


Highlight Brilliant ideas

Performer Flying

A safety protocol and method statement for

Mountbatten Players

Peter Pan in the Abbey
Titchfield Abbey
August 2004

Revision 1.0 June 2004

Performer Flying

A protocol outlining the policies and issues for safely flying performers during the performance of *Peter Pan at the Abbey* to be held at Titchfield Abbey during August 2004.

Introduction

The Mountbatten Players are to perform a musical version of the children's classic *Peter Pan* at Titchfield Abbey near Fareham during the Titchfield Festival in August 2004.

There is an expectation by the audience that during this performance certain characters will fly. Despite the practical difficulties of flying in the open air, the production team have asked that two flying effects be included to ensure that the audience are not disappointed.

This protocol outlines the safety considerations taken into account during the design of the effects, and details the safe working practices to be employed during the rigging and operational phases of the effects. In doing so, we seek to satisfy venue management and local licensing authorities that a safe and proper system of work is in place and that the risks involved with performer flying have been identified, and control measures introduced.

Mountbatten Players wish to amaze, amuse and entertain their audience, but in doing so, they wish to provide a safe environment for all involved.

In preparing the document, reference has been made to the following legislation and guidelines:

1. Association of British Theatre Technicians, Code of Practice for the Theatre Industry Part 2 Chapter 1 – Flying.
2. Work at Height Regulations 2004 (WHR)
3. Lifting Operations and Lifting Equipment Regulations1998 (LOLER)
4. Provision and Use of Work Equipment Regulations1998 (PUWER)
5. Scout Association –Aerial Runway Code 2002 Ed5

Consultation and advice has been sought from theatre flying experts *Kirby's AFX* and *Flying by Foy*, and the document incorporates industry best practice.

Kirby's AFX produced the first flying effects for the original J M Barrie production of Peter Pan in 1904.

Flying by Foy have been UK market leaders in performer flying since 1984.

The protocol is divided into 4 Sections.

Section 1	The specification of equipment and general safety aspects to be taken into consideration when flying performers.
Section 2	Details of Effect 1 - the straight vertical lift of Peter, Wendy, John and Michael during the song *Fly with the stars.*
Section 3	Details of Effect 2 - an Aerial runway to enable Peter Pan to 'fly' from the back of the seating area, down the centre aisle to the acting space.
Section 4	Training and operation of flying effects.

Section 1 – Specifications and General Safety

Definitions

Breaking Strain / Load	The minimum load which will cause a component to fail.
SWL	Safe Working Load. The maximum load (as certified by a competent person) that may be carried under particular service conditions.
System SWL	Taken to be the lowest SWL of all components in the system.
Safety Factor	The Ratio of the Breaking strain to the SWL. LOLER recommends a safety factor of 5; however ABTT CoP suggests a Safety Factor of 8 should be used in the theatre such that the SWL is 1/8 the breaking load.
WHR	Work at Height Regulations 2004.
LOLER	Lifting Operations and Lifting Equipment Regulations1998.
PUWER	Provision and Use of Work Equipment Regulations1998.
ABTT Flying	Association of British Theatre Technicians, Code of Practice for the Theatre Industry, Part 2 Chapter 1 – Flying.

General Safety Aspects

When designing a system for flying people, it is obvious that major safety implications exist for the person being flown and also for the audience. However it is sometimes less obvious to take into account the risks to other people, actors, crew and operator. In this section, an attempt will be made to identify these risks and suggest control measures.

The most palpable risk in performer flying is the failure of the rig itself, although experience shows that this is not common and is controlled by correct design, thorough and regular inspections and trained competent operators.

The rig will be constructed following the ABTT Code of Practice to minimise the possibility of rig failure. All components will conform to the relevant BS specifications and the SWL of the rig designed to handle the heaviest flyer. Once completed, the rig will be inspected by an independent competent person and load tested to a load 1.5 times the system SWL. The rig will be inspected daily for signs of wear.

Each flier will have their own trained operator, and a trained understudy will be nominated for each operator. Flying harnesses are adjusted to fit the individual performers and will be marked to aid identification by the performers. Harnesses will also be inspected daily in the presence of the performer.

In fact the most common incident occurring with performer flying is when the flyer bumps into scenery or other actors when swinging in a pendulum fashion. Unfortunately, the pendulum swing is a very convincing effect and is widely used in many performances. The longer the drop wire, the further the actor can move in a lateral direction. It is important therefore that the operator can predict the flyer's movement; a swift pull on the control line will slow the flyer and cause them to change direction. Equally the flyer has some control; in a similar way to that of a child on a swing, a flyer can accelerate or slow down by amending their body posture.

The second most common risk is falling objects; the flyer must avoid dropping objects onto the acting space below. He or she should remove all unnecessary items from pockets and those essentials such as radio mic packs must be contained in zip or velcro pockets.

Problems can sometimes occur when the flyer is launching from a high platform into space. In this case the performer should be lifted above the platform so that the weight is taken by the rig before being moved out over the flying space.

In the case of effect 1 where the performer is required to fly down the central aisle of the seating area, ushers will be positioned to ensure members of the audience do not enter the flying area immediately before or during the effect. The effect will also be designed such that the performer can not swing over the audience seats themselves.

Only trained designated performers will be allowed to use the flying effects; only trained designated operators will be allowed to operate. Effects will be disabled by key operated lock when not in use.

Equipment Specifications

1. All components used will comply with the relevant BS specification, will be CE marked and will be marked with SWL or coded so that SWL can be easily identified.
2. Ropes – man made fibre ropes should be made of polyester and conform to BS EN 697.

   Where ropes are terminated in a loop or thimble, they should be spliced with not less than 4 complete tucks across the lay of the rope.

   Ropes will be coded with coloured PVC tape at both ends so that the SWL can be easily identified.

3. Wire Rope – Made from galvanised or stainless steel, 6 cores of 19 wires around a central core of 19 wires. To conform with BS EN 302.

   Wires to be terminated using a suitable coupling device giving a strength of at least 80% of the wire.

4. Pulleys – fibre rope; should comply with BS EN 3810/4344.

5. Pulleys – wire rope; should comply with BS EN 3810/4536.

6. Shackles etc - should comply with BS EN 3551/6994.

7. Harnesses – harnesses designed for climbing and fall arrest applications are not generally suitable for flying personnel in a theatrical application. The one possible exception to this advice is the Petzl Newton or Newton Fast harness which is designed in a similar way to the Kirby theatrical harness. The Newton lacks the additional padding of the Kirby, so additional padding must be provided for prolonged use. No BS specification currently exists for theatrical flying harnesses.

Section 2 Vertical lift – Flying with the Stars

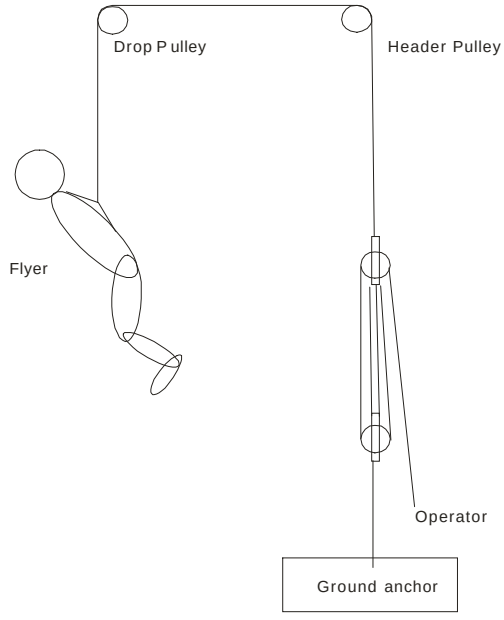
Design Considerations

ABTT give the following advice: *Generally when lifting people on stage a safety factor of twelve should apply. However because of the nature of the effect and because the precise load can be ascertained, it is acceptable to apply a safety factor of 8 to the flying wires which are visible to the audience, thus achieving the most effective but safe system.*

The CoP allows for the use of thin single strand wire for the visible wire, but to aid with the practical rigging of the system 3mm multi-core wire to BS EN 302 will be used. This has a breaking strain of 540 Kg allowing a performer of 67.5 Kg to be flown safely. Suitable terminations will be made off site by *Bursledon Riggers.*

ABTT stipulate that the diameter of pulley sheaves should be 30 times the diameter of the wire used. 3 x 30 = 90mm. A Doughty 100mm single sheave wire pulley type DOUT42800 with SWL of 150Kg will be specified for the header and drop blocks. The connection of the wire to the harness needs to be able to be connected and disconnected quickly but must have a positive safety lock to prevent accidental opening during flight. Three types are considered to be suitable, and practical tests will be carried out to ascertain the most appropriate type. They are: the Screw Gate Karabiner; the D Ball Lock Karabiner and the Gibb Safety Hook.

The actual lift can be provided either by a suitable electric winch or by a manual system. In this case, a manual system is considered to be more natural as the operator has a more intimate feel of the flyers movement. To reduce operator load, a 4 to 1 reduction 'Block and Tackle' system will be fitted to the operator end of the lift wire. the system specified is a Bowden commercial system using 70mm sheaves and 14mm braided 16 plait matt polyester rope to BS EN 697. The system SWL of the 'Block and Tackle' using the safety factor of 12 is 165Kg.



The drop pulley of the vertical lift flying rigs will be attached to a mock balcony platform constructed between the north towers of the abbey. The platform has been designed and will be supplied by Robert Shaw of RBS Scaffolding Ltd. RBS were established in 1987 and specialise in temporary structures in historic buildings.

The platform itself is inherently stable, but further stability will be provided by passing poles through the window spaces and connecting to the existing structure.

A scaffold tower will be created inside the main abbey tower and tied into the existing scaffolding to provide the support for the header pulleys and the ground anchor.

The operators will stand in the tower behind their flyers, and will have line of sight to the flying space through a scenic gauze.

It is envisaged that this effect will last for approximately 2 minutes during the song *Fly with the stars*. During the evening performances this song is scheduled to start at around 8.00pm so a considerable amount of daylight will still light the acting space. Some stage lighting will be used to supplement this.

Section 3 Aerial Runway – Peter Pans first entrance

Design Considerations

Considerable time has been spent discussing a suitable effect to simulate Peter Pan's first entrance into the nursery. The effect will be used only once, at the start of the performance in normal daylight. So it has been decided that the use of an aerial runway would provide the safest means by which Peter can fly onto the set and still create significant audience 'wow' factor.

Aerial runways are often found in adventure playgrounds, and smaller versions in local authority recreation grounds. In most cases the flyer sits on a swing seat, tyre or just hangs from a crossbar handle. It is not surprising therefore to discover that in almost every accident involving an aerial runway the fault lay in either the seat, the method of attachment to the travelling block or the breaking system. It is these risks that will be examined first.

The effect of Peter flying means that the standard flying harness will prove to be far more effective than a seat and also has the added advantage of being much safer. The harness will not allow the performer to slide out of the seat and will be attached to the travelling block via a short drop wire using a karabiner, as described above.

Primary breaking will be provided such that at no time is the travelling block allowed to free-wheel down the main hawser. An 8 to 10mm braided rope will be attached to the back end of the travelling block and this will be run back over a suitable brake pulley and wrapped with at least one complete turn around a 48mm bar to provide breaking friction.

A secondary break will be provided at the ground end of the runway to ensure that in the event of primary break failure, the performer cannot hit scenery or other actors.

The runway will be designed and rigged by David Fairclough from Southampton Venture Scouts using a braided rope or raid rope with a BS of at least 3 tonnes and a Petzl tandem travelling block BS 2.4 tonnes.

The head end of the runway will consist of an 8m alloy scaffold tower situated behind and clamped to the roof of the audience dome. It is also envisaged that additional bracing will be fitted to the tower to tie it into the adjacent wall.

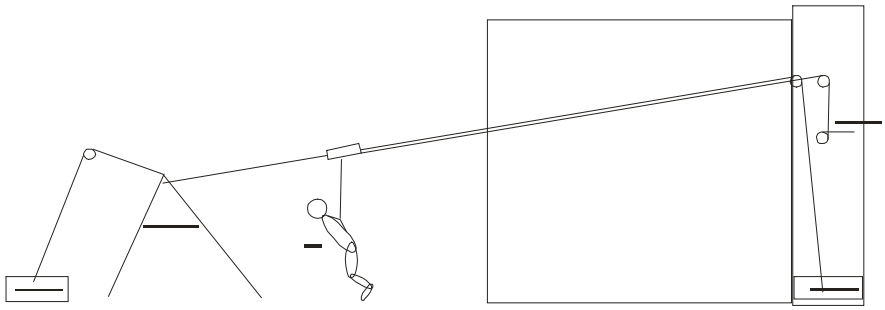
The hawser will be fixed at a level between 2 and 3 metres above the audience staging so that in flight the performer's feet will be approximately 1.2m off the staging. The hawser will pass over a pulley and be fixed using shackles and a span set to the ground anchor consisting of 480 Kg of water ballast in two plastic tanks.

At the lower end, the hawser will pass over a pulley fixed to the underside of the mock balcony where it will terminate on a similar ground anchor.

The hawser is designed to have an incline of about 15 degrees to enable the performer to reach a flying speed of about 1 – 2 m/s. The inclination will have to be adjusted on test to ensure that the best flying speed is achieved.

Provided the stretch and droop of the hawser is at least 10 degrees, then with a 60Kg performer the load at each end of the hawser will not exceed 180Kg, well within the 250 Kg SWL of the rig.

The system will be adjusted and tested with a 60Kg flying load and then finally load tested with 90 Kg load prior to the first manned flight.



Section 4 Training and Operations

Training

The primary operators for the vertical lift have all been trained by a *Flying by Foys* technician and acted as primary operators in a previous performance of Peter Pan at *The Point* in Eastleigh. Reserve operators will be trained prior to rehearsals. Production Manager David Buss has followed a formal course of training given by *Foys* and has designed flying rigs and operations for 4 previous productions. He has worked in the theatre technical industry for 5 years following a 21 year grounding in broadcasting.

Further training will be given in the following areas:

- Component parts of the flying system
- Routine safety checks
- Safety issues with performer flying
- Cause and Effect - how the operator influences the flight
- Emergency procedures

The primary operator for the aerial runway will be David Fairclough. David has rigged and operated aerial runways for Southampton Venture Scouts on numerous occasions over the past 7 years. A secondary operator will be nominated and trained prior to rehearsals commencing.

Three out of the four performers who will be flying have done so before during the performance of Peter Pan at the Point in 2003. They were trained by *Foys* but all will receive further training along with the operators.

Operations

Vertical Lift

1. All operators to satisfy themselves that their rig is sound, including the fitting of the performer's harness prior to each performance.
2. Operators to be in place 5minutes before the start of the flying scene.
3. No operator to commence a lift or continue a move if the performer is not visible.
4. If an operator's vision is obscured by another person or prop etc during a move, the move is to be halted and the control rope locked off until vision is restored. If this should exceed 1 minute a slow emergency descent should be commenced.
5. Only trained operators should fit the flying wire karabiner to the harness.

Aerial runway

1. Only a trained operator to operate this effect.
2. Only a trained Aerial runway flyer (Peter Pan/stunt double or trained understudy) to travel on this effect. It is not a fairground ride!
3. Brake to be locked off and performer standing on loading step before drop wire connected to harness.
4. Performer leans forward to take weight on harness.
5. Operator to ease break to allow performer to start decent.
6. Operator to control descent at approx 1 to 2 metres per second or as amended by production manager on site.

Conclusion

It can be seen that provided the control measures outlined are implemented, an exciting but safe effect can be devised. As with all effects of this nature, risks and practical difficulties may become apparent during the course of the rigging and testing phases of the effects. If this is the case, a pragmatic approach to the design and implementation will ensure that any changes to the design are kept within the guidelines that have governed this document.

This document will be available on the Mountbatten Players website at www.mountbattenplayers.co.uk/technical and any revisions will be posted there.

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