Guidance Note PM 70
from the
Health and Safety
Executive

Safe operation of passenger carrying amusement devices - Ark/Speedway

Plant and Machinery Series PM 70 (August 1988)

These Guidance Notes are published under five subject headings: Medical, Environmental Hygiene, Chemical Safety, Plant and Machinery and General.

INTRODUCTION

1 The Code of Safe Practice at Fairs was published by the Health and Safety Executive (HSE) in April 1984. It is the result of a joint initiative of HSE and the associations* representing the fairground industry designed to improve safety standards at fairgrounds. The Code describes general principles and procedures required to safeguard operators, employees and members of the general public against injury from fairground amusement devices.

2 This note describes various factors that can contribute to accidents on the Ark or Speedway, and the precautions that should be taken to avoid them. It is intended for operators, ride attendants and anyone else concerned with the safe operation of this ride.

3 The guidance is based on HSE reports of incidents, visits to fairgrounds by inspectors, and the considerable experience of fairground operators. The advice is not exhaustive, and should be read in conjunction with the Code. However compliance with this Guidance Note or the adoption of other equally effective measures will reduce the risk of accidents on these rides.

SCOPE

4 This Guidance Note deals with the safe operation of a passenger-carrying amusement device known commonly as the Ark or Speedway and other rides of similar design and construction but which may be known by other names such as Easy Rider, Night Rider, Ark or Noah's Ark.

DESCRIPTION

5 The Ark or Speedway is circular in plan. The main moving part is a segmental platform which rotates about the centre of the ride. Most of these rides have a central operator's control box situated above the drive hub and a fixed loading platform which surrounds the moving platform. The segments of the moving platform are connected together by hinge pins and assembled round the hub. The platform segments are supported by radial members. These are attached at their inboard end to the hub by a ball and socket arrangement. Wheels attached to the outer ends of these members ride on a circular track below the outer edge of the moving platform. The track has a series of hills and valleys throughout its length and as the platform support wheels travel over it they cause the segmental moving platform to undulate.

6 Passenger seating arrangements vary from ride to ride, depending on the ride name and the theme of its decoration but in all cases the rides are designed to accommodate passengers in a seated position facing the direction of travel. On the Speedway the seats are mounted on features designed and decorated to look like motorbikes and side cars. On the Ark they take the form of animals, chariots or other features. They are mounted on each platform segment and arranged in concentric rows around the moving platform.

RISKS

7 Experience has shown there is a risk of injury from:

(a) passengers being thrown from their seats or from other positions on the moving platform;

(b) ride attendants being thrown from the moving platform, or falling while working on the moving platform;

(c) collapse of parts of the structure of the ride, for example side car or chariot seat frames, other forms of seating or the track;

(d) people on the loading platform being struck by passengers or attendants thrown from the moving platform, or by parts which have broken away from the platform;

(e) people on the loading platform coming into contact with moving parts of the ride.

ASSEMBLY AND DISMANTLING OF THE RIDE (Paragraphs 134-155 of the Code)

8 All load bearing joints should be correctly assembled using the fixings supplied by the

* The British Association of Leisure Parks Piers and Attractions
Showmen's Guild of Great Britain
The British Amusement Catering Trades Association

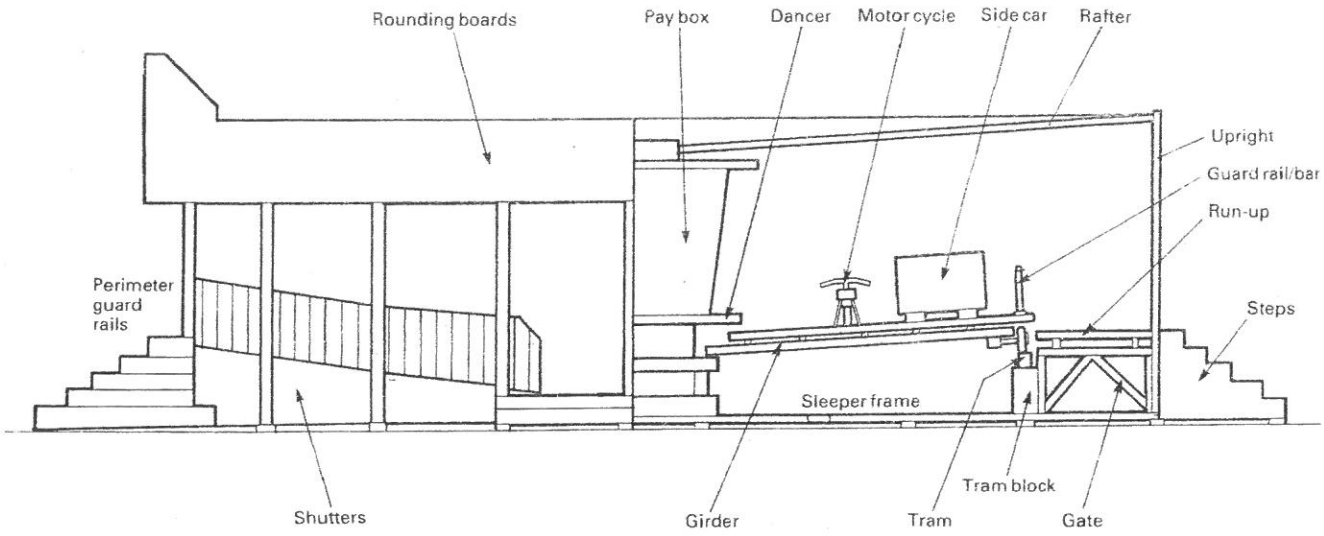

Fig. 1 Part sectioned front elevation of a speedway : schematic only

manufacturer. Where it is necessary to replace lost or worn fixings, parts should be obtained from the manufacturer. Alternatively, advice on suitable equivalents should be obtained either from the manufacturer, from the person appointed to carry out the periodic thorough examination of the machine or any person competent to give such advice. The importance of using fixings of the correct design and specification cannot be over-emphasised.

9 Packing used to support any load bearing part of the structure should be carefully assembled and should be positioned exactly in accordance with the manufacturer's instructions, where these are available. Packing assemblies should be made from solid timber or other suitable materials. They should be capable of withstanding the compression loads involved and forces resulting from the ride motion. They should have a base area which gives adequate load spreading support for the ground conditions on any particular site. Wooden pallets and bottle crates should not be used.

SAFE OPERATION
(Paragraphs 41-70 of the Code)

10 Systems of work and standards of supervision play an important part in the safe running of any passenger-carrying ride. The ride controller should ensure that the systems of work employed are safe.

11 The ride controller should decide how many attendants are needed to operate the ride safely and should ensure that the correct number are on duty and properly supervised when the ride is in operation.

12 Strict control should be exercised over passengers getting on or off the ride. A ride cycle should not start until all passengers are properly seated. So far as is reasonably practicable, passengers should not be allowed to disembark before the ride has stopped.

13 On occasion, passengers will attempt to stand or ride in an unsafe way while the ride is in motion. This kind of behaviour is difficult to control but operators and attendants should take all reasonable steps to prevent it, including where necessary stopping the ride.

14 It has been customary for the loading platforms of these rides to be used by spectators and people sheltering from the rain, as well as by those waiting to board the ride. Such people on the loading platform may come into contact with moving parts of the ride or be trapped between the fixed and moving platforms. All reasonably practicable steps should be taken to ensure that they stay outside the area of potential danger. People should also be discouraged from sitting on the barriers provided at the outer edge of the loading platform where there is a foreseeable risk of them falling backward outside the ride perimeter or forward onto moving parts of the ride or on to other people standing on the runups.

15 So far as is reasonably practicable operators should:

(a) prevent people from moving into or remaining in the danger area on the loading platform at times when it is dangerous to do so;

(b) ensure that passengers are properly seated and attendants are working in safe positions.

This system will require the operator and attendants to exercise careful and continuing supervision.

16 Where operators are unable to meet the requirements of paragraph 15(a) they should:

(a) institute a system whereby the loading platform is not occupied during the ride cycle; or

(b) provide effective barriers or other equally effective means to prevent access to the danger area.

17 Ride attendants should be given suitable and sufficient training on the safe performance of their duties. This training should include clear instructions on their work on the moving platform and on unsafe working practices and behaviour. The ride operator and each ride attendant should wear some form of conspicuous identification which clearly indicates that they are the ride operating staff.

18 The following practices are unsafe and should not be allowed:

(a) transferring between the loading platform and moving platform, other than when the ride is operating at a slow crawl;

(b) riding outboard of the inner circle of seats, other than in a safe position on a passenger seat or in other safe positions where it is necessary to assist passengers who are in difficulty.

19 While carrying passengers the ride should not be operated at a speed greater than the maximum operational speed specified in the log book (but see paragraph 22).

20 Operators should give clear advice about how passengers should behave during the ride. Where necessary, they should caution passengers who expose themselves to risk (see paragraph 14). Reliance should not be placed solely on notices to convey such advice or warnings, since passengers may not read or understand them. A suitable public address system is perhaps the most effective way of communicating with passengers.

SAFE ACCOMMODATION OF PASSENGERS (paragraphs 31-40 of the Code)

21 In general there are two types of passenger seating on these rides. They are:

(a) seats inside sidecars or chariots where passengers are contained; and

(b) seats on motorbikes or animals designed to carry passengers who sit astride holding on to the handlebars.

22 A passenger on a seat at the outer edge of the platform will therefore be subjected to greater forces than if he/she were sitting nearer to the centre of the ride. Furthermore, small increases in the speed of the ride will result in relatively large increases in the forces acting on a passenger. Passenger positioning and the speed of the ride are therefore factors which have a bearing on passenger safety. It is important that rides of this type are not operated at speeds above those which are safe for passengers. The ride operator and attendants should watch passengers carefully during the ride cycle and the maximum speed should be limited to that which is safe for the passengers involved.

23 Passengers seated on motorbikes or animals are not contained. To resist forces resulting from the motion of the ride they must sit in a secure position and hold on to the ride. If passengers in these positions lose their grip then they may fall from the seat and could be thrown off the moving platform. A number of factors may increase the risk of this happening, such as:

(a) the speed and duration of the ride;

(b) increases in speed which occur towards the end of the ride or at other times;

(c) the physical characteristics of individual passengers;

(d) their seat position, relative to the centre of the ride (see paragraph 22); and

(e) the behaviour of passengers.

24 Passengers using the ride should remain seated in or on the seats provided while the ride is moving. Those who sit on motorbikes or animals should sit astride their seats, facing the direction of travel, and hold on to the handle bars (see paragraph 13).

25 People whose physical characteristics are such that they are not able to ride the device in safety should not be allowed to ride unless measures can be taken to enable them to ride safely. If ride operators or attendants have any doubts about the ability of prospective passengers to hold on during the course of a ride then they should seat such passengers on the inner seats, or in the side cars or chariots, or, alternatively, exclude them from the ride.

TRAINING OF OPERATORS AND RIDE ATTENDANTS (Paragraphs 71 and 72 of the Code)

26 Each operator should receive suitable and sufficient training in the safe operation of the ride. Training should include adequate instruction on:

(a) the method of operating the ride;

(b) the maximum safe load of the ride;

(c) the maximum speed at which the ride can be operated while carrying passengers;

(d) the systems of work that should be followed to ensure the safety of the attendants;

(e) the systems of work that should be followed to ensure the safety of passengers, and other members of the public;

(f) the training needs of the attendants;

(g) the safe method of assembling and dismantling the ride (where appplicable);

(h) how to carry out the daily inspection of the ride.

27 It is desirable that operators are aware of the Code requirements relating to daily inspection, and the need for regular maintenance.

28 Each attendant should receive suitable and sufficient training for the type of work expected of them. Training should include adequate instruction on:

(a) control of the loading platform;

(b) the safe loading and unloading of passengers;

(c) the safe systems of work which should be adopted and the risks which should be avoided;

(d) the procedures for reporting defects or breakdown;

(e) procedures that should be followed in the event of an emergency.

EXAMINATION AND INSPECTION OF RIDES (Paragraphs 1-23 of the Code)

29 Each ride should be thoroughly examined at least once every 14 months by an appointed person as required by the Code. This examination should, where practicable, be carried out before the season starts, but in any case within three months of its starting. The examination should take account of the condition of:

(a) all packing materials;

(b) the gates, the track, the moving platform, the loading platform and the steps;

(c) the top frame and sleeper frames;

(d) the centre paybox and its supports;

(e) the car or chariot seats, frames and fixing points;

(f) the fixing bolts and reinforcing plates of all parts mounted on the moving platform;

(g) the guardrails on the moving platform;

(h) the drive, ferrules, pinion and racks;

(i) the platform wheels and pins;

(j) the platform stay bars and their fixings;

(k) the platform hinges, hinge pins and pin retaining brackets;

(l) the hydraulic transmission hoses, fittings and connections (where applicable);

(m) the guarding for the outside friction drive (where appropriate).

This list is neither intended to be exhaustive nor to inhibit the exercise of judgement on the part of the appointed person.

30 Where the appointed person directs, or where recommended by the manufacturer, parts of the ride should be subjected to suitable non-destructive tests. Such testing should be carried out by people competent to select and apply appropriate techniques and interpret the results.

31 The operator should carry out daily inspections of the ride before it is brought into use. These inspections should take account of information supplied by the manufacturer (where this is available), and should, where appropriate, include visual checks of the following:

(a) location and fixing of all components;

(b) the condition of platform support wheels and tyres;

(c) the condition of all electricity cables;

(d) the condition of hydraulic hoses and hydraulic oil level where appropriate;

(e) the general condition of all structural members;

(f) the condition and security of packing under the ride and track support frames, to ensure that it has not worked loose as a result of vibration, subsidence or other factors.

32 Once the daily inspection has been completed the ride should be operated on a trial run before it is used to carry passengers.

33 The device should not be made available to the public until any adjustments or repairs judged to be necessary as a result of this inspection have been satisfactorily completed.

34 Records of all examinations and inspections should be kept by the operator and/or the ride controller in the form required by the Code.

MAINTENANCE OF THE RIDE (Paragraphs 24-30 of the Code)

35 The ride should be maintained in accordance with the manufacturer's instructions. If such instructions are not available, the ride controller should prepare suitable instructions which should incorporate advice from the ride supplier, the independent appointed person and other sources of relevant expertise.

36 Replacement parts should be of suitable design and specification. If the replacement parts used are of a different design or specification from that specified by the manufacturer, their use may affect the integrity of the ride. In such circumstances the guidance in paragraphs 41 and 42 may need to be followed.

37 Loading platforms and steps should be properly maintained, adequately supported and structurally sound. They should, so far as is reasonably practicable, be kept free from mud or other substances on which people may slip.

38 All passenger seating positions should be properly maintained. The following should receive particular attention:

(a) motorbikes, animals or other similar features should be fixed securely to the moving platform, using all of the fixing points provided;

(b) seats in the side cars or chariots should be maintained in a safe and secure condition;

(c) the side cars or chariots and their support frames should be maintained in a safe structural condition; and should be fixed securely to the moving platform, using all of the fixing points provided;

(d) damage liable to cause weakness in the structure or mountings and put passengers at risk should be repaired before further use;

(e) where damage has produced sharp projections, which may injure passengers or ride attendants, the ride should be taken out of use until repairs have been made.

39 Guardrails provided at the outer edge of the moving platform should be fixed securely to the platform and maintained in a sound structural condition.

40 Barriers provided at the outer edge of the loading platform should be at least one metre high, and should be capable of restraining people who may fall or who are pushed against them.

MODIFICATION AND REPAIR

41 Where it is intended to carry out modification or repairs which may adversely affect the integrity of a ride, the modifications should be devised in accordance either with the manufacturer's and designer's instructions, or with a plan and specification drawn up by a person competent to prepare such instructions. Once these instructions have been drawn up they should be submitted to an independent consulting engineer to establish that the design concept is sound and that the calculations are correct, before any changes are made.

42 Ride controllers should take care to ensure that their employees and others who may be involved with the maintenance, modification and repair of the ride make a distinction between routine maintenance work and work involving modification and repair, and should give clear instructions regarding this distinction.

ELECTRICAL SAFETY
(Paragraphs 156-201 of the Code)

43 All electrical equipment associated with any ride should be correctly installed and all electrical conductors supplying the ride should be fully insulated and protected from mechanical damage. All joints and connections should be of adequate strength, properly insulated and protected from mechanical damage. Particular care should be taken over the wiring and installation of alternating current equipment.

FURTHER INFORMATION

This Guidance Note is produced by the Health and Safety Executive. Further advice on this or any other publications produced by the Executive is obtainable from St Hugh's House, Stanley Precinct, Bootle, Merseyside L20 3QY, or from Area Offices of HSE.