ASPEC

GUIDANCE IN THE PROVISION AND SAFE OPERATION OF CAMERA CRANES

October 2002

Foreword

With the ever increasing demand of producing a quality product within ever tighter time constraints, comes the obligation for both organisations and individuals alike to develop sound working practices to achieve this in a safe, professional and legal manner. The Film & Broadcasting industry is not alone in this.

At the request and with the help of our members, we have attempted to produce a comprehensive document in an area that appears to have been overlooked. It attempts to set standards for health and safety that can be used by those who are required to supply, use or operate camera cranes.

We recognise that, due to the diversity of the industry, it is difficult to cover all sectors. However we see this document as a starting point which, with the support of all concerned and with it's every day use, will provide a recognised standard upon which we can continue to build and improve.

Aspec Limited 247-249 London Road Burgess Hill West Sussex RH15 9QU
Tel : 01444 257155 Fax : 01444 257588 Email: aspec@peterlawson.co.uk

Acknowledgements

This document could not have been developed without the support, dedication and time freely given by those individuals & organisations named below

ARRI MEDIA SERVICES
BRITSAFE LIMITED
DENNIS FRASER M.B.E.
J. BARRY MEASURE
N.F.W.INSPECTION CO. LIMITED
PANAVISION
TECHNOVISION UK LIMITED
VFG PLC

Our sincere thanks also go to all others who contributed with constructive comment and suggestions.

INDEX

GUIDANCE IN THE SAFE USE OF CRANES

INTRODUCTION

This guidance has been produced to support the safe operation of crane equipment within the broadcasting and film industry. Within its scope this guidance will attempt to draw out the key legal requirements from the:

Health and Safety at Work Act 1974
Management at work Regulations 1992
Health and Safety (young Persons) Regulations 1997
Provision and Use of Work Regulations 1998
Lifting Operations and Lifting Equipment Regulations 1998
Supply of Machinery (Safety) Regulations 1992
BS 7121, Safe Use of Cranes

It is not the intention of this guidance document to give legal interpretation but to provide best practice in the use of cranes within the broadcasting and film industry. Consultation with current legislation and approved codes of practice may still be required depending on the work being undertaken.

For the purpose of this document the term “Crane” covers any camera support equipment with a counter balance arm.

This guidance will cover the following five areas that affect the safe operation of cranes.

ROLES AND RESPONSIBILITIES

CRANE EQUIPMENT

STRENGTH AND STABILITY

PLANNING THE USE OF CRANE EQUIPMENT

CORRECT USE OF CRANE EQUIPMENT

ROLES AND RESPONSIBILITIES

RELATIONSHIPS

Where there may not be a direct 'employment' relationship between the Technician operating the crane and the persons who control the use of the crane equipment. Where a Grip/technician operating the crane carries out work on a client's production with crane equipment provided by that person or a third party:

(a) Employers (whether individuals, partnerships or companies) have a Duty to ensure that crane equipment provided for their production team and the self-employed working for them complies with the detailed Regulations and industry best practice;

(b) Freelancer must comply with the same duties in respect of Crane equipment that they use in the studio or on location;

(c) Employers who have control of lifting equipment or its management or the way it is used also have duties as far as their control permits. For instance, those hiring out cranes may, in practice, have some control over the way the crane is used or maintained by their customers. Alternatively, employers may provide all crane equipment to others working on their premises and they clearly have some control over the equipment provided.

Note.

A competent Crane technician should attend a Crane at all times, supported by two grips.

The crane Hire Company must ensure that when a crane is hired out, physical evidence accompanies it, such as a copy of the last examination report (the Technician operating the crane should ensure that this evidence is available) and the Instruction Manual/SWL/Serial Identification No.

Only competent technicians must operate cranes

After assembly of a crane the Technician operating the crane should ensure that the crane is thoroughly examined before it is put into use to make sure it is safe to operate.

All cranes must be checked on return from hire and any maintenance work signed off before re-hire.

A formal hand-over certificate should be used to support this process.

The Crane Technician has the duty to operate the subsequent lifting operations in a safe manner. The Crane user (as an employer or a self-employed person) also has the duty to ensure that:

The periodic thorough examinations are undertaken at the frequencies identified through risk assessment or an examination scheme if there is one.

The Crane user may well come to an arrangement with the hirer under which the hirer carries out the thorough examinations but that does not alter the Crane user's duty to make sure these are carried out prior to use.

Where a Production Company enters into a contract with a Crane hire company who will undertake the lifting operation on their behalf ; i.e. the Hire Company provides the crane and the operator, the crane owner has the duty to ensure that the crane is properly maintained, examined and safe to use and that the crane operation is carried out safely.

A summary of the roles and responsibilities of parties involved in crane operation is detailed in **Appendix D**

CRANE EQUIPMENT

Suitability of Crane Equipment

When selecting lifting equipment you should always take account of principal ergonomic hazards associated with the technician whilst operating the crane.

Crane design should take account of the size and shape of a technician operating the crane and should ensure that the crane is compatible with a persons dimensions:

Operating positions/working heights/reach distances etc.

Can the crane be adapted to accommodate the intended operator technician?

Operation of the equipment should not place undue strain on the Technician operating the crane.

Operator technicians should not be expected to exert undue force or stretch or reach beyond their normal strength or physical reach limitations to carry out tasks.

Means of Access

You need to consider all parts of the crane equipment to which access may be required, regularly or irregularly, and to the people who need this access.

If modifications are considered necessary in order to provide a permanent means of access to the lifting equipment, then these may affect the strength and stability of the equipment. You may therefore need to seek advice from the manufacturer or supplier before any modifications are made.

Protection Against Slips, Trips And Falls

This applies to those parts of the crane equipment where people may need to be present in order to operate, maintain, inspect and/or carry out repairs. The following applies:

Where you are using crane equipment in locations where the accumulation of liquids, cables or dust may pose a risk of slipping/tripping all practical preventative measures must be taken.

Routine checks must be taken to ensure that effective control measures remain adequate.

If there is a danger from falling persons or materials from a static platform, then guard rails and kick boards must be in place.

Where edge protection cannot be provided or where operators are using mobile elevating work platforms then a suitable mounting and appropriate safety harness should be used. (Safety assistance should be sought where needed)

Situations where there is a potential fall of less than 2 m may also require edge protection to be provided, for example:

(a) Where traffic route passes close to the edge of the crane equipment;
(b) Where large numbers of people are present;
(c) Where a person might fall onto a sharp or dangerous surface or material/substance; or
(d) Where a person might fall into fast flowing or deep water.
(e) For shooting, crane erection or maintenance then appropriate safety equipment must be used to prevent falls.

Operator Protection

In certain circumstances some form of protection may be needed to protect personnel from risk associated with the location environment. Situations where protection would be necessary include where the operator of the crane is exposed to:

Water, falling objects, pyrotechnics.
The weather; e.g. lightning
The possibility of being struck by vehicles
Levels of noise/dust/smoke that could damage their health

The exact nature of any personnel protection will depend upon the nature of the hazards to which the personnel are exposed and the risks these hazards present. Those nominated as being responsible for providing any protection will need to consider:

(a) The operator's visibility of the task.
(b) The suitability of the protection being provided.
(c) If the operation is taking place in a hot or cold environment
(d) Whether it is ergonomically suited to the operator.

Effects of High Wind

Crane equipment used in open-air locations can potentially become unstable if used in high wind conditions. Where appropriate, the maximum wind speed in which the lifting equipment can be used should be provided. Measures therefore need to be in place to determine the wind speed and also reduce its effect.

The weather forecasting services will provide a general idea of the expected wind conditions on a day-to-day basis for a particular area.

Appendix C provides general guidance for the safe use of cranes in various wind speeds (the manufactures instruction on wind speeds must be used where provided). If wind speeds exceed these guidance or manufactures instructions then crane activities must cease

The most common way of providing an instantaneous indication of the wind speed is to use a hand-held anemometer. However, this method may not give an accurate indication of the wind speed in the most exposed position.

There may be some instances where the wind could also affect the stability of crane equipment used indoors. This could be the case where studio doors are opened allowing the wind to 'funnel' through a building. You therefore need to take the stability of lifting equipment into account if such situations could arise.

Appendix A Hazard checklist for Crane Equipment provides further guidance to Manufactures and users of cranes

Strength and Stability

Adequate Strength

The crane equipment should have adequate strength but you should pay particular attention to the mounting or fixing points.

The mounting or fixing points do not include where the crane equipment is secured to another surface and also where parts of the crane equipment are fixed together, e.g. two jib sections of a crane.

In addition to the downward and upward reaction force of the weight of the load, you should consider additional forces, e.g. any wind loading since this may place extra stresses on the crane equipment.

Modifications to crane equipment may affect the wind loading.

Careful consideration of the risks that may arise from such changes to the wind loading and the potential effect on the stability of the crane equipment.

Dynamic loading from the rapid acceleration/deceleration of either the whole crane structure or the suspended load must be considered

A competent person should ensure that the strength and stability of the crane equipment continues to be adequate for the tasks that the equipment is to be used for.

For difficult or unusual lifts you may need to contact the supplier or manufacturer of the crane equipment to ensure that it is strong enough for the use of propose.

Safe working load must be indicated on all cranes & crane accessories and these limits must be strictly adhered to.

Safe Working Loads (SWL)

A 'safe working load' (SWL) is a value or set of values based on the strength and/or stability of the equipment when lifting. A range of safe working loads can be specified for the same equipment when used in different configurations. The SWL is usually expressed in terms of the maximum load that the equipment may safely lift, as for cranes and lifting attachments.

Where the safe working load (SWL) of a crane is not known then you must ensure that this equipment is not used until this value is determined. This may mean that you need to contact the manufacturer or supplier or alternatively arrange for the equipment to be thoroughly examined by a competent person.

For the purpose of a test only, where a competent person requires the crane to be loaded beyond its SWL then this should only be done with certain precautions in place (Refer to appendix F). These include:

(a) Ensuring that the area around the crane is cleared;
(b) Making sure that only essential workers are retained to lift the load;
(c) Completing the test as efficiently as possible; and
(d) Ensuring that the test is carried out in an area where the consequences of failure are minimised,

Adequate Stability

A number of factors can affect the stability of the crane. These include:

(a) The strength of the ground or surface on which the crane equipment is positioned or located, e.g. spreader plates or sub-frames may be needed so they can safely support the weight of the equipment and the maximum load to be lifted;
(b) Stability of the surface under load conditions, e.g. if the lifting equipment is too close to level changes the ground may slowly subside or collapse suddenly;
(c) Cranes must only be operated in a level position;
(d) The size and nature of the equipment/load (e.g. whether the load itself is unstable);
(e) How the equipment/load is intended to be lifted; and
(f) The maximum wind loading that may occur.
(G) Dynamic effects e.g. centre of gravity, fugal forces etc…

You can use various methods or combinations of methods to improve the stability of lifting equipment. These include:

(a) Designing a suitable sub-frame/tubular rigging on which to position the crane equipment. (The base must be able to demonstrate that it is adequate to support operating load of the crane);
(b) Using an anchorage system (must be approved by supplier/manufacture before use;
(c) Using counterbalancing weights; and
(d) Using recognised ballast, outriggers or stabilisers.

Where cranes are anchored to other work equipment or structures you should ensure that this equipment or structure could withstand the forces that the crane and its use will impose on them i.e. putting one crane onto another, tracking cars to achieve fast crime shots.

Floating Vessels

- If the crane is situated on a floating vessel it will be effectively operating on a variable out-of-level base and thus subject to significantly different loading conditions than is the case on firm level ground.

- In addition, the distance between the water level and the deck of the floating vessel will vary as the lifting operation is carried out. Vessel should be fitted with inclinometer and competent body should determine maximum angle of heel for vessel/crane combination. Also position of crane on vessel will have an effect, i.e. a crane mounted in centre of vessel will be more stable than on side.

- Such lifting equipment will be subject to greater dynamic loading than when used on land. For example, for a crane there will be increased side loading on the jib and greater forces in the slewing mechanisms, brakes and clutches due to changes in inclination of the vessel.

- The crane must therefore be derated from its normal land-based duties. A competent person based on the crane manufacturer's recommendations for floating duties should determine the extent of such derating.

- If on occasions the camera needs to go under water. Consideration must be given to the effects the buoyancy will have on ballast weight calculations.

Crane Equipment Used On Tracks

Ground settlement can cause tracks to be become misaligned and the running surface to become uneven. You should not allow such settlement to develop to the extent that the crane can become unstable or derailed in use.

Only use track specified for the crane

Track to be stored and maintained to manufactures/suppliers recommendations

Cranes over 2 meters must not be used on curve track.

Mobile Crane Equipment Fitted With Pneumatic Tyres

Solid tyres for mobile crane equipment is strongly recommended, however, where pneumatic tyres are being used the following must apply:

Tyre pressures are checked before use and then on a regular basis
Use an appropriate pressure gauge that can be calibrated to confirm that the pressures meet manufacturer /suppliers recommendations.

Pneumatic tyres should have inner tubes

Crane should be lowered to a safe position before checking tyre pressures in case valve jams or fails.

Preventing Overload

To prevent the risk of overturning and/or overloading arising from the use of a Crane strict compliance to design specification is required.

Regular checks of wind speeds, ground conditions and/or supporting structures should be carried out prior to use to ensure fall operating stability

Ensure manufactures safe working load is not exceeded.

Position And Installation

As part of the planning requirements you will need to liase with the grip to address:

Installed or positioned to ensure that the risks of the equipment, or its load, injuring people is minimised.

The measures that you need to take to control the risks, which will depend upon the type of crane and where and how it is used.

The dimensions of any access passageways or paths are sufficient so that any persons using them will not be put at risk from any crane operation.

Any gap into which persons may enter, which may be reduced, for example, by a crane operating motion, should be at least 0.5 m and preferably never less than 0.6 m.

You may need to cover such a passageway to help protect persons should the crane drop unexpectedly.

Prevent A Movement In Uncontrolled Manner

This requirement aims to ensure that crane movements and loads are under control at all times to minimise risks to persons in the vicinity of the crane operation. The aim is to prevent uncontrolled free fall. Various methods can be used to minimise the risk from the crane falling out of control. These include:

1. Unless detailed by manufacturers instructions or a risk assessment, two grips and one Crane Technician should be in attendance when operating a crane. (One grip at each end of crane).

2. Safety equipment to ensure effective strapping and bonding of camera and heads

3. Lifting mechanisms with a high factor of safety or strength must be operated in line with manufactures recommendations;

4. Safety gear;

5. Final check to be completed by the technician to cover:
   - Operating area
   - Track/Mountings/sub-frames (Check for settling)
   - Weights
   - Strapping/Bonds

6. Crane equipment, which is designed for lifting persons, must be appropriately and clearly marked that it is for lifting persons.

7. The risk assessment carried out in line with the Management Regulations will help select lifting equipment and assess its suitability for particular tasks. To support this process, Appendix A Crane/Jib Hazard Check has been designed for guidance.

Note : Persons involved with Crane risk assessment must be able to demonstrate competence

PLANNING THE USE OF CRANE EQUIPMENT

Risk Assessment

A risk assessment will identify the hazards and corresponding risks.

The degree of planning to control these risks will vary considerably. And will depend upon the type of crane to be used and the complexity of the crane operation for which it will be used and the environment it will be used in. Consultation with the grip is critical in the planning process

Proper planning of crane operations is a combination of two parts:

(a) Initial planning to ensure that a crane is provided which is suitable for the range of tasks that it will have to carry out; and
(b) Planning of individual crane operations so that they can be carried out safely with the crane provided.

The balance between the two parts of the planning process will also vary depending upon the crane and the particular crane operation.

Initial Planning

Initial planning must be considered at the first point of enquiry and should be encompassed within an organisation's hire/use procedures.

Factors you should consider when selecting crane equipment so that it is suitable for the proposed task include:

(a) The operational task

(b) Type of loads (Person/Camera/other)
(c) Restrictions (Height, lateral movement etc.)
(d) How often the crane equipment will be used to carry out the task
(e) The environment in which the crane equipment will be used, and
(f) The personnel available to operate the crane and their knowledge, training and experience.

The competent person required to carry out the planning must be able to demonstrate that they have adequate knowledge and experience within broadcasting and film industry to carry out the planning requirement

For routine crane operations the planning of each individual crane operation will usually be a matter for the grip using the crane equipment. To support the planning process it is essential that the grip be involved in the location reconnaissance where applicable.

The grip carrying out this part of the planning exercise should have appropriate knowledge and expertise.

Visibility

If the technician is unable to maintain a clear view of the path of the load then the grips will assist. The grips will need to be in a safe position and either be in view of the responsible person or able to communicate effectively with them.

The crane technician needs to use the same reliable means of effective communication. This could be by using hand signals, radios or telephones etc.

Where hand signals are used they should be consistent with the code of signals in Schedule 1 of the Health and Safety (Safety Signs and Signals) Regulations 1996

Environment

Various weather conditions could have an effect on the integrity of the equipment or expose persons to danger which may mean that the crane operations have to be stopped, e.g. excessive wind speed, poor visibility due to mist or fog, lightning, heavy rain, sea state etc.

Other factors may produce unsafe conditions after the particular weather condition has finished, e.g. waterlogged and unstable ground following a period of heavy rain.

You therefore need a system of work in place, which sets out what measures or action needs to be taken for particular weather conditions.

Such systems of work need to recognise that additional measures may be needed to reinforce the stability of the crane or to reduce the safe working load so that the crane operations can be continued safely.

Location

You also need to ensure that you have adequate site access and egress for the crane equipment. You should also consider whether there would be sufficient space to safely position and install the equipment.

CORRECT USE OF CRANE EQUIPMENT

Overturning

You should not use a crane unless it is of adequate strength and stability for the operation. This means that you need to ensure that those people who use the crane have sufficient knowledge to judge whether or not the equipment is likely to be over-stressed or made unstable while they are using it. This could arise, for example:

(a) When turning a crane with a raised load;
(b) Persons riding the crane when re-positioning.
(c) During excessive and uneven loading
(d) When using a crane to lift an unknown (and excessive) load, and when using a crane in excessively high winds or in locations where traffic could collide with it.
(e) Unknown ground conditions

Crane equipment must not be operated whilst under the influence of alcohol, certain medication (seek medical advice) or drugs

You need to ensure that the crane technician operating the equipment knows or can judge the risk associated with the designated task and avoid overloading the equipment.

For crane equipment which travels in a raised position you will need to consider the layout, ground conditions and overhead obstacles of the studio/location to ensure that the possibility of it overturning or hitting an overhead obstruction are minimised.

Proximity Hazards

You need measures that address the risks arising from proximity hazards. These measures need to take into account the crane equipment in use and the particular proximity hazard.

Proximity hazards that you will need to consider include:

(a) Coming into contact with overhead structures, work structures' electrical energy sources;
(b) Level changes
(c) Other operations in the vicinity;
(d) Low structures;
(e) Gradients;
(f) Scenery/support lines
(g) Ground services such as cables.
(h) Change in ground conditions i.e. beaches, tide changes or causeways

The measures you need to take will depend upon the particular kind of crane and hazards.

Derating

Although a safe working load may be marked on a piece of crane equipment, it may be necessary to reduce this value to take into account where and how the equipment is being used.

This is often referred to as 'derating'. You therefore need to ensure that those involved in crane operations know when this may be necessary and that those undertaking the derating have sufficient competence. e.g. on boats, man riding, tracking vehicles.

Lifting of Persons

Ideally you should provide lifting equipment designed specifically for the purpose to lift people. Adequate precautions should be taken these include:

The safe working load for the equipment and accessories should be reduced (derated) by a suitable amount (such as 50%) to provide an appropriate factor of safety. Your competent person should be able to provide advice.

Where the distances between the person being lifted and the person controlling the lifting operation are short then verbal communication may be adequate.

Where the distances involved mean that the people involved cannot hear each other then you will need to provide the person being lifted reliable means of communication. This could be based on a system of hand signals, a radio or telephone.

Certain cranes used for man riding should incorporate a number of safety features to prevent free fall (Seek guidance from the manufacturer).

Pre Use Check

You need to ensure that people who use crane equipment have received appropriate training, information and instruction so that they can carry out pre-use checks on the lifting equipment. (Appendix B refers)

The Crane Technician or Grip are the best placed to identify faults or damage to equipment.

The purpose of these pre-use checks is to identify faulty equipment and initiate corrective actions where appropriate.

The crane technicians operating the crane equipment should act as the first line of defence in identifying any faults or damage. Such checks should be carried out:

Before the crane is used by the technician during each working day
At the beginning of each shift.

The aim of such checks is to pick up faults due to day-to-day wear and tear and malfunction of safety-related equipment. If any defects are found the technician must report the defect or, if competent to do so, take appropriate action to rectify it.

Persons carrying out the checks must be able to identify damage to crane and crane accessories/equipment,

Continuing Integrity

You are required to maintain the crane equipment in an efficient state, in efficient working order and good repair.

You need to ensure that lifting accessories/equipment are suitably stored away after use so that they are not damaged. This requires the provision of suitable storage facilities such as a storage rack or container.

Competent Person (Thorough Examinations)

A competent person can be defined as having the balance of both theoretical and practical knowledge which they will require to carryout a required task safely and to a required standard

It is essential that the competent person be sufficiently independent and impartial to allow objective decisions to be made.

This does not mean that competent persons must necessarily be employed from an external company. If employers and others within their own organisations have the necessary competence then they can use it. However, if they do, they must ensure that their 'in-house' examiners have the genuine authority and independence to ensure that examinations are properly carried out and that the necessary recommendations arising from them are made without fear or favour.

Thorough Examination/Testing

Thorough examination may be needed at several points during the life of crane: on initial use or following installation:

Periodically during its life, and following certain exceptional circumstances. Before you use any item of lifting equipment for the first time, unless you have received physical evidence that a thorough examination has been carried out which shows that it is safe to use, it must be thoroughly examined by a competent person. Due to the frequent proximity of crane equipment around third parties and the public, camera crane equipment should be examined at 6 monthly intervals. Appendix F. provides appropriate examination and testing guidance in line with current legal requirements.

APPENDIX A - CRANE HAZARD CHECKLIST

DEFINITIONS

Work Equipment:
Machine, appliance, apparatus, tool assembly of components which are arranged so the function is as a whole.

Use:
Any activity involving work equipment and includes starting, stopping, and programming, repairing, modifying, maintaining, servicing and cleaning.

THOROUGH EXAMINATION:
Examination by a competent person including testing the nature and extent of, which are appropriate for the purpose, described in the statutory regulations.

INSPECTION;
Visual or more rigorous inspection by a competent person as is appropriate. It also includes testing the nature and extent for the purpose.

Lifting Equipment:
Work equipment for lifting or lowering loads and includes its attachments used for anchoring/fixing/supporting.

Lifting Operation:
An operation concerned with the lifting or lowering of a load.

Load:
Includes a person.

Accessory for Lifting:
Work equipment for attaching loads to machinery for lifting.

Examination Scheme:
A suitable scheme drawn up by a competent person for such thorough examinations of equipment at such intervals as may be appropriate for the purpose described in the regulations.

Competent Person:
A competent person can be defined as having the balance of both theoretical and practical knowledge which they will require to carryout a required task safely and to a determined standard.

Name Of Item Of Work Equipment:
Serial/Plant Number

Date of assessment:	**Person carried out assessment:**	**Location:**	**Approved by:**	**Date:**
Date of assessment Review:	**Person carried out assessment review:**	**Location:**	**Approved by:**	**Date:**

NB please contact your Department head or Supervisor for this information

REQUIREMENT	YES/ NO	FURTHER ACTION	DESIGNATED PERSON	CLOSE OUT DATE
Suitability Is the crane suitable by design construction? Is the crane suitable for studio environment? Is it suitable for production-location requirements? Are wheels of a solid type construction?				
Maintenance Is the crane maintained in an efficient state (Health and Safety not productivity), in efficient working order and good repair? Date of last statutory inspection and test? (Test Number) What are the manufactures' maintenance requirements? Are there records of maintenance? Is the maintenance log kept? **Maintenance Operations** NB. Maintenance of all cranes must be done in house by qualified technicians and signed off by appointed Supervisor. Has the crane been constructed or adapted to undertake maintenance operations without risk to health and safety? **Motorised Shafts** Is the crane fitted with a means to prevent it seizing? Is lubricant undertaken to prevent seizure?		Agree schedule 6 Month Period		
Inspection Is someone appointed at location to inspect the crane before use? Could the crane jeopardise safety? Who maintains the inspection records? Are they up to date? **Thorough Examination and Inspection** Has the crane/jib been thoroughly examined before being put into service for the first time? Has the crane/jib been examined prior to use after assembly at the onsite location?		Crane Inspection Tag		
Reports and Defects Does the person making a thorough examination: ▪ Notify forthwith any defects. ▪ As soon as they make the report in writing ▪ Notify of any defects, which could become a danger to persons, in writing. N.B. crane/jib must not be put into service before the defects identified have been correctly rectified. **Keeping Information** Are records kept for a minimum of 2 Years?				
Specific Risks Does a competent person operate the crane? Are specific risks clearly identified, i.e. over head structures etc?		Agree Check list (Grip)		

REQUIREMENT	YES/ NO	FURTHER ACTION	DESIGNATED PERSON	CLOSE OUT DATE
Information & Instruction Are supervisors and users of the crane provided with adequate health and safety information and instruction? Is an instruction manual provided? (Is it current and up to date?)				
Training Have assemblers and users of the crane received adequate health and safety training? Has a Training needs analysis been undertaken? Are training records maintained? Are they kept up to date? Are personnel made aware of the risks? Are personnel made aware of the precautions?				
Conformity with community Requirements NB. Work equipment provided after 31st December 1992 Must conform to relevant legislation, which implements EU Directives (CE marking etc.). Is the crane "CE" marked? Has a declaration certificate been issued with the crane? Does the crane appear to be in fact safe? Specify and residual risks remaining.				
Dangerous parts of Crane Have measures been taken to prevent access to dangerous parts of the crane/jib? Have the following measures been taken, so far as is practicable: ▪ Fixed guards ▪ Other guards ▪ Information/instruction/training/supervision Are the guards and protection devices of good construction, sound material and adequate strength?		Labels to warn of hazards		
Specific Crane Hazards Have appropriate measures been taken to prevent the following hazards: ▪ Falling/overturning ▪ Collapse ▪ Electrocution				

REQUIREMENT	YES/ NO	FURTHER ACTION	DESIGNATED PERSON	CLOSE OUT DATE
Crane Controls & Control Systems Has the crane been provided with one or more readily accessible start/stop controls? Are the controls easily and clearly identifiable and visible? Are the controls positioned correctly? (E.g. in a position that the operator can establish that no one is in a hazardous area before operating a control device). Are the interlocking devices suitable and appropriate to the level of risk? Are all sources of energy switched off after stopping the crane? How are allowances made for crane failures, faults, etc.?				
Isolation of Crane from Sources of Energy Has the crane been provided, where appropriate, with identifiable and readily accessible means of isolation?				
Stability Has the crane been stabilised where necessary by acceptable means?				
Lighting Is there suitable lighting supplied for rigging and de-rigging crane equipment?				
Persons carried on cranes Are adequate features incorporated in the crane to reduce risk to persons being lifted/carried? Have measures be taken to prevent crushing/trapping? Can personnel fall from crane?				
Remote Controlled Crane Will the crane mechanism automatically stop if it leaves its control range? (e.g. telescopic boom) Is there a risk of crushing or impact?				
Reports Is there a system of notification of defects? Is there a system of notification of any inspection and test?				
Records Are records of all thorough inspections/examinations kept for 5 years?				
Strength & Stability of Crane Is the crane/jib suitable for lifting on location loads?				
Position and Assembly of Crane Have measures been taken to prevent the crane/jib striking other personnel/third parties?				

REQUIREMENT	YES/ NO	FURTHER ACTION	DESIGNATED PERSON	CLOSE OUT DATE
Marking of Lifting Equipment Are cranes clearly marked with the safe working load (SWL)? Is configuration information i.e. extent of limitation of use marked on the crane? Does the SWL apply to different configurations? Has the crane/Jib been examined prior to use after assembly at the site location? What defects/hazards can arise from use in potentially hostile environments? (e.g. created by special effects)				
Organisation of Lifting Operations Is every lift operation involving the crane/jib: ▪ Properly planned by a competent person? ▪ Appropriately supervised? ▪ Carried out in a safe manner?				
Additional Information Operating Perimeters 1. Wind factor 2. Maximum extension/i.e. operating radius/safe working limits				

Appendix B

Guide to Crane operator training

Introduction

To enable cranes to be operated safely and in line with legal requirements, training plays an important part in establishing crane technician/operator competence. Training alone will not ensure technician/operator competence; suitable experience and supervision all play their part. It is, however, critical that the technician/operator undergoes continuous training and development to ensure that best practice will be implemented in crane use and that bad practices are eliminated. This guidance document should be used, in conjunction with current legal and industry best practice, to help employers meet their legal and moral obligations.

The following criteria are detailed to enable employers to assess current levels of competence within their existing workforce and support future crane technician/ operator development.

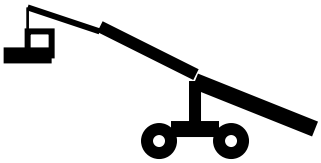
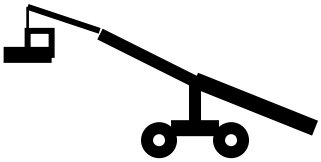
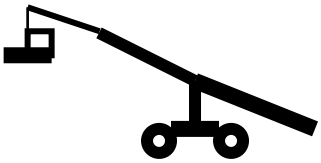
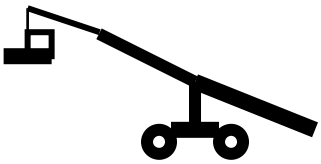
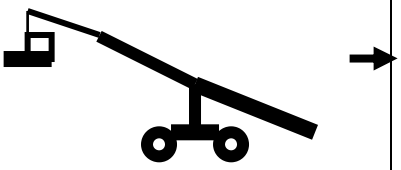
Specific areas	**Training Standards**
Trainers Requirements	Trainers involved in crane operator training must have the following requirements: Skilled in training/instruction techniques to recognised level Qualified assessors D32/33 Have recognised experience in Film/Broadcasting crane operation Have sufficient depth of knowledge to relate their training to film/broadcasting environments These requirements can be met by a combination of trainers
Training Environment	The training environment must be controlled and be located off-the –job to prevent interruptions. On the job development may be required for crane operator assessment. Training facilities should include the following: • Sufficient space and crane equipment • Classroom facilities for theoretical work • Training equipment and aids • Food & Drink facilities
Training	The training should cover the critical areas for crane operation and safety. It should involve both theoretical and practical learning, which will require to be evaluated through assessment. Listed below are specific risk areas where crane operators will require training input: <u>CRANE PREPARATION</u> 1. Ability to assist in undertaking risk assessment. 2. Carry out visual check and inspection of crane components. 3. Ensure appropriate test certificates for electrical (PAT Test)/mechanical (SWL)/critical components are in order. 4. Carry out reporting defects procedure ensuring remedial work is carried out. 5. Prepare crane components for handling and transport.
	<u>LOADING/UNLOADING</u> 1. Use of mechanical aids for lifting heavy loads 2. Banking of reversing vehicles 3. Correct use of truck hoists/other mechanical lifting aids 4. Securing crane equipment for travel Unloading crane equipment at studio/location

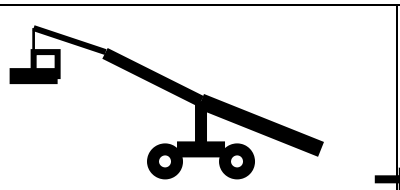
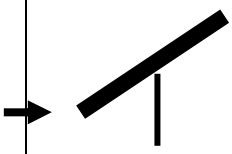
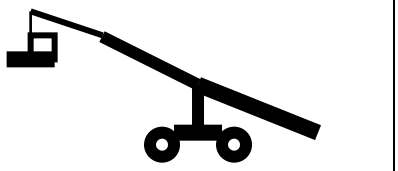
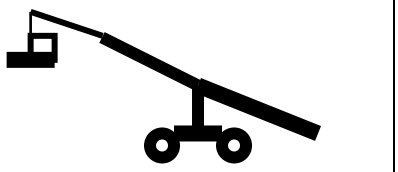
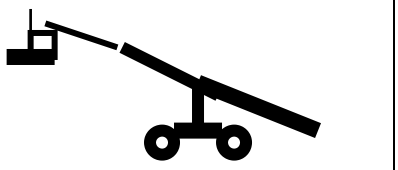
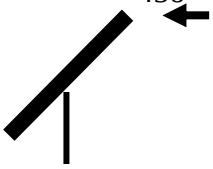
	<u>ASSEMBLY</u> 1. Assess area for safe operation of crane 2. Prepare ground for stability and protect against crane arm striking overhead obstacles 3. Correct assembly of track ensuring stability 4. Assemble crane in line with manufactures instructions 5. Ensuring stability of crane during assembly 6. Manual handling best practices 7. Bonding techniques 8. Levelling a crane 9. Crane operator must be competent, having a good working knowledge in constructing temporary platforms 10. Correct electrical set-up of crane 11. Securing area from damage
	<u>CONFORMANCE CHECKS</u> 1. Carry out conformance check 2. Use of crane tag system to control safe use of crane 3. Reporting and actioning defects
	<u>USE</u> 1. Knowledge of crane operators duties (Appendix E Refers) 2. Maintaining safe operating area 3. Awareness of studio/location hazards 4. Securing procedures when not in use 5. Operating with passengers
	<u>Dismantling</u> 1. Preparing area for dismantling 2. Correct sequence and tools 3. Ensuring stability during dismantling 4. Complete post use check

(APPENDIX C)

EFFECTS OF HIGH WIND TESTS CAMERA CRANES

The following measurements were obtained by exposing a camera crane to the forces produced from a wind machine within a studio environment. It is the intention of this document to illustrate the effects wind forces can have on camera cranes and provide general guidance for safe operation in windy conditions. This document does not replace the specific guidance of the manufacture's instruction manual, which should be consulted when operating crane equipment in windy conditions and considered within a risk assessment.

	60o 	**20 mph 32km/hr Unsteady**
	45o 	**28 mph 45 km/hr Unsteady**
	-20o 	**28 mph 45 km/hr Unsteady**
	90o 	**25 mph 40 km/hr Unsteady**
	90o 	**30 mph 48 km/hr Unsteady**
← **IS THE END OF THE ARM WHERE THE WIND WAS DIRECTED**		

	45o 	**30 mph** **48 km/hr** **Unsteady**
	10o 	**30 mph** **48 km/hr** **Unsteady**
	25o 	**25 mph** **40 km/hr** **Unsteady**
	45o 	**30 mph** **45 km/hr** **Unsteady**
 **IS THE END OF THE ARM WHERE THE WIND WAS DIRECTED**		

Beauport Scale	**Wind speed**		**Sailor's description**
	Km/hr	**Mph**	
0	Below 1	Below 1	Calm
1	1-5	1-3	Light air
2	6-11	4-7	Light breeze
3	12-19	8-12	Gentle breeze
4	20-28	13-18	Moderate breeze
5	29-38	19-24	Fresh breeze
6	39-49	25-31	Strong breeze
7	50-61	32-38	Moderate gale
8	62-74	39-49	Fresh gale
9	75-88	47-54	Strong gale
10	89-102	55-63	Whole gale
11	103-117	64-75	Storm
12	Above 117	Above 75	Hurricane

Appendix D - Roles & Responsibilities

	Suitability Of Crane Equipment	Safe Position And Installation	Safe Use
Client To Ensure:	• Conformance with essential health and safety requirements i.e. "CE" marking under The Provision and Use of Work Equipment Regulations 1998 Regulation 10. • Crane and crane equipment has the required examinations and tests. • Ensure adequate attention has been given to the suitability of crane with regards to tasks to be undertaken and work environment.	• Risk assessment is in place and has considered position, installation and third parties. • Provide location information to support risk assessment to grip & Rental Company. • Competent person (Grip) has been appointed to co-ordinate and ensure correct set-up of crane. • Adequate resources have been provided.	• Competent grip is appointed for supervision of crane operations. • That two grips are in attendance during crane operations. • That a competent person is operating the crane. • Risk assessment is in place for safe use.
Crane Hire Company to ensure:	• Conformance with essential health and safety requirements i.e. "CE" marking under The Provision and Use of Work Equipment Regulations 1998 Regulation 10. • Ensure cranes comply with the requirements of Provision of Use and Work Equipment Regulations 1998 & Lifting Operations and Lifting Equipment Regulations 1998 (Refer to appendix A). • Ensure that all required tests and examinations have been carried out. (Refer to appendix F). • A suitable maintenance system is in place. • A system for monitoring and recording defects whilst in use. • Suitable manual /instructions are available.	• Appropriate instructions or manual have been provided for safe set-up. • That competent grips and Technicians are used to set up the crane.	• Crane equipment is only hired to competent grip and crane technician. • That crane equipment will only be issued where a risk assessment is in place. • Instructions/Manual have been made available to users.

	Suitability Of Crane Equipment	Safe Position And Installation	Safe Use
Grip to ensure:	• A check is made prior to use to ensure that they are satisfied that the correct crane has been selected, all tests and examinations have been carried out and correct manual/instructions are available.	• Risk assessment has been carried out covering position and installation. • Sub-frames/temporary supports are competent to support crane and operations. • Crane is positioned/installed in line with manufacturers/suppliers instructions. • Consider exposure to wind conditions (Refer to appendix C).	• Two grips are in attendance during crane operation. • Competent crane Technician is being used • Requirements from risk assessment have been briefed to team and are being implemented. • Adequate supervision is in place.

Crane Operator to ensure:	• Technician's safety check has been completed prior to use/re-use. • Safety related defects recorded and reported. • Not to operate crane with any defects.	• Cranes position and installation is checked prior to use/re-use. • Crane is not be used if position/installation is unsafe.	• All crane operation is being carried out in line with industry best practice/instruction manual (Refer to appendix E). • Crane is secure when not in use.

Appendix E - Crane Operator/Technician Guidance

Operating Areas	**General Guidance**
Risk Assessment	A risk assessment must be in place before crane operation. The risk assessment should consider the following: • Operating limits of Crane (Overhead services) • Access/Egress to and from location/studio • Studio/location hazards • Overall weight limits/Load requirements • Ground conditions/Temporary platforms/Stability of crane dolly tracks • Passenger requirements (i.e. seat belts) • Use of remote camera heads instead of passengers where practical • Remote operation • Grip and operator/technician experience • Assembly/set-up • Time/resource requirements
Assembly/ Set-up	Instruction Manual supplied by hirer should accompany the Crane. Assembly/set-up instructions should ensure the following: • Safe working Load • Correct assembly sequence • Duties of the crane in all operating configurations • Pre use/in use Tests, examinations and check requirements (refer to appendix F) • Correct handling of heavy parts • Stability of crane during assembly • Correct base dimensions and levelling of crane • Recommended counter weight system • Security of suspended crane items • Isolation and security of Crane when not in use • Correct electrical installation • Correct guarding/signing of hazardous parts/movements Consult manufacturer/hirer regarding configurations that are not explicitly specified in the instruction manual (i.e. working of floating platforms).

Operation	An operator of crane equipment must be able to demonstrate competence in the use of crane equipment. Listed below are the key duties that should be undertaken by a Crane Operator before, during and after use: • Crane operators/technician must be a minimum age of 18 years or older. • Must not operate crane equipment under the influence of alcohol or drugs. (This can also mean some types of medication). • Check crane before use and report any defects that cannot be dealt with. DO NOT OPERATE AN UNSAFE CRANE. Crane safe tag to be used. • Assemble crane strictly to manufacturer's instructions; this should be checked prior to use. • The crane must be level and correctly balanced. (Temporary platforms and track must be capable to support the crane in all operating configurations). • Weights must be secured within a bucket. Never place outside the bucket. • Cameras with remote heads should have cable tie from camera to head. • Ensure safe operating area of crane is sufficiently protected to prevent damage or harm to third parties. (Special consideration must be given to avoid overhead structures/electrical services. Where avoidance cannot be implemented, then barriers should be established 6 meters from the overhead electric line(s) to prevent contact.) • Ensure Safe operating area is maintained during crane operation (Grip responsibility). • Passengers when stepping on or off the crane must be under the strict control of the Grip (passengers must be made aware that uncontrolled movement off the crane can cause rapid elevation of arm). • Safety belts must be used when carrying passengers. • Do not operate a crane in extreme wind conditions (Appendix C refers) or where there is a chance of being struck by lighting. • Properly maintain the crane and safety equipment at all time in line with manufacturer's instructions (Consider also environmental conditions). • De-weight the crane and secure when not in use and left unattended. Show Red crane safety tag to prohibit use. • Always re-check the crane equipment when being re-used after being left unattended to ensure no damage has occurred. • When dismantling, cranes weights should be de-weighted before persons or camera heads are removed.