CONTRACT SERVICES

Safety Training Course B2

BOOM LIFT/SCISSOR LIFT RIGGING

FOR SET LIGHTING TECHNICIANS

Presented by

Contract Services

As part of the

Safety Pass Training Program for the Motion Picture and Television Industry

B2

LINKS TO SUPPLEMENTAL MANUALS:
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Second Edition
February 2018

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Safety Pass Training Program

The Entertainment Industry is committed to maintaining a safe and healthful working environment. To that end, all major studios have a safety representative on staff. In addition, all employers have a safety program in force. This Safety Pass Program has been designed to further promote safety and health and to prevent injuries, illnesses, and accidents on all productions, both on-lot and off-lot.

Studios and production companies may have more restrictive safety requirements than those mandated by local, state, or federal laws or regulations. They also may assign different duties or responsibilities to employees. Therefore, in addition to this Safety Pass training course, employees should refer to the safety manual and materials provided by their employers.

Employees must adhere to all safety rules and regulations. Failure of any employee to follow safety rules and regulations can lead to disciplinary action, up to and including discharge. However, no employee shall be discharged or otherwise disciplined for refusing to perform work that the individual reasonably believes is unsafe.

No safety training can comprehensively cover all possible unsafe work practices. Each production and its employees, therefore, should fully promote each employee's personal obligation to work safely in order to prevent accidents involving, and injuries to, the employee and to his/her fellow employees.

The Safety Pass Program derives from Federal and California Occupational Safety and Health Administration (OSHA) safety regulations. However, the material included in this workbook and its accompanying presentation should be used only as a general guideline. It is not intended as a legal interpretation of any federal, state, or local safety standard.

During the course of your employment, you may be acting as a supervisor or manager. In California, individuals with management authority and actual authority for the safety of a business practice could be convicted of a crime if they have actual knowledge of a serious concealed danger and fail to warn the affected employees and report the hazard. If a hazard exists, immediately notify the employer or studio safety department of the hazard and insure that potentially affected employees are informed of the danger and that steps are taken immediately to mitigate it.

Although the information contained in this training program has been compiled from sources believed to be reliable, the Alliance of Motion Picture and Television Producers, Contract Services Administration Trust Fund, Contract Services Administration Training Trust Fund, and the instructor make no guarantee nor warranty as to, and assume no responsibility for, the accuracy, sufficiency, or completeness of such information.

The Entertainment Industry is committed to maintaining a safe and healthful working environment.

Injury and Illness Prevention Program

This class is part of the employer's safety program.

Employers must provide workers a place of employment free from recognized hazards and must have a safety training program in place.

In the State of California, this is known as an Injury and Illness Prevention Program (IIPP). One of the key requirements of an IIPP is that every employee must be properly trained in safety.

The IIPP and Safety Pass training courses are part of the employer's safety program.

Contents

Disclaimer

In order to take Safety Pass training course B2, *Boom Lift/Scissor Lift Rigging for Set Lighting Technicians*, a student must first take Safety Pass training course B, *Boom Lift/Scissor Lift Operator Safety*. No one other than Course B-trained persons will be allowed to take this course.

This book contains supplemental operator's manuals from Genie/Terex Corporation ("Genie"), JLG Industries, Inc. ("JLG"), and Snorkel. These manuals provide a special exception to the standard use of aerial lifts that permits camera and set lighting equipment to be attached to the platform guardrails by authorized and trained set lighting technicians and studio grips.

All safety rules, allowable wind speed charts, platform capacity reduction charts, and electrical distance requirements outlined in the supplemental manuals **must be followed**. Failure to comply with these specifications can result in serious injury or death and may void the permissions our industry has obtained from the above manufacturers.

Introduction

This course focuses on concepts that have been developed and approved specifically for set lighting technicians by three manufacturers—Genie, JLG, and Snorkel—for rigging set lighting, camera equipment, and diffusion frames to boom lifts. In specific, this course will cover:

- Basic lift safety and operation (review of B Course)
- The industry exception for attaching equipment to boom lifts
- Determining load weights and reducing platform capacity
- Choosing the appropriate lift and equipment for the job
- Assessing wind resistance and allowable wind speed
- Procedures for rigging equipment in scissor lifts

Terminology

The lifts discussed in this course go by a number of names. In general, they can be called *mobile elevating work platforms* (MEWPs) or *aerial lifts*. In OSHA regulations, a scissor lift is called an *elevating work platform,* and a boom lift is referred to as an *aerial device* or an *extensible boom platform*. Boom lifts also have nicknames such as *Condor*, *stick boom*, *knuckle boom*, *cherry picker,* or *Z boom*.

In the interest of simplicity, this course will use *scissor lift* and *boom lift* to refer to the individual machines. The terms *platform*, *machine*, *lift*, and *device* will apply to both types unless otherwise indicated. *Boom* and *basket* will apply only to boom lifts.

Scene 1
Lift Safety Review

This scene revisits basic boom lift and scissor lift safety and operation. Safety Pass course B, *Boom Lift/Scissor Lift Operator Safety* covers these topics in more detail.

Common Lift Hazards

Lift work can be dangerous when not done properly, as seen in the statistics below. Many of these hazards can be avoided with the right knowledge and preparation.

ACCIDENTS BY TYPE

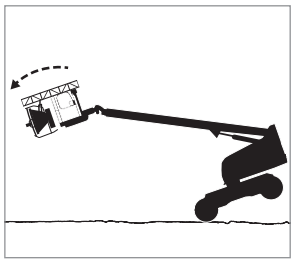
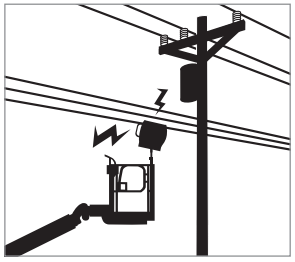
- 21% OVERHEAD/SIDE HAZARD
- 19% TIP-OVER
- 18% FALL FROM PLATFORM
- 14% SHOCK/ELECTROCUTION
- 9% STRUCK BY OUTSIDE OBJECT
- 8% COLLISION
- 4% EJECTION FROM PLATFORM
- 3% MACHINE COLLAPSE/FAILURE
- 1% OBJECT DROPPED FROM LIFT
- 4% OTHER

FATALITIES VS. INJURIES

- 65% FATALITY
- 35% INJURY

Source: US Dept. of Labor/OSHA Fatality and Catastrophe Investigation Summaries.

Common Lift Hazards and Possible Causes

Hazard	Description	Possible Causes
Overhead/Side Hazard 	Operator or passenger gets pinched, trapped, or crushed between the platform and an outside structure or object	• Not looking in the direction of the platform's movement • Clothing or equipment snags on control lever • Unfamiliarity with controls
Tip-Over 	Machine becomes unbalanced and falls over	• Overloading the platform or attaching equipment too far out of the platform • Driving over or working on an incline with too steep a grade or sideslope • Driving over or parking on a curb, bump, edge, hole, or unstable surface • Working in high winds • Using the lift as a crane
Fall from Platform 	Falling while entering or exiting the platform or falling from the platform itself	• Not facing the platform and/or using three points of contact while exiting or entering • Standing on the toeboard, guardrails, or other objects in the platform to gain height • Reaching too far over the guardrails • Not wearing PFPE (when required) • Not securing entry gate or chain
Electrical Hazard 	Shock or electrocution through contact with energized wires, equipment, or the vehicle itself	• Not following minimum safe approach distance (MSAD) requirements (see page 5) • Using the machine as a ground for welding • Improper use or dressing of power cables

Minimum Safe Approach Distance

To avoid electrical hazards, lift operators must maintain the proper minimum safe approach distance (MSAD) from energized overhead lines, as set by state or federal OSHA (see tables below). Not that your employer may set greater MSAD requirements than OSHA.

When determining a safe distance, consider the operator's height in the platform, the equipment inside or attached to the platform, and machine and electrical line sway. For details, see Safety Bulletin #22A, *Power Line Distance Requirements*, as well as the operator's manual for the lift being used. When in doubt, stay the maximum distance away from power lines.

California Boom-Type Lifting or Hoisting Equipment Clearances Required from Energized Overhead High-Voltage Lines

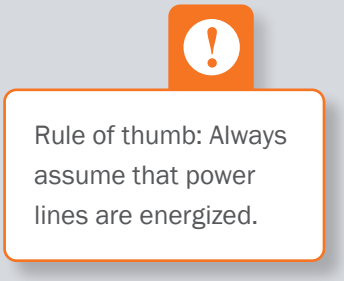
Nominal Voltage (Phase to Phase)	Minimum Required Clearance (Feet)
600 50,000	10
over 50,000 75,000	11
over 75,000 125,000	13
over 125,000 175,000	15
over 175,000 250,000	17
over 250,000 370,000	21
over 370,000 550,000	27
over 550,000 1,000,000	42

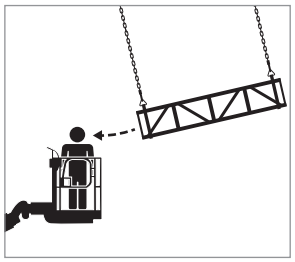
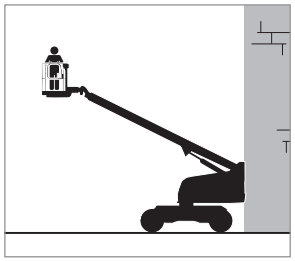
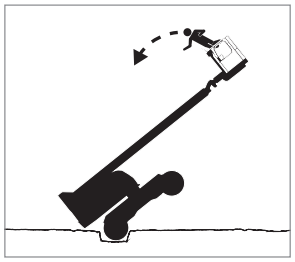
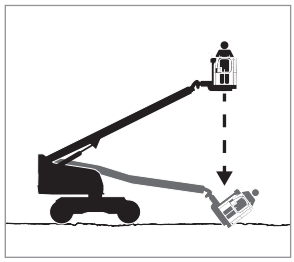
Source: 8 CCR §2946 (2)

Federal Clearances Required When Working On or Near Exposed Energized Parts

Nominal Voltage (Phase to Phase)	Minimum Required Clearance (Feet)
50,000 or below	10
over 50,000	10 feet plus 4 inches for every 10,000 volts over 50,000 volts

Source: 29 CFR §1910.333



Hazard	Description	Possible Causes
Struck by Outside Object 	Personnel or lift struck by a moving object or a falling structure	• Not properly assessing work zone hazards • Inattention to work being done from the platform or near the lift
Collision 	Impact between lift and another vehicle, object, or person	• Not looking in the direction of the platform's movement • Not signaling before moving machine • Allowing personnel and vehicles to enter the work zone • Not allowing for backswing (boom lifts)
Ejection from Platform 	Operator and/or passenger is catapulted from boom lift platform	• Driving over or parking on a curb, bump, edge, hole, or unstable surface • Platform caught under an obstacle, then released • Contact with another object or vehicle • Not wearing PFPE
Collapse 	Structural failure causes machine to collapse	• Poor maintenance • Defect in machine • Misuse of machine • Unauthorized modifications to machine • Overloading the platform

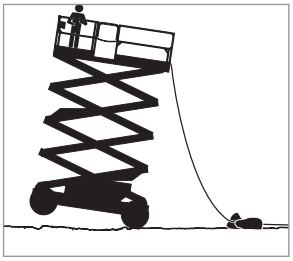
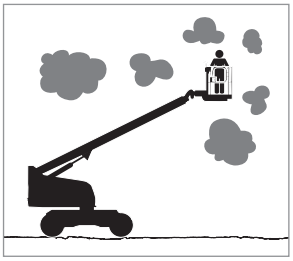
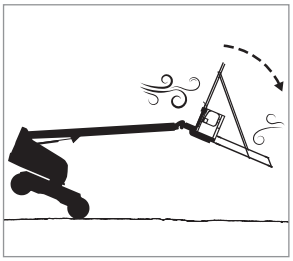
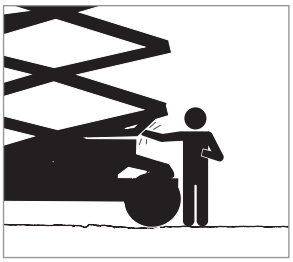
Hazard	Description	Possible Causes
Entanglement 	Machine tip-over or equipment damage when cords or cables become snagged between lift and another structure	• Not properly organizing cords and cables • Not properly assessing work zone hazards
Environmental 	Working in a hazardous environment (combustible dust, exhaust, toxic chemicals, flammable vapors, etc.)	• Not properly assessing work zone hazards • Not wearing appropriate personal protective equipment (PPE) • Operating a lift in a confined space • Operating a lift in an unapproved area
Weather Hazards 	Operator injury or machine tip-over due to weather conditions	• Working in wind speeds that exceed industry or manufacturer limits • Carrying a load with a large surface area • Rain, ice, or snow causes the platform or the ground surface to become slippery • Working in extreme heat or cold without proper safety precautions • Working during lightning or storms
Other 	Injuries from pinch points, protrusions, equipment, or falling objects while working on, near, or under a lift	• Inattention while entering or exiting a lift • Inattention while a lift is in motion • Inattention while using tools or other equipment on the platform • Horseplay on or around a lift • Allowing personnel to enter the work zone

Figure 1.1. A walk-around inspection is required for boom lifts and scissor lifts.

Pre-Use Inspection

The first step in avoiding lift accidents is making sure that the work area and the machine are inspected often. A three-part inspection must be performed at the beginning of each work day or shift—refer to the operator's manual or employer instructions for procedures. Never operate a lift that fails any part of an inspection.

Always check the weight limits of a stage floor or filming location before operating a lift.

1. A **work zone inspection** identifies potential hazards in the immediate work area, including an assessment of:
   - Ground conditions
   - Side and overhead obstructions
   - Non-load-bearing work surfaces on stages and on location
   - Concealed holes and pits

2. A **walk-around inspection** (Figure 1.1) is a visual assessment of the physical condition of the lift. It ensures that:
   - All parts of the machine are intact and in good working condition
   - There are no leaks or cracked hoses
   - All manuals and safety decals are present
   - There have been no unauthorized modifications

3. A **function test** focuses on the lift's power sources and operation. It includes:
   - Checking that all ground and platform controls are working properly
   - Extending and retracting the boom arm (boom lift)
   - Raising and lowering the platform (scissor lift)
   - Testing the drive and brake functions

Minimum Safe Approach Distance (MSAD)

Boom lifts and scissor lifts are not insulated. Stay 10 ft. or more away from energized power sources. Follow all local regulations regarding MSAD at all times, and when determining safe work distances, consider all equipment and personnel in the platform. For details, see page 5 of this book.

PFPE and PPE

All occupants in the platform of a boom lift must wear a full-body harness with a fall restraint or fall arrest lanyard of the appropriate length connected to an authorized anchor point (Figure 1.2). Personal fall protection equipment (PFPE) is not required for occupants in the platform of a scissor lift; however, local regulations, manufacturer instructions, or your employer may recommend or require it.

In addition to PFPE, be sure to use any personal protective equipment (PPE) that is required for the task at hand while working on the platform.

Figure 1.2. Anchor points are for fall protection use only. Do not attach equipment to an anchor point.

Driving While Elevated

Boom lifts and scissor lifts should be driven with the platform in the lowest recommended driving position (Figure 1.3 A). Driving while elevated (Figure 1.3 B) is allowed if the following conditions are met:

- The driving surface is firm, smooth, and level, without any holes or debris
- The operator has a clear view of the travel path
- The lift is operated at a speed determined by the manufacturer
- The operator has the employer's approval to do so

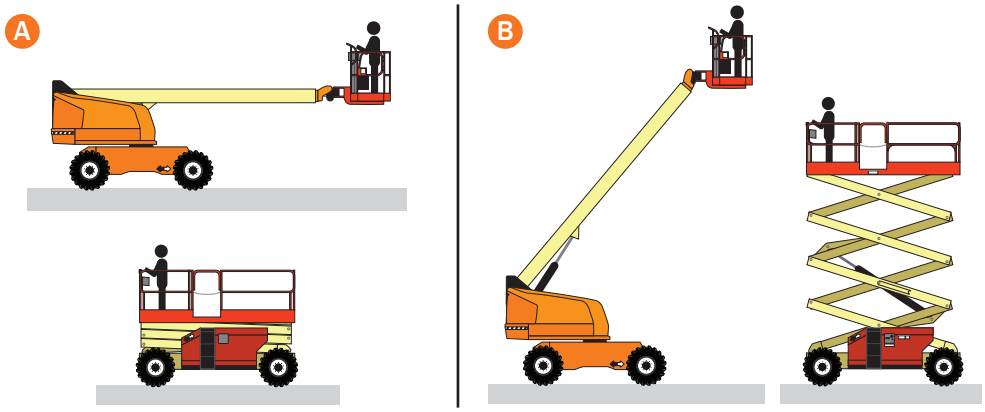


Figure 1.3. (A) Recommended driving position; (B) Elevated driving position.

Some employers may not allow boom lifts or scissor lifts to be driven while elevated.

Stability and Combined Center of Gravity

Every lift has a specific **combined center of gravity** (CCG), which is the point where the center of gravity of the lift and the center of gravity of the load on its platform are concentrated (Figure 1.4). Any action that changes the configuration or angle of the machine (raising the platform, extending the boom, driving on an incline, increasing the load weight) will affect its CCG and its stability (Figure 1.5).

Scene 3 outlines the procedures for determining a load's center of gravity when it is not evenly distributed in the platform.

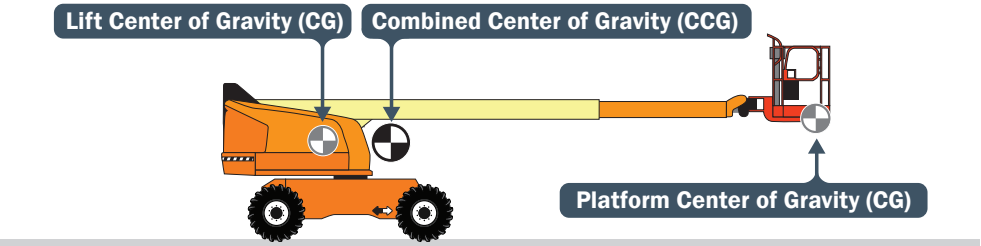


Figure 1.4. A lift's CCG is the balance point between the lift's CG and the platform's CG.

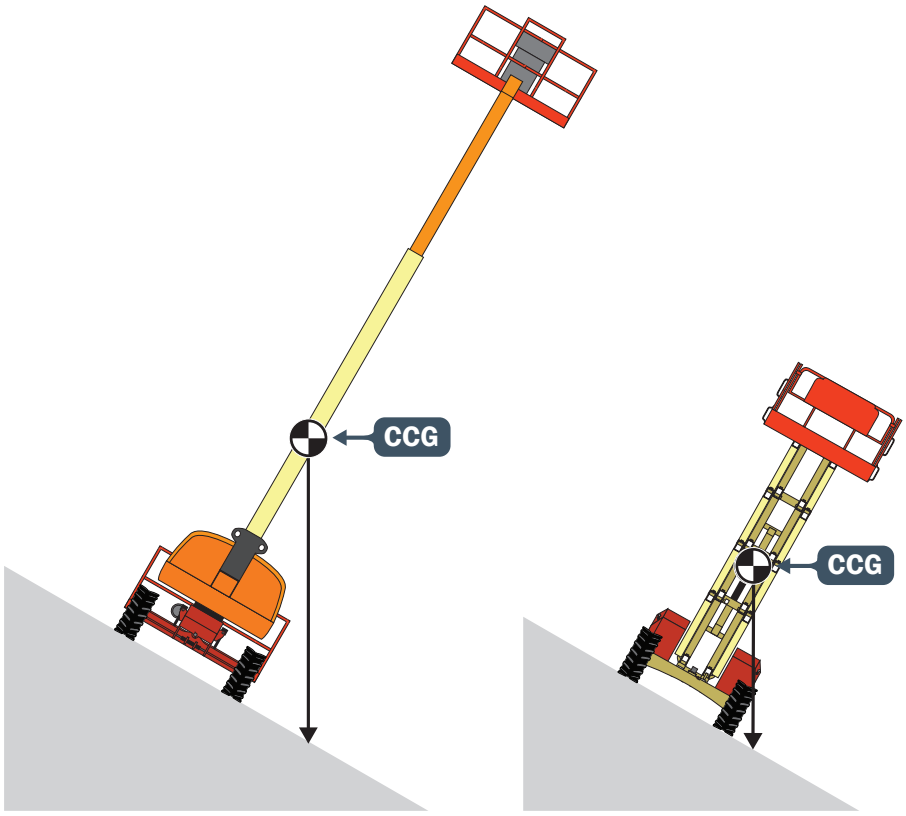


Figure 1.5. Boom lifts and scissor lifts can be used in a range of positions as long as the CCG remains within the lift's area of stability. If the CCG moves outside of the area of stability, the lift is likely to become unstable and tip.

Load Capacity

In order to maintain stability while working at height, lift manufacturers have limitations on the maximum load a platform can support. Often a manufacturer will specify different maximum allowable loads, based on the position of the platform and the weight of the load (**unrestricted capacity** and **restricted capacity**). Check the decals on the machine or the operator's manual for the capacity chart for the lift you are using. Figure 1.6 shows a sample chart.

A lift's allowable capacities will be affected if equipment is attached to the guardrails or extends past the platform. Scene 3, "Calculating Platform Capacity," covers this in more detail.

Never exceed a lift's maximum load capacity.

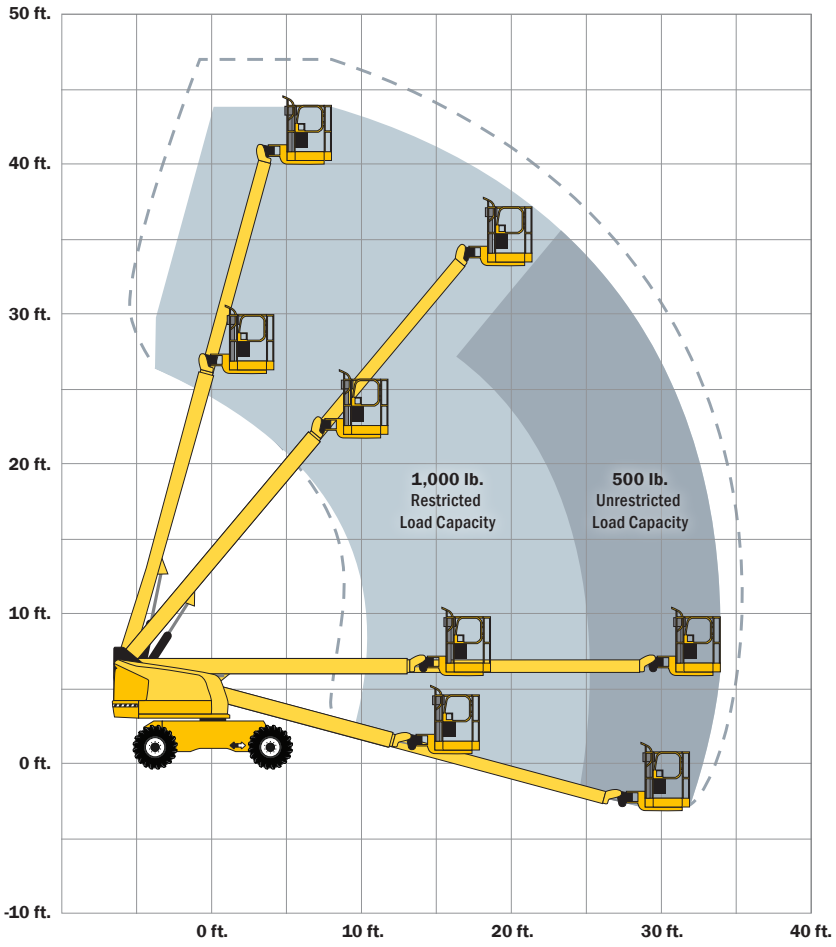


Figure 1.6. This lift has an unrestricted load capacity of 500 lb. and a restricted load capacity of 1,000 lb. When the load is 500 lb. or less, the platform can be positioned anywhere in the shaded areas. When the load is 500-1,000 lb., the platform is restricted to the lighter shaded area. Scene 3 covers how load capacity is affected when equipment is rigged to a boom lift platform.

Working on a Grade

Boom lifts and scissor lifts are designed to be operated on level surfaces. However, they can be driven over low inclines under certain conditions—check the lift's decals or operator's manual for gradeability and side slope ratings. If it is necessary to work on an incline, the lift itself must be made level. Depending on the lift type and model, this can be achieved with outriggers or cribbing blocks (Figure 1.7).

Snorkel does not allow its lifts to be leveled with cribbing blocks.

Figure 1.7. Cribbing blocks constructed for a boom lift. Scissor lifts cannot be leveled using cribbing.

Cribbing (Boom Lifts Only)

Two manufacturers—Genie and JLG—permit boom lift operators to use wood cribbing to level a lift that is on a grade. JLG also allows operators to use cribbing on a side slope. Cribbing permission is limited to specific models, and the construction details vary by manufacturer and model.

Both manufacturers require that any lift that is used on cribbing be equipped with a lock-out switch (Figure 1.8), which disables the drive and steer functions while the machine is on the cribbing. It must be engaged before raising the platform. If a machine does not come equipped with a lock-out switch, one must be installed by an approved vendor.

Figure 1.8. Lock-out switch.

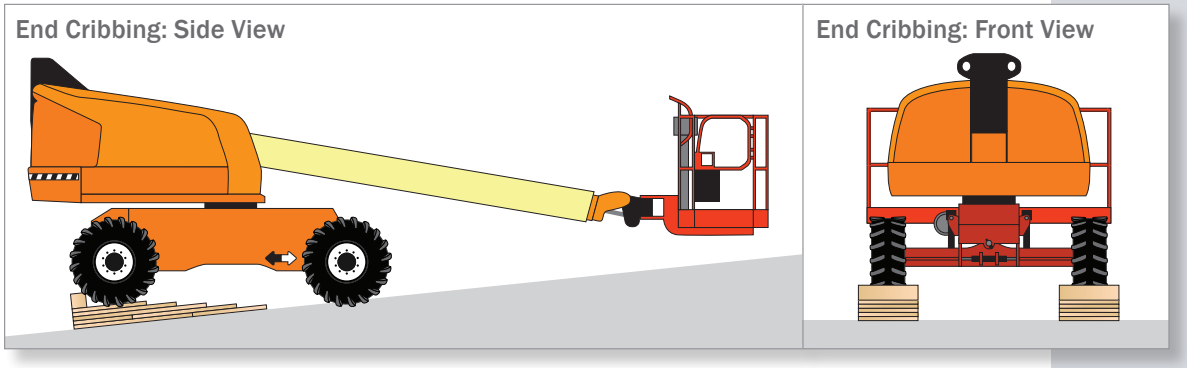


Figure 1.9. End cribbing (top): End cribbing on a grade (Genie and JLG). Two front tires or two back tires are supported on separate cribbing blocks. Do not crib one tire only.

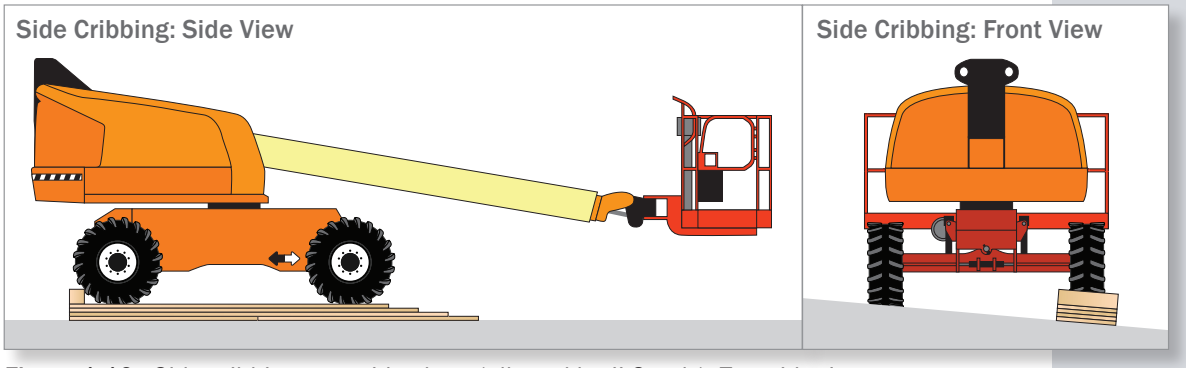


Figure 1.10. Side cribbing on a side slope (allowed by JLG only). Two side tires are supported on a single cribbing block. Do not crib one tire only. End cribbing blocks are not allowed to be used for side cribbing

When using cribbing:

- Follow the most current specifications provided by the two manufacturers (Figure 1.9, Figure 1.10, and Table 1.1).
- Only crib on a surface that is firm enough to support the weight of the machine, its load, and the cribbing itself.
- Check that the surface does not exceed the maximum grade allowances.
- Do not use cribbing over a hole or a bump.
- Inspect the cribbing before driving onto it.
- Drive onto the cribbing blocks slowly, with the platform in the lowered position.
- Do not raise the platform until the machine is leveled on the cribbing.
- Do not make any turns on cribbing blocks.
- Pay attention to wind while on cribbing—note that Genie and JLG specify different allowable wind speeds.

See Appendix A for links to the manufacturers' cribbing manuals.

Table 1.1 Cribbing Specifications for Genie and JLG Boom Lifts

	Genie	JLG
Manual name/Part number*	Operator's Manual Supplement: Cribbing Instructions (Part No. 82943GT)	Supplemental Manual for Cribbing of Approved JLG Products (Part No. 3128168)
Approved models	Check Genie cribbing manual	Check JLG cribbing manual
Maximum allowable grade for end cribbing	10% (6°)	9% (5°)
Maximum allowable grade for side cribbing	Not permitted	9% (5°)
Maximum allowable height for end cribbing	8 inches	8 inches
Maximum allowable height for side cribbing	Not permitted	6 inches
Maximum allowable wind speed when platform is raised while machine is cribbed	15 mph	28 mph**
Plywood specifications	APA-certified plywood sheets	APA-certified plywood sheets
Minimum plywood thickness	¾ inch	¾ inch
Minimum plywood width	24 inches (30 inches for TRAX models)	24 inches or twice the tire width, whichever is larger
Minimum resting surface for wheels	24 inches × 24 inches (30 inches x 62 inches for TRAX models)	24 inches square or twice the tire width square, whichever is larger (end cribbing); wheelbase + 24 inches or twice the tire width, whichever is larger (side cribbing)
Minimum chock size	6 inches × 6 inches	6 inches × 6 inches
Constructing and securing layers	Ramp must be constructed in a series of steps of at least 12 inches in length, with a minimum 24-inch overlap between joints. Use 6d ring shank nails, placed a minimum of 8 inches OC edge and 12 inches OC face. Use 8d ring shank nails for plywood over 1⅛ inches thick.	Ramp must be constructed in a series of steps of at least 12 inches in length, with a minimum 24-inch overlap between joints. Use 6d ring shank nails, placed a minimum of 8 inches OC edge and 8 inches OC face. Use 8d ring shank nails for plywood over 1⅛ inches thick.

*Manuals are updated periodically-check with genielift.com or jlg.com for the most recent edition.
**Use the industry wind speed limit of 25 mph for JLG lifts.

Scene 2
The Industry Exception

The capacity of a boom lift is based on a load that is evenly distributed on the platform. In our industry, however, there are situations where equipment may need to be attached to the guardrails or outside of the platform. These practices increase the risk of tip-over due to:

- Shifting the lift's CCG too far outside of its area of stability
- Attaching equipment that exceeds the lift's capacity
- Attaching equipment or cables from the platform that are too heavy or that get snagged on an outside object or run over by the machine itself
- Increasing wind load by attaching equipment with a large surface area

Links to the manufacturers' supplemental manuals can be found in Appendix A.

At the request of our industry to address these risks, three lift manufacturers—Genie, JLG, and Snorkel—have produced special supplemental manuals that contain procedures specific to the motion picture industry (Figure 2.1). These manuals allow trained grips and set lighting technicians to safely attach lighting equipment, camera equipment, and light diffusion frames onto and outside of the platform guardrails of specific boom lift models.

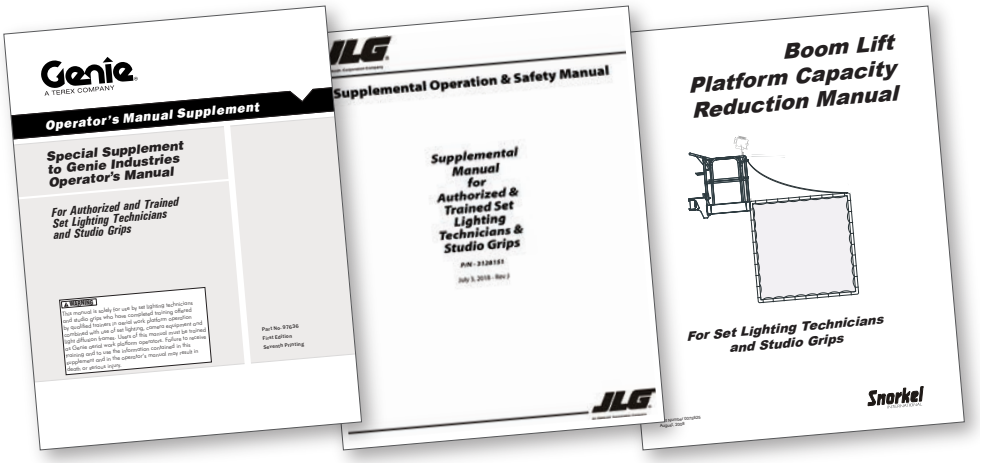


Figure 2.1. These supplemental manuals were developed for use in the motion picture industry. They are used in conjunction with the normal operator's manual.

The supplemental manuals provide information on calculating the weight of the load, reducing the platform's capacity to account for a shifted load center of gravity, restrictions on attaching equipment and cables, and determining maximum allowable wind speeds when the equipment creates an increased surface area. These topics are covered in more detail in Scenes 3 and 4.

The supplemental manuals provide an exception for rigging specific models of telescopic and articulating boom lifts only (Table 2.1). Scissor lifts, vertical manlifts, forklifts, or any other lift not named in a supplement are not covered in the exception. Procedures for rigging motion picture equipment in scissor lifts are addressed in Scene 5.

Restrictions Regarding the Exception

In order to comply with the exception given by the manufacturers, set lighting technicians and grips must:

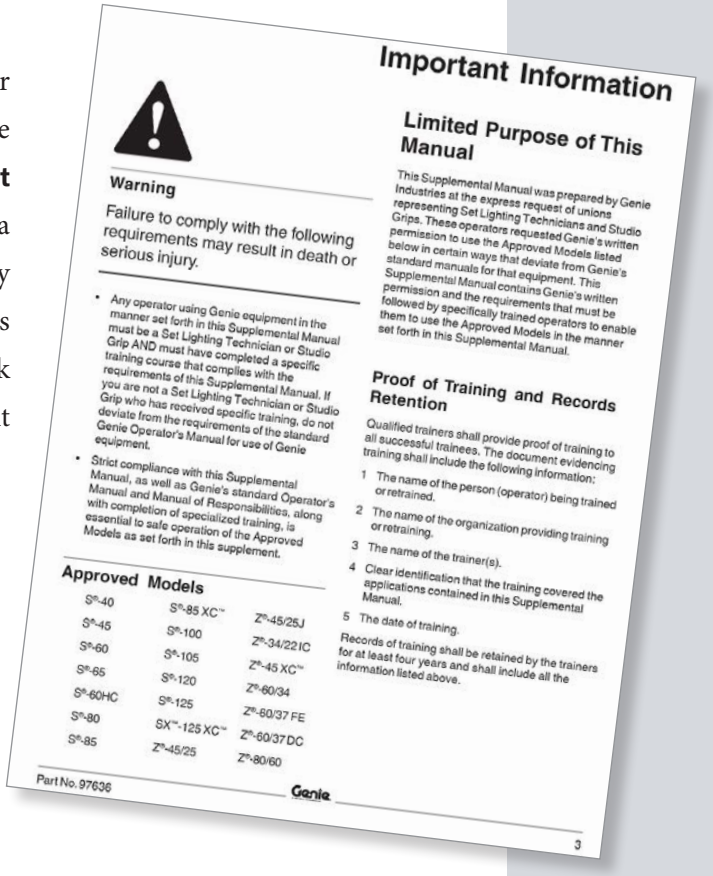
- be trained by an authorized person to perform the procedures described in the supplemental manual;
- follow all procedures in the supplemental manual, as well as in the regular operator's manual, for the specific lift model being used; and
- keep the supplemental manual with any other operator manuals on the machine at all times.

Failure to follow the requirements provided by the manufacturers may void the permissions they have granted to the industry. Contact the manufacturer directly with any questions.

This course fulfills the training requirement listed in the supplemental manuals.

Which Lift Models Are Covered

The permission given by each manufacturer applies only to the boom lift models listed in the manuals. Any model that is not listed **cannot** be used for attaching set lighting, camera equipment, and light diffusion frames in any manner that falls outside of the procedures listed in its regular operator's manual. Check the latest supplemental manual for current approved models.



Important Information

Limited Purpose of This Manual

This Supplemental Manual was prepared by Genie Industries at the express request of unions representing Set Lighting Technicians and Studio Grips. These operators requested Genie's written permission to use the Approved Models listed below in certain ways that deviate from Genie's standard manuals for that equipment. This Supplemental Manual contains Genie's written permission and the requirements that must be followed by specifically trained operators to enable them to use the Approved Models in the manner set forth in this Supplemental Manual.

Warning

Failure to comply with the following requirements may result in death or serious injury.

- Any operator using Genie equipment in the manner set forth in this Supplemental Manual must be a Set Lighting Technician or Studio Grip AND must have completed a specific training course that complies with the requirements of this Supplemental Manual. If you are not a Set Lighting Technician or Studio Grip who has received specific training, do not deviate from the requirements of the standard Genie Operator's Manual for use of Genie equipment.
- Strict compliance with this Supplemental Manual, as well as Genie's standard Operator's Manual and Manual of Responsibilities, along with completion of specialized training, is essential to safe operation of the Approved Models as set forth in this supplement.

Proof of Training and Records Retention

Qualified trainers shall provide proof of training to all successful trainees. The document evidencing training shall include the following information:

1 The name of the person (operator) being trained or retrained.
2 The name of the organization providing training or retraining.
3 The name of the trainer(s).
4 Clear identification that the training covered the applications contained in this Supplemental Manual.
5 The date of training.

Records of training shall be retained by the trainers for at least four years and shall include all the information listed above.

Approved Models

S®-40, S®-45, S®-60, S®-65, S®-60HC, S®-80, S®-85, S®-85 XC™, S®-100, S®-105, S®-120, S®-125, SX™-125 XC™, Z®-45/25, Z®-45/25J, Z®-34/22 IC, Z®-45 XC™, Z®-60/34, Z®-60/37 FE, Z®-60/37 DC, Z®-80/60

Part No. 97636 Genie 3

Notes

Scene 3

Calculating Platform Capacity

Before attaching equipment to a boom lift, consider these four factors:

1. **Approved Model.** Is the lift approved for attaching film production equipment? If it is not listed in the supplemental manual, it is not approved.
2. **Capacity and Reach.** What is the lift's capacity and reach? Check the load rating and reach charts in the supplemental or operator's manuals and compare them to the needs of your job. Note that some employers may require authorization for lifts or lift work over a certain height.
3. **Adjustments.** How will the weight of the load affect the capacity of the lift? A load that is attached outside of the platform's CG will reduce the capacity of the platform. (See "Direct and Adjusted Weight," page 20.)
4. **Wind.** How will the load be affected by wind speed? Production equipment can be broad or bulky, and could cause a lift to become unstable in windy conditions. (See "Using Wind Speed Charts," page 26.)

See supplemental manuals for approved boom lift models.

direct weight.
The actual weight of a load.

adjusted weight.
A calculation of a load's weight which compensates for the distance between the load's CG and the platform's CG.

Direct and Adjusted Weight

As discussed in Scene 1, every boom lift has maximum load capacities based on the CCG of the lift. These capacities apply to the **direct weight** (actual weight) of personnel operating or working in the lift, a load inside the platform, or cables extending down the boom arm.

However, when equipment is attached to the guardrails of a boom lift, or extends past the platform, the load is positioned outside of the lift's normal CCG, creating an increase in force that affects the lift's normal capacities (Figure 3.1). This type of load must be calculated as **adjusted weight**, using the tables in the supplemental manuals. A load's adjusted weight will always be more than its direct weight, and will also reduce the remaining capacity of the platform.

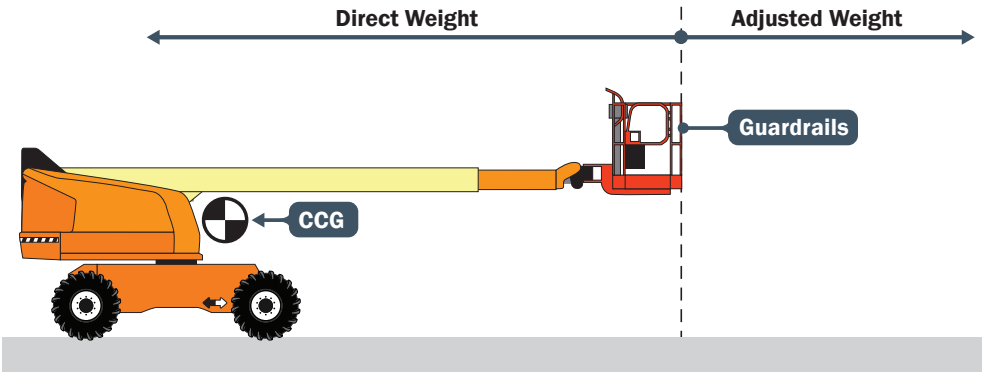


Figure 3.1. A load carried within the area of a boom lift's normal CCG is counted as direct (actual) weight. A load that is carried at or beyond the guardrails of the platform must be adjusted to reflect the increase in force that the load has on the lift. The farther the equipment is outside of the platform, the greater the adjusted weight will be.

The weight of any personnel in the platform is always calculated as direct weight.

The total weight of the load, whether direct weight, adjusted weight, or a combination of both, cannot exceed the maximum allowable load rating for the lift model in use.

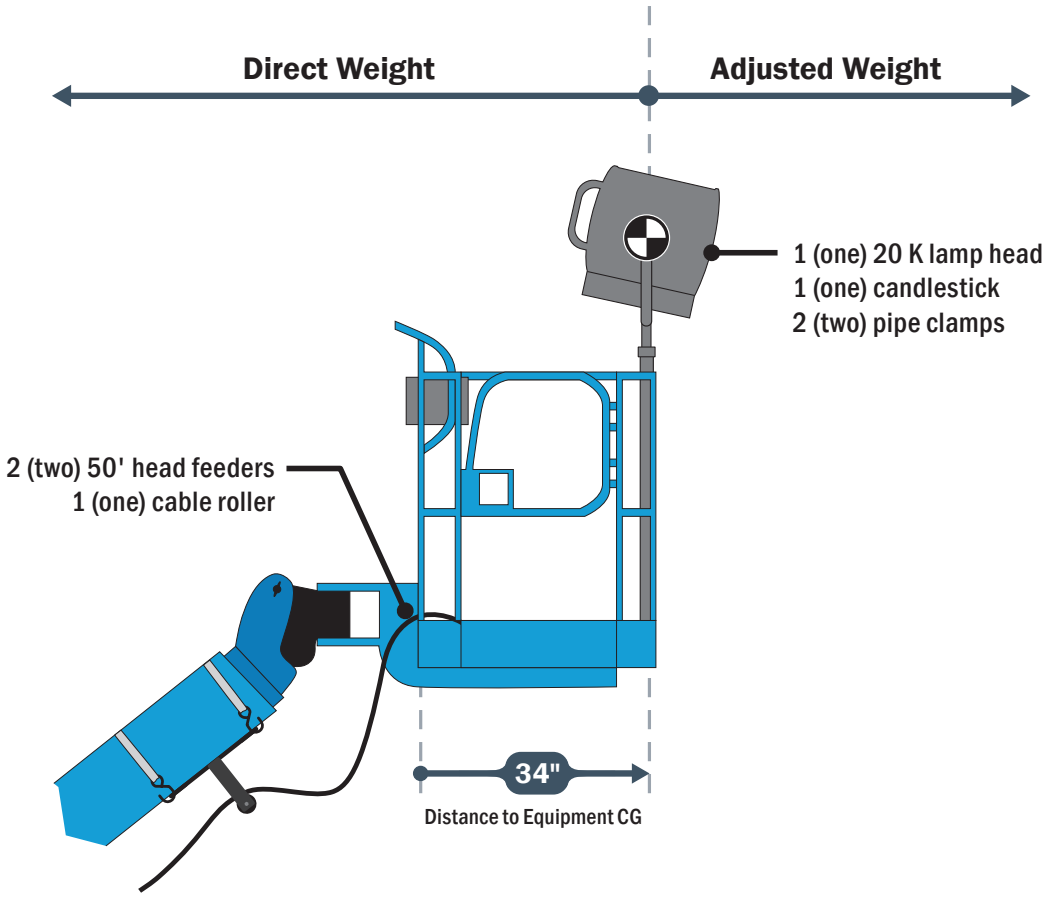
To calculate adjusted weight and reduce platform capacity, you will need to know:

- The actual weight of the equipment
- The distance from the toeboard under the control panel to the CG of the equipment (note that JLG uses "kickplate" instead of "toeboard")
- How to use the capacity reduction charts in the supplemental manuals

Examples 1 and 2 in this scene will demonstrate these procedures.

Reducing Platform Capacity: Examples

Example 1: Lighting Equipment, Genie S-60 Boom Lift (Serial Number Before 9154)



1 Find the Equipment's Weight. Determine the weight of each type of equipment being used.

Item	Weight*
20K lamp head	125 lb.
Candlestick	10 lb.
Pipe clamps	3 lb. each
50' head feeders	60 lb. each
Cable rollers	25 lb. each

*All weights are approximations.

How do you find the weight of your equipment?

- Weigh it on a scale
- Look in the owner's manual
- Research it online
- Contact the manufacturer

2 **Calculate the Equipment's Direct Weight.** Count any equipment that will be placed or attached within the platform's CG as direct (actual) weight, using the information determined in Step 1. Round up if necessary.

2 (two) 50' head feeders	120 lb.
1 (one) cable roller	25 lb.
	145 lb. (Direct Weight)

3 **Calculate the Equipment's Adjusted Weight.** Follow steps **a** through **d** to adjust the weight of any equipment that will be placed or attached outside of the platform's CG. Round up if necessary.

a Add up the weights of the equipment as determined in Step 1:

1 (one) 20K lamp head	125 lb.
1 (one) candlestick	10 lb.
2 (two) pipe clamps	6 lb.
	141 lb.

b Locate the platform capacity reduction chart(s) in the supplemental manual. (For this example, use Genie's chart in Appendix C.) Find the weight in the left column of the chart. If the weight falls between two numbers, round it to the next higher weight:

141 lb. ⟶ 150 lb. (rounded)

c Determine the distance from the toeboard under the control panel to the equipment's CG. Find the result in the top row of the platform capacity chart. If the distance falls between two numbers, round it to the next higher number:

Distance from toeboard under control panel to CG of lamp = 34" ⟶ 36" (rounded)

d Find the number at the intersection of the weight and the distance on the platform capacity chart to determine the adjusted weight:

Intersection of 150 lb. and 36" ⟶ **206 lb. (Adjusted Weight)**

4 Add the Direct Weight and Adjusted Weight.

Direct Weight	145 lb.
Adjusted Weight	206 lb.
	351 lb. (Total)

The total reflects the increase in the force of the load as it extends past the platform's CG. In this example, the equipment now has the effect of weighing 351 lb. in total—65 lb. more than if it had not been adjusted.

The total is also the amount by which the platform's capacity must be reduced if you need to add more equipment or personnel to the platform. In this case, the maximum capacity of the Genie S-60 (1,000 lb.) must be reduced by 351 lb. The remaining capacity will be 649 lb. (1,000 lb. – 351 lb.).

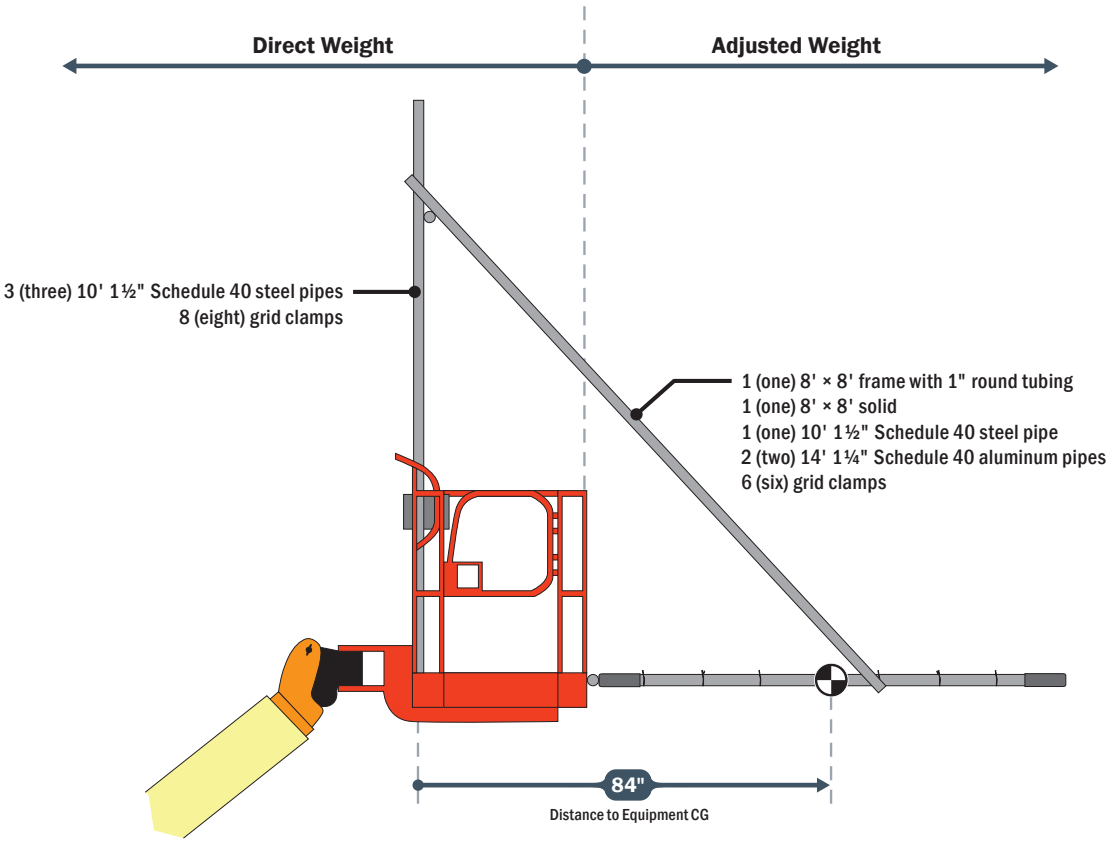
5 Check the Capacity/Reach Chart. Once you have determined the weight of the load and the remaining platform capacity, refer to the capacity/reach chart in either the supplemental manual or operator's manual for the model in use. See the table below for chart locations. For this example, refer to the Genie chart in Appendix C—note that there are two charts for the S-60, depending on the serial number. The total weight on the platform **cannot** exceed the allowable capacities shown on the chart.

Where To Locate Capacity and Reach Charts for Platform Capacity Reduction

	Approved Model*	Chart Location
Genie	S-40, S-60*, S-60HC, S-80, S-100, Z-34/22IC, Z-45/25, Z-45/25J, Z-60/34, Z-80/60	Refer to Supplemental Manual
	All other approved models	Refer to Operator's Manual
JLG	All approved models	Refer to Supplemental Manual
Snorkel	All approved models	Refer to Operator's Manual

*Approved models are subject to change.

Example 2: Diffusion Frame, JLG 600S Boom Lift (Serial Number Before 0300235168)



1 Find the Equipment's Weight. Determine the weight of each type of equipment being used.

Item	Weight
8' × 8' frame with 1" round tubing	12 lb.
8' × 8' solid	6 lb.
1½" Schedule 40 steel pipe	3 lb./ft.
1¼" Schedule 40 aluminum pipe	0.8 lb./ft.
Grid clamps	3 lb. each

2 Calculate the Equipment's Direct Weight. Count any equipment that will be attached or placed within the platform's CG as direct (actual) weight. If you need to round any weights, always round up.

3 (three) 10' 1½" Schedule 40 steel pipes	90 lb.
8 (eight) grid clamps	24 lb.
114 lb. (Direct Weight)	

3 Calculate the Equipment's Adjusted Weight. Follow steps **a** through **d** to adjust the weight of any equipment that will be placed or attached outside of the platform's CG. Round up if necessary.

a Add up the weights of the equipment as determined in Step 1:

1 (one) 8' × 8' frame with 1" round tubing	12 lb.
1 (one) 8' × 8' solid	6 lb.
1 (one) 10' 1½" Schedule 40 steel pipe	30 lb.
2 (two) 14' 1¼" Schedule 40 aluminum pipes	23 lb.
6 (six) grid clamps	18 lb.
	89 lb.

b Locate the platform capacity chart(s) in the supplemental manual. (For this example, use JLG's chart on page 76.) Find the weight in the left column of the chart:

89 lb. ⟶ 100 lb. (rounded)

c Determine the distance from the toeboard under the control panel to the equipment's CG. Find the result in the top row of the platform capacity chart:

Distance from toeboard under control panel to CG of frame = 84" (on chart)

d Find the number at the intersection of the weight and the distance on the platform capacity chart to determine the adjusted weight.

Intersection of 100 lb. and 84" ⟶ **299 lb. (Adjusted Weight)**

4 Add the Direct Weight and Adjusted Weight.

Direct Weight	114 lb.
Adjusted Weight	299 lb.
	413 lb. (Total)

In this example, the equipment now has the effect of weighing 413 lb. in total—210 lb. more than if it had not been adjusted. The maximum capacity of the JLG 600S (1,000 lb.) must also be reduced by 413 lb. The remaining capacity will be 587 lb. (1,000 lb. – 413 lb.).

5 Check the Capacity/Reach Chart. After determining the weight of the load and the remaining platform capacity, refer to the capacity/reach chart for the model in use. For this example, refer to the JLG chart in Appendix D—note that there are two charts for the 600S, depending on the serial number. The total weight on the platform **cannot** exceed the allowable capacities shown on the chart..

Personnel in Genie Lifts

The Genie supplemental rigging manual specifies that when the weight of a load exceeds the machine's normal rated capacity, the procedures in the manual apply to "material lifting applications only." In general, this means that when using a Genie lift, no personnel can be in the platform when the adjusted weight of the load is over 500 lb. (see Platform Capacity Reduction Chart, Appendix C). Always follow Genie's operator manuals and supplementary rigging manual (Appendix C) for specific instructions.

Using Wind Speed Charts

The surface area of production equipment such as light diffusion frames can cause increased resistance to wind. For this reason, the supplemental rigging manuals identify maximum allowable wind speeds that are lower than those in the regular operator's manuals (see table below). Note that the maximum speeds vary by manufacturer **and** by model.

Allowable Wind Speeds for Attached Movie Production Equipment*

Area of Attachments	Maximum Wind Speed (MPH)		
	Genie	JLG	Snorkel
4' × 4' (16 sq. ft.)	25 mph*	18-25 mph, depending on model	24 mph
6' × 6' (36 sq. ft.)	25 mph*	11-25 mph, depending on model	22 mph
8' × 8' (64 sq. ft.)	18-25 mph, depending on model	11-25 mph, depending on model	19 mph
12' × 12' (144 sq. ft.)	11-18 mph, depending on model	11-18 mph, depending on model	15 mph
20' × 20' (400 sq. ft.)	5-11 mph, depending on model	5-11 mph, depending on model	10 mph

*Higher allowable wind speeds may be listed in the rigging manual for some models--always use the industry wind speed limit of 25 mph.

Remember that lifts used with cribbing have separate wind speed restrictions. Always observe the lowest allowable wind speed for any lift model, as specified in the applicable supplemental manuals. Note that Safety Bulletin #22 does not allow lifts to be raised--with or without attached equipment--in wind speeds exceeding 25 miles per hour.

Scene 4
Rigging a Boom Lift

This scene addresses basic procedures for attaching production equipment to the guardrails of a boom lift. There is no one way to properly rig equipment. For questions regarding specific procedures, check with a supervisor or the safety department.

General Safety Considerations

- Move the lift as close as possible to the location where it will be used. Do not block fire lanes, exits, doors, or stairs.
- Attach equipment only when the platform is in its lowest position—do not gain access to or exit the platform using the boom, rope, or a ladder.
- Limit the quantity and size of equipment by the surface area of the attachments and the maximum allowable wind speed.
- Avoid contacting obstacles or power lines with the lift or its attachments.
- Do not use boom lifts in tandem to raise or support equipment.

Be sure you have calculated the adjusted weight of the load and the platform capacity reduction (Scene 3) before attaching equipment to a lift.

Figure 4.1. Fasten attachments securely when rigging equipment to the platform.

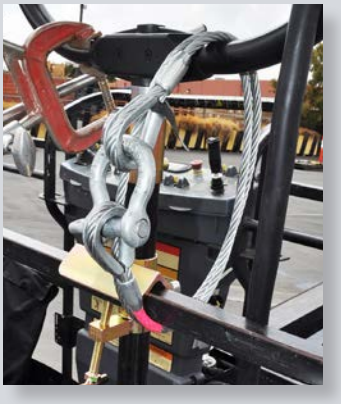


Figure 4.2. Secure loose or heavy equipment with safety cables.

When Rigging Equipment

- Inspect all equipment before rigging for damage or missing parts and after rigging for secure connections.
- Do not attach equipment to a fall protection anchor point.
- Do not overtighten fasteners, which may dent or damage the guardrails.
- Do not drill, weld, or otherwise modify the platform or the guardrails without the manufacturer's authorization.
- Check that all equipment is fastened securely (Figure 4.1), using safety cables when necessary (Figure 4.2).
- Attach clamps so that the ends or handles do not create protrusion hazards.
- If personnel will be working on the platform:
  - Don't block the platform entry gate, footswitch, control panel, fall protection anchor points, decals, or the manual holder with equipment.
  - Do not fasten equipment in any manner that blocks access to its switches or controls.
  - Do not raise equipment switches or controls higher than the tallest occupant in the platform can safely reach.

i

Use a lift model that has an entry gate position (side or back) that will allow access when equipment is attached.

Cable Management on Boom Lifts

When rigging equipment that requires power, the cables must be attached in a way that does not restrict the movement of the platform or cause a side or vertical load. This can be done by securing the cables to the boom arm.

- Extend the boom and run the cables through rollers, keeping both away from the power track. (Figure 4.3)
- If the lift does not have pre-installed rollers, attach individual rollers to the end of each boom section with ratchet straps. Neatly wrap and position the ends of the straps out of the way of the boom's moving parts (Figure 4.4).
- Do not modify the lift by permanently attaching cable rollers by drilling holes or welding.
- Secure the cable so that it cannot be stretched, pinched, cut, snagged, or become unplugged, but leave enough slack to allow for the extension of the boom and the movement of the platform.
- Roll unused cable neatly in the platform and tie it off to the guardrails, away from the operator.
- Extend and retract the boom arm to check the cable *before* powering the equipment.

Figure 4.3. Electrical cables on cable rollers. The cable is tied to the first roller to allow for any horizontal or vertical movement of the platform.

Figure 4.4. A cable roller attached to a boom using ratchet straps.

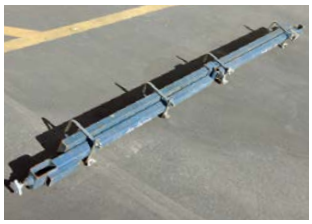
Types of Rigging Equipment for Lifts

Swivel Clamps

Ratchet Straps

Candlesticks with Clamps

Condor Mount



Rope

Safety Cable with Shackle

Cup Blocks

Span Set

Moving the Boom Lift While Rigged

Once equipment has been attached to a boom lift, it is preferable not to move the machine. However, there may be some situations in which this is unavoidable. If the lift must be moved, be sure that:

- All of the equipment is securely fastened to the platform
- The cable is unplugged from the power source
- There is a clear route of travel, including the area above the lift—use a spotter if necessary
- The driver follows all of the normal safety procedures for operating the lift

The machine may need to have some of its equipment de-rigged if:

- The driver cannot access the platform through the entry gate
- There is no room for the driver on the platform
- The driver cannot access the platform controls
- The weight of the driver exceeds the allowable weight limit for the platform and attached equipment
- The machine cannot be moved without the attached equipment causing a safety hazard

Scene 5
Rigging a Scissor Lift

Scissor lifts are not covered under the industry exception given by Genie, JLG, and Snorkel in their supplemental manuals. Instead, refer to the lift's regular operator's manual for specific procedures regarding load handling.

General Safety Considerations

- All camera, lighting, and grip equipment must fit within the confines of the platform. (See page 33 for cable management.)
- Do not attach equipment to the guardrails or beyond the platform without written permission from the manufacturer.
- Move the lift as close as possible to the location where it will be used. Do not block fire lanes, exits, doors, or stairs at any time.
- Inspect all equipment before rigging for damage or missing parts and after rigging for secure connections.

- Secure and adjust equipment when the platform is in its lowest position. Do not gain access to or exit the platform using the scissor arms.
- Do not overload the platform—check the operator's manual or machine decals for maximum load limits, and account for personnel weight.
- Check overhead clearance before raising the platform.
- Get assistance if needed to lift heavy equipment onto the platform, or use mechanical means such as a crank stand.
- Secure all materials to prevent them from falling inside or out of the platform (Figure 5.1).
- Be aware of trip hazards when using straps to secure equipment .
- If personnel will be working on the platform:
  - Don't block the platform entry gate, footswitch, control panel, fall protection anchor points, decals, or the manual holder with equipment.
  - Do not fasten equipment in any manner that blocks access to its switches or controls or raises them higher than the tallest occupant in the platform can safely reach.
- Do not cover the sides of the platform or carry items with large surface areas—these practices increase the exposed wind area of the machine.
- Do not use scissor lifts in tandem to raise or support equipment.

Check with your safety representative regarding policies for the use of large-surface-area items (such as diffusion screens) in scissor lift platforms.

Figure 5.1. A lamp stand secured to a scissor lift platform with ratchet straps.

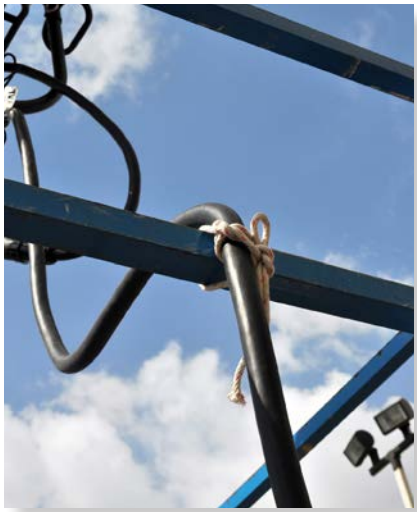


Figure 5.2. Secure cable to the guardrails of the platform (above) and run it down the narrow end of the scissor lift (left). Be sure there is enough cable to allow for raising the platform.

Cable Management on Scissor Lifts

- The total weight of the cable extending from the platform to the ground cannot exceed the manufacturer's side force restrictions—check the operator's manual or machine decals for maximum load limits.
- Run and secure all cables neatly and properly so that they cannot be pinched, stretched, cut, snagged, or become unplugged.
- Leave enough slack in the cable to allow for the vertical movement of the platform to its full height.
- Hang cable over the narrow end of the platform and secure it to the guardrails (Figure 5.2).
- Raise and lower the platform to check the cable length *before* powering any equipment.
- Roll unused cable in the platform in an area that will not create a trip hazard for the operator or interfere with the operation of the lift.

Moving the Scissor Lift While Rigged

Once a scissor lift has been rigged with equipment and cables, it is preferable not to move the machine. However, there may be some situations in which this is unavoidable. If the lift must be moved, be sure that:

- All of the equipment is securely fastened to the platform
- The cable is unplugged from the power source
- There is a clear route of travel, including the area above the lift—use a spotter if necessary
- The driver follows all of the normal safety procedures for operating the lift

The machine may need to have some of its equipment de-rigged if:

- The lift needs to be moved, but there is no room for the driver on the platform
- The driver cannot access the platform controls
- The weight of the driver exceeds the allowable weight limit for the platform and its equipment
- The machine cannot be moved without the rigged equipment causing a safety hazard

Scene 6
Conclusion

Any time you are rigging a lift with camera, lighting, or diffusion equipment:

- Be sure that the lift model you are using is approved for rigging
- Use the correct manual(s) for the lift in use
- Know the lift's load and reach limitations
- Know the weight of the equipment being rigged
- Adjust the load according to manufacturer instructions
- Account for wind speed
- Practice basic lift safety as well as rigging safety

Notes

Appendix A
References and Resources

Links to Supplemental Manuals

Special Supplement to Genie Industries Operator's Manual for Authorized and Trained Set Lighting Technicians and Studio Grips (Part No. 97636). Genie Industries. Link

Special Supplement to Genie Industries Operator's Manual for Authorized and Trained Set Lighting Technicians and Studio Grips (Part No. 134078GT). Genie Industries. Link

JLG Supplemental Operation and Safety Manual: Supplemental Manual for Authorized and Trained Set Lighting Technicians and Studio Grips (Part No. 3128151). JLG Industries Inc. Link

Boom Lift Platform Capacity Reduction Manual for Set Lighting Technicians and Studio Grips (Part No. 0075625). Snorkel International. Link

Genie Operator's Manual Supplement: Cribbing Instructions (Part No. 82943GT). Link

JLG Supplemental Manual for Cribbing of Approved JLG Products (Part No. 3128168). Link

Related Industry Safety Bulletins

CSATF safety bulletins can be found online at: https://www.csatf.org/production-affairs-safety/safety-bulletins/

Safety Bulletin #22, *Guidelines for the Use of Scissor Lifts (Elevating Work Platforms) and Aerial Boom Lifts (Extensible Boom Lifts)*

Safety Bulletin #22A, *Power Line Distance Requirements*

Safety Bulletin #23, *Guidelines for Working with Portable Power Distribution Systems and Other Electrical Equipment*

Safety Bulletin #23A, *Power Line Distance Requirements*

Safety Bulletin #23B, *Basic Electrical Safety Precautions for Motion Picture and Television Off-Studio Lot Location Productions*

Safety Bulletin #23C, *Working with 480-Volt Systems*

Safety Bulletin #23D, *Common Motion Picture/Television Tasks and Associated Personal Protective Equipment*

Safety Bulletin #23E, *Guidelines for Meeting National Electrical Code (NEC) Grounding Requirements for Portable Generators Supplying Portable Equipment in the Motion Picture and Television Industry*

Notes

Industry Safety Resources

Safety Bulletins

Safety bulletins are researched, written, and distributed by the Industry Wide Labor-Management Safety Committee for use by the motion picture and television industry. The Industry Wide Labor-Management Safety Committee is composed of guild, union, and management representatives active in industry safety and health programs.

These safety bulletins are guidelines recommended by the safety committee. They are not binding laws or regulations. State, federal, and/or local regulations, where applicable, override these guidelines. Modifications in these guidelines should be made, as circumstances warrant, to ensure the safety of the cast and crew.

The committee and these safety bulletins are representative of the commitment of both labor and management to safe practices in the motion picture and television industry. The members of the committee and all those who contributed to its work have devoted a great deal of time and effort to these guidelines because of the importance of safety to our industry.

Current safety bulletins are available on the CSATF website:

http://www.csatf.org/bulletintro.shtml

24-Hour Industry Safety Hotline

The 24-hour industry safety hotline number directs callers to an automated system that will assist them in reaching the desired Studio Safety Hotline.

888-7-SAFELY

A list of the Studio Safety Hotlines can also be found on the CSATF website:

http://www.csatf.org/studio_safety_hotlines.pdf

Safety is everyone's responsibility.