



*Introduction to Rigging*



# Basic Rigging Components

Walk onto any stage and look up, chances are you will be staring at a series of metal pipe rails, or battens, one of the basic components of a rigging system. Often theatres use these battens to hold elements of the scenery which can be easily “flown” or lifted out of site or into view using a rigging system. Some theatres also hang lights, curtains or legs on their battens for access using the rigging system. Either way, rigging is one of the cornerstones of stagecraft, and it can also be one of the most dangerous. To properly utilize rigging in your classes and productions, you must learn the parts of basic rigging, its systems, and how to safely operate them. It is critical that anyone who uses a rigging system knows exactly how to operate it and that the system is well maintained and regularly inspected.

NOTE: This guide is for a manually operated lineset system, if your space has a mechanically operated system please contact your manufacturer.

Terms in **BOLD** are found in the Rigging Vocabulary Section

## Overview

In order to safely operate a manual counterweight line set system, you will need to first familiarize yourself with the parts that make up the whole system. First you have the **batten**. This is the pipe that scenery and lighting are hung from. Battens are raised and lowered by a group of cables called **lift lines**. The batten is connected to the lines through the use of **trim chain** or a **batten clamp**. The lift lines are the steel wire rope or cable, also known as aircraft cable, attached to the batten. These lines continue up into your flyhouse to the grid. Once at the grid you will find **loft blocks**. These are the pulleys that change the direction of the lift lines from vertical to a more horizontal position. These allow for smooth travel of the lines back to the main head block. If you have a lot of space between lift lines, and your loft blocks are attached to the bottom of the grid, you may find additional pulleys in line. These are known as **idlers**. They keep the lines from sagging.

All the lift lines pass through the **head block**, changing direction back to a vertical position, and terminating at the top of the arbor. These lines should be terminated with swage sleeves or **wire rope clips**, for more detail on wire rope clips please see the Technical Theatre Educator’s Manual article “*Wire Rope Clips*”.

The **arbor** holds the stage weights, also known as bricks, used to counter balance the load that is attached to the batten. The arbor travels along a T-Track to keep it guided during travel. At the base of the arbor the operating line of the batten is attached. The **operating line** is the rope hand line that technicians would use to make the batten move. This operating line runs through the **tension block** at the base of the fly rail, also known as the locking rail. The tension block helps ease the movement of the operating line as it is pulled, and also keeps tension on the line. The line continues back up from the base of the fly rail and into a **rope lock**. The rope lock is used to keep the operating line from running when not in use. The rope lock should also have a loop of metal loop or key that goes around the operating line and the handle of the rope lock. These should always be used when a batten is not operating. The operating line runs up through the head block and terminates at the top of the arbor with the lift lines.

Rigging is a complicated system of many interlocking parts. Before you begin to actively work on any stage rigging, make sure you have a good understanding of how all these parts fit together to form the complete system. See “*Parts of a Counterweight Rigging System*” in this section to find a straightforward guide that can help you understand how each piece of equipment fits into the overall counterweight system.

# Rigging Vocabulary

**Arbor Pit:** Opening in the stage floor under the arbors that allows counterweight arbors to travel below stage level

Synonym: Arbor Well, Counterweight Pit, Well

**Arbor Rod:** Vertical, round metal members of a Counterweight arbor

**Batten:** Horizontal pipe, tube, or other structural shape  
1) for hanging scenery, lighting, curtains, etc.; 2) in a pocket of or attached to a fire safety curtain  
Synonym: Pipe

**Batten Heavy:** See also: Out of Balance

**Block:** An assembly of one or more sheaves in a housing designed to support one or more lines

**Body Harness Component** of a personal fall arrest system consisting of straps that adjust to fasten around the body; use requires training  
Synonym: Harness, Safety Harness

**Bowline:** Popular knot that is used extensively because it is secure and easy to undo

**Box Truss:** Truss consisting of 4 linear members

**Breaking Strength:** The load at which failure will occur in a component

**Breasting:** Laterally moving a suspended object

**Bridle:** Two or more support lines running from multiple points to a single point

**Bull Line:** Line used to lift or control an out of balance line set

**Carabiner:** Hardware clip used for quick connections; may be load rated  
Synonym: Biner, Crab, Krab

**Chain Hoist:** Manual or electric geared mechanical device that uses chain for lifting  
Synonym: Chain Motor, Chain Fall, Hoist

**Compression Fitting:** Swage fitting used to terminate wire rope by means of crimping the fitting onto the rope  
Synonym: Crimp, Nicopress<sup>®</sup> Sleeve, Oval Sleeve, Swage, Wire Rope Sleeve

**Counterweight:** A weight used to balance the load on a line that is being raised, lowered, or held in position  
Synonym: Brick, Pig, Stage Weight, Weight

**Counterweight arbor:** A guided, movable rigid carriage assembly used to hold counterweights and to counterbalance a load.  
Synonym: Counterweight Carriage

**Counterweight Loader:** Person who loads and unloads counterweight arbors  
Synonym: Loader

**Dead End:** End of a rope or part of a device that is not active or load carrying  
Synonym: Bitter End

**Dead Hung:** Suspension of an object in a fixed, nonadjustable position

**Design Factor:** A ratio of the design load to the breaking strength of a material or component.

**End Stop:** 1) Position at the end of a traveling device; 2) Mechanical device that physically limits travel

**Fire Safety Curtain:** Fire resistant barrier which closes off the proscenium opening in case of fire  
Synonym: Asbestos (obsolete term), Fire Curtain, Proscenium Fire Safety Curtain, Safety Curtain

**Fly Loft:** The space between the roof and the performance area that is not visible to the audience  
Synonym: Flies, Fly House, Fly Tower

**Fly Rail:** Operating position for a theatrical counterweight fly system  
Synonym: Rail

**Go No-go Gauge:** Piece of metal with slots that measures the accuracy of: 1) a crimp; 2) the spacing of chain links

**Gridiron:** Over stage support structure consisting of regularly spaced members permanently affixed to the venue to support equipment  
Synonym: Grid

**Guide Shoe:** A component of a counterweight arbor assembly that engages the guide rails in order to maintain vertical alignment over the length of the arbor travel

**Head Block:** The stationary block assembly above and closest to the counterweight arbor or pin rail. The head block permits lift lines to change direction. In some counterweight systems, the head block is also grooved to allow the operating line to change direction by 180 degrees.

**Hemp House:** Venue that uses ropes and sandbags primary rigging components

**Lanyard:** Component of a personal fall arrest system that connects the safety harness to the anchorage point; use requires training

**Lift Line:** Any fiber or wire rope reeved through block(s) and attached to a load. Lift lines operate singly, as spot lines, or in "sets" of several lift lines working together to support a load.

**Line Set:** A system of multiple lift lines, operated together to raise, lower, or suspend a load; all of the mechanical, component subsystems required for supporting, positioning, and operating those lift lines as a system.

**Loading Bridge:** A load-bearing, elevated personnel access and work area, located to permit counterweight loading and unloading at the arbor.  
Synonym: Loading Gallery

**Locking Collar:** A device placed on a counterweight arbor rod to reduce unintended vertical movement of counterweights on the arbor.

**Locking Rail:** A structural railing that supports the rope locks.

**Loft Block:** An overhead block through which one or more lift lines pass before being attached to the batten. A loft block typically permits the change of lift line direction in the vertical plane.

**Operating Line:** The line that an operator pulls to move, position or hold a counterbalanced load  
Synonym: Hand Line, Purchase Line  
**Personal Fall Arrest System:** System used to prevent an individual from falling from a working level; use requires training

**Rigging:** General term for arrangements of hardware and systems for the raising, lowering, and suspending of scenery, properties, lighting, and similar loads

**Rope Lock:** A positioning device, located on the locking rail that holds an operating line of a balanced counterweight set and prevents unintended movement.

**Shackle:** U shaped fastening device secured by a bolt or a pin through holes in the ends of the two arms  
Synonym: Round Pin Shackle, Screw Pin Anchor Shackle; Pin Anchor Shackle

**Single Purchase:** A system of rigging employing weights, blocks and lines to hold or move a load of similar weight, using a 1:1 mechanical advantage for counterweight and batten load.  
Synonym: Single Reeve

**Spreader Plate:** Plate that is installed between counterweight arbor rods to keep the rods from spreading during rapid travel or impact, preventing counterweights from falling out of the arbor.

**Spike:** Act of inserting a spike ribbon through an operating line See also: Spike Ribbon  
Synonym: Stab

**Swaging Tool:** Manual or hydraulic tool for crimping compression fittings  
Synonym: Nicopress<sup>®</sup> Tool

**Tension Wire Grid:** System of interwoven wire rope that serves as a working platform  
Synonym: Cable Grid, Izenour Grid, Sky Deck<sup>®</sup>, Tension Grid, Wire Grid

**Thimble:** A grooved fitting around which a rope is bent to form an eye. It supports and protects the rope to prevent kinking and wear

**Toe Rail:** Metal plate at the bottom edge that prevents objects from sliding through the opening

Trim Chain: A length of chain and fittings used to connect a lift line to a batten (or other load) and adjust its level relative to the other lift lines along the batten

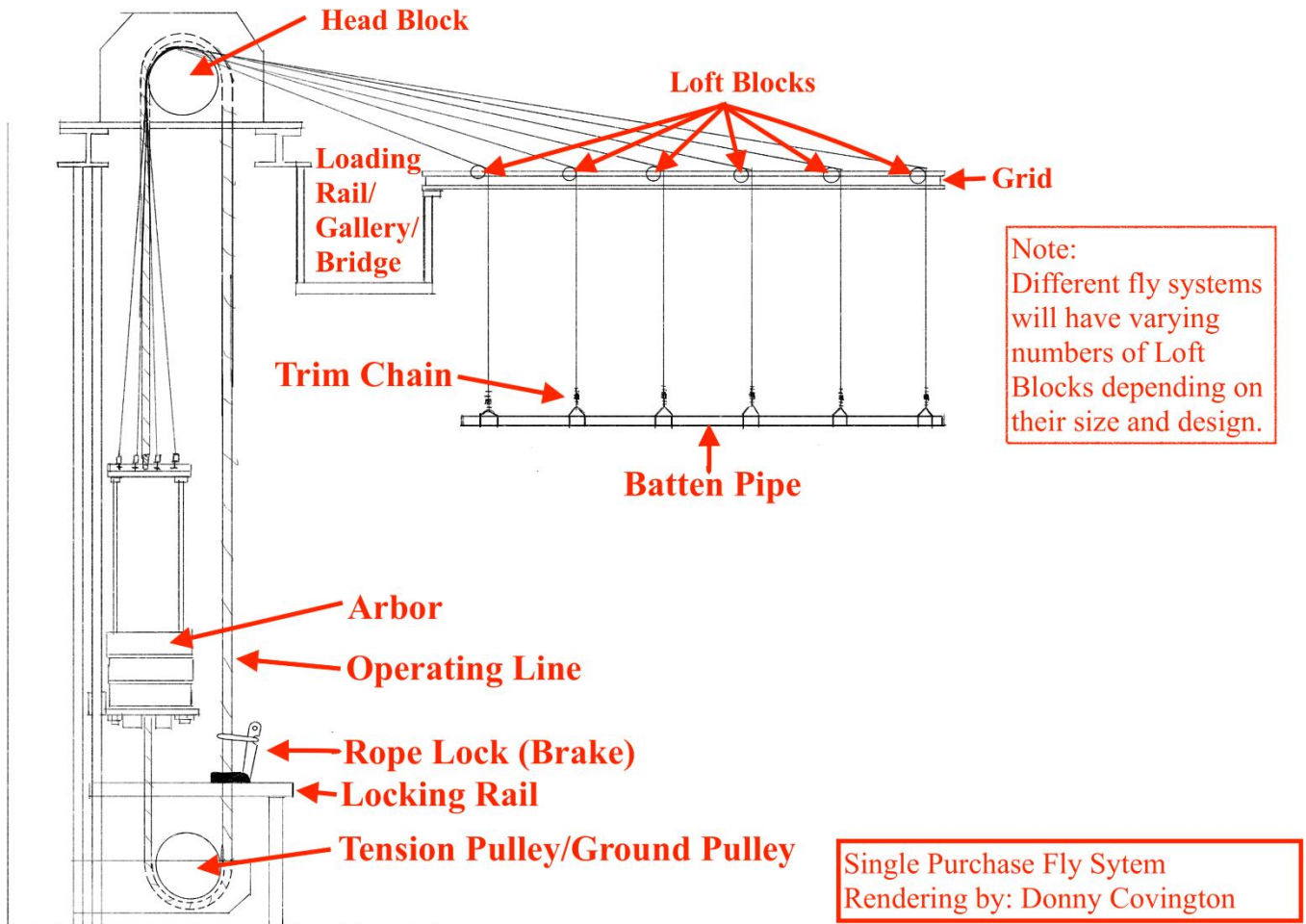
Trim: To bring a rigging element to a defined height  
Synonym: Trim Height

Wire Rope Clip: Mechanical device used for terminating wire rope by means of a saddle, a U bolt and two nuts  
Synonym: Crosby

Working load limit (WLL): The maximum rated capacity of a component or system during normal operating conditions, as determined by the component manufacturer, or as determined by a qualified person for a specific application

**\*Terminology derived from eSET Counterweight Rigging Lexicon and ANSI E1. 4 (2016)**

## Parts of a Counterweight Rigging System



The **batten** is the pipe that scenery and lighting are hung from. The batten is connected to the lift lines with a trim chain or a batten clamp. The **lift lines** are the steel wire rope (7x19 Galvanized Aircraft Cable- GAC) attached to the batten. These lines continue through the fly house to the gridiron.

At the gridiron are **loft blocks**—pulleys that change the direction of the lift lines from vertical to a more horizontal position. These allow for the smooth travel of the lines back to the main head block. If there is a lot of space between lift lines, and the loft blocks are attached to the bottom of the gridiron, additional pulleys may be necessary. These pulleys, known as idlers, keep the lines from sagging. The **head block** is main pulley that takes all the lift lines and gathers them together into one main block. All lift lines pass through this block, changing direction back to a vertical position, and stopping at the top of the arbor. These lines should be secured with swage sleeves or wire rope clips. This procedure is detailed in the *Wire Rope Clips* article.

The **arbor** holds the stage weights, also known as bricks, which counterbalance the load that is attached to the batten. The arbor travels along a T-Track to keep it guided during travel. At the base of the arbor the operating line of the batten is attached. The arbor also contains **spreader plates**. The spreader plates are positioned at specific locations along the height of the arbor to keep the arbor bars in place. The **operating line** is the hand rope that technicians use to move the batten. This operating line runs through the tension block at the base of the fly rail, also known as the locking rail, and terminates at the top of the arbor with the lift lines. The **tension block** helps ease the movement of the operating line as it is pulled and maintains tension on the line. The line continues from the base of the fly rail to a rope lock. The **rope lock** is used to keep the operating line from moving when not in use. The rope lock features a metal loop or **locking ring** that loops around the operating line and the handle of the rope lock. The locking ring should always be applied when a batten is not operating.

# Flying and Hanging

## Flying an Empty Batten

The only tool you need for flying an empty batten is a pair of good quality friction-resistant gloves. But you also need a fair amount of upper body strength and, most importantly, a partner.

**SAFETY NOTE: When the battens are empty, there should still be weight on the arbor that counterbalances the weight of an empty pipe. This is known as pipe weight.**

### Step-by-Step Instructions

1. Go to the flyrail and select the batten you wish to move.
2. Your partner will be your second set of eyes.
3. Place your hands on the operating lines, gripping them in one hand.
4. Check the stage to make sure it is safe to move, and yell clearly, “Lineset X coming into working height!” Be sure that someone onstage gives you a “thank you” or some other acknowledgement of the pending move before proceeding.
5. Remove the safety ring from around the rope lock and operating lines, then pull the rope lock open. You should feel a gentle tug as you take weight.
6. Pull the onstage rope closest to the stage down, so the batten will travel towards the deck and the arbor will go up. Remember that the onstage rope equals the onstage action.
7. Once the batten is at the lowest height (Normally 4’ off the deck), return the rope lock and safety ring back to its locked position.

**SAFETY NOTE: If for any reason you or your partner sees or hears something that is not normal—a loud noise, a batten moving unevenly, etc.—you or they must yell “STOP!” Words like “hold” or “wait” are not acceptable.**

## Hanging Soft Goods

Stage borders and Legs--short drapes hung above the stage, and tall narrow drapes hung parallel to the proscenium—are an important part of any stage design. Legs frame the sides of the acting space and border mask equipment and hidden, elevated scenery. For hanging either of these soft goods, you will still need your gloves and a partner.

**SAFETY NOTE: Be aware that a batten or arbor may shift as a load is added or removed.**

### Hanging a Border: Step-by-Step Instructions

1. Begin by following the steps for flying an empty batten.
2. To protect your soft good, make sure the area you are working in is swept and mopped. For additional safety, you can lay down fabric below the batten to act as a buffer between the soft good and the stage.
3. Unfold the border, running from stage left to stage right, exposing the ties at the top of the good.
4. At the center of the good, you should find a white piece of tie-line. This is the exact center of the good. Beginning with this tie, tie the border to the center of your batten.
5. Working your way from center to stage left and stage right, tie each tie to the batten. It can help to start by tying every other or third tie. Doing this will take some of the weight off the good, allowing you to go back and tie the rest with ease. To tie the good to the batten you can use a simple bow (called a square reef knot), like tying your shoes. See the Technical Theatre Educator’s Manual article on “Common Knots” for directions for tying common knots.
6. Once all ties are attached, go to both ends of the good and pull the border taut.
7. The batten is now weighed down by the good hanging from it. At this point, you will need to add weight to the arbor to counterbalance the load.

**PRO TIP: Paint a stripe around the center of all your batten pipes so it can be easily located. If you're feeling extra ambitious, you can paint additional stripes around the batten pipe at key measurements (12" or 18" etc.)**

### **Hanging a Set of Legs: Step-by-Step Instructions**

1. When you hang a set of legs, protect them the same way as borders. If you don't have extra fabric to lay on the stage below the legs as you hang them, apply the *saving face strategy*. Saving face is simply making sure the front part—the face of the soft good—does not touch the ground.
2. Before you can hang the leg on the batten, you need to know the desired opening. The opening is the measurement from center to the start of the legs. The measurement will depend on the total distance of your proscenium, and what the designers want. Let's say you need a 40' opening. That means you would measure from the center mark on the batten moving offstage 20'. Mark the batten at this measurement using tape or chalk. This is where you will start tying the leg on.
3. Before you begin tying, determine what kind of edge the leg needs—a hard or soft edge. For a hard edge, the first tie will be directly on the 20' mark. For a soft edge, you will start tying on the mark with the 3<sup>rd</sup> tie in on the soft good. The excess on the front would then be folded over and tied on the rear of the good. This is known as a tie back.
4. Tie up the leg the same way as a border, starting onstage and working your way offstage.
5. When you reach the end of the batten and there is excess hanging off the end, do a tie back. If there is an abundance of fabric, follow the same principle as tying back, but do an accordion fold back and forth until all the fabric is tied onto the batten.

## **Counterweight**

In order to properly balance the weight on the batten for flying it is necessary to add or remove counterweight. For this reason, many counterweight rigging systems include a "loading gallery" where the weights are stored and accessed.

***SAFETY NOTE: The loading gallery must be designed by a structural engineer who understands theatrical rigging systems.***

It is crucial for safety and ease of operation that you take every precaution to ensure that the load on the batten is properly balanced by counterweights. Prior to opening the rope lock, it is good practice to feel the hand lines above and below the arbor, checking for excess tension OR lack of tension. If you open the rope lock and the line begins to move, reapply the rope lock immediately and correct the imbalance.

**PRO TIP: When there is a large load to move, it is best to have two people on a line set.**

### **Adding Weight for Counterbalance**

1. With the batten in at working height, or just enough off the deck so you can stand at the batten and work, the arbor should be at the top of the flyhouse. The goods hanging on the batten keep it at deck level, and the rope lock should still be engaged. The loaders, the stagehands that will load weight onto the arbor, should be in position (With the proper PPE- harnesses etc.) and standing by.
2. The fly person should make the following call, "On deck and on the loading bridge!" They will pause for a response of "Go Ahead!" The fly person will continue, "Please take Lineset X to X bricks above pipe weight!"

***SAFETY NOTE: Know your load limits. Each line has a specific load capacity, make sure these are posted at the rail. DO NOT EXCEED THESE LIMITS. Allow only trained and authorized operators to work with your system.***

**PRO TIP:** In a counterweight system, the stage weights or bricks are needed to counterbalance the weight of the batten as well as scenery or lighting. There should always be pipe weight on the arbor that is the specific amount of stage weights needed to counterbalance an empty batten. Stage weights come in half and full bricks in varying weights, though 25 to 50 pounds is common. The weights of these can vary. Be sure to know the weights of everything you are hanging on battens so you can add the proper amount of weight to the arbor.

1. The loaders will now call back, "Taking Lineset X to X bricks above pipe weight, is the rail clear!?" This call back is key. It will help the loaders understand what they need to do. Once the rail is clear of all personnel, the fly person will call back, "The rail is clear!"
2. The loaders are now able to work on that specific batten. *During this time, no other battens should be worked on or moved.*
3. The loaders will move the spreader plates on the batten so they can access the arbor for adding weight. One loader will pick up one brick at a time and hand it to the other loader. When handing over bricks especially at height, the loaders should communicate that they have the brick in hand before the other let's go. This can be done with a simple, "Got it."
4. Once the bricks are loaded, and the loaders clear the batten, they will call down. "On Deck, Line set X is now X bricks above pipe weight and clear to test!"
5. The fly person is now clear to go to the rail, unlock the rope lock and move the batten. Please note, that when a soft good is buried, or piled up on the deck, when you first move the batten, there will be more weight on the arbor. The balance won't change until the soft good is off the floor and the weight of it is completely counterbalanced by the bricks.
6. The flyperson should fly the batten out until the good is off the deck. Lock the batten and let it settle.
7. Once settled they should unlock the batten and see if it drifts in one way or another. Depending on this test, you are either good to go or need to add or subtract stage weights.

***SAFETY NOTE:*** *If for any reason a batten or arbor starts to run, do not try to stop it on your own. You will get severe rope burns or worse. If this happens, you should yell, "CLEAR STAGE!" or "HEADS", whichever warning is used in your space for taking immediate evasive action. This call should be known and heeded by all stagehands immediately.*

**PRO TIP:** When flying a batten that you know will be slightly out of weight (More weight on either the batten than arbor, or reversed), it can be helpful to "take a wrap." When you approach the rail, one of the operating lines will most likely have some slack. Take this rope and simply wrap it around the other operating line. This adds friction, so when you unlock the rope lock you will have a little more control over the batten. Please note, this only helps in slightly out of weight battens. Heavily overweight battens can still run even with a wrap.

## Maintenance

### General Notes: Inspection and Maintenance of a Counterweight System

Rigging inspections are an important part of your venue's annual maintenance. There are many companies that will travel to your location and do a full inspection. These can be costly, but will save you from more costly damages, and even injuries later. Rigging systems should be scheduled for annual expert inspections. For more detail see the Technical Theatre Educator's Manual Article "*Theatrical Rigging Inspections*".

To help maintain your rigging system, there is a lot that you can do on your own, but please remember that this is in addition to *an expert's inspection*. The first step in maintaining your rigging system is getting organized. Make logbooks, maintenance sheets, or any other forms that will help you document your system. For example, in your rigging binder, you could have a spreadsheet detailing each line set. The sheet can list the lift line of each batten, so when you do visual inspections you can make note of any problems found. These kinds of documents will help you justify the needs for inspections authorized and paid for by your district. It will also show any vendors the history of your system, and where their focus is truly needed.

It is imperative to do frequent visual inspections of the system. This is the first line of defense against rigging accident. Many aspects of visual inspections can be done as you prepare your system for shows and events. Here is how you can visually inspect a line set, and what you should be looking for. To get started, you need an empty batten, your gloves, a flashlight, and, as with all rigging work, a partner.

### Checking your system: Step-by-Step Instructions

1. Inspect the *general components* of the rail, looking through all the nuts and bolts and make sure they are tight.
2. Inspect both **Rope Locks**, in both locked and unlocked position. When locked make sure it properly secures the rope in place. It can become loose over time and needs adjustment.
3. Examine all operating line connections at the top and bottom of the **Arbor**.
  - a. Look for loose knots or worn rope.
  - b. Check all lift line connections at the top of the arbor.
  - c. Look for loose or damaged connections.
  - d. Adjust spreader plates to make sure they can move along the bars within the arbor.
  - e. Look for any bends in the bars.

**SAFETY NOTE: Spreader plates are an essential part of the arbors within a counterweight rigging system. These plates need to be placed between the stage weight every 2 feet. The plates hold the bars that run vertically in the arbor in place if there is ever an accident. In a runaway arbor, the arbor may crash into the deck. If this happens the spreader plates hold the bars in place, and in turn hold the weights in place. Without these plates in the proper location the stage weight can easily pop out of the arbor in a similar accident. A second accident would then occur as an overweight batten would now come crashing onto the deck.**

1. Check the arbor's connection to the **Operating Line**.
  - a. Fly the batten and have your partner watch it while you inspect the rope.
  - b. Check for any abrasions or fraying.
  - c. Check for any stretching.
  - d. If you have natural fiber rope, be sure to check for rot and pest issues.

**SAFETY NOTE: The operating lines of a counterweight system should be replaced every 5-10 years by professionals. Replacement timeline depends on the kind of rope, conditions of venue, and normal wear and tear.**

1. Inspect **Lift Lines** all from the arbor to the batten.
  - a. These can be difficult to fully inspect depending on if you have access to your gridiron structure.
  - b. Follow the lift line all the way from arbor to the batten.
  - c. Look for kinks and bends.
  - d. Look for frayed lines.
  - e. Make sure each lift line is run properly through all the loft blocks etc.
  - f. Check for metal shavings. If present, it usually means you have a bigger issue such as misalignment or bent equipment.
  - g. At the connection point to the batten look closely at the swage and the thimble.

1. The **Swage** is the sleeve of metal (normally copper) that is crimped at the end of the line. This the termination of the lift line. Look for bent or unusual crimps.
2. The **Thimble** is the rounded metal channel that is placed in the loop of the lift line below the swage. This piece keeps the line from kinking or bending too much at and around the connection point to the batten. It should look like a fat teardrop. If the thimble is a more slender, elongated teardrop, then there has been significant force put on that lift line. This could be caused by overweighting the batten, or the batten colliding with another item. If you discover this, you should have your batten inspected; it likely means replacing lift lines. And if one lift line been damaged, it's likely that all the lift lines for that batten will have the same issue and need replacement.
3. Check the **Connection Point** to the batten.
  - a. The connection point of the lift lines to the batten can be accomplished in multiple ways, such as trim chain or batten clamps.
  - b. Check the weight-rated **Trim Chain**. For rigging, a shackle connects the thimble of the lift line to the trim chain wrapped around the batten. Your rigging system may also feature turnbuckles that will allow you to do finite adjustments to level out the batten.
    - i. Check for cracks, or other fatigue marks on the chain.
    - ii. Make sure the shackles are tightened properly.

**SAFETY NOTE: In a permanent rigging install, your connection points from the lift lines to the battens should have extra safety measures. A simple safety measure is known as mousing. Mousing is where you take bailing wire and run it through the pin of the shackle and wrap it around the shackle bell. This will prevent the pin from unscrewing itself. This should also be done on any turnbuckles in your system. Something as simple as vibrations from a sound system can wiggle these items loose causing safety hazards.**

1. Examine the **Batten Clamp** (if you don't have a trim chain). A batten clamp is exactly what it sounds like—a clamp that goes around the batten and is bolted together. At the top of the clamp is an opening to run the pin of a shackle through it. This shackle would be connected through the thimble of the lift line.
2. Check that all bolts are tightened properly (These bolts should be graded hardware: grade 5 or 8 depending on the application).
3. Make sure the clamp is aligned properly. If the clamp is not positioned with the connection point for the lift line perpendicularly, it will add more stress to that clamp.
4. Check the **Batten** for any bends or deformities.
  - a. If your batten is more than one pipe put together, check all the connecting bolts for tightness.
  - b. Look for deep gouges in the pipe. If you have too big of a gouge or deformation in your pipe, you will need to replace it. Something as simple as someone over tightening a lighting c-clamp can damage the batten in this way.
5. Do an *Auditory* inspection. It is another important aspect of a basic inspection.
  - a. While running the batten, listen for abnormal groans and squeaks. These can be the first sign of issues. A well-maintained system shouldn't make much noise.
6. *Document* your inspections. Documentation of inspections is key to maintaining your system. It can also show a history of any issues within the system.
  - a. Take photos of all the system parts where you find issues.
  - b. Keep a maintenance and inspection log book, and update it often.

You are better safe than sorry, so treat your rigging inspection as seriously as you do any other aspect of your program. If you find issues within your basic inspection, whether it seems to be a big or small concern, treat it as something that demands your full attention. This level of care will ensure the safety of everyone onstage and off.

**SAFETY NOTE: Remember, your visual inspection of your rigging system does NOT take the place of a professional inspection. When in doubt with anything on your system, reach out to the manufacturer. If there is a need for repair, reach out to rigging professionals who are qualified to work on your system.**

# Best Safety Practice

## Rigging Inspections – Drawn from ANSI E1.47 2020

**Frequency of Inspections:** Unless applicable standards, regulations, or manufacturer’s recommendations require more frequent inspections, the following FREQUENCY OF INSPECTIONS list provides types and frequency of inspection for various types of equipment. Category levels are defined in the section following the list.

In **ALL** instances: Level 2 Rigging inspections should occur immediately after equipment or components have been newly installed, altered, or repaired; or, when the last date of inspection is unknown.

### **Level 1 Inspections: Annually**

Manually operated equipment

Manually operated fire safety curtain

### **Level 2 Inspections: Annually**

Motorized equipment and motorized fire safety curtain

### **Level 2 Inspections: No less than every 5 years or as determined by a qualified person.**

Manually operated equipment

Statically suspended rigging equipment.

Note: Immediately after equipment or components have been newly installed, altered, or repaired, and **one year after installation**.

### **Levels of Inspection**

**Level One Inspection** is performed from accessible positions (rigging galleries, catwalks, facility ladders and gridirons) or the stage floor where no accessible positions exist. Unless otherwise noted below, all accessible components of all sets, including lifting media, are to be inspected.

**Level Two Inspection** is performed by gaining access, typically using ladders, scaffolding, or personnel lifts, to all rigging components. All components of all sets, including lifting media, are to be inspected. Level two inspection includes all items as described in a level one inspection including those requiring use of temporary equipment to gain access.

**Who Is a Qualified Person?** A person who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

An additional point of consideration is, failure to follow a manufacturer’s recommendations for inspections can void your warranty. This is especially the case with automated rigging systems.

## Relevant Industry Codes

### Other Relevant Code

ANSI E1.4 - 2014: Manual Counterweight Rigging Systems

ANSI E1.43 - 2016: Performer Flying Systems

ANSI Z359: Fall Protection Code

OSHA Standard Number 1910.66 Appendix C “Personal Fall Arrest System”

OSHA Standard Number 1926.502 (d) “Fall Protection Systems Criteria and Practices”

ANSI E1.1 - 2012: Construction and Use of Wire Rope Ladders

ANSI E1.2 - 2012: Design, Manufacturer and Use of Aluminum Trusses and Towers

ANSI E1.8 - 2012: Loudspeaker Enclosures Intended for Overhead Suspension—Classification, Manufacture and Structural Testing

ANSI E1.43 - 2016: Performer Flying Systems

All ANSI documents are available for free download at [www.esta.org](http://www.esta.org) (Technical Standards Program)

## Links and Resources

*Rigging 101 – Knowing and Operating Your Counterweight Rigging System* by Tom Young

[https://www.jrclancy.com/downloads/JRC\\_Cntrwt\\_Rigging.pdf](https://www.jrclancy.com/downloads/JRC_Cntrwt_Rigging.pdf)

*Stage Rigging Handbook, Third Edition*, by Jay O. Glerum

*Entertainment Rigging*, by Harry Donovan

*Entertainment Rigging for the 21st Century: Compilation of Work on Rigging Practices, Safety, and Related Topics 1st Edition*

## About the Authors

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