IATSE Local 26 Education and Safety Committee Presents:

Weight Loading at DeVos Performance Hall 101

Weight loaders are responsible for quickly loading 21 lbs. weights onto a counterweight system that allows the Flyman to hang theatrical equipment above the stage. They are an integral part of the house fly system. They will lift several hundreds to thousands of pounds throughout the call. They work next to a 50-70 foot hazardous drop off.

The job is often dangerous and involves a high level of risk due to the large amount of weight, the speed needed, and heights involved. A runaway line can injure the Flyman, the weight loaders, and everyone nearby the moving equipment. A dropped counterweight from the bridge could kill or injure a person standing underneath.

This Tutorial is only going to cover a small part of the Fly System.

For more information read:

Fly system https://en.wikipedia.org/wiki/Fly_system

Backstage Handbook an Illustrated Almanac of Technical Information by Paul Carter

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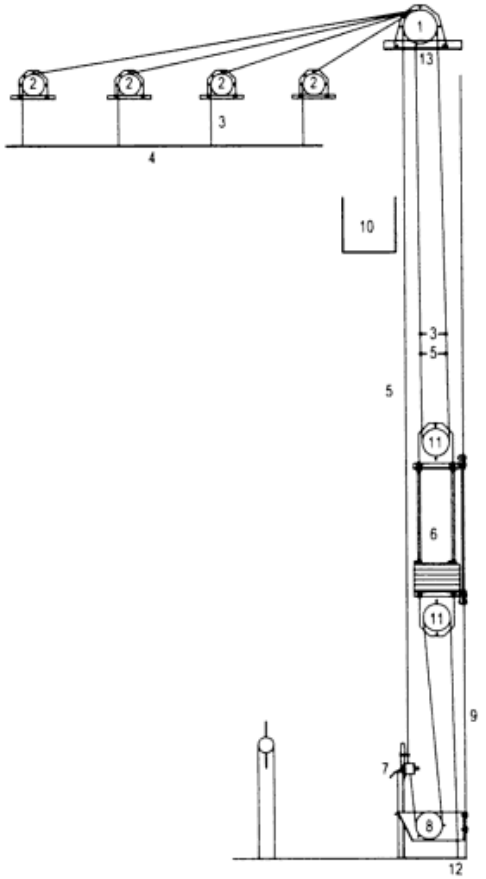
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1. Types of Fly Systems

A. **Single Purchase** - counterweight system in which the counterweight moves vertically the same distance as the load being lifted. Everything (including weight) is a 1:1 relationship.

B. **Double Purchase** - counterweight system in which the counterweight moves twice as far vertically as the load being lifted. Twice as much counterweight is needed on the arbor to balance the weight on the batten. This system allows results in twice the weight doing half the travel distance for the counterweight.



1. Head block for lift line and hand line
2. Loft blocks (mule blocks as needed)
3. Wire-rope lift lines
4. Batten
5. Hand line
6. Counterweight arbor
7. Lock rail
8. Tension block
9. T-bar–guide rails
10. Loading bridge
11. Arbor blocks
12. Hand-line tie-off
13. Hand-line and lift-line tie-off

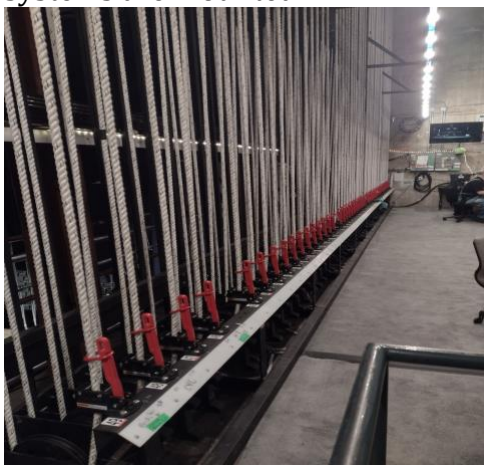
2. Locations:

A. **Grid or Gridiron** – channel working surface above the fly loft used to support and allow access to the rigging system's components.

B. **Fly Loft** – area above the stage where battens and their loads are flown to be out of view of the audience.

C. **Loading Bridge or Weight Floor** – Area above the stage where counterweights are loaded. The floor of the loading bridge is used to store counterweights.
   i. Top
   ii. Mid or Main Level
   iii. Lower

D. **Locking Rail or Fly Rail** – typically a steel angle or rectangular tube to which the rope locks of a counterweight systems are mounted.





3. Parts of the Fly System

A. **Fly System**- a system of lines (e.g. steel cables), blocks (pulleys), counterweights and related parts that allow the crew to safely, quickly, and quietly fly (hoist) things such as curtains, lights, scenery, and stage pieces.

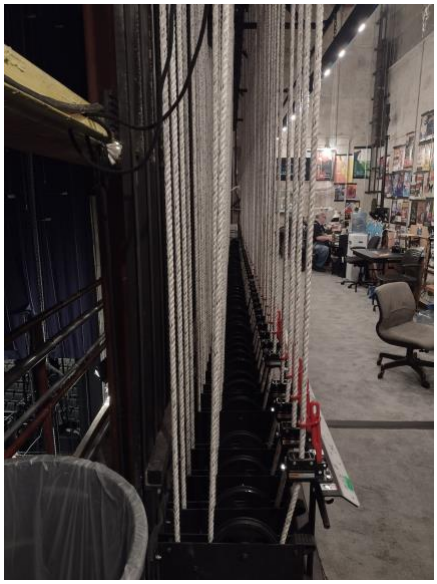
B. **Batten –** Long pipe on which goods and scenery are hung

C. **Line Set** – main component of the fly system. Includes the batten, lift lines, and running lines (aka the cables the Flyman handles). These are numbered on the handrail.

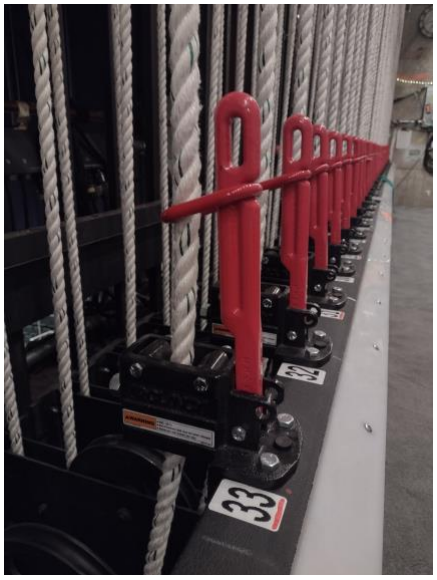
D. **Purchase Line or Running Line –** lines that take the piece in and out.
   i. **Front Line** – the line closest to you when standing at the locking rail or fly rail. Pulling that brings the load in.

   ii. **Back line** – the second line in from you when standing at the locking rail or fly rail. Pulling that brings the load out.

   iii. **Dead line -** line farthest from you when standing at the locking rail or fly rail. **We don't use this line**



E. **Rope lock -** a device used to prevent a rope, and the lineset it controls, from moving. A rope lock is controlled by a steel handle that engages the lock when vertical and releases it when horizontal. The handle is typically red powder coated or covered by a red rubber grip. Steel, oval shaped safety rings encircle both the rope and the handle to ensure that the lock cannot be accidentally released. Rope locks are mounted to the locking rail, which provides structural support and holds them at a convenient level for the stage crew. **Not to be used as a brake!**



F. **Head Block** – overhead multi-line blocks used for the lift lines and operating lines



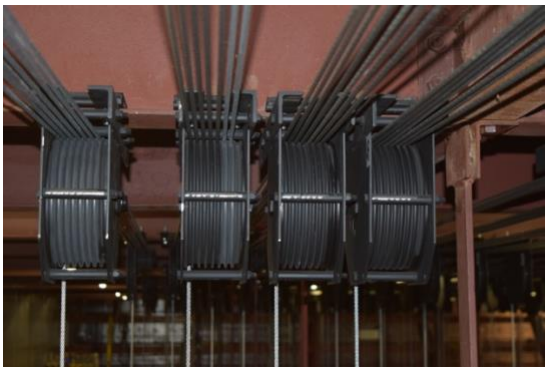


G. **Floor Block –** the running line, attached to the bottom of the arbor, goes around the lower block through the lock and through the head block to the top of the arbor.



H. **Arbor –** sturdy assembly that holds the counterweights. It consists of five lockers that hold nineteen bricks each. One arbor is capable of holding 2,140 lbs.

I. **Lift lines or Pick up lines –** Cable that is connected to the top of the arbor



J. **T Track or T Bar**- track that guides the arbor.

K. **Counterweight** – a weight that by exerting an opposite force, balances and stabilizes a hanging load (e.g. curtain) to make lifting the load easier.
    a. All counterweight bricks are 21 lbs. each, painted white and placed on arbor shelf handle out.
    b. Counterweight Pile Sizes –Weight needs to be spread somewhat evenly across the floor so that the weight is dispersed safely. Too much weight stacked in a small area could compromise the floor. Weights should be stacked in piles of no more than ten.







L. **Pipe Weight** – the top brick of pipe weight is orange and placed on arbor shelf handle in the balance of pipe weight is unpainted and is also placed on arbor shelf handle in. Pipe is a counterweight that is never removed because it balances the weight of the empty batten.

4. Team Members:

A. **Flyman**- Member of the crew operating the fly system from the locking rail. Responsibilities include bringing battens in and out, keeping the weight on the line sets balanced, and making sure the rope locks are applied when the line set is not moving.

B. **Weight Loader-** Member of the crew loading counterweight into and out of the arbor.



5. Actions and Communications:

Flyman

A. **On the Weight Floor** or **On the Loading Bridge** is usually the first command you will hear. It is said to get the weight loaders attention and to notify the people on the floor that the loading process has started.

B. **Give me a hand on the front line or give me a rub** is assisting the Flyman to handle the weight on the working line. Do not pull on the line unless directed.

C. **Standby line set "_____"** - Go to the line set you are directed toward, and be prepared to give a hand on the front line

D. **Float line set "___"** - command used when the exact weight of the piece on the batten is not known. We will load until the arbor moves

E. **Chasing an arbor or Following the Arbor**– When a scenery piece is attached in multiple sections. Weight loader will put enough weight on to fly one section, when that section is flown enough to attach an additional section the weight loaders will then load enough weight to fly both sections.

F. **Get Out!** – Command to get clear of the arbor as fast as possible before the Flyman loses control of the line.

G. **Runaway –** If the Flyman announces a "Run Away" first get yourself clear, and then shout to clear the floor. If possible, get to the Flyman to assist in stopping the runaway.

H. **Balancing a load** - using the information from a show person or line plot that tells you how much weight to load into the arbor to balance the load being flown

I. **make a mark or mark that -** the flyman will say this indicating the load placed on the batten will be coming in pieces. When each piece of the load has been counterweighted, you will place a 1" wide piece of white tape over the top brick in the current box. This indicates on the loadout when to stop unloading.

J. **C.O.D -** come on down, leave the weight floor to return to the ground

Weight loader

K. **"On the rail. Line set ___ stripped and clear"**
   - **a.** Stripped indicates
     - **i.** Counterweight has been removed
     - **ii.** Locker doors are secured

   - b. Clear indicates:
     - i. Weight loader is out of the way of the arbor
     - ii. Pipe completely ready to strip from the ground
     - iii. Flyman is ready to move the line set

L. **"On the Rail. Line Set ___. ___ bricks Loaded and Clear".**
   - a. Loaded indicates
     - i. Counterweight has been added
     - ii. Locker doors are secured
   - b. Clear indicates
     - i. Weight loader is out of the way of the arbor
     - ii. Pipe completely ready to strip from the ground
     - iii. Flyman is ready to move the line set

M. Communication between Flyman and Weight Loaders should happen at the handrail and you need to project your voice. **Always repeat back the instructions you were given.** Between the noise from the ground and the noise of weights being moved it can be hard to hear.

N. Alert the Flyman when changing levels

O. If you see something broken or if there is a piece missing, alert the Flyman and Head Carpenter.

Loading Procedure for a Specific Amount

Before You Go Up:

- You need to make sure you are safe to work several feet above your coworkers for an extended period of time. This means that you are not going to drop anything on them or need to stop a task after only a few minutes. Always check that you:

  A. Use the restroom
  B. Bring a refillable bottle or get a bottle of water to bring upstairs with you
  C. **Stop to talk to Flyman** before going to the main loading galleries.
  D. Empty pockets into a chair on the weight floor

- Let the environment decide where you stand and how to move. It is crucial that the person standing on the loading platform maintain their balance. They should not have to lean out or crouch down to receive the weight.

- **Pass weight between partners -** the weight loaders on the loading bridge will start handing the counterweights one at a time using both hands to the receiver. Acknowledge when you have control of the weight and the person passing it off can let go.





- **Safety is paramount -** counter weight should be lifted with care. bend your knees. use both hands. maintain a comfortable and secure grip at all times

- **Load weight into arbor -** place weights into arbor securely; the non-handle side of the weight goes in first

- **Load specific amount -** load the number of weights the flyman has requested. **if anyone yells stop before you reach the number of weights do not load anymore**

Loading procedure for load it until it floats

- **Assess the load -** look to the floor at the load you are trying to balance. the flyman may give you an estimate. This method is primarily used for loading electrics.
- **Lock is open -** the flyman will tell you when the lock is open. this allows the arbor to move
- **Test load -** when you approach what you think is a balanced load, pull down on the arbor. if the arbor does not move it has not been loaded with enough counterweight. if the arbor moves alert the flyman. Based on a test pull the flyman will determine if the counterweight needs to be adjusted.

Additional loading procedures

- **Transferring -** moving counterweight from one line set to another
    - if the line set you are transferring from is going to be completely stripped the weight goes to the floor of the loading bridge in front of the line set you are transferring to before it is reloaded
    - if the line set you are transferring from is going to be used for the current show, only strip the excess weights off
    - when transferring side by side line sets the weight can go directly onto the other line set
- **Marrying pipes -** if the load has been deemed to be too heavy for one arbor to pick up you will “marry” pipes together
    - someone on the floor will chain the battens together
    - flyman will alert you which line set is the primary
        - primary arbor is typically fully loaded
        - secondary carries additional load

Unloading procedure

- **Strip it -** unload all weight except for pipe weight

- **Store the weight -** the person catching the bricks will stack the weight appropriately

- **Halfway -** alert the flyman when you are halfway through unloading. the flyman can then call down to the floor how much of the load can be safely taken off the batten

- **Lights out -** on your way down, check to see if there are any riggers on the grid. if there isn't anyone working above you, stop at the lower loading bridge to turn the lights out (the second one in from the left)