Boston University Theatre
&
Calderwood Pavilion

Rigging Handbook
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This rigging handbook is to give you the basic knowledge of the standards we use here in the BU Theatre as well as in the Calderwood Pavilion. Read the entire book please, even if you know how to do that task, we may do things slightly different hear because of building design, system limits etc. Please do not use this book as your training in rigging, rigging knowledge is picked up in combination of book work and hands on. If you do not understand or know how to do something PLEASE ASK. Remember that all rigging accidents that lead to major injuries or death usually result in lawsuits and criminal charges, in those cases the buck stops with the rigger. You have the responsibility of other people’s lives when you design or hang things overhead. Rig Safely.
The Counterweight System

A counter weight system is the basic see saw theory, if your batten (pipe) ways 100lbs then your arbor and weights must add up to 100lbs.

Hardhats Hardhats must be worn at all times (except during rehearsal and show times) while on the rail, hard hats are also required during installs and strikes while overhead work is going on, as well as moving around walls taller that 8ft. Please see the separate hard hat policies.

Standard Verbal Calls When you are at the rail it is your responsibility to inform everyone on the deck and in the air that you are moving a lineset. As well as telling people on the deck and the load gal when they should be adding weight or removing weight. After you make a call you must wait for a response from the air and on the deck, after you get a response you may proceed with caution, just because you received a response does not mean everyone is aware of your intentions.
If you want to move a lineset the call should be. On deck in the air line set # __ coming in. or going out.
If you are loading and unloading arbors the calls should be. On the load gal please unload (load) lineset #__ too ___lbs. When you have finished your snub knot and you and others have step away from the rail you may call out. Clear to unload (load).
If you are loading weight the call should be. Lineset #__ too ___lbs am I clear to load? When you have been cleared to load, before loading weight call out. loading weight on lineset #__.
When you have finished loading weight call out. On the rail lineset ___ is loaded with ___lbs

A lineset Runaway A runaway occurs when the weight is so far off balance that a snub knot will not even support it and the lineset takes off at a high rate of speed. If a lineset ever takes off at a high rate of speed (NEVER TRY TO GRAB ON) scream “runaway” and get off of the stage. You are going to want to be in the house, or in the electrics hall, or scene shop. If you are on the grid, mid gal or load gal run away from the runaway all the way up or down stage of it and curl into a ball on the floor. Do not go back onto deck until everything has stoped moving and falling. If the sprinkler’s have started going off lower and snub as many softgoods as possible as long as it is safe to do so, and then leave the stage and wait for the water to be turned off.

Loading weight Loading weight is most often done from the load gal but is also done from the mid gal and the deck on occasion. The same principles will apply whether you are on the deck or the load gal. Before doing anything you must be told by the person on the rail what to do and when to do it, if you assume while you are loading you may load (unload) weight in the arbor before the rail is ready causing a runaway lineset.
The rail will tell you how much weight to load and you should at that point call back with clearance to load. You should do nothing until your receive word that you are clear to load. Once you have received word that you are clear to load and you have told them you
are loading you can load. Loading is as simple as stacking bricks into the arbor without dropping them.

When unloading down to pipe weight (aprox 330lbs, 11 @ 2” thick weights) there should be a bolted plate to stop you at pipe weight. An arbor MUST NEVER BE STRIPPED OF ALL ITS WEIGHT unless the pipe is removed.

**Standard weights**

At the BUT theatre we stock one size brick

- All = 15lbs

At the Pavilion the bricks are all steal in full, and halve bricks

- Full brick = 50lbs
- Half brick = 25lbs

**Storing weight**

In the BUT there is 3 storage locations for weight, the load gal, the mid gal and the floor.

When storing weight on the load gal, all weight should be store next to the onstage side of the gal against the steel kick plate. Never store the weight against the offstage side, not only is it under your feet while you are trying to work but the chance of a brick getting kicked off the gal is much higher.

When storing weight on the mid gal, all the weight should be store in the middle of the gall in the painted out zone. Never store the weight against the offstage side, not only is it under your feat while you are trying to work but the chance of a brick getting kicked off the gal is much higher. Never store weight on the onstage edge because it will be under foot again, and electrics and sound run there cabling along the onstage edge.

Minimal weight is store on the floor, but there is usually about 150lbs, this is stored under the rail out of the way of your feet and not interrupting the linesets above it.

At the pavilion there are two storage locations for weight, the load gal and the floor. As with the BUT the weight on the gal should be stored on the onstage side of the gal so they are not under foot. There is a stack of about 1000lbs on the floor all the way upstage next to the ladder for all your floor loading needs at the Pavilion.

**The rail**

The rail is made up of the rail and rope locks, every lineset has a rope lock on it and every rope lock has a safety ring on it. When that line set is not in use you must keep the rope lock locked and the safety ring over the rope lock. DO NOT trust the rope lock to hold an out of balance load, it is designed to hold a balanced load.

**Tying a snub knot**

The snub knot is easy to tie once you get the hang of it. The snub lines are hung off the ladder on the upstage wall; please return the snub lines to the ladder when you are done. A snub knot is required anytime that weight is being changed in anyway on the lineset, and at all times on the focus tracks. Please talk to a Huntington staff member, your shop supervisor or instructor for the proper tying method of a snub knot.

**Spike marks**

Spike marks are to put on the linesets with gaff tape only, spike tape is a version of gaff tape and may be used. Never use electrical tape, duct tape, masking tape etc…. They all leave residue on the rope that is sticky and very annoying.
The batten. The pipes in both systems are have center marks on them and are capable of accepting extension pipes. The extension pipes must be tightened down with the 3/8 bolts that are tapped into the ends of the battens.

**Our Gals and Grid**

Mid Gals. At the Pavilion there are no mid gals. At the BUT the mid gals are used for cabling, breasting, loading into the focus tracks, horizontal life lines and hanging of dead hung pipes. There is a full length pin rail up/down stage on both sides for your rope tying needs. Please keep them clean and neat so that there are no trip hazards, keep all the rope tied up and on the pin rails so that they are not the floor. If you do not know how to tie a cleat hitch on the pin rail **Please Ask**.

Cross over. At the pavilion there is no crossover. At the BUT there is a crossover linking the two mid-gals. For the most part it is just for crossing over, but occasional breasting is done from it, and a dead hung pipe. If you are doing breasting lines or pipes it is preferred that ropes or cables are not crossing over the walkway, if the rigging has to cross the path, you must flag it.

Ladders. The ladders in the BUT go all the way to the grid on both side of the building (S.L. lower ladder is taken up by the dum-waiter), the ladders are very old and need to be treated as such. Only one person at a time should be on a ladder section. Never use the ladders for breasting lines.

At the Pavilion the ladders have a safety cages on them, which loves to grab things hanging on your belt, please use caution.

Grid. There is no grid in the pavilion; The Grid at the BUT is about 65’ in the air and is open slat design. Most of the booms, chain hoist, and dead hung pipe are rigged from the grid. We have a very specific way of rigging from the grid that we have developed over the years. It involves a system of pipes and ratchet straps spreading over the structural members of the grid to avoid overloading the slats. If you need to be rigging any chain hoist, booms, or other heavy loads please ask for help from your shop supervisor or Huntington scene shop foreman or Huntington ME.

The lift lines for all the line sets as well as the fire suppression system are all over the grid in your way at every step please be careful when walking up there. There are storage locations for rope on both sides of the grid, please don’t leave any rope lying around on top of the grid unless in use. SL also stores all of the pipes and other rigging gear used in the grid, please return it neatly during strikes to its proper location.

Paint Frame. The paint frame is not used for painting anymore. We use it mostly for bounces, but do put other drops on occasionally. The controls for the paint frame are SR on the crossover and require 2 people to operate. There is a weight on a line that is on the brake lever, pull the rope to lift the weight and simply move the other ropes like a curtain. Do not put anything other than soft goods on the frame.
**Fall Arrest Systems**

**Vertical fall arrest** We have 4 vertical fall arrest setups at the BUT. They should be used anytime there is a potential for a fall that could result in injury. There are in bags with all of the parts in the bag. The anchor straps should be rigged as you would a chain hoist. If you do not no how a part works, or are unsure how to rig them please ask.

**Horizontal fall arrest** The horizontal fall arrests are stretched between the two pin rails on the mid gal. These are mostly used by the electrics department for there focus chairs, but on occasion scenic will use them for truss or other special circumstances. If you need to put up a horizontal lifeline, please discuss the usage with the master Electrician before you count on using it.

**Dumpster fall arrest** Above the dumpster doors there are two retraceable fall arrest for people to use while throwing trash out the back doors. If you or anyone on your crew is throwing out trash you must be wearing a harness and be clipped into the lanyards.

If at any point anyone falls on a fall arrest please notify the student shop supervisor, the HTC TD, or shop foreman, and that unit will be replaced.

**Chain Hoist**

**Stocked chain hoist** We stock eight 1ton hoists at the BUT, two ½ ton hoists for the Pavilion, four ¼ ton used by electrics and sound, and two 1 ton hoist stay in the shop for helper motors. All of our chain hoists are CM loadstars with Motion Labs controls.

**Use of stocked Hoist** The chain hoist are available for all to use in the BUT or Pavilion with proper training and supervision. If you would like to use the hoist you must check with the ATD of the Huntington for availability, and make arraignments with the student shop supervisor or HTC shop Foreman to be present on that day of your load in.

**Storage of Hoist** All the hoist (except for the shop motors) have a road box for them. Two hoist go into one box and with each motor is one 5/8 shackle, one 3’ GAC Flex, one pair ring, and one Chain Bag. And in every box should be one pickle. The boxes store in the trap room stacked two high.

BE CAREFULL stacking and unstacking full boxes they weight about 350lbs, use 4 or 6 people.

**Inspection of the hoist** All hoist must be visually inspected before each use. You must look at the hoist make sure the case is not loose, all bolts are there, there are no cracks in the case. The HTC sends the hoist out once a year for there OSHA inspection and load test.
Rigging the hoist     Most of the time we rig the hoist motor down but we do put them motor up on occasion. The support system for motor down is the same as motor up, and it is the pipe system we have developed over the years. The supporting pipe for a hoist is always the 2 ½ SCH 40 pipe or larger that is in the grid and a piece of GAC flex in a vertical pick going to that.

Using a hoist to support a lineset     Sometimes we use a hoist to support a lineset when we are doing something on that lineset that is either very heavy or requires a lot of weighting sessions due to height limitations. All line set’s in the BUT are ladder batten’s and all you have to do is lay motors in the wells of the grid and spanset onto the ladder. As you add scenery pay attention to the bow in the batten, you may have to rereg for bridles.

Safety off the load     Chain hoist are devises for lifting a load, they are not intended for holding a load for long periods of time. After you lift the unit and get it to its location, you need to safety off the load. For example; If you lift walls up with hoist and land them down to the deck you have now taken the weight off of the hoist and no further action is required. If you are using chain hoist on a lineset you may lock that arbor for that that line set with wire rope and a turnbuckle and that could work as your safety.

**Special rigging**

Dead hung pipes     A dead hung pipe that is a pipe hanging from a rope or wire rope that is not running on a pulley system. If you are dead hanging from ropes you need to support the pipe with the appropriate amount of rope and tie clove hitch’s backed up by two half hitches. And usually hung by bunny ears in the grid. If you are dead hanging with wire rope, 98% of the time you are going to use stock picks, and shackle them together. Make sure the shackles have zip tie safeties on them and you will make the connections to the pipe with trim chain just as you would onto a batten.

Breasting lines     Breasting lines are usually rope from the mid gals but can be ratchet straps, wire rope, or come along’s. Make sure that breasting lines are secured to something that can take the weight of the object, and that the lines are not going to interfere with operation of other linesets, moving scenery etc…

Block and Fall     There are several bock and fall setups pre rigged that hang in storage upstage right in the BUT, if you use those please restrig them nicely and hang them back up in there location. There are parts to make your own if you wish to make a custom mechanical advantage. Always remember that no matter what Mechanical advantage you have the high block’s rigging point will be receiving double the load weight on it.

Ratchet Straps     Ratchet straps are extremely useful for all kinds of things. If you use ratchet straps for any type of over head work the straps MUST have a load rating on
the strap, and you must back up the strap with a piece of aircraft cable. The ratchet straps that are in the grid for securing pipes are to stay in the grid please.

**Come-along**  We have a few come-along’s in the building, they are all stored in the metal shop. A come-along is never to be used for overhead lifting, they may be used for breasting, guy wires, moving, and pulling things.

**Home made rigging**  This one is easy, AVOID, AVOID, AVOID. If a rigging part fails in your rig that is made by a company then they will get the law suit. If you make a piece of rigging then you get the lawsuit. Lets clear up what a piece of homemade rigging is, a flying wall is not a piece of rigging, it is a custom built piece of scenery, but if you made a bracket that bolted to the wall and then to the batten, that is a piece of home made rigging.

**“Bunny Ears”**  Bunny Ears were engineered by a grad student several years ago for the BUT grid. They are very simple to use, if you want to drop a dead hung line just feed the line through them, when you are at the correct height you would like close down on the moving jaw on the bunny ears and then tie a cleat hitch around the “ears”. They are only to be used with ¾ multi line, and never exceed 200lbs per ear.

**Pony Frames**  There are two types of pony frames for the BUT a small version and a large. The small units are used mainly in the grid for boom picks, and the large versions are used 90% to install a chain hoist on the mid gal. All pony frame used on the grid should be secured to the grid with ratchet straps to prevent them from slipping around.

**Aircraft Cable**

**Storage**  New aircraft cable can be found in the last row of the tool room, please use plain cable when ever possible; the black tinted cable is much more expensive. For the most part we don’t save used aircraft cable, its more trouble that its worth.

**Stock Picks**  We have several lengths of stock picks in good quantities made of ¼ aircraft cable. These picks are identified in length by the color code of electrical tape on the thimble ends. Do not modify stock picks please, they are there for everyone to use, If you need a custom length that cannot be built with stock picks please make a custom length for your show and throw it out during strike.

**Nico-Press**  The ¼” is a nico-press tool and all of the others are Loos and Co they are the same basic concept but you have to use the recommendations of the Loos an Co. for number of crimps and you must use the gauges by Loos and Co or Nico-Press depending on the tool you have. The gauges can be found in the plexi cabinet in the tool room. If you are building cable you must check every crimp and every crimp must pass (there is no close enough in building rigging cables). Please return the gauges when you are done.
Wire Rope Clips

The wire rope clips we stock are by Crosby and are forged. You should only use forged wire rope clips for overhead rigging. To install wire rope clips read the package for the proper number of clips for that wire rope size, and the proper spacing apart from each other. REMEMBER never saddle a dead horse.

Ver locks

Ver locks are a trade name from Ver sales in California, the are also called wire rope grabs, they come in sizes for 1/16, 1/8 , and 3/16 cable. Ver locks are not rated for overhead rigging so they must be backed up with either Crosby clips or nico stops.

Circus Hitch

This not is also known as the Foy knot, it is hitch that is used on 1/16 or 1/8 cable only and will uphold 75% of the cable strength when tied properly. We do use this every once in a while here, please do not tie this knot if you are not 100% confident in it, they can come apart very easily if not tied properly.

Other rigging hardware

Rope

We have two types of rope we use for hauling and lifting, ¾ white multi line and 5/8 braided hand line. Please keep the rope clean do not let it get filled with metal shavings, do not leave the rope on the floor to be stepped on, and please do not cut stock lengths of rope into custom sizes.

Span sets

You will find span set in two places in the tool room, the span sets on the ground floor is for carrying scenery only NEVER OVERHEAD LIFT with those span sets. The lifting slings are upstairs in the tool room and come in many sizes.

Trim chain

Trim chain is found in buckets in the tool room; please do not cut stock lengths of trim chain. The SWL of trim chain is 1200lbs.

Turnbuckles

Turnbuckle are mostly used by lighting in there booms. All turnbuckles must be moused off after instillation with zip ties or mouseing wire.