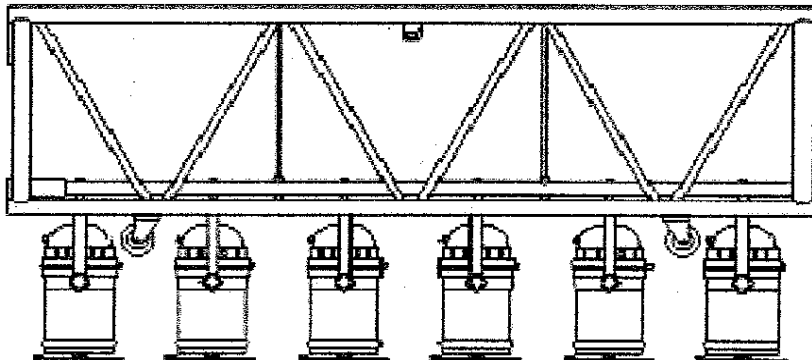
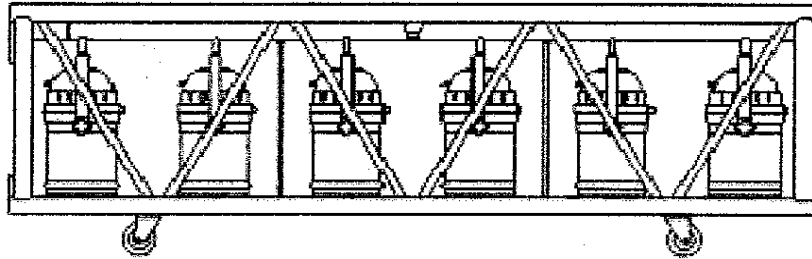


ARENA GROUND RIGGING PROCERURES



Arena Ground Rigging Procedures

Load in procedures

General Definitions & terms

Safety is No. 1 priority. Hard hats should be worn by all people working on the ground while the up riggers are in the air. A shackle dropped from 60 feet up will be traveling at approximately 50 mph. A 1 pound weight hitting someone at this speed will do a lot of damage.

Marking the Floor

The floor is generally marked by the show riggers. Someone is sometimes needed to assist in measuring off the points. Be available if needed.

If you have to mark the floor. Always start by determining the centerline of the building. Don't depend on the stage to be in the center of the room. In order for the hang to be symmetrical you need to reference everything to the centerline of the building.

Lighting Markers

Lighting points are generally marked with a circle.

Sound Markers

Sound points are generally marked with a square

Bridle Notation

See illustrations in the handout.

Notes

Arrange Boxes

Place boxes a per Show Rigger's Instructions or a convenient location.

This is usually in front of the stage, far enough down stage to be out of the way of sound and lights. If the show is traveling with their own stage the usual place is off the one side or the other. This allows the normal work of loading in a show to proceed without interruption.

Arena Ground Rigging Procedures

Open steel boxes and arrange contents as needed for efficient use of hardware. There may be burlap, ropes, spansets or other misc. items on top of the normal steel. Remove them and place them in a convenient place.

If there are different sets of steel for Sound & Lighting, make note of which boxes are which so that you can return the steel to the correct boxes during the load out.

Equipment definitions:

Motors

1 ton. This is the most common type. Primarily they are CM Lodestar chain hoists modified to run upside down. It has a single chain.

2 ton. This type is used most often on sound but may also be seen on some heavy lighting points. It has a pulley at the hook and a double chain. This is very heavy. Ground assistance is often needed to raise this type up in place.

1/2 ton. This type is a specialty motor. It is used occasionally on some lightweight lighting points, cable picks, or curtain trusses. It is often hung with the motor in the air. Heavy pull that may also need ground assistance.

Steel (Wire Rope) Length color codes

5' Red

10' White

20' Blue

30' Green

Arena Ground Rigging Procedures

Steel diameters

- 3/8" 12,000 to 14,000 lb capacity
- 1/2" 23,000 to 26,000 lb capacity

Shackles

5/8 General use shackle to be used in most cases.

3/4 Used mostly for sound points that require a 2 ton motor.

Short steel

This comes in 3/8" and 1/2" and are custom made and marked. In other words there are no standard markings for them.

K links

K-Links are 1 foot spansets that have been manufactured in a chain. Very handy for adjusting the length of a bridle leg in the air.

Deck Chain

Deck chains are a relatively new addition to most steel boxes. They come in 3 links per foot and 4 links per foot sizes. Their overall length varies from 3 ft. to 5 ft.

Burlap

Burlap bags are used to keep the sharp edges of the steel beams from cutting the wire rope of the bridle assembly. They are only used with wire rope baskets only, spanset baskets don't need burlap.

Spansets

Spansets are made from a single fiber of polyester that is wound in a loop and jacketed for protection from cutting. They come in a variety of sizes from 3 feet to 12 feet.

Arena Ground Rigging Procedures

Pear Rings

Pear Rings are used at the bottom of a bridle assembly that needs to carry a very heavy load and has a strong side pull. This will take the side stress off of a normal shackle. This piece of equipment isn't used often, but it will usually be seen on a sound rig.

Pickles

A "pickle" is an individual motor control switch. It allows a person to run the chain in or out on a single motor instead of having to rely on a master motor control. It is used mostly on the load out to run out the chains of the individual motors.

Block & Fall

A rope & pulley system used to pull up light loads such as cable picks and video screens. They usually are daisy chained, starting at the bottom.

Place Motor Boxes near marked hanging points

Pay attention to motor sizes. As covered above there are several different sizes of motors. The size needed is usually marked next to the hanging point on the floor. If there is no size marking you can assume that it is a 1 ton motor.

If the motor boxes have more than 1 motor in them, try to place the boxes between the marked points and drag the chain hook to the marked point. However if the show rigger needs it or you can't conveniently locate the box, you need to take the motor out of the box and place it next to the marked point.

Unless otherwise instructed leave chain bag with box.

The exception to this is if you take the motor out of the box. Then keep

Arena Ground Rigging Procedures

the chain bag with the motor.

Place hooks at the point, & don't cover the point with the motor.

The marked points must be visible from the air. Also watch that the stagehands don't cover the point with truss pieces.

Building the bridles & dead hangs.

Bridle terms and definitions:

Bridle

A bridle assembly is a way to position a chain at a point between the locations of the steel beams in the ceiling. See the illustrations in the handout to see how they look.

Standard 2 way

This is a bridle that has two legs that extend from the point where the chain hooks on, to the steel beams.

Hi Low

This is a bridle assembly that attaches to the steel beams at different heights. This is a rarely used assembly but you need know about it.

H Bridle

This is an assembly that is normally used to get around the scoreboard or similar obstructions.

Dead Hang

This assembly is made to hang straight down from the steel beam.

Basket

This is a short section of steel that is on the ends of the bridle or

Arena Ground Rigging Procedures

dead hang that is used to attach the assembly to the steel beam

Choke

This method of attaching the steel to the beam wraps the end of the assembly around the beam and pins back to itself.

Stinger

A Stinger is an extra piece of steel that hangs down from the assembly to extend the chain on the motors. Sometimes the motors may have a short chain and will need to be extended.

Always place the shackles so that the load is hanging directly on the pin.

This allows for any side loads on the shackle to be in the bell of the shackle.

Build bridles with the shortest pieces at the ends.

This is important in case the up riggers need to shorten the length of the bridle leg in the air.

Make baskets and attach to ends of bridle legs.

Attach chain to the bridle assembly at the correct point.

Place burlaps with the bridle assembly.

exception: no burlap required for a spanset basket.

Sending the Assembly up

For basket be sure rope is in correct position.

If the rope isn't tied on the load shackle opposite from the loose shackle, the up rigger won't be able to get his rope out after the basket is made and lowered in.

For choker leg use a Klien tool 5 or 6 ft. from end.

Arena Ground Rigging Procedures

This will allow the end of the leg to be wrapped around the beam and pinned back to itself.

Send the bridles up on the ropes.

Look up to see which end of the rope hanging down you should tie on. It should be on the side of the beam that is directly opposite the other beam that the bridle will be attached to. This is important when the up rigger's rope is very long.

Always use a bowline knot!

Make bowline loop about 3 feet long (about waist high) unless the end is to be attached under the catwalk. In that case use a 1 foot or shorter loop. This allows the rope to be pulled through the grid of the catwalk floor.

Leave about a 6 in. tail to give the up rigger a handy handle and to prevent the end from working its way back through the knot.

Tie the bowline in the bell of the load shackle on the side opposite the loose shackle.

After tying the bowline raise the loop and wait for the up rigger to take up the slack. This prevents the rope from jumping across the basket eye. If the up rigger doesn't take up the slack, let him know about it.

Stuff the burlap in the loop.

Check the bridle unit as it goes up to make sure there are no twisted shackles or kinks in the steel.

Always check your work. It is quite difficult to change some things out upstairs sometimes.

Arena Ground Rigging Procedures

Look at the assembly as it is being raised. Check for twisted shackles, kinks in the cable, hook seated properly, and any other thing that may not seem right. Stop the assembly from being raised and correct the problem before it is raised.

Although the ground rigger has a lot of duties, he should keep a constant check on the location of the up riggers. Look for the ropes and other clues as to where they are and what they need.

Pack away the steel boxes & motor boxes.

Show riggers will usually direct this operation

If you have to decide yourself, look for a location that will be easily accessible after the show ends.

Load out procedures

Return boxes to previous locations

Run the motors into their boxes

Usually use the "Pickles" to run the motors into their boxes.

Run out chain until the limit switch shuts off the motor, then back it up 6 inches to a foot. This prevents the limit switch from cycling as it bumps down the road in the truck. This also insures that the maximum chain length is available for the next show.

Detach chain bag from motor and keep close by.

When up riggers go up be alert!

Watch for locations of the ropes.

Look for the "basket" steel hanging loose to cue you when a point is ready to come in.

Arena Ground Rigging Procedures

Again, although the ground rigger has many duties, always keep an eye on where the up riggers are and what they are doing.

Assist with lowering the assembly to the floor.

As chain comes in feed it into boxes and unhook it from the bridle.

Breast the bridle away from stagehands as it is lowered the remaining distance to the floor.

Untie the bowline knot from each end of the bridle.

Announce loudly to the up rigger that the rope is clear after being untied.

Drag bridle to main steel boxes for disassembly.

Pack motor boxes.

When motor box has all motors and chains loaded, place chain bag inside, close and latch the lid.

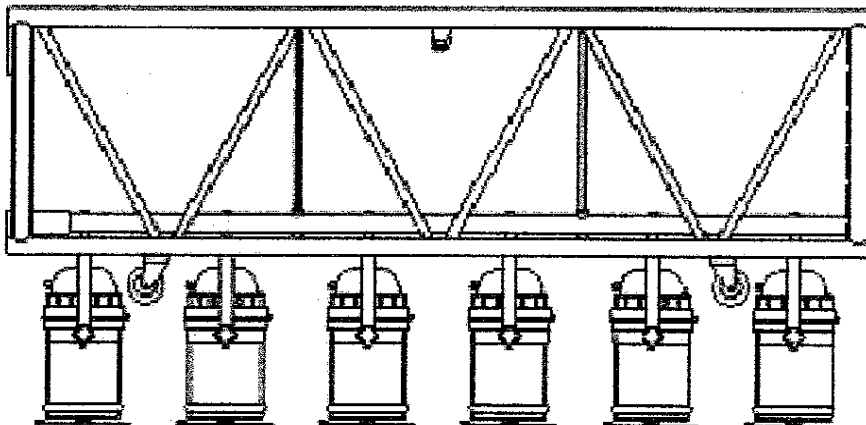
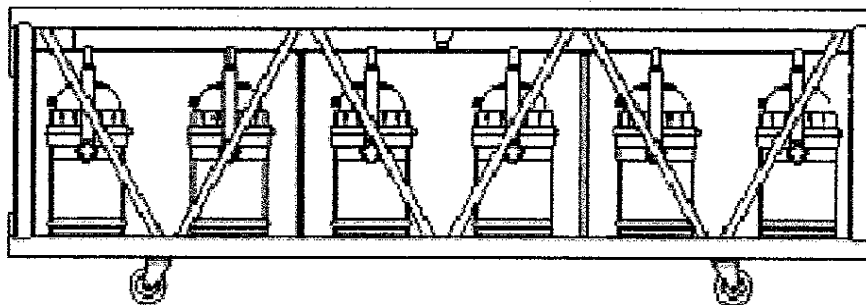
Pickup burlap bags and return them to their boxes.

Finish disassembly of all the wire rope assemblies and return all the components to the correct boxes.

Teamwork is important!

If enough ground people are available, it is often useful to split up some people to lower the points in, and others to break apart the assemblies. The main priority is to get the stuff on the ground. The up riggers will assist in breaking the remainder of the assemblies apart when they come down if necessary.

ARENA UP RIGGING PROCERURES



Arena Up Rigging Procedures

General requirements

All up riggers should show up for work with the following items.

1. Rope

It should be long enough to reach the floor from the beams plus 15 to 20 ft. This will allow enough extra to tie the bowline on one end and have enough extra tail on the other end to avoid dropping it.

2. Safety Harness

A rock climbing harness or a full safety harness are acceptable. The climbing harness is nice because it usually has loops to clip things onto.

3. Lanyard or webbing

A sewn safety lanyard that will gradually pull out during a fall is probably the best, but 1" flat or tubular webbing that you get at a climbing shop will work. A 13 ft. piece tied together with a secure knot will work nicely with the fall arresting systems in Roanoke & Salem.

Optional things:

1. Klein tool

This is also known as a bulldog grip and probably several other names. It is used to attach the rope directly to the bridle leg that is to be choked around the beam.

2. prusik loops

This is a loop of 5.5 mm nylon or spectra climbing rope. It can be used to tie a prusik knot around the wire rope. It serves the same function as the Klien tool, but is a lot lighter. It is very handy when it is necessary to take a section out of a leg while in the air.

3. extra carabiners

These can be aluminum climbing carabiners or steel industrial use carabiners. They are very handy to clip things to when extra things are sent up to you.

Arena Up Rigging Procedures

4. small wrench or spike

This is used to free up stuck shackle pins. Most shackles have a hole in the end of the pin that you can stick something in to turn it. The tool you use can be anything that will fit into this hole. For safety reasons be sure that you have a way of attaching the tool to yourself so that it cannot be dropped.

5. pulley and spanset

An aluminum pulley and a locking carabiner from a climbing shop is nice and light and will always do the job. A 3 ft. spanset is needed to attach the pulley to a support above the main beams. This allows the ground riggers to assist in pulling up very heavy loads from the ground.

General do's and don'ts

1. Relax but remain alert.

If you are not relaxed while you are working you tend to overcompensate, and are generally unable to think clearly. This particularly important will working without a fall arresting system. It is much harder to maintain your balance while you are all tensed up. Always try to breathe deeply and keep your muscles relaxed as much as possible.

Being alert is also important. Always pay strict attention to the shackle pin when you remove it from or replace it to a shackle. This is the most dangerous moment while making or breaking a basket. It is the time of greatest risk of dropping something on someone below.

Being aware of all that is going on around you can save you a lot of time and energy as well as insuring a safe rig.

2. Working without a fall arresting system

1. If no fall arresting system is in place always go to and upright to turn

Arena Up Rigging Procedures

around. Maintaining your balance is much more difficult in this situation.

2. Always take the time to center yourself on the beam before you begin walking. Other techniques such as focusing on the beams to give you a stable visual reference can also be helpful. In short, whatever works for you to maintain your balance, do it.

3. Try to keep an eye on your partner when pulling up a bridle so that you can pull together. This will keep the chain from shaking back and forth and throwing you both off balance.

4. If you feel yourself being pulled to the side too hard by a flat bridle, stop, break the rope over the beam, kneel down and slowly pull it to you.

5. Walk the bottom lip of the small steel "I" beams. This will give you a better way to balance yourself as you move across these beams.

6. Take your time. Don't rush yourself and end up falling or dropping something.

3. Avoid dragging rope over the top of the beams.

The rope has a tendency to get snagged in the joints where the beams are bolted together. This can result in an annoying trip to free it up, or your losing your balance as you try to free it up by pulling hard on it. A better strategy is to flip the rope under the beams as you move along. This will avoid rope snags and also will always be hanging down from your present position. This way the ground riggers always know where you are located.

4. Be aware of the hook alignment so that you don't hook the previous bridle with the one you are pulling up.

Arena Up Rigging Procedures

When points are closely spaced or are inline with each other this may happen. To prevent it be sure that the ground rigger orients the hook so that this can't happen before you pull it up.

- 5. Try to look ahead to anticipate the best order to bring up or to lower in the next point.**

The main considerations here are avoiding crossing the legs of different sets of bridles and avoiding having to step over too many burlap bags.

Arena Up Rigging Procedures

Load in procedures

Assist ground and show riggers in laying out the floor and any other tasks that may be needed.

For some shows the show riggers do all the marking of the floor. On other shows you may have to figure everything out yourself. You never know. Just make yourself available when the load in starts.

Suit up before going up.

If you get into your harness and gather your gear before going up there is less chance of you leaving something behind and also less chance of dropping something while in the air. This is also a good time to make sure that you aren't carrying up something that may fall. Such as keys, loose change or maglights.

Clip onto fall arresting system before stepping out.

If a fall arresting system is available, use it all the time. It only take one misstep to produce a tragedy.

Lower rope in near the point to be pulled up.

This will alert the ground rigger that a point is ready to be pulled up.

Watch the ground rigger.

Be sure that the correct bridle is being tied on for the point that you wish to pull up. Sometimes the points are marked close together and it may not be clear to the ground rigger which point that you need next. You can also alert them if a bridle has been laid out backwards. These things save you time, energy, and aggravation if you can catch them while the assembly is still on the ground. on.

Once the bowline has been tied raise the rope so that the basket doesn't touch the floor. This prevents the rope from jumping over to the wrong place and causing a lot of trouble for you once you have it up.

Arena Up Rigging Procedures

Once the burlap has been stuffed into the bowline loop it is ready to be pulled up.

Work in sync with your partner on the other beam.

As mentioned before, pulling together with your partner will prevent the chain from shaking back and forth too hard. We tend to forget this point after working on a fall arresting system for a while. Then when we get with a lesser experienced rigger without a protection system, they can feel pretty nervous about pulling up the bridles.

Use your legs to lift heavy loads.

To avoid back injury and overtaxing your arms, use your legs to pull up the cable assembly. Especially when pulling up a dead hang.

Don't get in a hurry.

The rig will generally go a lot faster, and surely a lot safer if everyone takes the time to work together.

When the end of the bridle has been pulled up, kneel down and break the rope across the beam.

This will provide enough friction to enable you to easily hold your end of the bridle while preparing to connect it to the beam. If a bridle is very flat you or your partner may need to hold one side away from the beam while the other connects their end.

Either stand in the loop or use your knee to hold the rope in place.

This is to free both hands to connect the basket to the beam. The knee technique is fine for inverted "T" beams, but the foot in the loop usually works better for other types of beams.

Position the burlap out of the way but close at hand.

Arena Up Rigging Procedures

Remove the burlap from the loop, fold it and lay it out of your way while you makeup the basket. This is usually in front of you on the beam, far enough to be out of the way but easily reached once the basket has been made.

Wrap basket around the beam.

Which way you pull the basket over the beam is usually determined by which way the loose shackle lays. If it is on top it is best to bring it under the beam and connect it. If it is hanging down it is better to bring in over the beam and connect it.

Connect the basket to the beam.

In performing this operation you need to have control of the end of the basket and the bell of the loose shackle and well as the pin. This is the time that the most concentration is required. Don't allow anything else to distract you.

Place burlap and position basket over it.

While you have tension off the basket, move the burlap into place and lower the basket onto the bag. Making sure that a part of the burlap is between the basket and beam at all stress points.

Check your work and correct any problems.

Look for:

1. Twisted connecting shackle.
2. Burlap under the stress points
3. Anything else that doesn't seem right.

Slide the basket and burlap into place.

Arena Up Rigging Procedures

Slide either or both ends until the chain is hanging over the marked point on the floor. Wait for someone on the ground to check it and approve the location.

If a change needs to be made don't hesitate to ask for help.

Some changes can easily be made by one experienced person, but an inexperienced rigger should not hesitate to ask for help in changing out something. Again, safety first!

Take a quick look around after everything is up to make sure everything is hanging properly.

Check again for anything twisted or not made up correctly. There will be a lot of people under a lot of heavy stuff. So always double check your work.

Be sure to check with a persons in charge that everything has been pulled up and meets with their approval before coming down.

There is often sound and lighting guys as well as the show riggers that have to check off on the installation.

Special procedures:

Dead Hangs

This assembly only requires one person to pull up and connect. It will be heavier than a bridle, so be sure to use your legs especially at the top of the pull.

2 ton motors

This is a very heavy pull since you have double the amount of chain and a heavy block connected to the hook. It often is necessary to rig up a pulley on a bracing beam as high as possible, so that the ground riggers can assist in pulling up the assembly. Be sure that the ground riggers know to

Arena Up Rigging Procedures

use a short (1 ft.) bowline when they tie an end on that will be using a pulley. This allows the end to be raised high enough to connect the basket. Also quite often the person on the other side of a bridle will need to not bring up their end all the way until the heavy end has been connected. The angle may be too great to allow connection otherwise.

choker legs

The ground rigger needs to connect the rope to the bridle leg with a Klein tool or other device, about 5 or 6 feet from the end of the leg. The exception to this is if there is a 5 ft. section at the end of the leg then it can be tied through a shackle and still be close enough to untie and lower in. Make sure that the pin of the connecting shackle is made up so that it is in contact with the leg and not the eye in the end of the cable. This isn't important load wise but is a little insurance against making a mistake on the load out.

under catwalk points.

These points usually are done with 2 people. One under the catwalk to connect the basket and position the point, and another on the catwalk to pull the cable assembly up. Be sure the ground rigger knows that a short bowline is needed.

Split 10 ft. basket across 2 closely spaced beams.

This is a special rig that is used in several places under the catwalk at the Roanoke Civic Center Coliseum. It requires that the bowline be tied in the shackle at the center. It also requires 2 burlap bags.

Load out procedures.

General considerations.

Arena Up Rigging Procedures

These are much the same as for the load in. If possible help the ground riggers find and position the motor and steel boxes. Be sure to suit up before going up. Be sure to clip into the fall arresting system before stepping out onto the beam.

Generally go to the farthest offstage point and work your way back.

Tie bowline into the load shackle of the basket.

If it isn't tied here the basket cannot be disconnected.

Tie the bowline long enough so that you can comfortably stand in the loop if you plan to use this method to hold the end while you disconnect the basket. Also remember to leave a 6 in. tail at the knot. This will be handy to pull the knot over the beam when you lower the assembly to the ground. It also prevents the end of the rope from working its way back through the knot.

Pull up bridle to take the load off the basket and break the rope over the steel.

Disconnect the basket from the load shackle.

Use the same precautions that were used during this step during the load in. Also be aware that as you remove the pin from the connecting shackle the end of the basket may jump out and may knock the pin from your hand. So be very careful to control the pin and shackle.

Replace the pin and pass the basket over the beam so that it hangs down. This should be an indication to the ground rigger that the assembly is ready to be lowered in.

If a choke has been made be sure that the pin has been made back into the eye of the cable.

Once the ground rigger is in place, lower the assembly to the ground.

It may be helpful to wrap the rope with the burlap before you lower the

Arena Up Rigging Procedures

assembly. This will keep your hands from being burned by the rope. 1 ton motor bridles may not need this technique, but for 2 ton and dead hangs it is very handy.

Don't lower the chain too fast for the ground rigger to keep up with. It doesn't save any time to zip it down to the ground. You usually spend more time waiting on the ground rigger to pick up the spilled chain and feed it back into the box. So take it easy.

Stop when bottom of the bridle is at the ground rigger so the chain can be unhooked from the bridle and placed in the motor box.

After the hook is in the box lower the bridle on to the ground, being careful not to hit any stagehands.

Wait for ground rigger to untie the rope.

Toss the burlap bag to the floor.

Move onto the next point.

Continue until all points have been lowered in.

Special Procedures:

Chokes

Unless you have a 5 ft. piece of cable connected as a choke, then you will need to attach the rope directly to the cable in order to free it. A Klein Tool or a prusik knot are needed here.

2 tons

These can be disconnected and lowered in the same as a 1 ton assembly, but use extra caution to insure that you don't burn your hands with the rope.

Arena Up Rigging Procedures

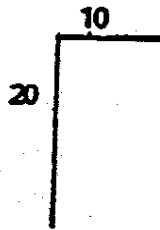
Split 10 ft. baskets

One person can disconnect this and lower it in. Position yourself on the beam that is on the same side as the pin in the top shackle. Pass the rope through the eye of the cable that the bell of the shackle has been passed through. Tie the bowline and pull the shackle to you. This will take the load off of the pin. Carefully remove the pin and disconnect the cable. Replace the pin, and throw the loose end over the side of the beam. The assembly is now ready to be lowered to the ground.

When laying out Bridle legs be sure you put on stage length on the on stage side or the up stage on the up stage.

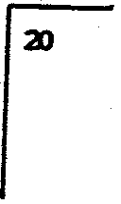
Choke with a down leg

Given a 10 foot choke and a 20 foot down leg would look like this.



Choke - straight

A straight choke is a choke made with a single sling and a 20 foot would look like this.

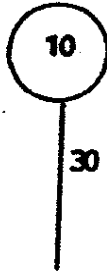
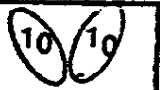


Basket with a down leg

Given a 10 foot basket and a 30 foot down leg

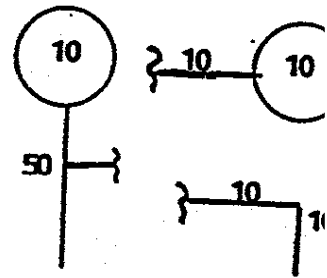
This may appear with no down leg.

A double basket given two ten foot cables looks like this.



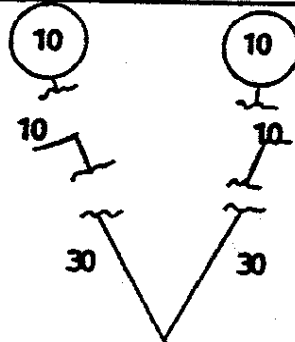
Sliding Breast

Given a ten basket a fifty down leg and a ten slider with a ten basket or choke.

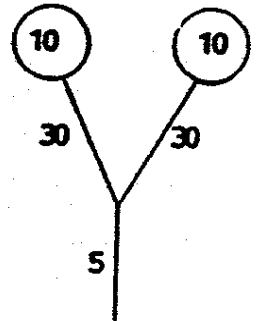


Bridle

ten 10 foot basket or choke and 30 foot legs.

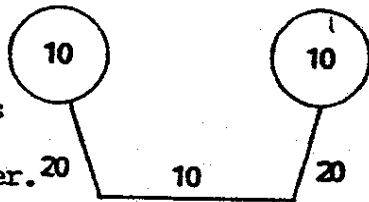


Bridle with stinger
Given ten foot baskets thirty foot legs and a five foot stinger.



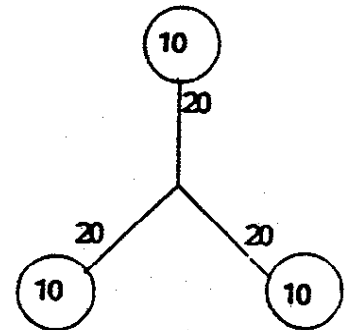
Basic H Bridle

Given ten foot baskets twenty foot down legs and a ten foot spreader.



Multi Leg Bridle

Given ten foot baskets and twenty foot legs.



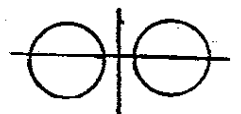
Center Line

This is the symbol that is used to divide the stage into left and right halves.



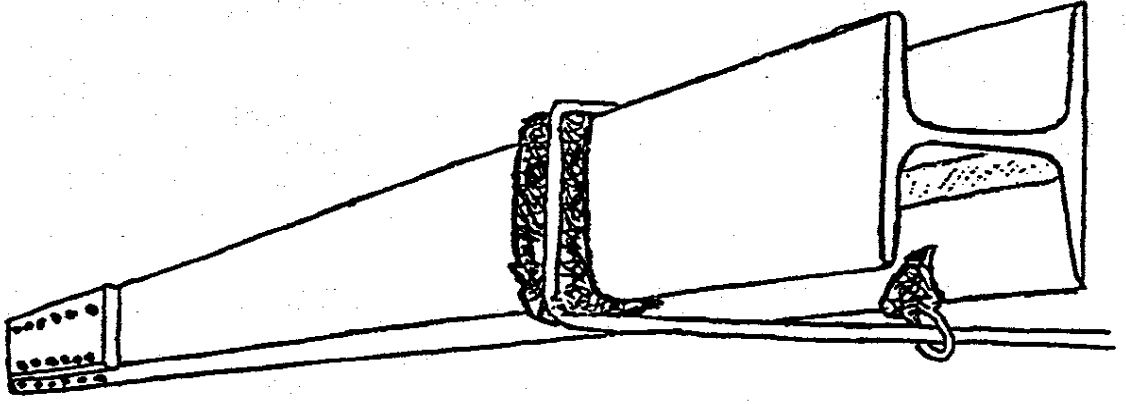
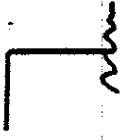
Zero Zero

This is the symbol for the spot where all measurements start.

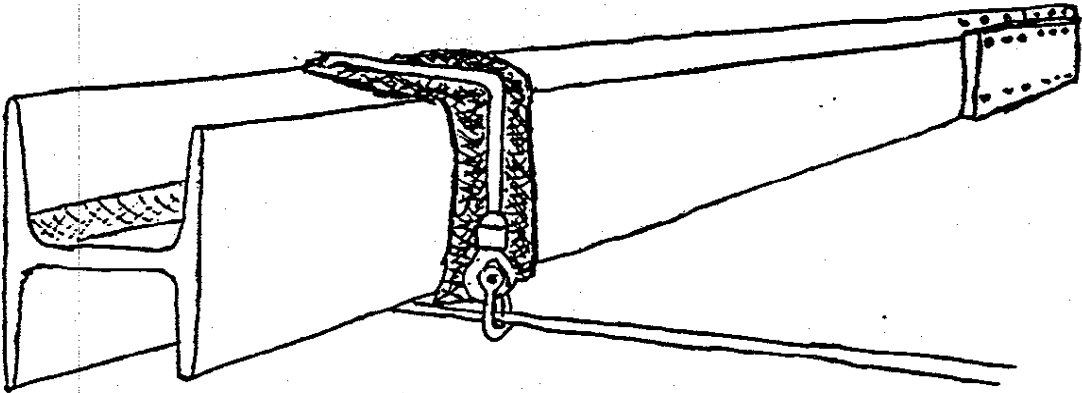
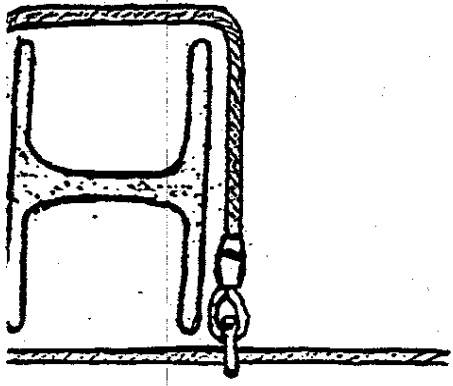


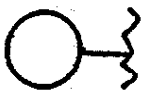


CHOKER HITCH

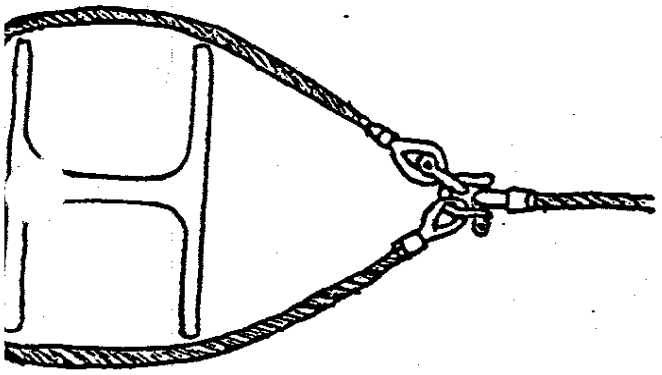
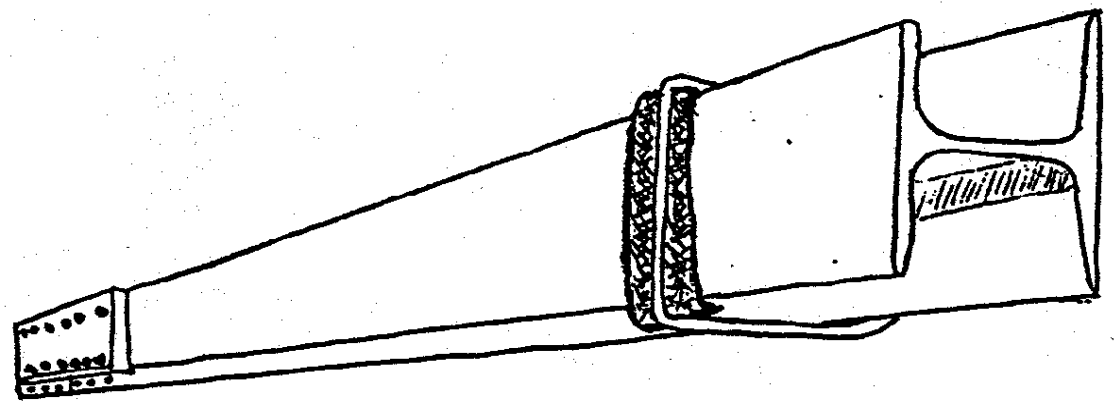


NOTE: Bag all sides touching beam.
Remember to set this hitch.
WARNING!! Never let the pin ride
on the leg, as pin roll
out could occur.

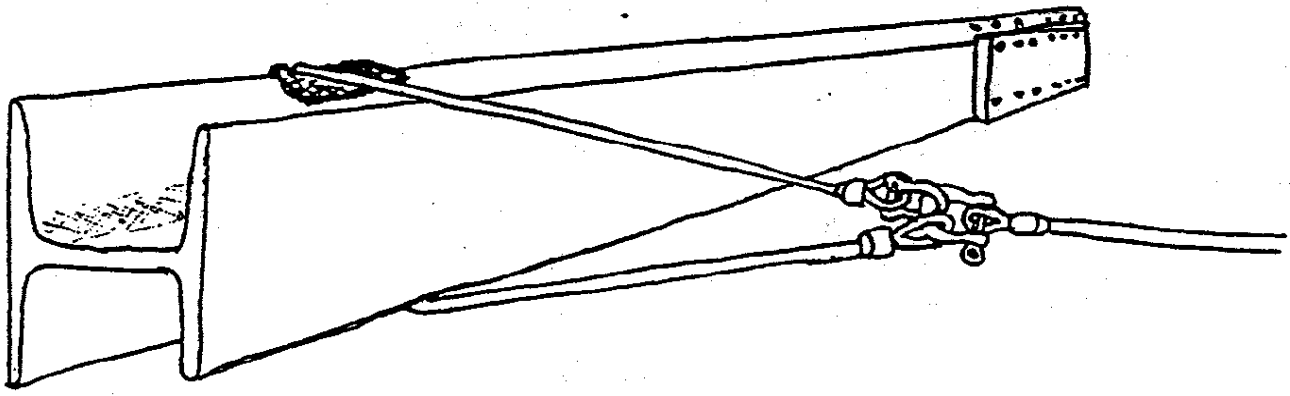




BASKET HITCH

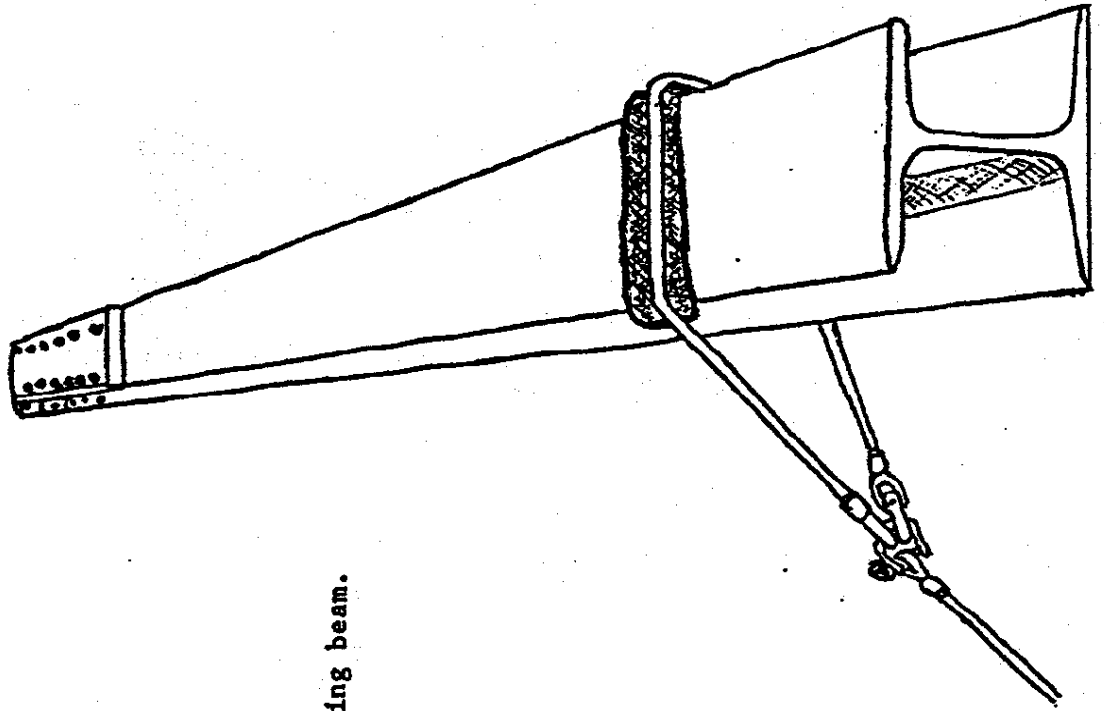


NOTE: Bag the beam.
Always put the spare shackle
opposite of the pin side.

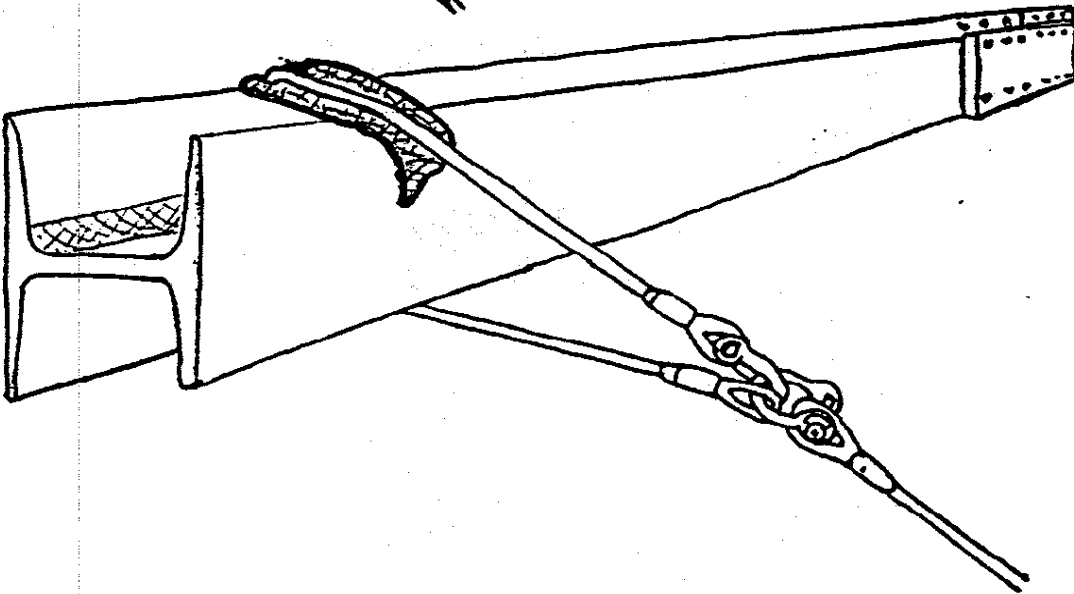
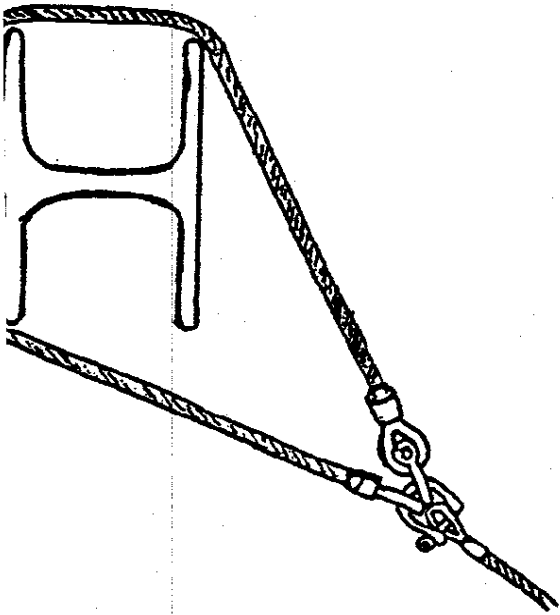




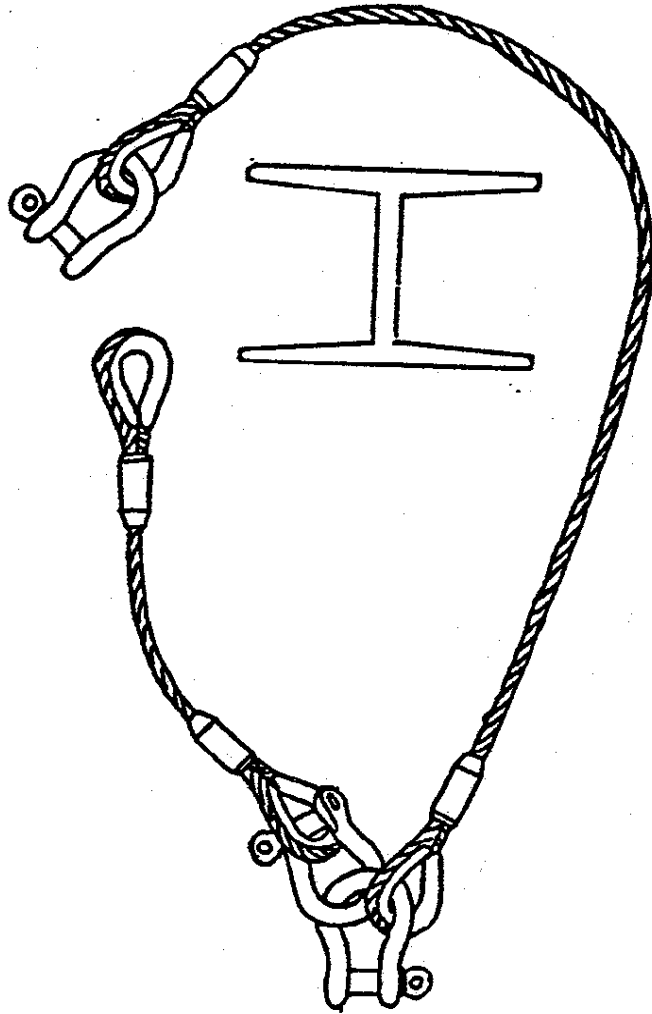
BASKET HITCH on a BRIDLE

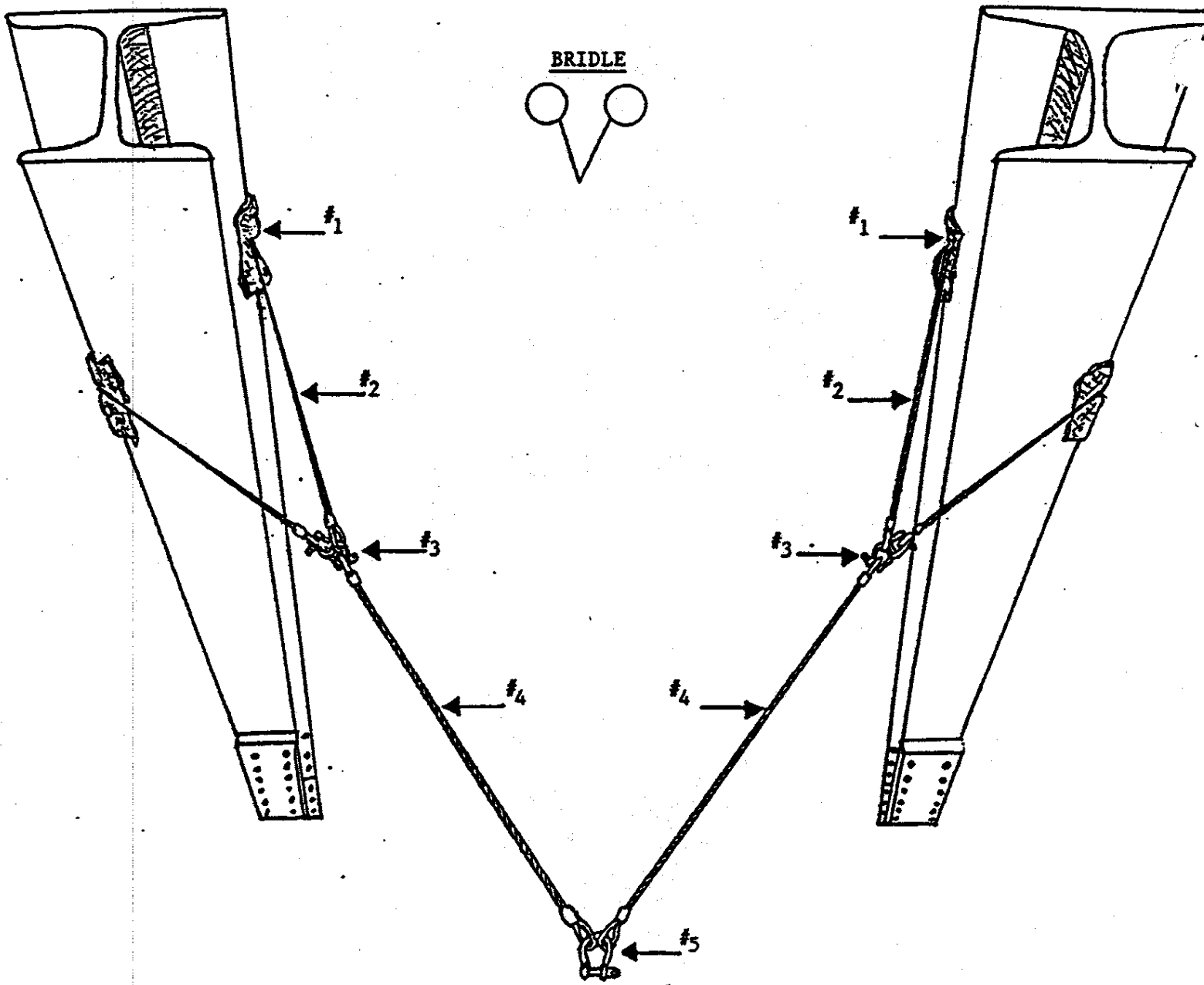


NOTE: Bag all sides touching beam.



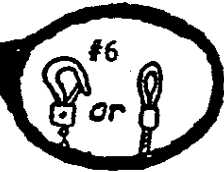
SPLIT BASKET

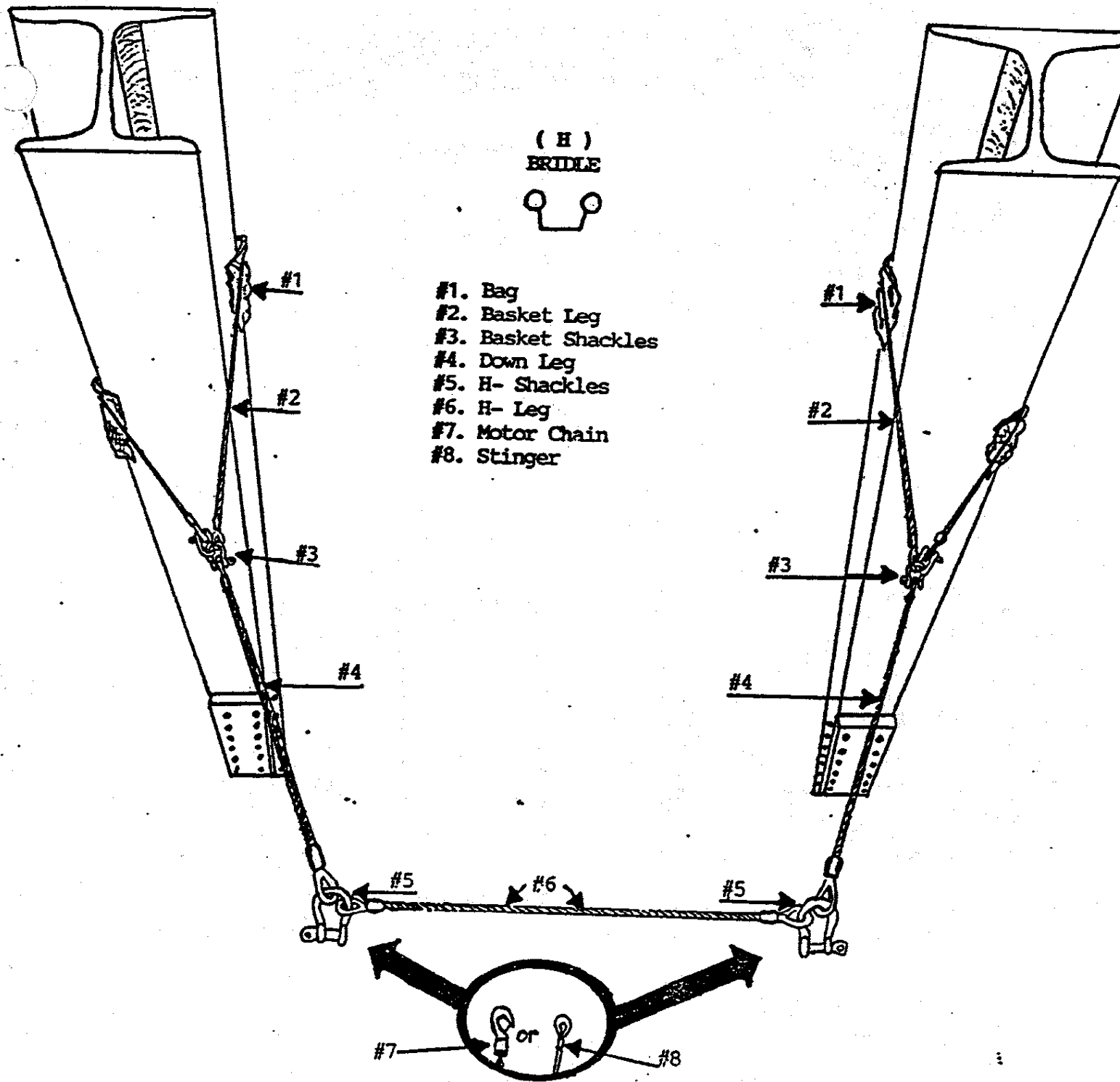




BRIDLE

- #1. Bag
- #2. Basket Leg
- #3. Basket Shackles
- #4. Down Leg
- #5. Bridle or Hook Shackle
- #6. Motor Hook or Stinger



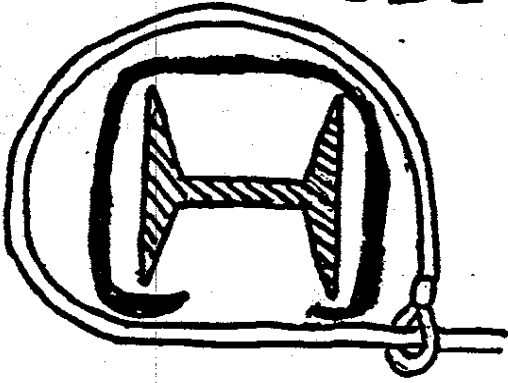


Note: May be (H)ed above or below motor's.

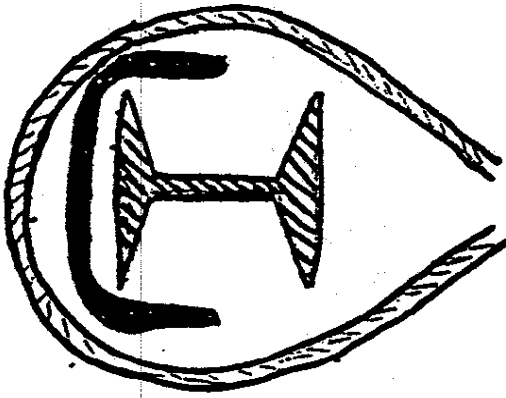
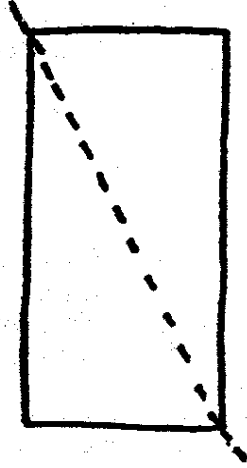
WARNING: The load being lifted must be evenly distributed.
Both motors must lift on the same piece at the same time.
The weight of a man walking on the load is enough to cause
the load to SEE/SAW.



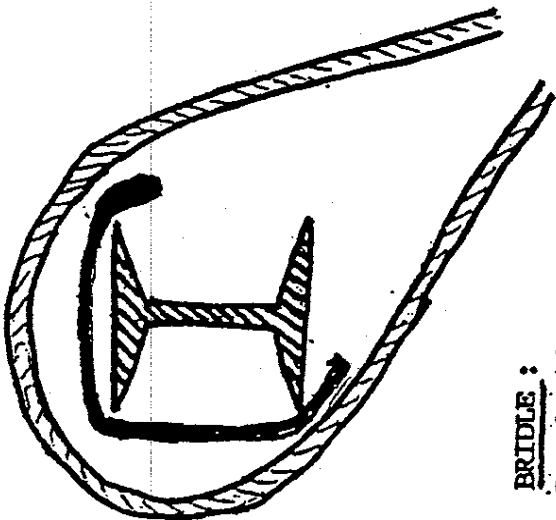
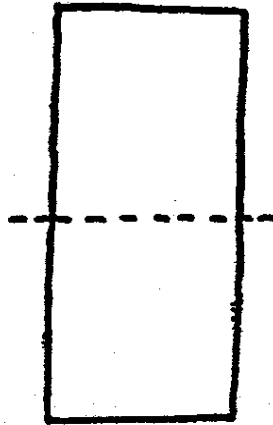
BAGGING



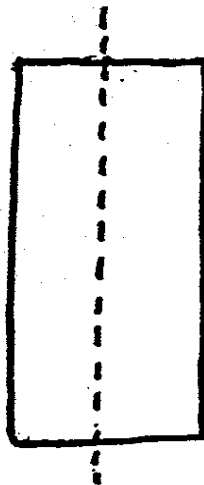
CHOKER :
Bag 4 sides
of beam.



DEAD-HANG :
Bag 2 sides of beam



BRIDLE :
Bag 3 sides
of beam.

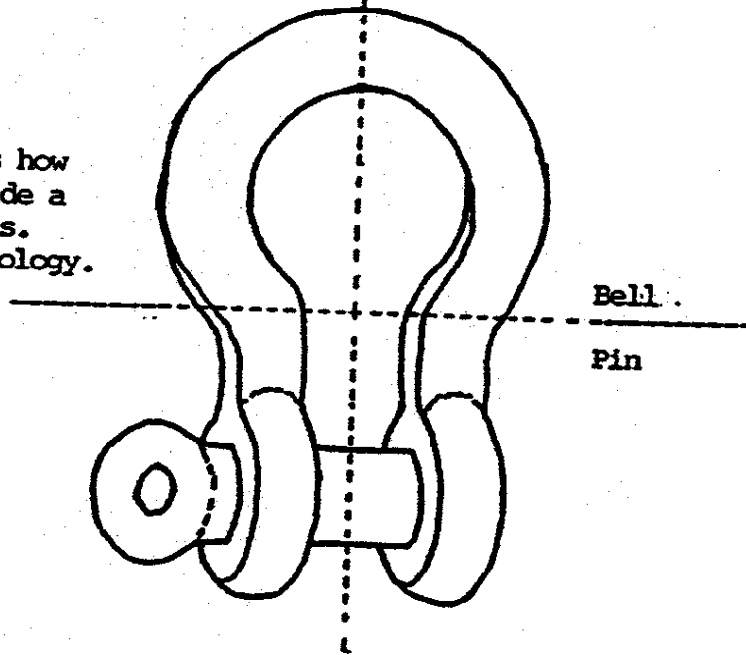


Fold bag at the least 2 times,
The general idea is to get as much bag
under the cable as possible. This helps
to prevent damage to the cable and the
building structure.



Pin Side | Side Opposite Pin

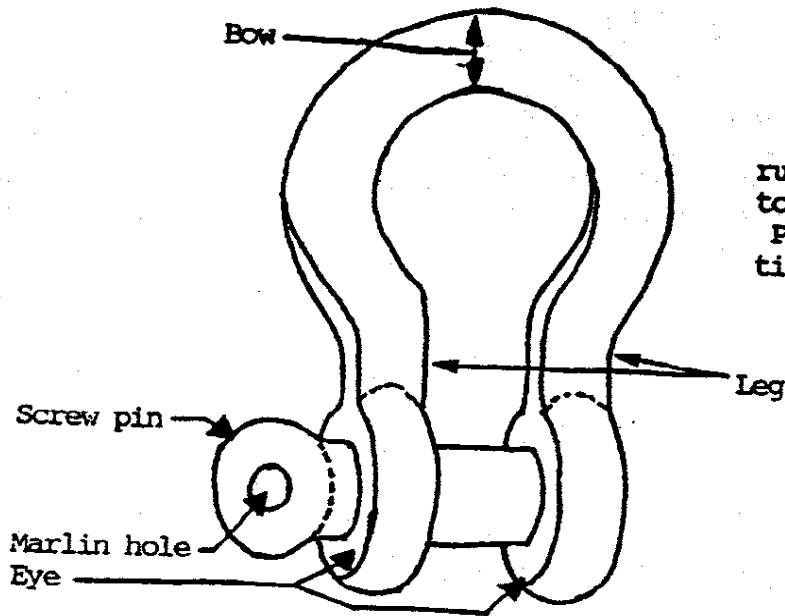
The top picture is how most Riggers divide a shackle into parts.
Note: Slang terminology.



Down Shackle

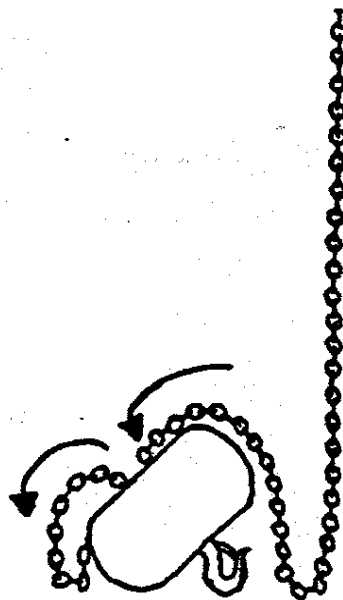


Upset Shackle



NOTE: The general rule of thumb is pins go towards motor.
Pins should be finger tight at the least.





(1)
fig.

When running chain up it is helpful to lay the motor on its side so that the dead end of the chain is on the lower side next to the floor. The chain on the opposite side that is being run into the motor should be stretched out away from the motor so that it feeds in a straight line across the floor towards the motor.

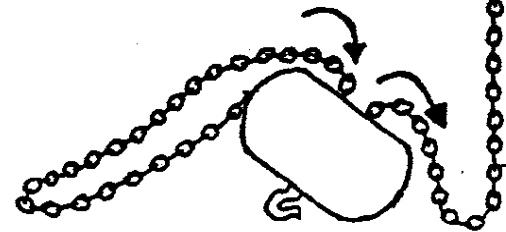
(see figure 1.)

When running chain out it is helpful to lay the motor on its side so that the dead end of the chain side is on the up side with the chain outstretched.

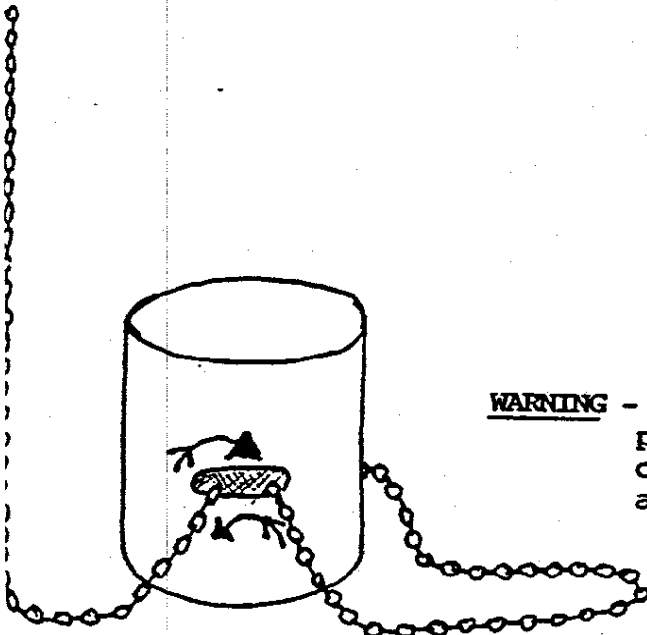
(see figure 2)

Always watch the chain running into the motor and do not allow slack links that may become lodged to enter the motor.

When running motor out, DO NOT run the chain out to the limit and leave it, always leave at least two and a half to three foot of chain on the dead end side. This will prevent the limit switch from cycling due to vibration from trucking. It will also allow time so as to allow to check that the motor is running in the proper phase direction.



(2)
fig.



WARNING - Never operate or store motor's in this position.; Motor may tip over and bust casing. Lubricant may also leak onto brake system causing slippage.



Fig. 2.35 Bowline

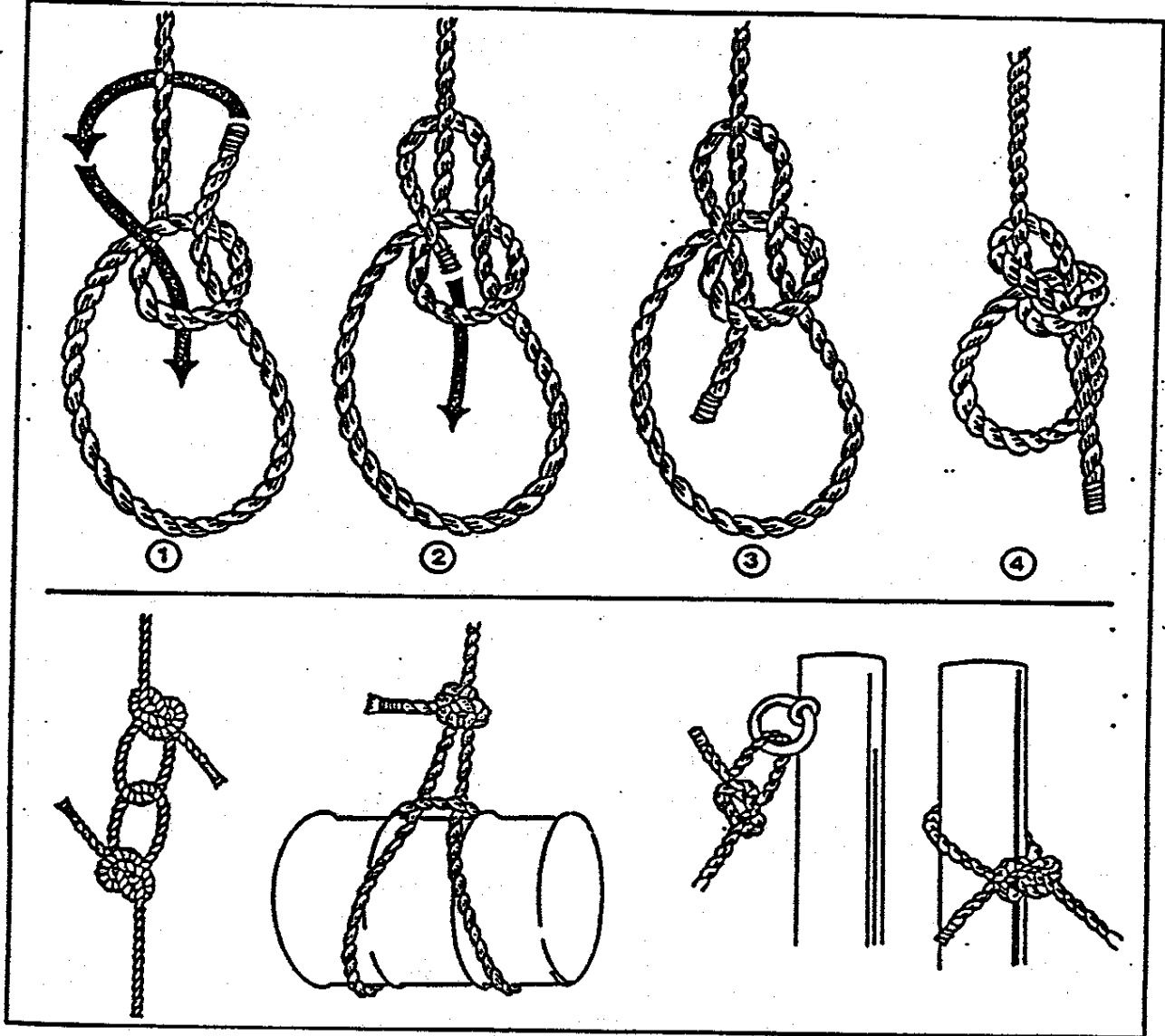
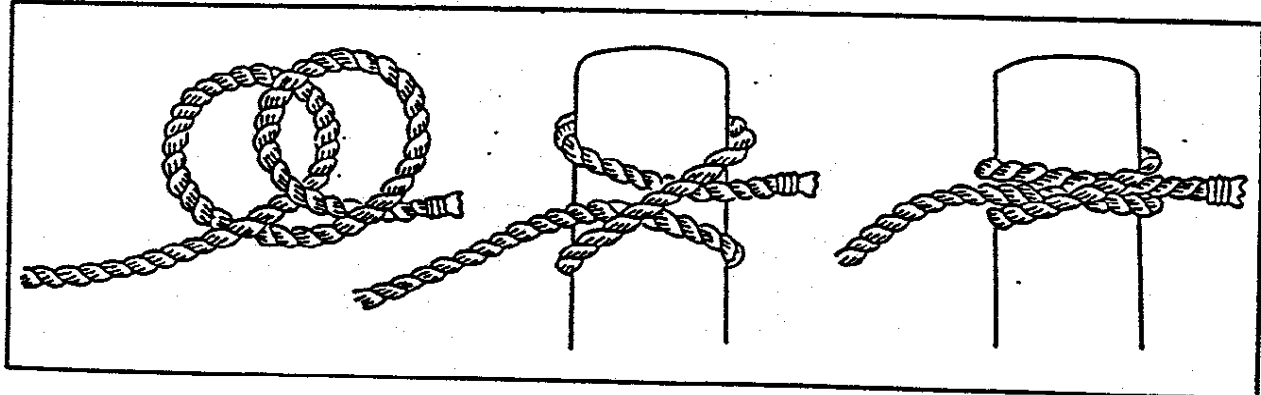


Fig. 2.42 Clove Hitch



WEIGHTS OF THINGS

Since it is imperative that the rigger know the weight of the system he is flying, the following is a list of commonly used objects and their approximate weights. Since the manufacturer may at anytime re-design these objects, this section should not be taken as gospel. Also there may be some variation in weight for the same object depending on the manufacturer of the object. Unless otherwise noted all weights are extracted from manufacturer or trade journals.

Rigging Materials

Wire Rope (7 X 19 or 6 X 19 IWRC)	
1/4"	.11 lb. / ft.
3/8"	.243 lb. / ft.
1/2"	.46 lb. / ft.

3/8" Slings (PG Thimble eye both ends)	
5'	2.2 lb.*
10'	3.4 lb.*
20'	5.7 lb.*
30'	8 lb.*
50'	12.6 lb.*

1/2" Slings (PG Thimble eye both ends)	
5'	4.4 lb.*
10'	7 lb.*
20'	10.8 lb.*
30'	15.2 lb.*
50'	25.5 lb.*

* Weighed in groups of 10 to arrive at unit weights

Shackles (Screw pin anchor)	
1/2"	.63 lb.
5/8"	1.38 lb.
3/4"	2.25 lb.

CM Lodestar	
Mod F	62 lb.
Mod L	98 lb.
Mod LL	105 lb.
Mod R	110 lb.
Mod RR	112 lb.
1/4" Chain	.6 lb. / ft.
5/16" Chain	.8 lb. / ft.

Pipes, Beams, Trusses

Steel Pipe (Schedule 40)	
1 1/4"	2.28 lb. / ft.
1 1/2"	2.72 lb. / ft.
Aluminum Pipe (Schedule 40)	
1 1/2"	.94 lb. / ft.

Aluminum Pipe (Schedule 80)	
1 1/2"	1.26 lb. / ft.

FM Productions

30" Box	7.9 lb. / ft.*
w/ PARS	14.7 lb. / ft.*

* Verbal weights from manufacturer

Rohn Truss

25G (12")	4.0 lb. / ft.
45G	7.0 lb. / ft.
55G	9.5 lb. / ft.

Slick Systems

Lite Beam	2.35 lb. / ft.
Mini Beam	6.33 lb. / ft.
Maxi Beam	8.94 lb. / ft.
Maxi Beam pre-rigged	
unloaded	11.46 lb / ft
Mk 6 Triang.	9.22 lb / ft

Thomas

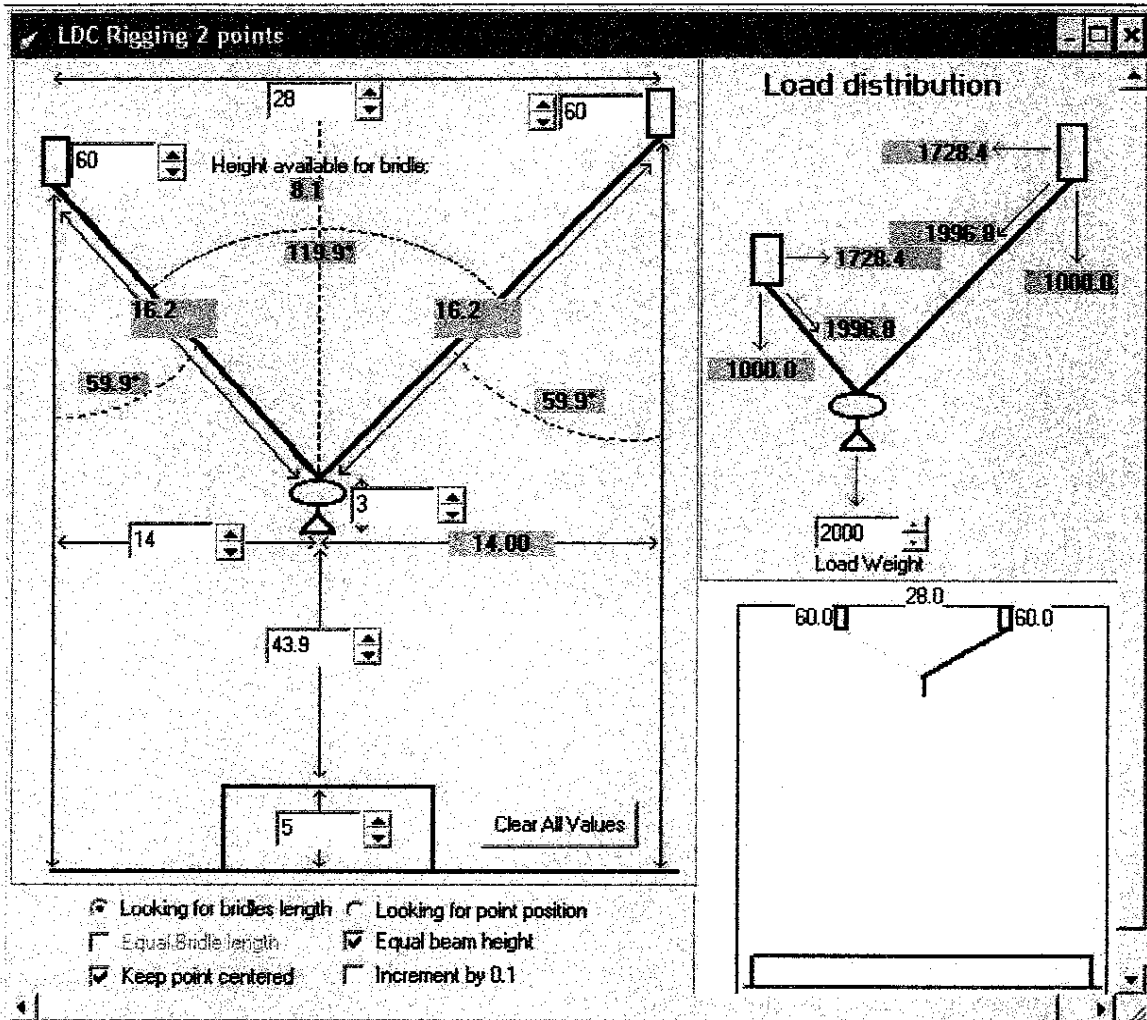
8 X 8"	1.23 lb. / ft.
12 X 12"	5.5 lb. / ft.
18 X 12"	6.16 lb. / ft.
20.5 X 20.5"	8.8 lb / ft
23" triang.	6.6 lb / ft
30 X 26" pre-rigged	
unloaded	14.74 lb / ft
loaded	27.94 lb / ft

Roanoke

60 feet to steel

28 feet truss to truss

1000 lbs per stick small steel



Salem

46 feet to steel

32 feet truss to truss

No sideways rigging ! Cable Picks only ! on lateral braces ! NO SOUND !!!

